

User guide

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12 User Guide. Introduction

On the page:

- General Information(see page 72)
- Purpose of the Document(see page 72)
- Purpose and functionality of Axxon One(see page 73)

12.1 General Information

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The *Axxon One* trademark is the property of AxxonSoft. All other trademarks included in this document are the property of their respective owners.
All information contained in this document is current as of the publication date. AxxonSoft reserves the right to change or update this document without the prior notification of or to any third party.

12.2 Purpose of the Document

User guide(see page 45) contains the information necessary for building, implementing, and operating a security system based on *Axxon One*.
User guide(see page 45) contains a detailed description of the process of installing, configuring and working with *Axxon One*, using Windows users as an example. For the features of installing and configuring *Axxon One* in Linux OS, see Linux OS Administrator's guide[1].
The structure of this document enables the user to get acquainted with the software package and then, depending on the user's level of training, choose sections of interest for a more detailed study. The sections in this guide, whether they are informative or serve as a reference, have their own internal structure.
Introduction(see page 72) and Description of Axxon One(see page 77) are intended to generally acquaint the user with the technical features and functionality of *Axxon One*, as well as with the key stages of building a security system based on the software package.
Recommendations to the user/administrator for installing the software and configuring hardware are presented in detail in Installing Axxon One(see page 97). Licensing of the software product(see page 128) contains manuals on how to register a license to use *Axxon One*.
Startup and shutdown of the software package are described in Starting and stopping Axxon One software(see page 137).
Configuration of Axxon One(see page 148) presents step-by-step instructions on configuring user-specific settings and activating the required functionality. This information is useful for system administrators as well as for operators with permissions to manage system settings.
Recommendations on configuring the user interface, working in various video surveillance modes, and utilizing the functional capabilities of *Axxon One* are presented in Working with Axxon One(see page 1109).
Axxon One utilities(see page 1378) contains a description of additional software utilities employed when working with the software package.
Appendices(see page 1426) contains a glossary of the product's basic terms and definitions. It also lists all known issues that you may encounter while using *Axxon One*.

1 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/260926669/Linux+OS+Administrator+s+guide

12.3 Purpose and functionality of Axxon One

Axxon One is a video and security system management software (VMS) platform that combines neural network video analytics, search in archive, a user-friendly interface, and the ability to integrate with external access control, alarm and perimeter security systems.

Security systems based on *Axxon One* range from home security systems (for an apartment or a house) to professional large-scale distributed security systems for businesses of any size (car service centers, shops, factories, airports, government offices, and so on).

Video and audio surveillance of protected facilities, video analytics, and rapid response to suspicious situations without operator involvement, and storage and export of obtained data are just a few of *Axxon One*'s many functions.



We constantly expand the functionality of *Axxon One* by adding new capabilities in response to customer requests and incorporate the latest developments in AI and video analytics.

13 Software lifecycle policy

On the page:

- Software Lifecycle Phases(see page 74)
- Software Technical Support(see page 74)
- Standard Period for Release of Software Updates(see page 74)
- Licensing Policy with Regard to Software Updates(see page 75)

13.1 Software Lifecycle Phases

The software source code repository is divided into three branches:

- **trunk**—current changes;
- **stabilization**—preparation of a new release;
- **release**—the latest official release.

During the development process, all new software features are added to the **trunk** branch.

After reaching *Feature Complete* status, all changes from the **trunk** branch are moved to the **stabilization** branch.

From that time on, only software fixes that are critical for this version are added to the **stabilization** branch. These fixes are also duplicated in the **trunk** branch.

After the version stabilization is completed, all changes are moved from the **stabilization** branch to the **release** branch, and a new development phase begins.

13.2 Software Technical Support

After purchasing a license key, the customer can receive full technical support throughout the key's validity period or until the end of the software lifecycle if the license is unlimited in time.

13.3 Standard Period for Release of Software Updates

Release	Standard period
Major release	1–1.5 years
Minor release	3–5 months
Bug and security fixes*	3–5 weeks

Major and minor releases are available on the company's official website[2]. Releases with bug and security fixes can be requested from technical support[3].

2 https://www.axxonsoft.com/
3 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3

***** Software bugs can only be fixed in the latest official release.

13.4 Licensing Policy with Regard to Software Updates

- New software versions are fully compatible with the license keys of previous versions.
- After the softwarehas been updated, all the features previously specified in the license key will be available in the new version.
- New software features that are subject to licensing will not be available until the license key is updated.

14 Information security of Axxon One

Information security is a field dedicated to protecting information and information systems from unauthorized access, use, disclosure, destruction, modification, or violation of system integrity. The main goals of information security are to ensure **confidentiality** (protecting information from unauthorized access), **integrity** (ensuring the accuracy and completeness of data, preventing its unauthorized modification) and **availability** (guaranteeing that information is available only to those who are entitled to it).

Elements of information security in *Axxon One*:

Element	Description
Authentication and access control	• General information about users(see page 917) • Changing user password(see page 941)
Protected export	• Exporting frames and video recordings(see page 1306) • Watermark checker utility(see page 1381)
Object masking	• Privacy masking(see page 450) • Person-based privacy masking(see page 694)
Automatic system responses in the event of inactivity or integrity violations	• Configuring automatic logging out and locking of the Client(see page 1045) • Configuring automatic response when Axxon One integrity check fails(see page 1008)
Encrypting and hiding private information in the archive	• Encrypting a volume of an object archive(see page 300) • Configuring privacy masking in archive(see page 1001)
Technical protection of information	• Configuring the Web-Server(see page 165) • Using Axxon One with antivirus software(see page 113)

15 Description of Axxon One

15.1 Basic principles of building a security system based on Axxon One

Building a security system based on *Axxon One* includes the following recommended stages:

1. Selecting a configuration for the security system (with the help of professionals)
2. Building a separate local area network with restricted access
3. Calculating the sufficient bandwidth required for each segment of the local area network
4. Selecting and configuring the software and hardware platform on which the selected security system configuration will be implemented (selecting and configuring personal computers to act as servers and clients in accordance with the requirements, as referenced in Implementation requirements for Axxon One(see page 84), Operating system requirements(see page 86))
5. Selecting and connecting reliable equipment that is optimally suited for a specific security system (with the help of professionals)
6. Training personnel to work with *Axxon One* in accordance with the requirements (see Requirements for Personnel Quantity and Qualifications(see page 96)).

15.2 Axxon One features: reference information

On the page:

- Micromodule architecture(see page 77)
- Support for IP devices(see page 78)
- Video and Audio detectors(see page 79)
- Video archive(see page 79)
- Interactive 3D Map(see page 80)
- User Interface(see page 80)
- Face Recognition(see page 80)
- License plate recognition(see page 81)
- Receiving Events from External Systems(see page 81)

The advanced features available in *Axxon One* are continuously updated and extended.

Axxon One offers virtually wide opportunities for system scaling, task-based adaptation, and reallocation of the used resources when changing the number or the quality of video and audio monitoring tasks on the controlled objects. Video surveillance systems based on *Axxon One* can include an unlimited number of video servers, operator workstations, and video cameras.

Axxon One supports over 10000 models of IP devices, allows working via mobile devices and web interface, and supports operation with touch screens.

15.2.1 Micromodule architecture

The micromodule architecture of *Axxon One* allows implementing different video surveillance system functions in different operating system processes. Each function is the responsibility of a different micromodule; a dispatcher module monitors the functioning of the micromodules. If a function encounters an error and a process is quit unexpectedly, the dispatcher module automatically relaunches the corresponding micromodule. It doesn't affect the performance of other processes or the video surveillance system overall functioning.

15.2.2 Support for IP devices

Drivers Pack

IP device support in *Axxon One* is provided through the *Drivers Pack* Module, specially developed by AxxonSoft and regularly updated to support new IP devices.

Drivers Pack allows adding support for new IP devices in *Axxon One* without having to wait for the release of new versions of *Axxon One* and without reinstalling the entire system.

See Documentation Drivers Pack[4].

Multistreaming

Many up-to-date IP devices allow receiving from them multiple video streams with different parameters, for example, compressed by different codecs. *Axxon One* supports receiving two streams from a camera: high-quality and low-quality, which allows optimizing the CPU load on the video server and the client workstation.

See Camera(see page 171).

GreenStream

The GreenStream software can automatically select a video stream from a camera to the server and then to the client, depending on the resolution at which the video is currently displayed on the client.

See Selecting video stream quality in a Surveillance window (GreenStream)(see page 1161).

Embedded detectors

Axxon One supports the function of embedded camera detectors, which allows receiving the events generated by detectors and using these events in further work. Embedded detectors don't burden the CPU of the video server and operate with the uncompressed video stream, which helps to provide extra stability of video detectors in difficult conditions such as poor visibility.

See General information about embedded detectors(see page 811).

Fisheye cameras and ImmerVision lenses

Support for fisheye cameras and ImmerVision lenses allows dewarping video from a fisheye camera or camera with the ImmerVision panomorphic lens to obtain several "normal" flat images with different frame aspect ratios for display on the client screen. One of the resulting virtual cameras can be a virtual PTZ camera.

See Working with fisheye cameras(see page 1254).

ONVIF support

AxxonSoft is a member of ONVIF[5] (the Open Network Video Interface Forum), which works toward the development and promotion of international standards for network security and video surveillance system interfaces. ONVIF is supported in all *Drivers Pack* versions starting from 3.1.3.

See Features of configuring and working with cameras connected via ONVIF(see page 185).

ONVIF server support

Axxon One has an embedded ONVIF server that you can use to add *Axxon One* as a video recorder to other software.

With the ONVIF server, you can:

- Get live video.
- Access archive videos.
- Work with external sensors (rays).
- Work with PTZ cameras (this feature is available starting with *Axxon One* version 2.0.8).
- Work with PTZ presets (this feature is available starting with *Axxon One* version 2.0.10).
- Use video analytics based on detectors (for example, the motion detector or the abandoned object detector).

See Configuring the ONVIF server(see page 169).

RTSP support

4 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack
5 http://www.onvif.org/

Many IP devices support multimedia streaming via the RTSP protocol. *Axxon One* supports receiving such streams without requiring integration of the relevant camera via Drivers Pack.

See Configuring connection of single-channel devices(see page 187).

15.2.3 Video and Audio detectors

The *Axxon One* video surveillance system has a comprehensive video analysis system. It includes the following video detectors:

1. Video clarity detector.
2. Motion detector.
3. Neural tracker.
4. Object tracker.
5. Human pose detector.
6. Equipment detector.
7. Person-based privacy masking.
8. Fire detector.
9. Smoke detector.
10. Water level detector.
11. Neural counter.
12. Queue detector.
13. Visitors counter.

In addition to the video detectors, *Axxon One* has three audio detectors:

1. Noise detector.
2. Audio loss detector.
3. Signal detector.

You can set the rules that are automatically executed when a detector generates an event (individually for each detector) and simultaneously use detectors of different types.

See Detectors(see page 308).

15.2.4 Video archive

For storing an archive in *Axxon One*, you can use both local and network file storage with the SolidStore system or object storage.

SolidStore

SolidStore is a file system to store a video archive developed by AxxonSoft deliberately for storing the video archive. By optimizing the reading/writing process, we managed to achieve three important advantages:

- Provide high read/write speed, approaching the physical access speed limit of the hard disk.
- Increase the service life of the hard disk.
- Solve the problem of data fragmentation.

Cloud archive

Cloud archive is an object file system for storing the video archive in cloud storage (for example, Amazon S3, Microsoft Azure). Using a cloud archive allows reducing the price of data storage and setting up flexible integration with AxxonSoft VSaaS. According to Amazon[6], the reliability of using an object archive is up to 99.999999999%.

See Archive(see page 272).

TimeCompressor

Time Compressor is a convenient function for quick viewing of events in the archive, which doesn't require the use of speedup playback. When using this function, the user simultaneously sees all objects in the camera's field of view during a specified time interval on the screen. The use of the TimeCompressor algorithm is especially effective for viewing large archives by cameras with a small number of objects in the field of view at a time.

See Compressed playback of archives (TimeCompressor)(see page 1191).

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6 https://aws.amazon.com/s3/faqs/?nc1=h_ls#Durability_.26_Data_Protection

Search in Archive

Axxon One uses the Metadata database(see page 333) that is developed by AxxonSoft for indexing and storing descriptions of observed scenes. Along with video recording, this database allows archiving characteristics of all moving objects in the frame and then, based on these characteristics, performing quick searches of the video recordings.

See Search in archive(see page 1216).

15.2.5 Interactive 3D Map

Video from a camera and a map of the object are rationally combined in one window. All cameras from the current layout are displayed on the map with colored markers, the color of which corresponds to the camera status. By clicking on the video, the operator can instantly determine at which point in the protected facility the interesting event takes place.

Immersion Mode

In immersion mode, a translucent video image overlays the map, and static objects in the frame (furniture, doors, and so on) are combined with their depictions on the map. This function visualizes the objects' movement in real space.

OpenStreetMap

OpenStreetMap support is available in *Axxon One*. The map is downloaded from the Internet, and the user selects the necessary area and scale. Additional map data is downloaded in real time when zooming in/out or scrolling.

> **Note**
>
> To work with OpenStreetMap maps in *Axxon One*, you need to purchase an OpenStreetMap[7] license.

Virtual PTZ cameras on the map

The "Virtual PTZ Camera" function becomes available when the map contains at least one fisheye camera. This function allows viewing video from a fisheye camera on the map. When you click at any point of the viewing angle sector in the corresponding cell of the layout, the source video is expanded, digitally zoomed in, and positioned to the specified point.

See Working with the interactive map(see page 1291).

15.2.6 User Interface

Editable camera layouts

Axxon One allows you to create custom camera layouts. Layouts can be configured in any way the user wants, and the aspect ratios of surveillance windows can be fine-tuned. This function allows rationally placing cameras with different frame aspect ratios on the screen, as well as providing a convenient way to work with images from fisheye cameras.

See Configuring layouts(see page 942).

Autozoom

Autozoom helps monitor the moving objects by automatically adjusting the level of digital zoom. Autozoom shows close-in video for parts of the frame that contain a moving object or objects and follows them as they move.

See Autozoom(see page 1164).

15.2.7 Face Recognition

Axxon One implements an algorithm for recognizing human faces in video images and then searching for them in the video archive of several cameras at once. You can search by an uploaded photo or by an image of a person's face selected in a video archive frame. The search results display the video fragments from the archive where the searched person is present.

See Face search(see page 1233).

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7 https://www.openstreetmap.org/copyright/en

15.2.8 License plate recognition

Axxon One implements an algorithm for recognizing vehicle license plates. The recognized license plates are saved to a database and matched with a video archive of several cameras. If a license plate contains similar characters, the system generates several hypotheses during the recognition. It increases the probability of a successful search for a particular number in a generated database.

See Search by LPs(see page 1227).

15.2.9 Receiving Events from External Systems

Axxon One implements a new feature set that is capable of receiving events from various external devices and systems—POS terminals, access control units, external software, and so on.

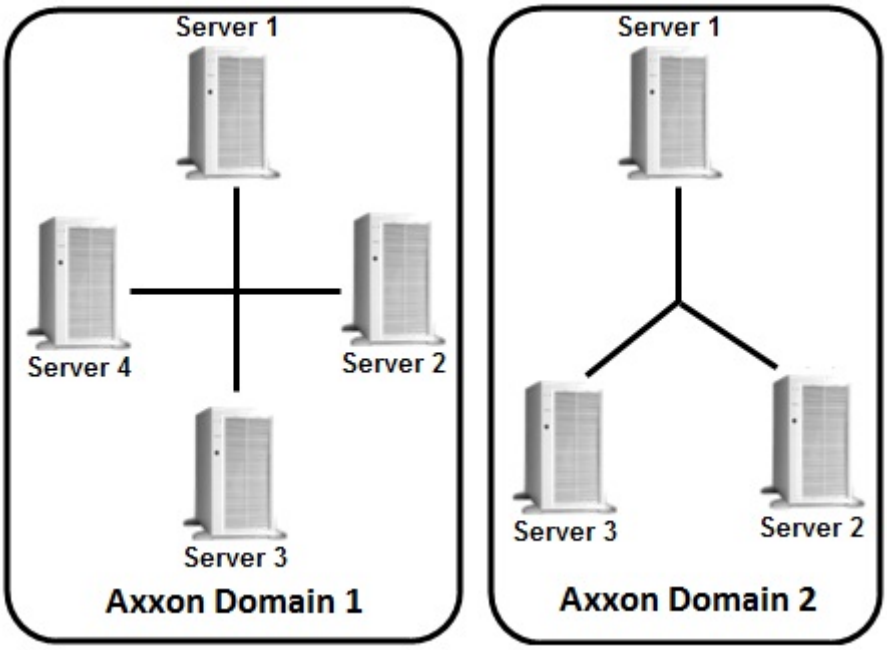
See Receiving events from external systems(see page 257).

15.3 Functions of the distributed security system

You can create a distributed system within an Axxon Domain in *Axxon One*.

Axxon Domain is a selected group of computers, on which the Server configuration of *Axxon One* is installed. Linking Servers in a group makes it possible to set up interaction between them, thus organizing a distributed system.

Servers are interoperable only if they belong to the same Axxon Domain. At the same time, each Server of the domain operates independently and has its own database.



A distributed security system based on *Axxon One* offers the user the following functional capabilities:

1. Viewing and manual processing of video and audio data from several Servers on one Client;
2. Controlling cameras connected to various Servers from one Client;
3. Configuring all Servers of the distributed system on one Client;
4. Execution of automatic responses when detection tools generate events (audio notification, triggering of relays, email notification, and so on) within the distributed system.

Note

If a Server is not accessible by NetBiosName or some TCP and UDP ports are closed, it is possible to build a distributed security system on a virtual private network (VPN). For example, with the help of OpenVPN[8]. Detailed information on OpenVPN and examples of virtual private network configuration are given in the official documentation[9].
Suppose, the Server relies on a defined port range (see Installation(see page 98)), and you want to set up a surveillance system based on several networks. You do not have to use VPN in that case. Use port forwarding instead.

Axxon Domain configuration is described in detail in Configuring domains(see page 151).

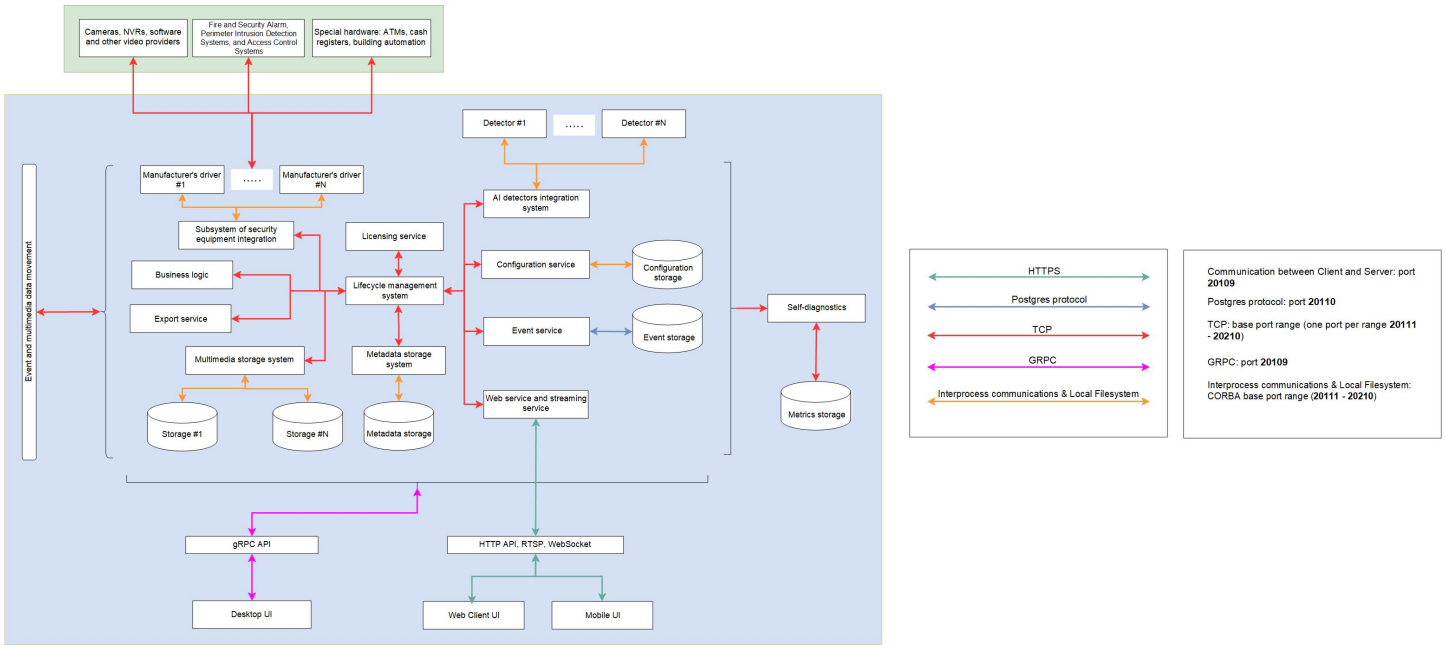
15.4 Axxon One architecture

Axxon One setup checklist and best practices[10]
Information security of Axxon One(see page 76)
Ports used by Axxon One(see page 95)
Ports used by the failover system(see page 1065)

The micromodule architecture of *Axxon One* video management software allows implementing different video management system functions as different operating system processes. Each function is the responsibility of a different micromodule; a dispatcher module monitors the functioning of the micromodules. If a function encounters an error and a process is quit unexpectedly, the dispatcher module automatically relaunches the corresponding micromodule. This does not affect the performance of other processes or the functioning of the VMS overall.

Below is a general diagram of the micromodule architecture of *Axxon One*.

Axxon One architecture



15.5 Network Topologies of Axxon One

Axxon One supports both decentralized and star network topologies.

The decentralized architecture better suits smaller systems.

The star architecture is more practical for creating large centrally monitored distributed systems where no local monitoring is required on remote sites.

8 http://openvpn.net/
9 http://openvpn.net/index.php/access-server/docs.html
10 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246484085/Axxon+One+setup+checklist+and+best+practices

Attention!

If your system is based on star topology, please take into account the following:

1. In a failover (see General information about a failover system(see page 1064)) and non-failover systems, the Client must have access to all Servers (located centrally).
2. In a failover system, all Manager Servers must have access to each other (located centrally).

15.6 Characteristics of Axxon One

Security systems based on *Axxon One* have the following primary characteristics.

Characteristics	Value
Number of Servers in the distributed system	Unlimited
Number of Clients that support simultaneous connection to the Server	Unlimited
Number of Servers that simultaneously transmit video to a Client	Unlimited
Number of video capture channels for "live video" processing on one Server	Unlimited
Number of detection tools per camera	Unlimited
Number of simultaneously processed signals coming from microphones	Unlimited
Number of audio output channels (to speakers, headphones, and so on)	Depends on the sound card used for audio playback
Number of PTZ devices used	Unlimited
Number of event sources (POS devices)	Unlimited
Number of user roles and users	Unlimited
Number of objects simultaneously tracked by the Object tracker(see page 359)	Up to 25
Number of license plate recognition channels	Determined by the license, number is unlimited
Number of face recognition channels	Determined by the license, number is unlimited
Number of connected mobile Clients or Web-Clients	Unlimited
Number of videowalls	Unlimited
Number of maps	Unlimited
Support for IP devices	IP cameras and IP video servers. This list is continuously expanding: support for new hardware is added via updates to *Axxon Driver Pack*
CPU support	64-bit (x64)

Characteristics	Value
Number of archives in the system	Unlimited
Maximum archive size	Unlimited
Video compression algorithms	MJPEG, MPEG-2, MPEG-4, MxPEG, H.264, H.264+, H.265, H.265+
Audio compression algorithms	PCM, ADPCM, g711, g726, aac, mp2
Available video image resolutions	Resolutions supported by video cameras
Support for embedded camera analytics	Yes
Support for touchscreens	Yes

15.7 Implementation requirements for Axxon One

15.7.1 Limitations of Axxon One

Attention!

We don't recommend you delete or modify any *Axxon One* files without prior consulting with AxxonSoft technical specialists.

When working with *Axxon One*, keep in mind the limitations that the developer has imposed on the system in order to ensure its operability.

No.	Limitation
1	To work with *Axxon One,* the following requirements for OpenGL must be met: 1. Version 2.0 and higher. 2. The following extensions must be available: **ARB_vertex_program**, **GL_EXT_blend_func_separate**, **GL_ARB_framebuffer_object**. You can check the availability of extensions with the *OpenGL Extension Viewer* program (download[11]). This program also contains a large database of OpenGL support in video cards of various vendors **Attention!** If your computer's graphics card does not meet OpenGL requirements, OpenGL can be emulated in software. But in this case, the CPU load can be high.
2	You cannot start *Axxon One* client if the scale of all items on the screen (DPI) is over 100%. If the screen resolution is set lower than 1280*960 pixels, the correct operation of *Axxon One* isn't guaranteed
3	The server and the client versions must be the same. If not, the correct operation of *Axxon One* isn't guaranteed
4	For the correct operation of *Axxon One*, the OS must use the UTF-8 locale

11 https://www.realtech-vr.com/home/?page_id=1402

No.	Limitation
5	Downgrade to a previous version of *Axxon One* is not allowed

6	• In one LAN, two servers with the same name are not allowed, even if they belong to different Axxon-domains.
	• If the name of the client computer and the name of the server computer in the LAN are the same, the correct operation of *Axxon One* isn't guaranteed.
	• You cannot name servers LOCALHOST, LOCAL, TEST, EXAMPLE, or INVALID, as these are special-purpose domain names, and their use can prevent *Axxon One* from working.
	• Computer name:
	  • must contain only Latin letters, digits, and the "-" character;
	  • the name length must not exceed 15 characters

7	Maximum video frame rate in the client is 50 FPS. When *Axxon One* is running in the safe mode, the frame rate decreases
8	To install *Axxon One*, you must log in to Windows as administrator
9	For the correct installation of *Axxon One*, there must be no spaces at the beginning of the name of the folder that contains the installer
10	For the correct and full-featured operation of *Axxon One*, the system must not limit network activity between all servers and clients. If during *Axxon One* installation(see page 98), you specified certain ports, the access to these ports via the TCP and UDP protocols must be enabled. Otherwise, access to all ports must be allowed in the system. For the client to operate correctly, disable unnecessary network interfaces on the server. If you want the server to work with only one network interface, set its gateway and mask in the network settings utility (see Network settings utility(see page 1379))
11	For the correct operation of *Axxon One*, you must use different IP addresses for all network interfaces on the server or use the interface mask to specify a designated set of addresses where the server will operate (see Network settings utility(see page 1379)). If there are identical IP addresses on the servers, there can be problems in communication between the servers, as well as between the client and the server
12	Time must be synchronized among all computers in the system (configured by the user)
13	If you have embedded storage enabled in the system, synchronization between the server and the IP device is necessary (see Embedded storage(see page 234)). If there is no synchronization, events from the device can be incorrectly recorded to the database
14	Before installing *Axxon One*, make sure that your computer uses the latest version of the video card driver
15	The face detectors require a CPU supporting SSE4.2, FMA3, or AVX2.0 instruction sets
16	You cannot start the client on a remote desktop through the standard *Remote Desktop Connection* Windows utility
17	If a computer is connected to an Active Directory domain, one of the following conditions must be met to enable disk access: 1. Disk Access Control Lists must contain only local or embedded groups and users. 2. Create an **AxxonFileBrowser** user in the domain and add it to the **Users** group (see Installation(see page 98)). This behavior is typical only of the file systems that have access permissions (for example, NTFS)
18	Hibernation mode and sleep mode are not supported. Before you switch the computer to these modes, stop the server (see Stop the server(see page 146))

15.7.2 Operating system requirements

On the page:

- Windows OS(see page 86)
- Windows Server OS(see page 86)
- Linux OS(see page 86)

Attention!

- For *Axxon One* to work corectly, the operating system needs to be up to date—the latest updates must be downloaded and installed.
- Only 64-bit versions of operating system are supported.

15.7.2.1 Windows OS

- **Windows 11** [4]: Home, Pro, Education, Pro Education, Pro for Workstations, Enterprise;
- **Windows 10**: Pro, Enterprise, Education, Home Edition;
- **Windows 10 IoT** [3]: Enterprise, Enterprise LTSB 2016, Enterprise LTSC 2019.

15.7.2.2 Windows Server OS

- **Windows Server 2025** [4];
- **Windows Server 2022** [4]: Standard, Essentials, Datacenter, Azure Datacenter;
- **Windows Server 2019** [4]: Essentials [2], Standard, Datacenter;
- **Windows Server IoT 2019** [4];
- **Windows Server 2016** [1, 4]: Essentials [2], Standard, Datacenter.

15.7.2.3 Linux OS

- **Debian**: 12, 11, 10;
- **Ubuntu**: 24.04, 22.04, 20.04.
- **Server in Docker container** (see the current list of supported distributions[12]);
- **Client as Flatpak** [5] (supported starting with *Axxon One* 2.0.10, see the current list of supported distributions[13]).

Linux OS Administrator's guide[14]
Limitations of Axxon One in Linux OS[15]

Attention!

[1]—neural analytics is not applicable (see Hardware requirements for neural analytics operation(see page 339)).
[2]—there are restrictions, posed by OS edition (2 physical processors)—see http://www.microsoft.com[16].

12 https://docs.docker.com/engine/install/
13 https://flatpak.org/setup/
14 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/260926669/Linux+OS+Administrator+s+guide
15 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486748/Limitations+of+Axxon+One+in+Linux+OS
16 https://www.microsoft.com/en-us/?ql=3

[3]—Core edition is not supported.
[4]—Full Installation type is supported. Server Core Installation type is not supported.
[5]—Hardware decoding on NVIDIA isn't supported.

15.7.3 Hardware requirements

Axxon One is the hardware and software system designed for video analytics tasks and video surveillance management. For the stable performance of all its components, the server must correspond to certain hardware requirements that depend on the system scale and used functions.

The main tool for calculation is the AxxonSoft Platform Calculator[17]. It helps to determine the required hardware configuration accurately (RAM, processor, hard disk) for the specific script.

Documentation to the AxxonSoft Platform Calculator[18]

Means	Requirements
Configuration with two processors	We recommend disabling the Hyper-threading option in BIOS in order to improve the predictability of performance and reduce delays on the servers with two physical CPU (sokets)
AMD platforms	We don't guarantee the correct operation of *Axxon One* on the AMD platforms (processors, integrated and discrete graphics). We recommend using platforms based on the Intel processors
RAM	**Minimum capacity:** 8 GB. **Recommendations**: You can calculate the required memory capacity in the AxxonSoft Platform Calculator[19]. When you use the memory with a greater frequency in the multi-channel mode (Dual-Channel, Quad-Channel), it reduces the load on the memory controller and increases the overall system performance

17 https://sale.axxonsoft.com/calc/calculator.jsf
18 https://docs.axxonsoft.com/confluence/spaces/apc/pages/189622025/Documentation
19 https://sale.axxonsoft.com/calc/calculator.jsf

Video adapters	• **Requirements for OpenGL**:
	  • The GPU supporting OpenGL version 2.0 and higher is required for the video output operation only (the display of the interface on the monitor). For servers without monitors, this requirement is irrelevant.
	• **Minimum requirements**:
	  • Discrete NVIDIA GPU: GeForce 7300LE / GeForce 200 or higher (512MB).
	  • Integrated GPU: Intel HD Graphics 530.
	• **Recommended requirements**:
	  • Discrete NVIDIA GPU: GeForce 1030 (1GB) or higher, Quadro P400.
	  • Integrated GPU: Intel UHD Graphics 630 or higher.
	• **Extensions checkup**:
	  • For the video output to operate, the **ARB_vertex_program**, **GL_EXT_blend_func_separate**, **GL_ARB_framebuffer_object** extensions are required. You can check if they are present by using the OpenGL Extension Viewer[20] utility.
	• **Drivers**:
	  • We always recommend using the latest stable driver versions from the manufacturer.
	• **Several adapters**:
	  • If there are several installed video adapters in the system, you must select the adapter corresponding to minimum requirements as the main one in the OS settings (for image display)

Disk storage subsystem requirements(see page 88)
TCP/IP Network Bandwidth Requirements(see page 92)
Hardware requirements for GPU-based video decoding(see page 321)
Hardware requirements for neural analytics operation(see page 339)
Hardware requirements for the Face detector TV and its sub-detectors(see page 501)
Hardware requirements for the Face detector VA and its sub-detectors(see page 486)
Hardware requirements for the Face detector VL and its sub-detectors(see page 473)
Hardware requirements for the License plate recognition IV(see page 521)
Hardware requirements for License plate recognition RR(see page 543)
Hardware requirements for Vehicle recognition RR(see page 608)
Hardware requirements for License plate recognition RR—Parking(see page 582)
Hardware requirements for License plate recognition RR—Search in archive(see page 561)
Hardware requirements for the License plate recognition VT(see page 638)

15.7.4 Disk storage subsystem requirements

On the page:

20 http://realtech-vr.com/home/glview

- General requirements(see page 89)
- Storage requirements(see page 90)
  - Minimum requirements(see page 90)
  - Size of the archive(see page 90)
  - System log database(see page 91)
  - Metadata database(see page 91)
  - The system logs(see page 91)
  - Self-diagnostics service(see page 91)

15.7.4.1 General requirements

For *Axxon One* VMS operation, the disk subsystem must match the following requirements:

1. The number of input/output operations (IOPS) of the device must not be less than the IOPS of *Axxon One* VMS.
   Axxon One records the archive in blocks of 4 MB every 10 seconds. However, if the block is not filled in 10 seconds, a smaller fragment of the block will be recorded, which will be added to later.
   Archive playback is also performed in blocks (except when reindexing, see Console utility for working with archives (vfs_format.exe)(see page 1422)).
   Below you can see how you can estimate the IOPS for *Axxon One* VMS.

	If the average bitrate per camera is less than ~3.6 Mbps	**If the average bitrate per camera exceeds ~3.6 Mbps**
IOPS during archive recording Archive recording includes both data input (recording) and output (reading) operations	IOPS (recording) = 0.29 * N IOPS (reading) = 0.035 * M	IOPS (recording) = 0.065 * M IOPS (reading) = 0.035 * M
IOPS during archive playback Archive playback includes only output (reading) operations	IOPS (reading) = 0.035 * R * S	
IOPS during simultaneous recording and playback	IOPS (recording) = 0.29 * N IOPS (reading) = 0.035 * M + 0.035 * R * S	IOPS (recording) = 0.065 * M IOPS (reading) = 0.035 * M + 0.035 * R * S

where

- N is the number of cameras being recorded;
- M is the cumulative bitrate of all cameras being recorded, in Mbps;
- R is the cumulative bitrate of all cameras being played back from the archive at normal speed (1x), in Mbps;
- S is the playback speed.

2. If you use RAID storage, specify the write-back policy for recording to cash memory.

15.7.4.2 Storage requirements

The disk subsystem capacity of *Axxon One* Server must be estimated taking into account the resolution, the compression algorithm, the frame rate of the recorded video signal, the number of video cameras from which the recording to disk(s) takes place and other recording parameters. In addition, the size of the system log and metadata databases must be considered.

15.7.4.2.1 Minimum requirements

You need at least 10 GB of free disk space on Windows OS and 5 GB on Linux OS to install the *Axxon One* VMS package in the **Server and Client** configuration.

See the storage calculations below, taking into account the size of the archive, the size of the database and the size of the archive of the system logs.

15.7.4.2.2 Size of the archive

The capacity of the disk subsystem can be calculated by the formula:

Capacity of disk subsystem (MB) = Time of storing archive (days) * Cameras number * Rate of recording (FPS) * 3.51 * Time of guaranteed recording from a camera (h/day) * Average frame size (KB),

where

Time of storing archive is the required time for storing an archive from one camera, days;

Cameras number is the number of cameras from which recording to the archive takes place;

Rate of recording is the frame rate of recording to the archive, frames per second;

3.51 = (60 sec in min * 60 min in hour) / (1024 KB in MB) is the factor used for KB/s in MB/h conversion;

Time of guaranteed recording from a camera is the number of hours of guaranteed recording from one camera per day;

Average frame size is the average size of the camera frame in KB.

Note

Average frame size of 640x480 resolution is:

Video codec	Average frame size
H.264	from 8 KB to 17 KB
MPEG4	from 8 KB to 35 KB
MJPEG	from 23 KB to 60 KB

Average frame size may vary over a wide range depending on the vendor, the model and the settings of the camera and video image complexity.

Note

To calculate the frame size you can use the ratio, that when increasing the vertical or horizontal resolution two times, the average frame size will be increased four times (this rule is a relative and can be applied only to some camera models).

Examples of calculating the capacity of the disk subsystem (without the capacity of the system log and metadata databases) are presented below.

Recording parameters	Calculating results
4 cameras with 25 FPS and 640x480 resolution, guaranteed recording of 24 hours per day during one week	H.264: from 500 GB to 1 TB MPEG4: from 500 GB to 2 TB MJPEG: from 1.3 TB to 3.5 TB
16 cameras with 12 FPS and 640x480 resolution, guaranteed recording of 12 hours per day during one week	H.264: from 500 GB to 1 TB MPEG4: from 500 GB to 2 TB MJPEG: from 1.3 TB to 3.5 TB
4 cameras with 25 FPS and 1280x960 resolution, guaranteed recording of 24 hours per day during one week	H.264: from 2 TB to 4 TB MPEG4: from 2 TB to 8 TB MJPEG: from 5.3 TB to 14 TB

15.7.4.2.3 System log database

The capacity of the system log database must be taken into account when the capacity of the disk subsystem is calculated. The estimated capacity of the system log database is calculated by the formulas:

Capacity of system log database (low detection tools activity) = D * T * (0.04 GB / day);

Capacity of system log database (average detection tools activity) = D * T * (0.12 GB / day);

Capacity of system log database (high detection tools activity) = D * T * (0.48 GB / day);

where

D is the total number of detection tools created in the system,

T is the estimated duration of system log storage, days.

15.7.4.2.4 Metadata database

The following formulas can be used to determine the required disk size for the metadata database:

Size of metadata database = N * T * (0.5 GB / day) – sufficient disk size;

Size of metadata database = N * T * (1 GB / day) – sufficient disk size plus reserve space;

Size of metadata database = N * T * (5 GB / day) – sufficient disk size plus a large reserve,

where

N is the number of detection tools in the system actively recording metadata. One video camera can have several detection tools with metadata (see Metadata database(see page 333)),

T is the period of time (number of days) that metadata will be stored. By default, T = 30 days.

If you have less than 15 GB of free disk space, the metadata database is overwritten - the new data is written over the oldest data.

15.7.4.2.5 The system logs

When calculating the disk subsystem capacity, it is necessary to include at least 1 GB for the system logs archive.

15.7.4.2.6 Self-diagnostics service

When calculating disk subsystem capacity, note that self-diagnostics service may generate up to 100 MB of data per day.

The depth of the service internal database is limited to 7 days and 512 MB.

15.7.5 TCP/IP Network Bandwidth Requirements

Network bandwidth is a limiting factor in distributed system performance. The bulk of the information streamed over the network is video data. For example, the data flow (video stream) from remote cameras, such as used to monitor ATMs, is sent via communication channels.

> **Attention!**
>
> The minimum bit rate through the communication channel (network bandwidth consumption / goodput) for *Axxon One* must be at least **2 Mbit/s**.

To determine the required TCP/IP network bandwidth for video transmission from IP devices and some video capture cards, we recommend you to use Axxon Platform Calculator[21] (check the **Total bitrate from ip devices (Mbit/s)** parameter).

15.7.6 Requirements for BIOS configuration

For the performance of *Axxon One*, especially for video decoding, the frequency of the processor is important. The higher the frequency, the higher the performance of *Axxon One* on a given platform.

On modern computers, the energy saving mode is activated in BIOS by default. Using this mode on multiprocessor systems leads to a partial load of CPU cores and reduces the performance of the I/O subsystem.

For better performance of *Axxon One*, you must configure the computer BIOS as follows:

> **Attention!**
>
> Different manufacturers of motherboards call these technologies differently. So, for each specific motherboard model, you must always check the documentation for that model to find out the name of the technology.

Action	Technology	Reason
Enable	E-Cores	To get the calculation results with the actual load
Disable	Turbo Boost	The clock rate and displayed CPU load can vary from server to server depending on the cooling system
	Hyper-Treading	Uneven load of processor cores
	Intel Speed Shift	To keep the processor clock from dropping below the base clock
	Enhanced Intel SpeedStep (EIST)	Reduces the operating clock of the CPU
	Energy saving	To keep the processor clock from dropping below the base clock
	Smart throttling	Abrupt reset of processor clock

15.7.7 Running Axxon One in virtual machines

The *Axxon One* VMS can be run in the following virtual machines:

- VirtualBox (all versions);
- VMware (all versions);
- Hyper-V (all versions).

21 https://sale.axxonsoft.com/calc/calculator.jsf

Attention!

To run the Client, 3D acceleration must be enabled.

Note

The operating system in a virtual machine must meet the general requirements.
If you use VirtualBox on Windows 7 SP1 and in Hyper-V, you won't be able to access a Guardant USB key from the guest system.
In Hyper-V, you can use third-party utilities (for example, USB Network Gate[22]) instead.

15.7.8 General information about updating Windows OS

It is necessary to update Windows OS and its components to ensure the correct operation of *Axxon One*. Otherwise, unexpected errors and system malfunctions can occur.

You can update Windows OS automatically (see the official Microsoft documentation[23]).

For Servers, it is necessary to define a maintenance period during which the downloaded updates can be installed manually after *Axxon One* is safely shut down.

If automatic update is not configured, you must check for updates at least once a week. Typically, important updates are released monthly. You can check the updates using the Windows Update service (see Get the latest Windows update[24]).

Regardless of the options you choose, some updates are not installed automatically. These include optional updates and updates that require you to accept new terms of use. When these updates become available, the Windows Update service will notify you that they are ready to be installed.

In some cases, it can be necessary to install specific Windows OS updates to ensure the *Axxon One* operation (see Installation(see page 98), Error when installing Drivers Pack(see page 111)).

15.8 Interface of Axxon One

On the page:

- General information(see page 93)
- Incorrect display of the client interface elements(see page 94)
- Problem with upper panel display(see page 95)

15.8.1 General information

Axxon One Client has 2 basic interfaces: Layouts  and Settings  .

To switch the two, click the tabs at the top of the screen.

22 http://www.net-usb.com/downloads/
23 https://support.microsoft.com/en-us/windows/windows-update-faq-8a903416-6f45-0718-f5c7-375e92dddeb2
24 https://support.microsoft.com/en-us/windows/get-the-latest-windows-update-7d20e88c-0568-483a-37bc-c3885390d212

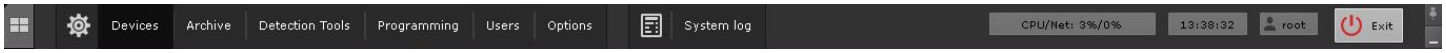
Note

If there are no cameras in VMS, the tab is not available.

Attention!

You can configure access to any given tab and buttons in the top panel individually for each user role (see General information about users(see page 917)).

When you are configuring VMS, the top panel shows tabs with different groups of settings, the button for switching to the system log, current user name and the **Exit** button.



When you select **Server** or any child object in the **Hardware**, **Archive** or **Detection Tools** tabs, the upper panel shows the current CPU and network load for the selected Server (or the Server to which the object selected on the specified tabs belongs).



In the Layouts interface in the upper panel, you see the following elements:

1. Camera search panel(see page 1130).
2. System time.
3. Context menu.
4. Video surveillance mode selection tabs.
5. Video wall management panel.(see page 1127)
6. Monitor management panel(see page 1128).
7. Layouts panel(see page 1129).
8. Macro menu(see page 1316).
9. Layout scaling buttons(see page 1140).



In the Layouts and Search interface, you can hide the top panel. To do this, click the button in the top right corner. To show the top panel, hover over it with the pointer.

Note

To pin the top panel, click the button.

In Full Screen (see Configuring the Client screen mode (full screen or window)(see page 1030)), to collapse the client window, click the button.

15.8.2 Incorrect display of the client interface elements

The client interface elements can be distorted on systems with some versions of GeForce drivers (such as 327.23, 337.88) installed.

In some cases, this problem is solved by disabling stream optimization for the AxxonOne.exe process:

1. Go to **Control panel** → **NVIDIA control panel** → **3D parameters** → **Software settings**.
2. Click the **Add** button and select the AxxonOne.exe file (<*Axxon One* installation directory >/bin).
3. Set the **Off** parameter for the **Threaded optimization** function.
4. Click the **Apply** button.

If this solution does not eliminate the problem, then install an older driver for the graphics card.

15.8.3 Problem with upper panel display

In some cases, the client can have a problem displaying the upper panel.

In this case, we recommend installing the most recent version of Intel graphics subsystem[25] drivers.

15.9 Ports used by Axxon One

Appendix 5. Using Axxon One with NAT(see page 1436)

Ports	Changeable	Installation type	Process	Open the port*
20040 (Windows, Linux) 20041 (Windows, Linux) 20042 (Linux) 20108 (Windows, Linux)	No	Server and Client	Self-diagnostics service(see page 1097)	Not required
20109	Yes	Server and Client Client	gRPC API (see Configuring the Server ports(see page 1014)) Client to Server connection	Required
20110	Yes	Server and Client	PostgreSQL database (see Configuring the Server ports(see page 1014))	Required
20111–20210	Yes	Server and Client	Server (see Installation(see page 98), Network settings utility(see page 1379)) Communication between Servers within the same Axxon-domain	Required
80 (Windows) 8000 (Linux)	Yes	Server and Client	Web server (see Configuring the Web-Server(see page 165))	If necessary + HTTPS port 443
554 (Windows) 20554 (Linux)	Yes	Server and Client	RTSP server (see Configuring the RTSP server(see page 167))	Not required
8080	Yes	Server and Client	Virtual input (see Configure virtual inputs(see page 226))	Required
8888	No	Server and Client Client	Client HTTP API (see Client HTTP API[26])	Not required
4000 4646–4648 8300–8302 8500 8600	No	Failover Server and Client	Failover (see Ports used by the failover system(see page 1065))	Required

* In a configuration including several Servers in firewalled LANs, or port forwarding on the router under NAT environment.

25 https://www.intel.com/content/www/us/en/support/products/80939/graphics.html
26 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246487047/Client+HTTP+API

15.10 Requirements for Personnel Quantity and Qualifications

The following roles have been defined for operating the *Axxon One* software package:

1. Security system administrator.
2. Security system operator.

In special cases, one person can perform the functions of both the administrator and the operator.

The main duties of the administrator are to:

1. Update, configure, and monitor the operability of the security system's hardware.
2. Install, update, configure, and monitor the operability of basic and system software.
3. Install, configure, and monitor software applications.
4. Manage user accounts (this duty can be carried out by a user entrusted with system administrator permissions).

The administrator must have the skills necessary for network configuration, including routing and firewall, as well as NetBIOS, DNS, and NTP network services.

Besides, the administrator must have high qualifications and practical experience installing, configuring, and administering the software and hardware employed in the software package.

The software package is structured so that all accessible functionality can be managed by one administrator or administration responsibilities can be divided among several users.

The main duties of an operator are to:

1. Work with the software's GUI (graphical user interface).
2. Optimize the performance of the personal computer to carry out tasks using the functionality provided in the software package.
3. Create roles and users in the system (if the user has been granted the appropriate permissions).

The system operator must have experience with, and be a qualified user of, PCs running Microsoft Windows and must be able to easily perform basic operations.

16 Installing Axxon One

16.1 Installing equipment

16.1.1 Types of devices used

An IP device is the source of the video signal (video data) for *Axxon One*.

> **Note**
>
> You can connect analog video cameras to *Axxon One* via video capture cards, which the software defines as IP devices.

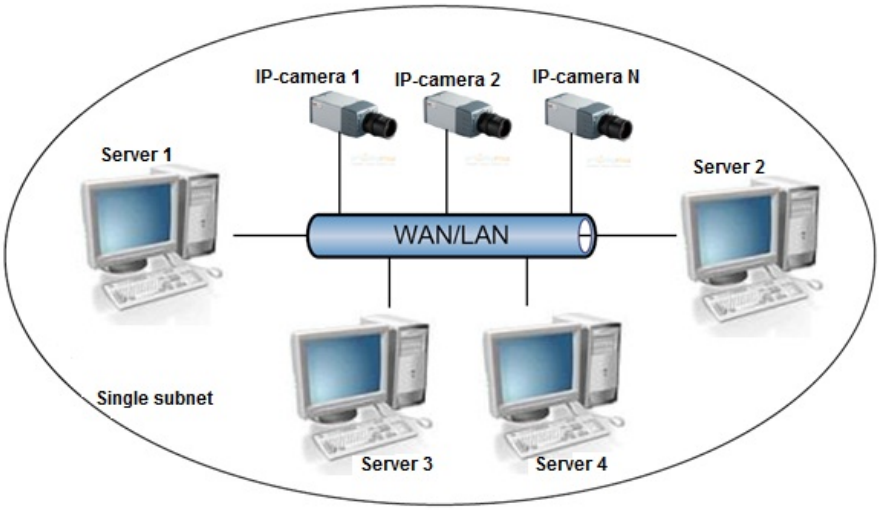
The following types of equipment are IP video and audio surveillance devices:

1. IP video cameras.
2. Various types of IP video servers.

IP video servers, which use analog video cameras directly connected to them, digitize the analog video signal, and transmit it to users via TCP/IP. When working with analog video cameras connected to IP video servers, users can utilize the same video image viewing and transmission functions as with IP video cameras.

16.1.2 Connecting IP devices

To work with IP devices, you need to connect the *Axxon One* server to the local network where the required IP devices are enabled.



To ensure support for IP devices on an external network:

- The IP devices must have an external static IP address.
- The necessary ports on the network equipment must be open.

> **Attention!**
>
> If these requirements are met, IP devices must be properly handled. However, correct functioning is not guaranteed.

Based on the video signal coming in from the IP device, an assessment is made of the guarded location and the system responds to events registered for that location. The content and quality of the obtained video information depends on how the IP device is installed and configured. There are a number of rules that must be followed to obtain a high-quality video signal. In particular, high-quality peripheral equipment (hubs/routers) must be used; we advise against use of Home and Office-class devices, which are not intended for use in such security systems.

Note

IP devices connected to such equipment will transmit a video stream with an unacceptably long delay (from 1.5 to 3 seconds per frame)

Detailed information about creating a local network and connecting IP equipment to it is presented in the corresponding reference documents.

16.1.3 Configuring IP devices in Windows

IP devices can be configured in Windows by using the following software:

1. Software included with the IP device. This software is used to accomplish the following tasks:
   a. Searching for network devices connected to the local network.
   b. Preliminary IP address assignment (without account of routing).

   Attention!

   Without assigning preliminary IP addresses to the devices, it is not possible to access their Web interface.
2. Web interface of the IP device. This interface is used to accomplish the following tasks:
   a. Configuring the IP devices with consideration for routing.
   b. Configuring modes for the IP devices to work with video and audio signals.
   c. Viewing video images coming in from IP devices in standard Web browser mode.

Configuration of IP devices in Windows is described in detail in the official reference documentation for the respective devices.

16.2 Installation of Axxon One

16.2.1 Installation

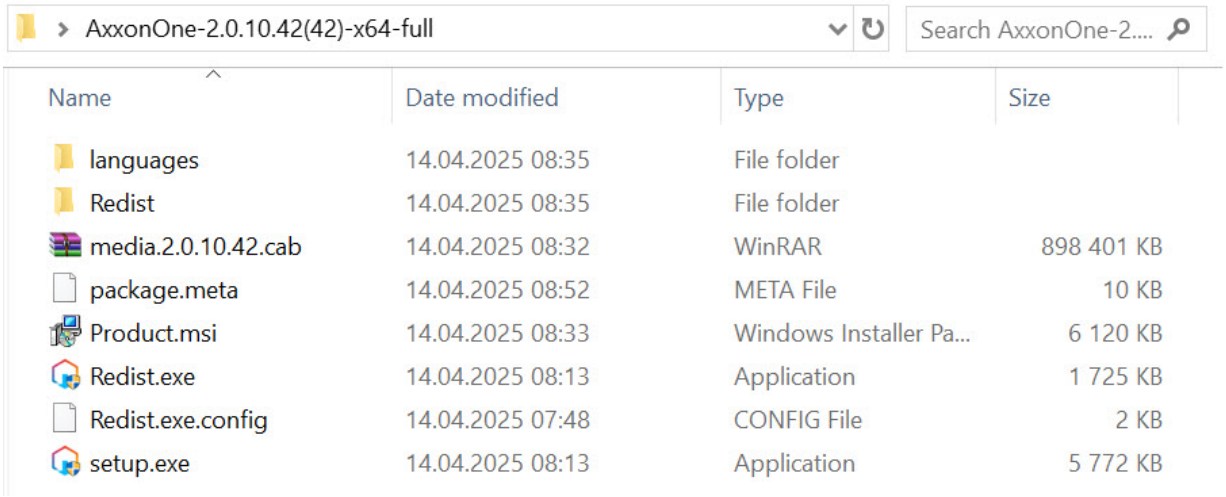
To install *Axxon One* with any type of installation, do the following:

Attention!

- *Axxon One* is not guaranteed to work on Windows N or KN editions. For correct operation, you must install the Media Feature Pack[27].
- Before installation, we strongly recommend that you read the restrictions on names of servers and computers in *Axxon One* (see Limitations of Axxon One).

27 https://support.microsoft.com/en-us/topic/media-feature-pack-list-for-windows-n-editions-c1c6fffa-d052-8338-7a79-a4bb980a700a

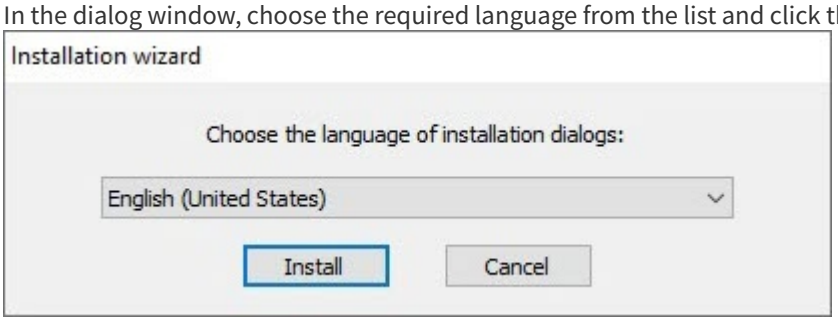
1. Open the *Axxon One* distribution package.



2. Run the **setup.exe** executable file.

> **Note**
>
> If you cannot run the installation files downloaded from the internet, allow running programs and unsafe files in Windows OS.

3. In the dialog window, choose the required language from the list and click the **Install** button.



4. Select the *Axxon One* installation type in the dialog window by selecting the appropriate option:
   a. **Server and client**—installation of the client and server services. We recommend selecting this type of installation if you use no more than five servers in one place that must work within the same domain.
   Axxon One server:
      i. Interacts with devices (cameras, microphones, inputs, outputs, and so on) that constitute a security system.
      ii. Stores archived data on its own disk spaces and interacts with archives located in network storage.
      iii. Stores databases of events and databases of object motion metadata.
      iv. Analyzes the incoming video using detectors.
      v. Keeps configurations of the security system, user settings, custom layouts, macros, and so on.

> **Note**
>
> The Windows OS will create two accounts when the *Axxon One* software package is installed using a **Server and client** type of configuration.
>
> 1. An account with administrator rights which is used by the *Axxon One* file browser. The name of this account is set during installation of *Axxon One*. For *Axxon One* to function correctly, this account must have Windows administrator rights. If the account is a domain user account, you must also add the account to the **Users** and **Power Users** groups. The file browser helps to navigate through the Server's file system (such as when choosing disks for log volumes). The account can also be used for configuring access rights to the hard disk.
> 2. Axxonpostgres – an account under which the log data database service is started. A log database (Postgres) is used for storing system events.

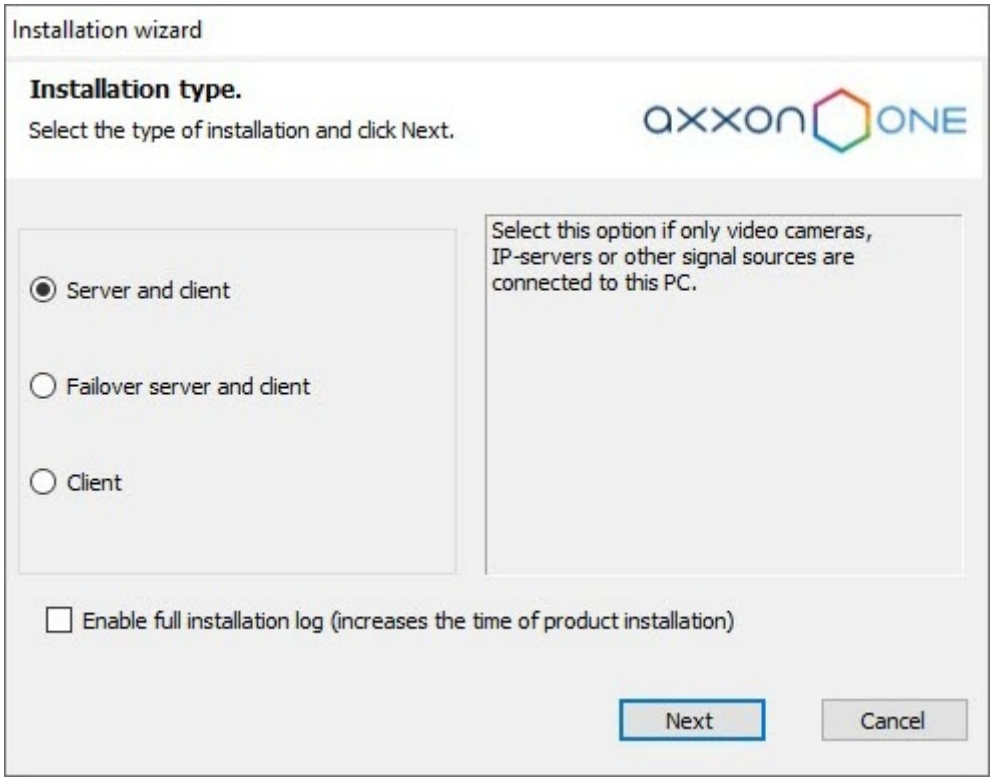
   b. **Failover server and client**—installation of the client and server services enhanced with the FailOver capability. In emergency (power outage, network problems), the FailOver technology restores the server configuration on

another server (see Configuring Failover VMS(see page 1064)). We recommend selecting this type of installation if you use from 5 to 30 (minimum 3) servers in one place that must work within the same domain.

Attention!

- For stable operation with more than 500 cameras on a single server, the **Failover server and client** (cluster type—independent nodes (see Creating and configuring independent nodes(see page 1079))) installation type is required.
- For stable operation with more than 1,500 cameras in a single *Axxon One* domain, the **Failover server and client** (cluster type—independent nodes (see Creating and configuring independent nodes(see page 1079))) installation type is required on all servers.

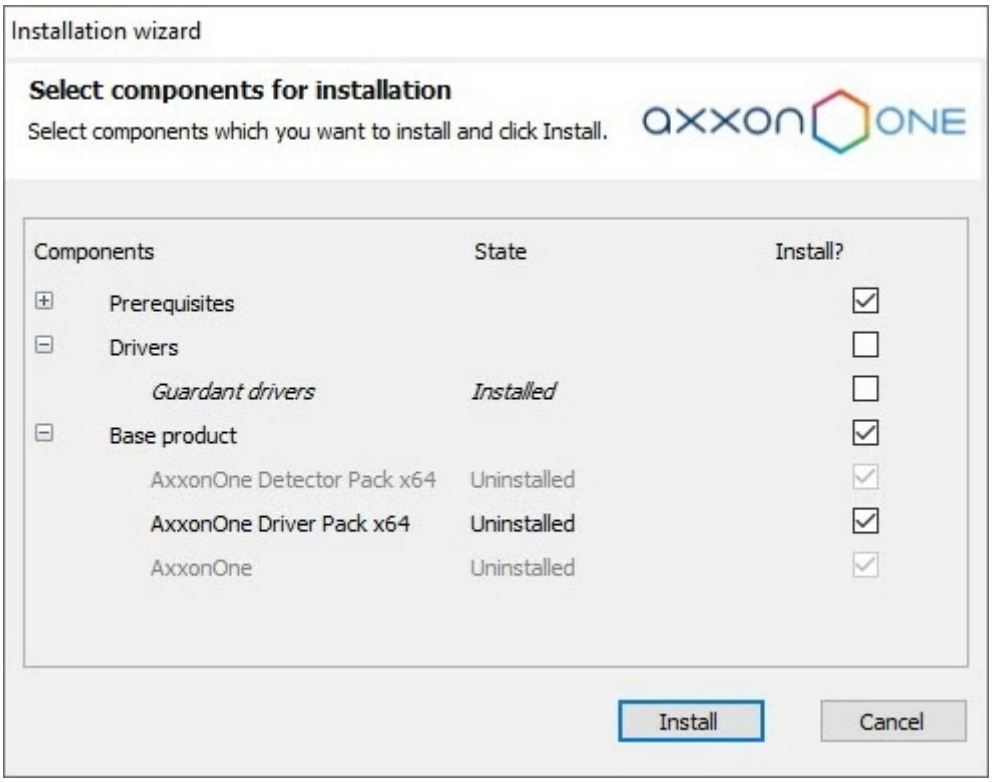
c. **Client**—installation of only the client that allows the user to connect to any server and perform administration/management/monitoring operations with the protected facility based on the permissions granted by the administrator.



Note

If you use more that 30 servers in one place or if they are located in different places, and you need to have a single user management on all servers, you must consult an AxxonSoft manager or technical support service.

5. Set the **Enable full installation log (increases the time of product installation)** checkbox if you want to record all installation-related events to a log file and control the entire installation process (all available windows described on the page will be displayed).
6. Click the **Next** button.
   A dialog window with a selection of components for installation opens.



Note

To view the list of components that will be installed, click ⊞.

Attention!

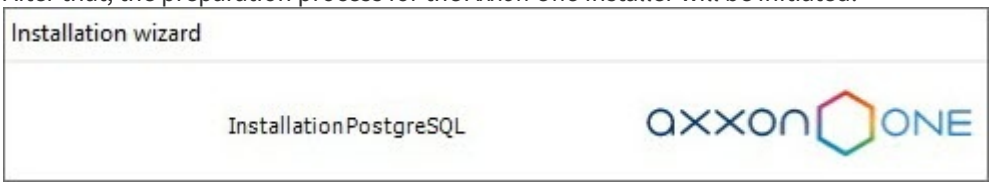
- In Windows 11 OS and Windows Server 2019 OS, errors can occur in the server operation when Guardant drivers are installed. We don't recommend installing Guardant drivers. Installation of Guardant drivers is disabled by default.
- For the correct installation of Guardant drivers, you must disable the check of the drivers digital watermark in the operating system and disable Secure Boot in BIOS.

7. Set the checkboxes next to the components that you want to install. We recommend installing all components.

Note

By default, the *Axxon One* distribution package includes only the basic *DetectorPack.* For the information on installing *DetectorPack* add-ons, see Installing DetectorPack add-ons(see page 321).

8. Click the **Install** button. All selected components will be installed. The installation process can take considerable time. After that, the preparation process for the *Axxon One* installer will be initiated.



Note

The following software is installed among the prerequisites:

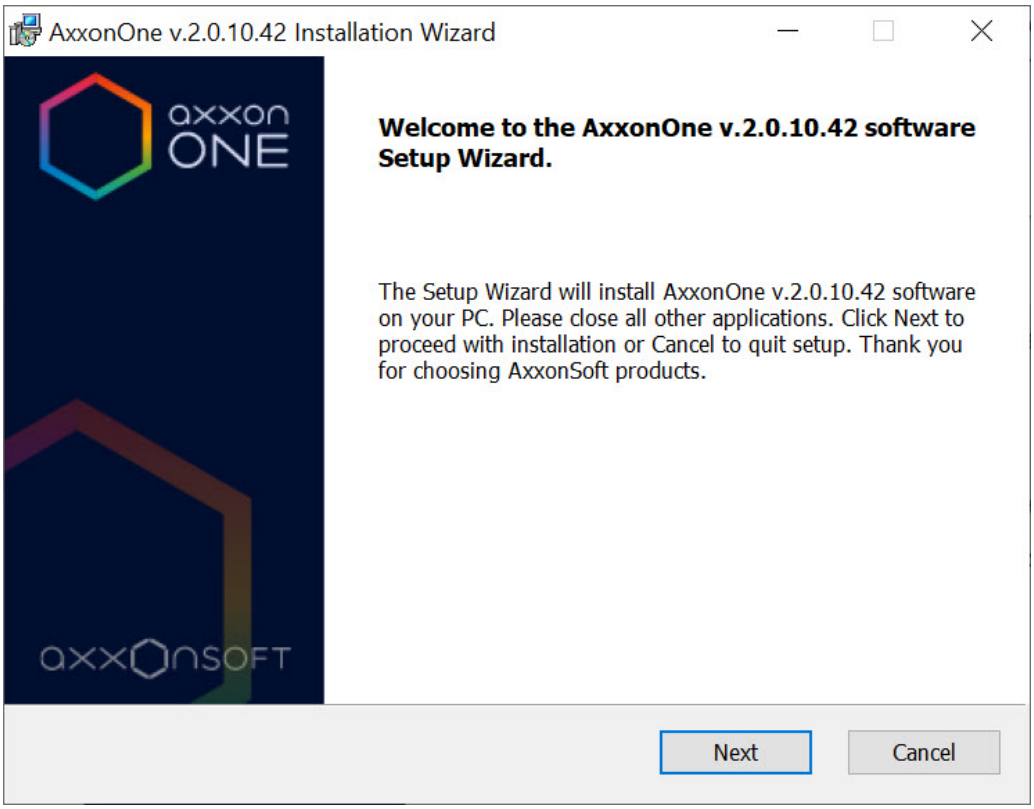
a. PostgreSQL 10.8.0 server database. If an older version of PostgreSQL is installed, it is updated to version 10.8.0. A new log database is automatically created (name: ngp, username: ngp, password: ngp). By

default, PostgreSQL is installed on the system disk. You can change the path using the command line options of the installation file (see Silent installation (Quiet Mode)(see page 120)).

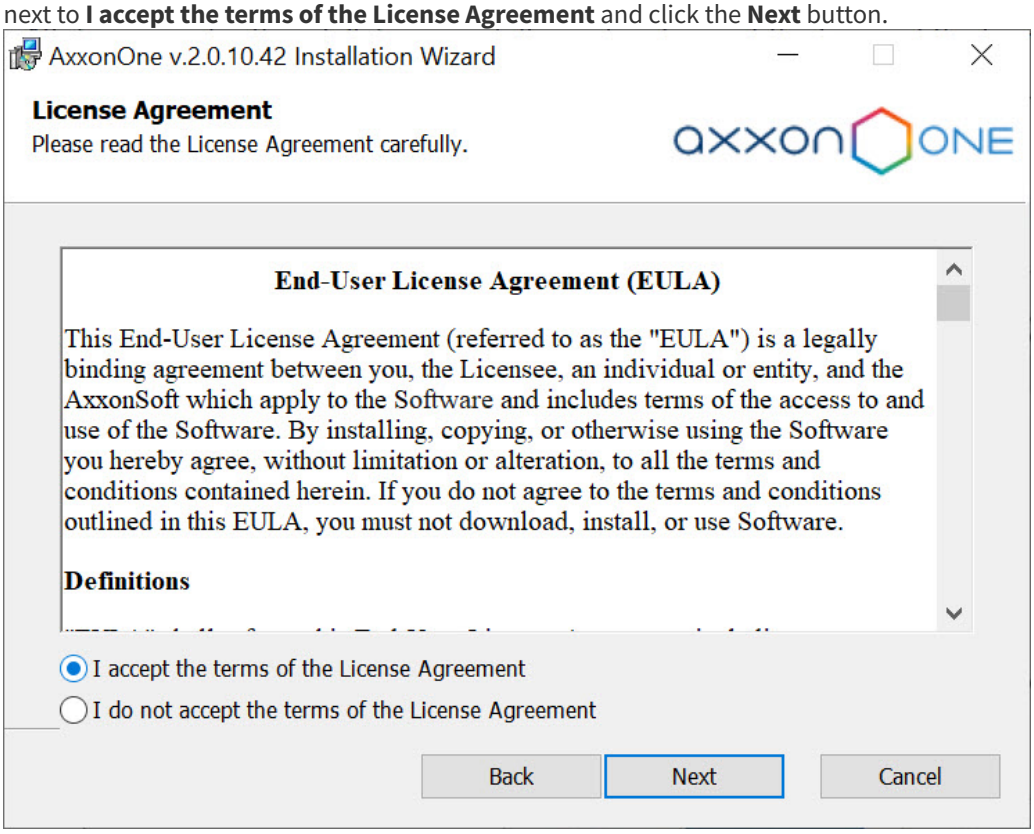
b. *NET Framework 2.0*, *.NET Framework 3.5 SP1* and *.NET Framework 4.0.*

c. Acrobat Reader that is necessary for viewing the exported frames in PDF format and printing them (see Frame export(see page 1307)).

9. Click the **Next** button in the welcome screen of Installation Wizard.



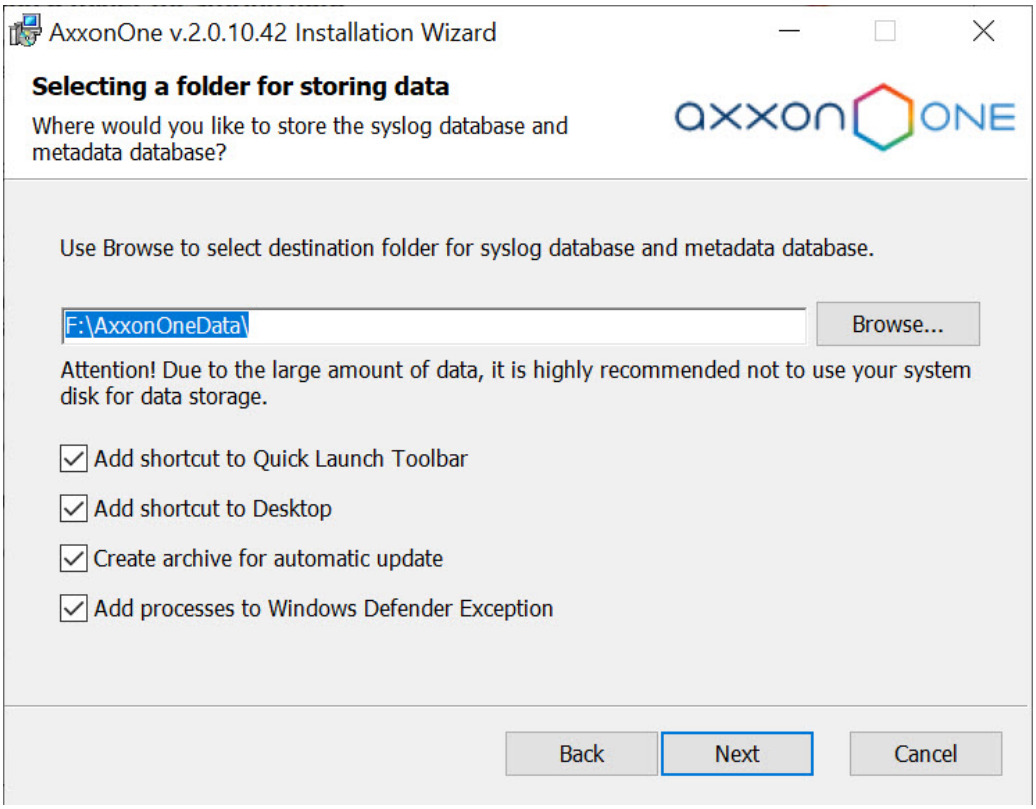
10. To proceed with installation, carefully read and accept the terms of the license agreement by selecting the radio button next to **I accept the terms of the License Agreement** and click the **Next** button.



11. Select the folder for storing the log database and the metadata database used in *Axxon One*.

Attention!

- The path to the folder for storing the system log database and metadata database:
  - can be specified only once during the installation process,
  - must contain only Latin letters and digits,
  - must be local.
- The default path is **<Drive letter with the largest amount of free memory>:\AxxonOneData** (in the **Data** and **vmda_db** subfolders, respectively). In future, you can place the metadata database in the network storage (see Data storage(see page 1009)). You can change the path by reinstalling *Axxon One* (without losing the configuration and video archive).
- To reduce the load on the system disk, we recommend storing the system log database and the metadata database on a separate physical disk.
- To calculate the required amount of disk space for the system log database, the metadata database and *Axxon One*, you can refer to Disk storage subsystem requirements(see page 88).

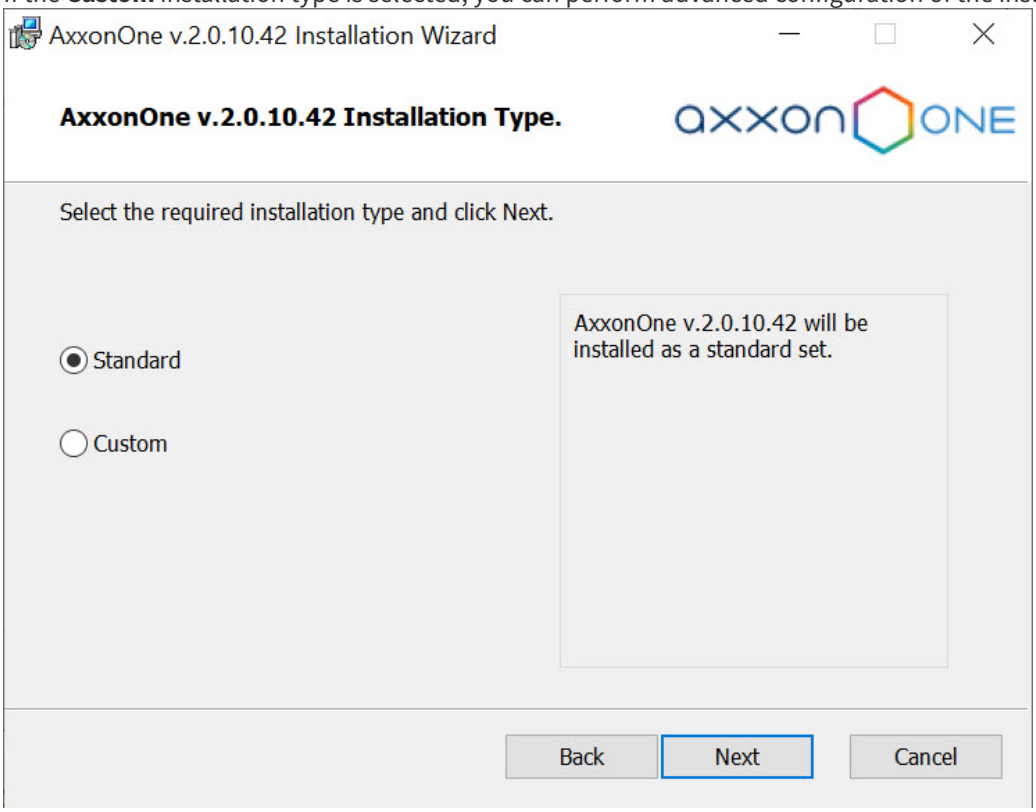


12. By default, shortcuts are added to both Quick Launch Toolbar and desktop. If it's not required, clear the **Add shortcut to Quick Launch Toolbar** checkbox and the **Add shortcut to Desktop** checkbox.
13. By default, upon connecting to the server, the client can be automatically updated (see Automatic update of a remote Client(see page 125)). If it's not required, clear the **Create archive for automatic update** checkbox. In this case, you can save *Axxon One* installation time, but the clients will not be automatically updated upon their connection to the server.
14. By default, the *Axxon One* processes are added to Windows Defender Exception. If it's not required, clear the **Add processes to Windows Defender Exception** checkbox.

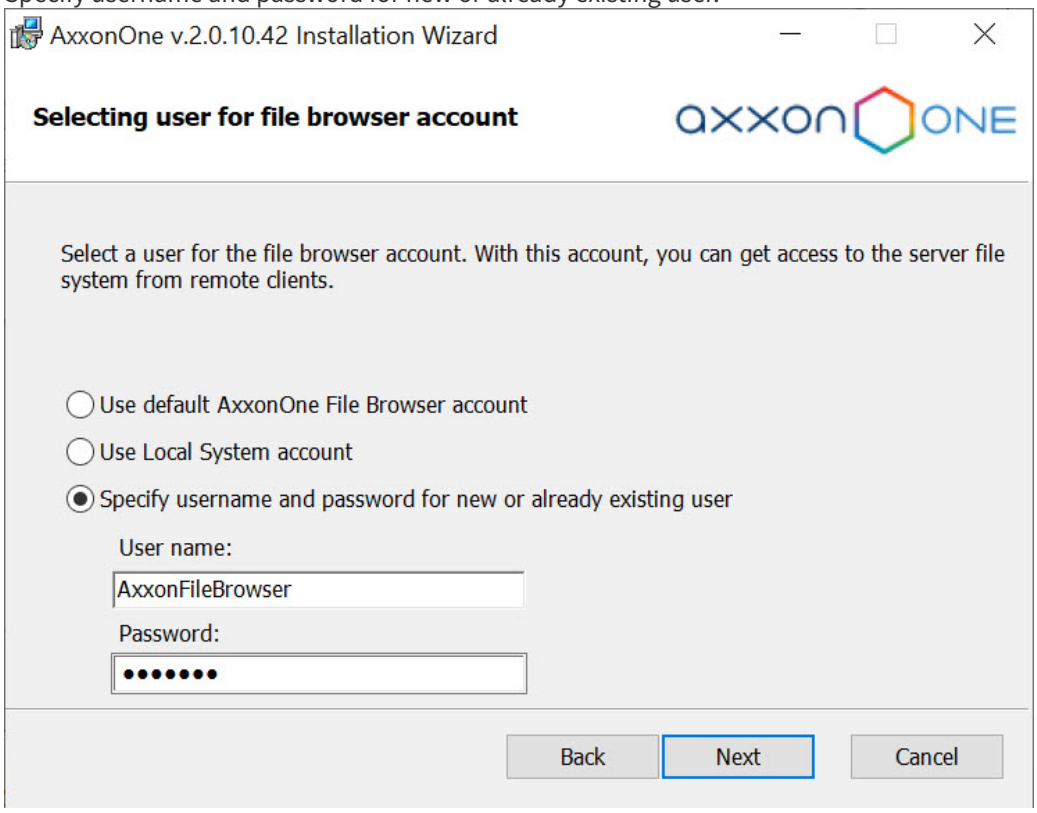
> **Note**
>
> The **Add processes to Windows Defender Exception** checkbox is available starting with *Axxon One* 2.0.8.

15. Click the **Next** button.
16. In the window that opens, select an installation type and click the **Next** button.
If the **Standard** installation type is selected, you are prompted to select an Axxon-domain (step 25). Default values will be used for other settings.

If the **Custom** installation type is selected, you can perform advanced configuration of the installation of *Axxon One*.



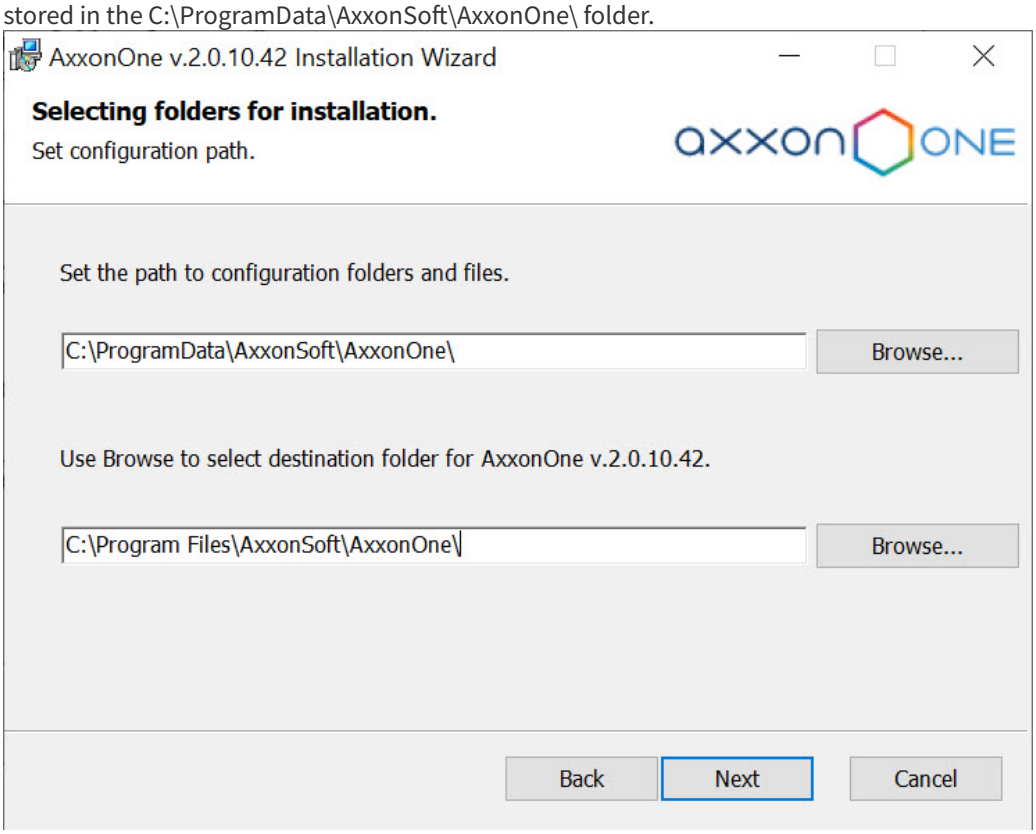
17. Select a user account in the file browser:
    a. Use default AxxonOne File Browser account.
    b. Use Local System account.
    c. Specify username and password for new or already existing user.



Attention!

- The file browser helps to navigate through the server's file system (such as when choosing disks for archive volumes). The user account for the Windows file browser is created with administrator permissions.
- After installation of *Axxon One*, make sure that a file browser account has been created in Windows and belongs to the Administrators group.

18. Specify the path to *Axxon One* folders and configuration files. By default, the files and folders of the configuration are stored in the C:\ProgramData\AxxonSoft\AxxonOne\ folder.

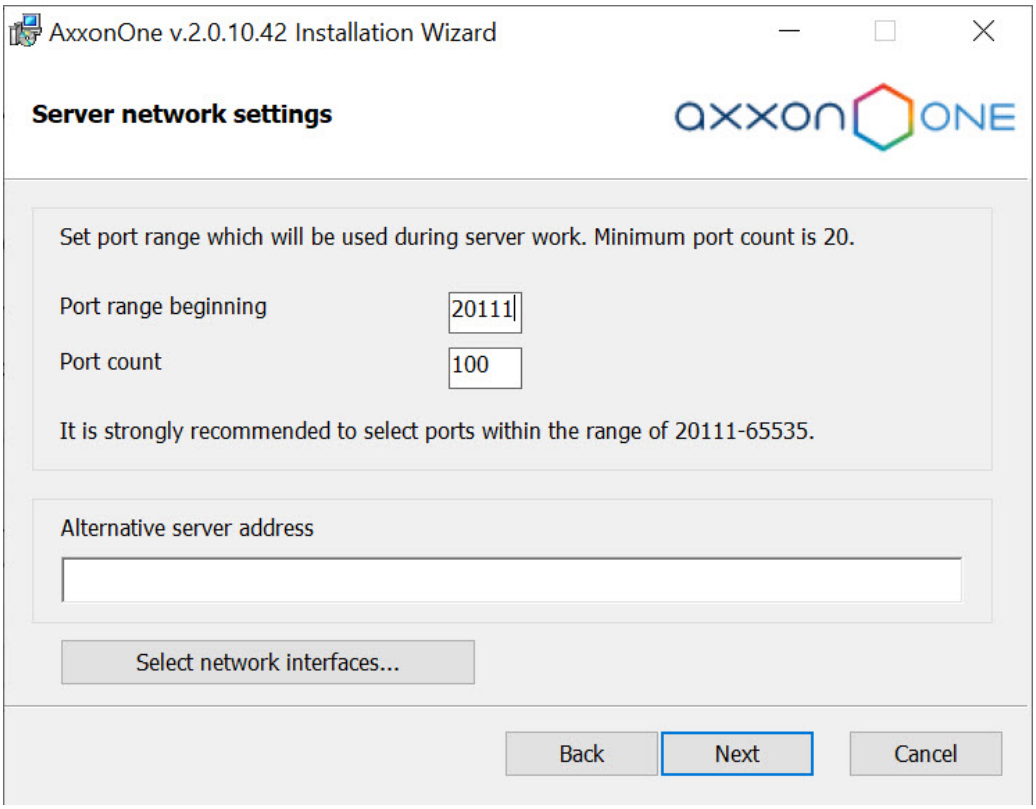


Attention!

The specified paths must contain only Latin characters and digits.

19. Specify the path to the folder for installing *Axxon One*. By default, *Axxon One* is located in the C:\Program Files\AxxonSoft\AxxonOne\ folder.
20. Click the **Next** button.
21. Specify the range of ports that are used for the server. To do this, specify the lower end of the range, as well as the number of ports. This range can be used by the local network administrator to forward the port manually[28] in cases when it is necessary to give the client access to the server from another network. The minimum possible number of ports is 20. For a full list of ports, see Ports used by Axxon One(see page 95). After you install *Axxon One*, you can change the range of ports manually (see Configuring the Server ports(see page 1014)).

28 https://en.wikipedia.org/wiki/Port_forwarding



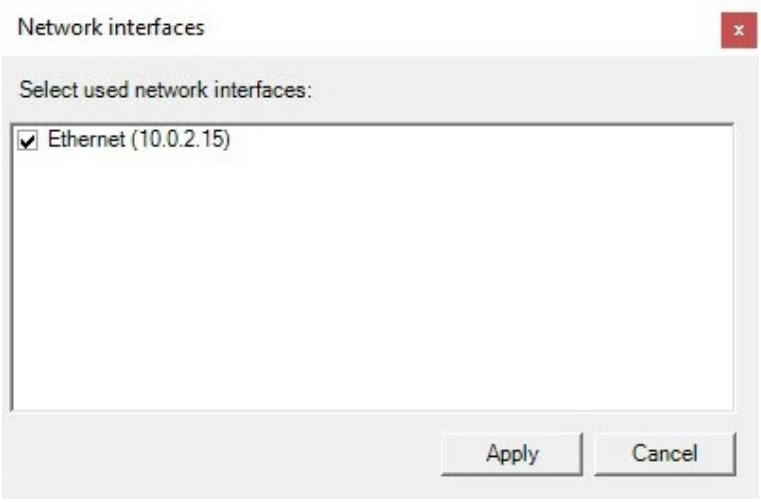
Note

Connected devices only work on ports from the specified range. If not enough ports are allocated, then some of the devices may not work or can be unstable.
The number of ports that you select affects the scalability of the system. Keep the following in mind when specifying the number of ports:

- After the server is installed, it occupies **10 ports**, including one for sending emails (via the SMTP service, see Email notifier(see page 231)).
  Attention! The **Failover server and client** installation type (see Configuring Failover VMS(see page 1064)) uses 9 base ports and preset port ranges for each node (see Ports used by the FailOver system(see page 1065));
- In a 64-bit configuration, **4 ports** are required for any number of IP devices. In a 32-bit configuration, **4 ports** are required for each **32 cameras**;
- Each archive requires **1 port**;
- **1 port** is required for viewing archive in the web client;
- **2 ports** are required for each decoded video stream on the currently opened layout in the web client;
- **2 ports** are required for mobile client;
- **2 ports** are required for any number of speakers in the system (see The Speaker object(see page 228));
- **1 port** is required for recording metadata into the database;
- **2 ports** are required for operation of service detectors;
- **2 ports** are required for operation of scene analytics detectors;
- **2 ports** are required for operation of scene analytics detectors based on Neural tracker;
- **2 ports** are required for operation of Neural counter.

22. If necessary, specify an alternative server address—the external address of the switch if the server is behind the NAT[29]. Interface specification format: "IP address1 or DNS name1, IP address2 or DNS name2".
23. To restrict visibility of the servers on particular networks in the list of servers during *Axxon One* configuration, do the following:
    a. Click the **Select network interfaces** button. The **Network interfaces** window opens.

29 https://en.wikipedia.org/wiki/NAT



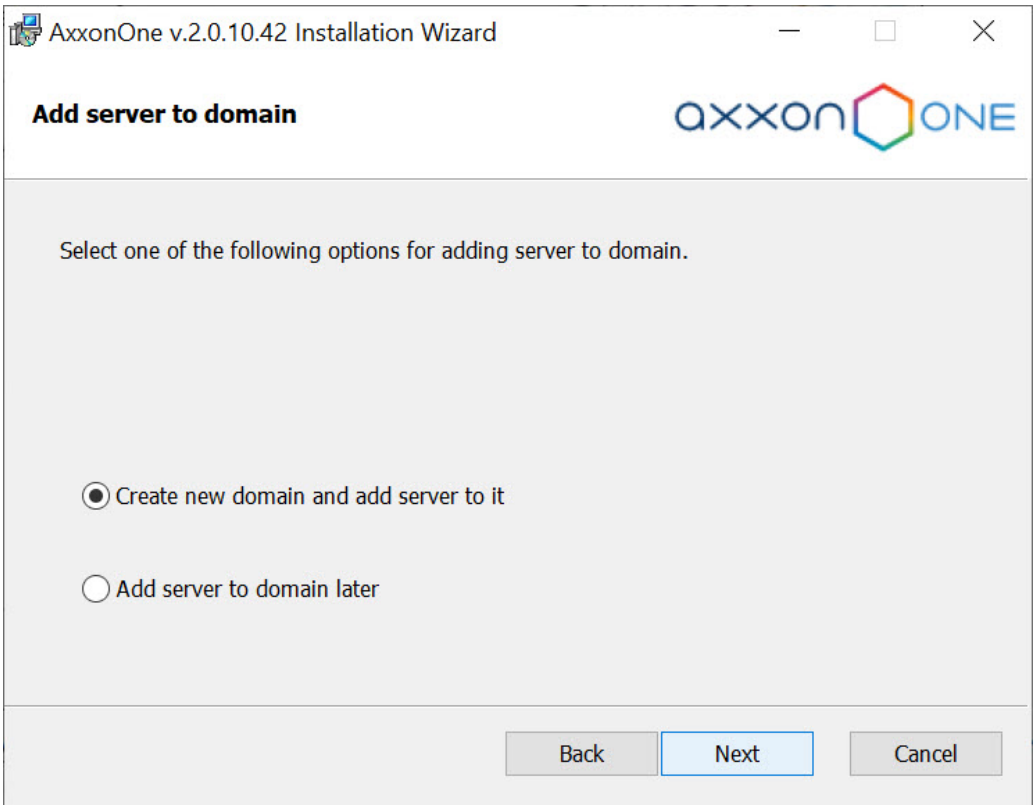
b. By default, use of all available network interfaces on the server is allowed, meaning that servers on the relevant networks are visible in the list. If you don't want for the servers on the networks of certain network interfaces to be visible in the list, clear the relevant checkboxes.

> **Note**
>
> Depending on the network topology, it is still possible to reach the servers manually (if broadcasting is allowed between the network segments).

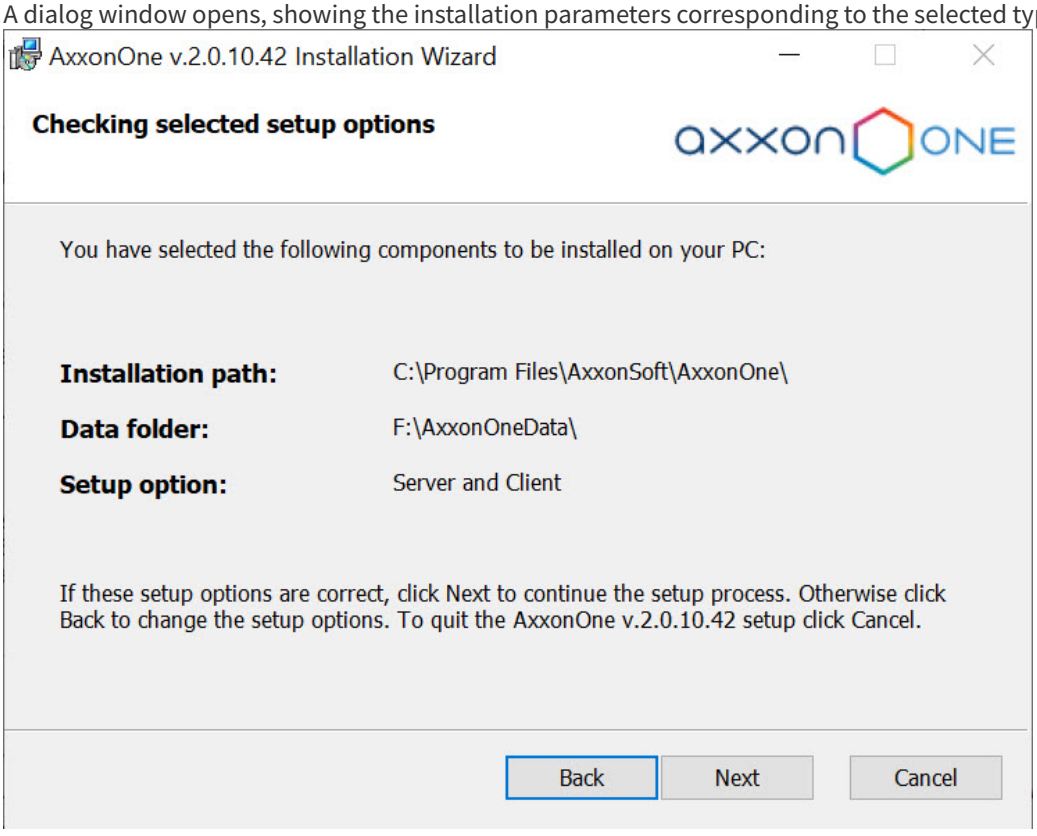
c. Click the **Apply** button.

24. Click the **Next** button.
25. Create a new Axxon-domain with the name **Default** (for the definition of an Axxon-domain see Appendix 1. Glossary(see page 1426)). If you want to add the computer to an Axxon-domain at a later time, select **Add server to domain later**. Click the **Next** button.

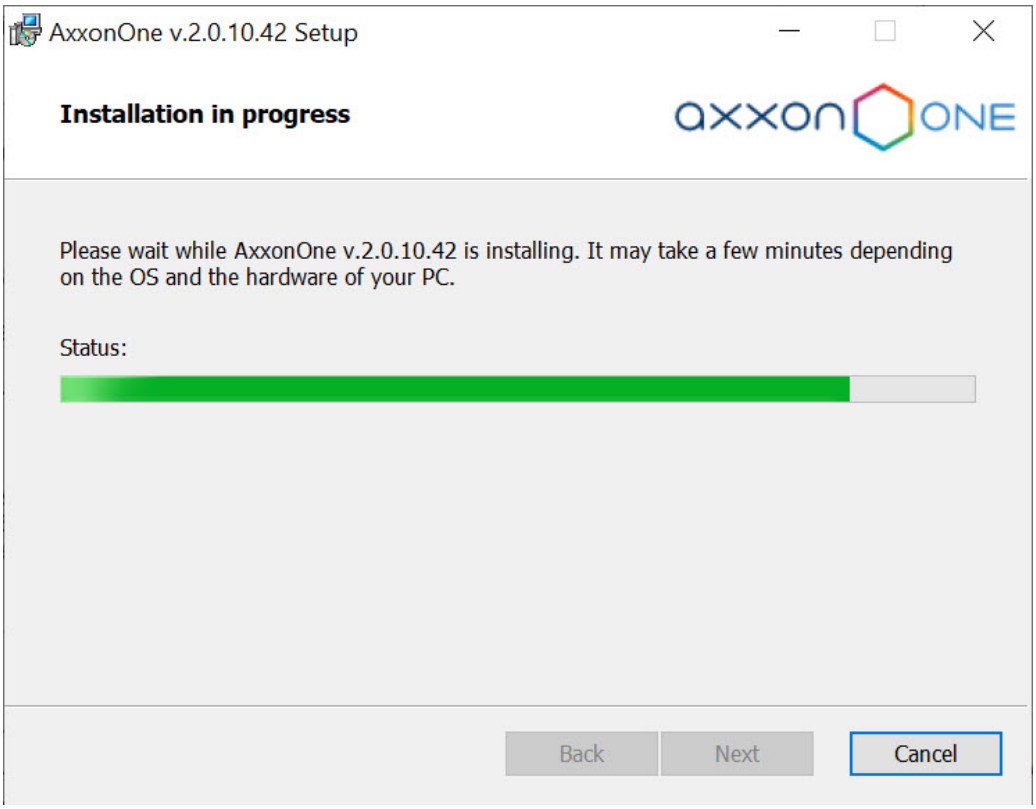
> **Note**
>
> - When reinstalling *Axxon One*, you have the option of using the previous domain (select **Use existing configuration**).
> - Using the same Axxon-domain name doesn't guarantee that the servers will be in the same Axxon-domain. To place all servers into one Axxon-domain, you must use *Axxon One* interface to add each server to the necessary Axxon-domain. Axxon-domain configuration is described in detail in Configuring domains(see page 151).



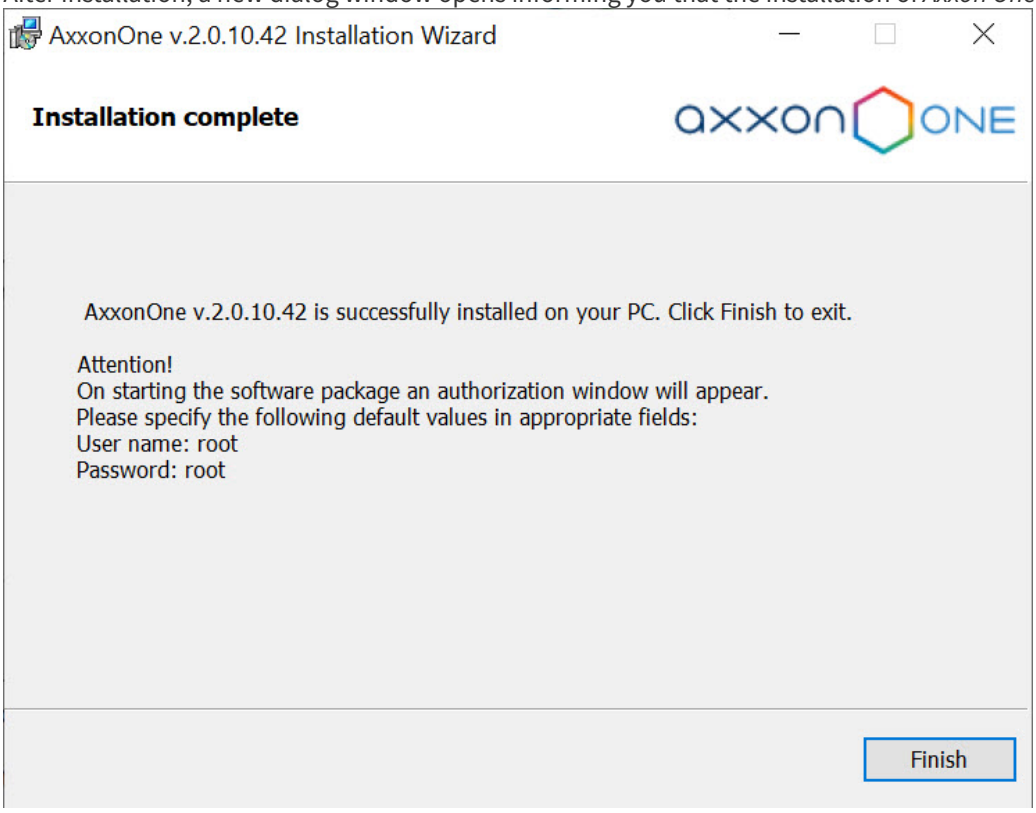
A dialog window opens, showing the installation parameters corresponding to the selected type of installation.



26. Verify your installation settings and click the **Next** button to begin installation of *Axxon One*. Installation of *Axxon One* is then performed.



After installation, a new dialog window opens informing you that the installation of *Axxon One* is complete.



27. Click the **Finish** button to confirm completion of the installation.

Installation of *Axxon One* is complete.

- Installing Axxon One in Linux OS[30]
- Migrating a configuration from Windows OS to Windows OS(see page 1408)
- Migrating a configuration from Windows OS to Linux OS(see page 1407)
- Migrating a configuration from Linux OS to Windows OS(see page 1407)
- Migrating a configuration from Linux OS to Linux OS(see page 1406)

16.2.1.1 Possible errors during installation

On the page:

- Error installing Drivers Pack(see page 111)
- Error connecting to the Postgres Database(see page 112)
- Server error on Windows 11 OS and Windows Server 2019 OS(see page 112)
- Guardant drivers compatibility issue(see page 112)
- Window 10 OS installation error(see page 113)
- An error occurred when installing on Windows with the language pack Norsk (bokmål)(see page 113)

Error starting NGP Host Service

If port 20111 is busy during installation of *Axxon One* (for example, because of nethost.exe processes that have not been unloaded since removal of the previous version), an error message regarding the launch of NGP Host Service appears.

To continue installation, free up port 20111 and try again.

16.2.1.1.1 Error installing Drivers Pack

In some cases, you may encounter errors while installing *Drivers Pack*:

```
Installation failed because the Universal C Runtime is not installed. Please run
Windows Update and install all required Windows updates(KB2999226). You can download
the UCRT separately from here: 'https://support.microsoft.com/en-us/kb/2999226'.
```

This can be solved by installing the Windows update KB2999226[31].

30 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486750/Installing+Axxon+One+in+Linux+OS
31 https://support.microsoft.com/en-us/help/2999226/update-for-universal-c-runtime-in-windows

16.2.1.1.2 Error connecting to the Postgres Database

After installation of the Postgres database, the *Axxon One* installer may quit prematurely. This situation may be associated with the inability of the installer to connect to the Postgres database, if the firewall is enabled. To prevent this, disable your firewall during installation.

Note

Disabling the firewall during installation can cause another problem—see Camera(see page 171).

16.2.1.1.3 Server error on Windows 11 OS and Windows Server 2019 OS

On Windows 11 OS and Windows Server 2019 OS errors may occur in the Server operation when Guardant drivers are installed. It is recommended not to install Guardant drivers. Installation of Guardant drivers is disabled by default.

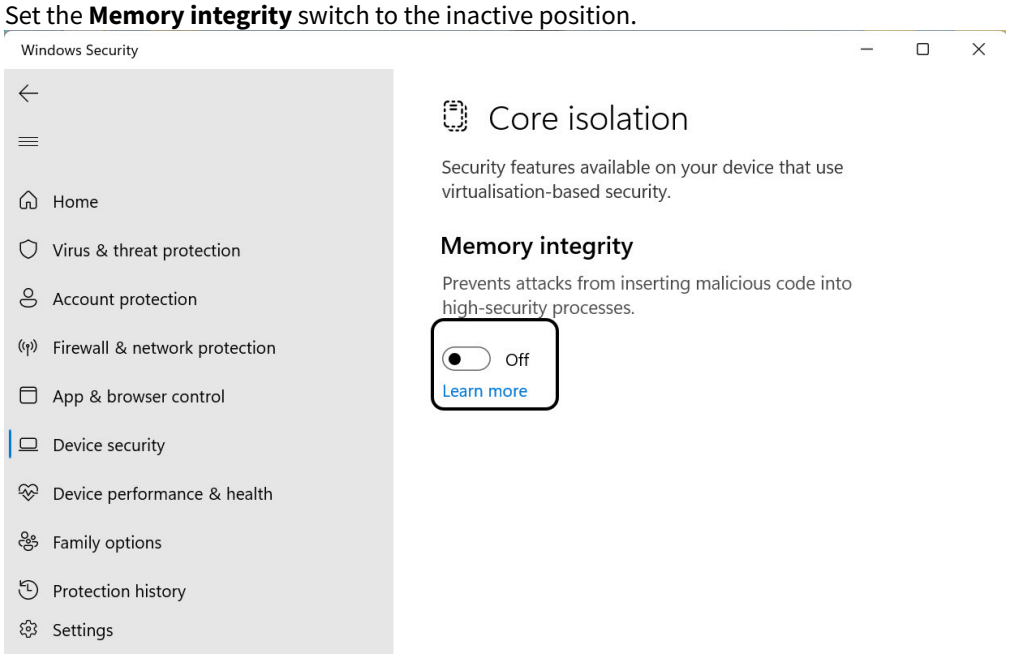
For the correct installation of Guardant drivers, it is necessary to disable the check of the drivers digital signature in the operating system and disable Secure Boot in BIOS.

16.2.1.1.4 Guardant drivers compatibility issue

When you install *Axxon One*, a Guardant driver compatibility issue may occur (**grdkey.sys** or **grdusb.sys** file error).

To fix the error, do as follows:

1. Disable **Memory integrity**:
   a. Open **Windows Security Center** → **Device security**.
   b. In the **Core isolation** section, click the **Core isolation information** link.
   c. Set the **Memory integrity** switch to the inactive position.



   d. After you complete these steps, restart your computer to apply the changes.
2. Disable **Device Guard**:
   a. Using the command line, run the gpedit.msc command to launch the **Local Group Policy Editor**.
   b. Go to **Computer Configuration** → **Administrative Templates** → **System** → **Device Guard** → select **Enable virtualization-based security** on the right.
3. After you disable these options, restart your computer and reinstall the current version of Guardant drivers.

Attention!

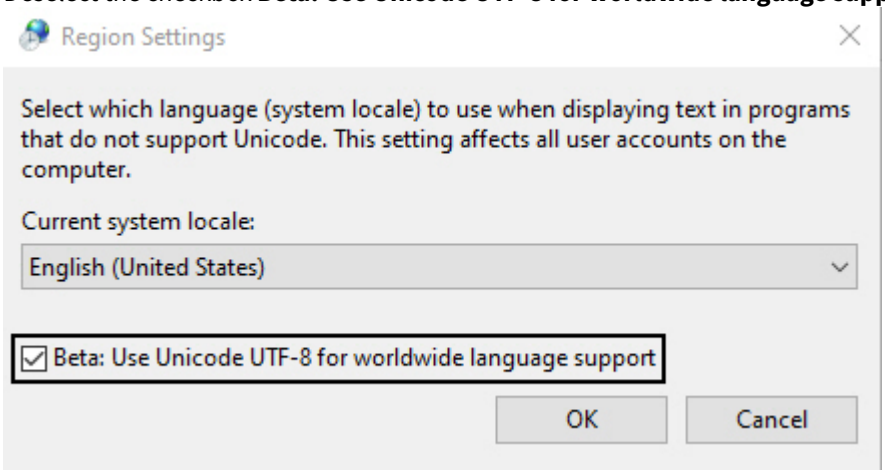
If you use modern Guardant keys (Sign/Sign Net/Time/Code), you can contact the developer of the protected application and request to switch the key to driverless mode (see the official Guardant documentation[32]). In this case, it will not be necessary to install the Guardant Driver on your computer to work with the key.

16.2.1.1.5 Window 10 OS installation error

When you install *Axxon One* on Windows 10.0.17763 and up you may see the Create Recovery Archive error message.

To fix the error, do as follows:

1. Go to Control Panel → Clock and Region → Region → Administrative tab → Change System Locale.
2. Deselect the checkbox **Beta: Use Unicode UTF-8 for worldwide language support**.



3. Reinstall *Axxon One*.

16.2.1.1.6 An error occurred when installing on Windows with the language pack Norsk (bokmål)

Installing the *Axxon One* Server on Windows with the language pack Norsk (bokmål) is not possible due to incompatibility with PostgreSQL.

You must install Norsk Language Pack (nynorsk).

16.2.2 Using Axxon One with antivirus software

On the page:

- ESET NOD32(see page 114)
- ESET NOD32 Internet Security(see page 114)
- ESET Smart Security(see page 114)
- AVG(see page 114)
- DrWeb(see page 114)

To ensure the correct operation of *Axxon One*, it is recommended to configure the antivirus as follows:

1. Add the following processes to the exclusion list:
   a. consul.exe;
   b. nomad.exe;
   c. apphost.exe;

32 https://dev.guardant.com/display/PUB/HID+mode

   d. postgres.exe.
2. Add the following folders to the exclusion list:
   a. C:\ProgramData\AxxonSoft\Axxon One;
   b. C:\Program Files\AxxonSoft\Axxon One;
   c. C:\Program Files\Common Files\AxxonSoft;
   d. Postgres and metadata folders if they were changed during installation.
3. Add the following ports to the exclusion list:
   a. 20109-20210;
   b. 4000 (only for the **Failover server and client** installation type);
   c. 4646-4648 (only for the **Failover server and client** installation type);
   d. 8300-8302 (only for the **Failover server and client** installation type);
   e. 8500 (only for the **Failover server and client** installation type);
   f. 8600 (only for the **Failover server and client** installation type).

Depending on the antivirus software that you use, when you install, start, and use *Axxon One*, your antivirus software may ask for permission for the software components to perform Internet access.

It is recommended that you allow these components to do so for proper functioning of the application.

Recommendations for the specific antivirus programs are given below.

16.2.2.1 ESET NOD32

If you use ESET NOD32 antivirus, it is strongly recommended to either disable the Web Access Protection service, or add the IP addresses of the IP cameras to the list of exclusions for antivirus scanning.

See also Starting the client(see page 138).

16.2.2.2 ESET NOD32 Internet Security

If you use ESET NOD32 Internet Security antivirus, if the SSL/TLS protocol filtering is enabled, it is strongly recommended to either add the certificate file to the list of known certificates, or add the Axxon One.exe app to the list of exclusions for antivirus scanning.

16.2.2.3 ESET Smart Security

If you use ESET Smart Security antivirus, select automatic mode with exclusions for Firewall and add the remote Servers to the exclusions by creating network rules (for help with creating these rules, refer to the official user guide for the antivirus software).

16.2.2.4 AVG

When you install *Axxon One*, allow the NetHost.exe and ngpsh.exe processes to run.

If you use AVG antivirus and a configuration with many video cameras, it is strongly recommended to add the IP addresses of the IP cameras to the list of exclusions. Otherwise, the avgsa.exe process may severely slow down the CPU.
This action can be performed only on the paid version of AVG.

16.2.2.5 DrWeb

If you use DrWeb antivirus, do the following before installing *Axxon One*:

1. Disable the automatic start of the DrWeb firewall.
2. In the proactive protection settings, select the option to use custom settings and enable the following options:
   a. Allow low-level disk access
   b. Allow system services
   c. Allow loading drivers
   d. Allow User drivers
   e. Allow Winlogon shell parameters
3. In the SpiDer Gate settings, add the apphost.exe and Axxon One.exe processes to the list of exclusions for scanning of incoming traffic. If possible, it is recommended to disable scanning of incoming and outgoing traffic.

16.2.3 Restoring

A repair installation is used to re-install all components of *Axxon One*.

To start a repair installation, launch *Axxon One* without removing the current installed version of the program.

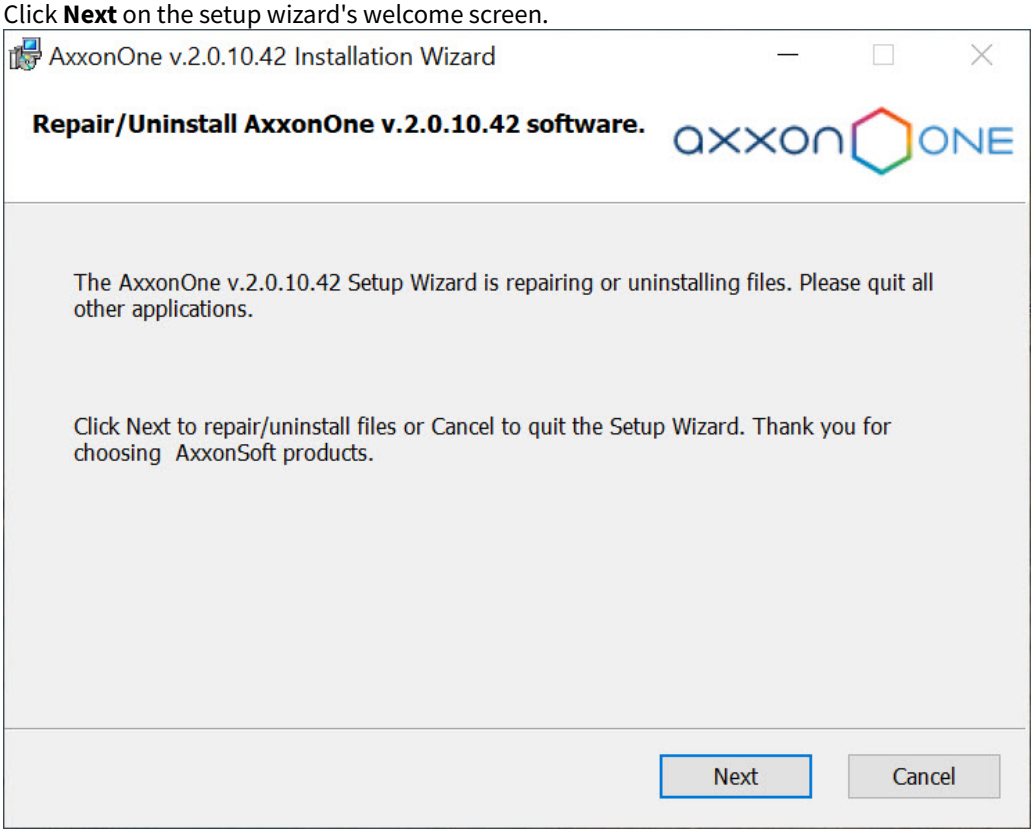
> **Note**
>
> To ensure that *Axxon One* is re-installed correctly, all related applications must be closed before starting the repair installation.

You can run the *Axxon One* repair installation via one of the following methods:

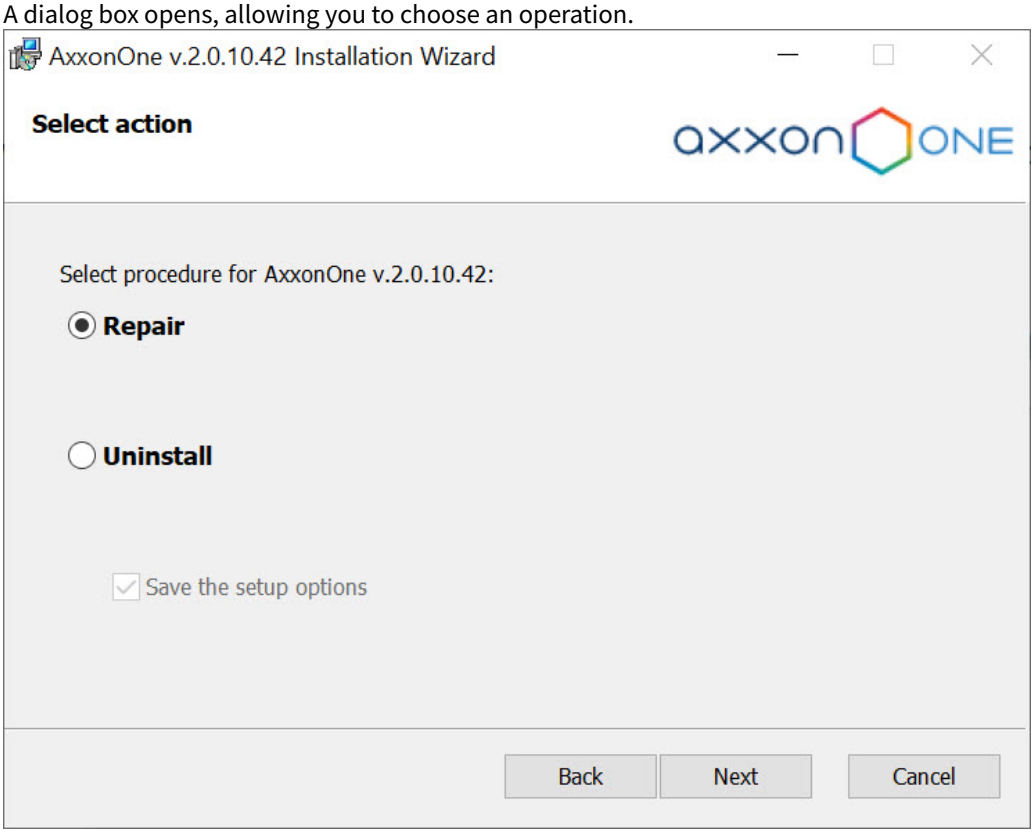
1. From the **Start** menu.
2. Using **Add or Remove Programs** in the Windows control panel.

When you do this, the setup wizard's welcome screen appears. To start a repair installation, you must observe the following procedure:

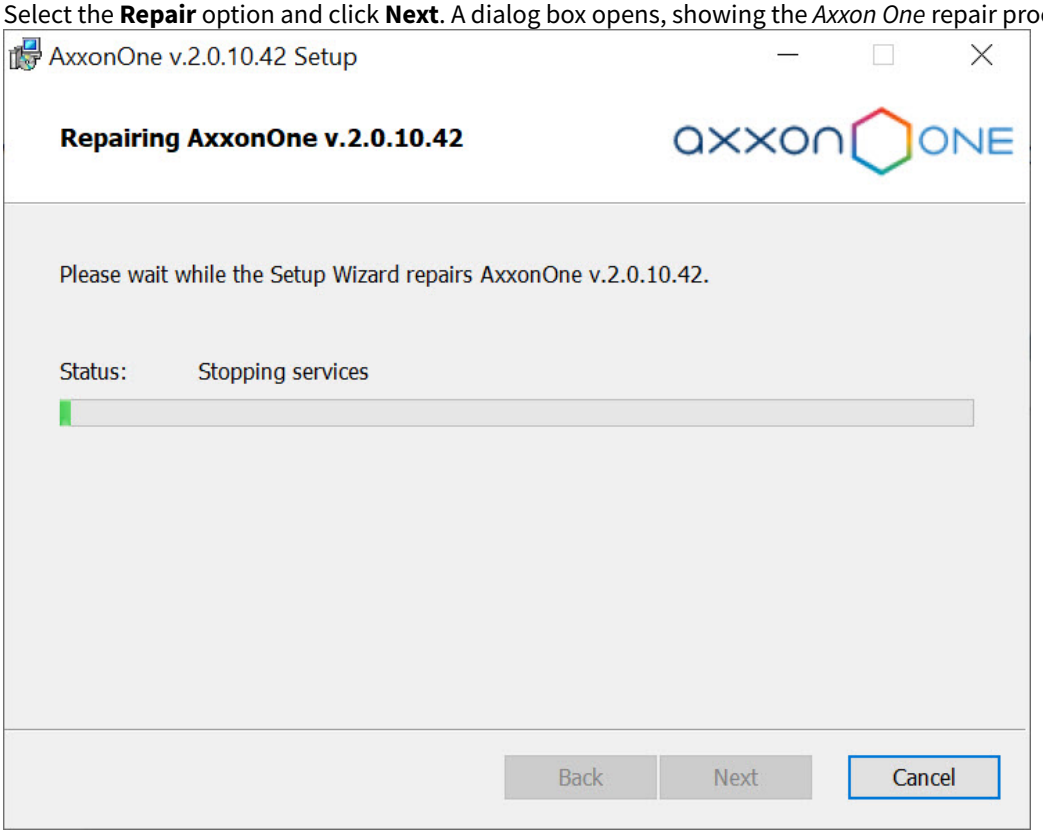
1. Click **Next** on the setup wizard's welcome screen.



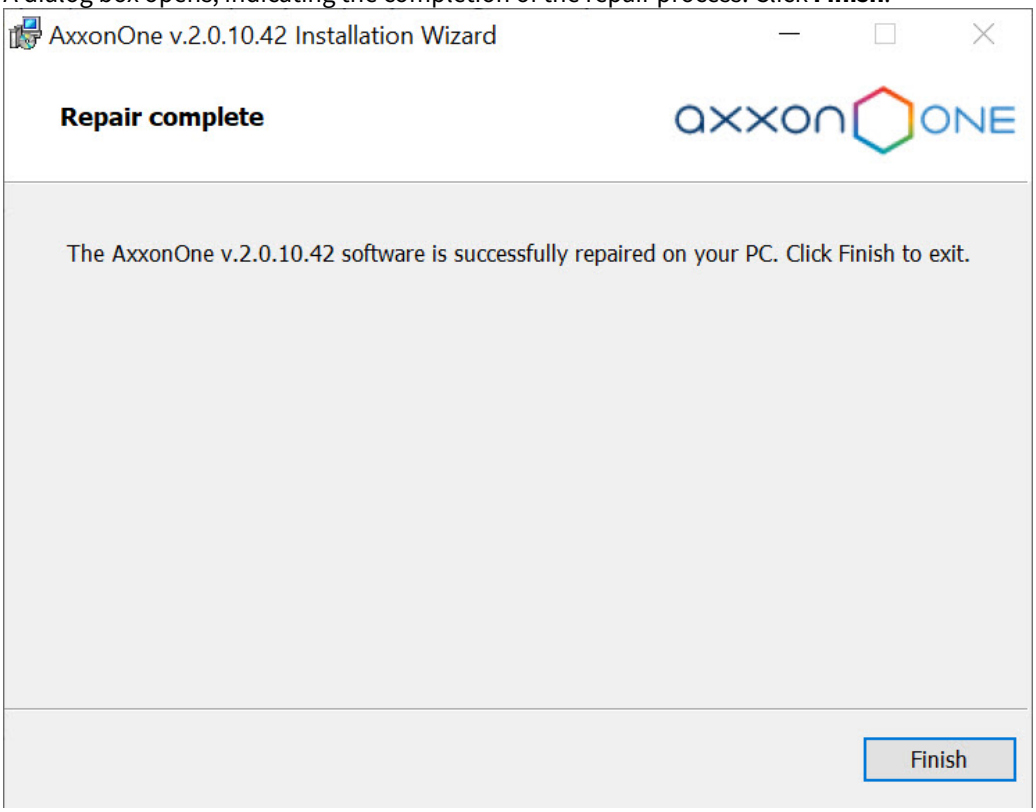
A dialog box opens, allowing you to choose an operation.



2. Select the **Repair** option and click **Next**. A dialog box opens, showing the *Axxon One* repair process.



3. A dialog box opens, indicating the completion of the repair process. Click **Finish**.



4. Restart the system in order for the configuration changes made to *Axxon One* to take effect.

Repair of *Axxon One* is now complete.

16.2.4 Removal

The *Axxon One* installation program can also remove the software. Use this option when you need to remove all components of *Axxon One* from your computer.

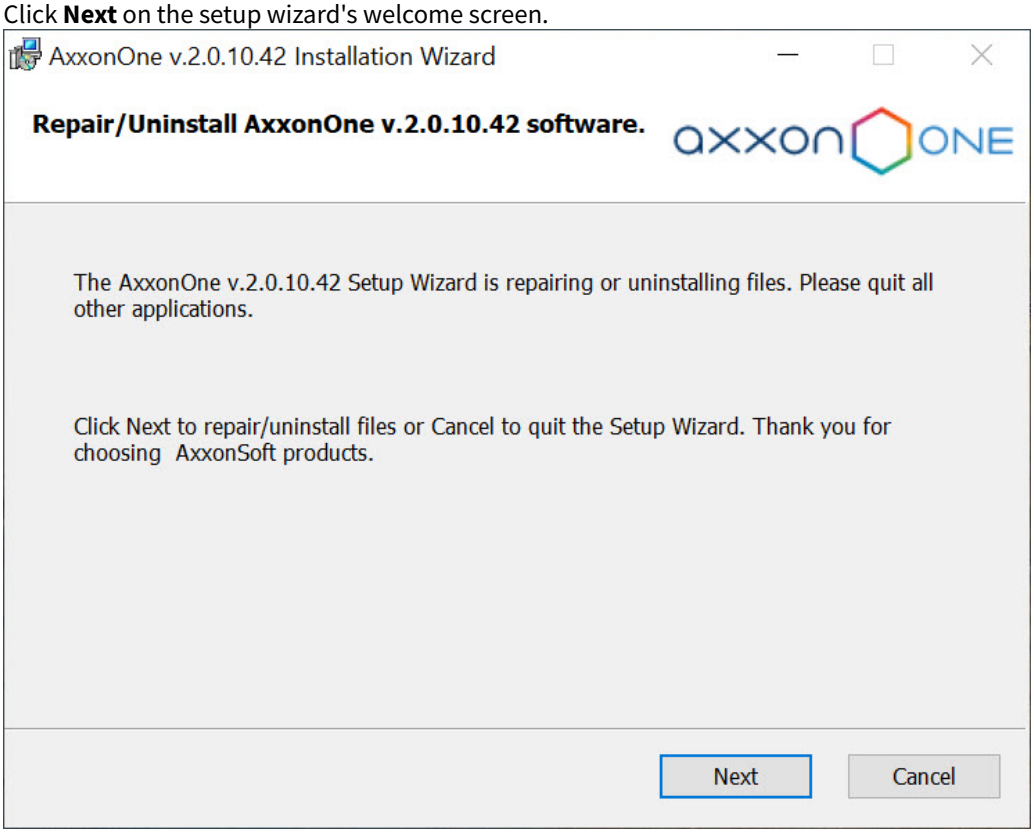
> **Note**
>
> All related applications must be closed before beginning removal of the *Axxon One* software.

You can run the *Axxon One* uninstaller via one of the following methods:

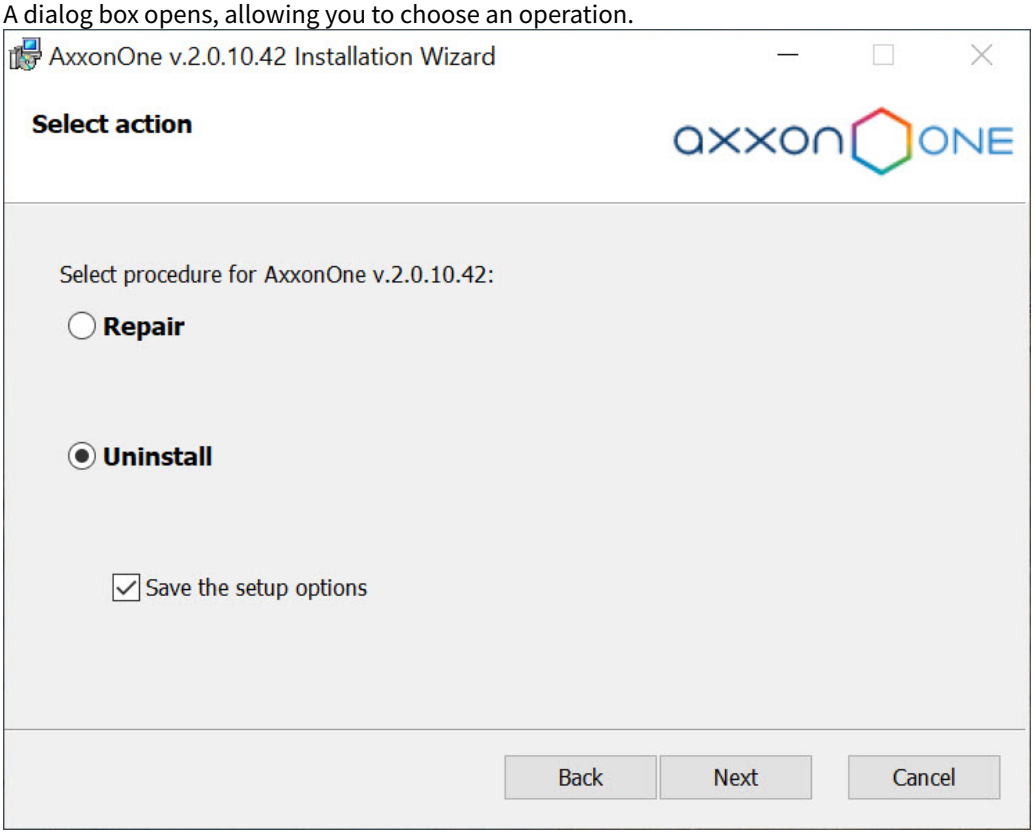
1. From the **Start** menu.
2. Using **Add or Remove Programs** in the Windows control panel.
3. By starting the executable file named setup.exe, which is included with the installed version of the product.

When you do this, the setup wizard's welcome screen appears. To remove *Axxon One*, you must observe the following procedure:

1. Click **Next** on the setup wizard's welcome screen.

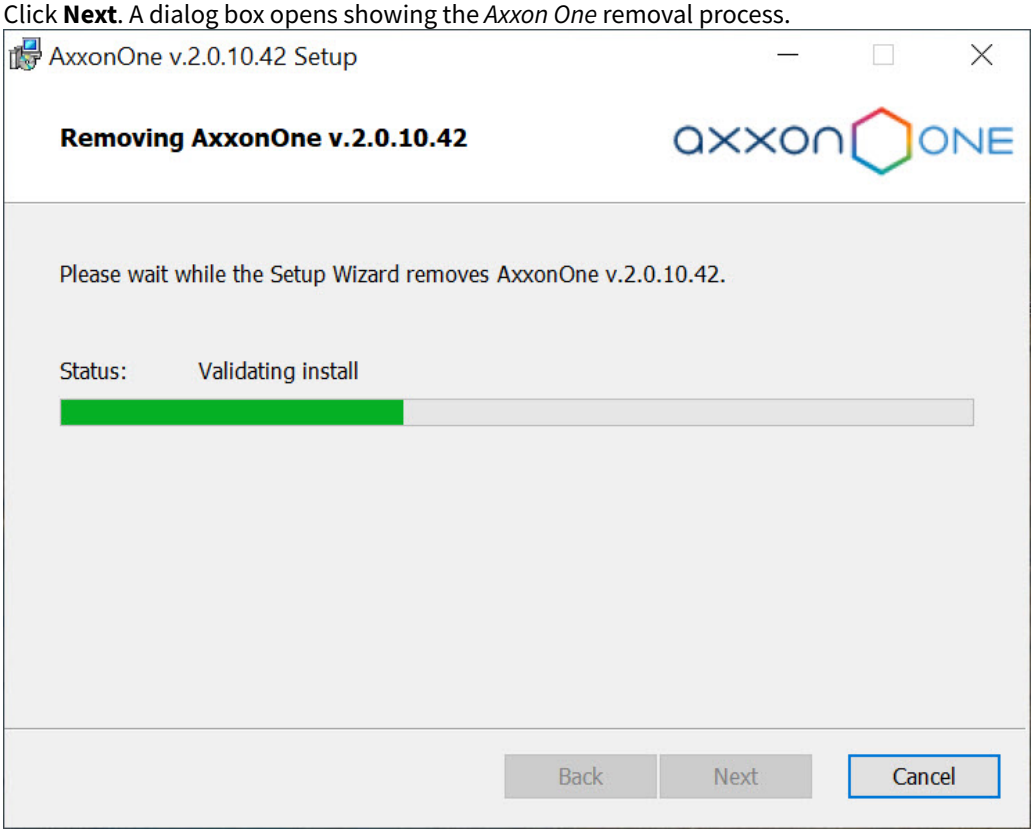


A dialog box opens, allowing you to choose an operation.

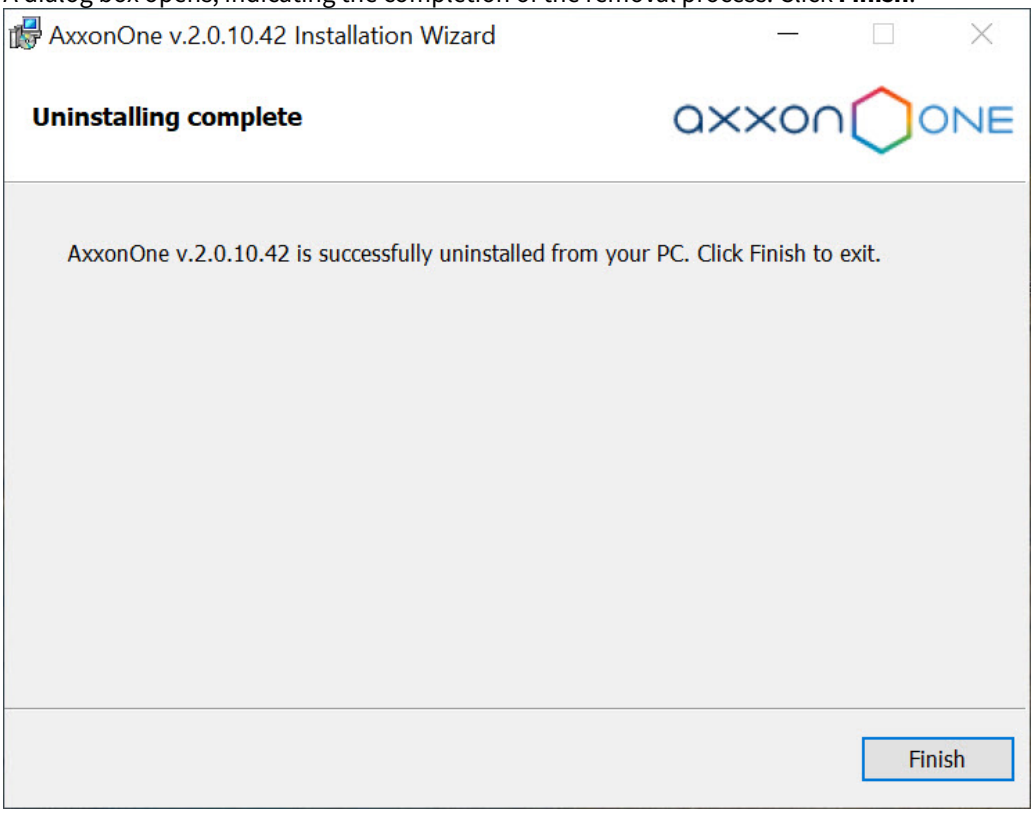


2. Select **Uninstall**.
3. To save your *Axxon One* settings in a database, set the **Save the setup options** checkbox. This option can be useful when updating the product.

4. Click **Next**. A dialog box opens showing the *Axxon One* removal process.



5. A dialog box opens, indicating the completion of the removal process. Click **Finish**.



Removal of *Axxon One* is now complete.

Note

To completely remove *Axxon One*, use the Windows Control Panel to remove the following software:

1. Postgres NGP.
2. DetectorPack.
3. Axxon Drivers Pack.
4. Guardant Drivers.

16.2.4.1 Possible errors during removal

On the page:

- Error uninstalling Axxon One on systems with Videoinspector installed(see page 120)

16.2.4.1.1 Error uninstalling Axxon One on systems with Videoinspector installed

In some cases, uninstalling *Axxon One* may be impossible if *Videoinspector* is used.

To correctly uninstall *Axxon One*, first uninstall *Videoinspector.*

16.2.5 Silent installation (Quiet Mode)

You can run *Axxon One* installation in quiet mode (unattended setup with no user intervention).

Note

During installation you may have to reboot the system. After rebooting the installation will continue automatically.

When Redist.exe process ends and not listed in Windows Task Manager, the installation is complete.

This mode of installation can be configured by adding command-line options to setup.exe. See the command-line options in the table.

Command-line option	Description
/? or /help	Open the Help window
/x or /uninstall	Remove *Axxon One* and save the configuration
/x/removeall	Remove *Axxon One* and delete the configuration
/r or /repair	Repair *Axxon One*
/qn or /quiet	Silent install
/norestart	Disable automatic reboot of the system during installation
/debug	Log installation

Command-line option	Description
/noOSCheck	Skip OS compatibility check
/postgresinstalldir="D:\Postgres"	PostgreSQL installation folder
/LANG=”en”	Select installation language: For example, en—English
/INSTALLTYPE="ServerClient"	Installation options: • ServerClient—**Server and Client** (default), • raftServer—**Failover Server and Client**, • **Client**
/ADD="[]"	Hers is the list of components to install or remove (if you remove/uninstall software). See the possible values in the table below
/REMOVE="[]"	Hers is the list of components NOT to install or remove (if you remove/uninstall software). See the possible values in the table below
/dpcmd="INSTALL_BOSCH_VIDEOSDK=\"no\""	**Bosch VideoSDK** driver Installation (see notes). • no—do not install, • yes—install
/CMD="[commands]"	Basic installation options and values. Commands are [option] = \ "[value] \" or [option] = [value]" . See available installation options in the table below

Attention!

Occasionally, when installing the **Bosch VideoSDK** driver, the CLI window opens. To continue with installation, close this window.

/ADD and /REMOVE values:

x64
Acrobat
BaseProduct
IPDriverPack_x86
Guardant_amd64
Postgres
dotnetfx35_x86
Redist2005_x86
Redist2010_x86

DetectorPack

Installation options:

Installation options	**Description**
QUICKLAUNCH_SHORTCUT='1'	Create shortcut: • 1—Yes (default), • 0—No
DESKTOP_SHORTCUT='1'	Copy shortcut to desktop: • 1—Yes (default), • 0—No
INSTALLDIR='[%ProgramFiles%\AxxonSoft\AxxonOne]'	*Axxon One* installation folder
NGP_IFACE_WHITELIST="0.0.0.0/0"	Network interfaces The default value is "0.0.0.0/0" (all available network interfaces) Format of network interfaces: "IP-address1 / number of unit bits in the mask, IP-address2 /number of unit bits in the mask"
NGP_ALT_ADDR="0.0.0.0"	Setting the outside local address for a Server behind the NAT[33]). Format of network interfaces: "IP Address1 or DNS-name1, IP address2 or DNS Name2"
PORT_RANGE_START="20111"	The initial value of the port range for Server. 20111—default
PORT_RANGE_COUNT="100"	Number of ports in use. The minimum number is 20. 100—default
Options for **Server and Client** installation	
PATH_TO_DATA = 'X:\AxxonOneData', where X is the letter of the disk with the most free memory	Directory for storing the log database and metadata database. Default is X:\AxxonOneData. The PATH_TO_DATA parameter should be after the INSTALLDIR parameter
FBUSER_TYPE='DEFAULT'	User account for file explorer: • DEFAULT—create a new account; the default name selected will be AxxonFileBrowser, • SYSTEM—select an account from the Local System, • SPECIFY—create a new account; choose the user name and password
FBUSER_NAME='[AxxonFileBrowser]'	Setting a user name and password for an account in file explorer. When you choose SPECIFY of the FBUSER_TYPE parameter
FBUSER_PSW='[Axxon2.0.0]'	
CONFIG_PATH='[CommonAppDataDirectory]'	Path to configurations files and folders

33 https://en.wikipedia.org/wiki/NAT

Installation options	Description
DOMAIN_NAME_TYPE = '[NewDomain]'	Select Axxon-domain: • NewDomain—create new Axxon-domain (default), • WithoutDomain—do NOT add Server to Axxon-domain, • TheSameDomain—use existing Axxon-domain
WHATDBUSE = '[EXIST]'	• EXIST—use existing log DB (default) • NEWDB—create new DB
WHATVMDADBUSE = '[EXIST]'	• EXIST—use existing object tracking DB (default) • NEWDB—create new DB

The command for silent installation of *Axxon One* can look like:

setup.exe /quiet /norestart /debug /INSTALLTYPE="ServerClient" /REMOVE="Guardant_amd64" /
CMD="CREATE_QUICKLAUNCH_SHORTCUT=\"0\" PORT_RANGE_COUNT=\"50\" DOMAIN_NAME_TYPE=\"WithoutDomain\""

This will launch installation with the following options:

1. Quiet mode (/quiet);
2. no reboot (/norestart);
3. log installation to file (/ debug);
4. **Server and Client** (/ INSTALLTYPE = "ServerClient");
5. No *Guardant* drivers (/ REMOVE = "Guardant_amd64");
6. And with the following properties (/ CMD =):
    a. no shortcut (="CREATE_QUICKLAUNCH_SHORTCUT=\"0\");
    b. 50 ports for Server (PORT_RANGE_COUNT="50");
    c. Server NOT added to Axxon-domain (DOMAIN_NAME_TYPE = '[WithoutDomain]').

16.2.6 Updating Drivers Pack

To install the latest version of *Drivers Pack*, do the following:

1. Run the IPDriverPack.msi executable file.
2. After the installation is complete, restart the server (see Stop the server(see page 146), Starting the server(see page 137)).

Attention!

After you update *Drivers Pack*, an error can occur: "*The current version of the installed Drivers Pack does not match the device configuration. The device cannot work properly until it is removed and re-added to the hardware tree*." To fix this error, you must remove the device and re-add it to the configuration. To save the rules (see Types of permissions to access hardware, archives and macros(see page 919)), we recommend adding devices with the original identifier (ID, see Camera(see page 171)) and only after that binding them to the archive (see Configuring recording to an archive(see page 295)).

16.2.7 Update

Before you start updating, it is highly recommended to:

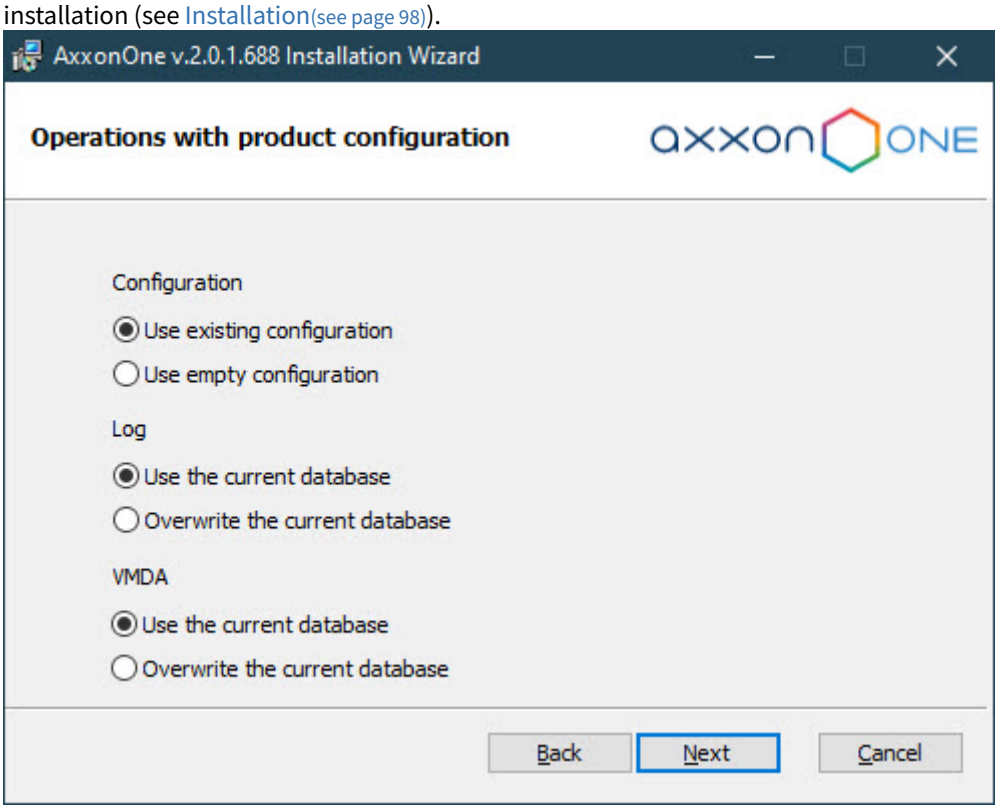
- back up your configuration (see Backup and restore utility(see page 1384));
- stop the Server (see Stop the server(see page 146)). If you run multiple Servers in the Axxon-domain, make sure to stop them all.

Note

When you work with the Failover system, we recommend updating the Servers through a supervisor interface (see Updating cluster servers(see page 1092)).

To update, do the following:

1. Run the new build installer. You do not need to remove the previous build.
2. Install the build using the previous settings, existing configuration and database. The procedure is the same as for a new installation (see Installation(see page 98)).



Attention!

- In *Axxon One 2.0* and newer, there are no restrictions on database location. To reduce the load on the system disk, we recommend storing the metadata database and the log database on a separate hard disk.
- When you update *Axxon One,* only the basic *DetectorPack* is updated. If you installed the *DetectorPack* add-ons, you must update them to the version of the basic *DetectorPack* (see Installing DetectorPack add-ons(see page 321)).
- After you update *Drivers Pack*, an error can occur: "*The current version of the installed Drivers Pack does not match the device configuration. The device cannot work properly until it is removed and re-added to the hardware tree*." To fix this error, you must remove the device and re-add it to the configuration. To save the rules (see Types of permissions to access hardware, archives and macros(see page 919)), we recommend adding devices with the original identifier (ID, see Camera(see page 171)) and only after that binding them to the archive (see Configuring recording to an archive(see page 295)).

16.2.7.1 Update from Axxon Next to Axxon One

Axxon One 2.0: https://www.axxonsoft.com/support/downloads/axxon-one-vms

There are some restrictions for updating from *Axxon Next* to *Axxon One*:

1. You must update to *Axxon One* 2.0 in stages: *Axxon Next* 4.5.10/*Axxon Next* 4.6.0 → *Axxon Next* 4.6.2.1186 → *Axxon One* 2.0.
2. You cannot update client via the server, you must update each client manually.
3. You cannot update from *Axxon Next* to *Axxon One* via the supervisor web interface.

Note

Axxon Next 4.5.10 uses *DetectorPack* 3.7.4 (see DetectorPack 3.7.4 Release Notes[34]), while *Axxon One* uses *DetectorPack* 3.11.1 (see DetectorPack 3.11.1 Release Notes[35]) that has an updated manufacturer SDK for the Face detector. This means that after the update, the search for previously recognized faces doesn't work.

To update from *Axxon Next* to *Axxon One*, do the following:

1. Back up the configuration of *Axxon Next* 4.5.10/*Axxon Next* 4.6.0 (see Backing up a configuration[36]) in case it is necessary to restore the previous version. In case you use the Failover system, see Configuration backup and restore for failover VMS[37].

   Attention!

   After the backup is complete, check for the **backup** file in C:\Users\<User name>\Documents\AxxonSoft\Backups.

2. Update to *Axxon Next* 4.6.2.1186 (Windows OS: Update[38], Linux OS: Updating Axxon Next on Linux OS[39]).
3. Back up the configuration of *Axxon Next* 4.6.2.1186 (see Configuration backup[40]). In case you use the Failover system, see Configuration backup and restore for failover VMS[41].

   Attention!

   After the backup is complete, check for the **backup** file in C:\Users\<User name>\Documents\AxxonSoft\Backups.

4. Stop the server (see Windows OS: Shutting down a Server[42], Linux OS: Starting and stopping the Axxon Next Server in Linux OS[43]) or the NGP_Supervisor service in case you use the Failover system. If there are several servers in the domain, stop them all.
5. Uninstall *Axxon Next* 4.6.2.1186 without saving the configuration.
6. Install *Axxon One* 2.0 (see Windows OS: Installation(see page 98), Linux OS: Installing Axxon One in Linux OS[44]).
7. Restore the configuration of *Axxon Next* 4.6.2.1186 (see Configuration restore[45]). If you use the Failover system, use the mode **Migration (enable if you are using backup from different cluster or want to restore nodes data only)** (see Configuration backup and restore for failover VMS(see page 1087)).
8. Restart the server (see Windows OS: Stop the server(see page 146), Starting the server(see page 137), Linux OS: Starting and stopping Axxon One in Linux OS[46]).

   Attention!

   - For the correct operation of *Axxon One*, after you update from *Axxon Next*, you must restart the server.
   - After you update from *Axxon Next* 4.5.10 to *Axxon One* 2.0.2 and higher, the settings of the **PDF template** and **Watermark settings** in the **Options** section → **Export** are **reset**. You must reconfigure them.
   - After you update from *Axxon Next* 4.5.10 to *Axxon One* 2.0.2 and higher, **Export agent** is automatically added to the **Devices** tab.

Update from *Axxon Next* to *Axxon One* is complete.

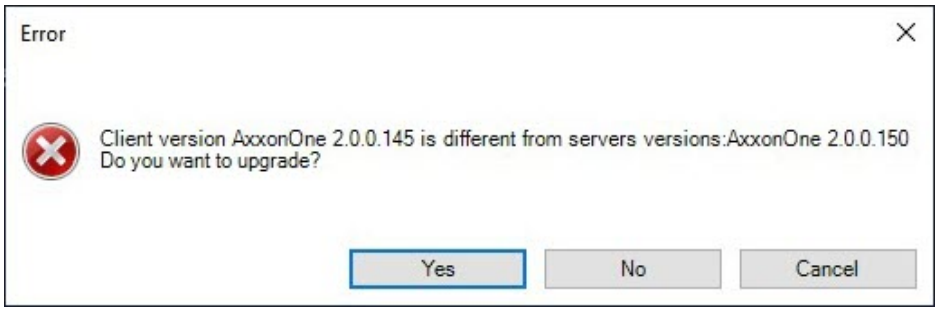
16.2.8 Automatic update of a remote Client

If a Server software version is higher than the Client version, you will be prompted to update your Client software automatically.

34 https://docs.axxonsoft.com/confluence/spaces/next45en/pages/314520292/DetectorPack+3.7.4+Release+Notes
35 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/280166405/DetectorPack+3.11.1+Release+Notes
36 https://docs.axxonsoft.com/confluence/spaces/next45en/pages/184376780/Backing+up+a+configuration
37 https://docs.axxonsoft.com/confluence/spaces/next45en/pages/184377408/Configuration+backup+and+restore+for+failover+VMS
38 https://docs.axxonsoft.com/confluence/spaces/next46en/pages/202673579/Update
39 https://docs.axxonsoft.com/confluence/spaces/next46en/pages/202673538/Updating+Axxon+Next+on+Linux+OS
40 https://docs.axxonsoft.com/confluence/spaces/next46en/pages/202672015/Configuration+backup
41 https://docs.axxonsoft.com/confluence/spaces/next46en/pages/202672376/Configuration+backup+and+restore+for+failover+VMS
42 https://docs.axxonsoft.com/confluence/spaces/next46en/pages/202673465/Shutting+down+a+Server
43 https://docs.axxonsoft.com/confluence/spaces/next46en/pages/202673533/Starting+and+stopping+the+Axxon+Next+Server+in+Linux+OS
44 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486750/Installing+Axxon+One+in+Linux+OS
45 https://docs.axxonsoft.com/confluence/spaces/next46en/pages/202672010/Configuration+restore
46 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/277741576/Starting+and+stopping+Axxon+One+in+Linux+OS

Attention!

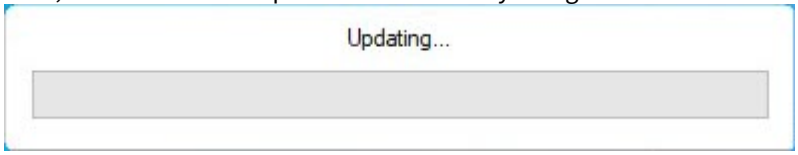
- You must launch the Client as administrator to update it automatically.
- If the Client computer has a Server installed, no update will be possible.



After you click the **Yes** button, the distribution package will be automatically downloaded from the Server.



Next, the Client will be updated automatically along with *DetectorPack* and *DriverPack* driver modules (if required).



Note

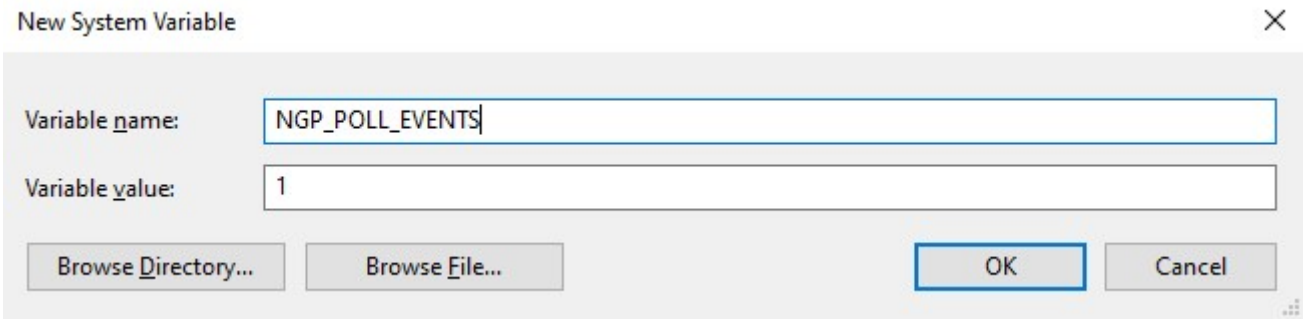
You may need to restart your computer during updating.

When the update is complete, the Client will start automatically.

16.2.9 Creating system variable

System variables store the data about several directories of the operating system and computer. To create them, do the following:

1. Go to **Control panel** → **System** → **Advanced system settings**.
2. Click the **Environment Variables...** button.
3. Under **System variables** group, click the **New...** button.
4. Specify the name and value of variable.



5. Click the **OK** button.

17 Licensing of the software product

17.1 Axxon One license types

Creating an activation request[47]
Activating the Axxon One Free license[48]

There are 6 types of *Axxon One* license: **Axxon One Demo**, **Axxon One Free**, **Axxon One Start, Axxon One Professional**, **Axxon One Enterprise** and **Axxon One Unified**. Upon installation, the software will be launched in *Axxon One* Demo mode. You must activate *Axxon One* VMS to utilize the full feature set of the security software package. You can activate the software by distributing an activation key in the system. Data on all the types of *Axxon One* licenses is presented in the table below.

Functionality	Type of license					
	 **Axxon One Demo** (8:00-18:00)[1]	 **Axxon One Free**	 **Axxon One Start**[8]	 **Axxon One Professional**	 **Axxon One Enterprise**	 **Axxon One Unified**
Maximum number of servers in a distributed system(see page 151)	Unlimited	1	1	30	30	Unlimited
Maximum number of cameras in a distributed system[9](see page 151)	Unlimited	4	64	Unlimited	Unlimited	Unlimited
Free Software Updates[49]	No	No	Yes	Yes	Yes	Yes
Support for SD cards (edge storage, playback only)(see page 234)	Yes	No	Yes	Yes	Yes	Yes
Macros (event response wizard)(see page 828)	Yes	No	Yes	Yes	Yes	Yes
AxxonData Reports[50]	Yes	No	Yes	Yes	Yes	Yes
Standard sub-detectors(see page 359)	Yes	No[2]	No[2]	Yes	Yes	Yes
Line crossing(see page 362)	No	No	No	Yes	Yes	Yes
Abandoned objects(see page 423)	No	No	No	Yes	Yes	Yes
Time Compressor(see page 1191)	No	No	No	Yes[8]	Yes[8]	Yes[8]
Cross-System client(see page 143)	No	No	No	Yes	Yes	Yes

47 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486840/Creating+an+activation+request
48 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486828/Activating+the+Axxon+One+Free+license
49 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486861/Upgrading+Axxon+One
50 https://docs.axxonsoft.com/confluence/spaces/anet/pages/218240189/AxxonData

AI Features and Retail License Pack						
Advanced archive search: • Search in archive(see page 1216) • Search by LPs(see page 1227)	Yes	No[3]	No[3]	Optional	Yes	Yes
Face search(see page 1233)[6]	No	No[3]	No[3]	Optional	Yes	Yes
Tag&Track Pro(see page 255) (feature that automatically tracks moving objects using a PTZ camera)	Yes	No	No	Optional	Yes	Yes
Retail analytics: • Visitors counter(see page 782) • Queue detector(see page 779) • Heat map(see page 1360) • Barcode detector(see page 760)	Yes	No	No	Optional	Yes	Yes
Mask detector VL(see page 483) Mask detector VA(see page 497) Mask detector TV(see page 512)	No	No	No	Optional	Yes	Yes
Neural tracker(see page 405)	Yes	No	No	Optional	Yes	Yes
Stopped object detector(see page 440)	Yes	Optional	Optional	Optional	Optional	Optional
Fire detector(see page 706)	Yes	No	No	Optional	Yes	Yes
Smoke detector(see page 725)	Yes	No	No	Optional	Yes	Yes
QR/Barcode reader(see page 760)	Yes	No	No	Optional	Yes	Yes
Neural counter(see page 771)	Yes	No	No	Optional	Optional	Optional
Abandoned object detector VI(see page 389)	No	No	No	Optional	Optional	Optional
Abandoned object detector VI (Street)(see page 396)	No	No	No	Optional	Optional	Optional
Line crossing VI(see page 466)	No	No	No	Optional	Optional	Optional
Movement in prohibited direction VI(see page 460)	No	No	No	Optional	Optional	Optional
Motion in area detector VI(see page 455)	No	No	No	Optional	Optional	Optional
Detector of atypical changes in the scene VI(see page 794)	No	No	No	Optional	Optional	Optional

Fight detector VL(see page 799)	No	No	No	Optional	Optional	Optional
Meta-detector(see page 768)	No	No	No	Optional	Optional	Optional
Human Behavior Analytics						
Human pose detector(see page 669)[6] includes: • Sitting person detector • Person down detector • Hands up detector • Shooter detector • Handrail holding detector • People counter • Close-standing people detector	Yes	No	No	Optional	Optional	Optional
Personal Protective Equipment Detection						
Equipment detector(see page 711) and Equipment detector VL(see page 738) include: • Helmets • Hi-viz vests • Protective clothing	Yes	No	No	Optional	Optional	Optional
Add-On Modules						
Integration With Access Control System	Yes	No	No	Up to 50 readers	Up to 100 readers	Optional
Integration With Fire and Security Alarms System	Yes	No	No	Optional	Optional	Optional
Integration Perimeter Intrusion Detection System	Yes	No	No	Optional	Optional	Optional
Events from external systems (POS terminals, ACFA)(see page 257)	Yes	No	Optional	Optional	Optional	Optional
Custom AI Analytics	No	No	No	Optional	Optional	Optional
Water level detector(see page 729)	Yes	No	No	Optional	Optional	Optional
Multicamera Tracking. Tracking follows objects across multiple camera FOVs based on appearance similarity[7]	Yes	No	No	Optional	Optional	Yes
Similarity Search[7]	Yes	No	No	No	Optional	Yes[8]
AxxonNet cloud service[51]	Yes	No	Yes	Yes	Yes	Yes

51 https://docs.axxonsoft.com/confluence/spaces/anet/pages/157697076/AxxonNet.com

Datacenter Domain Unification/Private Cloud[52]	Yes	No	No	No	No	Yes
Checking in lists of faces(see page 499)	No	No	No	Optional	Optional	Optional
FaceCube external face recognition module(see page 499)	No	No	No	Optional	Optional	Optional
Vehicle license plate recognition based on the created lists(see page 668)[4]	No	No	No	Optional	Optional	Optional
Vehicle Recognition(see page 600)[4]	No	No	Yes	Yes	Yes	Yes
Person-based privacy masking(see page 694)	Yes	Yes	Yes	Yes	Yes	Yes
Privacy masking(see page 450)	Yes	Yes	Yes	Yes	Yes	Yes
Crowd estimation VA(see page 765)	No	No	No	Optional	Optional	Optional
Searching for LPR/ANPR numbers and faces on video from multiple cameras(see page 1252)	Yes	No	No	Optional	Yes	Yes
Data replication(see page 298)	No	No	No	No	Yes	Yes
FailOver(see page 1064)	No	No	No	No	Yes	Yes
Video walls management(see page 1287)	Yes	No	No	No	Yes	Yes
LDAP authentication supported(see page 930)	Yes	No	No	No	Yes	Yes
Encrypting a volume of an archive(see page 300)	Yes	No	No	Optional	Optional	Optional
System features available for all licenses						
Hardware Control panels Security keyboards Joysticks I/O modules	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited	Unlimited

52 https://docs.axxonsoft.com/confluence/spaces/anet/pages/209191104/Axxon+Datacenter

Server ONVIF Profiles G, S, T(see page 171) H.265 support(see page 83) Edge analytics (metadata from IP devices) (see page 811) Configuration backup and restore(see page 1384) Mass configuration of cameras(see page 182) Multicasting(see page 1041) Hotkeys(see page 1054)	Yes	Yes	Yes	Yes	Yes	Yes
Recorded video / Investigation Local and network archives[10](see page 276) Events search[10](see page 1213) Time slice search (search by time intervals)[10](see page 1214) Simultaneous search in the archive of several cameras[10](see page 1252) Video bookmarking (searchable text comments)(see page 1215)	Yes	Yes	Yes	Yes	Yes	Yes
Live monitoring Service audio and video analytics(see page 788) Embedded detectors(see page 811) (except for Axis on-board tracker(see page 825)[5]) Interactive 3D map(see page 1291) GreenStream adaptive bandwidth management(see page 1161) Tag&Track Lite(see page 253) (feature that automatically detects the next camera in the field of view of which the selected object is most likely to appear) OnScreen PTZ mode(see page 1173) Support for fisheye cameras and ImmerVision lenses(see page 1254) Export of frames and video recordings to multiple formats(see page 1306) Information boards(see page 1265)	Yes	Yes	Yes	Yes	Yes	Yes
Remote clients Web client interface(see page 1325) iOS app (including Apple TV)[53] Android app[54]	Yes	Yes	Yes	Yes	Yes	Yes

Note

Information about the type of license you are using is displayed in the Server properties in the **Product type** field. Users in the **admin** role get an informational message to renew the license 30 days or less before it expires.

53 https://docs.axxonsoft.com/confluence/display/mobile/AxxonNet+iOS+Mobile+Client+User+Guide
54 https://docs.axxonsoft.com/confluence/display/mobile/AxxonNet+mobile+client+on+Android+OS.+User+Guide

[1]—the system will operate in demo mode from 8:00 AM to 6:00 PM within 30 days after installation of *Axxon One*.

[2]—all scene analytics detectors based on Motion detector are available in *Axxon One Free* and *Axxon One Start* licenses, except for the **Abandoned object** detector (see Motion detector(see page 446)).

[3]—Search in archive with metadata search from the Database VMDA is available in *Axxon One Start* and *Axxon One Free* licenses. It is not possible to determine the object type and color based on metadata from VMDA.

[4]—it is necessary to activate the license for the following detectors:

- Vehicle Recognition IV;
- License plate recognition VT (see Licensing of the software module for the License plate recognition VT in Windows OS(see page 650));
- License plate recognition IV (see Configuring the License plate recognition IV(see page 524));
- License plate recognition XR (see Licensing of the software module for the License plate recognition XR in Windows OS(see page 623)).

[5]—the module has to be purchased separately.

[6]—with the license, you can use privacy masks based on data from the corresponding detectors.

[7]—to be released in the next version.

[8]—country restriction. Please contact an AxxonSoft manager to find out if this functionality is supported in your country.

[9]—If the activation key allows using fewer video channels than currently created in the system, it will not be possible to work with all video channels. To resume operation, remove the objects corresponding to the excess video channels and restart the server.

[10]—if the activation key allows using archives with a total capacity less than the current one, you must adjust the capacity of the archives to the required amount and then restart the server.

- Restart the server through the **Start** menu as follows:
  a. **All Programs → Axxon One → Stop server**
  b. **All Programs → Axxon One → Start server**.

17.1.1 Disclaimer

AxxonSoft reserves the right to make changes to the specification and cost of software licenses without notice and without any obligation to make the same changes to the licenses already sold. Orders are processed in accordance with the price list valid at the time of placing the order. If a placed order contains incorrect prices or license specifications, regardless of the cause of such errors. AxxonSoft reserves the right to reject or cancel the order, even if it has already been processed.

17.2 Licensing methods

There are several licensing methods for *Axxon One*:

Licensing method	Description
License file only	The license file contains the data on basic hardware configuration (motherboard, CPU, hard disk, video adapter, RAM, and network card) of all Servers. If you change any two basic hardware components, your license will be invalid. For example, this is the case when you change both CPU and motherboard. However, changing a graphics card or upgrading RAM will not affect the license. This is why, when working with *Axxon One,* consider the following: a. The activation request must be sent from the computer that will host the *Axxon One* Server. b. You can upgrade your license only if you saved the initial basic hardware configuration of all Servers. c. It is not possible to transfer a license from one computer to another.

Licensing method	Description
License file and Guardant dongle	This method allows replacing the Server hardware and transferring the license to another computer (see Transferring a license to another computer while maintaining configuration[55]). To activate *Axxon One* via this method, contact AxxonSoft to receive a license file and *Guardant* dongle. If you already have a *Guardant* dongle, you can perform activation yourself. To do this, connect the *Guardant* dongle to the computer that you wish to activate and perform the standard activation steps. **Attention!** You can use a Guardant Sign dongle only on Linux OS.
License Server[56]	The *License Server* allows you to account available and used licenses (see General information about the License Server[57]). You can use a public (see Public License Server[58]) or a private *License Server* (see Private License Server[59])

Attention!

Software that creates virtual devices (such as VirtualBox, VmWare, and others) may lead to the loss of the license. If you encounter this problem, it is recommended to remove all virtual devices from the computer's hardware tree or obtain a new license file.

17.3 Product activation utility

License activation for the *Axxon One* software package is carried out through the product activation utility.

You can launch the product activation utility from the Windows **Start** menu: **Start** → **All Programs** → **Axxon One** → **Utilities** → **Program Activation**.

Note

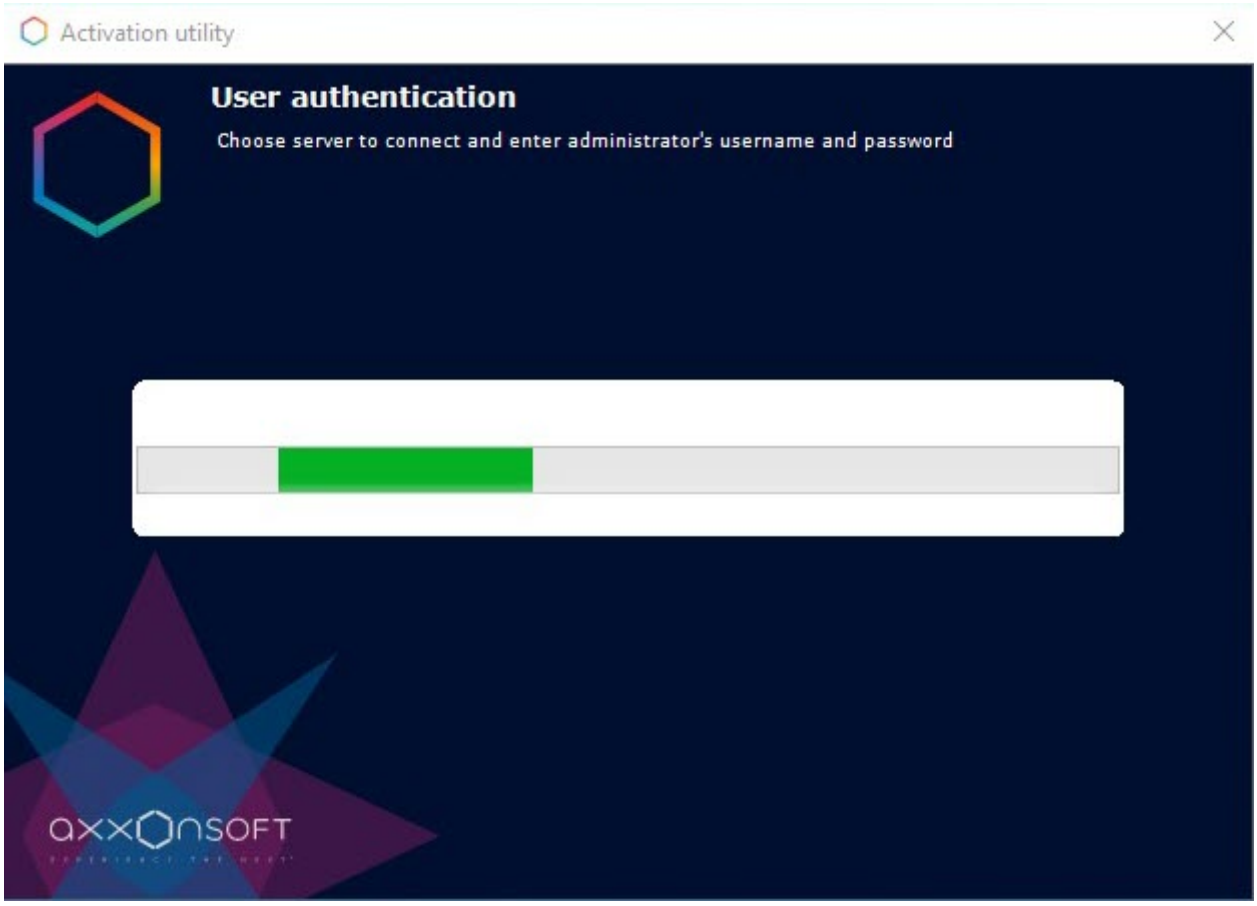
The product activation utility program file LicenseTool.exe is located in the **<Directory where *Axxon One* is installed>\AxxonSoft\AxxonOne\bin** folder.

Then you must select the name of one of the Axxon Domain servers to which the license file will be applied (the file is applied to all Axxon Domain servers launched at the moment of activation) and connect to the system, under an administrator's username and password, to continue the activation process.

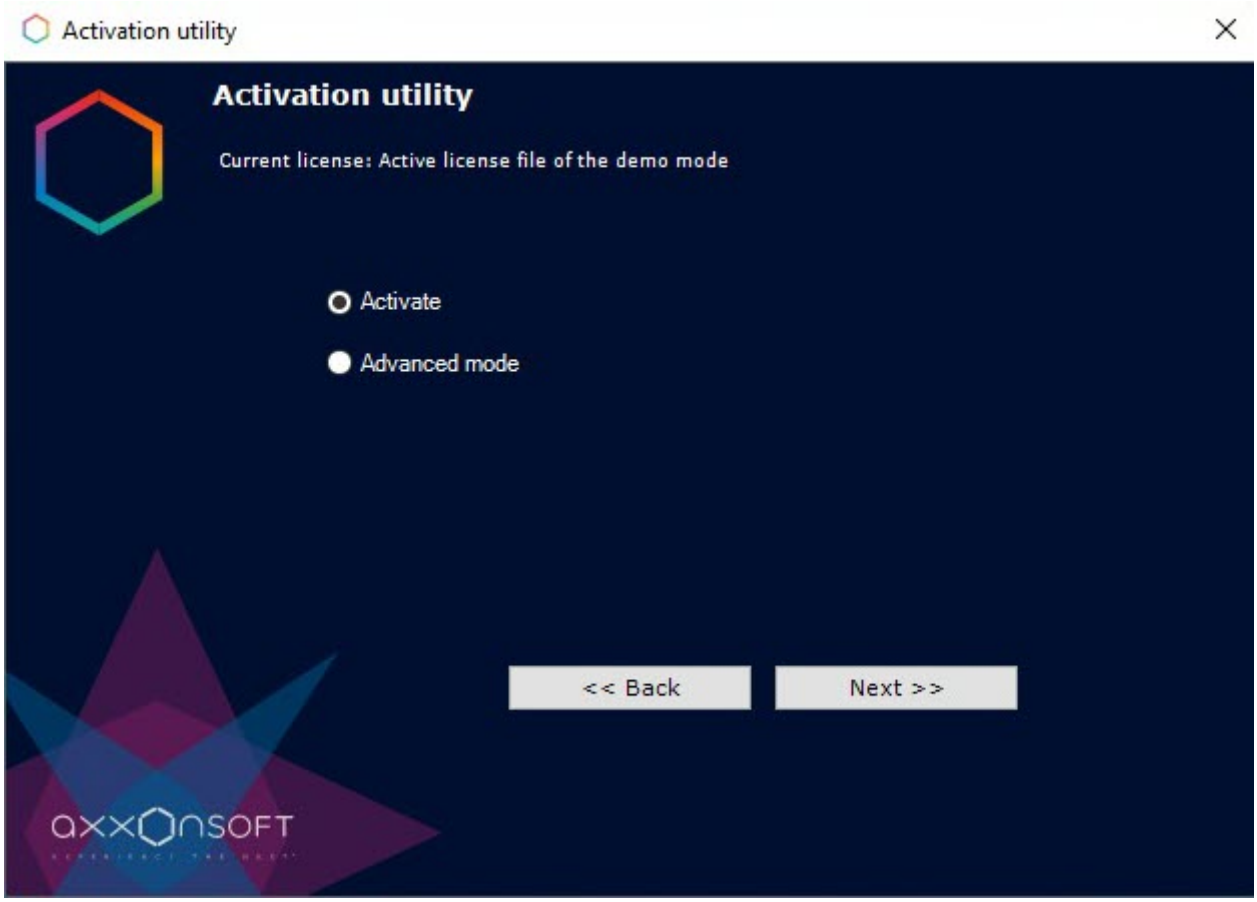
55 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486862/Transferring+a+license+to+another+computer+while+maintaining+configuration
56 https://docs.axxonsoft.com/confluence/spaces/LS/pages/260924375/License+server
57 https://docs.axxonsoft.com/confluence/spaces/LS/pages/260924378/General+information+about+the+License+server
58 https://docs.axxonsoft.com/confluence/spaces/LS/pages/260924382/Public+License+Server
59 https://docs.axxonsoft.com/confluence/spaces/LS/pages/260924388/Private+License+Server



The activation window opens.



After the download is complete the main window of license utility opens.



Note

To activate *Axxon One*, connect to a Server in the Axxon domain. Otherwise, an error message appears.

17.4 License Activation

To activate *Axxon One*, refer to Activation guide[60], which presents step-by-step instructions on activating, updating and upgrading *Axxon One*.

It is also recommended that you use the prompts displayed in the product activation utility's dialog boxes.

60 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486816/Activation+guide

18 Starting and stopping Axxon One software

18.1 Starting Axxon One

- Starting the server(see page 137)
- Starting the client(see page 138)
- Automatic start of the client(see page 141)
- Starting the client in demo mode(see page 141)
- Starting multiple Axxon One clients(see page 142)
- Cross-System client(see page 143)

18.2 Stop Axxon One

- Stop the client(see page 145)
- Stop the server(see page 146)

18.3 Quick user switching

18.4 Quick connection to another server

18.5 Automatic server restart

18.6 Starting Axxon One

18.6.1 Starting the server

The *Axxon One* server starts automatically when the operating system starts.

The default time to start the *Axxon One* server is **120000** ms. If the server fails to start within the set time, a second forced attempt to start the server is made.

You can use the **NGP_SERVICE_START_TIMEOUT_MS** system variable (see Creating system variable(see page 126)) to increase the server start time. You must specify the value of the variable in milliseconds.

If the server operation is stopped, do one of the following actions to restart the server:

- Restart the system.
- Start the *Axxon One* server from the notification area **Start server** (see Tray Tool utility(see page 1378)).
- Start the **NGP Host Service**.

If the **Cannot find Server** message error appears when you connect the client to the server, do the following:

1. Go to **Control Panel** → **Regional Settings** → **More**.
2. Change the current language of programs that don't support Unicode to the one that matches with the language of the used keyboard and the characters of which can appear in the user name and folders.
3. Restart the server.

If the **Connection Error** message appears when you connect the client to the server, do the following:

1. Go to the **Local Security Policy interface** interface.
2. Select **Local Policies** → **Security Settings**.
3. Disable the **System cryptography: use FIPS compliant algorithms for encryption, caching and signing** parameter.

18.6.2 Starting the client

Attention!

- The client version and the server version to which you connect must match. We strongly recommended avoiding any connections if the product versions don't match. The versions of the installed *DriversPack* must also match.
- If the server version is older than the client version, you will be prompted to update the client automatically (see Automatic update of a remote Client(see page 125)).

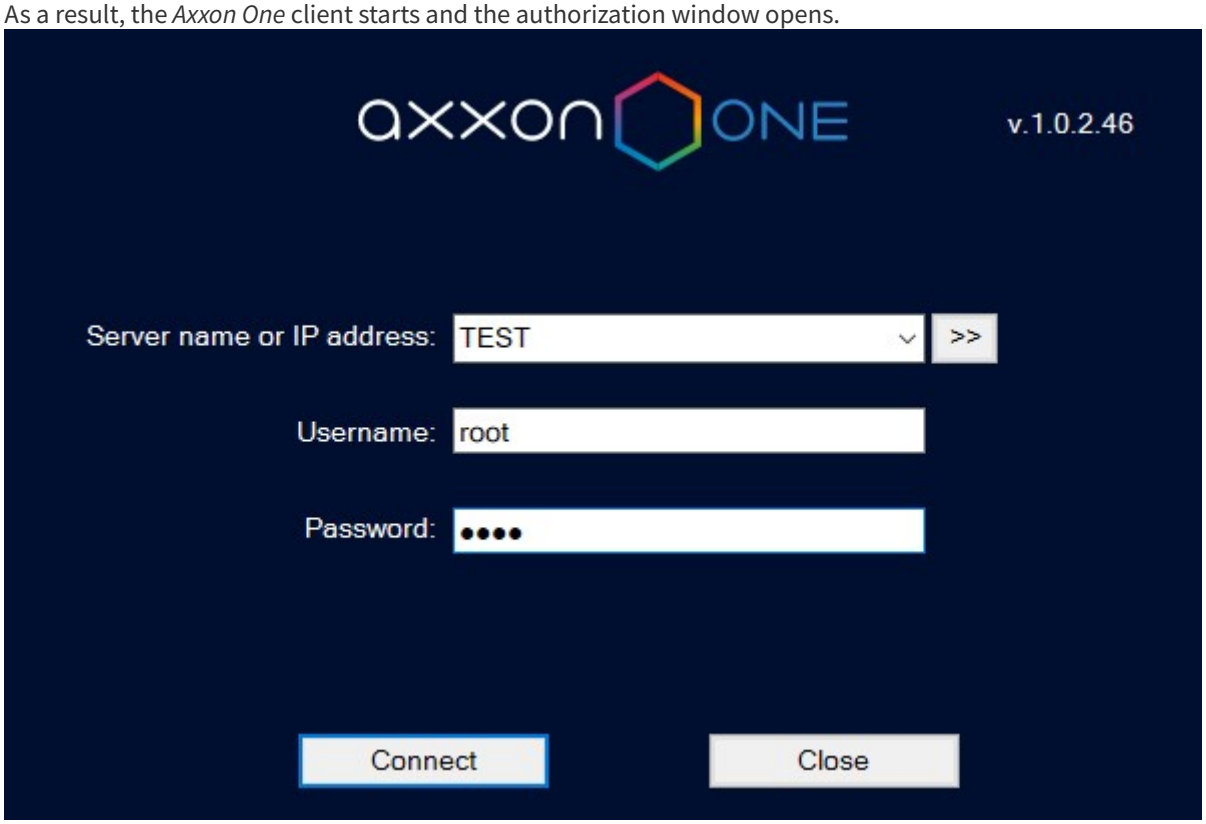
You can start the *Axxon One* client from:

- **AxxonOne** shortcut on the desktop.
- **Start** menu → **All Programs** → **Axxon One** → **Axxon One**.
- **Start Axxon One** notification area (see Tray Tool utility(see page 1378)).
- command line by specifying the **login**, **password** and **server** parameters. All parameters are optional. For example: **C:\Program Files\AxxonSoft\Axxon One\bin>Axxon One.exe --login=root --password=root --server=127.0.0.1**. To connect to multiple servers (see Cross-System client(see page 143)), specify their addresses separated by commas. For example: **C:\Program Files\AxxonSoft\Axxon One\bin>Axxon One.exe --login=root -password=root --server=10.0.11.30, 10.0.11.34**.

Note

- The **Axxon One.exe** executable file of *Axxon One* is located in the **<*Axxon One* installation directory>\Axxon One\bin** folder.
- To start the client in safe mode with OpenGL software emulation, select: **Start** → **Programs** → **Axxon One** → **Axxon One (safe mode)**. When the client is running in safe mode, the frame rate decreases.

As a result, the *Axxon One* client starts and the authorization window opens.



1. In the **Server name or IP address** field, select the server to which you want to connect. If a remote user connects to the server, enter the name or IP address of the computer to which the connection is established.

Attention!

If you specify **localhost** as the name of the server or a node, the server doesn't start.

The order in which the servers are displayed in the list:

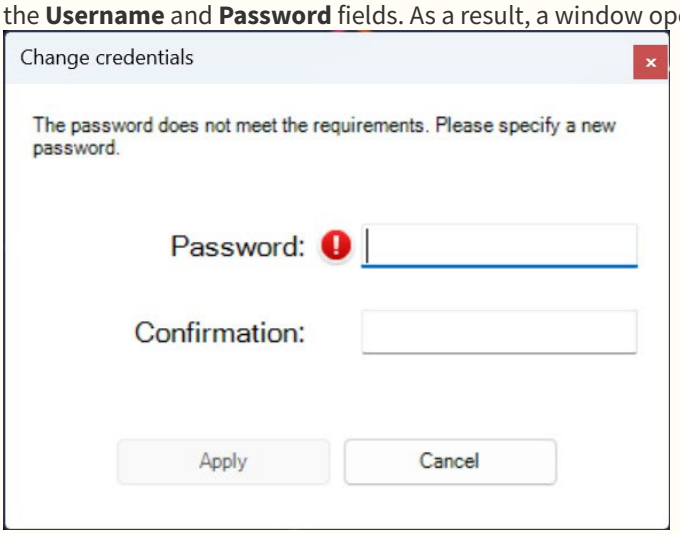
a. Preferred servers (see Selecting Preferred Servers(see page 1047)).
b. The last server that was connected to.
c. Other servers found on the network in alphabetical order.

- Cross-System client(see page 143)
- Connecting the Client to the Server behind NAT(see page 1438)
- Connecting to a Node and Configuring of an Axxon domain(see page 1091)

2. In the **Username** field, enter the username of the *Axxon One* user.
3. In the **Password** field, enter the password of the current *Axxon One* user.
4. Click the **Connect** button.

Attention!

The **root** user, which has administrator permissions, logs into the system first. Enter **root** into the **Username** and **Password** fields. As a result, a window opens in which you must enter a new password twice.

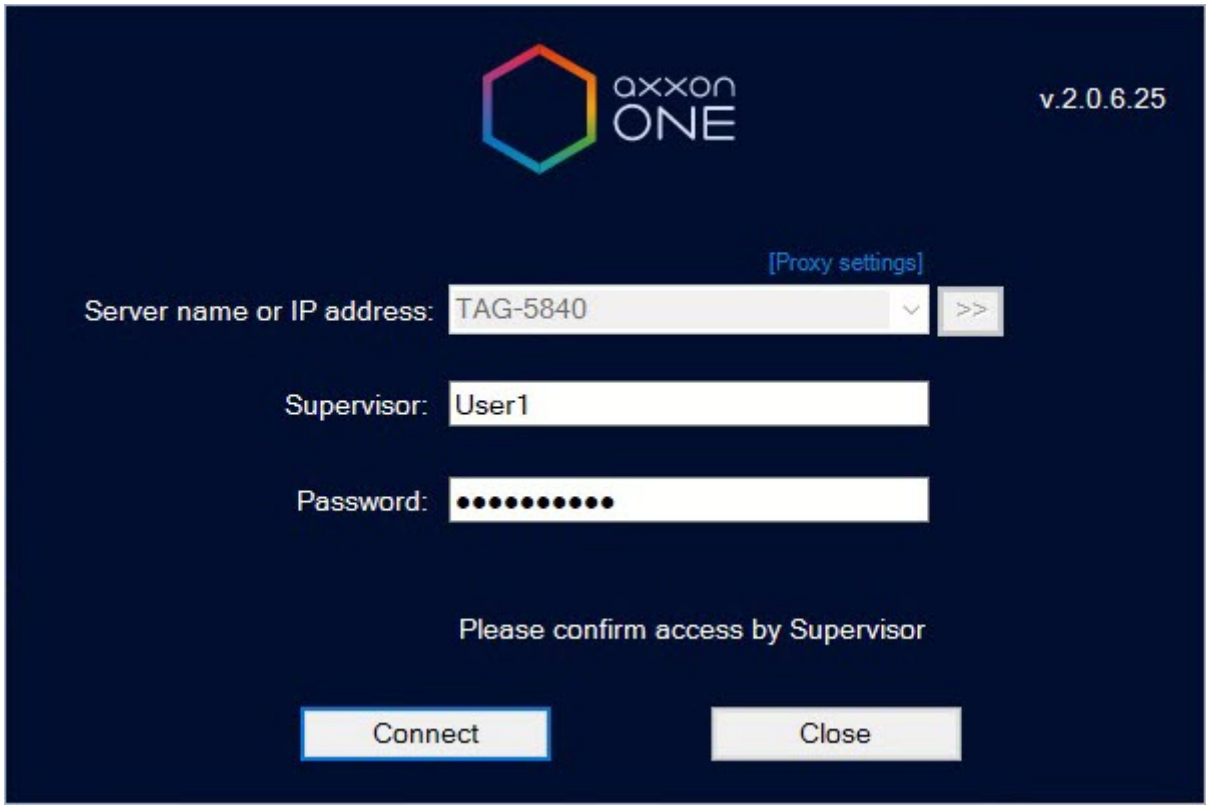


When you hover the cursor over the icon, a tooltip opens in which you can see the requirements for a new password (see Security policy(see page 939)). Click the **Apply** button to save the new password.
You must securely save the new password (see How to recover the password of the root user (superuser)?[61]).
Then the administrator must configure the system for multi-user access (see Users(see page 917)).

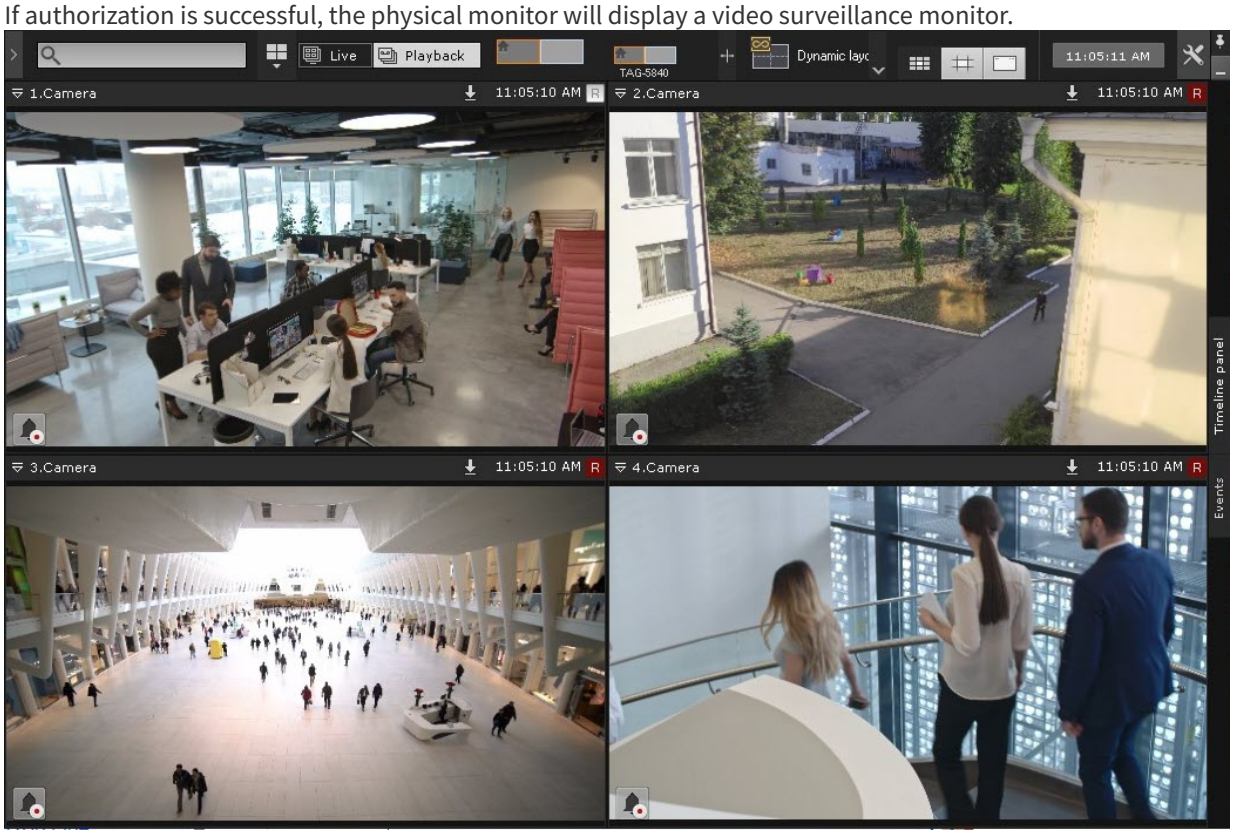
5. If the system administrator must confirm the user login (see Roles(see page 920), **Supervisor confirmation**):
   a. In the **Supervisor** field, enter the appropriate login.
   b. In the **Password** field, enter the supervisor password.

61 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/281551639/How+to+recover+the+password+of+the+root+user+superuser

c. Click the **Connect** button.

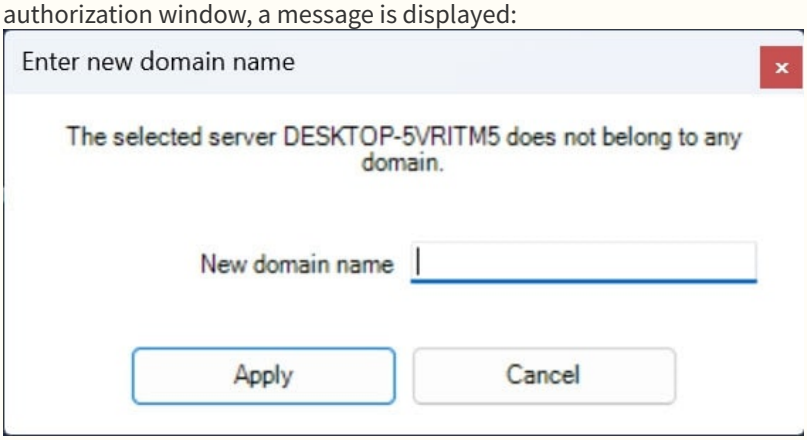


If authorization is successful, the physical monitor will display a video surveillance monitor.



Attention!

- When you start the client for the first time, the Archive(see page 272) tab opens. After you create an archive, you are automatically redirected to the Hardware(see page 151) tab to create IP devices. Search for IP devices starts automatically (see Searching, adding, configuring, and removing IP devices(see page 157)).
- If *Axxon One* is running in demo mode, then after you enter the authorization parameters, a corresponding message is displayed (see Starting the client in demo mode(see page 141)).
- If the server to which you connect doesn't belong to any domain, after you click the **Connect** button in the authorization window, a message is displayed:



To connect to the server, you must click the **Apply** button and create a new domain based on the server (see Creating a new domain(see page 152)), or click the button and add the server to an existing domain (see Adding a Server to an existing domain(see page 153)).

- Launching the *Axxon One* software program with client logging enabled can take a long time when the ESET NOD32 Antivirus 4 **Real-time file system protection** mode is on. To solve this problem, add the *Axxon One* installation folder and the folder with the client logs (<Letter of system disk>:\Users\<User>\Appdata\Local\AxxonSoft\Axxon One\logs) to the list of exceptions in ESET NOD32 Antivirus 4.
- If *NetLimiter 2* is installed in the system, there can be a significantly increased load on the processor when working with *Axxon One*. This problem is resolved by removing *NetLimiter 2*.

- Starting multiple Axxon One clients(see page 142)
- Starting the client in demo mode(see page 141)
- Automatic start of the client(see page 141)
- Quick user switching(see page 146)

18.6.3 Automatic start of the client

You can use Windows Task Scheduler[62] to configure the *Axxon One* client to start automatically (see Starting the client(see page 138)) at the system startup.

When configuring, we recommend specifying the delay required to start the server. The default value is **120000** ms (see Starting the client(see page 138)).

Note

You can also configure automatic authorization when the client is started (see Automatic connection(see page 1041)).

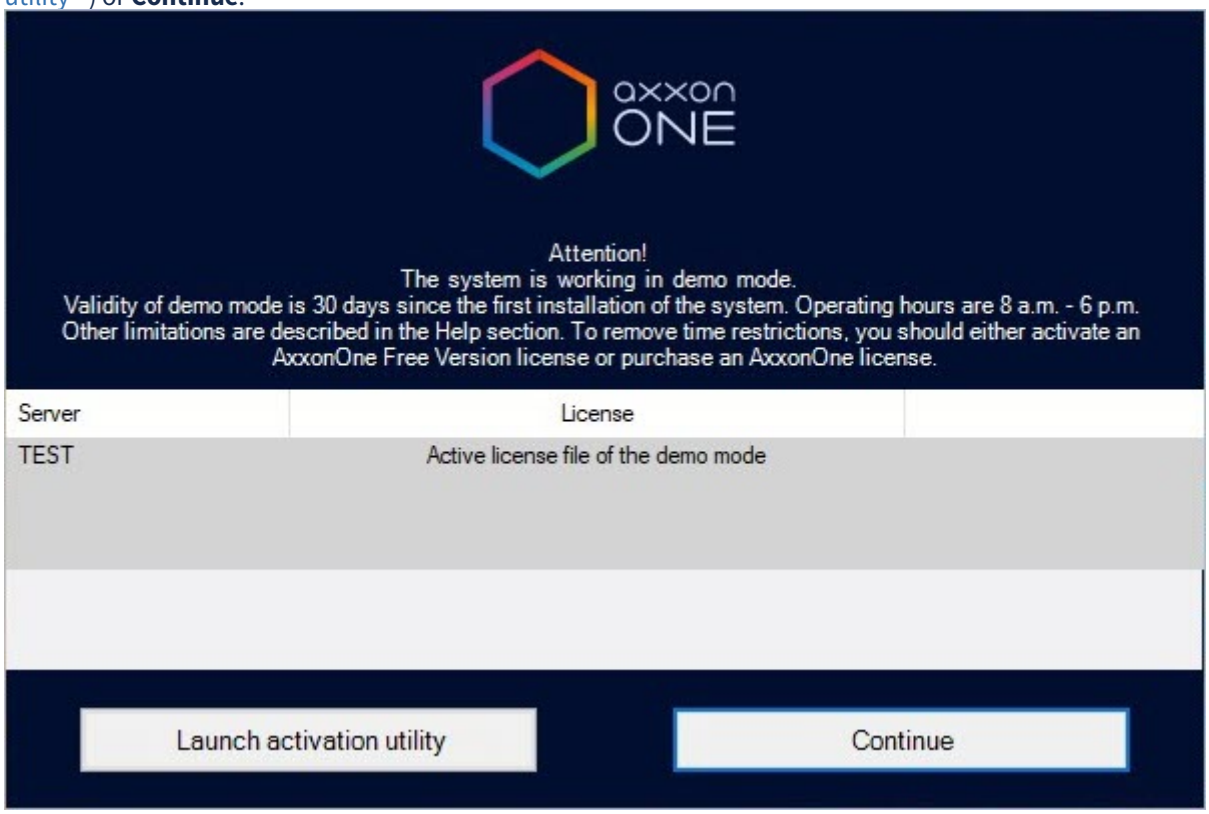
18.6.4 Starting the client in demo mode

If you don't activate *Axxon One* (see Activation guide[63]), the *Axxon One* client works in demo mode. Types of demo mode are described in the table:

62 https://technet.microsoft.com/en-us/library/cc721931(v=ws.11).aspx
63 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486816/Activation+guide

Type of demo mode	Start	Operation
Active	from 8 a.m. to 6 p.m.	You can work with the *Axxon One* client with limited functionality according to **Axxon One Demo** license (see Types of licenses[64])
Inactive	from 6 p.m. to 8 a.m.	The *Axxon One* server is inactive. You can only view the system configuration

After the authorization process is complete (see Starting the client(see page 138)), if the client connects to a domain where at least one of the servers is in demo mode, a corresponding notification is displayed, as well as a list of domain servers with the license type. If at least one server in the domain is in active demo mode, you are prompted to **Launch activation utility** (see Activation utility[65]) or **Continue**.



18.6.5 Starting multiple Axxon One clients

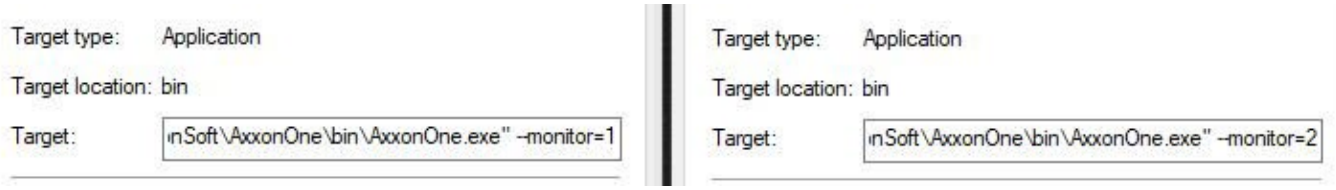
You can run multiple *Axxon One* clients simultaneously on a single computer in order to connect to different servers.

To run multiple clients, do the following:

1. Create a number of client shortcuts on your desktop equal to the number of connected monitors.
2. In the properties of each shortcut, in the **Target** line, add the additional parameter --**monitor=N**, where N is the number of the monitor on which you want to run the client.

> **Attention!**
>
> - The maximum number of clients that you can run is limited by the number of monitors that meet the minimum supported resolution (see Limitations of Axxon One(see page 84)).
> - You can run only one client on a single monitor.

64 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses
65 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486821/Activation+utility



3. Start the clients using the created shortcuts.

Note

If the client is started in window mode (see Configuring the Client screen mode (full screen or window)(see page 1030)) and moved to another monitor, the situation changes: clients are started on the specified monitors even if a client is already running on any of them.

18.6.6 Cross-System client

Cross-System client is a feature that allows an operator or administrator of a security complex to connect from one client workstation simultaneously to multiple servers located in different domains and not united in a single system. Cameras connected to servers of different domains, as well as the settings of these servers are displayed in a single user interface.

This feature is convenient, for example, for geographically distributed objects or a large number of objects that you plan to configure together. This situation can happen when protected facilities are located at a great distance from each other, as well as if there are many objects that you want to configure together, but they must operate separately, and so on. An example of using this feature is the ability of the police to connect to the security systems of stores belonging to different retail chains.

The client connects to different domains automatically when you start it (see Automatic connection(see page 1041)). First, it connects to the main domain. The client connects to other domains in the background after you start it. You can also connect to multiple domains manually in the client authorization window (see Starting the client(see page 138)). To do this, specify several servers separated by commas in the format: **<Server1 name or IP address>:<Connection port>, <Server2 name or IP address>:<Connection port>**, and so on. The server listed first will be the main server (see Automatic connection(see page 1041)).

Note

You can connect Cross-System client to servers of a regular domain and a failover cluster at the same time. To do this, specify the servers in the client authorization window as follows: **<Server2 name or IP address>/<Node name>, <Server1 name or IP address>**.

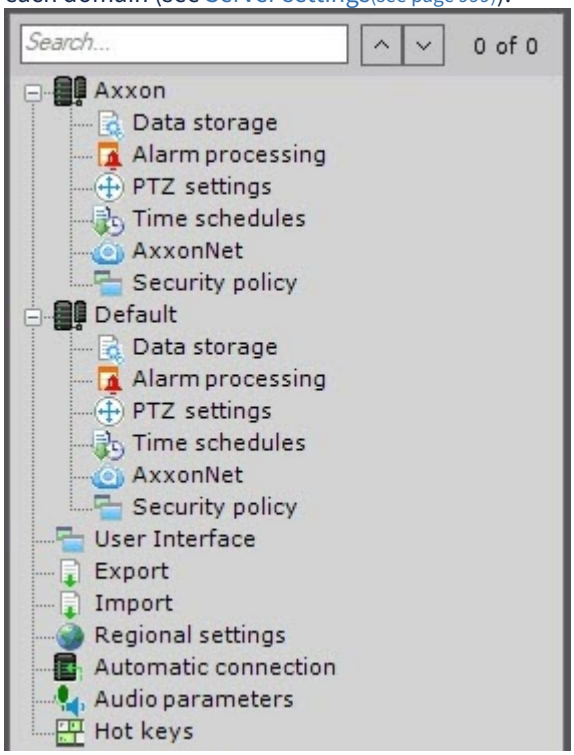


To connect the client to multiple domains, the following conditions must be met:

- each server to which the client connects has the **Axxon One Professional, Axxon One Enterprise** or **Axxon One Unified** license activated (see Types of licenses[66]). For example, some servers can have the **Axxon One Professional** or **Axxon One Enterprise** license activated, while others can have the **Axxon One Unified** license activated;
- Server name and IP addresses must not be the same;
- connection to all servers is made using a single **Username** and **Password** pair that must be created in each domain.

66 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

When the client connects simultaneously to multiple servers from different domains, the system settings section is duplicated for each domain (see Server settings(see page 999)).



18.7 Stop Axxon One

18.7.1 Stop the client

Before stopping *Axxon One*, you need to exit user interfaces. To do this, do one of the following:

1. Click the button located in the top right corner of the *Axxon One* dialog window.

   Note

   If the client is opened in full-screen mode (enabled by default, see Configuring the Client screen mode (full screen or window)(see page 1030)), the button isn't displayed.

2. Click the Exit button located on the **Settings** tab.
3. In the Windows taskbar notification area, in the context menu of the *Axxon One* icon, select **Close window**.

When you perform one of these actions, the authorization window opens. To stop *Axxon One* (completely exit the client), click the **Close** button.



18.7.2 Stop the server

To stop the *Axxon One* server, do one of the following:

1. Stop the *Axxon One* server from the notification area **Stop server** (see Tray Tool utility(see page 1378)).
2. Stop the **NGP Host Service**.

The default time to stop the *Axxon One* server is **60000** ms. If the server doesn't stop within the set time, a second forced attempt is made to stop the server.

You can use the **NGP_SERVICE_STOP_TIMEOUT_MS** system variable (see Creating system variable(see page 126)) to increase the server stop time. The value of the variable must be specified in milliseconds.

18.8 Quick user switching

You can switch *Axxon One* users quickly without exiting the client. To do this, do the following:

1. Exit the *Axxon One* user interface (see Stop the client(see page 145)).



2. In the **Username** field, enter the username of the *Axxon One* user.
3. In the **Password** field, enter the password of the current *Axxon One* user.
4. Click the **Connect** button.

Quick user switching is complete.

18.9 Quick connection to another server

You can connect to another server without exiting the client. To do this, do the following:

1. Exit the *Axxon One* user interface (see Stop the client(see page 145)).
2. In the **Server name or IP address** field, select the server to which you want to connect.
3. In the **Username** field, enter the username of the *Axxon One* user.
4. In the **Password** field, enter the password of the current *Axxon One* user.
5. Click the **Connect** button.

Quick connection to another server is complete.

18.10 Automatic server restart

Server is automatically restarted when:

- you change the IP address of the server;
- you restart the system;
- you update the *Axxon One* version (see Update(see page 123));
- you change the logging level of the server (see Log management utility(see page 1414));
- you change the network settings (see Network settings utility(see page 1379));
- you create a new network connection.

Attention!

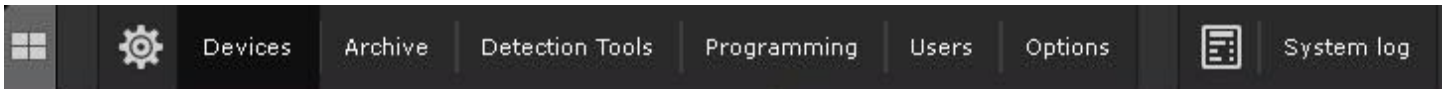
When the server is restarted, the connection to cameras is temporarily lost and recording to the archive stops.

19 Configuration of Axxon One

19.1 General information on system configuration

19.1.1 System configuration: stages

Most system configuration is performed via the **Settings** expanding menu, which contains six tabs for configuring certain parts of the system.



The main stages of system configuration are:

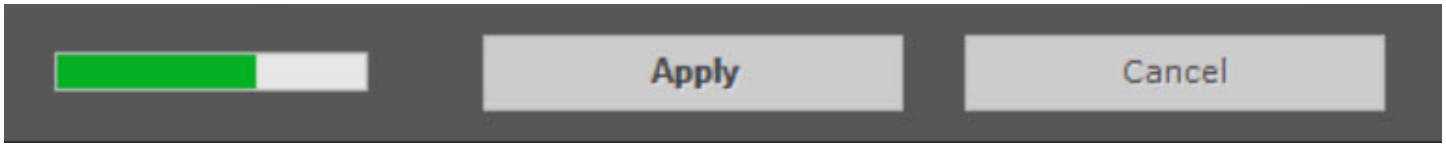
1. Configuring an Axxon domain.
2. Connecting and configuring hardware.
3. Configuring archives.
4. Configuring layouts and the interactive map.
5. Configuring users and roles.

Attention!

Please avoid changing system settings from different Clients simultaneously. When you change settings from Clients logged in under the same user (see Configuring local users(see page 933), Configuring LDAP users(see page 937)), all changes are automatically synchronized. For example, if Client 1 and Client 2 are logged in as the same root user, and the layout settings are changed on one of the Clients, then the second Client will automatically switch to this layout.

19.1.2 Applying and resetting settings

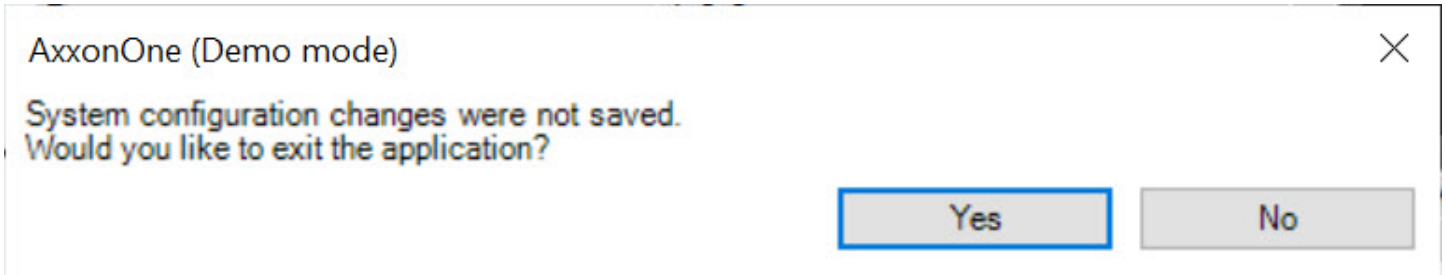
You must confirm each change of the system parameters using the **Apply** button. After you click this button, the progress bar indicating that the settings are applied is displayed. You cannot work with the system until this process is complete.



You can discard changes using the **Cancel** button before clicking the **Apply** button.

You can implement the bulk application of settings for cameras of the same model and firmware (see Bulk application of settings(see page 182)). Also, using the **Apply** button, you can create multiple detectors of the same type for selected cameras (see Configuring detectors and their sub-detectors(see page 328)).

If you don't save all changes while shutting down the client, the window opens where you must confirm the client shutdown or cancel the operation and save the changes.



When you set up the hardware, you can reset parameters to default values and download the configuration from the device.

To reset the device parameters to default values, do the following:

1. Select the device in the objects tree on the **Hardware** tab.
2. Click the **Reset** button, then **Reset parameters to default values**.



3. Click the **Apply** button.

If you add a camera using the ONVIF generic driver or the device configuration differs from its configuration in *Axxon One*, you can download the configuration from the device. To do this, do the following:

1. Select the device in the objects tree on the **Hardware** tab.
2. Click the **Reset** button, then **Download configuration from device**.



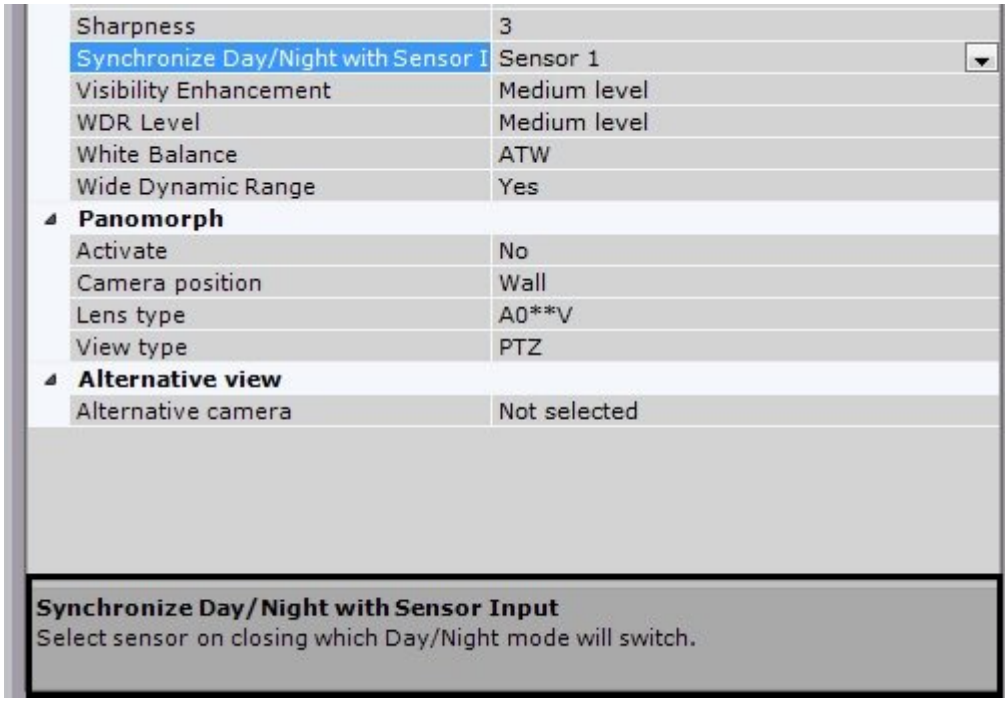
3. Click the **Apply** button.

Resetting default values is complete.

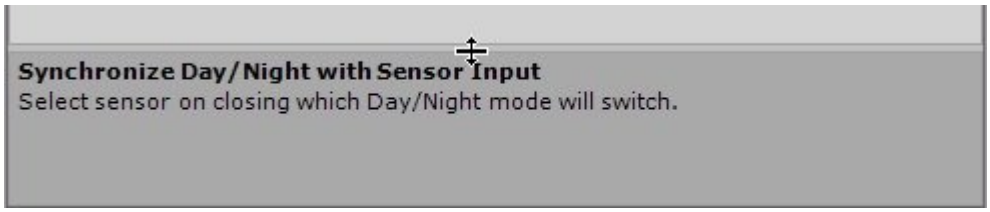
19.1.3 Display of parameters in interface

Most system parameters and hardware parameters are displayed in the *Axxon One* interface.

The description of a parameter is usually displayed in a special area when the relevant parameter is selected.



If the description of a parameter is truncated, you can stretch this area above the upper border.



19.1.4 System objects

Axxon One VMS has the following types of system objects:

1. Axxon domain objects (see Configuring Axxon-domains(see page 151)).
2. Hardware objects: Server, IP Server, Camera, Microphone, PTZ, Input, Output, Embedded Storage (see Configuring system objects for devices(see page 164)).
3. **Event Source** objects are used to integrate *Axxon One* with external systems (see Receiving events from external systems(see page 257)).
4. **E-mail** objects used in macros and automatic rules for e-mail notifications (see Email notifier(see page 231)).
5. **Export Agent** objects used in macros and automatic rules for exporting video recordings and frames (see Configuring export(see page 1048)).
6. Archive objects (see Archive(see page 272)).
7. Detection tool objects (see Detectors(see page 308)).
8. Role and user objects (see General information about users(see page 917)).
9. Macro objects (see Programming(see page 828)).

Some objects are created automatically, while others are created manually or are pre-created in the system.

19.1.5 Object search

Axxon One allows you to search for objects in the objects tree using only part of their name or the IP address. An object search can be performed on all tabs under **Devices**.

To search for objects, complete the following steps:

1. Select the tab containing the object tree that you need to search.

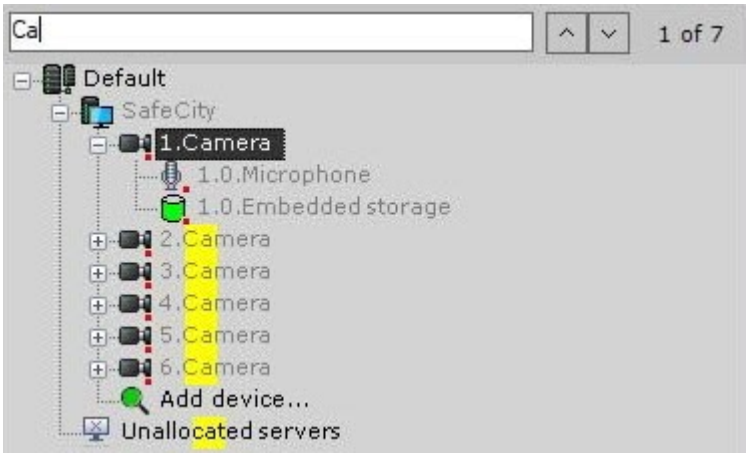


2. Enter the IP address, the full or partial name of the object in the **Search** field.

Note

- Search is not case-sensitive.
- Search can also be run based on object short name.

The search starts automatically once you enter something in the box. When the search is complete, you will see the number of objects found in the tree.



The parts of names corresponding to the characters you entered will be highlighted in yellow on the found objects.

Note

- If you search by an IP address, the found object will be fully highlighted.
- If a found object is located in a collapsed branch of objects, the branch will be highlighted with a yellow line.



You can use the  buttons or press **ENTER** to navigate through the search results.

The search results rotate in a loop; moving from the last object takes you back to the first object.

Note

If you move to an object located in a collapsed branch, the branch will automatically expand.

19.2 Devices

19.2.1 Configuring domains

A distributed system based on *Axxon One* is created within a domain, it means, a selected group of *Axxon One* Servers.

When configuring a domain, the following operations are used in the necessary combinations:

1. Creating a new domain.
2. Adding a Server to an existing domain.
3. Excluding a Server from the current domain.

Attention!

You cannot combine regular and Failover Servers within the same domain (see Configuring Failover VMS(see page 1064)).

To configure a domain, you must have the appropriate permissions (see General information about users(see page 917)).

This section gives step-by-step instructions for each operation used in configuring a domain, and then describes typical instances of their use.

19.2.1.1 The Domain object

The **Domain** system object is the basic object in the system.

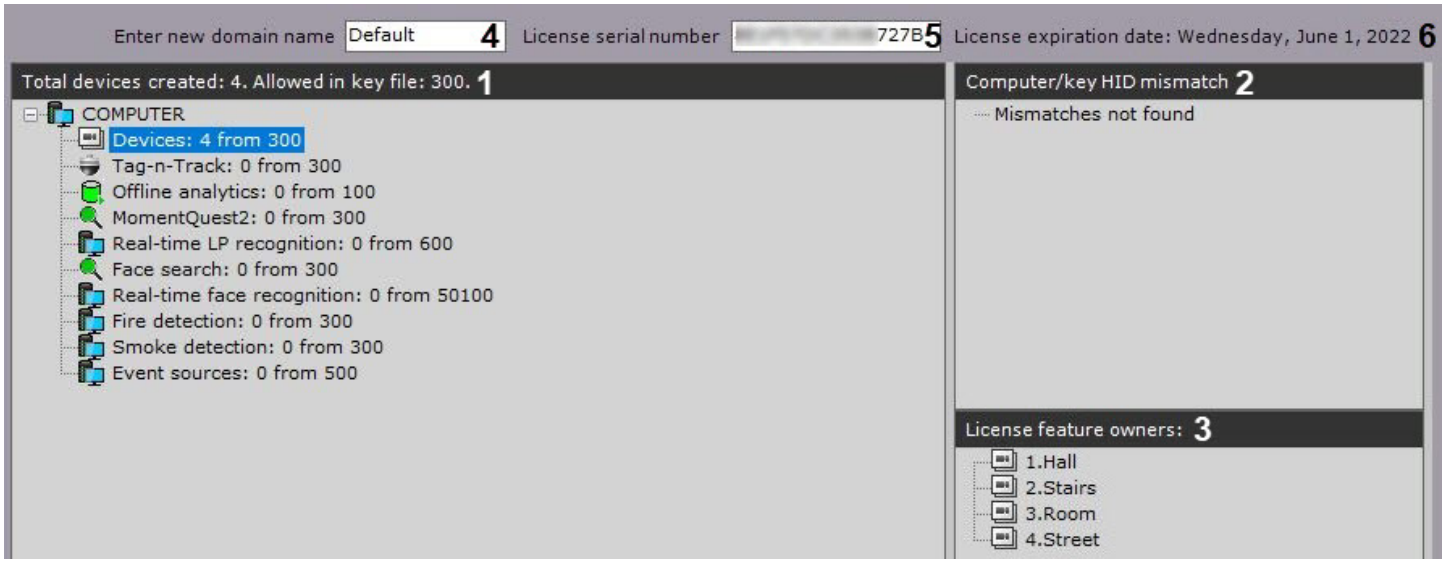
The **Domain** object is the parent of the **Server** objects, which correspond to the servers that are in a domain.

When you select the **Domain** object in the **Total devices created** group (**1**), the software displays information about the domain and the current license: Servers and their number, IP devices and various used functions.

Also displayed are license serial number (**5**) and license expiration date (**6**).

Note

The number of created devices means the total number of enabled IP video channels.



In the **Computer/key HID mismatch** (**2**) group, the license information/error is displayed.

If you select a licensing option in the relevant group (**1**), the **License feature owners** (**3**) group will include the objects currently using this license.

You can also rename the domain. To do so, enter the new name in the corresponding field (**4**) and click the **Apply** button.

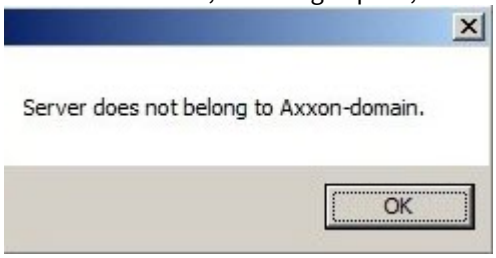
19.2.1.2 Operations with domains

19.2.1.2.1 Creating a new domain

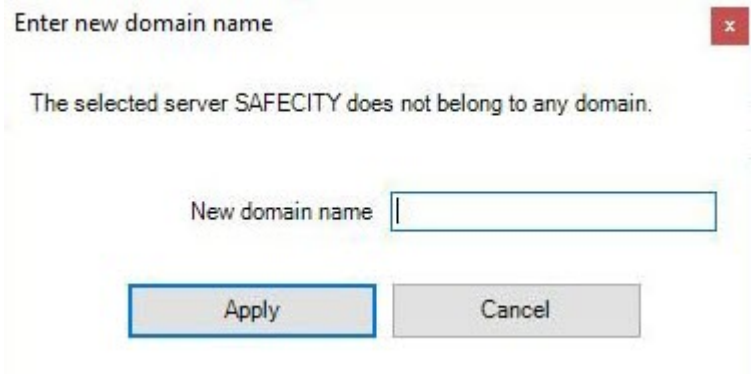
A new domain can be created in one of two ways:

1. During installation of *Axxon One* with the **Server and Client** configuration type (see Installation(see page 98)).
2. When attempting to connect to a Server, which does not belong to a domain.

In the second case, a message opens, in which you must click **OK** (see Starting Axxon One(see page 137)).



The **Enter new domain name** window opens. In the **New domain name** field, enter the domain name to create a new group of computers based on the Server and click **Apply**.



Attention!

- It is not possible to use the above steps to add a Server to an existing domain.
- Assigning the same domain name to several Servers does not guarantee that those Servers will be in the same domain.
- Different domains can have identical names.

This will create a new domain based on the Server. *Axxon One* will then be launched with the entered authorization parameters (see Starting Axxon One(see page 137)).

19.2.1.2.2 Adding a Server to an existing domain

A Server can be added to an existing domain from any Server within that domain.

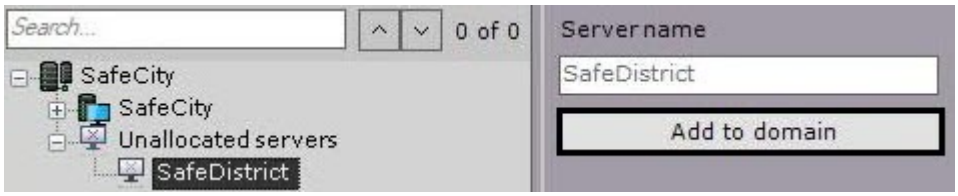
Attention!

- To add a Server to a domain, it is necessary to first add the new Server to the license (see Upgrading Axxon One[67]). This does not apply to cloud licenses.
- Before configuring a distributed system, be sure to consolidate your Servers into domain.
- When consolidating the Servers into domain, each Server must have a unique IP address.
- Only unallocated Servers can be added to domain. Unallocated Servers are the Servers that don't belong to any domain.

There are two ways to add a Server to a domain, depending on whether or not it is present in the search results (in the **Unallocated servers** group).

If a Server is present in the search results, select it and click the **Add to domain** button.

67 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486861/Upgrading+Axxon+One

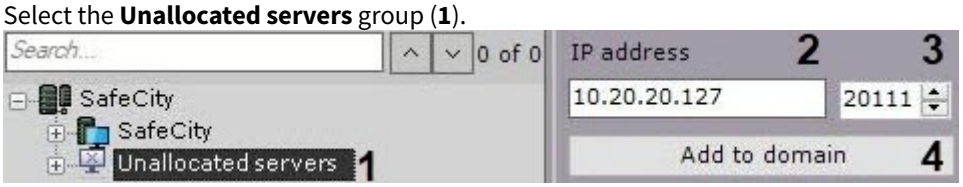


The Server will then be added to a domain from the **Unallocated servers** group.
Since the search for the unallocated Servers is conducted using the broadcast packets, the results may not include Servers located in a different subnetwork (for example, beyond a router that blocks broadcast packets).
In this case, you can add a Server to a domain manually. This option can be used with all unallocated Servers, including those present in the **Unallocated servers** group.

Consolidating the Servers from different networks into Axxon domain(see page 1436)
Network settings utility(see page 1379)

To add a Server to a domain manually, do the following:

1. Select the **Unallocated servers** group (**1**).



2. Enter the Server IP address (**2**).
3. Enter the Server port (**3**).
4. Click the **Add to domain** button (**4**).

The Server will then be manually added to a domain.
After a Server is added to a domain using any of the methods described, it will be displayed in the objects tree.



If a Server is not available when it is added to a domain, it will be displayed in the objects tree with the icon.

The Server will be added to a domain when it becomes available. To undo adding a Server to a domain, select the Server and click the Exclude from domain button.

19.2.1.2.3 Removing a Server from a domain

Any Server on a domain can be used to remove a Server from a domain.

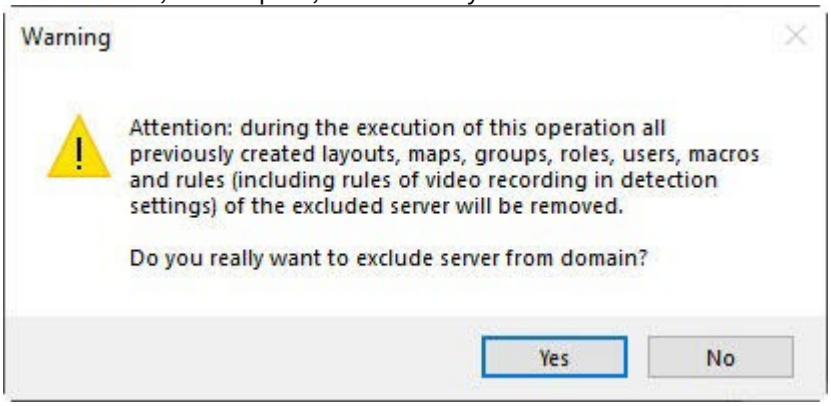
Attention!

By excluding a Server, you also delete the macros, layouts, maps, object groups, roles, and users that have been created on the Server.

To remove a Server from a domain, you must perform the following steps:

1. Select the Server in the list and click the Exclude from domain button.

2. In the window, which opens, confirm that you want to remove the Server from the domain by clicking the **Yes** button.



The Server will then be removed from the domain. If the current Client was connected to the excluded Server, the user interfaces will be unloaded and the user will be prompted to repeat the authorization procedure for *Axxon One* (see Starting Axxon One(see page 137)).

Note

You can also exclude a Server from a domain using the activation utility (see Excluding the Current Server from an domain[68]).

19.2.1.3 Cases of domain configuration

All possible cases of domain configuration are, to some degree, a combination of two typical cases.

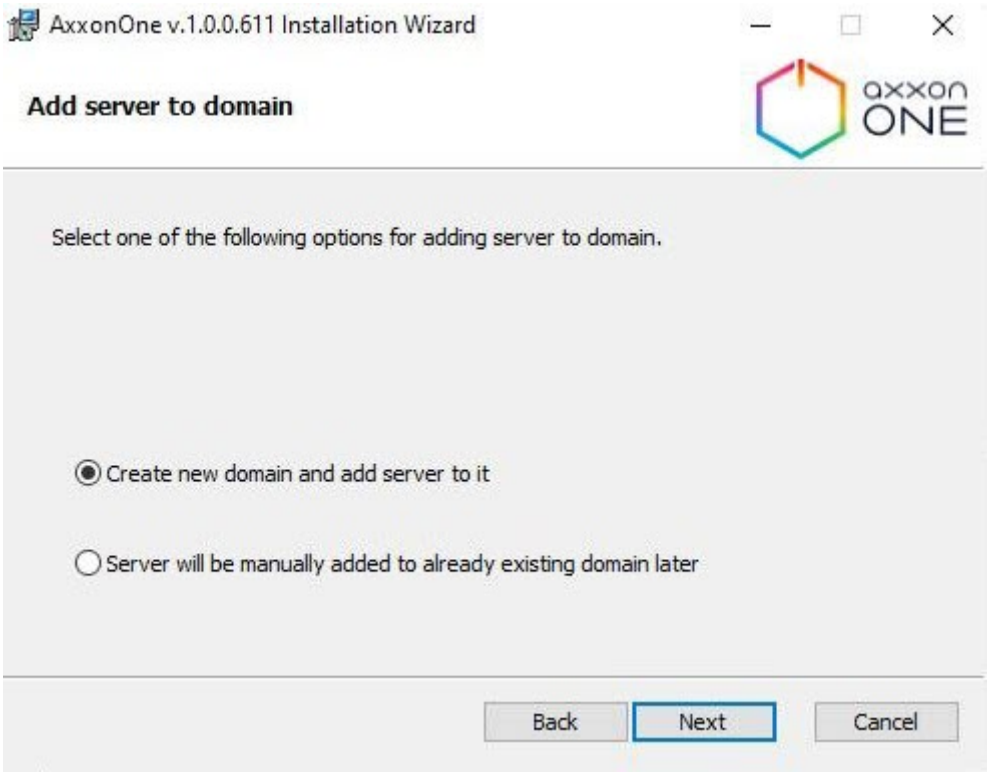
In the first typical case, the Servers for the future domain are selected before *Axxon One* installation. This case involves the following steps:

1. Selecting a Server on the basis of which a new domain will be created. Installing *Axxon One* with the **Server and Client** configuration type, indicating the name of a new domain (see Installation(see page 98)).

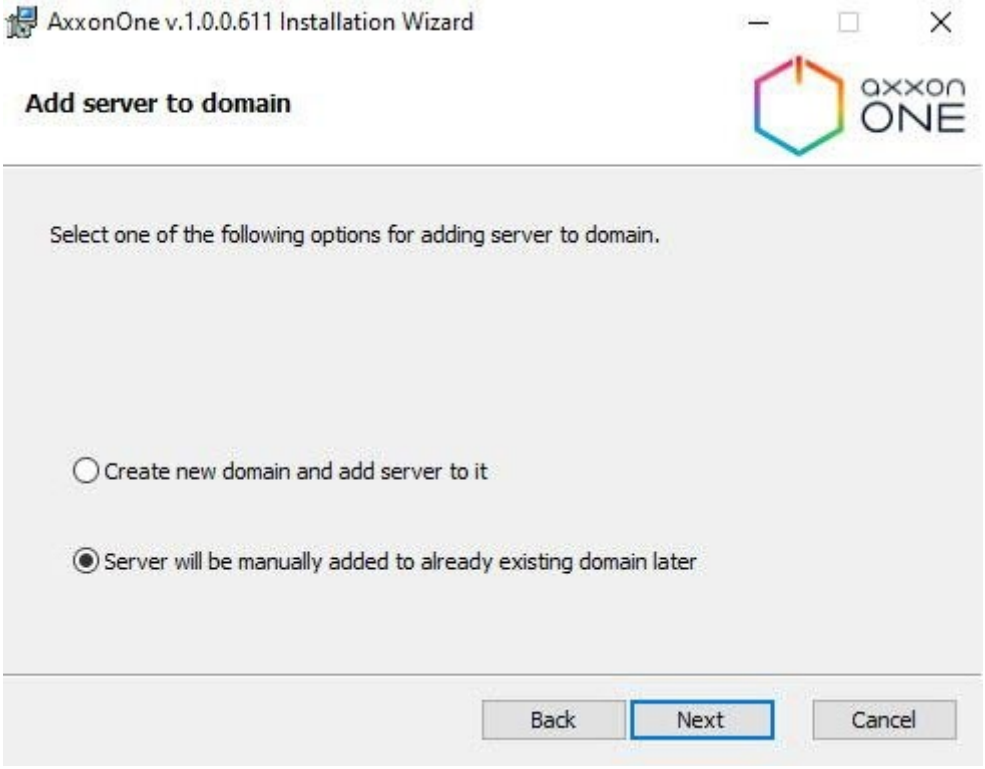
   Note

   Any Server in the future domain can be selected as the primary Server.

68 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486890/Excluding+the+Current+Server+from+an+domain



2. Installing *Axxon One* with the **Server and Client** configuration type on the other servers of the future domain, without adding them to a domain (see Installation(see page 98)).



3. Connecting to the primary server.
4. Adding the remaining Servers to a domain from the primary Server according to the instructions in Adding a Server to an existing domain(see page 153).

In the second typical case it is necessary to add servers which are part of another domain to a new domain. This case involves the following steps:

1. Excluding all the Servers which are to be added to a new domain from their current domains, according to the instructions in Removing a Server from a domain(see page 154).
2. Naming a new domain according to the instructions in Creating a new domain(see page 152), when attempting to connect to one of the Servers excluded in step 1.
3. Adding the remaining Servers to a domain from the primary Server according to the instructions in Adding a Server to an existing domain(see page 153).

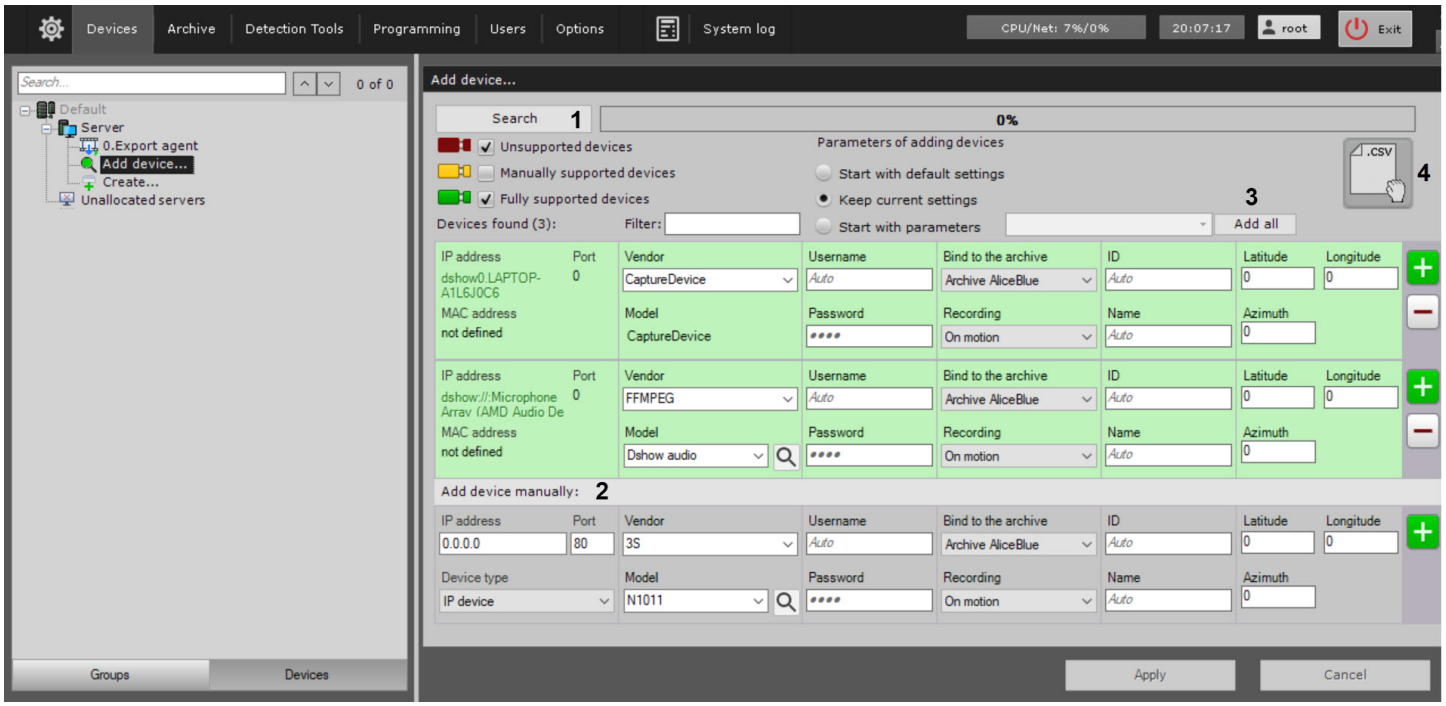
19.2.2 Searching, adding, configuring, and removing IP devices

On this page:

- General information(see page 158)
- Automatic search for IP devices(see page 158)
  - IP devices search(see page 158)
  - Filtering IP device search results(see page 159)
- Manual input of device data(see page 160)
- Adding devices to the configuration(see page 161)
  - Modes for adding devices to the configuration(see page 161)
  - Configuring IP device settings(see page 161)
  - Adding devices(see page 162)
- Removing IP devices(see page 163)

19.2.2.1 General information

You can add IP devices to the system using the IP Device Discovery Wizard. To open the IP Device Discovery Wizard, click the **Add device** link at the end of the server device list.



The IP Device Discovery Wizard interface includes:

1. Automatic device search.
2. Manual entry of device data.
3. Adding devices to the configuration.
4. Bulk adding devices using .CSV files (see Bulk creation of IP devices(see page 163)).

19.2.2.2 Automatic search for IP devices

19.2.2.2.1 IP devices search

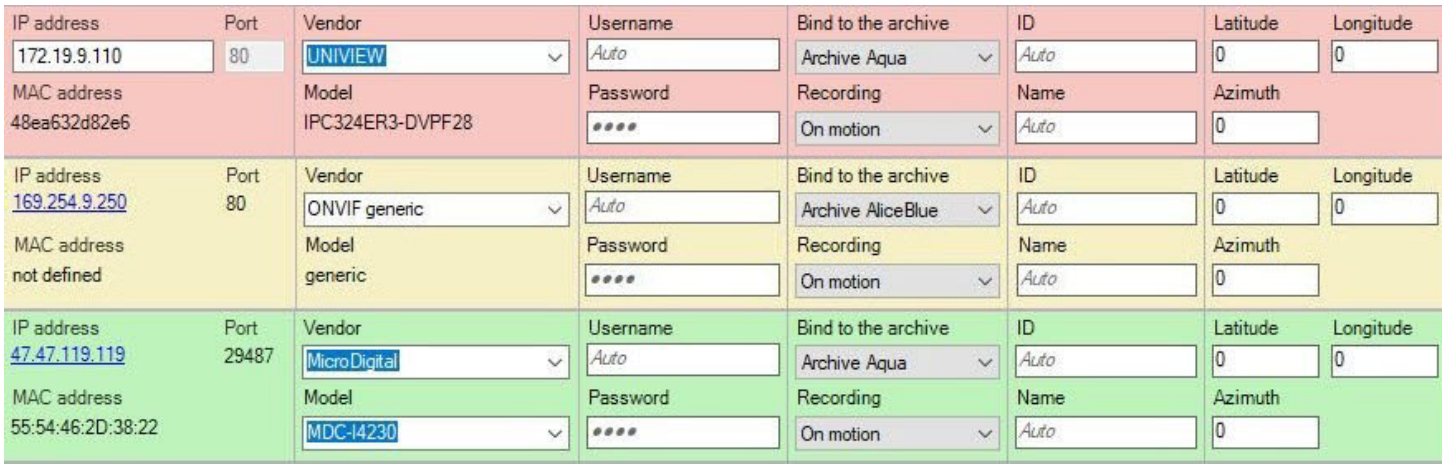
To start searching for devices, click the **Search** button. While searching, a progress bar is displayed.



To stop device search at any time, click the **Stop** button.

The search results are marked by different colors depending on the status of the found device.

Camera color	Description
	Fully supported device
	Manual configuration required
	Device operation in *Axxon One* isn't guaranteed



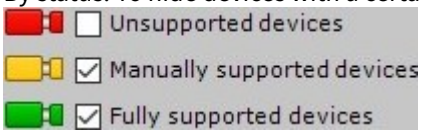
Note

- Since multicast packets are used for device search, the search results may not contain the servers and devices that are in another subnet.
- If you click the IP address, you will jump to the device web interface.
- You can search for devices in the domain regardless of through which server the client is connected.

19.2.2.2.2 Filtering IP device search results

Search results can be filtered in two ways:

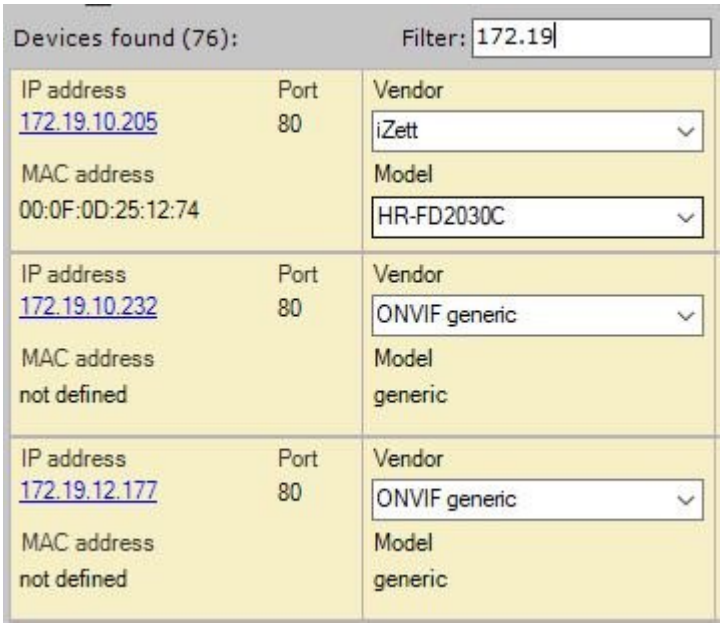
1. By status. To hide devices with a certain status in the search results, deselect the corresponding checkboxes.



2. By vendor, model, and IP address. To do this, use the **Filter** field. For example, this filter shows the search results of the **Sony** device.

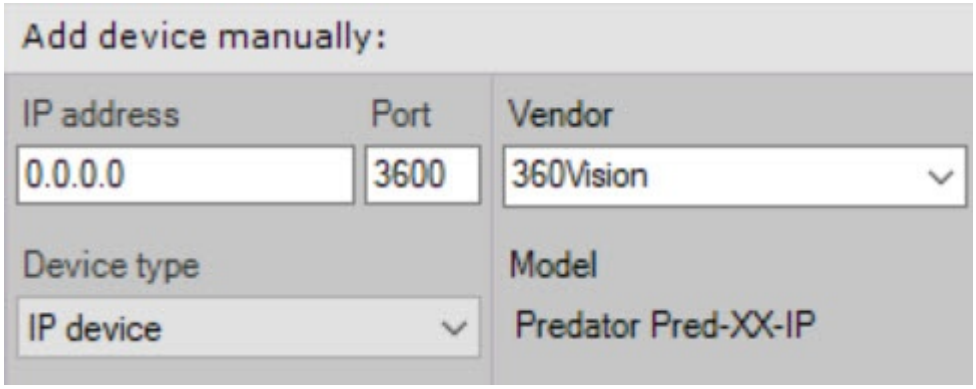


With a filter, you can search for cameras in a certain subnet.

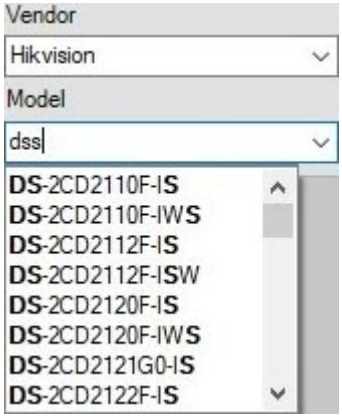


19.2.2.3 Manual input of device data

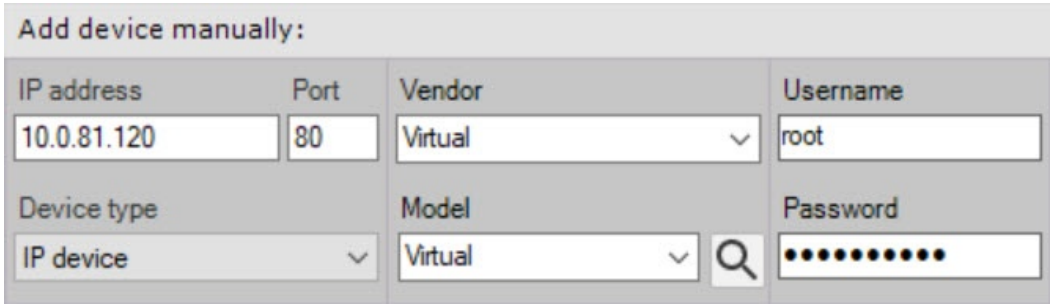
If the IP device is absent in the automatic search results (it is located on a different subnet or the connection with it is temporarily lost), you can add it manually. To do this, you need to select the type of the added IP device, specify the IP address and connection port of the device, and select the vendor and model in the area with a neutral background located under the list with automatic search results.



You can also specify the vendor and model of the device by using the search in the input field.



If the **IP address**, **Port**, **Vendor**, **Username** and **Password** are set for a device, the device model can be automatically detected by clicking the  button.



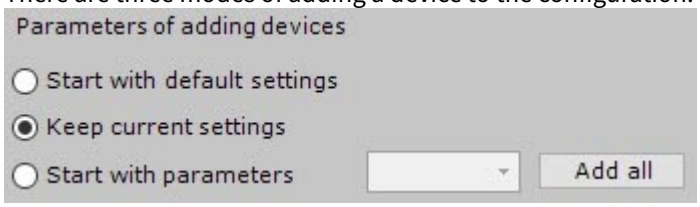
19.2.2.4 Adding devices to the configuration

The algorithm of adding the IP device to the configuration is the following:

- select a mode for adding a device to the configuration;
- specify the device settings, if necessary;
- add a device to the configuration.

19.2.2.4.1 Modes for adding devices to the configuration

There are three modes of adding a device to the configuration. Their description is given in the table.



	Device addition mode	Description
1	Keep current settings	The IP device is added to the configuration with the current settings that are specified in the web interface
2	Start with default settings	The IP device is added to the configuration with the settings that are determined as default in *Axxon One*. When you add a device in this mode, it changes the current device settings specified in the web interface
3	Start with parameters	The IP device is added to the configuration with the settings that have been previously specified for a device of the same model in the configuration. The template device from the corresponding list is selected. Only devices of the same model are shown in the list of search results when you select a template. Parameters that will be set according to the template device: firmware, video stream settings, buffering settings, the **Other** settings (see Camera(see page 171)), and the **Other** settings for **Microphone** and **Speaker** objects, if these are configured for the template device. This mode is best suited when cameras of the same model are used at a site. In this case, the algorithm of adding a device to the configuration is the following: • add and configure one device; • add other devices according to the template of the first one

19.2.2.4.2 Configuring IP device settings

When you add a device to the configurations, you can immediately set several parameters, such as:

- vendor and model,
- login and connection password,
- ID and object name,

Note

- The object ID can contain numbers, Latin letters, and the "_" sign. Once the device is created, its short name will match the specified ID (see Camera(see page 171)). In this case:
  - The camera ID cannot be changed, since it is used to maintain the connection with the archive if you replace the camera (see Saving the archive when replacing the video signal device[69]).
  - The short name can be changed, and the added devices will be sorted in the object tree in ascending order of this field (see Camera(see page 171)).

- select an archive and set the recording parameters (see Configuring recording to an archive(see page 295)):
  - **No**—camera is linked to the archive, no recording;
  - **Always**—continuous recording;
  - **On motion** (selected by default)—either the embedded motion detector (see General information about embedded detectors(see page 811)) or the *Axxon One* motion detector (see Configuring the Motion detector(see page 447)) will be automatically created for the added camera. Also, the automatic rule for recording to the specified archive (see Automatic rules(see page 358)) will be created. By default, recording stops when an event from the detector is no longer generated.

    Note

    - When you create a device, the pre-alarm time interval for archive recording is automatically set to 3 seconds (see Configuring recording to an archive(see page 295)).
    - The embedded motion detector is created automatically only for certain camera models. The information about the support for the embedded motion detector is given in the list of supported devices in the **Analytics** column. The embedded motion detector is configured through the web interface of a specific camera. In other cases, the *Axxon One* motion detector is created.

- device location coordinates in the 53.212558; 50.204991 format (coordinates are used when you add a camera to the map, see Adding video cameras(see page 985)).

19.2.2.4.3 Adding devices

During one operation, you can add one device or all devices from the search results to the configuration (except those for which operation isn't guaranteed). To add one device, click the  button. To add all devices, click the **Add all** button.

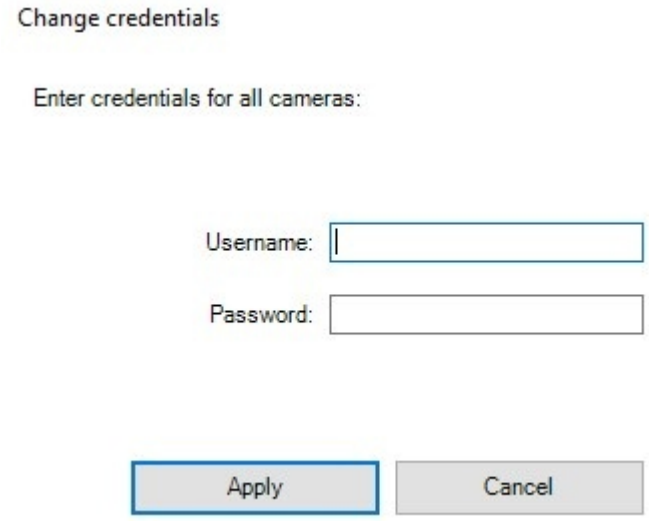
Note

Keep in mind that when you add all IP devices, the same addition mode will be used for all of them.

To remove a device from the search results, click the button.

69 https://docs.axxonsoft.com/confluence/display/one20en/Saving+the+archive+when+replacing+the+video+signal+device

If you don't set access parameters to the devices while adding them, the window for setting the unified access parameters will be displayed.



Next, a device is added to the configuration.

When you add a device to the system, the **Default** permissions are applied, which are configured for each role (see General information about users(see page 917)).

19.2.2.5 Removing IP devices

To remove IP devices, select one or more objects in the device tree by left-clicking (while holding down the **Ctrl** key) and click the **Delete** button.

19.2.2.6 Bulk creation of IP devices

You can create IP devices in bulk by importing their parameters from a CSV file.

> **Attention!**
>
> You have to disable the UAC first.

Do the following:

1. Create a CSV file with devices listed as follows:

```
IP address, Port, Vendor, Model, Login, Password, Identifier, Object name, Latitude,
Longitude, Azimuth, Archive name, Recording mode
```

> **Attention!**
>
> - For each added camera, three parameters are required: IP address, Vendor and Model. The parameters that aren't specified will be automatically set to their default values.
>   Even if no additional parameters are set, you must still include commas.
> - All parameters are case-sensitive.
> - To separate the integer and fractional parts in coordinates, use a point.
> - If there is a comma in the device model name, in order not to violate the logic of the CSV file, it is necessary to add the \ character before the comma in the model name.
>   Example: the device model name is CO-i20DY2(2,7-9) (CO-YUC-HM96-279). In the CSV file, it is necessary to specify the model name as CO-i20DY2(2\,7-9) (CO-YUC-HM96-279).

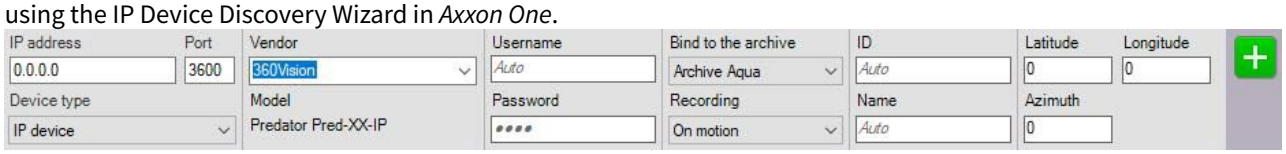
For example:

```
10.0.12.245, 80, Bosch, Dinion IP starlight 8000 MP, service, Admin12345!, 1441, Camera 1,
0, 0, 0, Archive AliceBlue, Always
10.0.12.246,, Bosch, Dinion IP starlight 8000 MP,,,,,,,,,
10.0.12.247, 80, Bosch, Dinion IP starlight 8000 MP,,,, Camera 3,,, Archive AliceBlue, On
motion
```

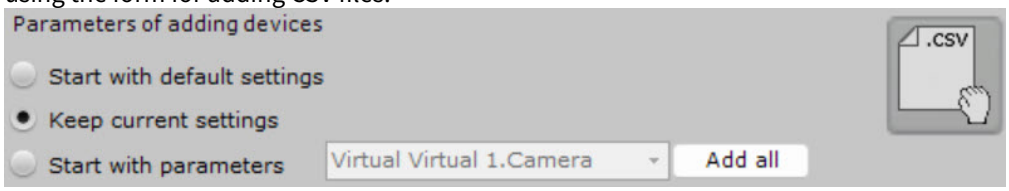
Attention!

The vendor and model of the device must be specified exactly as in the list of supported devices[70].
For correct display of the object name in *Axxon One*, the CSV file must be UTF-8 BOM or UTF-32 BOM encoded.

2. Upload the created file using the Drag&Drop method in one of the following ways:
   - using the IP Device Discovery Wizard in *Axxon One*.



   - using the form for adding CSV files.



Note

- If *Axxon One* is running in the safe mode, the CSV file must be dragged&dropped to the IP Device Discovery Wizard from the application window, which is running with the administrator rights.
- If you add a CSV file with incorrectly specified camera models or parameters, pop-up windows with warnings or error messages will be displayed. If the file is successfully uploaded, a pop-up window with success message will be displayed.

The specified devices will be added to the configuration.

19.2.3 Configuring system objects for devices

19.2.3.1 The Server object

The **Server** object corresponds to a computer:

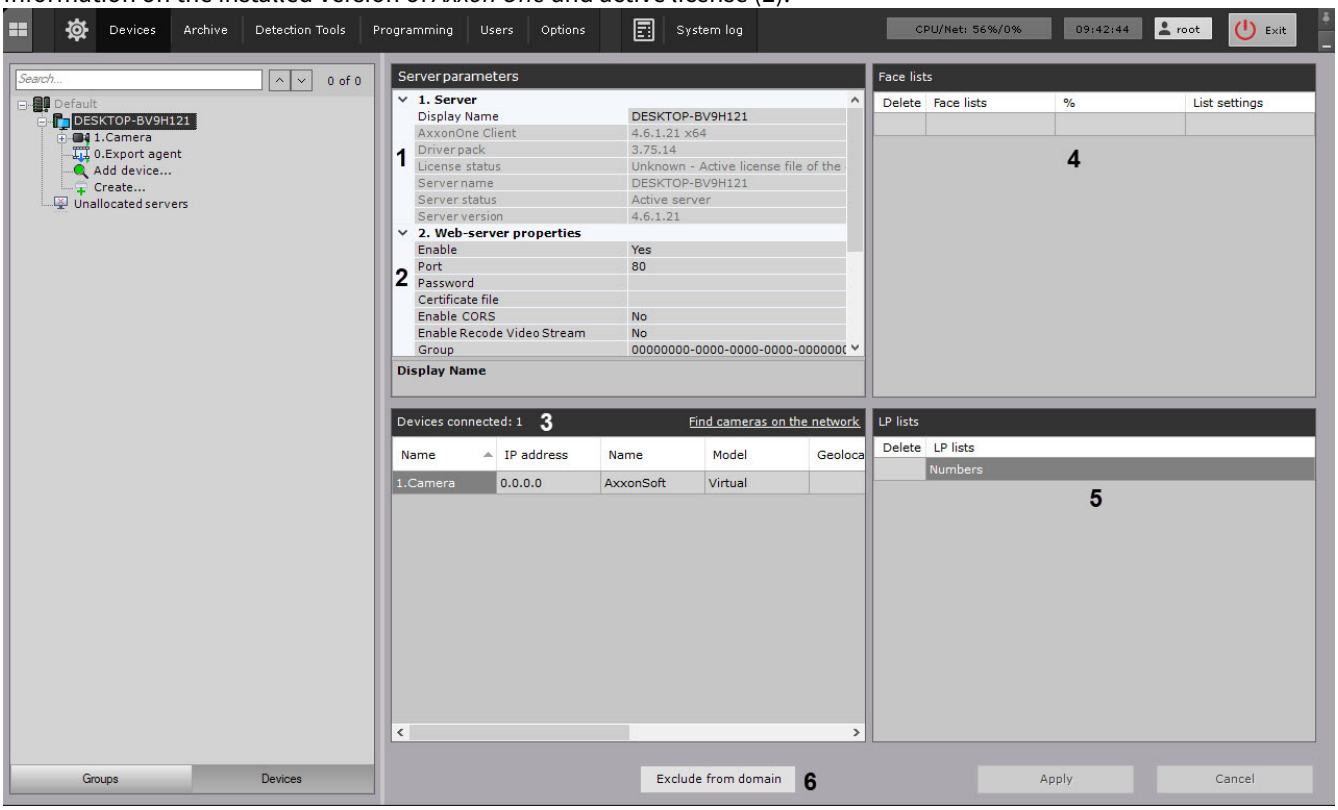
- on which *Axxon One* is installed in the **Server and Client** configuration;
- is on the Axxon-domain.

The name of the **Server** object is the same as the computer's network name by default. To change it, enter the new name in the corresponding **Display Name** field **1** and click the **Apply** button.

Click the **Server** object to view the following information:

70 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack

1. Information on the installed version of *Axxon One* and active license (**1**).



2. Web-Server configuration options (**2**, see Configuring the Web-Server(see page 165)).
3. A list of video cameras connected to the Server, with the main parameters (**3**). Cameras are listed in a table with the following columns: **Name**, **IP address**, **Name**, **Model**, **Geolocation**, **Azimuth**, **Video Stream, Frame Rate** and **Resolution**. You can sort the table by columns.

> **Note**
>
> If no cameras have been created on a Server, you are prompted to search for IP devices on the network (the IP Device Discovery Wizard is launched, see Searching, adding, configuring, and removing IP devices(see page 157)).

> **Note**
>
> The number of connected devices means the total number of available IP video channels, including disabled.

4. Created lists of facial templates (**4**, see Checking in lists of faces(see page 499)).
5. Created ANPR lists (**5**, see Checking in lists of LPs(see page 668))
6. The button to remove Server from an Axxon-domain (**6**, see Removing a Server from an Axxon-domain(see page 154)).

19.2.3.1.1 Configuring the Web-Server

On the page:

- General information(see page 166)
- Configuring the Web-Server(see page 166)

19.2.3.1.1.1 General information

The Web-Server allows you to access *Axxon One* remotely over the internet (see Working with Axxon One through the Web-Client(see page 1325), Working with Axxon One Through the Mobile Clients(see page 1377)).

Attention

- On the local computer with the Web-Server running, ports from the range [9001; 9001 + number of logical cores of the processor] must be open.
- Except for H.264 format, the Web-Server transcodes the incoming video image using the MJPEG compression algorithm, which can result in high levels of incoming traffic.

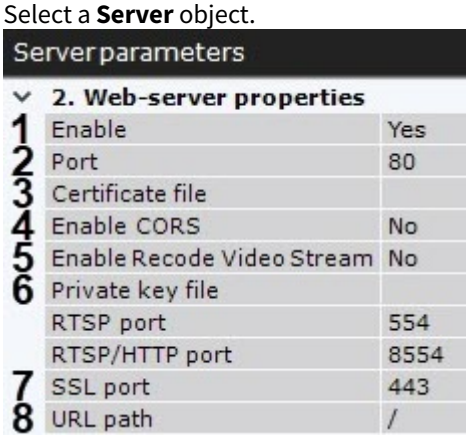
In addition, *Axxon One* allows you to use Wildcard certificates to work with the Web-Server. *Axxon One* also supports the following types of certificate validation:

- D (Domain Validation - DV):
  - certificate with domain validation;
  - only domain ownership is validated.
- D+O (Domain + Organization Validation - OV):
  - certificate with domain and organization validation;
  - In addition to validating domain ownership, the authenticity of the organization that registers the certificate is also validated.
- IDN (Internationalized Domain Name):
  - certificate for domains that use national characters (for example, Cyrillic characters);
  - this can be a D or D+O certificate, but intended for domains that contain non-Latin characters.
- EV (Extended Validation):
  - certificate with extended validation.
- Wildcard:
  - certificate that protects the domain and all its subdomains. For example, a certificate for .domain.com is valid for all subdomains like web.domain.com, client.domain.com, and so on.
  - can be either D or D+O.

19.2.3.1.1.2 Configuring the Web-Server

To configure the Web-Server in *Axxon One,* do the following:

1. Select a **Server** object.



2. By default, the Web-Server starts automatically together with the Server. If you want to disable the Web-Server, set the value of the **Enable** parameter to **No** (**1**).
3. In the **Port** field, enter the port number on which the Web-Server will be located (**2**).
4. To connect to the Web-Server via the SSL port only, do the following:
   a. Enter the SSL port number to connect to the Web-Server (**7**).
   b. Specify a path to the private key file (**6**).
   c. Specify a path to the certificate file (**3**).

Attention!

- *Axxon One* supports SSL certificates in PEM format with TLS cryptographic protocol v 1.2 and 1.3 and AES GCM, AES CCM and AES CBC algorithms. PEM format is a text container that uses base-64 encoding. File extensions in PEM format can be, for example, .pem, .crt, .key. For the correct operation of the Web-Server, the private key (**6**) and certificate (**3**) must be represented in one of these extensions. For example, private key—privkey3.pem, certificate—fullchain3.pem.
- If the private key file and certificate file are not specified in the Web-Server settings, the connection to the Web-Server is made via **HTTP Port** only.

5. If the Web-Server must use the CORS mechanism, enable the corresponding parameter (**4**).
   Axxon One supports the following:
   a. CORS HTTP-headers for GET and POST requests.
   b. Preflight requests.
6. If the Web-Server must transcode the stream, enable the corresponding parameter (**5**). By default, the Web-Server doesn't transcode the stream, which helps to avoid unpredictable CPU load on the Server. For example, if the browser cannot playback a video in H.265 format, you must switch to a browser-supported video codec (see Real-time video surveillance in the Web-Client(see page 1346)) or change the video codec of the camera to the video codec supported by the browser (see Camera(see page 171)).
7. In the **URL path** field, enter the prefix that is added to the Server address (**8**).
8. Click the **Apply** button to apply the configured parameters and restart the Web-Server.

The Web-Server is now configured and available over the internet at the following address: http://<IP address of *Axxon One* Server>:<Port>/<Prefix>. For example, if the Servers IP address is **10.0.11.1**, the port is **8000**, and the prefix is **/asip-api**, then the Web-Server can be accessed at the following address: http://10.0.11.1:8000/asip-api.

Attention!

In Linux OS, for the correct operation of the Web-Server, the ngp user must have permissions to open the directory where the private key and certificate files are located, as well as permissions to read the files. To give the permissions, do the following:

1. Run the command:

```
chmod 751 /home/certs/
```

   where instead of **/home/certs/** you must specify the path to the files.
2. Check the permissions for the directory with files using the command:

```
ls -lt /home/
```

   As a result, the permissions for the directory with files look like this:

```
total 8
drwxr-x--x  2 user user 4096 aug 20 14:46 certs
drwxr-xr-x 18 user user 4096 aug 20 14:46 user
```

19.2.3.1.2 Configuring the RTSP server

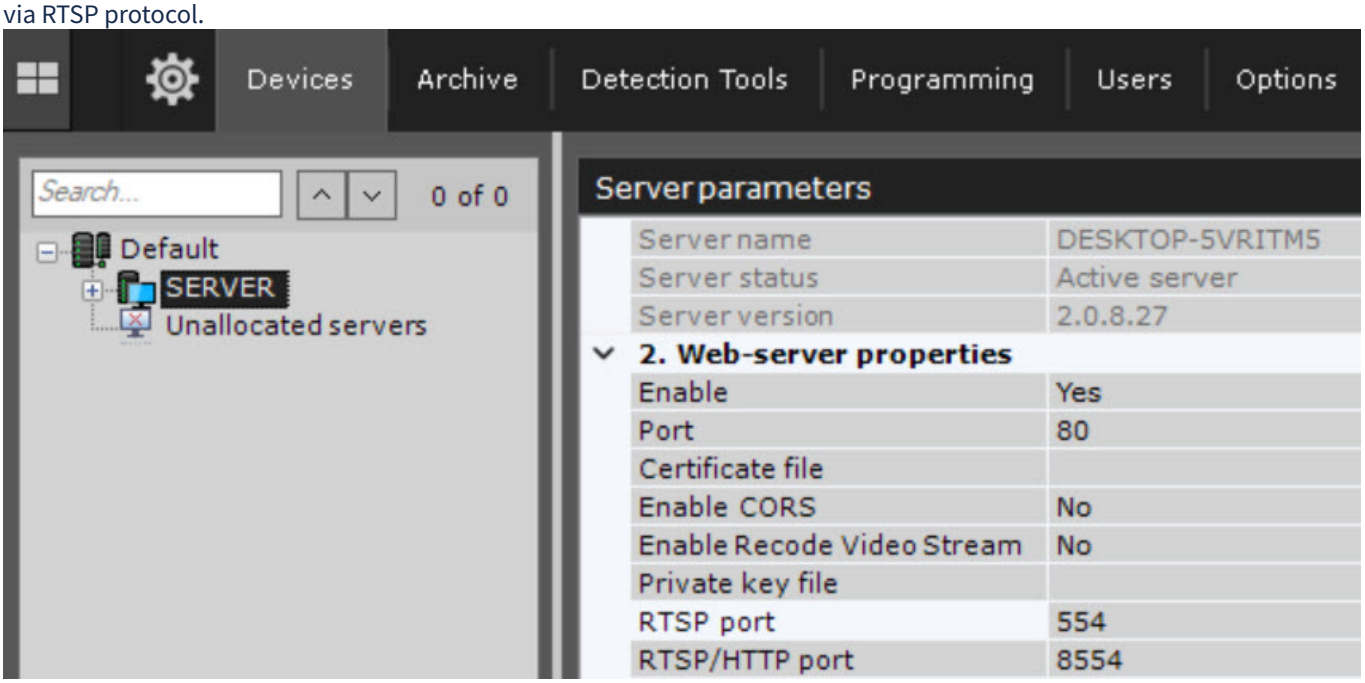
Axxon One supports RTSP streaming from cameras (see Get camera live stream[71] and Get archive stream[72]).

To configure the RTSP server, do the following:

1. Go to the **Devices** tab.

71 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486988/Get+camera+live+stream
72 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246487010/Get+archive+stream

2. Select the **Server** object (see The Server object(see page 164)).
3. In the **Web-server properties** section, in the **RTSP port** field, specify the port number that you want to use to transfer data via RTSP protocol.



4. Click the **Apply** 

button.

Configuration of the RTSP server is complete.

To receive videos from the RTSP server, use the following link format:

Live video	**High-quality stream**	rtsp://login:password@IP address:554/hosts/HOSTNAME/DeviceIpint.N/SourceEndpoint.video:0:0
	Low-quality stream	rtsp://login:password@IP address:554/hosts/HOSTNAME/DeviceIpint.N/SourceEndpoint.video:0:1
Archive video	rtsp://login:password@IP address:554/archive/hosts/HOSTNAME/DeviceIpint.N/SourceEndpoint.video:0:0/20160907T050548.723000?speed=1	

Attention!

You cannot receive video from cameras with MJPEG codec from the RTSP server. To receive video from cameras from the RTSP server, you must change the codec of cameras.

where:

Parameter	Description
login:password	User username and password in *Axxon One* **Attention!** For the correct operation of the RTSP server, the username must meet the following conditions: • start with a letter; • contain only Latin letters, digits, and the following characters: "/", "-", "_", ".", ":", "+".

Parameter	Description
hosts	Permanent part of a link
HOSTNAME	Server name (must be written only in uppercase letters)
N	camera ID in *Axxon One* (see Camera(see page 171))
SourceEndpoint.video:0:0	Permanent part of a link
speed	Mandatory parameter to receive archive stream

19.2.3.1.3 Configuring the ONVIF server

Axxon One features: reference information(see page 77)

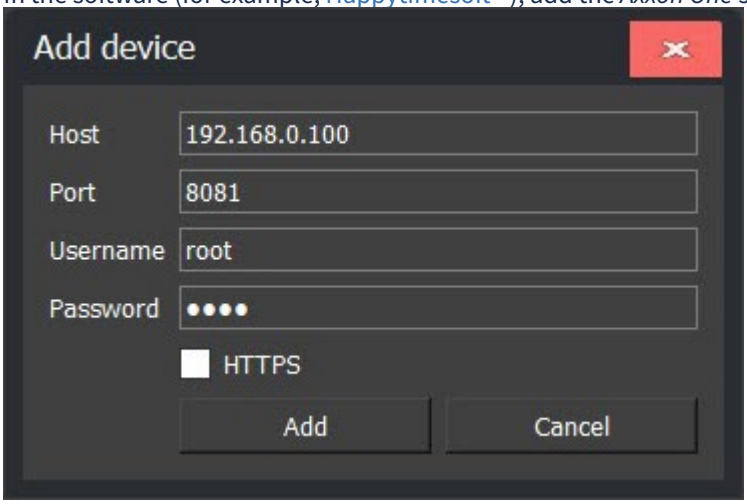
Axxon One has an embedded ONVIF server that you can use to add *Axxon One* as a video recorder to other software (for example, Onvif Device Manager (ODM) or Happytimesoft).

Attention!

The ONVIF server doesn't support the use of cameras with MJPEG codec. To work with the ONVIF server, you must change the codec of cameras.

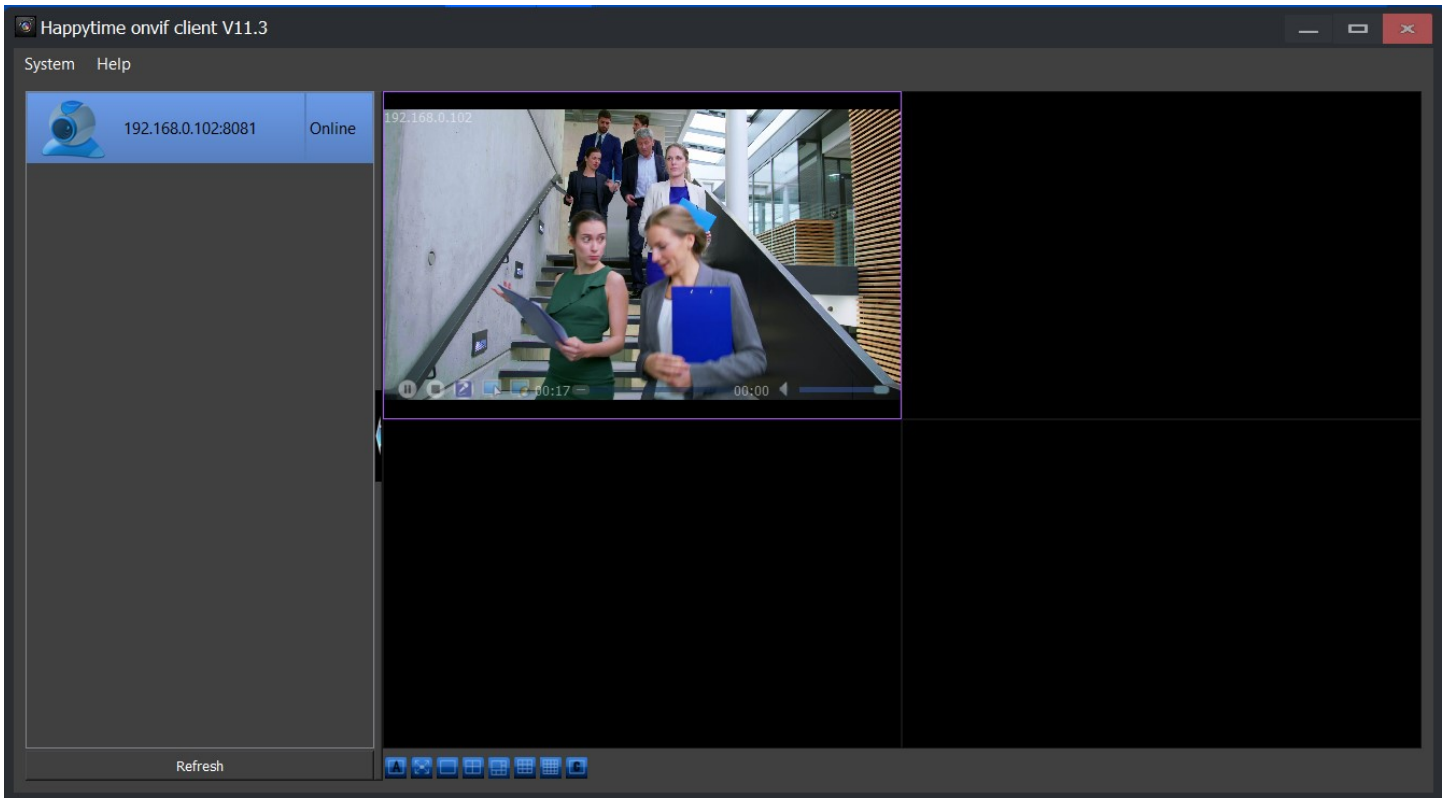
To configure the ONVIF server, do the following:

1. Install *Axxon One* 2.0 together with *DriverPack* 3.73.79 and later.
2. Stop the server (see Stop the server(see page 146)).
3. Create the NGP_ONVIFSERVER_ENDPOINT system variable (see Creating system variable(see page 126)). In the **Variable value** field, specify the IP address of the local *Axxon One* server.
4. Start the server (see Starting the server(see page 137)).
5. In the software (for example, Happytimesoft[73]), add the *Axxon One* server as a device using the 8081 port.

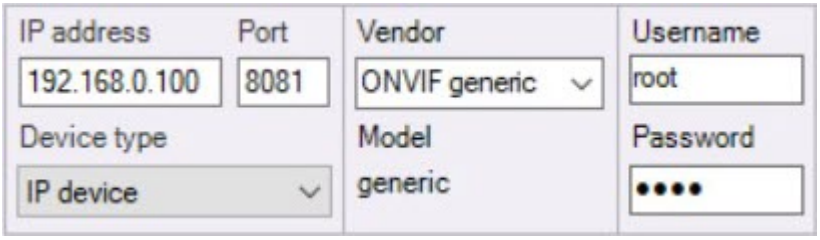


The ONVIF server configuration is complete. The software will broadcast the video image from *Axxon One* in real time.

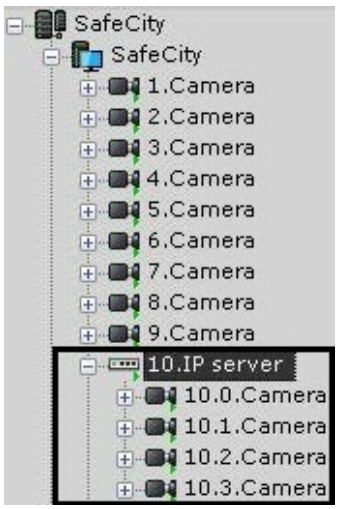
73 https://www.happytimesoft.com/products/onvif-client/index.html



You can also add the ONVIF server to another *Axxon One* server as an ONVIF generic IP device (see Searching, adding, configuring, and removing IP devices(see page 157)).



The ONVIF server will be added to the configuration as an **IP server** (see The IP Server object(see page 217)) with corresponding cameras.



19.2.3.2 Camera

On this page:

- General information(see page 171)
- Configuring the camera parameters(see page 171)
  - Object identification parameters(see page 172)
  - Object features parameters(see page 172)
  - Authentication parameters(see page 173)
  - Video buffering parameters(see page 173)
  - Video stream parameters(see page 173)
  - Panomorph view parameters(see page 174)
  - Other parameters(see page 174)
  - Alternative view parameters(see page 174)
  - Geolocation parameters(see page 174)
- Camera preview window(see page 175)
- No signal from cameras and failure to connect to other servers(see page 175)

19.2.3.2.1 General information

You can create and configure the **Camera** object on the **Hardware** tab. The object tree of a camera is generated automatically according to camera functions that are integrated into *Axxon One* (the presence of alarm inputs, relay outputs, a PTZ device, and so on).

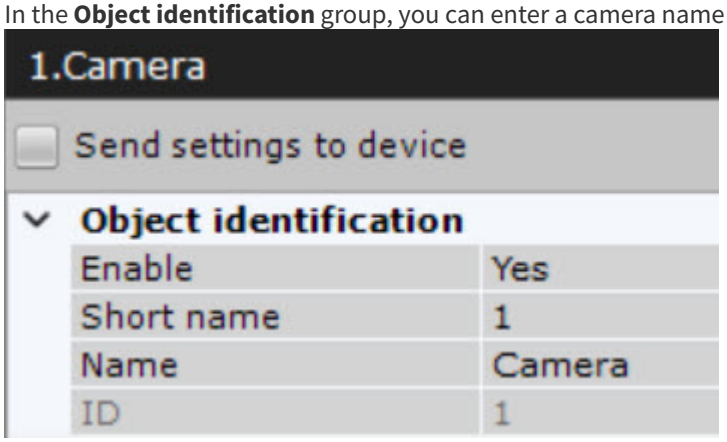
You can configure the camera recording to the archive on the **Archive** tab (see Archive(see page 272)).

19.2.3.2.2 Configuring the camera parameters

After you added a camera to the configuration via the IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)), you can edit the camera's parameters. The camera parameters are grouped as follows.

19.2.3.2.2.1 Object identification parameters

In the **Object identification** group, you can enter a camera name and a short name.



By default, a short name is a camera's ID. The camera ID cannot be changed since it is used to maintain the connection with the archive when you replace the camera (see Saving an archive when replacing a video signal device(see page 302)). You can change a short name, and the added devices will be sorted in the object tree in ascending order of this field.

The full name of the camera in the object tree is displayed in the <Short name>.<Name> format. You can use the camera's short name in keyboard shortcuts (see Notes regarding hot key actions(see page 1056)).

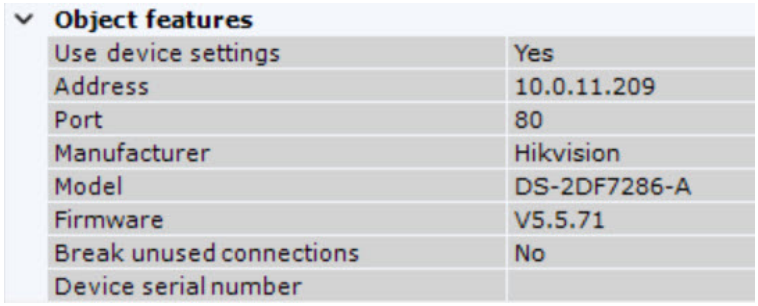
You can also disable a camera by selecting **No** in the **Enable** field.

> **Attention!**
>
> Every camera enabled in the system (including analog cameras, see The IP Server object(see page 217)) is a video channel in terms of licensing (see Axxon One licensing(see page 134)). Disabled cameras are not subject to licensing. If you run out of camera licenses, disable offline/unused cameras.

19.2.3.2.2.2 Object features parameters

In the **Object features** group, you can see the following camera parameters:

1. The IP address (assigned automatically and can be changed if necessary).
2. The port used to transmit data between a camera and *Axxon One* (this value is set to **80** by default but can be changed if necessary). Initially, the port number is set via the camera's web interface.
3. The MAC address.
4. Manufacturer, model, driver version, and current firmware.
5. The number of the video channel (for an IP server).
6. Device serial number (for Axis devices only, see Axis IP Devices(see page 238)).



You can also configure parameters shared by all cameras in this group:

1. If you want to use camera settings without overwriting them with the default settings specified in *Axxon One*, select **Yes** in the **Use device settings** field. This parameter is a reverse parameter of the **Send settings to device** checkbox, that is, when you enable one option, the other is automatically disabled, and vice versa.
2. If you want to interrupt video streaming from the camera to the server when the camera isn't used by the system, select **Yes** in the **Break unused connections** field.

> **Attention!**
>
> When you enable the **Break unused connections** parameter, additional time is required for stream initialization (to create a connection, request a stream, and so on) to display, start recording, or process a stream with a detector.

The following conditions must be met for the video stream transmission to be interrupted:

a. Video stream isn't currently displayed on either the client or web client layout.
b. Video stream isn't currently bound to any archive.
c. Video stream isn't currently being processed by any detector.

19.2.3.2.2.3 Authentication parameters

In the **Authentication** group, you can set the username and password to connect to the camera.

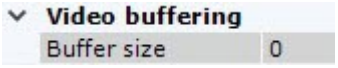


If the username and/or password for connecting to the camera are different from the factory settings, select **No** in the **Default** field and enter the current credentials.

> **Attention!**
>
> If the camera supports the Digest HTTP authorization, add the " **:** " character to the last character of the password.

19.2.3.2.2.4 Video buffering parameters

If you want to accumulate the data received from a camera to the buffer on the clients and transfer them for processing from the buffer, set the buffer length in milliseconds in the **Video buffering** group. This value must be between 50 and 1000 milliseconds. If the **0** value is selected, video buffering is disabled.



19.2.3.2.2.5 Video stream parameters

In the **Video stream settings** group, you can see video image parameters (contrast, brightness, color saturation, and so on). When configuring these, you can look up their descriptions in *Axxon One* interface. For more detailed information, refer to the camera manual.

Video stream settings	
Brightness	50
Color Saturation	50
Contrast	50
Day/Night Autoswitch Time	50
Exposure Mode	Auto
Flicker-free	50
Image Flip	None
IR Cut Filter Sensitivity	Medium level
IR Cut Filter	Auto
Sharpness	50
Shutter Speed	1/50
WDR Level	0
White Balance	AWB1
Wide Dynamic Range	None

Note

You cannot edit these parameters if you added the camera in the **Keep current settings** mode (that is, with the parameters that were set in the web interface, see Searching, adding, configuring, and removing IP devices(see page 157)).
To be able to configure these parameters, you need to set the **Send settings to device** checkbox.
Once you set a checkbox for a camera, the checkbox is also set on all its channels and child objects.

19.2.3.2.2.6 Panomorph view parameters

In the **Panomorph** group, you can configure fisheye cameras (see Configuring fisheye cameras(see page 183)).

Panomorph	
Activate	No
Camera position	Wall
Lens type	Common fisheye-lens
View type	PTZ
Fit to frame	No

19.2.3.2.2.7 Other parameters

In the **Other** group, you can configure the parameters for the devices connected via the RTSP protocol (see Configuring connection of devices via RTSP(see page 187)).

Other	
Enable	Yes
ID	0
Name	Camera
Comment	
Default archive	hosts/
Profile	High profile
Reconnection timeout	10
RTP packet reordering	Yes
Timeout	10
Video channel No.	0

19.2.3.2.2.8 Alternative view parameters

In the **Alternative camera 1** field, you can specify any camera in the current domain that can replace this camera on the layout when it isn't connected.

Alternative view	
Alternative camera 1	**1.Camera**
Alternative camera 2	**3.Camera**

19.2.3.2.2.9 Geolocation parameters

In the **Geolocation** group, you can specify the coordinates (latitude, longitude, azimuth) of the camera location (the coordinates are used when adding the camera to the geomap, see Adding video cameras(see page 985)).

Geolocation	
Geo location azimuth	0
Geo location latitude	0
Geo location longitude	0

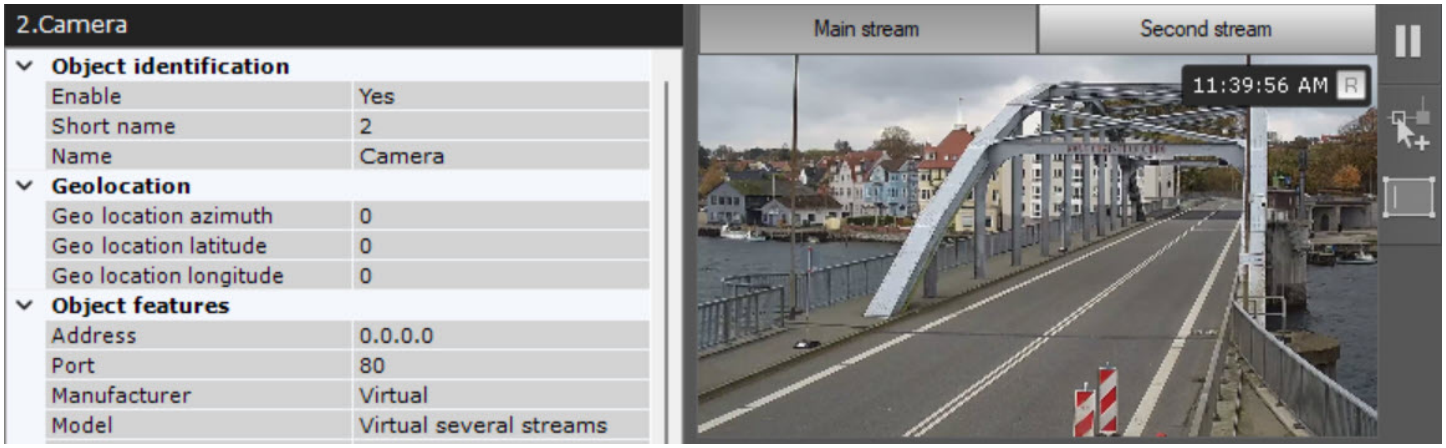
Note

When you specify the coordinates, only 6 decimal points are taken into account.

In a special case, when configuring an alarm layout (see Configuring Alarmed cameras layout(see page 975)), in these fields, you can specify the closest cameras to this one for simultaneous display.

19.2.3.2.3 Camera preview window

The preview window displays the video image from this camera.



If the camera supports multistreaming, then the **Main stream**, **Second stream** and other tabs are available in the window, depending on the number of added video streams (see Configuring video stream settings(see page 175)).

Note

- The indicator in the upper right corner displays the current time and recording status (see Time display(see page 1113)).
- When a stream is selected in the preview window, the settings for the relevant stream are displayed. The settings for the other stream are hidden.

19.2.3.2.4 No signal from cameras and failure to connect to other servers

If the Windows Firewall (or firewall of other manufacturers) was disabled during installation of *Axxon One*, *Axxon One* services and applications will not be automatically added to the list of firewall exceptions.

After you turn on the firewall, you can see no signal from cameras in both main and Web-Client and no possibility to connect to other servers.

To solve this problem, add the following applications to the firewall exceptions: **Apphost.exe**, **NetHost.exe**, **AxxonOne.exe**, and **LicenseTool.exe**.

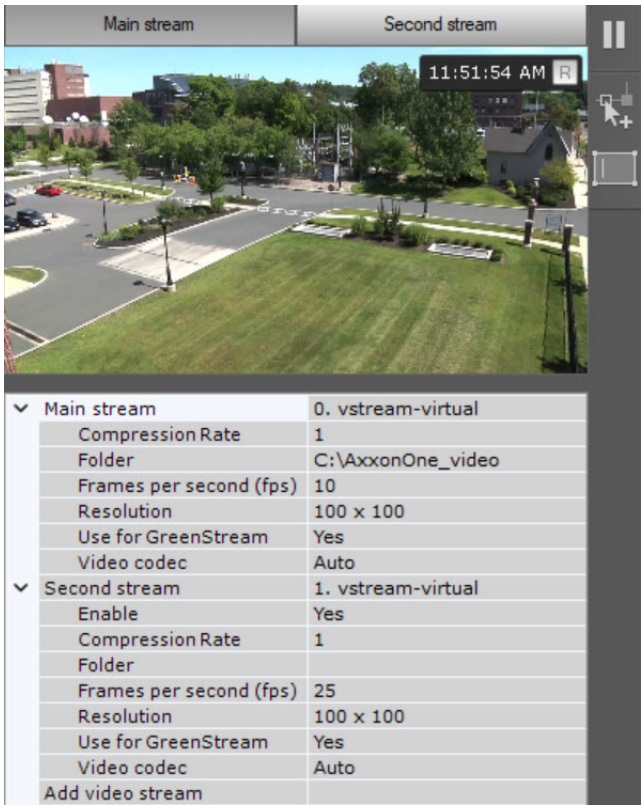
19.2.3.2.5 Configuring video stream settings

On this page:

- Video stream settings(see page 175)
- Changing the camera video streams(see page 177)

19.2.3.2.5.1 Video stream settings

You can configure video streams below the Surveillance window.



If the camera supports multistreaming, then when creating a camera, the stream with a higher resolution is selected as the main stream.

It is also possible to separately configure video streams: the **Main stream** and the **Second stream**. If necessary, you can configure additional video streams (third, fourth, etc.) using the **Add video stream** field.

In most cases, the following parameters are set for each stream:

- bitrate,
- compression rate,
- frame rate,
- resolution.

Detailed information on configurable parameters can be found in the official reference documentation for the camera.

> **Note**
>
> You cannot edit stream parameters if the camera was added in the **Keep current settings** mode (i.e. with the parameters that were set in the web interface, see Adding and removing IP devices[74]). To be able to configure these parameters, you need to set the **Send settings to device** checkbox (see Camera(see page 171)).

By default, all added camera video streams are enabled. If necessary, you can disable the second, third and other additional video streams by selecting **No** in the **Enable** field. The main video stream of the camera is activated by default and cannot be disabled.

The **Use for GreenStream** parameter is designed to display video streams in Auto (GreenStream)/High quality/Low quality modes (see Selecting video stream quality in a Surveillance window (GreenStream)(see page 1161)).

Set one of the following values:

- **Yes**, to display the video stream in these modes.
- **No**, to exclude the stream from display in these modes.

If you configure video streams in the camera web interface, it is necessary to set the real value of the expected frame rate in the corresponding field to correctly display the video stream status on the Health Board (see Viewing camera status(see page 1271)).

---

74 https://docs.axxonsoft.com/confluence/display/one20en/Adding+and+removing+IP+devices

Attention!

- You can select any video stream for recording into archive and displaying in the Surveillance window (see Selecting video stream quality in a Surveillance window (GreenStream)(see page 1161), Configuring recording to an archive(see page 295)).
- For some detection tools, you can select any video stream on which you want to perform detection (see Detectors(see page 308)).

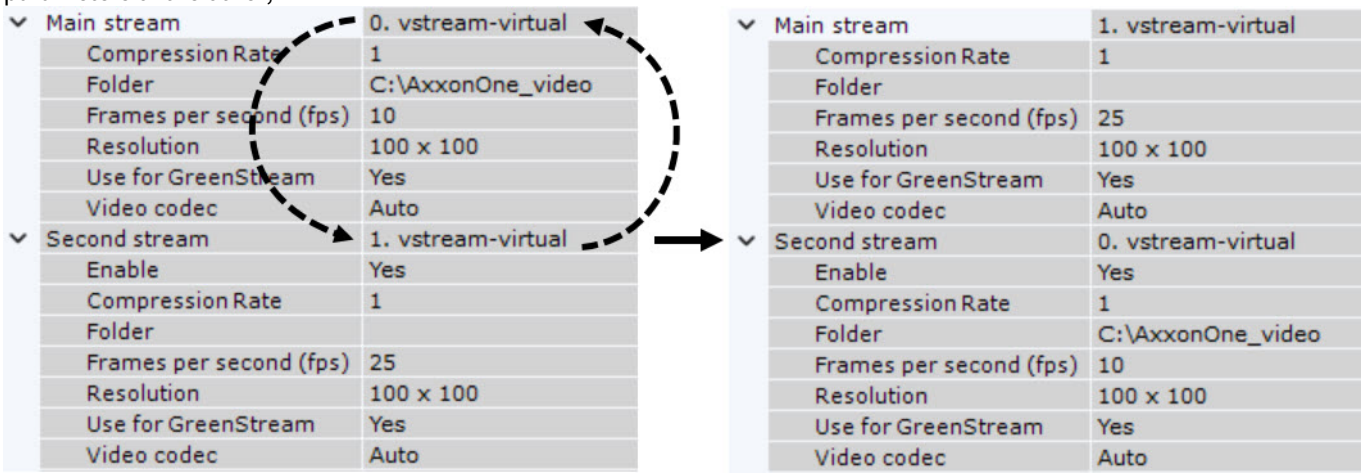
19.2.3.2.5.2 Changing the camera video streams

In *Axxon One*, each stream is assigned a corresponding video camera stream profile, for example:

Stream indication in *Axxon One*	Camera stream profile (profile name is determined by the driver)
Main	0. video_streaming_h264_QSXGA
Second	1. video_streaming_h264_VGA
Third	2. video_streaming_mjpeg

If necessary, you can change the profile for the stream, in this case:

- if a profile has already been added as a main or additional stream, the parameters of one stream are replaced with the parameters of the other;



- if a profile has not yet been added as a main or additional stream, the parameters of this video stream are changed to the default parameters.

Note

When some video stream parameters are changed, the camera can automatically restart, in which case it will become unavailable for some time (depending on the camera).

You can also change the video stream settings by sending an HTTP request to the device (see the manufacturer's official documentation) using macros (see Execute web query(see page 891), Run external application on server(see page 894), Run external application on client(see page 893)).

19.2.3.2.6 Configuring a privacy mask

On the page:

- General information(see page 178)
- Configuring a privacy mask(see page 178)

19.2.3.2.6.1 General information

A privacy mask is an area that hides certain parts of the frame to ensure privacy. For example, when cameras are installed in an office, you can use a privacy mask to cover employees' computer screens to prevent the leak of logins, passwords, and other sensitive information. In critical infrastructure, you can use a privacy mask to hide sensitive elements such as control panels and screens containing critical data.

You can apply a privacy mask to the video image:

- when viewing live videos;
- when viewing the archive;
- on exported videos and still frames.

Attention!

- Privacy mask is displayed for all users who have the **View masked video** parameter set to **No** in the role configuration (see Roles(see page 920)).
- Privacy mask is displayed in the client only. In the Web-client and the Mobile client, there is no mask on the video image.

The detectors that support privacy mask:

- Face detector TV(see page 500);
- Face detector VA(see page 485);
- Face detector VL(see page 473);
- Face detector and temperature control(see page 822);
- Mask detector TV(see page 512) (detection of a medical or similar mask on the face);
- Mask detector VL(see page 483);
- Mask detector VA(see page 497);
- Person-based privacy masking(see page 694);
- People masking(see page 693) (based on data from the pose detector).

19.2.3.2.6.2 Configuring a privacy mask

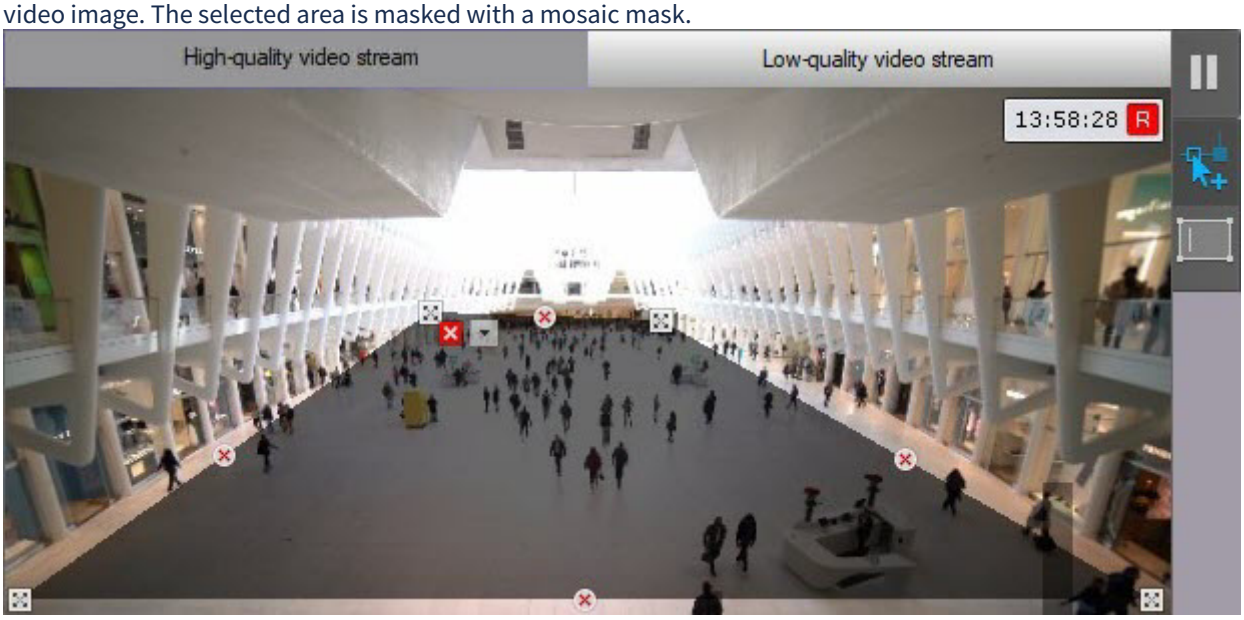
To configure a privacy mask, do the following:

1. Select the **Camera** object and click the  button.

Note

- The button is inactive if the text overlay button is active (see Putting a text over the Surveillance window(see page 180)).
- For your convenience, you can click the button and configure the mask on a still frame. To undo, click this button again.

2. In the preview window, sequentially set the anchor points of the closed area that you want to hide when viewing the live video image. The selected area is masked with a mosaic mask.



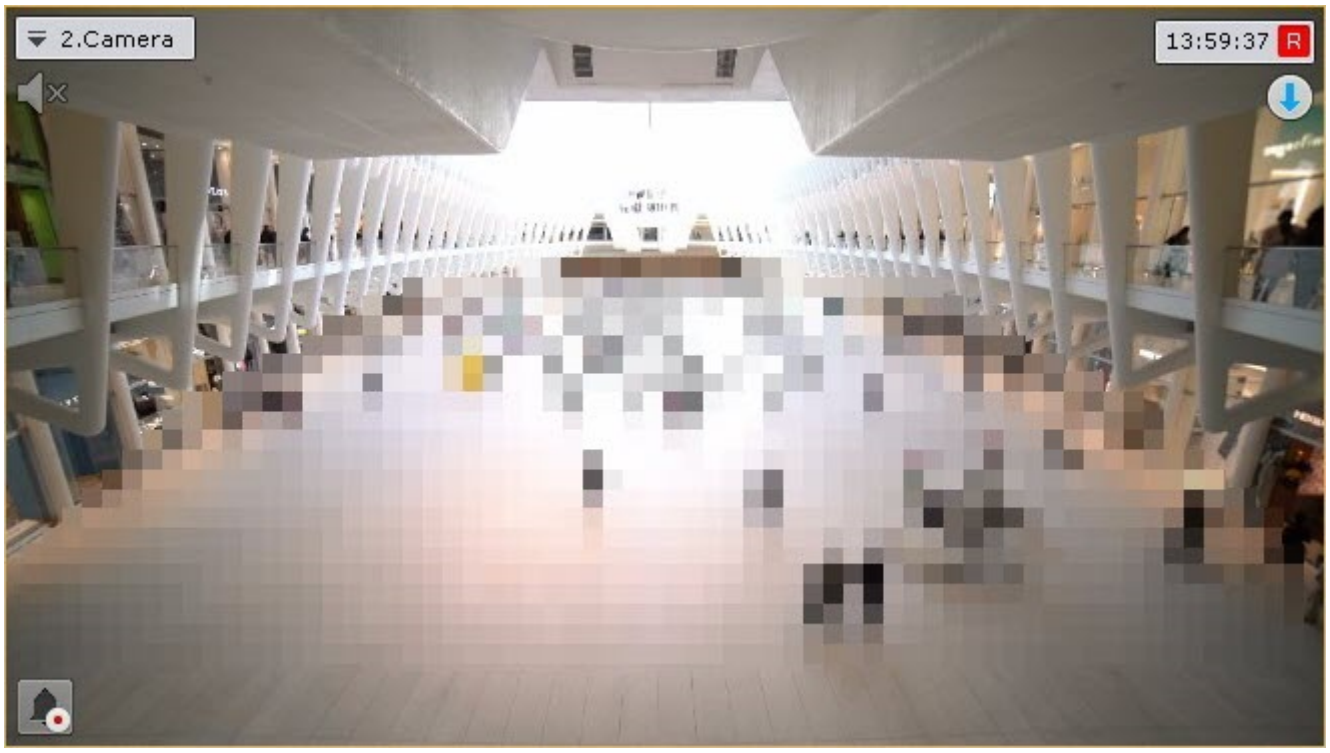
Note

When an area is being constructed, anchor points are connected by a two-color dotted line, which outlines the area's borders.

Action	Result
Left or right click in the Surveillance window	Create a new anchor point of an area
Right-click a created anchor point	Delete an anchor point of an area
Point the cursor to an anchor point and holding down the left mouse button, move the mouse	Move an anchor point of an area
Click the button	Delete an area

3. You can specify several areas.
4. Click the **Apply** button to save the changes.

Privacy mask configuration is complete. When you view a video image from this camera, the selected area is hidden.



19.2.3.2.7 Putting a text over the Surveillance window

You can superimpose a text over video in the Surveillance window. This text will be visible to all users in all monitoring modes, but will not be present on exported frames and videos.

To put a text over the Surveillance window, do the following:

1. Select a **Camera** object and click  .

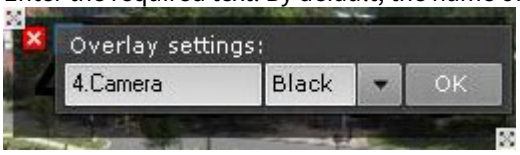
> **Note**
>
> - You cannot do it if the  button is clicked (see Configuring a privacy mask(see page 178)).
> - For your convenience, you can click the  button and configure the mask on a freeze frame. To undo, click this button again.

2. Click any mouse button anywhere in FOV to set two anchor points of the rectangular area where the text will be displayed. The higher the area, the larger the font size.



> **Note**
>
> To remove the area, click the button.

3. Click .
4. Enter the required text. By default, the name of the video camera is displayed.



> **Attention!**
>
> The text string has to fit the width of the area. If not, you cannot apply settings. For a longer text, make the area wider.

5. Select a font color from the drop-down list.
6. Click the **OK** button.
7. If required, you can set multiple text areas in different parts of FOV.
8. Click the **Apply** button.

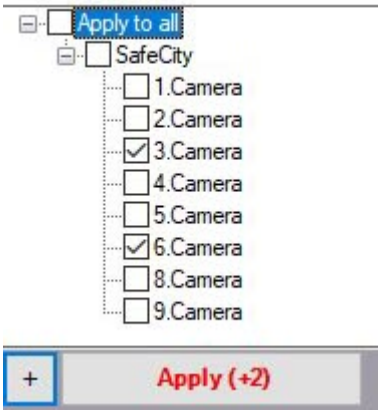
Now, the text is superimposed over the video image.



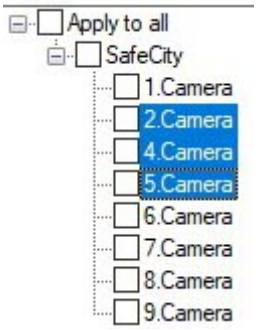
19.2.3.2.8 Bulk application of settings

You can bulk configure cameras of the same model and firmware. Do the following:

1. Configure any camera.
2. Click the + button and select cameras the same settings must be applied to.



A list of cameras of the same model and firmware opens. To quickly select multiple cameras, hold down the Shift key, select the first and last cameras the settings must be applied to. Selecting any camera from highlighted ones will result in selecting them all.



3. Click the **Apply** button.

Note

The number in brackets refers to the number of configured cameras.

19.2.3.2.9 Configuring fisheye cameras

If you use a fisheye camera or video camera with a panomorph lens, do the following:

1. Select the **Camera** object in the **Hardware** tab (see Camera(see page 171)).
2. Set the value in the **Panomorph view** parameter group:

Parameter	Value	Description
Panomorph view		
Activate	**Yes**	By default, panomorph view is disabled. To enable it, select the **Yes** value
	No	
Camera position	**Wall**	Select camera position **Attention!** Some functions and features of the system depend on the selected camera position: digital video zooming, display of video in the surveillance sector on the map, and immersion mode.
	Ceiling	
	Floor	
Lens type	**Common fisheye-lens**	If you use a fisheye camera, select the **Common fisheye-lens** lens type **Note** • The types of device lenses certified by ImmerVision are listed in the document. • You cannot select ImmerVision lenses in Linux.
	Double sphere fisheye- lens	When using double-sphere **XingYun devices**, select the **Double sphere fisheye-lens** type.

	A0V**	If you use a camera with a panomorph lens, select the corresponding type.
	A1UST	
	A8TRT	
	B0QQV	
	B4QQV	
	B5SST	
	B6SST	
	B72YV	
	B8QQT	
	B9VVT	
	C1ZZV	
	C2TTV	
	C322V	
	C4VVV	
	C7SST	
	C8WWT	
	C9VVT	
	D1SST	
	D2WWV	
	D4SST	
	D9SSV	
	E3VVV	
View type	**PTZ**	If you use a camera with an Immervision lens, select the appropriate display mode: 360° panorama with virtual PTZ (**PTZ** value) or 180° panorama (**Perimeter**).
	Perimeter	

Fit to frame	**Yes**	By default, the parameter is disabled. A **typical fisheye lens** with standard settings produces a skewed image in the upper part of the screen. In this case, you must perform the calibration of the video image. To do this, select the **Yes** value. As a result, the video image is automatically calibrated and cut at the edges of the frame, which can result in a significant loss of frame area. **Attention!** If a camera has multiple streams, you must calibrate each stream. To do this, before applying the settings, switch the stream tab in the Surveillance window (see Camera(see page 171)). Video is calibrated every time you change any parameters in the **Panomorph view** group.
	No	

Manual calibration is also available. To do this:

1. In the **Fit to frame** field, select the **No** value from the drop-down list.
2. In the **Activate** field, select the **No** value from the drop-down list.
3. Click the **Apply** button.
4. In the **Activate** field, select the **Yes** value from the drop-down list.
5. Configure the circle video area. To move the circle, left-click any point inside the circle and move the mouse pointer. To change the diameter of the circle, click an anchor point and move the mouse pointer.



6. Click the **Apply** button. After applying the settings, the area outside the circle is cut.

Configuration of the fisheye camera is complete.

19.2.3.2.10 Connecting and configuring cameras over standard protocols

19.2.3.2.10.1 Features of configuring and working with cameras connected via ONVIF

On the page:

- Connection through ONVIF Generic driver(see page 186)
- Resolution(see page 186)
- IP devices on other subnets (behind a NAT)(see page 186)

- IP devices which partially support the ONVIF protocol(see page 187)

By default, all ONVIF devices in the system are added as multistreaming (the **ONVIF 2.0** driver, see Searching, adding, configuring, and removing IP devices(see page 157)).

If the camera does not support multistreaming, then the video stream of lower quality will be disabled.

Note

In some cases (for example, if you do not have video from a camera), you may need to synchronize the time between the server and the camera when you connect them via ONVIF.

Attention!

If you connect cameras via ONVIF, autofocus (AF) and auto aperture are not available.

Connection through ONVIF Generic driver

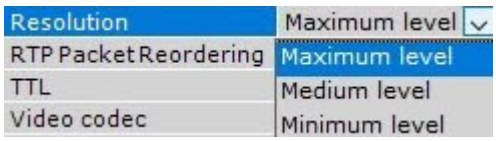
With the ONVIF Generic driver, you have the following options:

1. **Currently offline cameras can transfer their settings when they get back online.**
   To make it happen, follow the steps below:
   a. Add a camera via the ONVIF Generic driver (see Generic Drivers (General device, generic)(see page 190)).
   b. When the device comes online, reset its parameters (see Applying and resetting settings(see page 148)).
   c. Load the configuration from the device (see Applying and resetting settings(see page 148)).
2. **You can select another camera in object settings while keeping all layouts, macros and archive storage parameters.**
   To make it happen, follow the steps below:
   a. Add a camera via the ONVIF Generic driver (see Generic Drivers (General device, generic)(see page 190)).
   b. Set archive storage parameters and create macros.
   c. In **Camera** object settings, specify a new IP address and user credentials (see Camera(see page 171)).
   d. Reset device settings (see Applying and resetting settings(see page 148)).
   e. Load the configuration from the device (see Applying and resetting settings(see page 148)).

This operation will result in swapping cameras without the need to create a new object and remove the old one.

Resolution

Axxon One offers three resolutions for video from cameras connected via ONVIF: maximum, medium, and minimum.



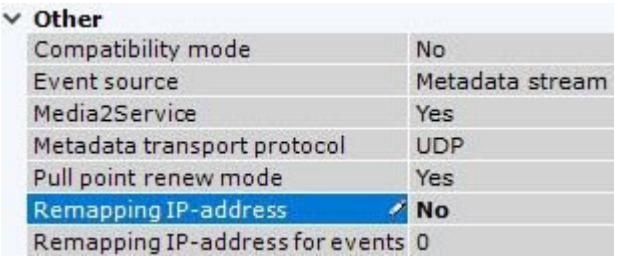
A description of the resolution levels is given in the table.

Camera type / Resolution	Maximum	Medium	Minimum
Non-megapixel	Maximum camera resolution	Average camera resolution	Minimum camera resolution
Megapixel	Maximum camera resolution	Camera resolution closest to 1024x768	Camera resolution closest to 640x480

IP devices on other subnets (behind a NAT)

By default, NAT[75]-friendly mode is enabled for cameras connected via the ONVIF driver.

To disable NAT-friendly mode, in the settings of a camera, select the **No** value for **Remapping IP-address**.



IP devices which partially support the ONVIF protocol

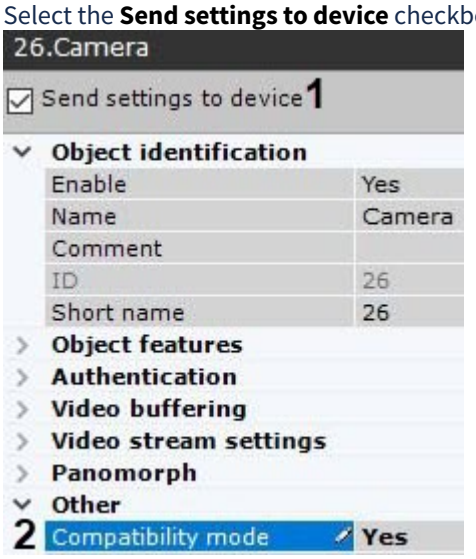
To connect IP devices, which only partially support ONVIF functions to *Axxon One*, you must use an ONVIF driver with compatibility mode enabled.

> **Note**
>
> Such video cameras include Hikvision models and early versions of firmware from Sony, Samsung, and others.

Compatibility mode makes it possible to receive a video image from video cameras; however, some capabilities of *Axxon One* will be unavailable. Enabling compatibility mode is recommended if the connection settings are correct, but there is no video image.

To enable it, you need:

1. Select the **Send settings to device** checkbox (**1**).



2. Select **Yes** for **Compatibility mode** (**2**).

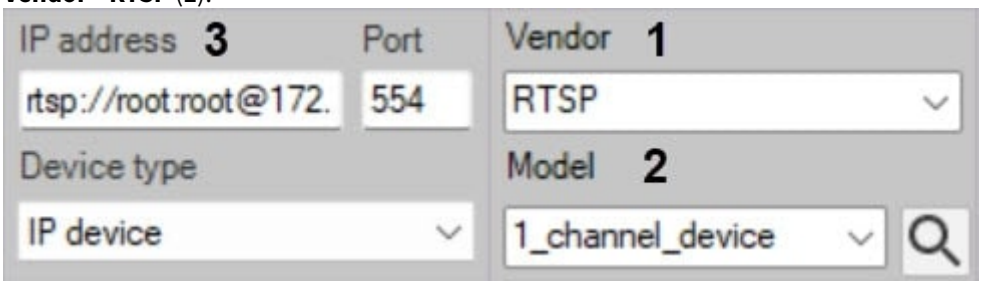
19.2.3.2.10.2 Configuring connection of devices via RTSP

Configuring connection of single-channel devices

To connect a camera via the RTSP protocol using the IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)), add a camera with the following parameters:

75 https://en.wikipedia.org/wiki/NAT

1. **Vendor**—**RTSP** (**1**).



2. **Model**—**1_channel_device** (**2**).
3. IP address—the address of RTSP transmission (**3**). In general, the address has the following format: **rtsp://<IP address of RTSP server>:<Port of RTSP server>/<Path>**. The RTSP protocol camera connection supports up to three video streams. To connect multiple streams, enter the transmission addresses separated by a semicolon: **rtsp://<IP address of RTSP server1>:<Port of RTSP server1>/<Path>**; **rtsp://<IP address of RTSP server2>:<Port of RTSP server2>/<Path>**; **rtsp://<IP address of RTSP server3>:<Port of RTSP server3>/<Path>**.

> **Attention!**
>
> Generally, the RTSP Server parameters (port and path) are set via the web interface of the camera. To do so, refer to the reference documentation for a particular camera.
> If the username or password in a URL contain invalid characters, such as "@", you have to escape these characters with special characters via the ASCII codes (in hexadecimal form). The "@" character is escaped as %40. For example, when connecting a device via RTSP, the link can look like this "rtsp://admin:New%40edge@192.168.0.75:554/RVi/1/1".

> **Note**
>
> In some cases, the address format can be different. For example, a username and password can be added to the address to connect to the camera if authentication is required.
>
> 
>
>
> It is recommended that you refer to the reference documentation for a particular camera.
> Even if the password field is empty, the address string must include a colon (:).
> A correct address can look like this: rtsp://user:@10.10.27.50:10017/...
> An example of an incorrect address: rtsp://user@10.10.27.50:10017/...

The **Camera** object will be created. If the address of the RTSP transmission is correctly specified, the preview window will display the image from this camera.

> **Note**
>
> **Port**, **Login** and **Password** can not be edited. These settings are specified in the transmission address.

If video is unavailable, refer the APP_HOST.lpint log file located in the <*Axxon One* installation folder>\Axxon One\Logs folder.

> **Attention!**
>
> If the APP_HOST.lpint log file is empty, in the Log Management Utility, check the logging level of the *Axxon One* Server (see Log management utility(see page 1414)). The recommended logging level is **Debug**.

To set the time in seconds after which a message about the loss of connection with the camera will be displayed, specify the value in the **Timeout** field in the camera settings.

Other	
Comment	
Default archive	hosts/DESKTOP-5VRITM5/MultimediaStorage.
Profile	High profile
Reconnection timeout	10
RTP packet reordering	Yes
Timeout	10
Video channel No.	0

If you want to set the time in seconds after which the reconnection to the device will take place, specify the value in the **Reconnection timeout** field.

In the **Profile** field, you can select the level of the H.264/AVC video codec profile:

- **Basic profile** provides a more effective usage of resources and a low bitrate video transmission, but can have limited resolution and number of frames per second.
- **High profile** provides a higher video quality, higher bitrate, higher resolution and more frames per second. High profile is used to transmit high definition video and video at the speed of 60 frames per second.

To receive the RTSP stream via HTTPS, select the **Tunneling RTSP over HTTP** value for the **Transport protocol** parameter.

Main stream	0. video_streaming_rtsp
Authorization token	
Frames per second (fps)	25
Message for keepAliveCommand property	OPTIONS
Proxy URL for RTSP tunneled over HTTP	
Range header for RTSP PLAY	npt=now-
Resolution	Auto
RTSP range value	
Scale header for RTSP PLAY	
SSRC identifier checking	Yes
Transport protocol	Tunneling RTSP over HTTP
Use for GreenStream	Yes
Video codec	Auto

In some cases, packets can be lost or delayed due to poor connection. This can cause some packets to arrive later than the next packets in the transmission order. To change the packet arrival order, set the **Yes** value in the **RTP packet reordering** field.

Attention!

- To get good video stream from some cameras, set the **No** value for the **SSRC identifier checking** parameter in the video stream settings.
- Sometimes the camera's live stream frame rate can be displayed incorrectly. To display the frame rate more accurately, in the **Buffer size** parameter, specify a value in milliseconds. The value must be in the range from 50 to 1000 milliseconds, and must be selected empirically.

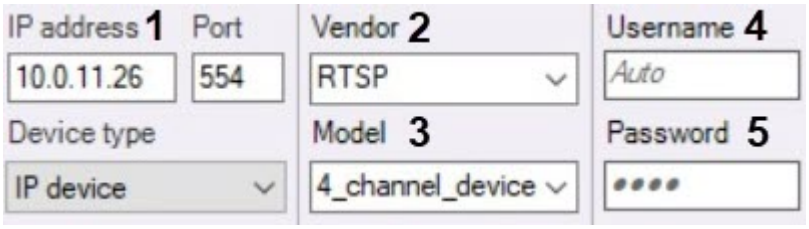
Configuring connection of multi-channel devices

To connect multi-channel devices (e.g. DVRs) over RTSP, do as follows:

1. Go to IP Device Discovery Wizard and open the manual addition field (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. In the **IP address** field, enter the device address (**1**).

Attention!

Following the IP address, add the";" character. Otherwise, some channels can fail.

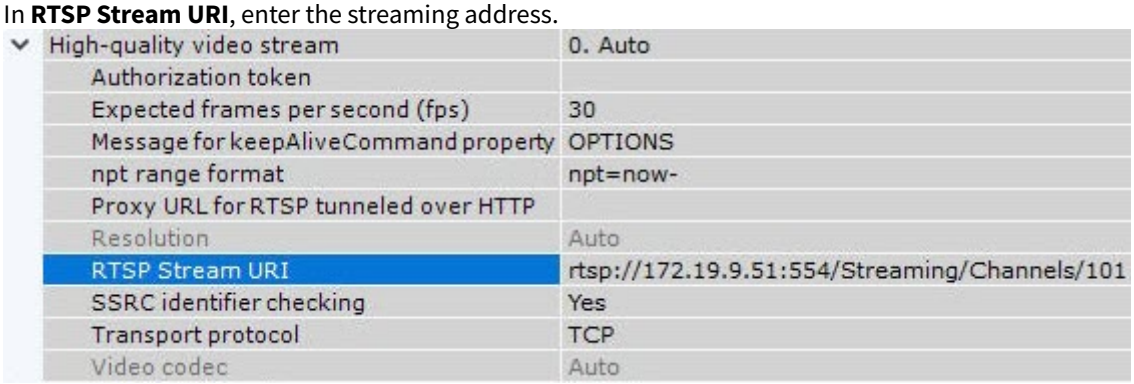


3. Select **RTSP** in the **Vendor** field (**2**).
4. In the **Model** field, select the model name that shows the corresponding number of device channels (**3**). For example, for a four-channel device, select **4_channel_device**.
5. Enter the username (**4**) and password (**5**).
6. Click  .

A parent IP server object will be created hosting a number of video cameras objects equal to the number of channels on the device.

To configure channels, do as follows:

1. Select a child **Camera** object.
2. In **RTSP Stream URI**, enter the streaming address.



3. Repeat the steps for all channels.

19.2.3.2.10.3 Generic Drivers (General device, generic)

General Device is a generic driver that supports nearly all devices from a particular camera vendor.

There are 2 types of generic drivers:

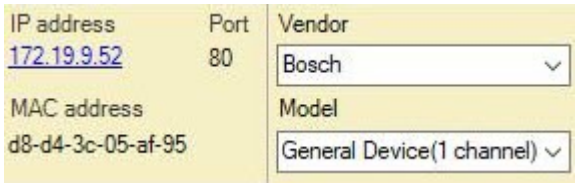
1. **General device**. Most configuration of General Device-connected cameras is performed via the web interface of the device. A detailed list of supported features is given on the Documentation Drivers Pack[76] page.
2. **generic**. When connected via a generic driver, the configuration of the device is read and transferred to *Axxon One*. After that, you can configure the device from within *Axxon One*.

Connection via generic drivers is available for the following devices:

	Axis	Bosch	Panasonic	Samsung	Sony	ONVIF
General Device	+	+	+	+	+	
generic	+	+	-	-	-	+

Devices connected via General Device drivers are findable via the IP device discovery wizard. The method for adding them to the system is the same as for ordinary devices (see Searching, adding, configuring, and removing IP devices(see page 157)).

76 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack



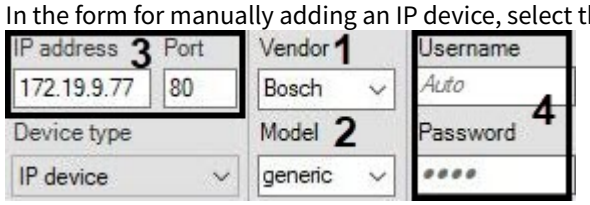
Note

Axis devices are affected by a special restriction: if the username and password for device access do not equal the default values, the number of channels for the device is not discoverable. Therefore, all non-integrated devices which username and password for device access do not equal the default values will be shown in search results as 1-channel General Devices.

You must always select a generic driver manually.

If a IP device is not displayed in search results, you can add it manually:

1. In the form for manually adding an IP device, select the device manufacturer from the list (**1**).



2. In the **Model** field, select **General Device** or **generic** (**2**). For Axis and Bosch General devices, select the number of channels on the device.
3. Enter the IP address and port for the device connection (**3**).
4. Enter the username and password for connecting to the device (**4**).
5. Click the  button.

Addition of the device is now complete.

Attention!

If a device, connected via a generic driver, is temporarily not available or it has incorrect connection settings, then it is not added to the configuration.

19.2.3.2.10.4 Configuring and using the RTP Stream Device driver to receive multicast streams

On the page:

- Purpose of the driver(see page 191)
- Stages of configuration(see page 192)
- Connection string format(see page 192)
- Configuring a device in Axxon One(see page 193)
- Features of configuration for Linux OS(see page 193)

Purpose of the driver

The **RTP Stream Device** driver is designed to receive streams transmitted via the RTP (Real-time Transport Protocol) protocol using multicast via the UDP (multicast UDP) protocol. This driver doesn't support the unicast data transmission.

Stages of configuration

First, you must set the data transmission via multicast in the web interface of the camera:

1. Enable the data transmission via multicast in the camera stream settings.
2. Specify the IP address of the multicast group and the video stream port. Each camera stream uses the individual block of settings with the unique multicast address.
3. Check if the traffic analyzer receives the multicast traffic using, for example, the Wireshark software. If there are no packages, you must disable transmission via multicast, save the settings, then reenable this feature and apply the changes.

Then you must create the SDP file. To do this, do the following:

1. Run the traffic analyzer, for example, the Wireshark software.
2. Set the capture filter:

   ```
   host <camera IP-address>
   ```

3. Connect to the required RTSP stream using any media client (for example, VLC or PotPlayer).
4. Enter the display filter:

   ```
   tcp contains "Content-Type: application/sdp"
   ```

5. Open the TCP session with the SDP message.
6. Copy the SDP block, change the IP address and port according to the parameters of the multicast group, and save in the file with the **.sdp** extension. Example of the SDP file:

   ```
   v=0
   s=RTSP server
   t=0 0
   m=video 5560 RTP/AVP 98
   c=IN IP4 239.128.1.99
   a=rtpmap:98 H264/90000
   ```

   > **Attention!**
   >
   > You must keep the order of lines in the file.

7. To check the SDP file, you must open the media client (for example, VLC media player) and execute the command:

   ```
   ffplay -loglevel verbose -protocol_whitelist file,udp,rtp d:\file_name.sdp
   ```

   where instead of **d:\file_name.sdp**, you must specify the path and name of the created SDP file. If you configure correctly, the stream playback must be started.

Creating the SDP file is complete.

Connection string format

To specify the stream address, use the following structure:

```
rtp://<multicast-stream destination address>:<destination port>/<local destination address>
```

Attention!

All parameters are mandatory. You cannot add any extra characters or parameters.

For example:

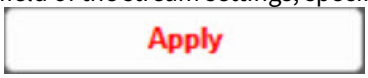
```
rtp://239.128.1.99:5560/10.0.12.43
```

To connect multiple ports, you must specify them using a semicolon.
For example:

```
rtp://239.128.1.99:5560/10.0.12.43;rtp://239.128.1.100:5564/10.0.12.43
```

Configuring a device in Axxon One

To add the RTP driver, do the following:

1. Go to the IP Device Discovery Wizard on the **Devices** tab (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. If you add a device manually in the field:
   a. **Vendor**, select **RTP stream device**.
   b. **Model**, select **RTP stream**.
3. Click the  button.
4. Click a device in the device tree on the **Devices** tab.
5. In the **Address** field, specify the generated RTP link.
6. In the **SDP-file** field of the stream settings, specify the full path to the created file.
7. Click the **Apply** 

button to save the changes.

As a result, a device is added in *Axxon One*.

Features of configuration for Linux OS

1. Check the access permissions to the SDP file:
   - The ngp user must have the permission to read the file and all directories in its path.
   - We recommend placing SDP files in the **/opt** directory.
   - If necessary, you must change the SDP file owner to the ngp user or assign permissions for reading to all users.
2. For the Linux version, you must add the slash character at the end of the RTP link. Example:

   ```
   rtp://239.128.1.99:5560/172.19.9.23/
   ```

19.2.3.2.10.5 Connecting cameras via the GB/T28181 protocol

On the page:

- General information on GB/T28181 standard and supported

functions(see page 194)
- Configuring an IP-device to operate via GB/T28181 standard(see page 194)
- Configuring IP-device connection via GB/T28181(see page 195)

General information on GB/T28181 standard and supported functions

Axxon One supports connecting devices via the Chinese standard GB/T28181. This standard is based on SIP over UDP (and over TCP since GB/T28181-2016). The GB/T28181 uses the following protocols over SIP:

- SDP (Session Description Protocol);
- MANSCDP (Monitoring and Alarming Network System Control Description Protocol);
- MANSRTSP (Monitoring and Alarming Network System Real Time Streaming Protocol).

This allows receiving the status of sensors, events from detectors, PTZ and relays control, access the embedded archive of the IP device (make sure to set the correct device time zone in the *Axxon One*), etc. within the SIP session. Single-channel and multi-channel devices in single-stream mode and working with the UDP and TCP transport protocols is also supported.

At the same level of the OSI model, the RTP/RTCP protocol also works in parallel with the SIP protocol, which makes it possible to use the following functions:

- video transmission (including archival) in H264, H265, or MJPEG format;
- audio transmission in G.711a, G.711u, or G.726 format in PS (Program Stream) only. Archive audio is not supported.

For the most up-to-date information on this standard and the features supported in *Axxon One*, see the Documentation Drivers Pack[77].

Configuring an IP-device to operate via GB/T28181 standard

Configuration of IP devices connected via GB/T28181 is performed through the web interface of the devices. Settings are not sent from *Axxon One* to the device.

Before connecting a camera via this protocol to *Axxon One*, perform the following steps to configure SIP on the device:

1. Set the Server IP to equal the Server's IP address.
2. Set the Server port (5060 by default).
3. Set the Device ID. The ID must be set on all cameras connected via the GB/T28181 protocol and must be unique. The format of the connection code (device ID and server ID) is a 20-digit number:
   a. the first 10 digits specify the address (according to the GB/T-2260-2007 standard);
   b. the next 10 digits indicate device information.
   If the IP device is located behind NAT, then forward and explicitly specify the external address of the Server, the port/port range for receiving video, and the SIP port of *Axxon One* Server. Example:
   34020000001110000001/50557-51557@10.3.3.11/85.172.174.36
4. For the device to perform autodiscovery of the Server more quickly, reduce the default value of RefreshRegTime. The name of this setting can vary on some cameras.

Note.

For telemetry to work correctly, set RefreshRegTime to more than 600.

Examples of IP device settings for connection via GB/T28181 standard(see page 196)

77 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack

Configuring IP-device connection via GB/T28181

Important!

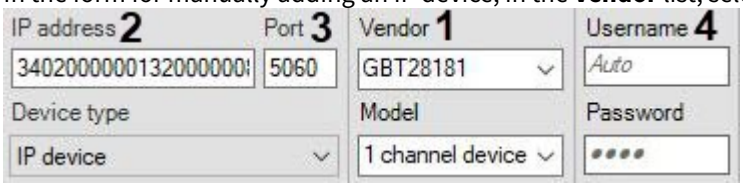
No more than one SIP server can be used for IP devices connection via the GB/T28181 protocol. This means that several **Video Capture Device** objects with **GBT28181** type can be created in the *Axxon One* hardware tree, however, the part of the address after @ must match for all of them. The server ID, local address, external address, and port must be the same for all devices. If at least one parameter is different (for example, the local IP address is not set for some device when it is set for other devices), then such a device will not start.

Note.

Axxon One does not support auto-discovery of devices connected via GB/T28181 and these devices are not added using the Camera discovery tool.

After configuring the device as described earlier, add it to *Axxon One* as follows:

1. Run the IP discovery wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. In the form for manually adding an IP device, in the **Vendor** list, select **GBT28181** (**1**).



3. In the **IP address** field specify the value of Device ID parameter set during IP device configuration (**2**). The following additional parameters can be specified optionally as follows:
[gbt://]deviceID[/videoPort]@serverID[-serverLocalIP[/serverExternalIP]]
OR
[gbt://]deviceID[/videoPortFirst-videoPortLast]@serverID[-serverLocalIP[/serverExternalIP]]
where:
   - deviceID is the Device ID parameter;
   - serverID is the identifier of the *Axxon One* Server generated according to the same rules as the IP device ID (see above);
   - videoPort is the port for receiving video;
   - videoPortFirst–videoPortLast is range of ports for receiving video;
   - serverLocalIP is the local IP address of the *Axxon One* Server, which sets the network interface on which the Server must be available;
   - serverExternalIP is the global IP address of the *Axxon One* Server; this parameter is in use when the *Axxon One* Server is behind the gateway. In this case, this IP address is specified as the SIP Server IP address in the IP device settings.

   Examples.

   ```
   34020000001320000008@34020000002000000001

   34020000001320000008@34020000002000000001-10.0.40.246/113.125.160.58
   34020000001320000008@34020000002000000001-10.0.40.246
   34020000001320000008@34020000002000000001-/113.125.160.58
   34020000001320000008/50200@34020000002000000001
   34020000001320000008/50200-50210@34020000002000000001-10.0.40.246
   ```

4. In the **Port** field, enter the local port number that the *Axxon One* Server uses for receiving messages from the IP device (**3**). The default SIP port is **5060**.

   Note.

   The IP device SIP port is detected automatically.

5. The **Username** and the **Password** fields are not used (**4**).

6. Click the  button.

Connection of the camera via GB/T28181 is now complete.

Examples of IP device settings for connection via GB/T28181 standard

On the page:

- Jovision(see page 196)
- Bosch(see page 199)
- Huawei(see page 200)
- Hikvision(see page 201)
  - GB/T28181-2011(see page 203)
  - GB/T28181-2016(see page 205)
- Dahua(see page 207)

Examples of IP device settings and connection settings in *Axxon One* for GB/T28181 standard are given below.

Note

The protocol is usually supported by cameras for China market not having any English interface. This is why some of the screenshots below are given in Chinese.

Jovision

Configure a Jovision camera for operation via GB/T28181 standard as follows:

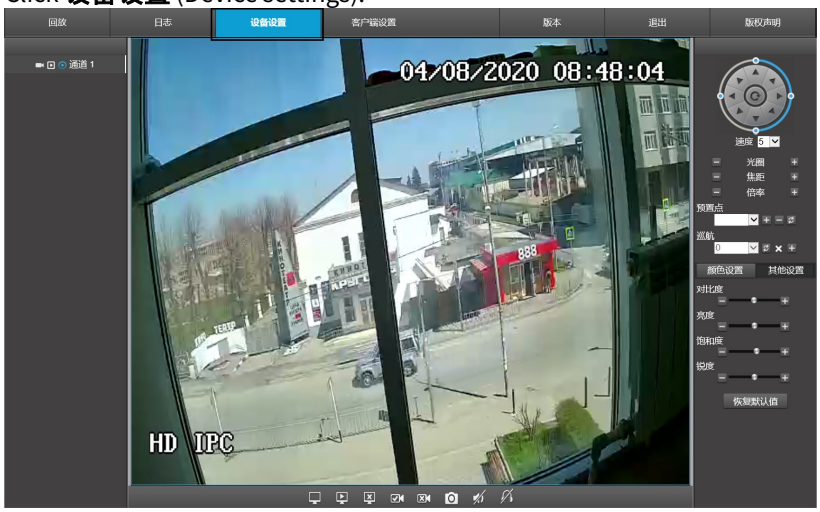
1. Perform the following settings of the IP device:
   a. Go to the IP device web interface.
   b. Enter your login and password.



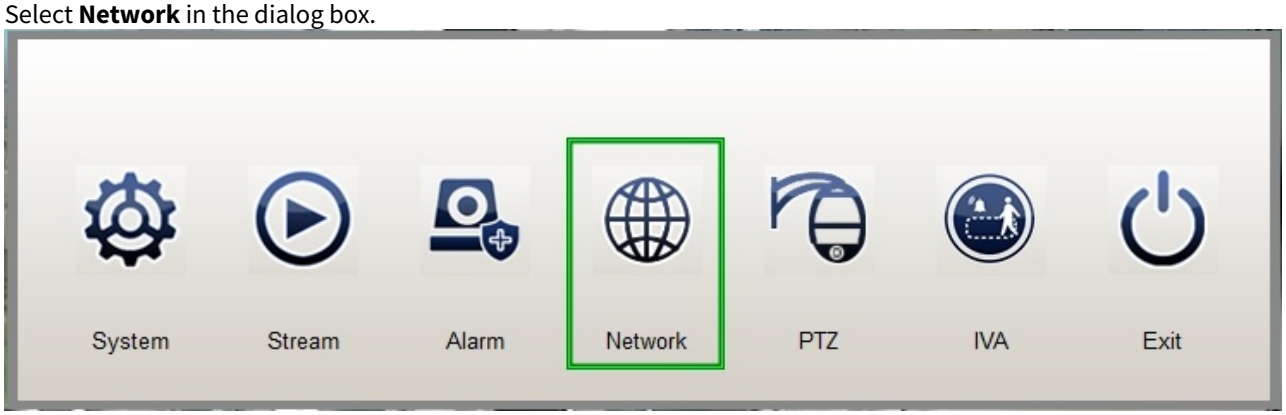
c. Click **确定** (Confirm) in the dialog box that opens.



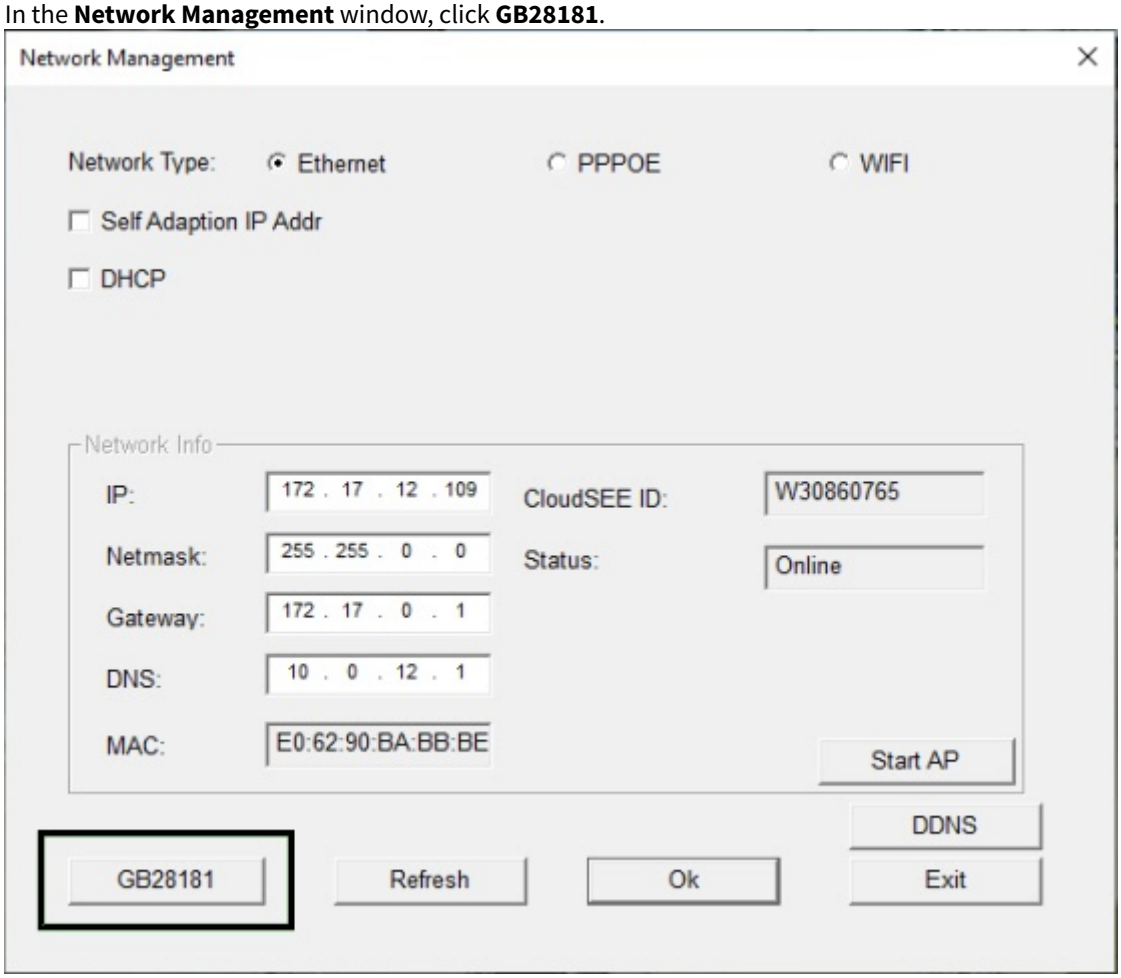
d. Click **设备设置** (Device settings).



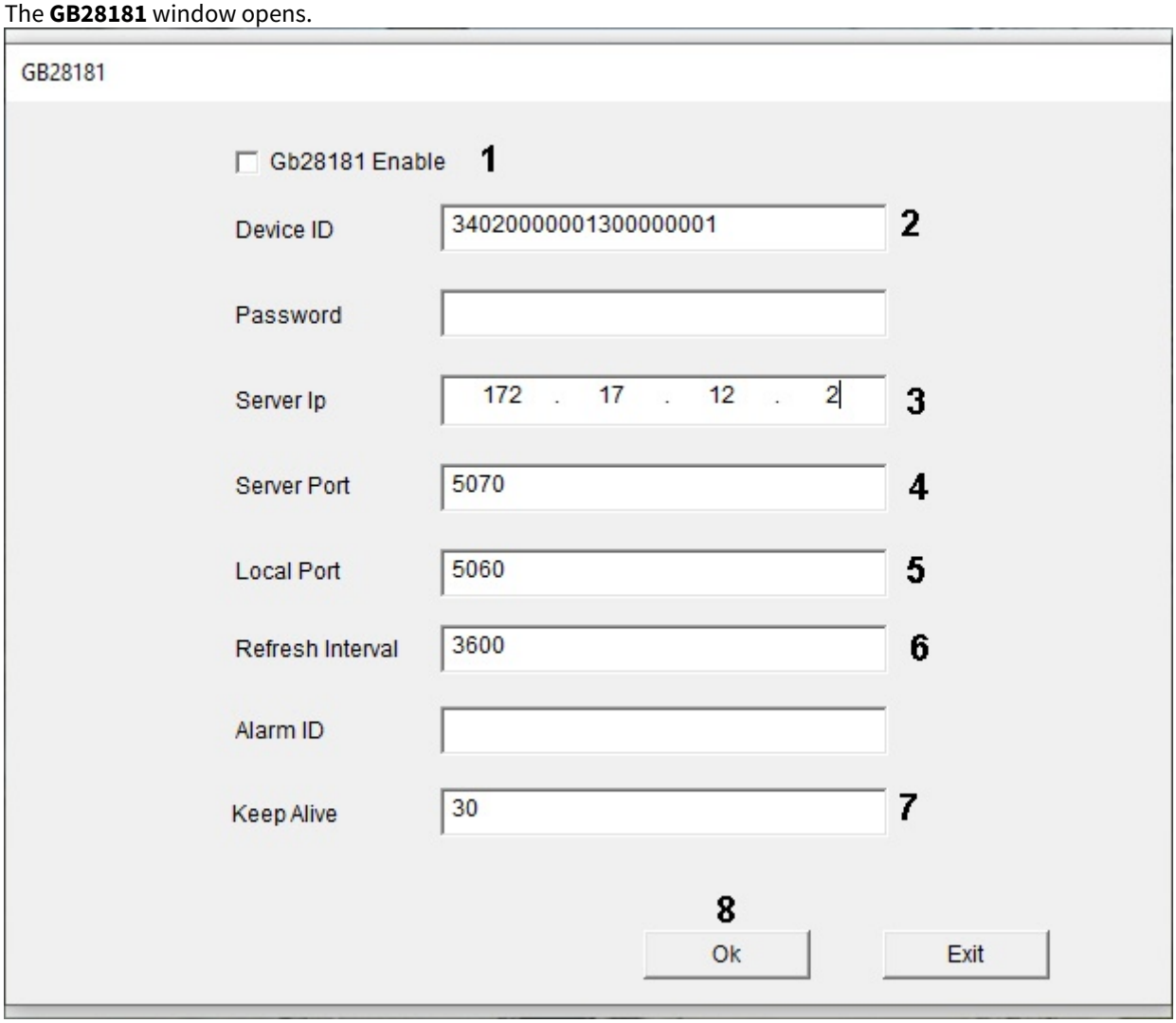
e. Select **Network** in the dialog box.



f. In the **Network Management** window, click **GB28181**.



g. The **GB28181** window opens.



h. Set the **Gb28181 Enable** checkbox (**1**).
i. In the **Device ID** field, enter the device identification number as described in Connecting cameras via the GB/T28181 protocol(see page 193) (**2**). Example on the picture shows Device ID 34020000001300000001.
j. In the **Server Ip** field, enter the *Axxon One* server IP address (**3**). The example shows IP 179.17.12.2
k. In the **Server Port** field, enter *Axxon One* server port number assigned for receiving messages from the IP device (**4**) The example shows port 5070.
l. In the **Local Port** field, enter the IP device SIP port number (**5**).
m. In the **Refresh Interval** field, enter the devise discovery period in seconds (**6**). The value must not be less than 600.
n. In the **Keep Alive** field, enter the period in seconds for sending messages confirming the device activity (**7**).
o. Click the **Ok** button (**8**).

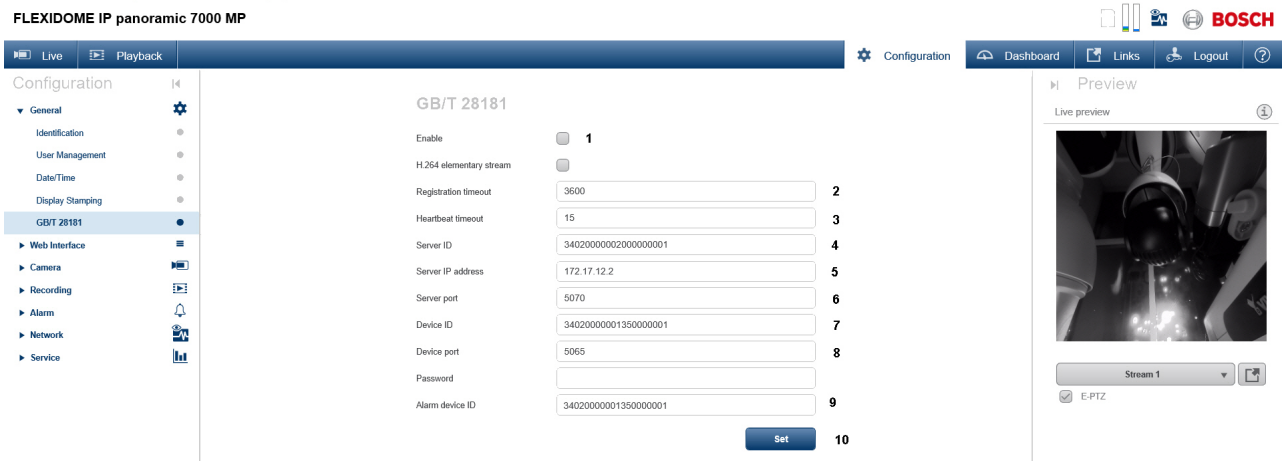
2. In *Axxon One*:
   a. Example value for the **IP address** field: 34020000001300000001@34020000001300000002-10.0.40.246/179.17.12.2 The Server ID 34020000001300000002 is not set on the Jovision device, so any Server ID can be chosen as per the conditions set in Connecting cameras via the GB/T28181 protocol(see page 193).
   b. Set **Port** to 5070.

Bosch

Configure a Bosch camera for operation via GB/T28181 standard as follows:

1. Perform the following settings of the IP device:
   a. Go to the IP device web interface.

b. Go to **Configuration – General – GB/T 28181**.



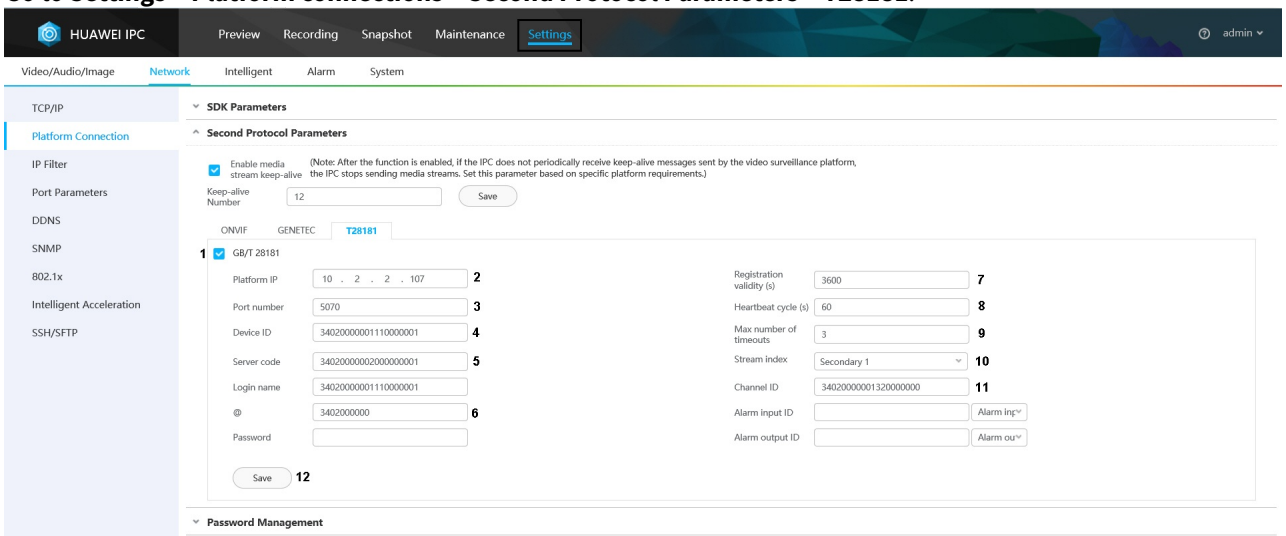
c. Set the **Enable** checkbox (**1**).
d. In the **Registration timeout** field, enter the devise discovery period in seconds (**2**). The value must not be less than 600.
e. In the **Heartbeat timeout** field, enter the period in seconds for sending messages confirming the device activity (**3**).
f. In the **Server ID** field, enter the *Axxon One* server identification number (**4**). The example shows 34020000002000000001.
g. In the **Server IP address** field, enter the *Axxon One* server IP address (**5**). The example shows 172.17.12.2
h. In the **Server port** field, enter *Axxon One* server port number assigned for receiving messages from the IP device (**6**). The example shows port 5070.
i. In the **Device ID** field, enter the device identification number as described in Connecting cameras via the GB/T28181 protocol(see page 193) (**7**). Example on the picture shows Device ID 34020000001350000001.
j. In the **Device port** field, enter the IP device SIP port number (**8**).
k. In the **Alarm device ID** field, enter the channel identification number (**9**). The same value as **Device ID** can be used.
l. Click the **Set** button (**10**).

2. In *Axxon One*:
   a. Example value for the **IP address** field: 34020000001350000001@34020000002000000001-10.0.40.246/172.17.12.2
   b. Set **Port** to 5070.

Huawei

Configure a Huawei camera for operation via GB/T28181 standard as follows:

1. Perform the following settings of the IP device:
   a. Go to the IP device web interface.
   b. Go to **Settings – Platform connections – Second Protocol Parameters – T28181**.



c. Set the **GB/T 28181** checkbox (**1**).
d. In the **Platform IP** field, enter the *Axxon One* server IP address (**2**). The example shows 10.2.2.107.

e. In the **Port number** field, enter *Axxon One* server port number assigned for receiving messages from the IP device (**3**). The example shows port 5070.
f. In the **Device ID** field, enter the device identification number as described in Connecting cameras via the GB/T28181 protocol(see page 193) (**4**). Example on the picture shows Device ID 34020000001110000001.
g. In the **Server code** field, enter the *Axxon One* server identification number (**5**). The example shows Server ID 34020000002000000001.
h. In the **@** field, enter the first 10 digits of the address according to GB/T-2260-2007 (**6**).
i. In the **Registration validity (s)** field, enter the device discovery period in seconds (**7**). The value must not be less than 600.
j. In the **Heartbeat cycle (s)** field, enter the period in seconds for sending messages confirming the device activity (**8**).
k. In the **Max number of timeouts** field, enter the maximum number of Heartbeat message omissions after which the device connection is considered lost (**9**).
l. Select the video stream from the **Stream index** drop-down list (**10**).
m. In the **Channel ID** field, enter the channel identification number in the same format as Device ID and Server ID (**11**).
n. Click the **Save** button (**12**).

2. In *Axxon One*:
   a. Example value for the **IP address** field: 34020000001110000001@34020000002000000001-10.2.2.107
   b. Set **Port** to 5070.

Hikvision

The Hikvision cameras can support several GB/T28181 standard versions: GB/T28181-2011 and/or GB/ T28181-2016. Examples of configuration for these versions are given below.

Setup video streams as follows before you configure the GB/T28181 standard on the IP device:

1. Go to **配置 - 视音频 - 视频** (Settings **–** Video and Audio **–** Video).
2. Configure the main stream:

a. From the **码流类型** (Stream type) drop-down list, select **主码流 (定时)** (Main stream) (**1**).



b. From the **分辨率** (Resolution) drop-own list, select the main stream resolution (**2**).

c. From the **视频编码** (Codec) drop-own list, select the main stream codec (**3**).

3. Configure the second stream:

a. From the **码流类型** (Stream type) drop-down list, select **子码流** (Second stream) (**1**).



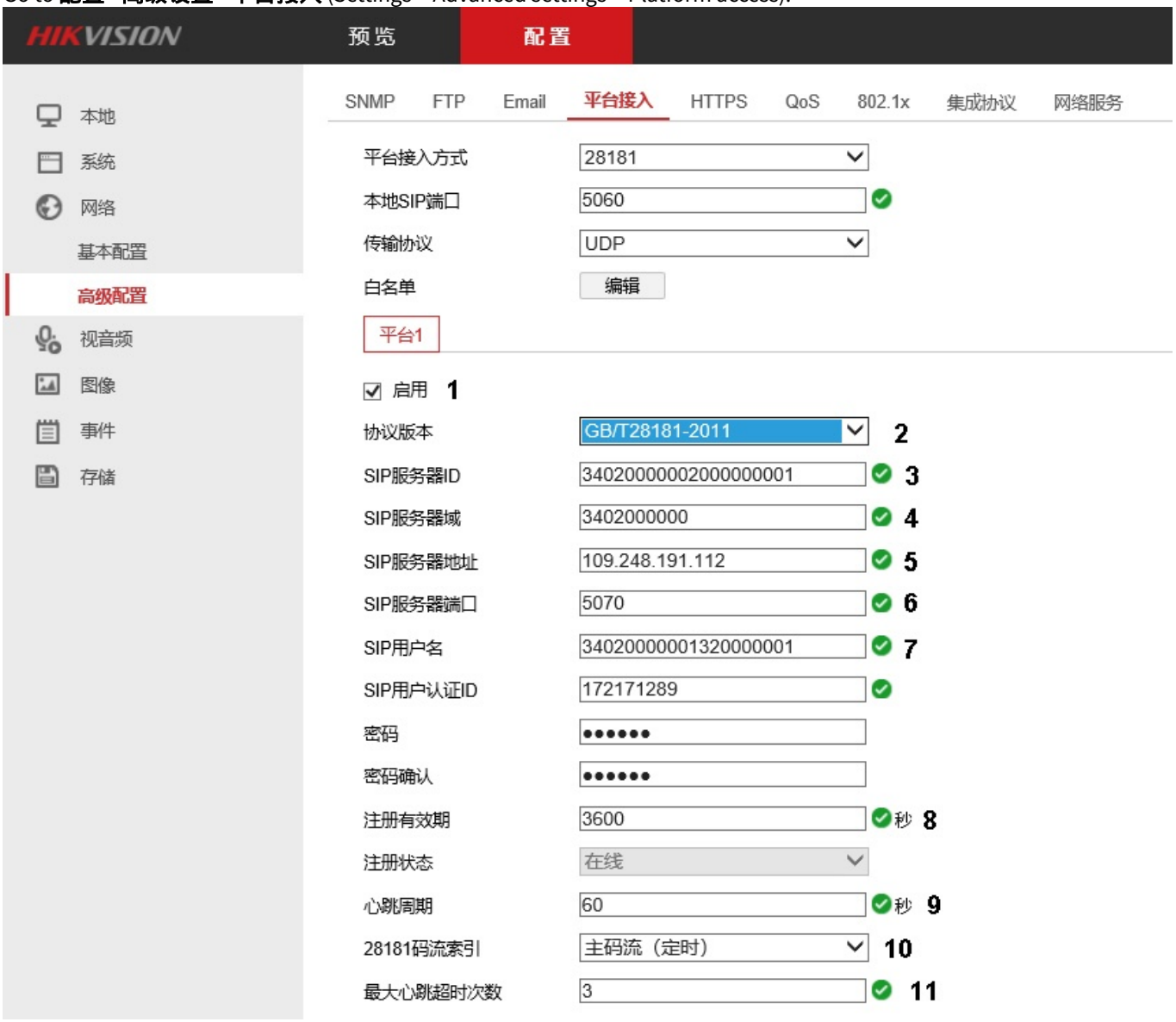
b. From the **分辨率** (Resolution) drop-down list, select the second stream resolution (**2**).

c. From the **视频编码** (Codec) drop-down list, select the second stream codec (**3**).

4. Click **保存** (Save).

GB/T28181-2011

1. Go to **配置 - 高级设置 - 平台接入** (Settings – Advanced settings – Platform access).



2. Set the **启用** (Enable) checkbox (**1**).
3. From the **协议版本** (Protocol version) drop-down list, select **GB/T28181-2011** (**2**).
4. In the **SIP服务器ID** (SIP Server ID) field, enter the *Axxon One* Server ID (**3**). The example shows Server ID 34020000002000000001.
5. In the **SIP服务器域** (SIP Server domain) field, enter first 10 digits of the address according to GB/T-2260-2007 (**4**).
6. In the **SIP服务器地址** (SIP Server address) field, enter the *Axxon One* server IP-address (**5**). The example shows IP 109.248.191.112.
7. In the **SIP服务器端口** (SIP Server Port) field, enter the *Axxon One* server port number assigned for receiving messages from the IP device (**6**). The example shows port 5070.
8. In the **SIP用户名** (SIP user name) field, enter the device identification number as described in Connecting cameras via the GB/T28181 protocol(see page 193) (**7**). Example on the picture shows Device ID 34020000001320000001.
9. In the **注册有效期** (Registration period) field, enter the devise discovery period in seconds (**8**). The value must not be less than 600.
10. In the **心跳周期** (Heartbeat period) field, enter the period in seconds for sending messages confirming the device activity (**9**).
11. From the **28181码流索引** (Video stream) drop-down list, select one of the streams configured earlier (**主码流 (定时)** for Main stream or **子码流** for Second stream) (**10**).
12. In the **最大心跳超时次数** (number of timeouts for Heartbeat messages) field, enter the maximum number of Heartbeat message omissions after which the device connection is considered lost (**11**).

13. Go to the **视频通道编码ID** (Video channel ID) tab at the bottom of the setings page (**1**).



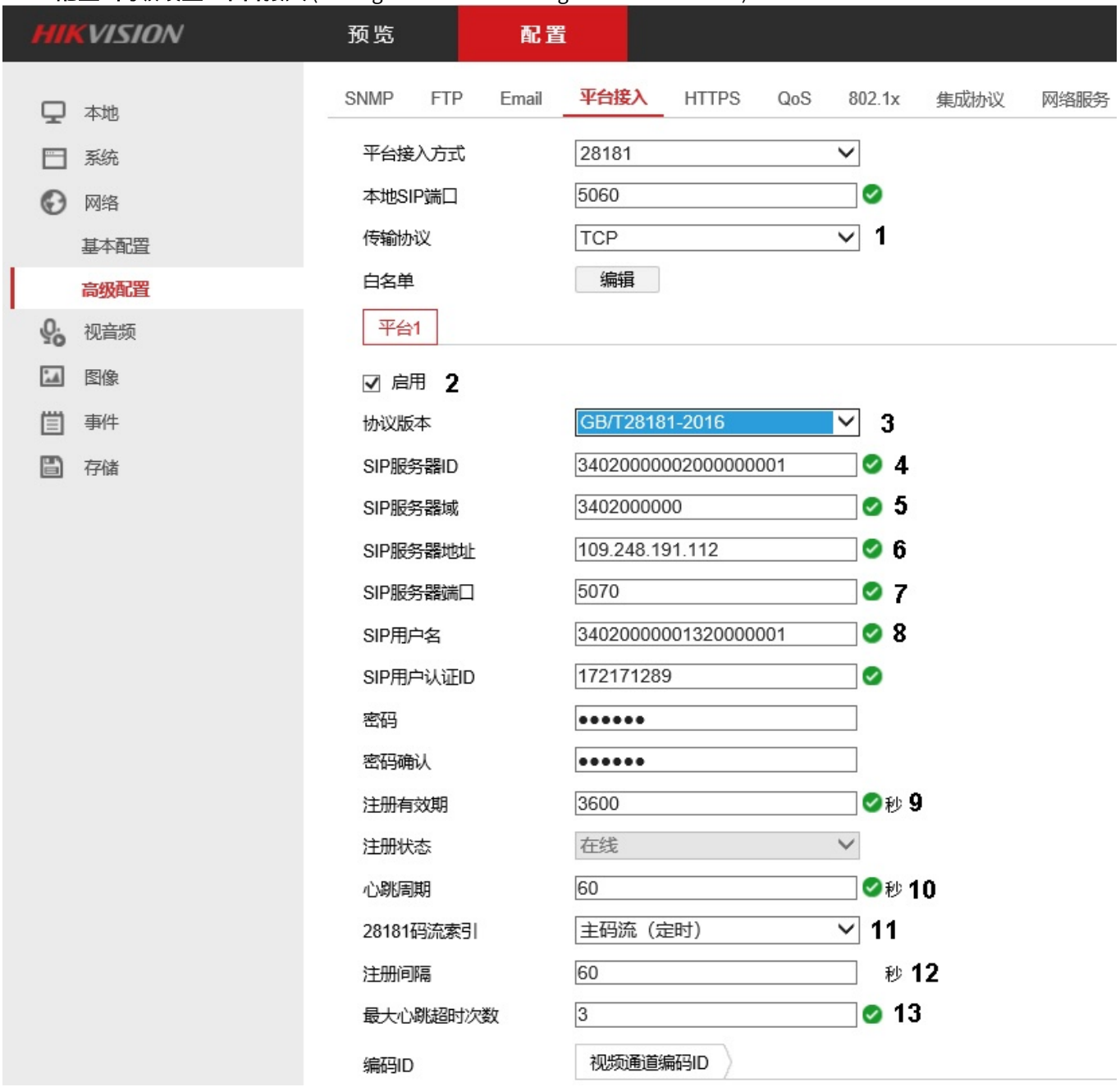
14. Enter the identifiers of all channels of the IP device in the same format as the device identifiers (**2**). The example shows ID 34020000001320000002.
15. Click the **保存** (Save) button (**3**).

In *Axxon One*:

1. Example value for the **IP address** field: 34020000001320000001@34020000002000000001-109.248.191.112
2. Set **Port** to 5070.

GB/T28181-2016

1. Go to **配置 - 高级设置 - 平台接入** (Settings – Advanced settings – Platform access).



2. From the **传输协议** (Transport protocol) drop-down list, select the transport level protocol to be in use: UDP or TCP (**1**).
3. Set the **启用** (Enable) checkbox (**2**).
4. From the **协议版本** (Protocol version) drop-down list, select **GB/T28181-2016** (**3**).
5. In the **SIP服务器ID** (SIP Server ID) field, enter the *Axxon One* Server ID (**4**). The example shows Server ID 34020000002000000001.
6. In the **SIP服务器域** (SIP Server domain) field, enter first 10 digits of the address according to GB/T-2260-2007 (**5**).
7. In the **SIP服务器地址** (SIP Server address) field, enter the *Axxon One* server IP address (**6**). The example shows IP 109.248.191.112.
8. In the **SIP服务器端口** (SIP Server Port) field, enter the *Axxon One* server port number assigned for receiving messages from the IP device (**7**). The example shows port 5070.
9. In the **SIP用户名** (SIP user name) field, enter the device identification number as described in Connecting cameras via the GB/T28181 protocol(see page 193) (**8**). Example on the picture shows Device ID 34020000001320000001.
10. In the **注册有效期** (Registration period) field, enter the devise discovery period in seconds (**9**). The value must not be less than 600.

11. In the **心跳周期** (Heartbeat period) field, enter the period in seconds for sending messages confirming the device activity (**10**).
12. From the **28181码流索引** (Video stream) drop-down list, select one of the streams configured earlier (**主码流 (定时)** for Main stream or **子码流** for Second stream) (**11**).
13. In the **注册间隔** (Registration interval) field, enter the device discovery interval in seconds (**12**).
14. In the **最大心跳超时次数** (number of timeouts for Heartbeat messages) field, enter the maximum number of Heartbeat message omissions after which the device connection is considered lost (**13**).
15. Go to the **视频通道编码ID** (Video channel ID) tab at the bottom of the setings page (**1**).



16. Enter the identifiers of all channels of the IP device in the same format as the device identifiers (**2**). The example shows ID 34020000001320000002.
17. Click the **保存** (Save) button (**3**).

In *Axxon One*:

1. Example value for the **IP address** field: 34020000001320000001@34020000002000000001-109.248.191.112
2. Set **Port** to 5070.

Dahua

Configure a Dahua camera for operation via GB/T28181 standard as follows:

1. Perform the following settings of the IP device:
   a. Go to the IP device web interface.
   b. Go to **网络设置** - **平台接入 - 国标28181** (Network settings – Platform access – GBT28181).



   c. Set the **接入使能** (Enable connection) checkbox (**1**).
   d. In the **SIP服务器编号** (SIP server number) enter the *Axxon One* Server ID (**2**). The example shows Server ID 34020000002000000001.
   e. In the **SIP服务器IP** (SIP server IP address) enter the *Axxon One* server IP address (**3**). The example shows IP 192.168.88.33
   f. In the **设备编号** (Device number) field, enter the device identification number as described in Connecting cameras via the GB/T28181 protocol(see page 193) (**4**). Example on the picture shows Device ID 34020000001300000001.

g. In the **本地SIP服务器端口** (Local SIP port) field, enter the IP device SIP port number (**5**).
h. In the **心跳周期** (Heartbeat period) field, enter the period in seconds for sending messages confirming the device activity (**6**).
i. In the **SIP服务器端口** (SIP server port) field, enter the *Axxon One* server port assigned for receiving messages from the IP device (**7**). The example shows port 5060.
j. In the **注册有效期** (Registration period) field, enter the devise discovery period in seconds (**8**). The value must not be less than 600.
k. In the **最大心跳超时次数** (number of timeouts for Heartbeat messages) field, enter the maximum number of Heartbeat message omissions after which the device connection is considered lost (**9**).
l. Click **刷新** (Update).

2. In *Axxon One*:
   a. Example value for the **IP address** field: 34020000001300000001@34020000002000000001-192.168.88.33
   b. Set **Port** to 5060.

Connecting and setting up devices with FFmpeg driver

FFmpeg generic driver is applied to receive video and audio data:

1. over RTSP and RTMP protocols (**1 channel device** model),
2. from connected USB devices (**Dshow device (USB camera)** model),
3. from the Server monitor screen (**Desktop capturer** model),
4. from the application window on the Server (**Window capturer** model, without audio).

Attention!

If it is necessary to use the RTSP and RTMP protocols to broadcast video via the FFmpeg driver, then they must be pre-configured using external programs. In this case, *Axxon One* acts as a client that receives video from a third-party RTSP or RTMP server.

Receiving video from the application window on the Server with the FFmpeg driver

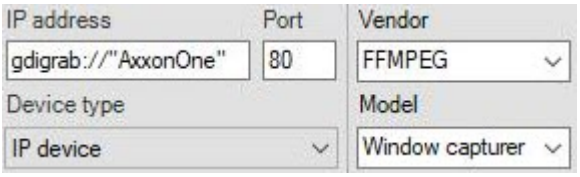
To receive video from the application window on the Server, add an object with the following address format:

```
gdigrab://"Window title"
```

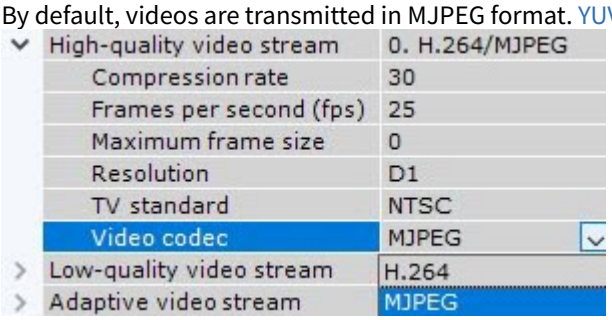
where "Window title" is the application window header.

Attention!

The address must contain only Latin characters. If the app window header contains some other characters, use any 3rd party utility to change them.



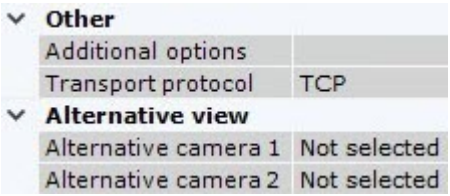
By default, videos are transmitted in MJPEG format. YUV422[78], H.264 and MPEG4 formats are also available.



Note

The YUV422[79] requires more network bandwidth. Take this into account when you select a format.

You can set a parameter string in the **Additional options** field.



Supported parameters	Description
-draw_mouse <int>	Mouse cursor presence. Available range: 0 to 1, default value: 1
-show_region <int>	Capture area indication. Available range: 0 to 1, default value: 1
-framerate <video_rate>	FPS value
-video_size <image_size>	Video image size
-offset_x <int>	Capture area X offset. Default value is 0
-offset_y <int>	Capture area Y offset. Default value is 0

An example parameter string:

```
-draw_mouse 1 -show_region 1 -framerate 25 -video_size 640x480 -offset_x 10 -offset_y
10
```

Receiving video from the remote Client screen and audio via FFmpeg driver

Your Server can receive video along with system audio and microphone audio from remote Client screens via the FFmpeg driver using the RTSP translation. To do it, do the following:

1. On the Server:
    a. Open the port for receiving data from the remote Client.

78 https://ru.wikipedia.org/wiki/YUV
79 https://en.wikipedia.org/wiki/YUV

Note

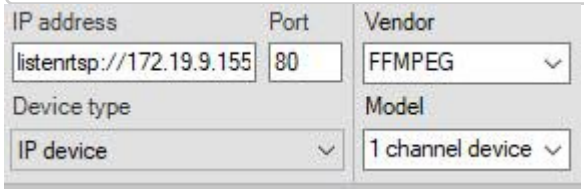
The open port mustn't be occupied. You can use the following command to check if the port is available:

```
netstat -ano | findstr :<Port>
```

It is recommended to set ports higher than 10000.

b. Add a **1 channel device** and specify its address in the **IP address** field in the following format.

```
listenrtsp://<Server IP address>:<Port>
```



Note

The RTSP link is specified optionally.

```
listenrtsp://<Server IP address>:<Port>/<RTSP link>
```

For example:

```
listenrtsp://127.0.0.1:1554/live1.sdp
```

where
127.0.0.1—IP address of the Server;
1554—RTSP port, which mustn't be occupied. To check if the port is available, you can use the command from step 1a;
live1.sdp—RTSP link.

2. On the remote Client:
   a. Download the package of open source FFmpeg libraries from the official website[80].
   b. Open the command prompt, and go to the folder containing the ffmpeg.exe file.
   c. Run the following command:

```
ffmpeg.exe -f gdigrab -video_size 640x480 -i desktop -c:v <Codec> -f rtsp -muxdelay 0.1 "listenrtsp://<Server IP address>:<Port>/<RTSP link>"
```

where
– the **Codec** parameter can accept the mpeg2video, mpeg4, h264 or hevc value;
– the **video_size 640x480** and **-muxdelay 0.1** parameters can be omitted or altered.
If necessary, you can specify additional parameters in this command.

Supported parameters	Description
-draw_mouse <int>	Mouse cursor presence. Available range: 0 to 1, default value is 1

80 https://www.ffmpeg.org/download.html

Supported parameters	Description
-show_region <int>	Capture area indication. Available range: 0 to 1, default value is1
-framerate <video_rate>	FPS value (number of frames)
-video_size <image_size>	Video image size (pixels)
-muxdelay <int>	Maximum demultiplexer-decoding delay (seconds)
-offset_x <int>	Capture area X offset (pixels). Default value is 0
-offset_y <int>	Capture area Y offset (pixels). Default value is 0

After the command execution, remote Client's screen is shared on your display.

Note

- The axes of the capture area are offset from the upper left corner of the main monitor.
- If the additional monitor is located to the left of the main monitor, a negative value of **offset_x** must be used to move the capture area to the additional monitor.
- If the additional monitor is located above the main monitor, a negative value of **offset_y** must be used to move the capture area to the additional monitor.

Examples of commands to share the screen of the remote Client

On the remote Client, you can run the commands to share the screen.

- If there are multiple screens on the remote Client, in order to share them all, you must run the command:

```
ffmpeg.exe -f gdigrab -i desktop -c:v <Codec> -f rtsp -muxdelay 0.1 "listenrtsp://<Server IP address>:<Port>/<RTSP link>"
```

where
the **-video_size** parameter is missing, thus the entire video space is used.

- If there are several screens on the remote Client, they can be shared separately.
For example, to share only the first screen, you can run the command:

```
ffmpeg.exe -f gdigrab -offset_x 0 -offset_y 0 -video_size 1920x1080 -i desktop -c:v <Codec> -f rtsp -muxdelay 0.1 "listenrtsp://<Server IP address>:<Port>/<RTSP link>"
```

Additionally, you can specify the **-pix_fmt** parameter to select the color scheme, since some video codecs can work incorrectly:

```
-pix_fmt yuv420p
```

To share only the second screen, you can run the command:

```
ffmpeg.exe -f gdigrab -offset_x 1920 -offset_y 0 -video_size 1920x1080 -i desktop -c:v <Codec> -f rtsp -muxdelay 0.1 "listenrtsp://<Server IP address>:<Port>/<RTSP link>"
```

where
the **-offset_x 1920** parameter offsets the X axis to the right by 1920 pixels, thus skipping the first screen and using the second screen.
If you want to share the third screen of the remote Client, the value of the **-offset_x** parameter is **-offset_x 3840**, i.e. the X axis is offset to the right by 3840 pixels, thus skipping the first and second screens and using the third screen.

> **Note**
>
> The value of the **-offset_x** parameter depends on the screen resolution. If the screen resolutions are different, the resolution of the individual screen must be taken into account to share it.

- It is possible to combine sharing from several specified screens.
For example, you can run the command to share the first and second screen:

```
ffmpeg.exe -f gdigrab -offset_x 0 -offset_y 0 -video_size 3840x1080 -i desktop -c:v
<Codec> -f rtsp -muxdelay 0.1 "listenrtsp://<Server IP address>:<Port>/<RTSP link>"
```

where
the value of the **-video_size 3840x1080** parameter is the sum of the widths of the first and second screens.
To share the second and third screens, you can run the command:

```
ffmpeg.exe -f gdigrab -offset_x 1920 -offset_y 0 -video_size 3840x1080 -i desktop -c:v
<Codec> -f rtsp -muxdelay 0.1 "listenrtsp://<Server IP address>:<Port>/<RTSP link>"
```

where
the **-offset_x 1920** parameter offsets the X axis by the width of the first screen;|
the value of the **-video_size 3840x1080** parameter is the sum of the widths of the second and third screens.

- When using three or more screens on the remote Client, you can decode NVIDIA format into FFmpeg.
To do this, run the following command:

```
ffmpeg.exe -f gdigrab -i desktop -c:v <Codec> -f rtsp -muxdelay 0.1 "listenrtsp://<Server
IP address>:<Port>/<RTSP link>"
```

where
the **Codec** parameter can accept the h264_nvenc (H264), hevc_nvenc (H265) values.

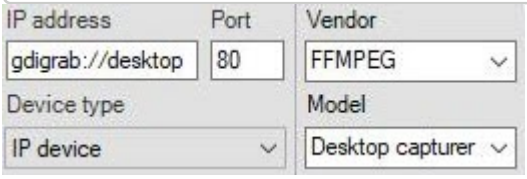
> **Note**
>
> For Intel graphics cards, you must use the h264_qsv and hevc_qsv codecs.

The maximum screen resolution that NVENC h.264 can work with is 4096x4096 pixels. The maximum screen resolution that NVENC h.265 can work with is 8192x8192 pixels. For example, when using NVENC h.264, three screens with a resolution of 1920x1080 pixels won't work.

Receiving video from the Server monitor with the FFmpeg driver

To receive video from the Server monitor screen, add an object with the following address format:

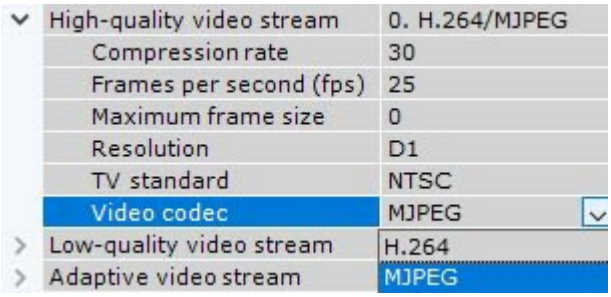
```
gdigrab://desktop
```



Note

To receive video from remote Clients, you have to use RTSP transmission (see Receiving video from the remote Client screen and audio via FFmpeg driver(see page 209)), or install Axxon One's Server services on your Client (see Installation(see page 98)).

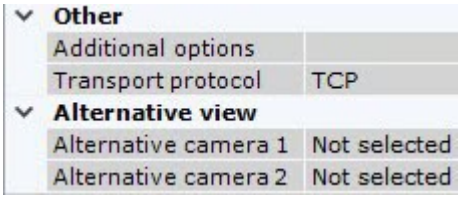
By default, videos are transmitted from all Server monitors in MJPEG format. YUV422[81] and H.264 format is also available.



Note

The YUV422[82] requires more network bandwidth. Take this into account when you select a format.

You can set a parameter string in the **Additional Options** field.



Supported parameters	Description
-draw_mouse <int>	Mouse cursor presence. Available range: 0 to 1, default value: 1
-show_region <int>	Capture area indication. Available range: 0 to 1, default value: 1
-framerate <video_rate>	FPS value
-video_size <image_size>	Video image size
-offset_x <int>	Capture area X offset. Default value is 0
-offset_y <int>	Capture area Y offset. Default value is 0

An example parameter string:

```
-draw_mouse 1 -show_region 1 -framerate 25 -video_size 640x480 -offset_x 10 -offset_y
10
```

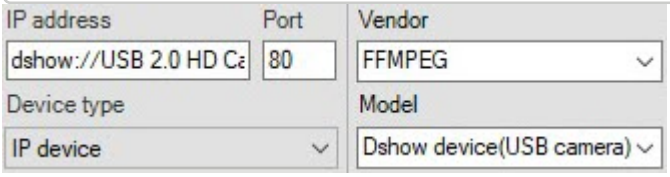
Receiving audio and video from connected USB devices

81 https://en.wikipedia.org/wiki/YUV
82 https://en.wikipedia.org/wiki/YUV

If a device is added automatically (see Searching, adding, configuring, and removing IP devices(see page 157)), separate objects are created for video and audio streams.

If you need to create a single object, add the device manually using the following address format:

```
dshow(<index>)://(<video_device_name>)(:<audio_device_name>)
```



If no index is specified in the address, the value is **0**. Use a non-**zero** index if you use multiple devices with the same name.

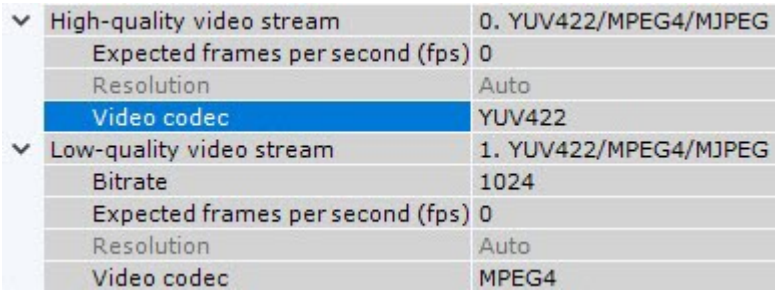
For example:

```
dshow://USB 2.0 HD Camera
dshow1://USB 2.0 HD Camera
```

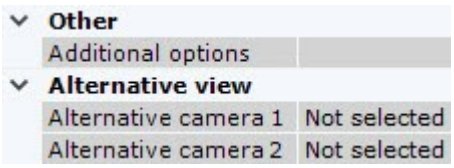
Note

If a video or audio device is not present, it cannot be specified in the address.

After you added the device, you have to set up its streams. For archive recording and transferring videos over the network, MJPEG codec is recommended; for detection purposes, use YUV422.



If required, you can set a parameter string for FFmpeg app in the **Additional options** field.



For example: receive video from a USB camera in YUV420P format, 1280x960 resolution.

```
-pixel_format yuv420p -video_size 1280x960
```

Parameters and their values differ by format and particular device. To list possible parameter values, run the following command from the Windows command line:

```
ffmpeg -list_options true -f dshow -i video="<device name>"
```

Receiving video and audio with FFmpeg driver over RTSP and RTMP protocols

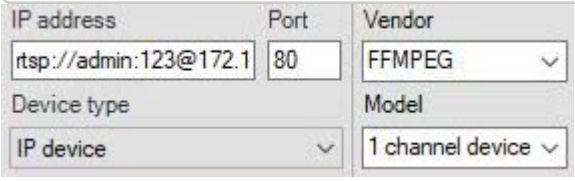
Attention!

FFmpeg currently has the following limitations:

- only one stream is supported;
- video codecs are limited to H.264/H.265, audio to AAC.

To add a device, use the following address format:

```
protocol://[login:password@]IP-address[:port][/path]
```



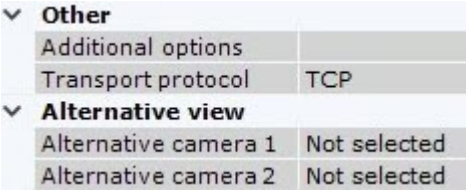
Note

You can set login and password either in the address bar or in corresponding fields when adding the device.
If authentication parameters are specified both ways, the address bar has the priority.

Attention!

If you use the address bar method, you must specify the port number. If no port number is specified, default ports are used (554 for RTSP, 1935 for RTMP).

After you add a device, you can set a parameter string for FFmpeg app in the **Additional Options** field. Parameters and their values differ by format, particular device and protocol used.



Note

See the full list of parameters for RTSP protocol on the page[83].

19.2.3.2.11 Configuring connection of video cameras with dynamic IP addresses

Axxon One needs a permanent hostname, such as provided by DynDNS or similar dynamic DNS services to work with IP cameras that use DHCP.

Use your permanent DynDNS hostname to access an IP camera with a dynamic IP address.

19.2.3.2.12 Configuring virtual cameras

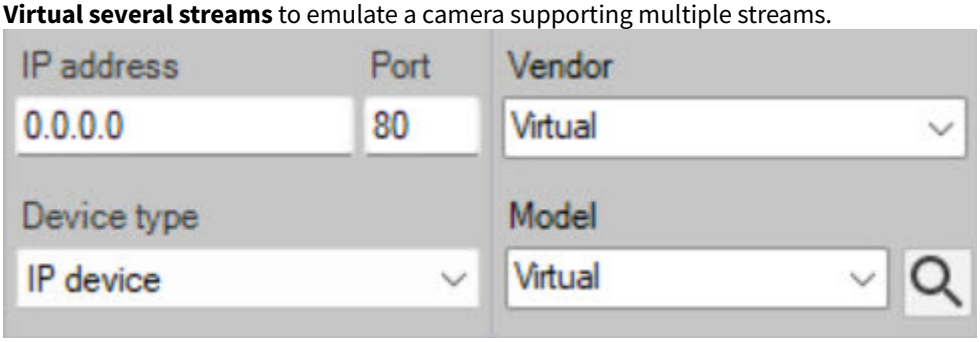
In *Axxon One,* you can work with virtual cameras.

This method requires running *Axxon One* in the test mode and imitating a stream of video data by playing an available video. You can play videos using video compression algorithms supported by *Axxon One* (see Characteristics of Axxon One(see page 83)).

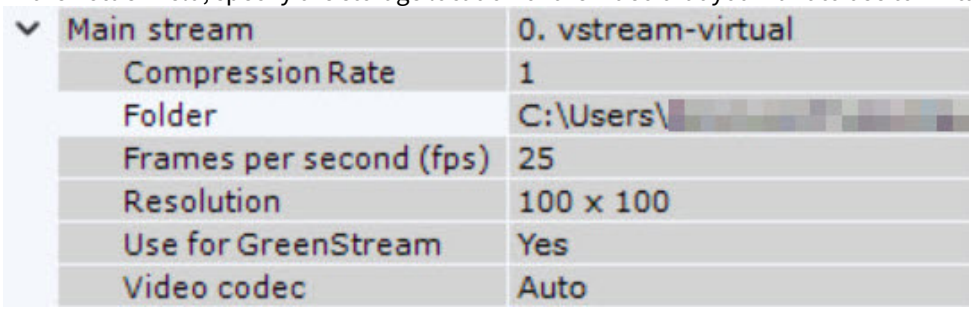
83 https://ffmpeg.org/ffmpeg-protocols.html#rtsp

To create and configure a virtual camera:

1. Run the IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. From the **Vendor** drop-down list, select **Virtual**.
3. Select **Virtual** from the **Model** drop-down list to emulate a single-stream camera. From the **Model** drop-down list, select **Virtual several streams** to emulate a camera supporting multiple streams.

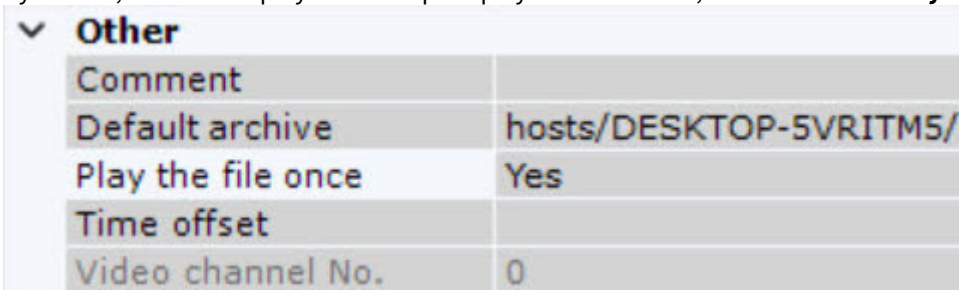


4. Click the  button.
5. In the **Folder** field, specify the storage location of the video that you want to use to imitate a video signal.



> **Attention!**
>
> - You must not use video with B-frames[84]. You can check the presence of B-frames in a video using the **ffprobe** utility that is included in the **FFmpeg** package:
>
> ```
> ffprobe -v error -select_streams v:0 -show_entries stream=has_b_frames -of
> default=noprint_wrappers=1:nokey=1 d:\Dev\!temp\1.avi
> ```
>
> where, instead of **d:\Dev!temp\1.avi**, specify the actual path to the file. The output value:
>
> - **0**—there are no B-frames in the video.
> - greater than **0**—the video contains B-frames.
>
> - You must not use the **H.263** codec. You can identify the codec, for example, using the **MediaInfo** utility.
> - If there are many files in the folder, they are played in a random order.
> - Scanning for files in a specified directory is limited to one minute.

6. By default, the video is played in a loop. To play the video once, select **Yes** in the **Play the file once** parameter.



7. Click the **Apply**  button.

84 https://en.wikipedia.org/wiki/Video_compression_picture_types#Macroblocks

Creating and configuring a virtual camera is complete.

19.2.3.2.13 Restoring default camera settings

You can restore the default *Axxon One* settings for a camera.

Current camera settings will be discarded and replaced with the defaults.

To restore default camera settings, select a camera in the device list. Click the **Reset** button and then the **Apply** button.



19.2.3.3 The IP Server object

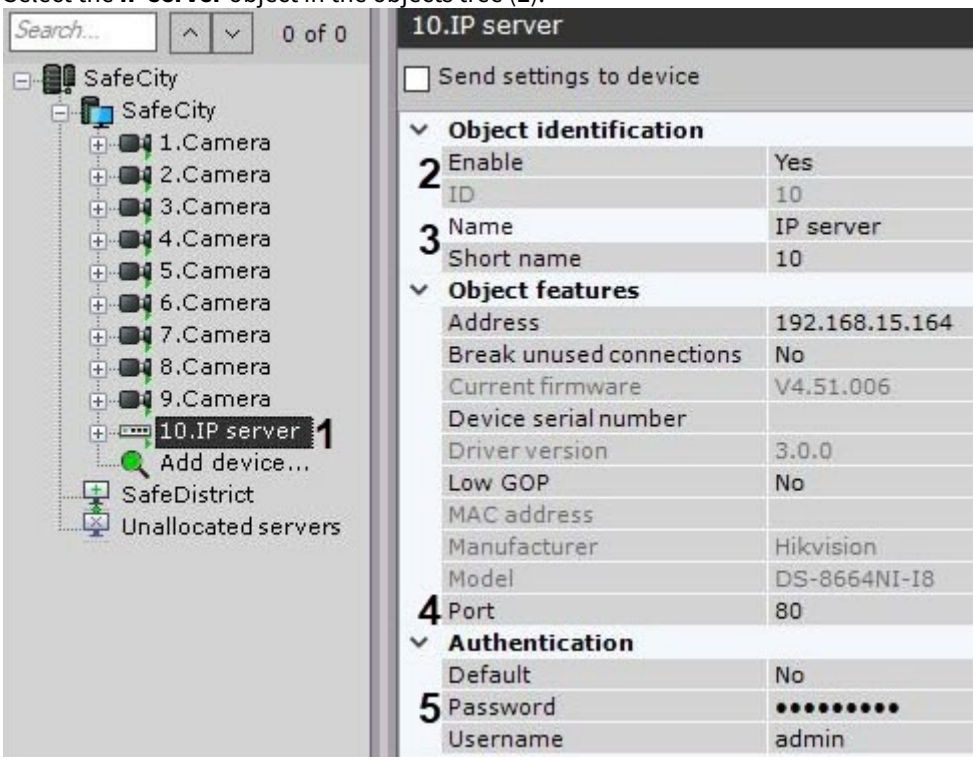
In *Axxon One*, an **IP Server** object relates to:

- video capture card;
- video server:
- control panel;
- DVR;
- input/output module.

If you configure a video capture card, video server or DVR, each video camera channel corresponds to a **Camera** object under the **IP Server** parent object.

To configure the IP server parent object, perform the following:

1. Select the **IP server** object in the objects tree (**1**).



2. Select **Yes** from the list in the **Enable** field to enable the object (**2**).
3. Enter the name of the IP server in the **Name** field (**3**).
4. Specify the number of the network port (**4**). The default value is **80**.

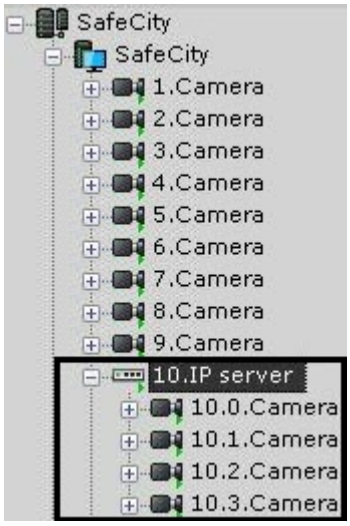
> **Note**
>
> The port number is initially set through the IP server's Web interface.

5. Set the authentication mode (**5**).

> **Note**
>
> The login and password for connecting to the IP server are set through its Web interface.

6. Click the **Apply** button.

The IP server and its video cameras will then be enabled, and the icon indicators for the IP server and video cameras in the objects tree will turn green.



Configuration of IP server channels must be performed separately for each channel (with the help of child objects of **Camera**).

> **Note**
>
> - Some parameters of the **Camera** child objects cannot be changed if the IP server was added in the **Keep current settings** mode (i.e. with the parameters that were set in the web interface, see Searching, adding, configuring, and removing IP devices(see page 157)). To be able to configure these parameters, you need to set the **Send settings to device** checkbox.
> - The **Send settings to device** checkbox can only be set for the IP Server parent object. Once you set a checkbox for an IP Server, the checkbox is also set on all its channels and child objects.

By default, you cannot delete child **Camera** objects from the IP server. To enable this feature, do as follows:

1. Quit Client.
2. Start a text editor and open the Axxon One.exe.config configuration file located in: <*Axxon One* installation folder Axxon One>\bin.
3. Find the line <add key="AllowIpServerChannelRemove" value="false" /> and change **false** to **true**.
4. Save the changes to the file.

You can now delete **Camera** objects from the IP server.

> **Attention!**
>
> You cannot restore a deleted object. You will need to create the IP server again.

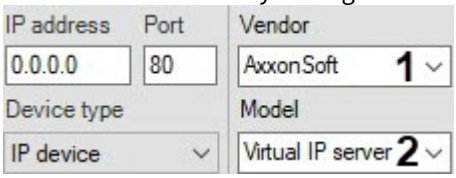
19.2.3.3.1 Configuring Virtual IP Servers

Axxon One supports working with a virtual IP server.

To create and configure a virtual IP server, perform the following steps:

1. Run IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).

2. In the form for manually adding an IP device, select **AxxonSoft** in the **Vendor** drop-down list (**1**).



3. Select **Virtual** from the models list to emulate a single-stream video camera. Select **Virtual several streams** to emulate a video camera supporting multiple streams (**2**).
4. Click the button.

An **IP server** object will be added. It will be used for creating 4 virtual video cameras; location of a video file to be used for signal emulation needs to be specified for each camera (see Configuring virtual cameras(see page 215)).

19.2.3.4 The Microphone object

Listening on the Client to sound from a camera microphone(see page 1288)

If a microphone is a part of an IP server, you must specify the camera to which it is matched in the parameters of this microphone. When you do this, the **Microphone** object becomes a child of the specified **Camera** object.

Attention!

When you reassign a microphone from one camera to another, all previously recorded audio archive is also transferred and later played back when you view the archive of the new camera.

This setting is used during synchronized video and audio monitoring of a situation as well as during synchronized video and video recording to the archive (see Audio Monitoring(see page 1288)).

In all other cases, the **Microphone** object is automatically displayed in the object tree as a child object of a camera.

To configure the **Microphone** object, do the following:

1. Go to the **Devices** tab.
2. Select the **Microphone** object in the object tree. If necessary, you can change the values of the parameters that are listed in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	By default, the microphone is disabled. To enable it, select **Yes**
	No	
Name	**Microphone**	If necessary, enter the microphone name
Audio codec	**RAW**	Select the audio codec used to compress the audio stream. The following audio codecs are supported: • AAC, • G.711 araw, • G726, • PCM
Volume	**High level**	Select the volume level of the audio device

	Low level	
Camera		
Camera	**{Short name.Name}**	From the drop-down list, select the camera with which you want to bind the microphone. As a result, the microphone becomes a child of the selected camera (see Camera(see page 171))

3. Click the **Apply** Apply button.

To check the operation of the microphone, do the following:

1. Go to the layout with the required camera and activated microphone
2. In the upper left corner of the preview window, left-click the speaker icon .
3. Send an audio signal to the microphone.



4. If the microphone is configured correctly, the audio signal is transmitted to the server speakers. To change the volume level, use the slider.

Checking the microphone operation is complete.

19.2.3.5 PTZ

On the page:

- General information about PTZ(see page 220)
- PTZ configuration(see page 220)
- Binding overview cameras to a PTZ camera and configuring calibration for the Tag&Track Pro feature(see page 223)

- Configuring PTZ control(see page 1011)
- The PTZ Control Panel(see page 1135)
- Controlling a PTZ camera(see page 1166)
- Features for tracking moving objects(see page 253)

19.2.3.5.1 General information about PTZ

You can configure the **PTZ** object (PTZ camera) on the **Devices** tab. The **PTZ** object is displayed in the object tree as a child of the Camera(see page 171) object.

19.2.3.5.2 PTZ configuration

To configure the PTZ camera, do the following:

1. Go to the **Devices** tab.

2. Select the **PTZ** object in the object tree. If necessary, you can change the values of the parameters that are listed in the table:

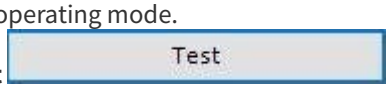
Parameter	Value	Description
Object identification		
Enable	**Yes**	By default, PTZ is enabled. To disable it, select the **No** value
	No	
Name	**PTZ**	Enter the name of the PTZ camera
Patrol	**Yes**	By default, patrolling is disabled. To enable it, select the **Yes** value. If patrolling is enabled, you can stop it on the PTZ control panel (see Patrolling(see page 1172)). After you finish the PTZ control session, patrolling is enabled automatically
	No	
Save presets	**Yes**	By default, the parameter is disabled. In this case, the Presets(see page 1168) are only stored on the server. To save the created presets to the IP device, select the **Yes** value
	No	**Note** This parameter is available only for the devices that support absolute positioning. For the current list of compatible devices, see Documentation Drivers Pack[85].
Switch interval	**1**	Specify the time interval in seconds at which the PTZ camera switches between the presets in the patrol mode. The value must be in the range [1, 600000]
Tag & Track		
Priority	Select the control mode (the algorithm of behavior when tracking objects) of the PTZ camera for the **Tag&Track Pro** feature (see Tag&Track Pro(see page 255))	
	None	The **Tag&Track Pro** feature is disabled. You can control the camera only manually
	Manual	The operator initiates manual tracking. To begin tracking, select an object's track in the surveillance window. If you click an area of the frame without an object's track, tracking immediately stops and the camera redirects (aims) to the specified point. This is suitable for targeted monitoring of a single specific object, when the operator needs full control over the start and end of tracking
	Automatic	The system automatically detects and sequentially tracks all active objects within the camera's field of view, switching between them at a preset switching frequency (the **Switch Frequency** parameter). This is suitable for situations when continuous coverage of the entire scene is required without operator intervention, such as on a perimeter during non-working hours
	User priority	The system starts working in automatic mode, tracking all objects. Once the operator selects a specific track, the system switches to manual tracking mode. After the operator deselects the track or the system loses the target, the system automatically returns to tracking all objects. This is the most balanced and recommended mode. It combines the advantages of automatic operation (constant visibility) and manual control (quick switching to a priority target upon operator command)
	Manual PTZ control	The operator can manually control the PTZ camera at any time for a detailed inspection of the area. Once manual control is stopped (after a short delay of inactivity), the feature returns to automatic operation. This provides maximum flexibility. It allows the operator to intervene in the automatic operation to check for suspicious activity without disabling the tracking function

85 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack

Parameter	Value	Description
Switch Frequency	**3**	Specify the time in seconds during which the camera focuses on one object before moving to the next object
Other		
		Attention! Depending on the camera, you can find other parameters in the **Other** group. To configure them, refer to their description in the interface or in the official documentation.
Discrete control via continuous control	**Yes** **No**	By default, the parameter is disabled. If you need to use the step buttons to control the PTZ camera even if the camera doesn't support this mode, select the **Yes** value (see Control using step buttons and virtual joystick(see page 1171)). In this case, the discrete PTZ control is emulated via the continuous control commands
Home preset	**0**	Select the home preset by specifying the required identifier. The value must be in the range [0, 999999999]
Home preset timeout	**0**	The return to the home preset is performed automatically after the specified time in milliseconds. The value must be in the range [0, 999999999] **Attention!** If the **Home preset timeout** value is greater than the **Operator idle time** value (see Configuring PTZ control(see page 1011)), the **Operator idle time** value is used.
Multiple control	**Yes** **No**	By default, the parameter is enabled, which allows multiple users with the same priority to control the PTZ camera at the same time. To disable multiple control, select the **No** value. In this case only one user at a time can have control (see Controlling a PTZ camera(see page 1166))
New PTZ interface	**Yes** **No**	By default, the parameter is disabled. To use the existing presets on the device in *Axxon One*, select the **Yes** value. The presets created on the device automatically appear in the PTZ control panel (see The PTZ Control Panel(see page 1135)) **Attention!** If the usage of the existing presets is disabled, they can be lost if the following conditions are met: a. In *Axxon One*, the recording of the presets to the device is enabled in the **Use device presets** parameter. b. The preset with the same ID is created in *Axxon One* (see Creating and editing presets(see page 1168)).
Patrol speed	**100**	Specify the speed of transition from one preset to another in conditional units. The value must be in the range [0, 100]
Use device presets	**Yes** **No**	By default, the parameter is disabled. To create the presets with the same identifier in *Axxon One* (see Creating and editing presets(see page 1168)), select the **Yes** value
Camera		
Camera	**{Short name.Name}**	If necessary, select the camera to which this PTZ camera must be assigned (see Camera(see page 171)). As a result, the object becomes a child object to the selected camera

3. Click the **Apply**  button.

As a result, the PTZ camera is switched to the specified operating mode.

To check the operation of the PTZ camera, click the **Test**  button. If the PTZ camera is configured correctly, it turns one step and returns to its original position.

19.2.3.5.3 Binding overview cameras to a PTZ camera and configuring calibration for the Tag&Track Pro feature

To use the automatic tracking feature **Tag&Track Pro**, you must create a logical connection between overview cameras and PTZ cameras, as well as set up precise positional correspondence between their fields of view. To do this, do the following:

1. In the **Tagtrack cameras** section:
   a. Click the  button.
   b. Select the required overview camera from the list. To search for a camera, enter the **Short name** or **Name** (full or partial, see Camera(see page 171)). This parameter is case-sensitive.
2. In the surveillance window of a PTZ camera, focus on any point:
   a. In the upper right corner, click the  button.
   b. Place the cursor in the middle of the frame, hold down the left mouse button, and move the cursor so that the object that you want to track is in the center of the frame.
3. In the surveillance window of the **Overview camera**:
   a. Left-click the point corresponding to the current position of the PTZ camera. A **Calibration point**  is added to the surveillance window. To delete a calibration point, click the **Delete**  button.
   b. Set at least six calibration points in the surveillance window of the overview camera, focusing on different points in the surveillance window of the PTZ camera.

   > **Attention!**
   >
   > - Setting calibration points is mandatory. Without this, the overview camera will not be bound to the PTZ camera.
   > - We recommend setting 6 to 10 points. Adding more points can improve accuracy but also increases the risk of errors, which will degrade the overall performance of the feature.
   > - The points must not be in a straight line in both the overview and PTZ cameras. They must be evenly distributed across the entire frame.
   > - All points must be in the same plane (floor, ground). We don't recommend placing points in different planes (for example, some points on the ground and others on walls or poles).

4. Click the **Apply**  button.
5. Test the calibration
   a. In the upper right corner from the surveillance window of the **Overview camera**, click the  button.
   b. Click each created calibration point in the surveillance window of the **Overview camera**. If the PTZ camera accurately positions itself at each selected point, the calibration is correct.
6. Repeat the steps for each required overview camera.

Binding overview cameras to a PTZ camera and configuring calibration for the **Tag&Track Pro** feature is complete:

- You have created logical connections between overview cameras and the PTZ camera that performs tracking.
- You have set up the precise correspondence between the position of the PTZ camera and points in the field of view of each overview camera.

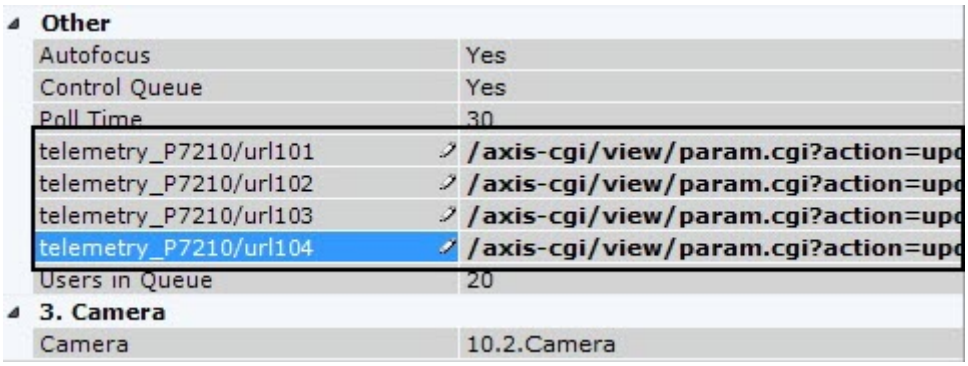
19.2.3.5.4 Configure HTTP-CGI commands to control Wash&Wiper

With *Axxon One*, you can control the Wash&Wiper feature in some Axis IP devices (M7016, P7216, Q7404, Q7436) using HTTP-CGI commands.

To set HTTP-CGI commands, do as follows:

1. Create presets for the camera, numbered as follows: 101, 102, 103 and 104 (see The Presets List(see page 1168)).
2. Go to the **PTZ** object and specify commands in the appropriate fields.

> **Note**
>
> The corresponding **Camera** object must have the **Send settings to device** option enabled (see Camera(see page 171)).



3. Click the **Apply** button.

When the camera goes to the presets 101-104, this triggers a pre-configured command.

19.2.3.6 The Channel object

The **Channel** object is displayed as a child object of the IP server object (see The IP Server object(see page 217)) in the object tree if a device is an input/output module or a video surveillance control panel (see CCTV Keyboards(see page 239)).

To configure the **Channel** object, do the following:

1. Go to the **Devices** tab.
2. Select the **Channel** object in the object tree. If necessary, you can change the values of the parameters that are listed in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	By default, the channel is enabled. To disable it, select **No**
	No	
Camera		
Camera	**{Short name.Name}**	From the drop-down list, select the camera with which you want to bind the channel (see Camera(see page 171))

> **Note**
>
> When you enable/disable a channel, all **Input** and **Output** child objects are automatically enabled/disabled.

3. Click the **Apply** 

button.

Configuration of a channel is complete.

19.2.3.7 The Input object

Displaying the input status(see page 1176)

The **Input** object is displayed as a child object of the **Camera** object in the object tree if a camera has a built-in or pluggable digital input. The number of **Input** objects for a camera corresponds to the number of pluggable digital inputs a camera has.

If a device is defined as an IP server, an input is displayed as a child object of a **Channel** object in the object tree (see The Channel object(see page 224)).

To configure the **Input** object, do the following:

1. Go to the **Devices** tab.
2. Select the **Input** object in the object tree. If necessary, you can change the values of the parameters that are listed in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	By default, the input is disabled. To enable it, select **Yes**
	No	
Name	**Input**	If necessary, enter the input name
Input/output ID	**0 (non-editable field)**	Input/output ID for the input on the controller
Normal status	**Open**	From the drop-down list, select the status of the input in which it must be when there is no alarm
	Closed	
Camera		

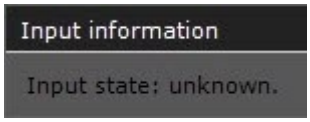
Camera	**{Short name.Name}**	From the drop-down list, select the camera with which you want to bind the input (see Camera(see page 171)). As a result, the input becomes a child of the selected camera
		Note
		• If the input is a child of the **Channel** object, then:
		  • When you enable the input, the **Channel** parent object is automatically enabled.
		  • When you enable all **Input** and **Output** child objects, the **Channel** parent object is also enabled.

3. Click the **Apply** 

button.

As a result, the input is switched to the specified operating mode.

The current state of the input is displayed in the **Input information** group.



19.2.3.7.1 Configure virtual inputs

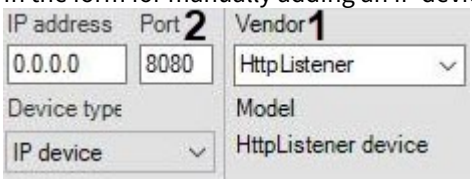
Switch between virtual IP device states (HttpListener)[86].

Axxon One enables you to work with virtual inputs, which can change their states (**Closed**/**Open**) and generate a corresponding event upon receiving an HTTP request.

19.2.3.7.1.1 Creating and configuring virtual inputs

To create and configure a virtual input, complete the following steps:

1. Run IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. In the form for manually adding an IP device, select **HttpListener** in the **Vendor** drop-down list (**1**).

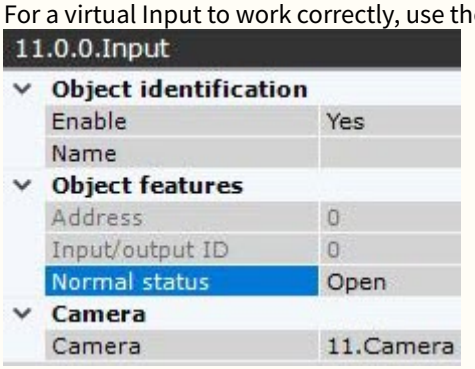


3. In the **Port** field, specify the port number that will be used Input status queries (**2**).
4. Click the  button.

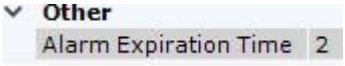
The **IP Server** object is automatically created to host four virtual inputs.

Attention!

For a virtual Input to work correctly, use the **Open** circuit.



You can configure virtual inputs in the same way as real ones. Also you can specify the time-out when virtual inputs reset their status in the **Alarm Expiration Time** field of the **IP Server** object. It ranges from 0 to 100.



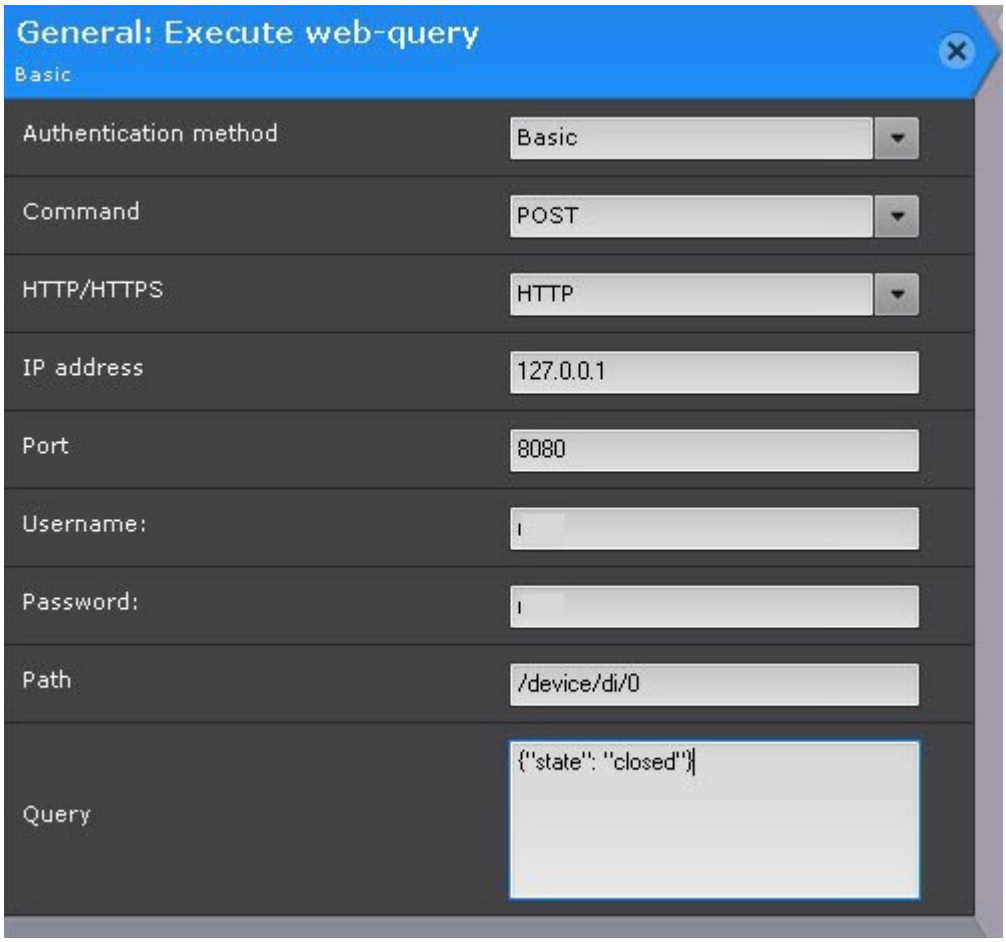
This setting is applied only after you disable and enable the input again.

19.2.3.7.1.2 Switching virtual inputs

To switch virtual inputs, the HTTP request is used (see Switch between virtual IP device states (HttpListener)[87]).

The requests can be handled by macros (see Execute web query(see page 891)). Create two macros for each virtual input: to switch to **Closed** state and to switch to **Open** state.

86 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246487043/Switch+between+virtual+IP+device+states+HttpListener
87 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246487043/Switch+between+virtual+IP+device+states+HttpListener



You can run macros and requests from Dialog board (see Configuring a Dialog Board(see page 966)).

19.2.3.7.1.3 Virtual inputs' status on map

You can add virtual inputs to maps just as you do with real ones (see Adding inputs and outputs(see page 987)).

The color of the virtual input on the map changes depending on its state (see Displaying device status(see page 1304)).

19.2.3.8 The Output object

Managing output(see page 1175)

The **Output** object is displayed as a child object of the **Camera** object in the object tree if a camera has a built-in or pluggable digital output. The number of **Output** objects for a camera corresponds to the number of pluggable digital outputs a camera has. If a device is defined as an **IP server**, an output is displayed as a child object of the **Channel** object in the object tree (see The Channel object(see page 224)).

To configure the **Output** object, do the following:

1. Go to the **Devices** tab.
2. Select the **Output** object in the object tree. If necessary, you can change the values of the parameters that are listed in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	By default, the output is disabled. To enable it, select **Yes**

	No	
Name	**Output**	If necessary, enter the output name
Input/output ID	**0 (non-editable field)**	Input/output ID for the output on the controller
Normal status	**Open**	From the drop-down list, select the status of the output in which it must be when there is no alarm
	Closed	
Camera		

Camera	**{Short name.Name}**	From the drop-down list, select the camera with which you want to bind the output (see Camera(see page 171)). As a result, the output becomes a child of the selected camera
		Note
		• If the output is a child of the **Channel** object, then:
		  • When you enable the output, the **Channel** parent object is automatically enabled.
		  • When you enable all **Input** and **Output** child objects, the **Channel** parent object is also enabled.

3. Click the **Apply** 

button.

As a result, the output is switched to the specified operating mode.
To check the operation of the output, click the **Test** button. If the output is configured correctly, its status will briefly change.

19.2.3.9 The Speaker object

On the page:

- General information(see page 228)
- Creating and configuring the object(see page 229)
- Checking the audio notification(see page 231)

Playing back sound from Client microphone on camera speakers(see page 1290)

19.2.3.9.1 General information

The **Speaker** object is used to configure audio notification that starts when a macro starts.

In *Axxon One*, you can create the following types of the **Speaker** objects:

1. **IP speaker device**. It is created automatically if there is an audio outlet on an IP device.

> **Note**
>
> One audio outlet on an IP device corresponds to one **Speaker** child object of the **Camera** object.

2. **System speaker**. It is created manually. Audio on the system speaker is played back using the server's sound card.

A **Speaker** object can play back audio notification files with the following extensions:

1. .ac3;
2. .amr;
3. .avi;
4. .aac;
5. .aiff;
6. .au;
7. .adts;
8. .caf;
9. .dts;
10. .flac;
11. .gsm;
12. .mkv;
13. .mp3;
14. .m4a;
15. .m4r;
16. .mp2;
17. .oga;
18. .ogg;
19. .opus;
20. .voc;
21. .w64;
22. .wav;
23. .wma;
24. .wv.

The following audio notification file encoding formats are supported:

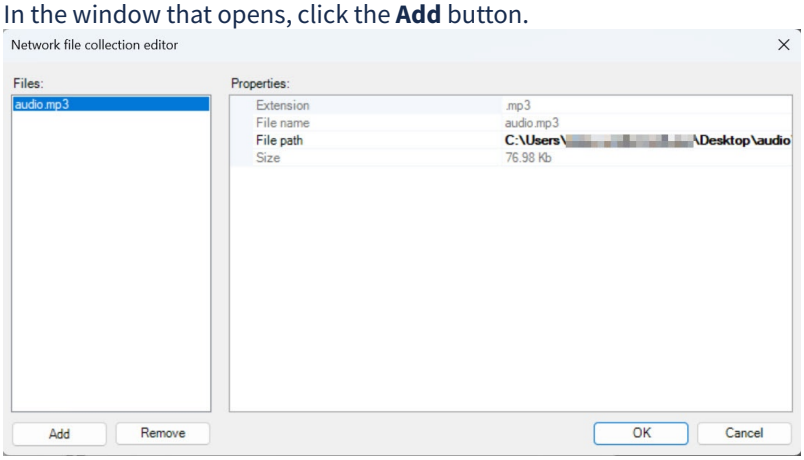
1. MPEG AAC Audio;
2. MPEG-4 Video;
3. MPEG Audio layer 1/2;
4. Vorbis Audio;
5. Opus Audio;
6. PCM S16 LE;
7. PCM S16 BE;
8. twos;
9. FLAC (Free Lossless Audio Codec);
10. AMR narrow band;
11. DTS Audio;
12. GSM Audio;
13. WavPack;
14. A52 Audio (aka AC3);
15. Yamaha ADPCM Audio;
16. ADTS.

The audio notification file must be stored on the computer corresponding to the **Server** object on the basis of which the **Speaker** object is registered.

19.2.3.9.2 Creating and configuring the object

To create the **Speaker** system object, do the following:

1. Go to the **Devices** tab.
2. Click the **Create...** link in the object tree and select **Speaker**.

Parameter	Value	Description
Name	**Speaker**	Enter the required name
Audio files		**Note** This parameter is mandatory. Specify the path to the audio notification file in one of the following ways: • Select any already added file from the file collection: • Add a file using the file collection: i. Click the … button. ii. In the window that opens, click the **Add** button.  iii. In the **File path** field, specify the path to the audio file. As a result, the remaining fields will display the name of the selected audio file, size, and extension. iv. Click the **OK** button.
Playback mode	**Disabled** **Play on server** **Play on client**	From the drop-down list, select the speaker playback mode
Volume	**100**	Enter the speaker volume level

3. Configuration of a speaker of an IP device:

Parameter	Value	Description
Other		
Enable	**Yes** **No**	By default, the speaker of an IP device is disabled. To enable it, select **Yes**
Name	**Speaker**	Enter the required name
Audio codec	**G.711**	Choose audio codec to be used

Audio files		Enter the full path to the audio notification file
Bitrate	**64000** (non-editable field)	The compressed data bitrate, kbit/s
Compression algorithm	**u-law** (non-editable field)	Audio stream compression algorithm
Camera		
Camera	**{Short name.Name}**	From the drop-down list, select the camera with which you want to bind the speaker. As a result, the speaker becomes a child of the selected camera

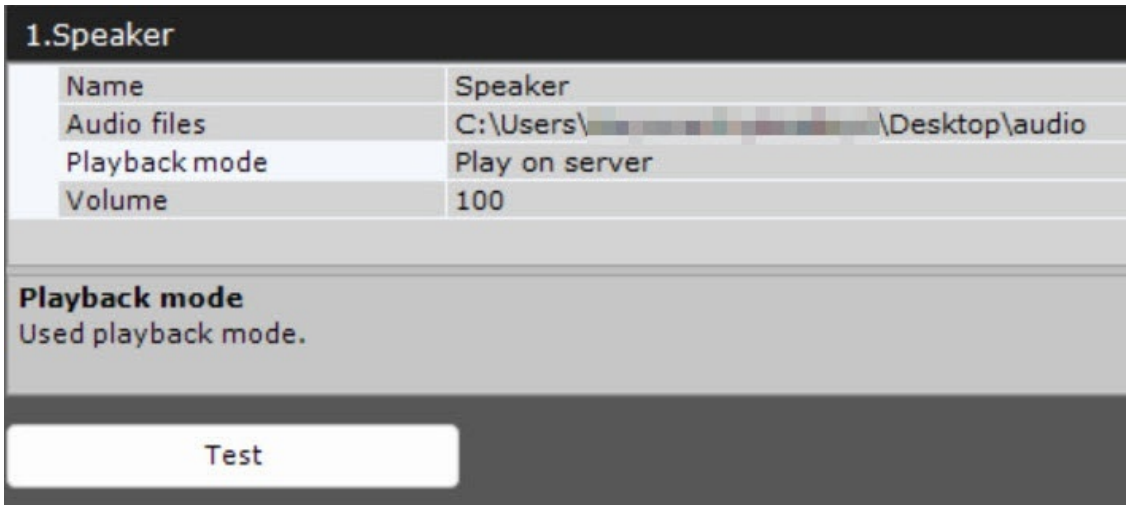
4. Click the **Apply** 

button.

Configuration of the **Speaker** object is complete.

19.2.3.9.3 Checking the audio notification

To check the **Speaker** object, click the **Test** button.



As a result, the audio notification file is played back, the path to which you specified in the **Audio files** field (see Creating and configuring the object).

19.2.3.10 Email notifier

On this page:

- General information(see page 232)
- Creating Email notifier(see page 232)
- Configuring Email notifier(see page 232)

- Checking Email notification(see page 234)

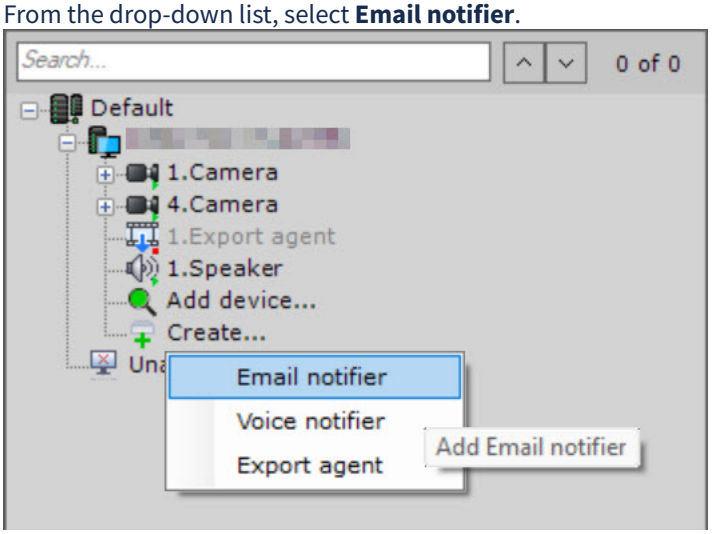
19.2.3.10.1 General information

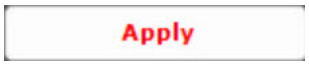
Email notifier is used to configure emails which then can be sent to the user when a macro or an automatic rule is initiated.

19.2.3.10.2 Creating Email notifier

To create Email notifier, do the following:

1. In the list of hardware, click **Create...**
2. From the drop-down list, select **Email notifier**.



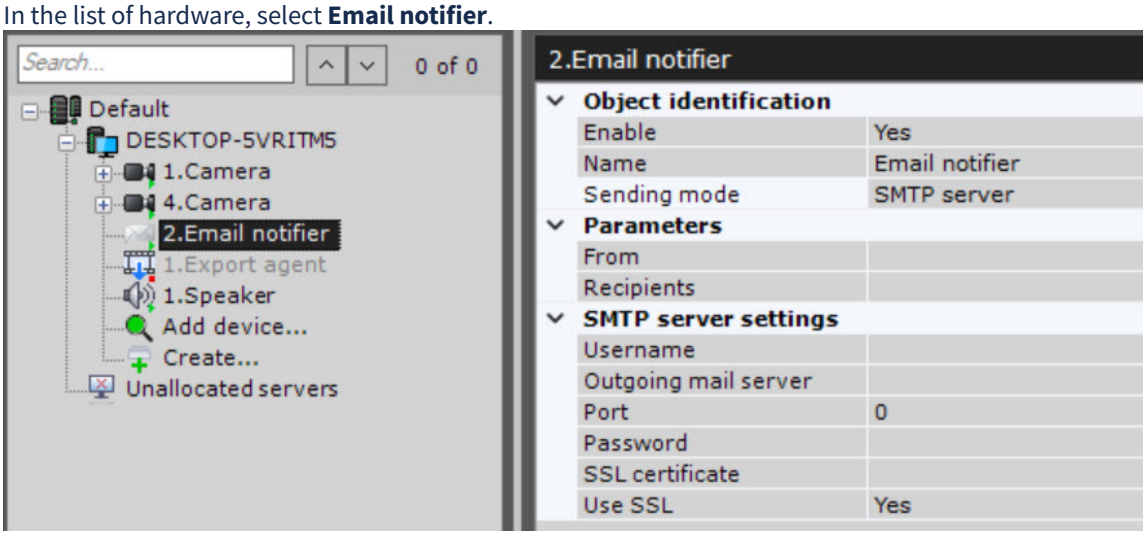
3. Click the **Apply**  button.

As a result, E-mail notifier appears in the list of hardware.

19.2.3.10.3 Configuring Email notifier

To configure Email notifier, do the following:

1. In the list of hardware, select **Email notifier**.



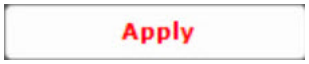
2. In the **Name** field, enter the name of Email notifier.
3. In the **Sending mode** parameter, select the mode for sending email notifications:
   a. **AxxonNet**;

b. **SMTP server**.

> **Attention!**
>
> - To send notifications via *AxxonNet*, you must connect the *Axxon One* domain to *AxxonNet* (see Configuring a domain in AxxonNet[88]).
> - *AxxonNet* has a limit of 10 messages a day. A message via *AxxonNet* is sent within a minute.

4. In the **From** parameter, enter the email address from which the messages are sent.

> **Attention!**
>
> When using email notification, email servers can disable the user account or deny authentication in some cases. We recommend you to disable all security parameters in your email account beforehand.

5. In the **Recipients** parameter, enter one or several email addresses to which messages will be sent.
6. Specify the SMTP server settings:
   a. In the **Username** parameter, enter the name of the user account used to send messages on the outgoing mail server.
   b. In the **Outgoing mail server** parameter, enter the SMTP server of outgoing mail.
   c. In the **Port** parameter, enter the number of the port used by the outgoing mail server.
   d. In the **Password** parameter, enter the password of the user account on the outgoing mail server.
   e. In the **SSL certificate** parameter, specify the path to the SSL certificate file if you use this protocol. If you don't specify a certificate, but the **Use SSL** parameter is enabled, then the email server certificate is used.
   f. If you need to use SSL-encrypted connection when connecting to the outgoing mail server, select **Yes** for the **Use SSL** parameter.
7. Click the **Apply** 

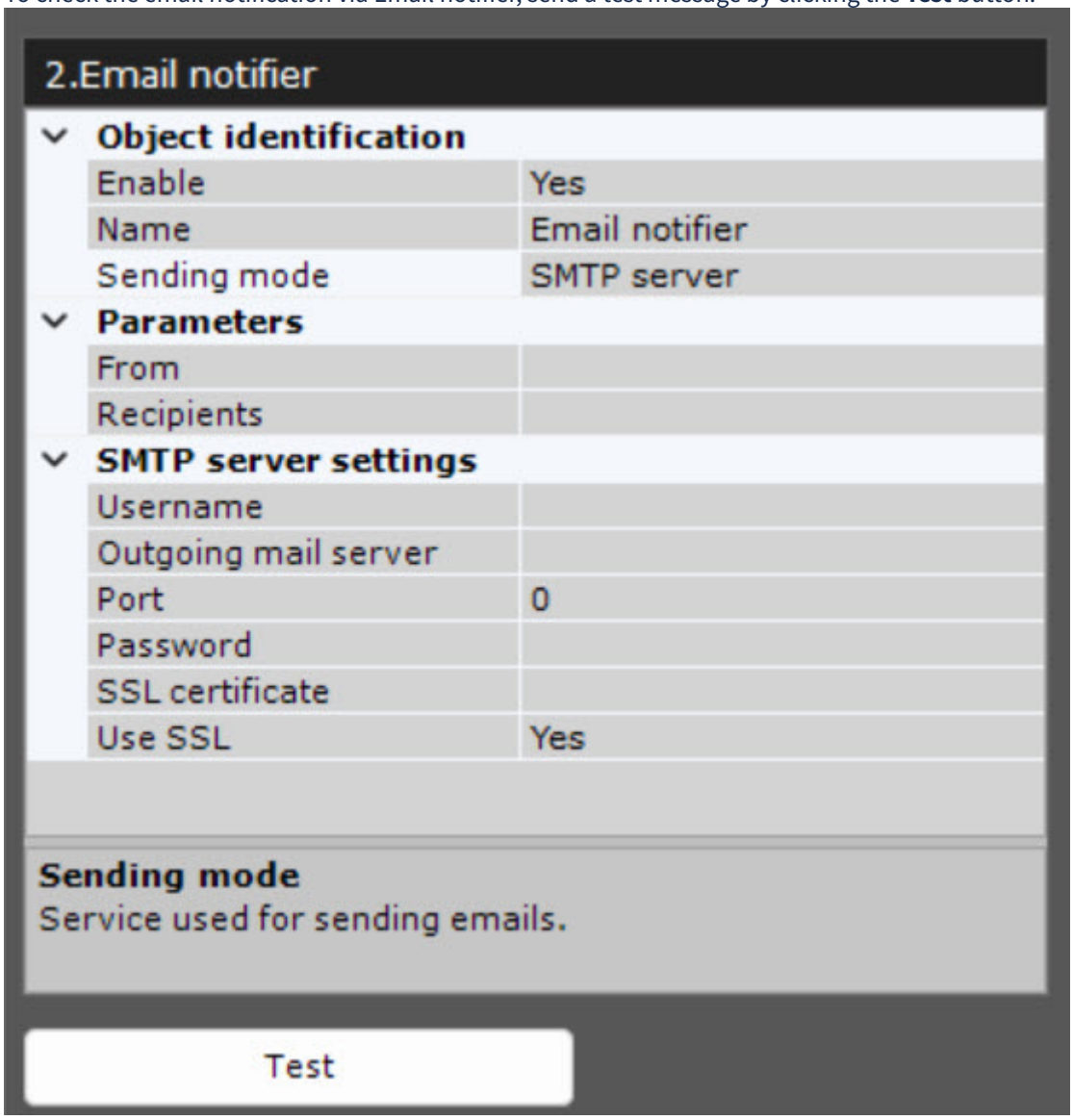
button.

Configuration of Email notifier is complete.

88 https://docs.axxonsoft.com/confluence/spaces/anet/pages/157697082/Configuring+a+domain+in+AxxonNet

19.2.3.10.4 Checking Email notification

To check the email notification via Email notifier, send a test message by clicking the **Test** button.



When you do this, the following message will be sent to the email address specified in the **Recipients** field (see Configuring Email notifier(see page 232)): "Test message".

19.2.3.11 Embedded storage

If a camera has an embedded storage, the system automatically creates the corresponding object.

To configure an embedded storage, do the following:

1. Go to the **Devices** tab.
2. Select the **Embedded storage** object from the child objects of the camera.

Parameter	Value	Description
Enable	**Yes**	By default, the embedded storage is disabled. To enable it, select **Yes**
	No	

Parameter	Value	Description
Name	**Embedded storage**	Enter the object name
Cache depth	**0**	Specifies the period (in days) during which the information on recordings is preloaded into RAM to speed up the operation. The background caching speeds up the display and processing of the archive data. The recommended value depends on the intensity of operation with the archive. With the **0** value (default), caching is disabled. The value must be in the range [0, 365]
Cache update period	**0**	Enter the cache update period in seconds. The value must be in the range [0, 86400]

3. Click the **Apply** 

button.

Configuration of an embedded storage is complete. If an embedded storage is enabled in the system, the data from it are available for viewing (see Selecting an archive(see page 1189)) and replication to the system archive (see Configuring data replication(see page 298)).

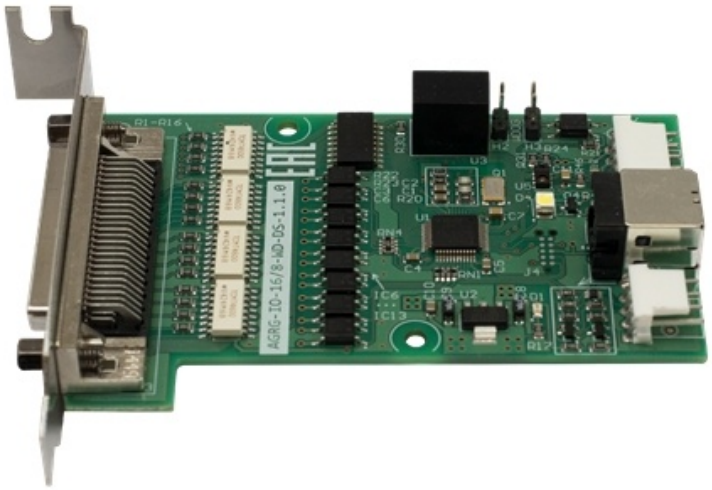
19.2.4 Specifics of device configuration

19.2.4.1 AGRG-IO-16/8-WD-DS Sensor-Relay cards

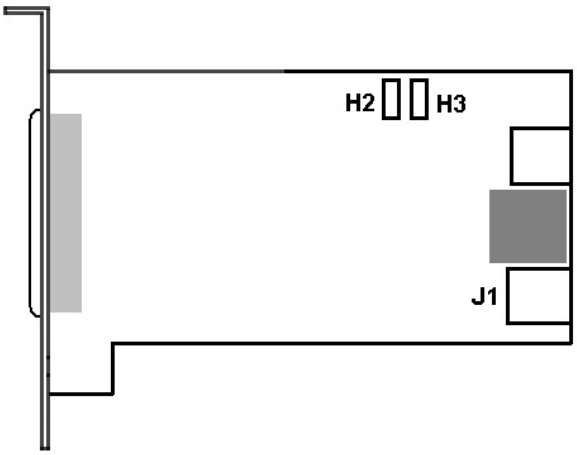
19.2.4.1.1 Connecting AGRG-IO-16/8-WD-DS Sensor-Relay cards

The *AGRG-IO-16/8-WD-DS Sensor-Relay* card is an interface of external sensors and external executive devices (relays) as a part of video surveillance and fire and security alarm systems.

The figure shows the appearance of *AGRG-IO-16/8-WD-DS* card.



The layout of card connectors:



The device is controlled via the USB interface. Electrical and technical specifications of the card are given in the Electrical and technical specifications of AGRG-IO-16/8-WD-DS devices(see page 237) section.

Connect the *AGRG-IO-16/8-WD-DS* card to the Server as follows:

1. Switch the computer power supply off. Remove the system cover.
2. Install the *AGRG-IO-16/8-WD-DS* card into a vacant motherboard slot and fix it in the casing.
3. Connect the loop (bundled with the distribution kit) to the **J1** connector and to a vacant USB connector on the motherboard of computer.
4. To activate the hardware control of the hang, connect the wires to the **H2 H3** connector.
5. To connect sensors and relays unsolder the connector bundled with the distribution kit.
    a. The connecting wires from the executive devices are soldered to the contacts marked as "Relay" (see the table below).

Connector	Application	Connector	Application
1	Relay 1 (+)	26	Sensor 5
2	Relay 1	27	Sensor 5
3	Relay 2	28	Sensor 6
4	Relay 2	29	Sensor 6
5	Relay 3	30	Sensor 7
6	Relay 3	31	Sensor 7
7	Relay 4	32	Sensor 8
8	Relay 4	33	Sensor 8
9	Relay 5	34	Sensor 9
10	Relay 5	35	Sensor 9
11	Relay 6	36	Sensor 10
12	Relay 6	37	Sensor 10

Connector	Application	Connector	Application
13	Relay 7	38	Sensor 11
14	Relay 7	39	Sensor 11
15	Relay 8	40	Sensor 12
16	Relay 8	41	Sensor 12

b. The connecting wires from the sensors are soldered to the contacts marked as "Sensor" (see the table below).

Connector	Application	Connector	Application
17	Sensor 1	42	Sensor 13
18	Sensor 1	43	Sensor 13
19	Sensor 2	44	Sensor 14
20	Sensor 2	45	Sensor 14
21	Sensor 3	46	Sensor 15
22	Sensor 3	47	Sensor 15
23	Sensor 4	48	Sensor 16
24	Sensor 4	49	Sensor 16
25	+ 12V (Output)	50	GND (Ground)

6. Fix the unsoldered connector in the casing bundled with the distribution kit.
7. Connect ready-for-use connector to external connector of the card in order to connect sensors and relays to the Server.

The *AGRG-IO-16/8-WD-DS* card is now connected.

19.2.4.1.2 Electrical and technical specifications of AGRG-IO-16/8-WD-DS devices

When connecting the AGRG-IO-16/8-WD-DS sensor-relay cards, the electrical and technical specifications shown in the table below should be considered.

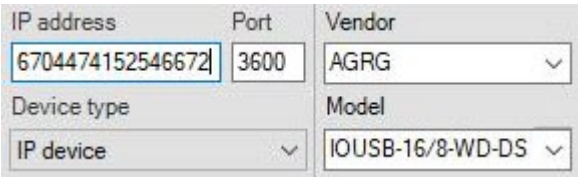
Parameter	Specification
Galvanic isolation on inputs/outputs	3750 V
Inputs	Quantity - 16 Type - current loop Galvanic isolation - Yes Maximum voltage - 60 V Rated voltage - 12 V Maximum current - 60 mA

Parameter	Specification
Outputs	Quantity - 8 Type - open collector Galvanic isolation - Yes Maximum voltage - 300 V Maximum current - 150 mA Minimum pick-up voltage - 1.0 V Minimum pick-up current - 5 mA
Reset Timer (Watchdog)	Customizable
Ping interval of all alarm inputs	100 ms for all contacts. Customizable
PC connection interface	USB 2.0, up to 5 meters
Power supply	500 mA consumption from USB port

19.2.4.1.3 Special features of configuring AGRG-IO-16/8-WD-DS card in Axxon One

The connected card is automatically detected in the IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).

If you add a device manually, enter the serial number of the device in the **IP address** field.



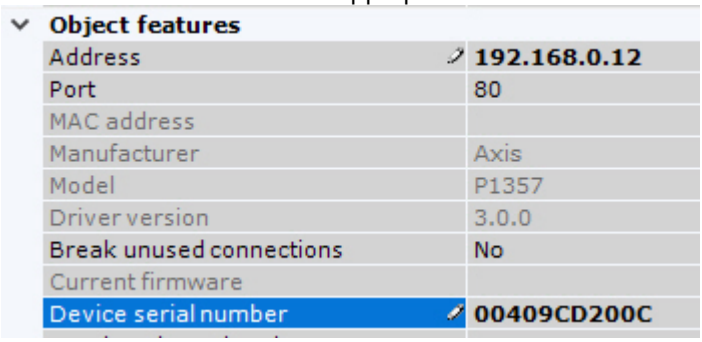
To read the serial number, you need to contact a manager of AxxonSoft.

19.2.4.2 Axis IP Devices

19.2.4.2.1 Serial number check

To check serial numbers of Axis IP devices, do the following:

1. Enter a serial number into the appropriate field.



2. Click **Apply**.
3. The device will be reconnected. Upon reconnection, the entered serial number will be checked against the real one. If numbers do not match, a separate event will be registered in the system Log.

19.2.4.2.2 Bonjour function

For Axis IP devices on which the Bonjour function is supported and enabled, changing the default value of the **Friendly name** parameter is strongly discouraged. If an arbitrary **Friendly name** value is set for an Axis IP device, a search for connected equipment in the *Axxon One* software package will give incorrect results for this IP device.

Note

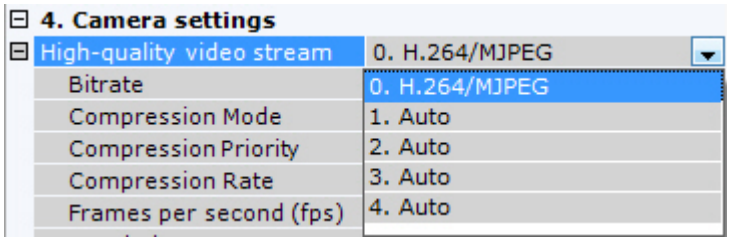
- The **Friendly name** parameter is configured through the Web interface of the IP device: Setup -> System options -> Network -> Bonjour.
- The default value of the **Friendly name** parameter is as follows: AXIS <model name> - <mac address>, where <model name> is the model of the Axis IP device and <mac address> is its MAC address (for example, AXIS 214 – 00408C7D2610).

19.2.4.2.3 Video streams

Axxon One can access the following video streams from Axis IP devices:

1. H.264/MJPEG video.
2–5. Streams matching the Quality, Balanced, Bandwidth, and Mobile profiles. These profiles are configured via the camera's Web interface.

In *Axxon One*, the Quality profile corresponds to stream **1. Auto**, Balanced is stream **2. Auto**, Bandwidth is stream **3. Auto**, and Mobile is stream **4. Auto** (see Camera(see page 171)).



19.2.4.3 CCTV Keyboards

19.2.4.3.1 General Information about CCTV Keyboards

Video surveillance control panels can be connected to *Axxon One* in two ways:

1. Connecting a panel via the Windows driver as an HID USB device. This method makes the panel immediately available for specifying hotkeys (see Assigning hot keys(see page 1055)).

   Attention!

   In HID mode, some control panel buttons may not work in *Axxon One*.

2. Connecting a panel via the *Axxon One* driver. Using this method, the panel is added to the system similarly to that of IP devices (see Searching, adding, configuring, and removing IP devices(see page 157)).

   Attention!

   To connect a control panel in this way, you need the *Axxon One* software to be installed in the **Server and Client** configuration. It's not possible to operate a board as a remote client.

Attention! After connecting, the control panel buttons should be configured in *Axxon One*.

The following control panels are supported in the current version of *Axxon One*:

	Windows driver	*Axxon One* driver
Axis T8310 (T8311, T8312, T8313)	+	+
Dahua DH-NKB1000	+	+
PELCO KBD5000	+	+
Videotec DCZ	+	+
Hikvision DS-1005KI	+	+
Hikvision DS-1100KI	-	+
Hikvision DS-1200KI	-	+
Hikvision DS-1600KI	-	+
UNIVIEW KB-1100	-	+

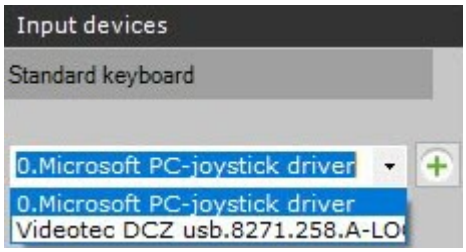
19.2.4.3.2 Axis T8310 specific configuration features

19.2.4.3.2.1 Setting up on a Server

To make a T8132 keyboard operate with Rev01 hardware, restart the *Axxon One* VMS server after you create the **IP Server** object (see Stop the server(see page 146), Starting the server(see page 137)).

19.2.4.3.2.2 Setting up on a Client

You can use the Axis T8310 control board with remote Clients through the driver embedded into the *Axxon One* software. The panel is not added to the system as an IP device, and is immediately available for assigning hotkeys.



Various models differ in connected devices[89].

T8310	All devices
T8311	Joystick only
T8311 / T8312	Joystick and keypad
T8311 / T8313	Joystick and jog dial
T8312	Keypad only

89 https://www.axis.com/products/axis-t8310-video-surveillance-control-board

T8312 / T8313	Keypad and jog dial
T8313	Jog dial only

19.2.4.3.3 Hikvision DS-1100KI specific configuration features

To work with the DS-1100KI network keyboard in *Axxon One*, power on the device and do as follows:

1. Switch the keyboard to **Server** mode.
2. Select **Third Platform Software**.
3. Enter the *Axxon One* Server's IP address and communication port number.
4. You have to use the same port to add the device to the *Axxon One* VMS.

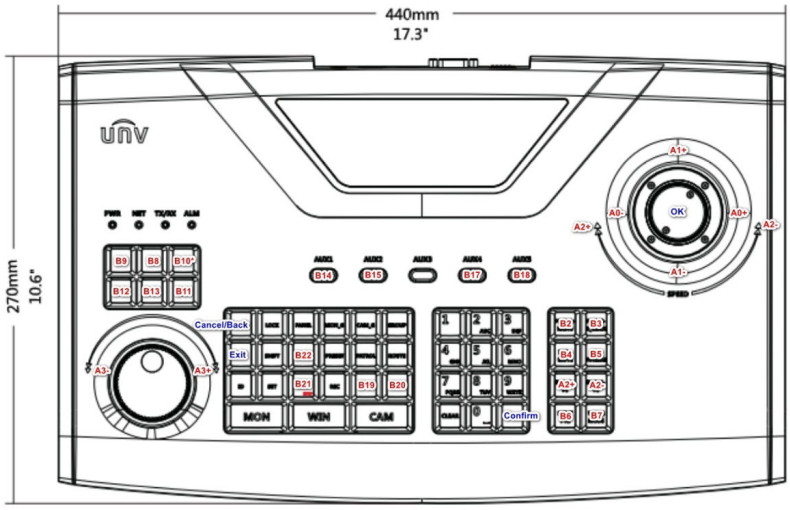
19.2.4.3.4 UNIVIEW KB-1100 specific configuration features

On page:

- General description of the UNIVIEW KB-1100 PTZ control device(see page 241)
- Configuring a remote control before adding it to Axxon One(see page 242)
- Configuring UNIVIEW KB-1100 in Axxon One(see page 242)

19.2.4.3.4.1 General description of the UNIVIEW KB-1100 PTZ control device

A schematic representation of the UNIVIEW KB-1100 PTZ control device is shown in the figure below.



The following physical controls are available on the device:

Joystick is a rotary control moving along three axes:

- Pan axis (panning: left or right deviation).
- Tilt axis (tilt: up or down deviation).
- Zoom axis (scaling: clockwise or counterclockwise deviation).

Acceleration along each of the three axes depends on the degree of deviation from the center. The movement is carried out until release. When released, the control returns to its original position.

Jog-Wheel (not integrated into the *Axxon One* software package!) is a rotary control rotating only around its axis. When released, the control returns to its original position. In the illustration it is located at the bottom left (outer ring).

Shuttle is a rotary control rotating only around its axis. Allows the intermittent movement in one of two directions. It has no initial position; when released, it remains in place. In the illustration it is located at the bottom left (inner ring).

Button is a push control element that can represent two states. Allows the call of one of two functions (the function for pressing and the function for releasing). When released, it returns to its original position (“not pressed” state).

Of all the push-button controls of the remote control, the following blocks are integrated:

- A block of playback control keys (6 keys on the left: the record button is triggered after pressing a button on the joystick).
- Block of keys for control of focus, zoom, aperture and PTZ presets (8 keys).

The following keys to manipulate the device interface are also available (not related to *Axxon One*):

- Pressing the button on the remote control joystick (OK) (equivalent to pressing the ENTER key).
- Cancel the action / return one step back in the remote control menu (equivalent to pressing the ESC key).
- Numbers / letters are entered from the numeric keyboard, the mode (upper/lower register, digits) is switched by the SHIFT key.
- Moving through the menu items and within the fields is carried out by deviating the remote control vertically / horizontally.

19.2.4.3.4.2 Configuring a remote control before adding it to Axxon One

Configure the network PTZ 4-dimensional Joystick Remote Control from Uniview (KB-1100) before you create the appropriate object in the *Axxon One* VMS. Proceed as follows:

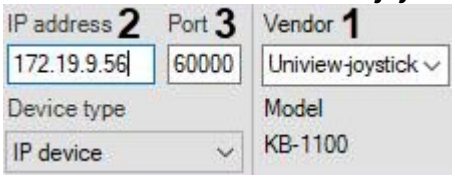
1. Switch on the control device.
2. Enter username and password in the device display. The default credentials are as follows:
    a. Login: admin.
    b. Password: 123456.
3. Configure the device network configuration. To do this, in the Local Cfg -> Net Cfg menu, set the following settings:
    a. IP address.
    b. Mask.
    c. Gateway.
4. Add the *Axxon One* Server to the internal configuration of this CCTV joystick keyboard. To do this, in the Dev Manage -> Manual Cfg -> Add Dev menu, set the following settings:
    a. ID – enter any number (range: 1-240, the number must not coincide with the ID of the remote control or other already added device).
    b. Name – enter a string (1-8 characters).
    c. DType – select VM (VideoManagementSystem, i.e. *Axxon One*).
    d. LType – select NetWork (the device is integrated for connecting to *Axxon One* via the network).
    e. After selecting LType, press the button on the joystick and enter the IP address of the *Axxon One* VMS Server and the port used (the default port is 60000).
5. Connect to *the Axxon One VMS*, added in the step above. To do this, enter the ID specified above in the FindDev -> Dev ID menu or select the found profile in the Dev Manage -> Search Dev menu.
6. If the device is found, information about it will be displayed on the device display.
7. Press on the ID field. This will onboard the remote control in the *Axxon One* VMS.

Setting up the UNIVIEW KB-1100 control device is completed.

19.2.4.3.4.3 Configuring UNIVIEW KB-1100 in Axxon One

Configure the UNIVIEW KB-1100 PTZ joystick control as follows:

1. Go to IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. In the **Vendor** list select **Uniview-joystick** (**1**).



3. In the **IP address** field, enter the IP address of the remote control (**2**).
4. In the **Port** field, enter the port number, as set in step 4 of the remote control settings configuration (**3**).
5. Click the  .
6. Enable the newly created **IP Server** and its **Channel** child object.

You have configured the UNIVIEW KB-1100 Joystick Remote Control and CCTV keyboard.

19.2.4.3.5 Hikvision DS-1200KI specific configuration features

On the page:

- Configuring the Hikvision DS-1200KI control device before adding it to Axxon One(see page 243)
- Features of the Hikvision DS-1200KI control device operation in Axxon One(see page 245)

19.2.4.3.5.1 Configuring the Hikvision DS-1200KI control device before adding it to *Axxon One*

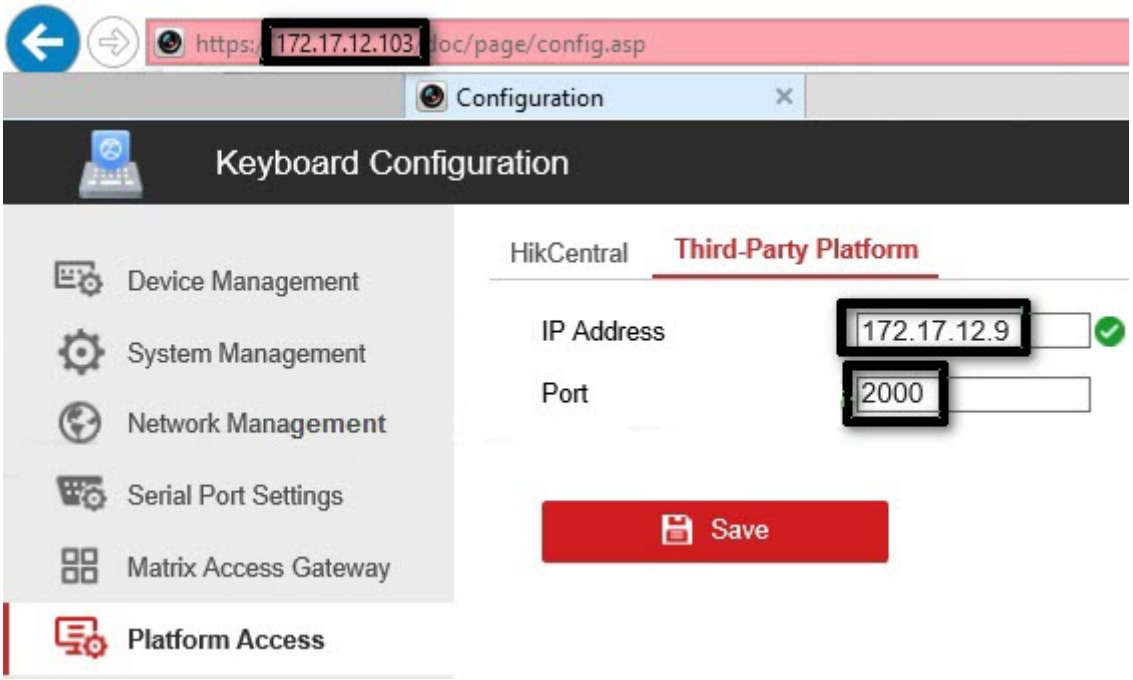
Configure the Hikvision DS-1200KI PTZ control device as follows before creating the corresponding object in *Axxon One*:

1. Set the control device address: **Select System – Network** in the device internal menu, then disable DHCP and set IP address and gateway.



2. Set the *Axxon One* server IP address and port on the device. Open the device Web interface by entering the above set IP address in the web browser, then select **Platform Access – Third-Party Platform**.

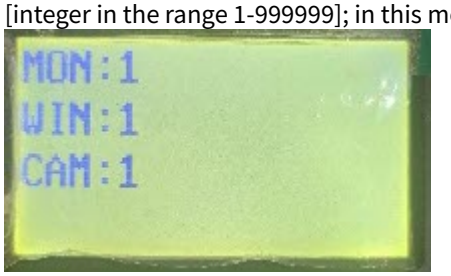
> **Note.**
>
> The Web interface is only available on https by default, so please use https prefix before the IP address.



3. Set the **8. Private VMS** mode in the device's internal interface.



4. Transfer the PTZ control device to operating mode by one of the following actions:
   a. Select any monitor MON (monitor) [integer in the range 1-9999], any camera CAM (camera) [integer in the range 0-999999]; in this mode all keys will work, including the WIN (subwindow of video wall) and MULT (layout size) keys for the monitor and camera.
   b. Select any camera CAM (camera) [integer number in the range 1-999999 (number 0 is available only when setting the monitor)]; the WIN, MULT and CAM-G keys will not work in this mode.
   c. Select any monitor MON (monitor) [integer in the range 1-9999] and any group of cameras CAM-G (camera group) [integer in the range 1-999999]; in this mode, only the MULT, OK keys and the rotations of the joystick axes will work.



> **Note.**
>
> To select these parameters, enter a number on the device keypad, then press the corresponding key (MON/WIN/CAM/CAM-G).
> If the the server IP address and/or port is not accessible from the PTZ control device, the "Connect failed" message will be displayed on the control device screen after pressing the MON/WIN/CAM/CAM-G keys.

The Hikvision DS-1200KI PTZ control device is now preconfigured.

19.2.4.3.5.2 Features of the Hikvision DS-1200KI control device operation in *Axxon One*

When the MULT, PRESET, PATROL, or PATTERN keys are pressed on the device, the following actions are performed:

- when entering a number in the range 1-99 and pressing MULT for each number, *Axxon One* receives a message about pressing the corresponding separate key with a number in the range 23-121 (B22-B120);
- when pressing PresetRec for the first time, *Axxon One* receives a message about pressing key 13 (B12), and the device displays **Record started**;
- after pressing PresetRec for the second time, *Axxon One* receives a message about pressing key 12 (B11), and **Record ended** appears on the device display;
- when entering a number in the range 1-65535 and pressing PresetRec, *Axxon One* receives a message about pressing key 22 (B21), and the device displays **PRESET:**;
- when entering a number in the range 1-65535 and pressing Patrol, *Axxon One* receives a message about pressing key 17 (B16), and the device displays **PATROL:**;
- when entering a number in the range 1-65535 and pressing PatternPlay, *Axxon One* receives a message about pressing key 18 (B17), and the device displays **PATTERN:**;
- when entering a number in the range 65536-999999 and press any of the PresetRec/Patrol/PatternPlay buttons, nothing happens: such numbers are not processed.

19.2.4.3.6 Dahua DH-NKB1000 specific configuration features

19.2.4.3.6.1 Keyboard operating modes

To work correctly with *Axxon One*, the keyboard must be recognized by Windows OS as the KEYBOARD 1000 game device.

If the keyboard is recognized as an HID device, hold down the Shift key on the device to toggle its operating mode.

19.2.4.3.6.2 Specific OS settings

If Windows Device Manager recognizes the keyboard as BETTER_USB_HS, the device will not work.

In this case, roll back the device driver. For correct operation, Windows Device Manager has to recognize the keyboard as a HID-compatible game controller.

19.2.4.3.6.3 Specific *Axxon One* settings

Axxon One can recognize a Dahua DH-NKB1000 keyboard as a Hikvision-joystick DS-1005KI due to their shared device ID.

For correct operation, the keyboard has to be recognized as Dahua DH-NKB1000.

The Pattern button will not work in *Axxon One*.

19.2.4.4 CH VM-Desktop USB multifunction controller

For the controller to work properly in *Axxon One*, the controller must be connected before the *Axxon One* Client is started.

> **Note**
>
> To learn about connecting the device, consult the manufacturer's official documentation.

Controller keys cannot be remapped.

Use of the CH VM-Desktop USB multifunction controller in *Axxon One* is described in the corresponding section (see page 1428).

19.2.4.5 Configuring Vivotek Panoramic PTZ

Vivotek Panoramic PTZ is a technology for linking a fisheye camera to a PTZ camera.

This Vivotek technology allows simultaneously maintaining full situational awareness in the field of view of a fisheye camera, while maintaining the ability to carefully monitor a specific area in depth by using a PTZ unit.

Vivotek Panoramic PTZ is supported by the fisheye cameras Vivotek SF8172 and Vivotek SF 8172V and by the PTZ camera Vivotek SD8362E.

To use this technology in *Axxon One*:

1. Install and configure the cameras in accordance with the official Vivotek documentation[90].
2. Add the cameras to an *Axxon One* configuration.

Vivotek Panoramic PTZ support in *Axxon One* is implemented via the Areazoom (see Control using Areazoom(see page 1174)) and Point&Click functions (see Control using Point&Click(see page 1174)).

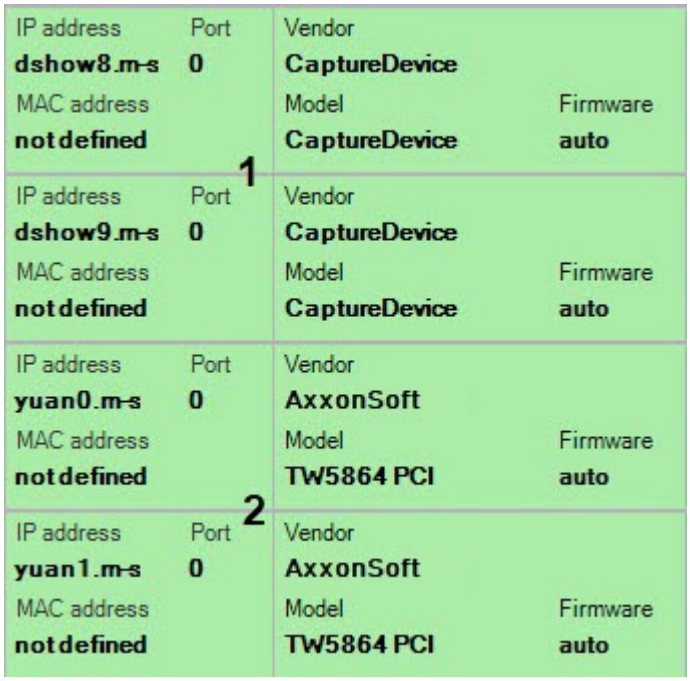
19.2.4.6 Video capture cards

Axxon One supports 3 PCIe and one USB video capture cards:

1. PCIe:
   a. Yuan SC300Q16.
   b. Yuan SC3C0N8.[91]
   c. Yuan WS216.
2. USB: Yuan PD652[92].

19.2.4.6.1 WS-216 video capture cards

In *Axxon One*, each WS-216 video capture card corresponds to two devices: manufacturer **AxxonSoft**, model **TW5864 PCI** (driver **Yuan**, **2**) and manufacturer **CaptureDevice**, model **CaptureDevice** (driver **DShow**, **1**).



Note

If you have a WS-216 card added through the Yuan driver, in Windows Server OS you must activate: Desktop Experience Feature[93].

Cameras connected to *Axxon One* through the WS-216 card require the following configuration: add **AxxonSoft TW5864 PCI** device configuration (**2**) and set the checkbox **Send settings to device** (see Camera(see page 171)).

Note

90 http://www.vivotek.com/panoramic%20ptz/
91 https://www.yuan.com.tw/products/capture/analog/sc3c0n8_l.htm
92 https://www.yuan.com.tw/products/capture/external/pd652.htm
93 https://technet.microsoft.com/en-us/library/dd759187(v=ws.11).aspx

Axxon One does not support receiving uncompressed video from WS-216 video capture cards.
For video cameras that are connected through WS-216 video capture cards, you can choose one of the two codecs for a video stream:
1. H.264 (configurable).
2. H.264 (minimum resolution, non-configurable).

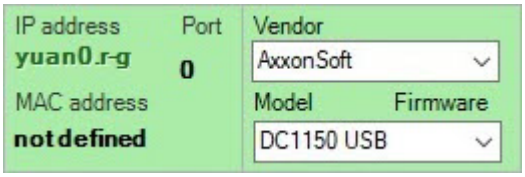
19.2.4.6.2 YUAN PD652 cards

To work with the YUAN PD652 cards in *Axxon One*, do as follows:

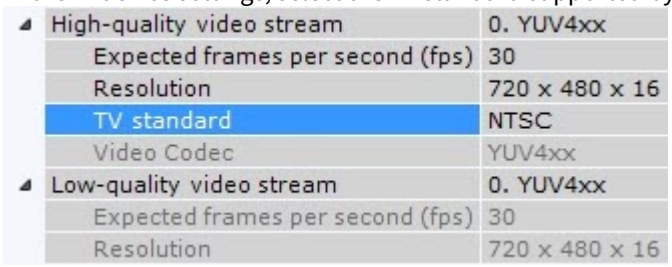
Attention!

Please see the list of supported OS for the YUAN PD652 board on the official website of the[94] manufacturer.

1. Disable the system check for the digital signature of the drivers and install the card driver[95].
2. Connect the camera to the card.
3. Create an IP device in *Axxon One*. The search result shows the camera connected through the YUAN PD652 card as follows.



4. In the IP device settings, select the TV standard supported by your camera.



19.2.4.7 Joysticks

Only joysticks that are detected in Windows as gaming input devices can be used in *Axxon One* for controlling PTZ cameras.

Information on how to view the status for a connected joystick is available in official Microsoft documentation[96].

Note

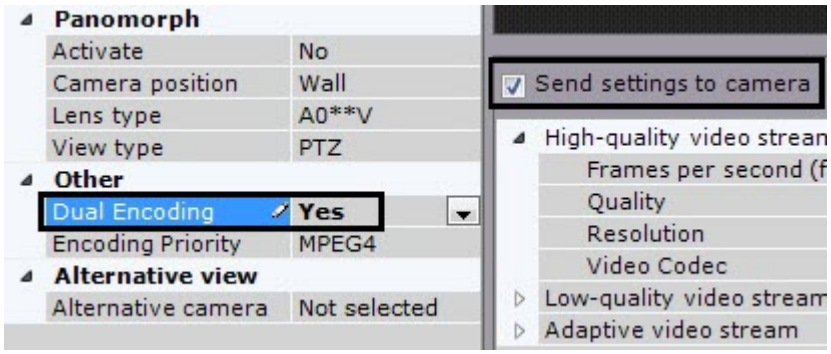
We recommend that you calibrate the joystick before you start working with *Axxon One*.

19.2.4.8 Sony IP Devices

Some Sony models support encoding of the video signal in two formats simultaneously. To use this option, you must perform the following steps:

1. Set the **Send settings to camera** checkbox.
2. From the **Dual Encoding** list, select the codec which will take priority when dual encoding.

94 http://www.yuan.com.tw/products/capture/external/pd652.htm
95 http://www.yuan.com.tw/download.htm
96 http://support.microsoft.com/kb/831361/en-us

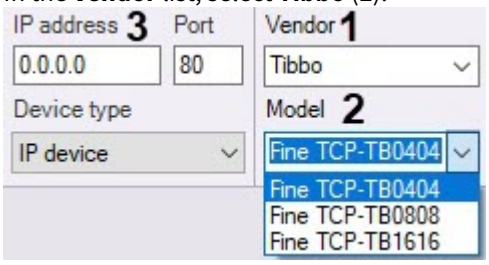


19.2.4.9 Setting up Tibbo relay/loop boards

Tibbo relay/loop boards allow monitoring air temperature and humidity on your premises.

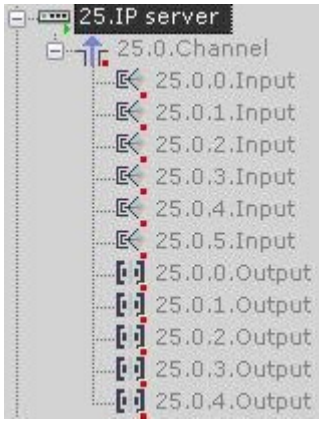
To add a board to the configuration, do the following:

1. Go to IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. In the **Vendor** list, select **Tibbo** (**1**).



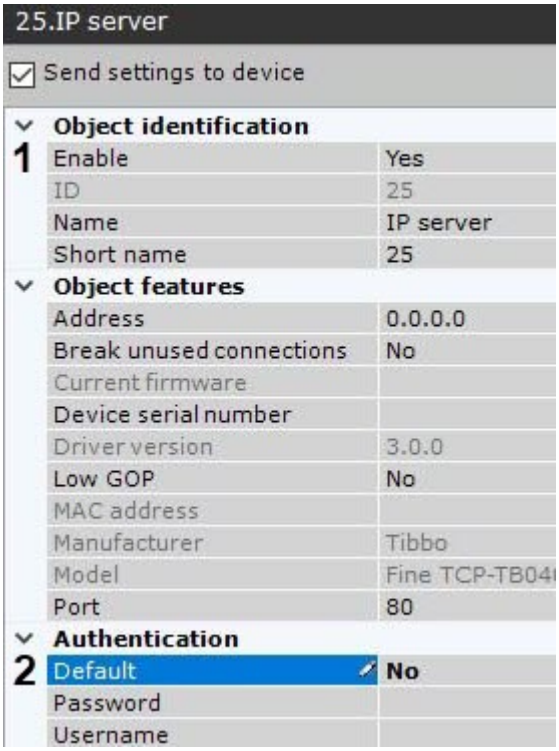
3. Select your board from the **Model** list (**2**).
4. Enter the IP address of the board (**3**).
5. Click the  button.

The parent **IP Server** object, and **Channel**, **Input** and child objects under it will be added.

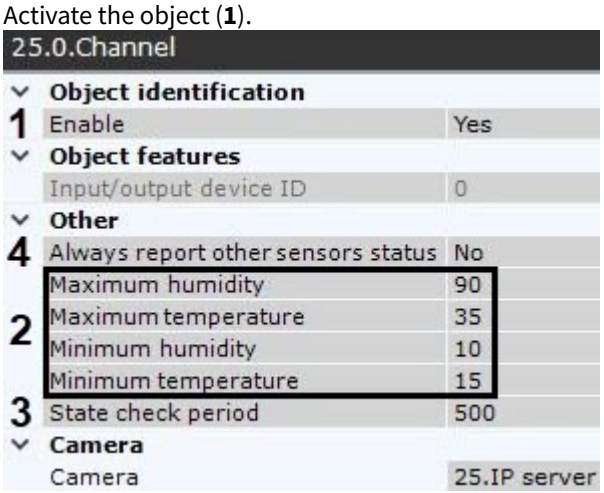


To configure the board, do the following:

1. Select the **IP Server**.



2. Activate the object (**1**).
3. In the **Authentication** parameter group, set **Default** to **No** (**2**).
4. Select a **Channel** object.
5. Activate the object (**1**).



6. Set permissible ranges for temperature (in centigrade) and relative humidity (in per cent) (**2**). If a reading falls out of the range, the corresponding Input (sensor) generates an event.
7. Set the check period in milliseconds (**3**).
8. If you need to report sensors statuses when readings are within the range, set **Yes** for **Always report other sensors status** (**4**). In this case, the following records will appear in the log file in specified intervals of time (see step 7):

```
Special humidity ray#16 changed status to: false ,Sensor value: 16,8 Correct range [15, 58]
. Time: …..
Special temperature ray#17 changed status to: false ,Sensor value: 29,8 Correct range [20,
60]. Time: …..
```

9. Click the **Apply** button.

Now, the board is configured. Current temperature/humidity value will be displayed next to input icon on the Map (see Displaying device status(see page 1304)).

19.2.4.10 SL USBIO board

On this page:

- General information(see page 250)
- Adding the board to Axxon One in Windows OS(see page 250)
- Adding the board to Axxon One in Linux OS(see page 251)

- Devices(see page 151)
- Searching, adding, configuring, and removing IP devices(see page 157)

19.2.4.10.1 General information

The **SL USBIO board** is an interface device designed for integrating external sensors and actuators (relays) into video surveillance and fire alarm systems. The 4x4 and 16x8 boards are supported.

Key technical specifications:

- Galvanic isolation: 1000 V for inputs/outputs.
- Connection interface: USB 2.0 (cable length up to 5 meters).
- Polling interval of alarm inputs: 250 ms for all contacts (not configurable).
- Power supply: USB port or external power supply (9-50 V, 500 mA).
- Additional features: Real-time clock and offline ROM for event logging.

19.2.4.10.2 Adding the board to *Axxon One* in Windows OS

In Windows OS, you can add the board to the *Axxon One* configuration in one of the following ways:

1. Using automatic device search (see Searching, adding, configuring, and removing IP devices(see page 157)). Do the following:
   a. In the *Axxon One* client, go to the Devices(see page 151) tab → **Add device**.
   b. In the **Add device** section:
      i. Click the **Search** button. *Axxon One* performs the search, and all available devices, including **SL USBIO** boards, are displayed in the **Devices found (n)** list.
      ii. Select the found **SL USBIO** board.
      iii. Click the  button.
2. Manually. Do the following:
   a. Open the Windows **Device Manager**.
   b. Go to the **USB Controllers** tab.
   c. Find the **Stream Labs USB-IO 16|8OWDint** device. If it isn't listed, you must check the physical connection of the board to the computer (make sure that the board is inserted into the computer's motherboard and recognized by the system).

Attention!

If the board isn't displayed in the device manager, you must install the driver manually. To do this, you must download the archive and select the folder with the x64 driver or the w2k folder in the device manager if you use the 32 bit Windows OS (Windows 2000, Windows XP).

d. Right-click the device.
e. Select **Properties** → **Details** → **Hardware IDs**.
f. Find the **VID/PID** values.
g. Run the WinObj[97] utility.
h. Open the **GLOBAL??** folder.
i. Find the string with the required USB device by the **PID** value.
   You will receive two types of USB address, any of which can be used to connect the board to *Axxon One*, for example:
   - \\?\USB#VID_13C0&PID_0070#5&521a615&0&10#{a5dcbf10-6530-11d2-901f-00c04fb951ed}
   - \\.\GLOBALROOT\Device\USBPDO-1
j. In the *Axxon One* client, go to the Devices(see page 151) tab → **Add device**.
k. In the **Add device manually** section:
   i. In the **IP address** parameter, enter one of the received USB addresses.
   ii. In the **Device type** parameter, select **IP device** from the drop-down list.
   iii. In the **Vendor** parameter, select **StreamLabs** from the drop-down list.
   iv. In the **Model** parameter, select **USBIO-16/8** from the drop-down list.
   v. Click the  button.

The board is added to the *Axxon One* configuration in Windows OS. The current state of the relay on the board is automatically displayed in the relay switch layout.

19.2.4.10.3 Adding the board to *Axxon One* in Linux OS

To add the board to the *Axxon One* configuration in Linux OS, do the following:

1. Create the **/sl_usb_io** directory.

```
sudo mkdir -p /sl_usb_io
```

2. Go to the **/sl_usb_io** directory.

```
cd /sl_usb_io
```

3. Download the StreamLabs USB-IO.rar archive.
4. Unzip the archive to the **/sl_usb_io** folder.
5. Clear previous builds and compile the driver:

```
sudo make clean
sudo make
```

6. Open an additional console window in any directory. This window will be used for the monitoring of the driver debug messages.
7. Run the monitoring of system messages.

```
sudo dmesg -C
sudo dmesg -w
```

8. Upload the driver into the kernel.

```
sudo insmod /sl_usb_io/sl_usb_io.ko
```

   Immediately after the driver is launched, messages about the registration of a new driver appear in the monitoring window. For example:

97 https://learn.microsoft.com/en-us/sysinternals/downloads/winobj

```
usbcore: registered new interface driver sl_usb_io_driver
```

9. Stop the driver.

```
sudo rmmod sl_usb_io
```

10. Configure automatic upload at system startup. Build the kernel module.

```
sudo make -f Makefile
```

The **sl_usb_io.ko** kernel module appears in the folder. You can upload and stop it manually, but we recommend using the **install_driver-1.sh** script.

11. Place **install_driver-1.sh** in the same directory with **sl_usb_io.ko**.
12. Set up automatic installation using the script.

```
sudo sh install_driver.sh
```

13. Reboot the system.
14. Set access permissions using **udev**:
    a. Create a rule file.

```
sudo touch /etc/udev/rules.d/50-slusbio.rules
```

    b. Edit the file.

```
sudo nano /etc/udev/rules.d/50-slusbio.rules
```

    c. Add the following text to the file:

```
SUBSYSTEM=="usbmisc", KERNEL=="sl_usb_io[0-9]", RUN+="/usr/bin/chmod a+rw
$env{DEVNAME}"
```

    d. Reload the **udev** rules.

```
sudo udevadm control --reload-rules
sudo udevadm trigger
```

    All **/dev/sl_usb_io*** devices will be granted read and write permissions for all users. ***** is the serial number of the device. To automate the creation of the **udev** rule, you can run the set_sl_rule.zip script with superuser permissions:

```
sudo ./set_sl_rule.sh
```

15. Reboot the system.

```
sudo reboot
```

16. Check device detection.

```
ls /dev/sl_usb_io*
```

Expected result:

```
/dev/sl_usb_io0
```

> **Note**
>
> - **sl_usb_io0** is the first connected device.
> - **sl_usb_io1** is the second connected device, and so on.
> - When only one device is connected, **sl_usb_io0** is always used.

17. Launch the *Axxon One* client.
18. In the *Axxon One* client, go to the Devices(see page 151) tab → **Add device**.
19. In the **Add device manually** section:
    a. In the **IP address** parameter, enter the path to the descriptor in the form **/dev/sl_usb_io***, where ***** is the index of the connected device.
    b. In the **Device type** parameter, select **IP device** from the drop-down list.
    c. In the **Vendor** parameter, select **StreamLabs** from the drop-down list.
    d. In the **Model** parameter, select **USBIO-16/8** from the drop-down list.
    e. Click the  button.

The board is added to the *Axxon One* configuration in Linux OS. The current state of the relay on the board is automatically displayed in the relay switch layout.

Problem diagnostics:

- Check uploaded kernel modules:

```
lsmod | grep sl_usb_io
```

- View system messages:

```
dmesg | grep sl_usb_io
```

- Check access permissions:

```
ls -la /dev/sl_usb_io0
```

19.2.5 Features for tracking moving objects

19.2.5.1 Tag&Track Lite

On the page:

- General Information about Tag&Track Lite(see page 254)
- System configuration for Tag&Track Lite(see page 254)
- Using Tag&Track Lite in the live mode(see page 255)
- Using Tag&Track Lite in the archive mode(see page 255)
- Joint operation of Tag&Track Lite and Tag&Track Pro(see page 255)

- PTZ(see page 220)
- Tag&Track Pro(see page 255)

19.2.5.1.1 General Information about Tag&Track Lite

Tag&Track Lite is a predictive video surveillance feature designed to automatically track an object as it moves between cameras' fields of view. The system calculates in real time the camera most likely to see the tracked object. This is done by analyzing the object's tracking data and a map containing all the necessary cameras, their fields of view, and intersections. This feature allows for continuous monitoring of the object's movement without manually searching by time or camera. The feature is compatible with all types of surveillance cameras, except fisheye cameras.

Attention!

- You cannot use fisheye cameras with the **Tag&Track Lite** feature.
- Before using this feature, you must configure cameras and map.
- The **appearance** of an object in the camera's field of view **isn't guaranteed**.

19.2.5.1.2 System configuration for Tag&Track Lite

To use **Tag&Track Lite**, do the following:

1. Arrange cameras so that their fields of view are directed downwards onto the surface (floor, ground) on which objects are moving. This ensures stable and accurate tracking.
2. For each of these cameras, configure the detector: Object tracker(see page 414), Neural tracker(see page 402), Human tracker VL(see page 425), or Motion detector(see page 446). You cannot use other detectors. The operation of this feature requires metadata (see Metadata database(see page 333)).

   Attention!

   - For **Tag&Track Lite** to work on the basis of the Motion detector(see page 446), in the **Object tracking** parameter of the detector, select the **Yes** value (see Configuring the Motion detector(see page 447)).
   - For **Tag&Track Lite** to work in the archive mode (see Using Tag&Track Lite in the archive mode(see page 255)), in the **Record objects tracking** parameter of the detector, select the **Yes** value (see Configuring the Object tracker(see page 415), Configuring the Neural tracker(see page 405), Configuring the Human tracker VL(see page 437), Configuring the Motion detector(see page 447)).

3. Enable Object tracking(see page 1148) in the surveillance window of each selected camera on the layout.
4. Place all necessary cameras on the map (see Adding video cameras(see page 985)).
5. Specify the exact location of each camera on the map (see Configuring a camera in standard map viewing mode(see page 989)). Configure the intersection areas of the fields of view for all adjacent cameras. Intersection areas are essential for tracking objects. The size of an intersection area must be at least three times the size of a typical tracked object (for example, a person).

6. Configure Immersion mode(see page 1299) for each camera (see Configuring cameras in immersion mode(see page 991)). You must specify four connections and match the points in the video image (for example, the four corners of an intersection) with their exact locations on the map. This is a key step for the feature to work.

19.2.5.1.3 Using Tag&Track Lite in the live mode

To track objects using **Tag&Track Lite** on a layout in the live mode (see Live video surveillance(see page 1159)), do the following:

1. Left-click to select the object of interest on the layout in the surveillance window. The object is outlined with a white frame. As soon as the object leaves the current camera's field of view, the system automatically:
   a. Calculates the next possible camera based on tracking data and camera mapping.
   b. Separates out the camera containing the object on the layout to attract the operator's attention. If this camera isn't present on the current layout, the system automatically displays a layout containing it.
2. To continue automatic tracking, select the same object in the new camera's field of view again. The cycle repeats.

19.2.5.1.4 Using Tag&Track Lite in the archive mode

To track objects using **Tag&Track Lite** in the archive mode (see Video surveillance in the Archive mode(see page 1187)), do the following:

1. Left-click to select the object of interest in the archive. The system:
   a. Determines the camera in the field of view of which the object could move.
   b. Automatically switches the video stream to the archive of that camera.
   c. Automatically starts playback from the calculated time when the selected object could appear in that camera's field of view.

19.2.5.1.5 Joint operation of Tag&Track Lite and Tag&Track Pro

In some situations, **Tag&Track Pro** (see Tag&Track Pro(see page 255)) and **Tag&Track Lite** can run simultaneously.

For example:

- You set **Tag&Track Pro** to **Manual** mode or **User priority** mode in the **Priority** parameter (see PTZ(see page 220));
- You select an object for **Tag&Track Lite** in the field of view of a camera that is added as an overview camera for **Tag&Track Pro** (see PTZ(see page 220)).

In this case, both **Tag&Track Pro** and **Tag&Track Lite** are enabled, and the following occurs simultaneously:

- PTZ camera tracks an object;
- the system calculates the camera in the field of view of which the selected object can appear.

19.2.5.2 Tag&Track Pro

On the page:

- General Information about Tag&Track Pro(see page 256)
- System configuration for Tag&Track(see page 256)
- Using Tag&Track Pro(see page 256)
- Joint operation of Tag&Track Lite and Tag&Track Pro(see page 257)

- PTZ(see page 220)

- Tag&Track Lite(see page 253)

19.2.5.2.1 General Information about Tag&Track Pro

Tag&Track Pro is a feature for automatic tracking of moving objects using a PTZ camera based on tracking data received from static overview cameras. The system uses one or more overview cameras to detect and track objects. Based on the object's coordinates calculated by the overview camera, the system determines the target and automatically directs the PTZ camera for detailed tracking. The PTZ camera is positioned so that the tracked object is always centered in the frame.

This feature requires the combined use of at least one overview camera and one PTZ camera. An unlimited number of overview cameras can be connected to a single PTZ camera.

Attention!

- For the **Tag&Track Pro** feature to work, the PTZ camera in *Axxon One* must support absolute positioning (telemetry using absolute coordinates). For the current list of compatible devices, see Documentation Drivers Pack[98].
- If the PTZ camera doesn't have embedded support for absolute telemetry, you must enable it via the ONVIF protocol, which must also support absolute coordinates. Please contact the device manufacturer for information on ONVIF support for this functionality.
- You cannot use fisheye cameras with the **Tag&Track Pro** feature.
- You cannot use **Tag&Track Pro** and **OnScreen PTZ** mode simultaneously (see Controlling a PTZ camera in the OnScreen PTZ mode(see page 1173)).

19.2.5.2.2 System configuration for Tag&Track

To use **Tag&Track Pro**, do the following:

1. Arrange cameras so that their fields of view are directed downwards onto the surface (floor, ground) on which objects are moving. This ensures stable and accurate tracking.
2. Direct the overview and PTZ cameras that you use in the same direction and position them close to each other. If you position the cameras too far apart from each other, it can lead to different interpretations of the scene and failures in the algorithm operation.
3. For all objects from the overview camera, the corresponding pan coordinates (rotation of the camera left and right without change in its position) must be in the range from 0° to 180° or from -180° to 0°.
4. For each of these cameras, configure the detector: Object tracker(see page 414), Neural tracker(see page 402), Human tracker VL(see page 425), or Motion detector(see page 446). You cannot use other detectors. The operation of this feature requires metadata (see Metadata database(see page 333)).

   Attention!

   For **Tag&Track Pro** to work on the basis of the Motion detector(see page 446), in the **Object tracking** parameter of the detector, select the **Yes** value (see Configuring the Motion detector(see page 447)).

5. Enable Object tracking(see page 1148) in the surveillance window of each selected camera on the layout.
6. Connect overview cameras to the PTZ camera and configure calibration (see PTZ(see page 220)).
7. Select the control mode of the PTZ camera in the **Priority** parameter and, if necessary, set the duration of the camera focus on one object in the **Switch Frequency** parameter (see PTZ(see page 220)).

19.2.5.2.3 Using Tag&Track Pro

You can use **Tag&Track Pro** depending on the control mode of the PTZ camera that you select in the **Priority** parameter (see PTZ(see page 220)).

98 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack

19.2.5.2.4 Joint operation of Tag&Track Lite and Tag&Track Pro

In some situations, **Tag&Track Pro** and **Tag&Track Lite** (see Tag&Track Lite(see page 253)) can run simultaneously.

For example:

- You set **Tag&Track Pro** to **Manual** mode or **User priority** mode in the **Priority** parameter (see PTZ(see page 220));
- You select an object for **Tag&Track Lite** in the field of view of a camera that is added as an overview camera for **Tag&Track Pro** (see PTZ(see page 220)).

In this case, both **Tag&Track Pro** and **Tag&Track Lite** are enabled, and the following occurs simultaneously:

- PTZ camera tracks an object;
- the system calculates the camera in the field of view of which the selected object can appear.

19.2.6 Receiving events from external systems

Axxon One synchronizes the information from cash registers with the video from cameras pointed at the register area, allowing you to monitor the process. In addition, *Axxon One* operators can receive events from any *Axxon PSIM* objects in real time and correlate the received information with the video. The event sources can be e.g.:

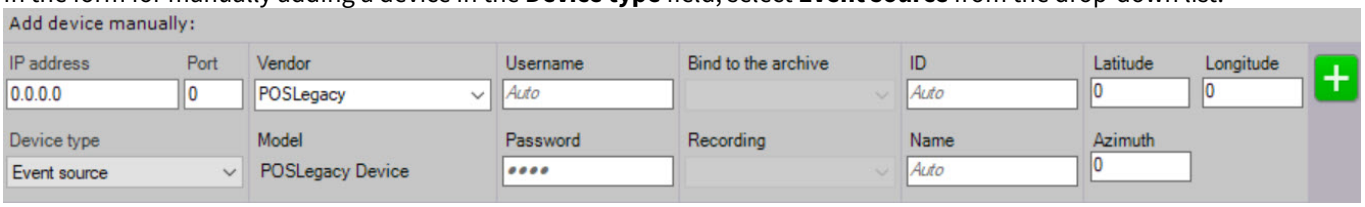
- Access control systems
- Security and fire alarm systems
- Perimeter security system

In *Axxon One*, information from external sources is superimposed on video from a selected camera.

19.2.6.1 Event source object

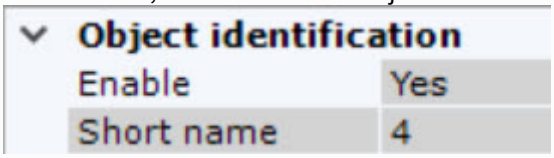
Axxon One uses the **Event source** object to get events from external systems. To create the object, do the following:

1. Go to the IP Device Discovery Wizard on the **Devices** tab (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. In the form for manually adding a device in the **Device type** field, select **Event source** from the drop-down list.



3. In the **Vendor** field, select the required manufacturer of the device from the drop-down list.
4. Click the  button.

The **Event source** object is added to the system.

> **Note**
>
> Once created, the **Event source** object is enabled by default. To disable it, set the **No** value in the **Enable** parameter.
>
> 
>

19.2.6.2 Configuring POS devices

Axxon One can obtain data from POS devices and offers the following capabilities:

1. Show titles in live and archive video (see Viewing titles from POS terminals(see page 1157)).
2. Search by titles in archive (see Search by titles(see page 1226)).

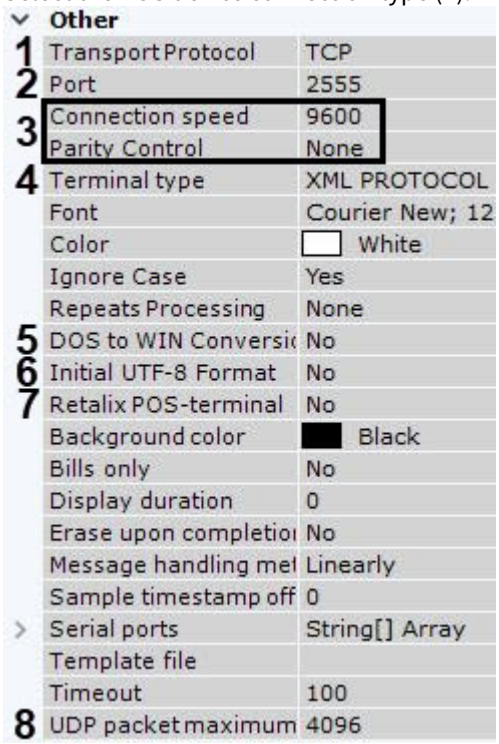
19.2.6.2.1 Connecting POS device

Attention!

- We recommend using the **PosXml** driver for proper operation. If necessary, you can use the **MixForward** utility with the corresponding plugin to integrate the existing POS systems.
- If you don't use **PosXml**, the event source operation in Linux OS as well as the use of *Axxon One* reports is unavailable.

To configure the POS device, do the following:

1. Create the **Event source** object; the manufacturer is **POSLegasy** (see Event source object(see page 257)).
2. Select the **Event source** object in the hardware tree on the **Hardware** tab.
3. Select the POS device connection type (**1**).



4. Set the POS device connection port (**2**).
5. To connect via the RS-232 interface, select the post speed and parity control (**3**).
6. Select the type of the used POS device (**4**).
7. Select **Yes** in the **DOS to WIN Conversion** field if the data from the POS device is DOS-encoded (**5**).
8. If the data is UTF-8 encoded from the POS device, select **Yes** in the **Initial UTF-8 Format** field to enable the correct display of captions (**6**).
9. If you use the Retalix POS-terminal, select **Yes** in the corresponding field (**7**).
10. Set the maximum size of the UDP packages in bytes (**8**). The packages whose size is greater than the set one are ignored.
11. Click the **Apply** button.

Connecting the POS device is complete.

19.2.6.2.2 Configuring titles overlay

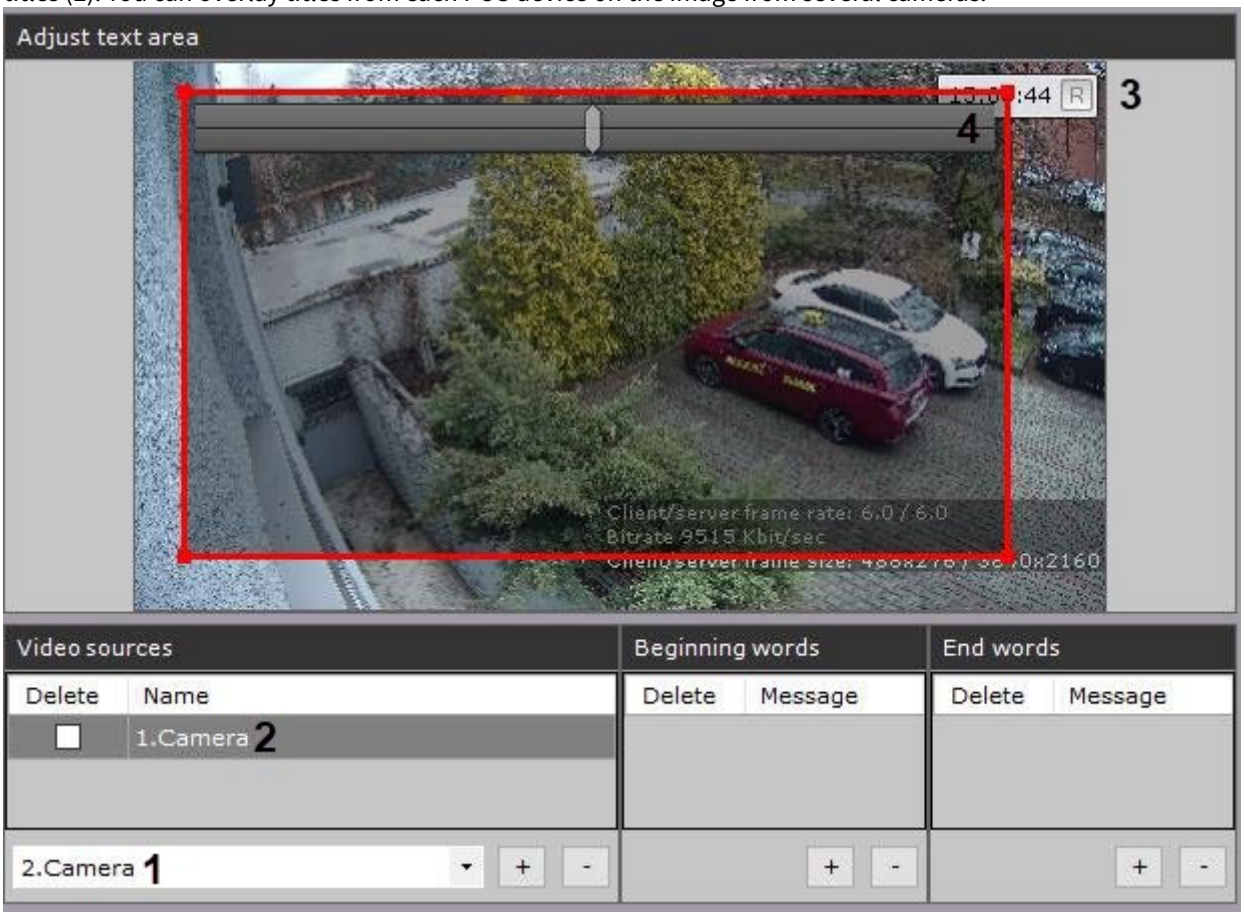
The titles overlay setting is to configure the area of titles display and set the font characteristics. Titles are overlaid in the rectangular area on the video.

Attention!

- If a camera and the event source are on different servers, you must ensure time synchronization between them. The allowable time difference is no more than 5 seconds. If you don't follow this recommendation, it can lead to delays in the display of titles.
- If a camera and the event source are on different servers, the search by titles is unavailable. In this case we recommend using the **MixForward** utility with the corresponding plugin. This utility transmits titles from one server to another. Also add the event sources and link them to the corresponding cameras on the server where these cameras are located.

To configure the titles overlay, do the following:

1. In the **Video sources** group, select from the list and add (the **+** button) the camera on whose image you want to overlay titles (**1**). You can overlay titles from each POS device on the image from several cameras.

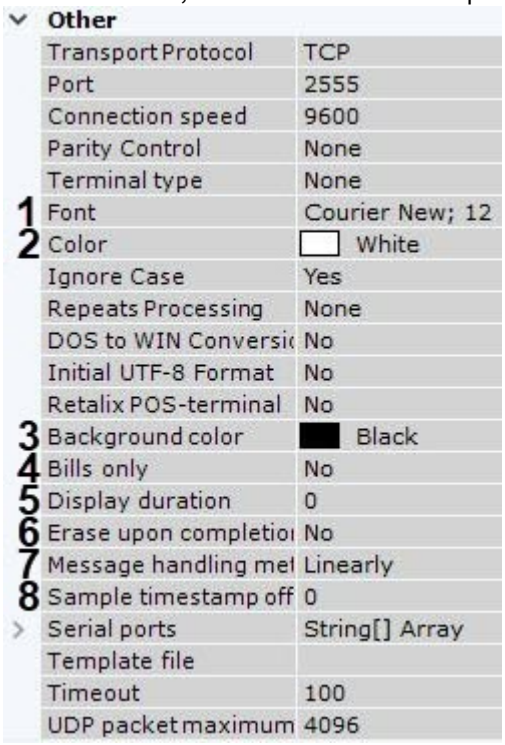


> **Note**
>
> To disable the titles overlay on the image from any camera, you must set the **Delete** checkbox that corresponds to it and click the − button.

2. Select a camera in the **Video sources** group (**2**). The **Adjust text area** group displays the video of the given camera and the adjustable titles overlay area (**3**).
3. You can configure the titles overlay area. You can change the area by moving its borders and anchor points. To move it, use Drag-and-drop[99] method.
4. Set the transparency of the titles overlay area (**4**). The far left position corresponds to the maximum transparency; the far right to the minimum one.

99 https://en.wikipedia.org/wiki/Drag-and-drop

5. In the **Font** field, click the ... button and specify the font settings in the standard Windows window (**1**).



6. Select the font color in the corresponding field (**2**).
7. Select the caption overlay font color in the surveillance window (**3**).
8. Select **Yes** for the **Bills only** parameter (**4**) if you want to display only the lines that are within the receipt between the start and end words (see Configuring receipt beginning/end(see page 260)).
9. In the **Display duration** field, set the time in seconds for displaying the accumulated group of rows on the screen (**5**). If you set the **0** value, information is constantly displayed on the screen. New events replace old ones as they are received.

   > **Note**
   >
   > For shops with low event intensity, we recommend setting the display duration to no more than 10 seconds.

10. Select **Yes** for the **Erase upon completion** parameter (**6**) if you don't want to display the lines that are within the receipt after the end words (see Configuring receipt beginning/end(see page 260)).
11. Select the method of processing the incoming data (**7**):
    a. **PROCESS_LINEARLY**—incoming data is stored in the buffer until the end of the line is received, and only after that is the data transmitted to *Axxon One*.
    b. **PROCESS_EVENT**—each message is immediately transmitted to *Axxon One*.

    > **Note**
    >
    > The **PROCESS_JSON** method isn't available in the current version of *Axxon One.*

12. By default, titles/captions are written to the database without the time offset. If necessary, you can set the offset in seconds in the **Sample timestamp offset** field (**8**) in the range [-5; 5].
13. Click the **Apply** button.

Configuring the titles overlay is complete.

19.2.6.2.3 Configuring receipt beginning/end

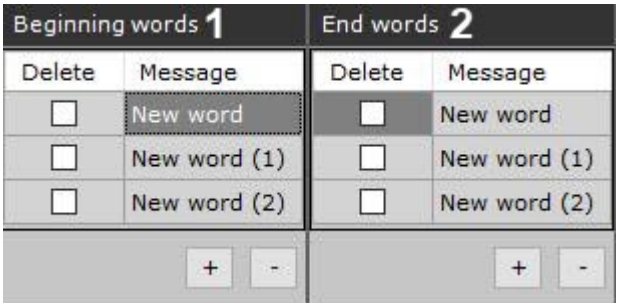
The database stores only a full receipt. A receipt starts and ends with the configured phrases. If not configured, receipts contain 2000 lines. In this case, search will not work until the receipt is saved into the database (see Search by titles(see page 1226)).

> **Attention!**

It is strongly recommended that you configure this setting for shops with low-intensity events at the checkout. Otherwise, the accumulation of 2000 lines can take a long time.

To configure the beginning and the end of a receipt, do as follows:

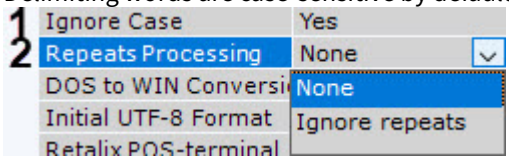
1. Populate the **Beginning words** (**1**) group. To add words, click the **+** button. To remove words, set their **Delete** checkboxes and click the − button.



2. Populate the **End words** (**2**) group in the same manner.

> **Note**
>
> You can add any number of delimiting words. Double click a word to edit it.

3. Delimiting words are case-sensitive by default. To ignore the case, select **Yes** in the corresponding field (**1**).



4. Select how to treat repetitions (**2**).
   a. Select **Ignore repeats** to skip repeating beginning words before the end words show up. When the end words show up, the next receipt starts with the beginning words.
   b. Select **None** to skip the end words and delimit receipts by the beginning words only.
5. Click the **Apply** button.

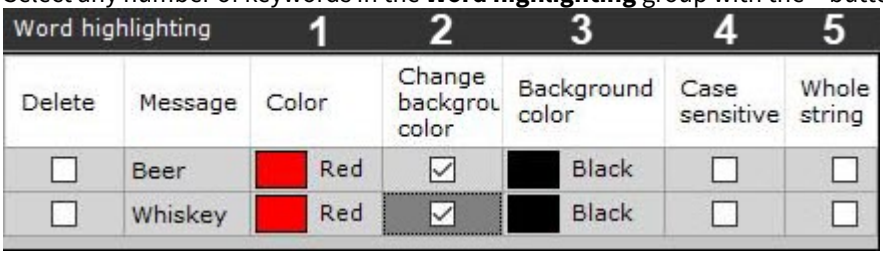
You have configured how receipts are delimited.

19.2.6.2.4 Configuring keywords

Keywords can be highlighted in the titles.

To configure keywords, do as follows:

1. Select any number of keywords in the **Word highlighting** group with the **+** button. Double click a keyword to edit it.



> **Note**
>
> To remove words, set their **Delete** checkboxes and click the − button.

2. You can also configure these parameters:
   a. Highlighting color (**1**). In the appropriate column, click the button and choose a color.
   b. If you want to change the color of the background of the titles output in the camera window, set the corresponding checkbox (**2**) and select the required color (**3**) when this word appears.

c. Set the **Case sensitive** checkbox if you want (**4**).
d. To highlight the whole line, set the **Whole string** checkbox (**5**).

3. Click the **Apply** button.

You have configured highlighting for keywords.

19.2.6.2.5 Importing parcers

A special parsing algorithm processes the receipts and adds data to the receipts database. This is an option for advanced settings.

The choice of parcers depends on POS data structure:

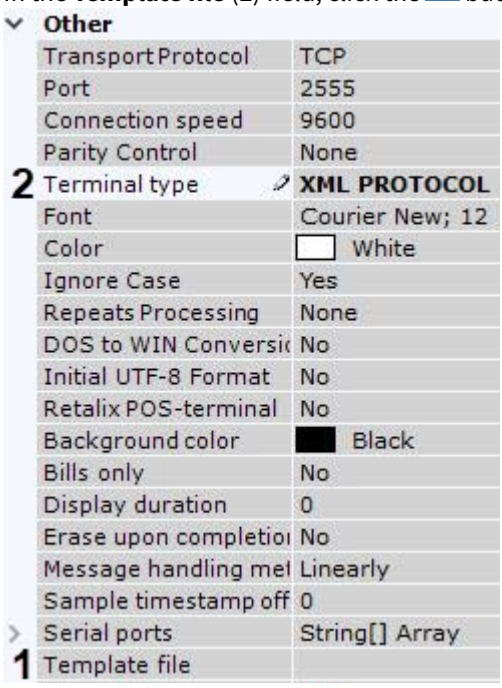
1. XML parcer for .txt files;
2. POS parcer for .prl files.

The XML parser specifies the rules for adding data to the receipts database if you have XML data from a POS terminal. The XML parser also validates the XML data against a schema.

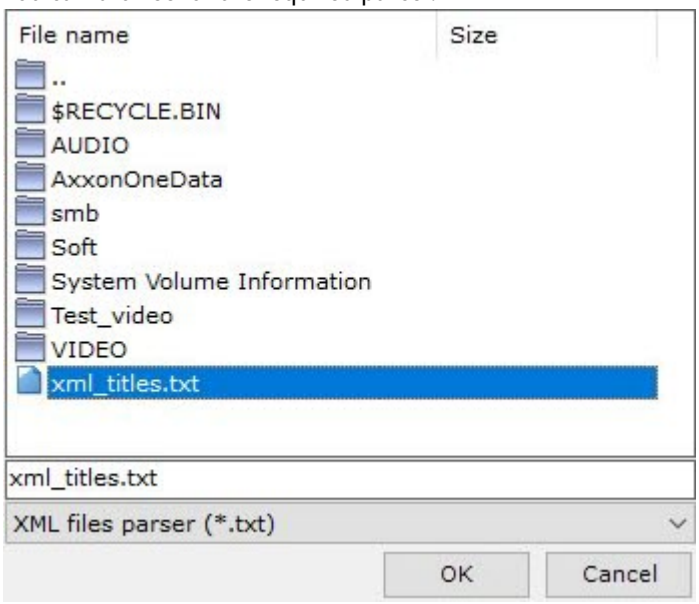
The POS parser specifies the rules for adding data to the receipts database if the data is from a POS terminal is other than XML. The parser depends on the POS terminal data structure.

To import a parcer, do as follows:

1. In the **Template file** (**1**) field, click the button.



You can browse for the required parcer.



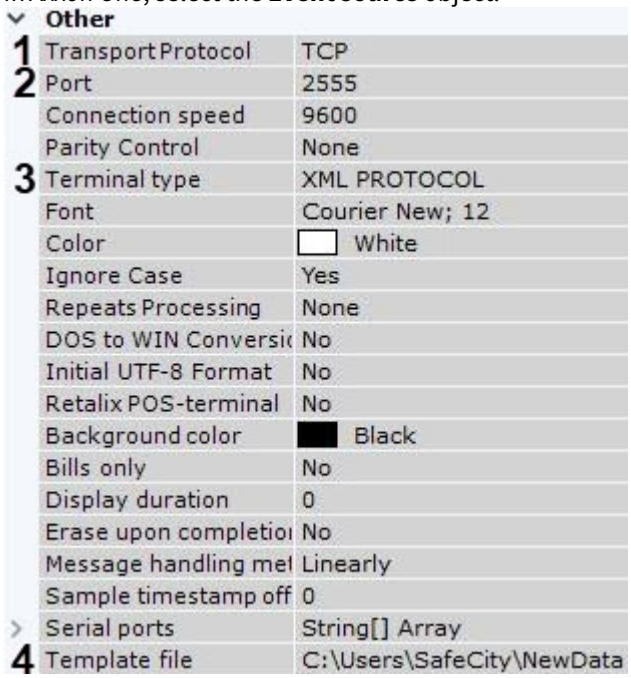
2. Select the type of the parser and the file.
3. If you use an XML parser, select **XML PROTOCOL** in the **Terminal type** field (**2**).
4. Click the **Apply** button.

You have imported the parcer.

19.2.6.3 Receiving Axxon PSIM events

To be able to receive *Axxon PSIM* events, do as follows:

1. On the *Axxon PSIM* machine, configure a data transfer module.
2. In *Axxon One*, select the **Event source** object.



3. Select **TCP** in the **Transport Protocol** field (**1**).
4. Specify the connection port to *Axxon PSIM* (**2**).
5. Select **XML PROTOCOL** in the **Terminal type** field (**3**).

6. Select a preconfigured parser (**4**, see Configuring parser[100]).
7. Configure the data output similar to that of the POS device (see Configuring titles overlay(see page 258)).
8. Configure keywords, if necessary (see Configuring keywords(see page 261)).
9. Click the **Apply** button.

If the setup procedure was done correctly, the events from specified objects will be displayed in the Surveillance window in *Axxon PSIM* in the same way as POS device captions do (see Viewing titles from POS terminals(see page 1157)).

19.2.6.4 Configuring receiving events from CommaxComplexServer

CommaxComplexServer events can be forwarded to *Axxon One* in two formats:

1. In JSON format using the **Event source** (see Configuring Commax Complex Server via Event Source(see page 264)).
2. As events from virtual inputs. This creates a virtual IP Server in the VMS (see Configuring Commax Complex Server via virtual IP server(see page 264)).

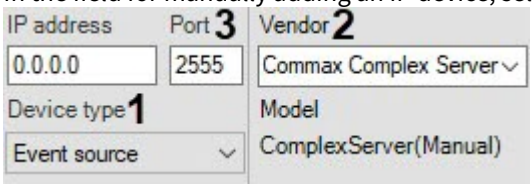
> **Note**
>
> CommaxComplexServer is smart apartment complex management software. It receives input from gates, doors, elevator call buttons, etc.

Configure CommaxComplexServer before connecting to *Axxon One*.

19.2.6.4.1 Configuring Commax Complex Server via Event Source

Connect Commax Complex Server via **Event Source** as follows:

1. Run IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).
2. In the field for manually adding an IP device, select **Event Source** in the **Device Type** drop-down list (**1**).



3. In the **Vendor** list select **Commax Complex Server** (**2**).
4. Enter the destination port name for Commax Complex Server events (**3**).
5. Click the button  .
   The **Event Source** object is added to the system.

The Commax Complex Server connection is now configured.

> **Note**
>
> You can present information as caption (titles) superimposed on video in the Camera window. See POS configuration instructions for that (see Configuring POS devices(see page 257)).

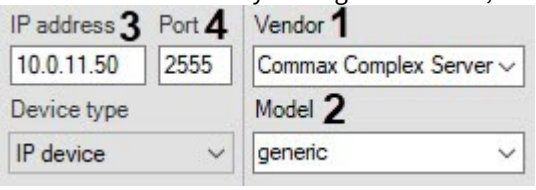
19.2.6.4.2 Configuring Commax Complex Server via virtual IP server

Connect to Commax Complex Server via virtual IP server as follows:

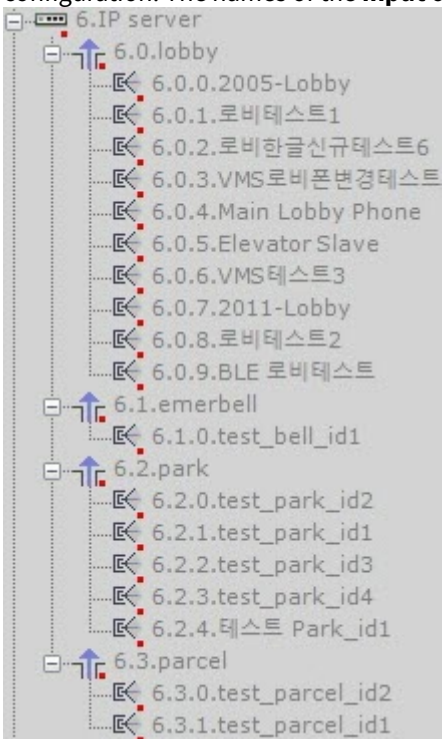
1. Run IP Device Discovery Wizard (see Searching, adding, configuring, and removing IP devices(see page 157)).

100 https://docs.axxonsoft.com/confluence/spaces/posPSIM100en/pages/235448456/Configuring+parser+in+the+POS+PSIM+software

2. In the field for manually adding an IP device, select **Commax Complex Server** in the **Vendor** drop-down list (**1**).



3. Select **generic** in the **Model** list (**2**).
4. Enter the IP address of the Commax Complex Server (**3**).
5. Enter the destination port name for Commax Complex Server events (**4**).
6. Click the button  .
   The parent **IP Server** object and **Channel** and **Input** objects under it are added according to Commax Complex Server configuration. The names of the **Input** objects in the VMS and Commax Complex Server are the same.

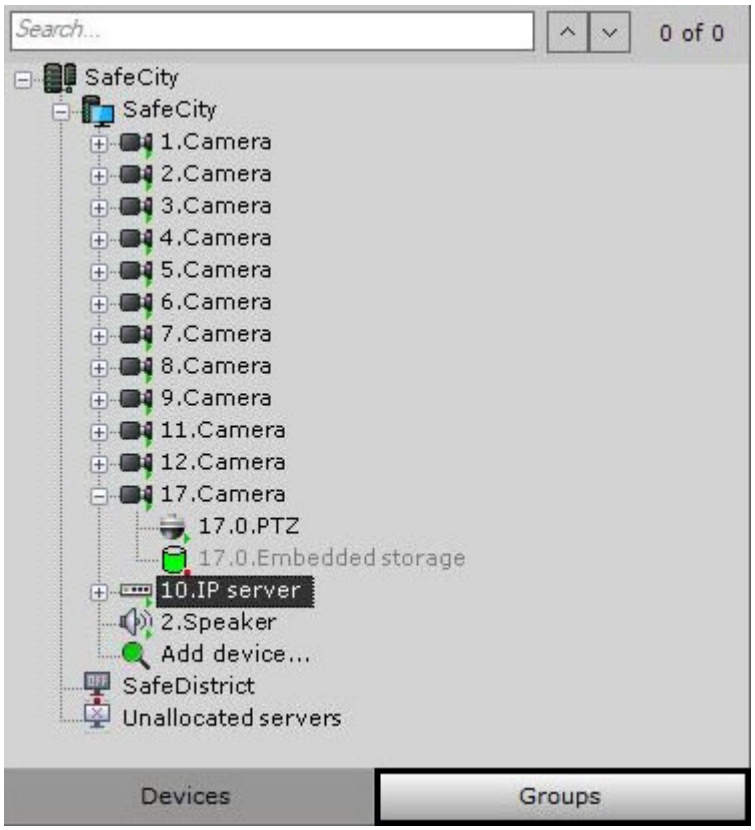


The Commax Complex Server connection is now configured.

19.2.7 Configuring video camera groups

Manual grouping of video cameras is designed to configure group access rights and quickly select the required video camera for display.

Video camera groups are configured through the interface using the **Devices** tab (under **Settings**). To configure device groups, you must have the appropriate permissions to configure devices.



19.2.7.1 Procedure for configuring video camera groups

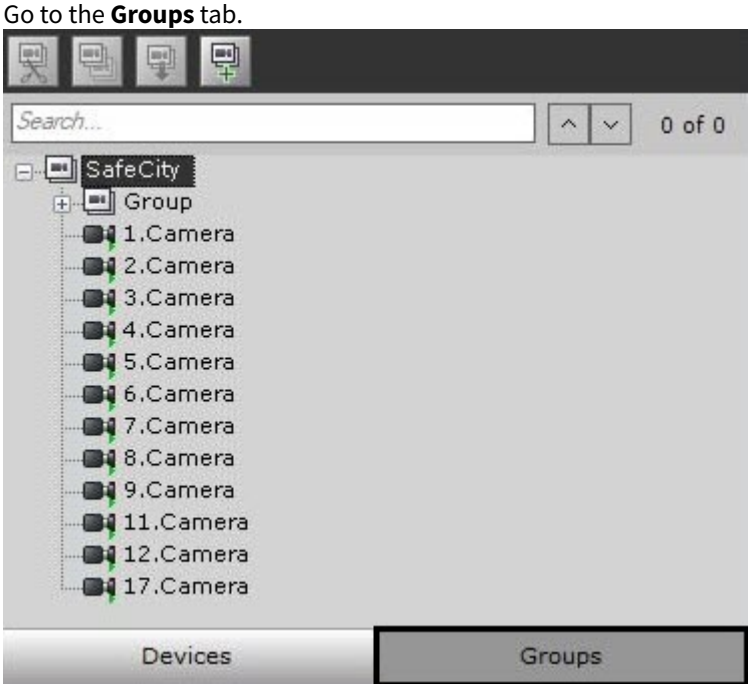
Camera groups are configured in the following sequence:

1. Create **Group** objects.
2. Add video cameras created in the system to the **Group** objects.
3. Create a system of groups and subgroups.

19.2.7.2 Creating a Group object

To create a **Group** object, complete the following steps:

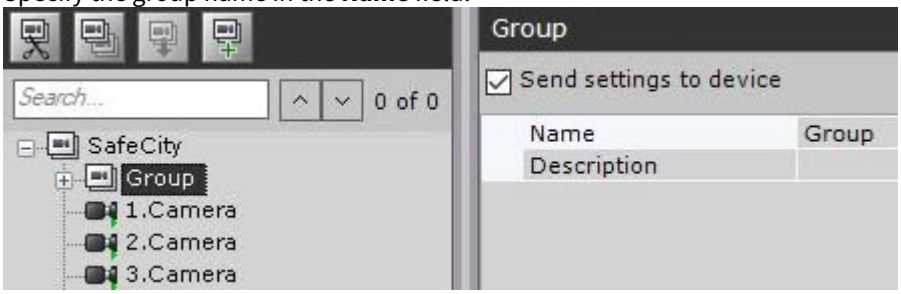
1. Go to the **Groups** tab.



2. To create a **Group** object, click the  button or select **Add group** in the context menu of the main group.

> **Note**
>
> By default, an object (whose name is the same as the Axxon-domain) is available, including all cameras that have been created in the system. This object is referred to here and elsewhere in the document as the "main group". This object cannot be deleted. Cameras in this group cannot be deleted.

3. Specify the group name in the **Name** field.



4. Enter a description of the group in the appropriate field.
5. Click the **Apply** button.

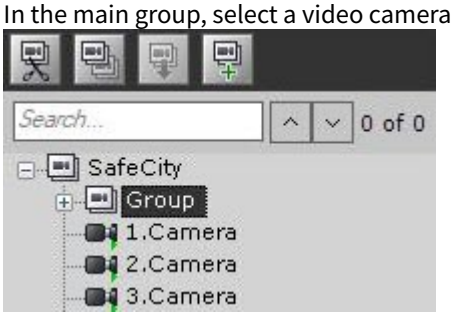
The **Group** object has now been created.

19.2.7.3 Adding video cameras created in the system to Group objects

To add video cameras to groups, complete the following steps:

> **Note**
>
> Video cameras are added to groups via management operations (see the section titled Managing Group and Video camera objects(see page 268)). The standard method for adding video cameras to groups is presented below.

1. In the main group, select a video camera to add to the selected group.



2. Click the  button or select **Copy** from the context menu of the selected video camera.
3. Select the **Group** object to which you need to add the video camera.
4. Click the  button or select **Paste** from the context menu of the selected group.
5. Fill the groups with the necessary video cameras (see steps 1-4).

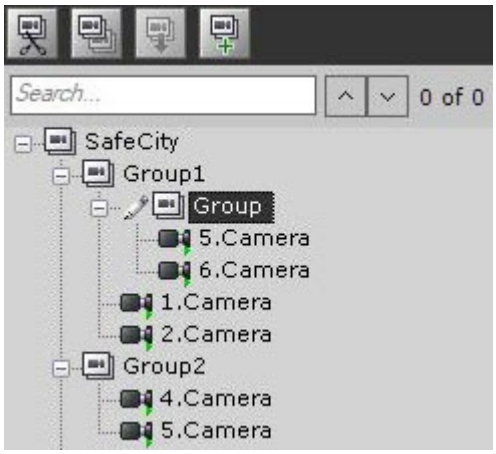
> **Note**
>
> One video camera can be assigned to multiple groups.

6. Click the **Apply** button.

Adding video cameras to groups is now complete.

19.2.7.4 Creating a system of groups and subgroups

Groups can be included within other groups, forming a system of groups and subgroups.

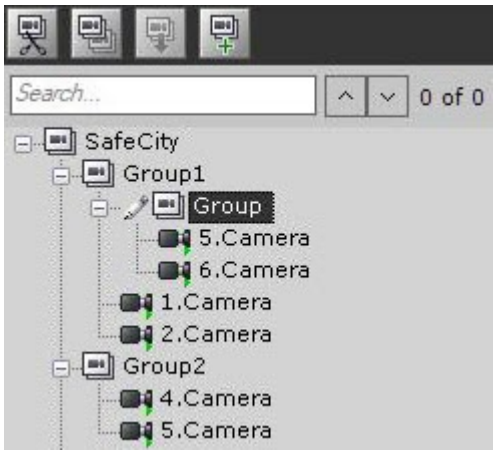


A system of groups and subgroups can be created via group management operations and video camera management operations (see the section titled Managing Group and Video camera objects(see page 268)).

Group objects can be moved or copied to other **Group** objects or to the main group.

19.2.7.5 Managing Group and Video camera objects

The main operations used to manage groups and video cameras are presented in table.



Action	Execution
Cut/Paste **Note** You can cut a **Video camera** object only from a **Group** object. You cannot cut a **Camera** object from the main group. It is also impossible to cut the main group.	**Using your mouse:** 1. Left-click and hold the **Video camera/Group** object. 2. Drag the object to the **Group** object (or to the main group if you are dragging a **Group** object). 3. Release the left mouse button.
	Using the toolbar: 1. Left-click the **Video camera/Group** object that you want to move. 2. On the toolbar, click  . 3. Left-click the **Group** object (or the main group, if one of the **Group** objects is being moved) to which you want to move the **Video camera/Group** object. 4. On the toolbar, click  .
	Using the keyboard: 1. Left-click the **Video camera/Group** object that you want to move. 2. Press the key combination **Ctrl+**X. 3. Left-click the **Group** object (or the main group, if one of the **Group** objects is being moved) to which you want to move the **Video camera/Group** object. 4. Press the key combination **Ctrl+V**.
Copy/Paste	**Using your mouse:** 1. Left-click and hold the **Video camera/Group** object while simultaneously holding down the **Ctrl** key. 2. Drag the selected object to the **Group** object (or to the main group, if the **Group** object is being copied). 3. Release the left mouse button.

Action	Execution
	Using the toolbar: 1. Left-click the **Video camera/Group** object that you want to copy. 2. On the toolbar, click  . 3. Left-click the **Group** object (or the main group, if one of the **Group** objects is being copied) to which you want to copy the **Video camera/Group** object. 4. On the toolbar, click  .
	Using the keyboard: 1. Left-click the **Video camera/Group** object that you want to copy. 2. Press the key combination **Ctrl+C**. 3. Left-click the **Group** object (or the main group, if one of the **Group** objects is being copied) to which you want to copy the **Video camera/Group** object. 4. Press the key combination **Ctrl+V**.
Deletion **Note** You can delete a **Video camera** object only from a **Group** object. You cannot delete a **Camera** object from the main group.	1. Left-click the **Video camera/Group** object that you want to delete. 2. Press the **Delete** key.

19.2.8 Automatic copying of data from local Servers to a centralized Server

In *Axxon One*, it is possible to automatically copy archives (video, audio, alarms) and camera events from local Servers that are not combined into a single Axxon-domain with a centralized Server.

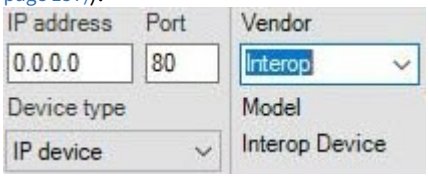
Note

This feature is useful, for example, in the following case:

- The video from a bus on the route network is recorded to a temporary archive on the local Server specific for each bus.
- When the bus arrives at the depot, the archive and camera events are automatically transferred to the centralized server.

To use this option, configure the centralized Server as follows:

1. Manually add the **Interop** IP device to the configuration (see Searching, adding, configuring, and removing IP devices(see page 157)).



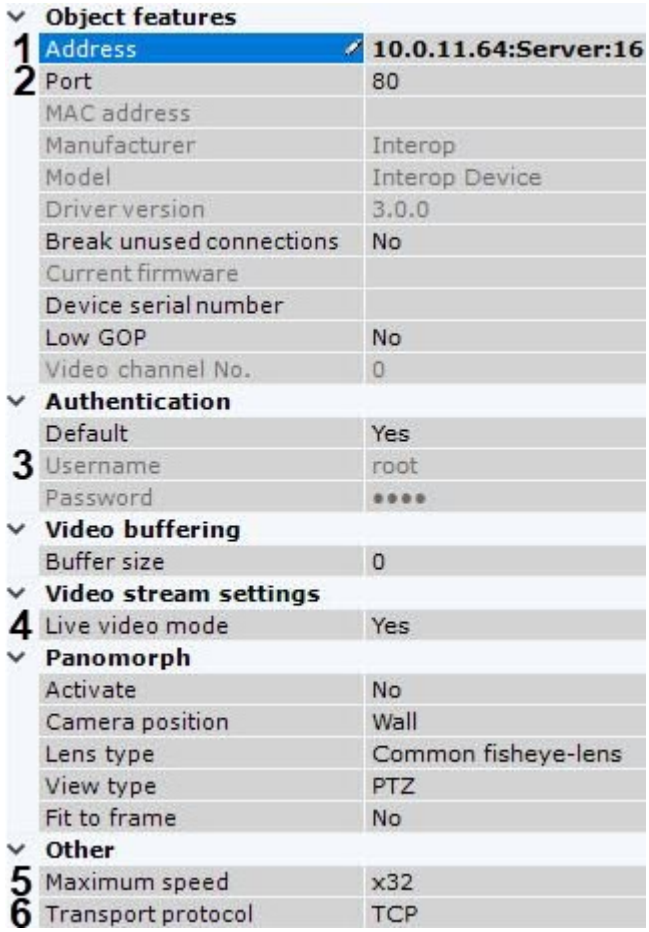
2. Enable the Embedded storage(see page 234) object.

Note

It is recommended to synchronize the time of the local Server with the time of the centralized Server.

3. To receive sound from video cameras, configure the Microphone(see page 219) object.
4. Specify the address of the device in the following format (**1**): <IP-address of local Server>:<name of local Server in Axxon-domain>:<ID of camera on Server>.

> **Attention!**
>
> The Server name is case-sensitive.
> If the Server name is Server1, then if you enter server1 or SERVER1 there will be no connection.



5. Specify a port of the local Server from which data is transmitted (**2**). If you use TCP protocol (see step 9), specify the RTSP port number (554 by default, see Configuring the RTSP server(see page 167)). If you use rtspoverhttp or rtspoverhttps protocol, specify the Web server's port (80 by default, Configuring the Web-Server(see page 165)).
6. Specify the user name and password (**3**). The user must have permissions to access the local server.
7. If you want to display live video from the local server when it is available, select **Yes** in the corresponding field (**4**).
8. Specify the maximum playback speed (**5**).
9. Select the data transfer protocol (**6**).
10. Click the **Apply** button.
11. Repeat the previous steps to add and configure all the necessary video cameras from all local Servers.
12. Configure automatic replication from the embedded storages of the added devices to the centralized server archive (see Configuring data replication(see page 298)).

> **Attention!**
>
> With a high network load, there can be gaps in the centralized server archive.

Automatic data copying from the local servers to the centralized server is configured.

19.3 Archive

19.3.1 General information about server archives

19.3.2 Creating archives

- Creating a local archive(see page 276)
  - General information about SolidStore file system(see page 279)
- Creating a remote archive(see page 280)
- Creating a cloud archive(see page 284)
  - General information about a cloud archive(see page 286)
  - Configuring an archive volume based on the Microsoft Azure solution(see page 286)
  - Configuring an archive volume based on the Amazon solution(see page 287)
  - Configuring an archive volume based on the Seagate Lyve Cloud solution(see page 289)
  - Configuring an archive volume based on the Wasabi solution(see page 290)
  - Configuring an archive volume based on the MinIO solution(see page 291)
- General information about the Round-robin algorithm(see page 293)
- Creating an archive based on existing archive volumes(see page 293)

19.3.3 Editing archives

19.3.4 Configuring archives

- Configuring recording to an archive(see page 295)
- Configuring the default archive(see page 297)
- Configuring a write limit on an archive volume(see page 297)
- Configuring access restrictions to an archive(see page 298)
- Configuring data replication(see page 298)
- Encrypting a volume of an object archive(see page 300)
- Extending the space of an archive volume(see page 302)
- Saving an archive when replacing a video signal device(see page 302)
- Protecting video recordings from FIFO overwriting(see page 303)
  - Configuring a macro to automatically copy protected videos(see page 303)
  - Configuring video protection(see page 304)

19.3.5 Statuses of archive volumes

19.3.6 Removing archive volumes

19.3.7 Removing archives

19.3.8 General information about server archives

On the page:

- General information(see page 273)

- General algorithm for configuring an archive(see page 275)
- Requirements for disk space arrangement(see page 275)
- Error creating new archives even when license restriction on total capacity is observed(see page 276)

19.3.8.1 General information

You can create and configure archives on the **Archive** tab. To create archives, you must have appropriate permissions (see Roles(see page 920)). You can create an unlimited number of archives on the basis of one server.

When you select the **Server** object on the **Archive** tab, the following information is displayed:

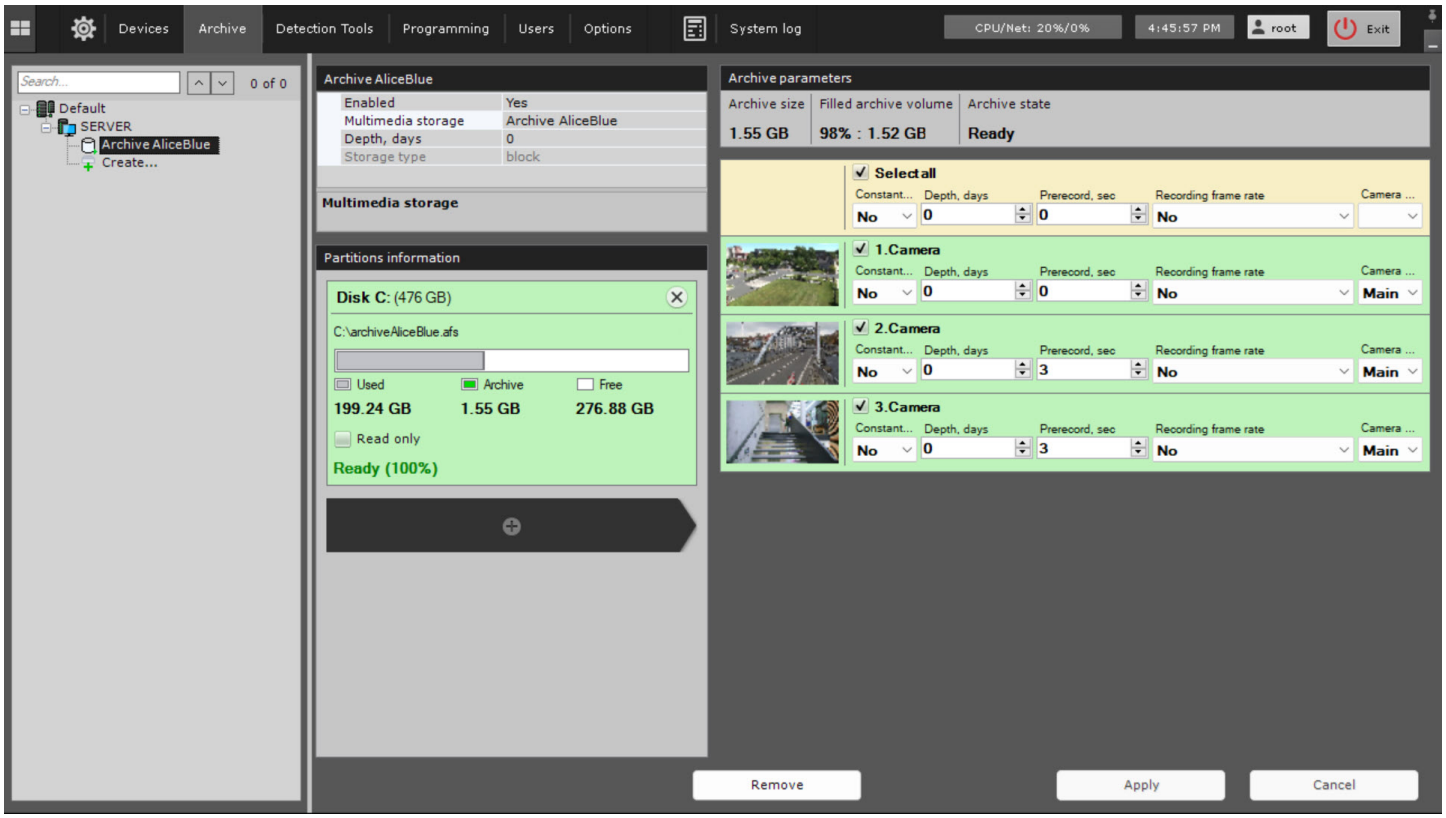
Section	Field	Description
Server archives allocation	**Archives GB**	Displays the percentage of used space of created archive volumes
	Disks size GB	Displays the total amount of disk space in the system, including both used and free space on all available disks
	Available GB	Displays the amount of free space on a disk
Partitions information	**Disk**	The section displays: • a list of available disks, • a total used disks space, • a total free disks space, • a total size of each disk, • used disk space, • free disk space
Default archives	**Camera**	Specifies the archiving settings for the cameras in the system. The section specifies which cameras are used by default to create archives, and sets the parameters for storing and managing the data received from these cameras

Note

You can calculate the percentage of space occupied by archives from the free space on disks using the formula: **A**/(**A**+**D**)*100%=**P**%,
where:

- **A** is the total volume of all created archives,
- **D** is the amount of free space on a disk,
- **P** is the percentage of space occupied by archives from the free space on disks.

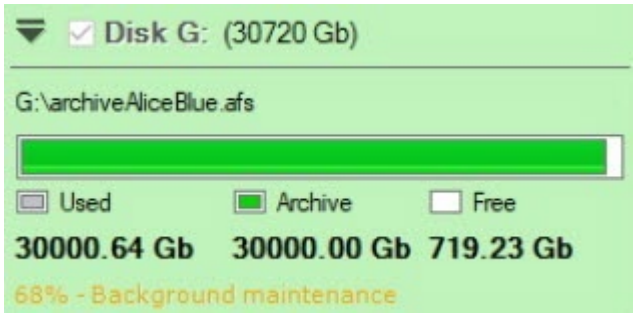
When you select the **Archive** object, the following information is displayed:



1. The **Partitions information** section displays the percentage of the filled archive volume. This parameter allows you to track the moment when the volume overwriting starts. If the volume is 100% full, it means that the new data is written over the old data (see Statuses of archive volumes(see page 306)).
2. The **Filled archive volume** field in the **Archive parameters** section displays the approximate volume of filling of the entire archive in percent and gigabytes.

In some cases (after you update *Axxon One*, after you restart the server, after you create an archive based on the existing volume, and so on), the archive is re-indexed (see Statuses of archive volumes(see page 306)).

The progress of reindexing is displayed in the archive panel:



19.3.8.2 Types of archives and their features

You can store an archive on the following disks:

Type of archive	Features of archive storage	Restrictions on archive volumes	Configuration features
Local(see page 276)	Archive can be stored on several logical disks of the server	On one logical disk for one archive, you can create only one archive volume, which occupies either a file of a set size or the entire partition (logical disk)	• Archive can contain several volumes that can be in the form of a file or a partition. • Archive can either have a block or object storage type
Remote(see page 280)	Archive can be stored in several remote storages	Archive can be stored only as a file of a specified size	Archive can either have a block or object storage type
Cloud(see page 284)	Archive can be stored in one cloud storage	Archive can contain several volumes of unlimited size. You can change the size of the archive without restarting ngp	You can create an archive based on the following solutions (see General information about a cloud archive(see page 286)): 1. Amazon S3. 2. Microsoft Azure. 3. Wasabi. 4. Huawei Cloud. 5. Seagate Lyve Cloud. 6. MinIO. AxxonSoft tested the RELEASE.2021-08-05T22-01-19Z version

19.3.8.3 General algorithm for configuring an archive

To configure an archive, do the following:

1. Create an archive (see Creating archives(see page 276)).
2. Configure recording of camera streams to an archive (see Configuring recording to an archive(see page 295)).
3. Configure data replication, if necessary (see Configuring data replication(see page 298)). Data from a local, remote, or cloud archive can be copied to other local, remote, or cloud archives.

You can also connect external archives—a set of video recordings with time links.

19.3.8.4 Requirements for disk space arrangement

- When you create an archive with block or object storage type as a file, note that the disk must **not** be completely full. For the correct operation of the system, it is necessary to leave some space free. General recommendations for arranging free space:

  Note

  When you create a local archive with block storage type as a partition (logical disk), the disk can be filled completely.

  - If archive size is less than 1 TB, you need about 100 MB of free space.
  - If archive size is between 1 TB and 10 TB, you need about 1 GB of free space.
  - If archive size is larger than 10 TB, you need about 10 GB of free space.
- For archives with object storage type, we do **not** recommend placing archive volumes or archives on the same physical device. If placing several archives on one physical disk is unavoidable, free space must be N times larger than the volume of all archives (N is the number of archives). We recommend splitting the archive into several volumes and placing them on different physical devices to improve the reliability and performance of storage.

19.3.8.5 Error creating new archives even when license restriction on total capacity is observed

If the user creates archives at the same time (in other words, without applying changes) while deleting some existing archives, creation of the archives can be forbidden even if the total archive capacity does not exceed the amount of the license restriction.

> **Note**
>
> This happens because when verifying the license restrictions, the size of created archives is calculated based on the total capacity at the time when changes were applied.

In such a situation, the user must first delete the unnecessary archives and apply changes, then create new archives.

- We recommend creating archive volumes of no more than 30 TB each.

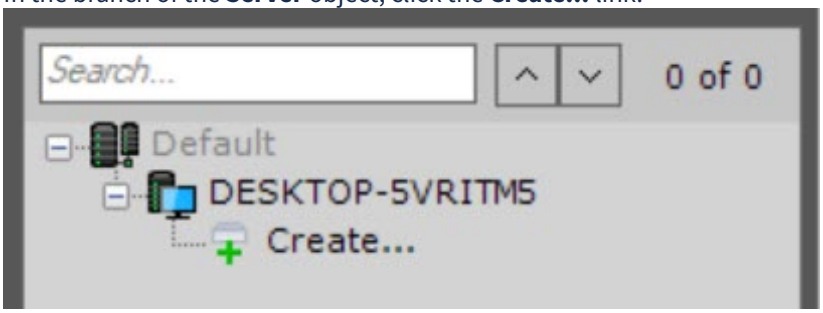
19.3.9 Creating archives

19.3.9.1 Creating a local archive

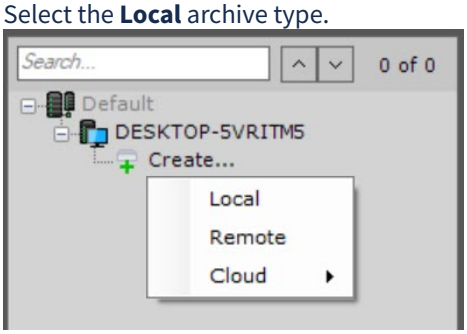
General information about server archives(see page 272)
Statuses of archive volumes(see page 306)

To create a local archive, do the following:

1. Go to the **Archive** tab.
2. In the branch of the **Server** object, click the **Create...** link.

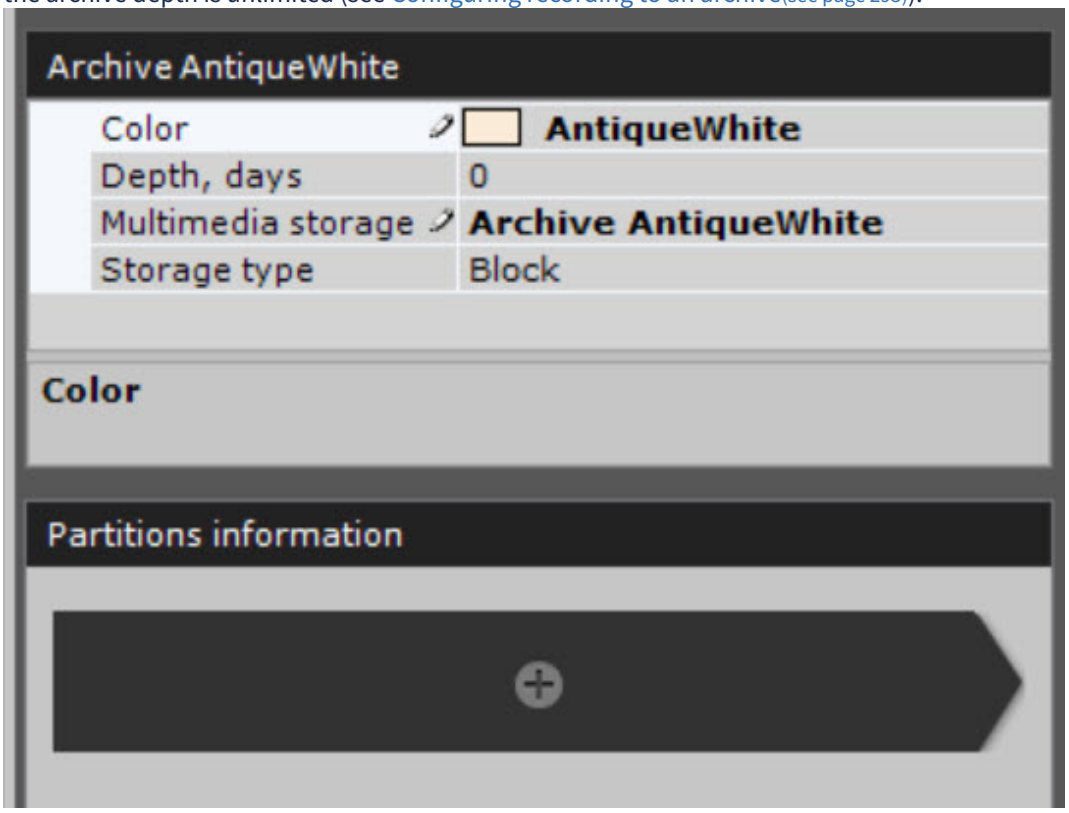


3. Select the **Local** archive type.

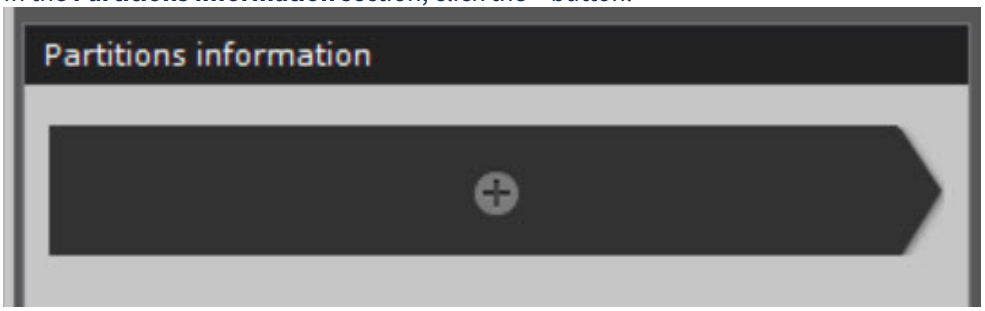


4. In the **Color** field, select the color of an archive.

5. If necessary, in the **Depth, days** field, specify the maximum depth of storing an archive in days. If you specify the **0** value, the archive depth is unlimited (see Configuring recording to an archive(see page 295)).



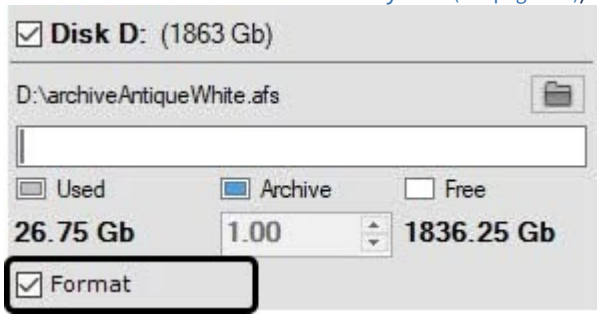
6. In the **Multimedia storage** field, specify the name of an archive.
7. In the **Storage type** field, select the type of archive storage:
   - **Block**, if you need low latency and high performance in various situations. For example, for tasks with a large read and write load;
   - **Object**, if you need to be able to change the size of an archive volume without restarting the system (see General information about the Round-robin algorithm(see page 293)), as well as to encrypt an archive volume (see Encrypting a volume of an object archive(see page 300)).
8. In the **Partitions information** section, click the + button.



As a result, a panel for configuring an archive volume opens.

9. Configure archive volumes:
   a. Set checkboxes next to the disks that you want to include in the archive.
   b. If a disk doesn't have a file system, the disk can contain an archive volume in the form of a partition. In this case, set the **Format** checkbox. This will format the disk to the SolidStore file system developed by AxxonSoft (see General

information about SolidStore file system(see page 279)).



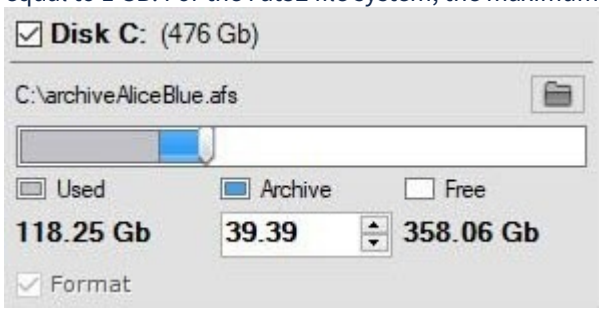
Attention!

- When you select a disk on which to place the archive volume, take into account its capacity. If the archive is completely full, the oldest data is overwritten with new data.
- You can delete the file system on the disk using the standard Disk Management utility in Windows OS. For the manual for starting and using the utility, see Microsoft website[101]. Deleting the file system on the disk in the Disk Management utility consists of the following:
  - delete logical disk;
  - create a new disk in the resulting unallocated area;
  - assign a letter to the disk, but do not format it.

The system disk cannot be completely allocated for an archive.

- You cannot create an archive volume as a partition on a removable disk, since its partition cannot be deleted through the Disk Management utility.

c. On disks that have a file system, you can store an archive volume in the form of a file. For this archive volume, you must enter a file size (in gigabytes) or set it by moving the slider. The size of an archive file must be greater than or equal to 1 GB. For the Fat32 file system, the maximum archive size is 4 GB.



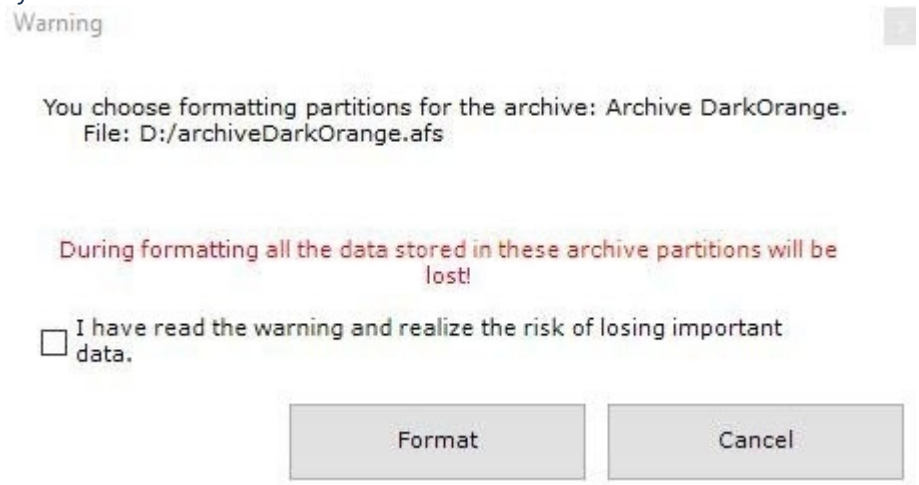
Attention!

- If the archive is completely full, the oldest data will be overwritten with new data.
- By default, the file name is the same as the name of an archive, and the file is located at the root directory of the disk. To change the name and/or location of the file, click the button.

10. Click the **Apply** Apply button.
If volumes are configured in the form of partitions, a dialog window is displayed, warning about formatting of the relevant

101 https://support.microsoft.com/en-us/windows/create-and-format-a-hard-disk-partition-bbb8e185-1bda-ecd1-3465-c9728f7d7d2e

system disks.



11. Read the list of partitions that will be formatted.
12. If the list is correct, set the **I have read the warning and realize the risk of losing important data** checkbox.
13. Click the **Format** button. Otherwise, click the **Cancel** button to return to the archive settings.

Creation of a local archive is complete.

19.3.9.1.1 General information about SolidStore file system

19.3.9.1.1.1 General information about the file system

Fragmented files accumulate over time in the Windows file system. This is due to the fact that the operating system sequentially fills the free disk space when writing files.

Free disk space, which appears when old files are deleted, can be located in different parts of the disk; therefore, each file can be split into many fragments. When reading or writing such a file, the hard drive head must constantly move, which reduces the read/write speed and causes mechanical wear of the disk.

AxxonSoft has developed its own SolidStore file system specifically for storing archives. The system is installed on a blank physical or logical disk, which is fully allocated to *Axxon One* archive (see Creating archives(see page 276)). When developing SolidStore, it was taken into account that recording takes place in one direction (in a loop), and the newest data is written in place of the oldest data.

> **Attention!**
>
> Loop recording (FIFO overwriting) generally deletes the earliest recordings, but in some cases selected recordings within 10% of the oldest ones can be deleted. This feature protects archive volumes from fragmentation. In such cases, these can be gaps near the beginning of the archive when viewing the recordings.

19.3.9.1.1.2 Features of SolidStore file system

By optimizing the reading/writing process, we managed to minimize the movement of the hard disk head and to achieve three important advantages:

- achieve high read/write speeds, approaching the physical access speed limit of the hard disk;
- increase the service life of the hard disk;
- solve the problem of data fragmentation: as data is written only in a loop, fragmentation is minimal and doesn't accumulate with time. This ensures that the read/write speed remains high throughout the operation of the video surveillance system.

SolidStore relieves the user from the need to periodically stop the video surveillance system and run the Disk Defragmenter tool. This significantly increases video surveillance uptime, and the protected facility remains protected at all times.

If it is not possible to allocate a separate disk for *Axxon One* archive, this archive can be written as a regular file in the existing Windows OS file system.

19.3.9.2 Creating a remote archive

On the page:

- General information(see page 280)
- Create a remote archive(see page 280)
- Limitations when working in Windows OS(see page 283)

General information about server archives(see page 272)
Statuses of archive volumes(see page 306)

19.3.9.2.1 General information

A remote archive can only be represented as a file on one or several remote storages.

The following protocols of remote storages are supported:

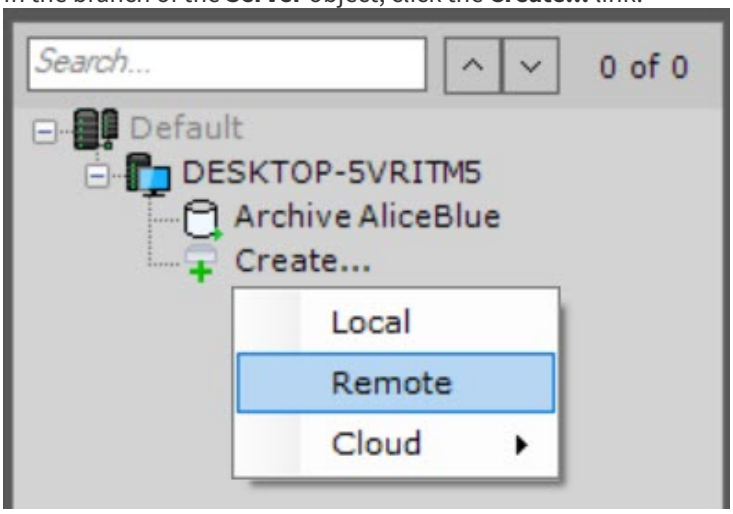
- For Linux OS:
  - SMB2/SMB3.
  - NFSv3/NFSv4.
  - CIFS.
  - iSCSI.
- For Windows OS:
  - WinAPI access mechanism (current version for Windows 10 and 11).

The choice of protocol depends on the configuration, security policies, and capabilities of the NAS.

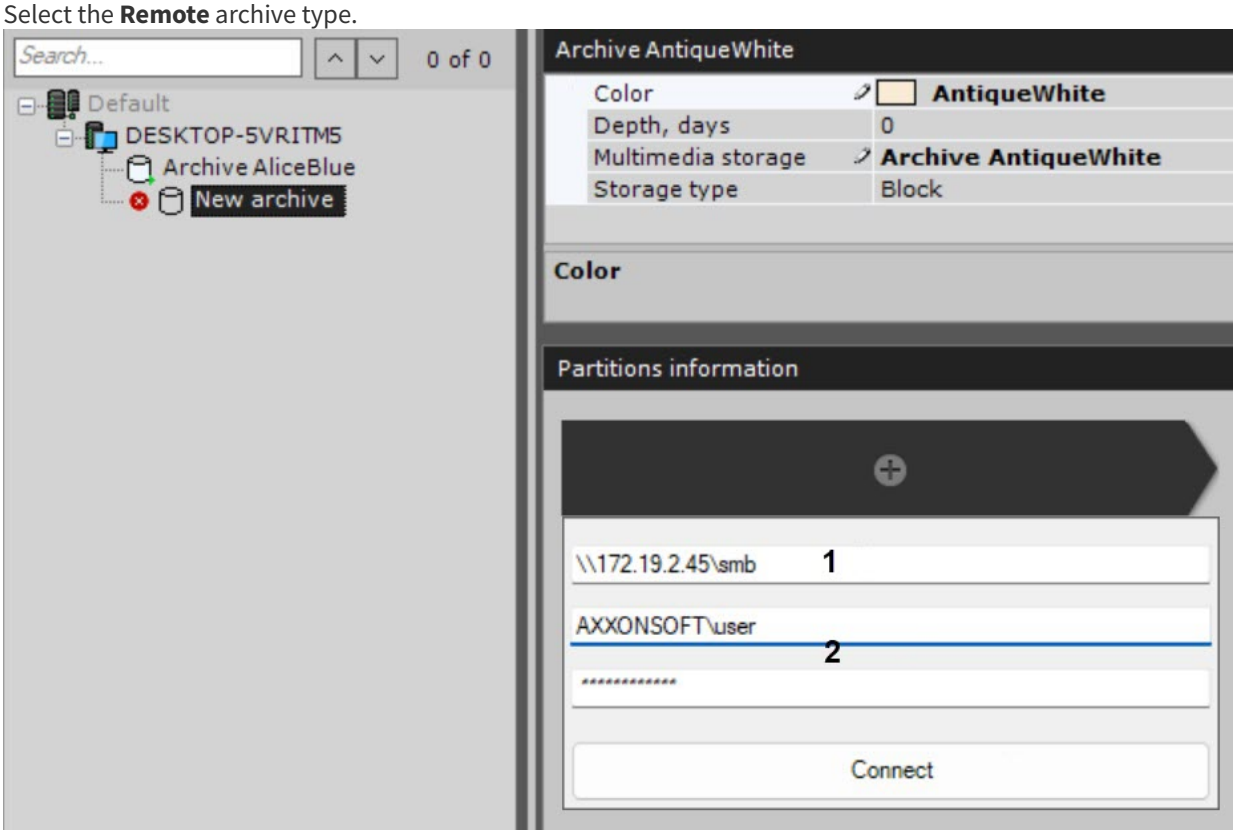
19.3.9.2.2 Create a remote archive

To create a remote archive:

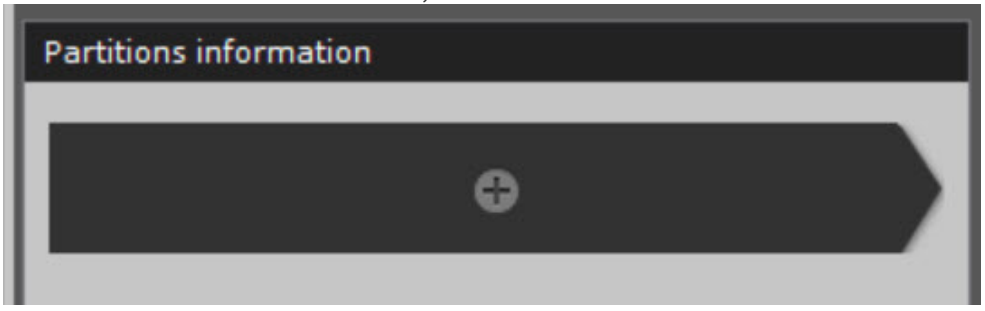
1. Go to the **Archive** tab.
2. In the branch of the **Server** object, click the **Create...** link.



3. Select the **Remote** archive type.



4. In the **Color** field, select the color of an archive.
5. If necessary, in the **Depth, days** field, specify the maximum depth of storing an archive in days. If you specify the **0** value, the archive depth is unlimited (see Configuring recording to an archive(see page 295)).
6. In the **Multimedia storage** field, specify the name of an archive.
7. In the **Storage type** field, select the type of archive storage:
   - **Block**, if you need low latency and high performance in various situations. For example, for tasks with a large read and write load;
   - **Object**, if you need to be able to change the size of an archive volume without restarting the system (see General information about the Round-robin algorithm(see page 293)), as well as to encrypt an archive volume (see Encrypting a volume of an object archive(see page 300)).
8. In the **Partitions information** section, click the **+** button.



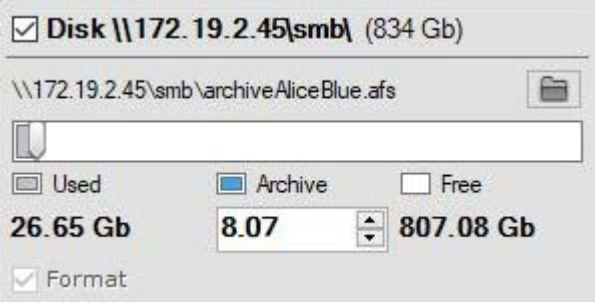
As a result, a panel for configuring a path to a remote storage opens.

9. Enter a path to a remote storage, where an archive must be located (**1**).
10. Enter the username of the user who has permission to access the remote storage (**2**).

> **Attention!**
>
> You must enter the username with a prefix of the domain (domainname\username) or name of the computer (computername\username) where this account is located.

11. Enter the password of the user who has access to the remote storage (**2**).
12. Click the **Connect** button.

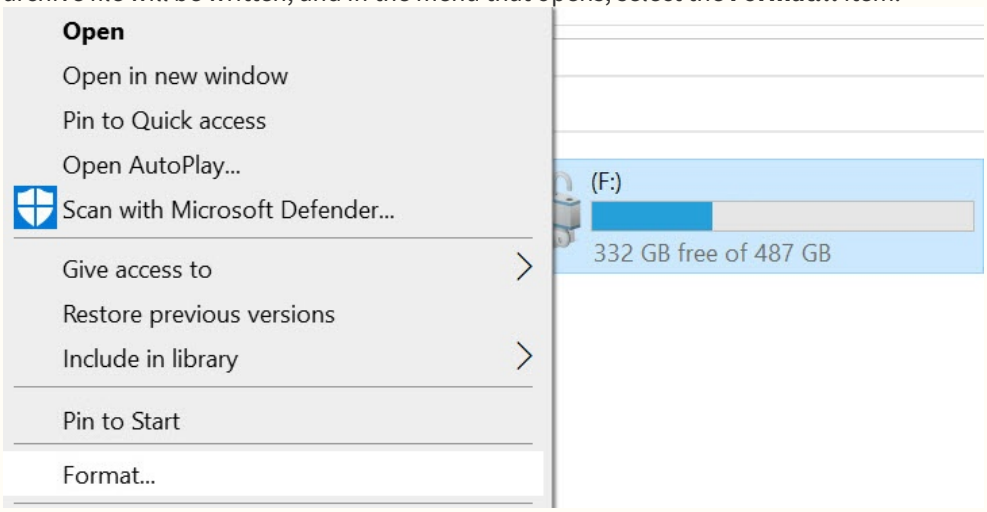
13. This will connect you to the remote storage. When you are connected, you see a window for configuring the archive parameters.



14. In the **Archive** field, enter the file size in GB or set it by moving the slider. The size of an archive file must be greater than or equal to 1 GB. For the Fat32 file system, the maximum archive size is 4 GB.

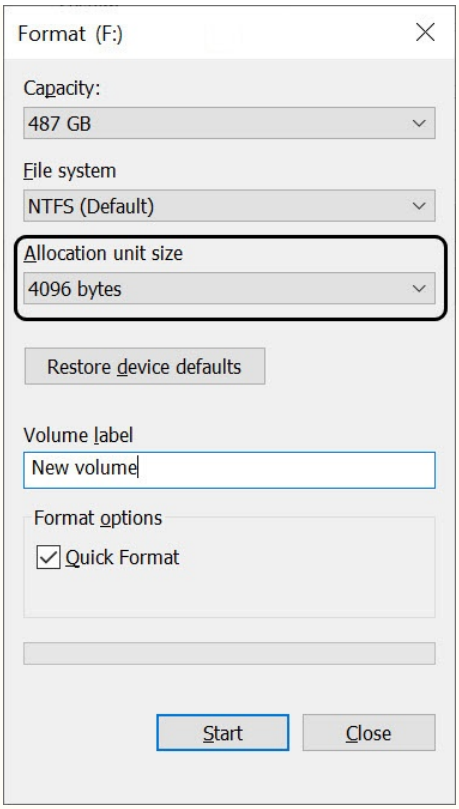
Attention!

If you need to create an archive file larger than 16 TB, the cluster size for the NTFS file system[102] must be set to a value greater than 4 KB when formatting the disk in Windows OS. To do this, right-click the disk to which the archive file will be written, and in the menu that opens, select the **Format...** item.



In the **Format** window that opens, from the **Allocation unit size** list, select a cluster size greater than 4 KB and click the **Start** button.

102 https://learn.microsoft.com/en-us/windows-server/storage/file-server/ntfs-overview

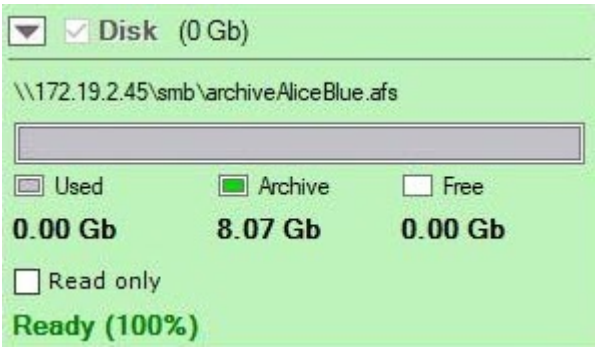


Note

To change the archive folder in the remote storage, click the button and select the required location.

15. If necessary, you can add other remote storages to the archive and configure their parameters.
16. Click the **Apply** button.

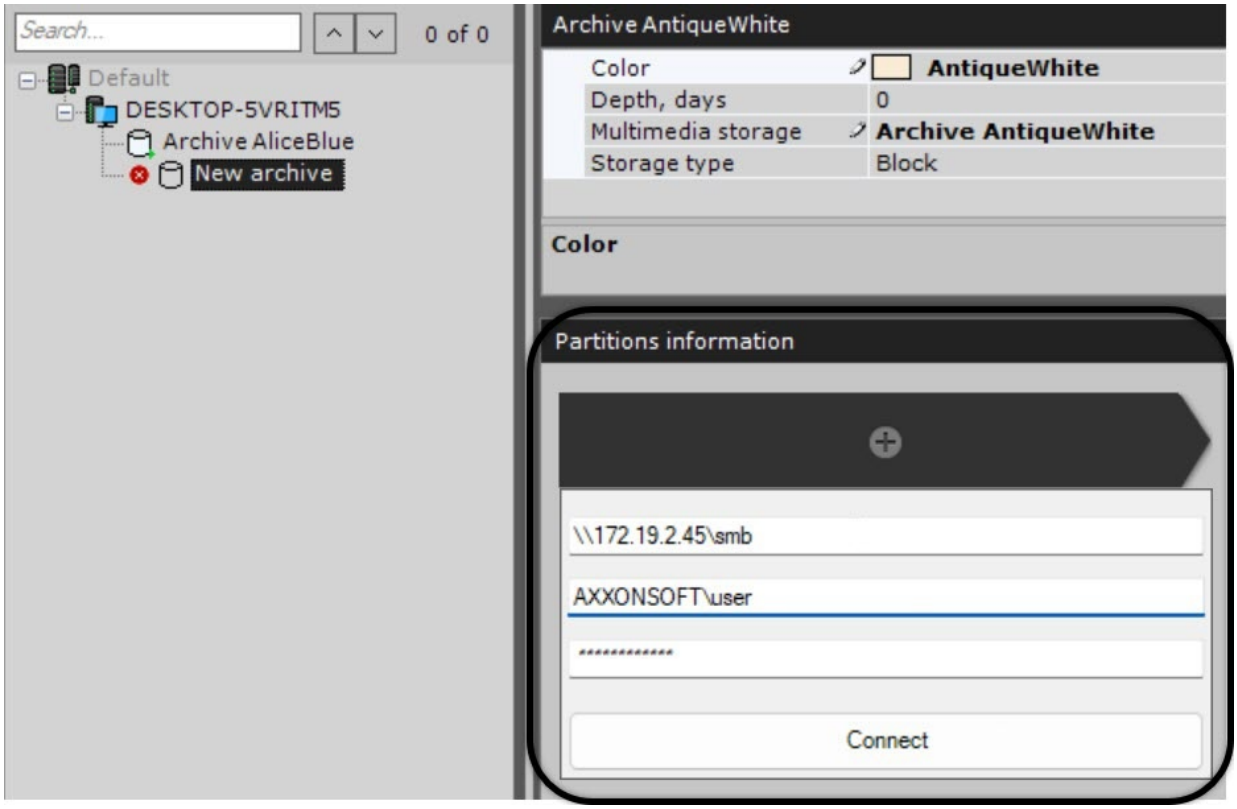
Creation of a remote archive is complete. After the archive is created, the status of the remote storages, where the archive is located, is displayed.



19.3.9.2.3 Limitations when working in Windows OS

! Only one remote user can connect to the remote storage at a time. This is a limitation of Windows OS !

Attempting to connect multiple users at the same time can result in connection errors and storage malfunctions. You can check the active user connections in the **Partitions information** section.



If this error occurs, disconnect the previous user from the device on which *Axxon One* is installed in one of the following ways:

1. Run the net use /delete[103] command.
2. Use the PsExec[104] system program to open the command prompt as the LocalSystem user (psexec.exe -i -s cmd.exe) and run the same command.

Attention!

If you plan to connect several users from this computer to a remote archive, do the following:

1. To the C:\Windows\System32\Drivers\etc\hosts file add the following string: "192.168.1.1 DNSname1", where 192.168.1.1 is the IP address of the remote storage and DNSname1 is the domain name of the remote storage.
2. When you create a remote archive, use the specified domain name in the address.

If you need to add several remote archives using different remote user accounts, do the following:

1. To the C:\Windows\System32\Drivers\etc\hosts file add the IP addresses and domain names of all remote storages.
2. When you create archives, use the specified domain names in the address.

In a failover system with a backup server (see Setting up a configuration with the backup Server(see page 1076)), the hosts file on the backup server must include recordings from all servers if domain names differ on each server.

19.3.9.3 Creating a cloud archive

General information about server archives(see page 272)
Manage archives using gRPC API (ConfigurationService)[105]
Statuses of archive volumes(see page 306)

103 https://technet.microsoft.com/en-us/library/bb490717.aspx
104 https://docs.microsoft.com/en-gb/
105 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246487079/Manage+archives+using+gRPC+API+ConfigurationService

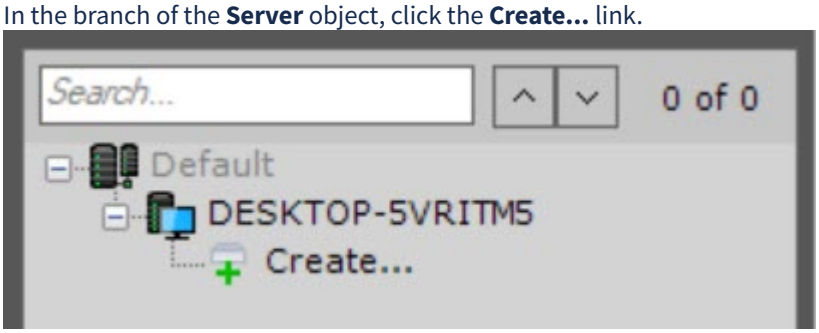
General information about the Round-robin algorithm(see page 293)

Attention!

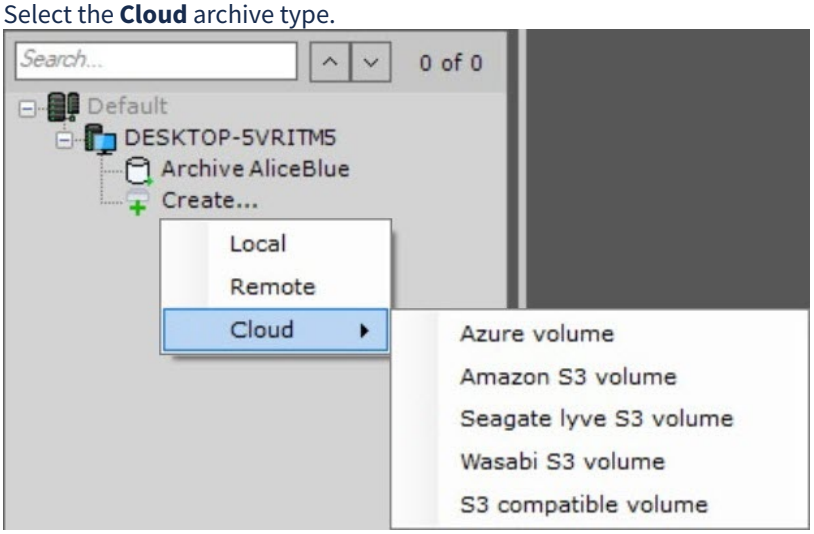
We don't recommend you to set a cloud archive lifecycle policy, as this can lead to a complete loss of the archive.

To create a cloud archive, do the following:

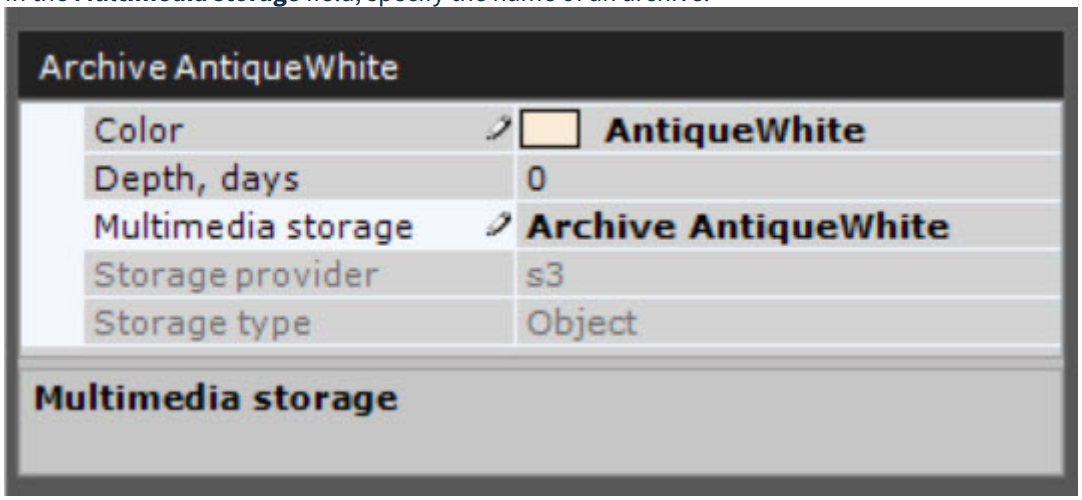
1. Go to the **Archive** tab.
2. In the branch of the **Server** object, click the **Create...** link.



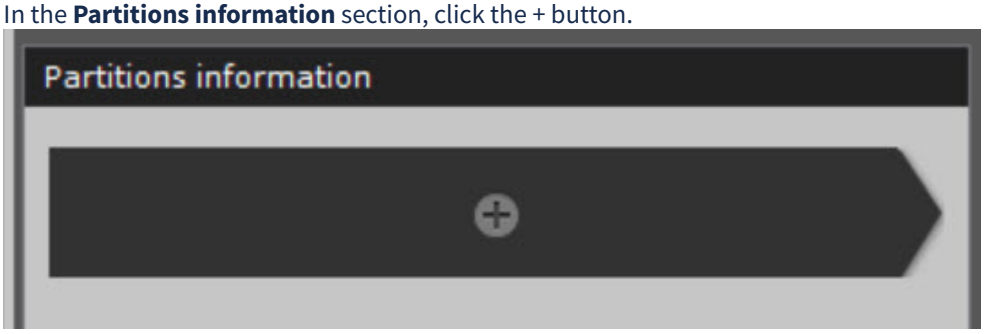
3. Select the **Cloud** archive type.



4. Select an archive from the suggested solutions.
5. Specify general parameters:
   a. In the **Color** field, select the color of an archive.
   b. In the **Depth, days** field, specify the maximum depth of an archive in days. If you specify the **0** value, the entire archive is available for viewing.
   c. In the **Multimedia storage** field, specify the name of an archive.

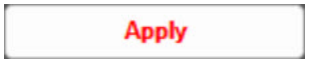


6. In the **Partitions information** section, click the + button.



7. Configure the fields of an archive volume depending on the selected solution.

> **Note**
>
> Specifics of configuring fields of an archive volume for different solutions are given on the corresponding pages:
> - Configuring an archive volume based on the Microsoft Azure solution(see page 286)
> - Configuring an archive volume based on the Amazon solution(see page 287)
> - Configuring an archive volume based on the Seagate Lyve Cloud solution(see page 289)
> - Configuring an archive volume based on the Wasabi solution(see page 290)
> - Configuring an archive volume based on the MinIO solution(see page 291)

8. Click the **Apply** 

button.

As a result, a cloud archive and a volume are created based on the selected solution.

19.3.9.3.1 General information about a cloud archive

> Creating a cloud archive(see page 284)

A cloud archive is an object file system for storing video archives in cloud storages

Benefits of using a cloud archive:

1. Integration with VSaaS.
2. Scalability.
3. High level of security.
4. Flexible pricing.
5. Durability up to 99.999999999% according to Amazon[106].

> **Attention!**
>
> Before creating a cloud archive in *Axxon One*, you must preconfigure a cloud storage via the web interface of the corresponding provider.

In *Axxon One*, you can create archives based on the following solutions:

1. Amazon S3: https://aws.amazon.com/s3/[107].
2. Microsoft Azure: https://azure.microsoft.com/en-gb/services/storage/blobs/.
3. Wasabi: https://wasabi.com/.
4. Seagate Lyve Cloud: https://www.seagate.com/.
5. MinIO: https://min.io/. The RELEASE.2025-02-07T23-21-09Z version was tested by AxxonSoft.

19.3.9.3.2 Configuring an archive volume based on the Microsoft Azure solution

> General information about a cloud archive(see page 286)

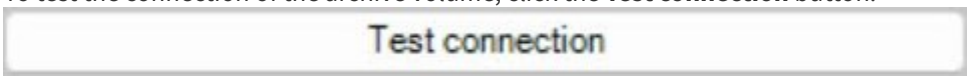
106 https://aws.amazon.com/s3/faqs/?nc1=h_ls#Durability_.26_Data_Protection
107 https://aws.amazon.com/s3/?nc=sn&loc=0

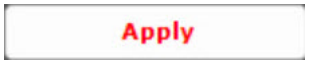
For an archive volume based on the Microsoft Azure solution, you must:

1. Specify the general parameters for an archive volume (see Creating a cloud archive(see page 284)).
2. Configure an archive volume.

Parameter	Value	Description
Host	Azure server address	Specify the Azure server address that can be found in the properties of the created container
Access key	Access key value	Specify the access key that can be found in the corresponding section[108]
Container name	Container name	Specify the Azure container that can be found in the properties of the created container
Username	Username	Specify the username that can be found in the Access keys[109] section (Storage account name)
Volume connection protocol	**http**	Specify the connection protocol
	https	
AES key	Encryption key	If you want to encrypt an archive volume, specify the encryption key (see Encrypting a volume of an object archive(see page 300))
Archive size	**1.00**	Specify the size of an archive volume in gigabytes. The default value is 1 GB

3. To test the connection of the archive volume, click the **Test connection** button.



4. Click the **Apply**  button.

Configuration of an archive volume based on the Microsoft Azure solution is complete.

Example of configuring a volume of a cloud archive in Microsoft Azure:

Parameter	Value
Host	axxonsoft.blob.core.windows.net
Access key	youraccesskey==
Container name	container
Username	axxonsoft

19.3.9.3.3 Configuring an archive volume based on the Amazon solution

General information about a cloud archive(see page 286)

For an archive volume based on the Amazon solution, you must:

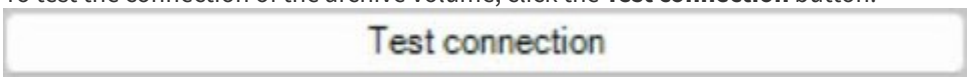
1. Specify the general parameters for an archive volume (see Creating a cloud archive(see page 284)).

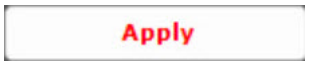
108 https://learn.microsoft.com/en-us/azure/storage/common/storage-account-keys-manage?tabs=azure-portal
109 https://learn.microsoft.com/en-us/azure/storage/common/storage-account-keys-manage?tabs=azure-portal

2. Configure an archive volume.

Parameter	Value	Description
Volume region	Region of an archive volume storage	Specify the region of the archive volume storage that is set when you create a cloud storage via the Amazon web interface. To reduce delays when writing and reading the archive, it is necessary to specify the nearest region to the *Axxon One* server in the Amazon web interface. The list of possible regions—https://docs.aws.amazon.com/general/latest/gr/rande.html#regional-endpoints
Volume bucket name	Name of the archive partition in the Amazon S3 (bucket) account	Specify the name of the archive partition in the Amazon S3 (bucket) account. Different volumes can be located in different regions. On the Amazon S3 server, the volume name must be unique and must be previously created by the user using the following rules to work in *Axxon One* (see https://docs.aws.amazon.com/AmazonS3/latest/userguide/bucketnamingrules.html)
Access key id	Value of the access key id	Specify the access key id. You must sign in to create access keys—https://console.aws.amazon.com/iam/home#/security_credentials$access_key
Password of access key id	Password of access key id	Specify the password of the access key **Note** The password is available after you create an access key.
Volume path	Folder of the *Axxon One* volume	Specify the path to the folder of the *Axxon One* volume inside the partition (bucket)
Volume connection protocol	**http**	Specify the connection protocol
	https	
AES key	Encryption key	If you want to encrypt an archive volume, specify the encryption key (see Encrypting a volume of an object archive(see page 300))
Archive size	**1.00**	Specify the size of an archive volume in gigabytes. The default value is 1 GB

3. To test the connection of the archive volume, click the **Test connection** button.



4. Click the **Apply** 

button.

Configuration of an archive volume based on the Amazon solution is complete.

Example of configuring a volume of a cloud archive in Amazon:

Parameter	Value
Volume region	us-west-1
Volume bucket name	axxonsoft-test
Access key id	youraccesskeyid
Password of access key id	yoursecretaccesskey
Volume path	path

19.3.9.3.4 Configuring an archive volume based on the Seagate Lyve Cloud solution

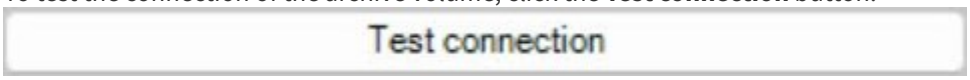
General information about a cloud archive(see page 286)

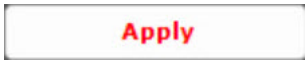
For an archive volume based on the Seagate Lyve Cloud solution, you must:

1. Specify the general parameters for an archive volume (see Creating a cloud archive(see page 284)).
2. Configure an archive volume.

Parameter	Value	Description
Volume region	Region of the archive volume storage	Specify the region of the archive volume storage that is set during its creation and corresponds to the Region parameter in the Bucket properties
Volume bucket name	Name of the archive partition (Bucket Name)	Specify the name of the archive partition (Bucket Name) previously set by the user. It corresponds to the Name parameter in the Bucket properties
Access key id	Value of the access key id	Specify the access key id that is generated when creating an account in the Create Service Account window
Password of access key id	Password of access key id	Specify the password of the access key **Note** The password is available after you create an access key.
Volume path	Folder of an archive volume	Specify the path to the folder created inside the archive volume
Volume connection protocol	**http**	Specify the connection protocol
	https	
AES key	Encryption key	If you want to encrypt an archive volume, specify the encryption key (see Encrypting a volume of an object archive(see page 300))
Archive size	**1.00**	Specify the size of an archive volume in gigabytes. The default value is 1 GB

3. To test the connection of the archive volume, click the **Test connection** button.



4. Click the **Apply** 

button.

Configuration of an archive volume based on the Seagate Lyve Cloud solution is complete.

Example of configuring a volume of a cloud archive in Seagate Lyve Cloud:

Parameter	Value
Volume region	us-west-1
Volume bucket name	axxonsoft-test
Access key id	youraccesskeyid
Password of access key id	yoursecretaccesskey

Parameter	Value
Volume path	path

19.3.9.3.5 Configuring an archive volume based on the Wasabi solution

General information about a cloud archive(see page 286)

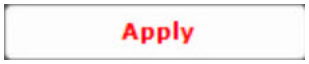
For an archive volume based on the Wasabi solution, you must:

1. Specify the general parameters for an archive volume (see Creating a cloud archive(see page 284)).
2. Configure an archive volume.

Parameter	Value	Description
Volume region	Region of an archive volume storage	Specify the storage region of the corresponding volume that was previously set in https://console.wasabisys.com/#/file_manager/. To select the correct storage region in *Axxon One* interface, see the official page[110] on the Wasabi website
Volume bucket name	Name of the archive partition (Bucket Name)	Specify the name of the archive partition (Bucket Name) previously set by the user in https://console.wasabisys.com/#/file_manager/
Access key id	Value of the access key id	Specify the access key id that you must create beforehand at https://console.wasabisys.com/#/access_keys
Password of access key id	Password of access key id	Specify the password of the access key **Note** The password is available after you create an access key.
Volume path	Folder of an archive volume	Specify the path to the folder created inside the archive volume (the Folder object in Bucket)
Volume connection protocol	**http**	Specify the connection protocol
	https	
AES key	Encryption key	If you want to encrypt an archive volume, specify the encryption key (see Encrypting a volume of an object archive(see page 300))
Archive size	**1.00**	Specify the size of an archive volume in gigabytes. The default value is 1 GB

3. To test the connection of the archive volume, click the **Test connection** button.



4. Click the **Apply** 

button.

Configuration of an archive volume based on the Wasabi solution is complete.

Example of configuring a volume of a cloud archive in Wasabi:

110 https://wasabi.com/locations/

Parameter	Value
Volume region	us-central-1
Volume bucket name	axxontest-1
Access key id	youraccesskeyid
Password of access key id	yoursecretaccesskey
Volume path	path

19.3.9.3.6 Configuring an archive volume based on the MinIO solution

General information about a cloud archive(see page 286)

Note

The RELEASE.2025-02-07T23-21-09Z version of the MinIO[111] object archive was tested by AxxonSoft.

For an archive volume based on the MinIO solution, you must:

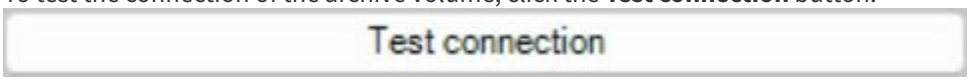
1. Specify the general parameters for an archive volume (see Creating a cloud archive(see page 284)).
2. Configure an archive volume.

Parameter	Value	Description
Host	Address of the MinIO server	Specify the address of the MinIO server
Port	Port of the MinIO Server	Specify the port of the MinIO server
Volume region	Region of an archive volume storage	Specify the location region of the corresponding volume
Volume bucket name	Name of the archive partition (Bucket Name)	Specify the name of the archive partition (Bucket Name) previously set by the user. It corresponds to the Name parameter in the Bucket properties
Access key id	Value of the access key id	Specify the access key id
Password of access key id	Password of access key id	Specify the password of the access key **Note** The password is available after you create an access key.
Volume path	Folder of an archive volume	Specify the path to the folder created inside of an archive volume

111 https://min.io/

Parameter	Value	Description
Bucket endpoint	Full path to bucket endpoint	Specify the full path to bucket endpoint **Attention!** The **Bucket endpoint** parameter must **only** be used if you specify the domain name of the **MinIO** server instead of the server IP address. Example: http://miniopoc1.agis.xh.ar:9000/ where • miniopoc1.agis.xh.ar[112] is a domain name of the **MinIO** server. • 9000—**MinIO** port
PEM Certificate	Security certificate file	Specify the security certificate file **Note** The **PEM Certificate** parameter is available starting with *Axxon One* 2.0.8.
PEM Private Key	Private key of the security certificate	Specify the private key of the security certificate **Note** The **PEM Private Key** parameter is available starting with *Axxon One* 2.0.8.
Volume connection protocol	**http**	Specify the connection protocol
	https	
AES key	Encryption key	If you want to encrypt an archive volume, specify the encryption key (see Encrypting a volume of an object archive(see page 300))
Archive size	**1.00**	Specify the size of an archive volume in gigabytes. The default value is 1 GB

3. To test the connection of the archive volume, click the **Test connection** button.



4. Click the **Apply**  button.

Configuration of an archive volume based on the MinIO solution is complete.

Example of configuring a volume of a cloud archive in MinIO:

Parameter	Value
Host	192.168.56.102
Port	9000
Volume region	us-east-1

112 http://miniopoc1.agis.xh.ar/

Parameter	Value
Volume bucket name	bucket
Access key id	MINIOROOT
Password of access key id	MINIOPASS
Volume path	path

Example of configuring a volume of a cloud archive in MinIO using the full path to bucket endpoint:

Parameter	Value
Volume region	us-east-1
Volume bucket name	bucket
Access key id	MINIOROOT
Password of access key id	MINIOPASS
Bucket endpoint	http://miniopoc1.agis.xh.ar:9000/

19.3.9.4 General information about the Round-robin algorithm

If there are several volumes in the object archive (see General information about server archives(see page 272)), the archive recordings are distributed among all volumes by the Round-robin algorithm.

The archive recordings are distributed in a round-robin cycle:

1. Key frames of a recording are divided into intervals.

   Note

   - Key frames are reference frames of the video that contain complete information about a scene.
   - The algorithm distributes key frames to the archive volumes. Intermediate frames are linked to the corresponding key frames and recorded to the same volume.
   - When writing, the algorithm processes the first key frame along with its intermediate frames. When the second key frame is reached, it is also written along with its intermediate frames to the next volume.

2. The first interval is recorded to the first volume of an archive.
3. The next interval is recorded to the second volume of an archive, and so on until the last volume is reached.
4. When the last volume is reached, the process is repeated until all key frames are completely distributed over available volumes.

This algorithm allows increasing the writing speed of an archive, as well as preventing the loss of recordings for a certain period, in case there are problems with archive volumes, that is, if an archive volume is lost, the recordings for the previous period are available with frame decimation. This behavior is ensured because key frames of recordings are distributed evenly over all available volumes of an archive.

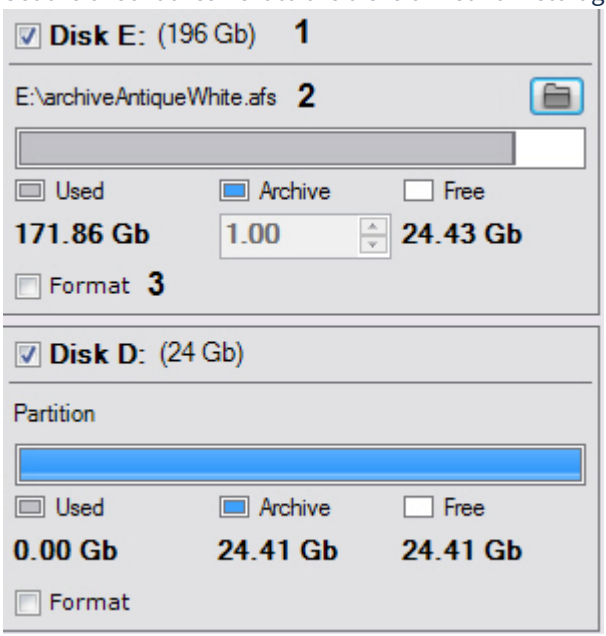
19.3.9.5 Creating an archive based on existing archive volumes

If you create an archive based on an existing volume, you can extract archive recordings from the archive only if the following conditions are met:

- The name of the server or node on which writing to an existing archive volume was performed is the same as the current name.
- The IDs of the cameras from which the recordings were written to an existing archive volume are the same as the IDs of the current cameras.

To create an archive based on an existing volume, do the following:

1. Create an archive (see Creating a local archive(see page 276), Creating a remote archive(see page 280)).
2. Set the checkboxes next to the disks or network storages that contain existing volumes (**1**).



> **Note**
>
> A new archive can contain volumes that previously belonged to different archives.

3. If a volume is in the file form, select an archive file to which recording was performed (**2**).
4. Clear the **Format** checkbox (**3**).

> **Note**
>
> If the **Format** checkbox is set, the archive recordings that are currently stored in the volume will be erased.

5. If necessary, create new archive volumes in free partitions.
6. Click the **Apply** 

button.

An archive is created, and if all requirements are met, archive recordings are available.

19.3.10 Editing archives

You can edit the archives that have been created in the system. You can do the following:

1. Rename an archive (see Creating archives(see page 276)).
2. Add new volumes. You can add new volumes in the same way as when creating an archive (see Creating archives(see page 276)).
3. Configure a write limit on the archive volume(see page 297).
4. Remove archive volumes(see page 307).
5. Edit archive recording parameters (see Configuring recording to an archive(see page 295)).
6. Edit replication parameters (see Configuring data replication(see page 298)).

19.3.11 Configuring archives

19.3.11.1 Configuring recording to an archive

On the page:

- General information(see page 295)
- Configuring recording to an archive for a camera(see page 295)
- Configuring recording to an archive for several camera(see page 296)

19.3.11.1.1 General information

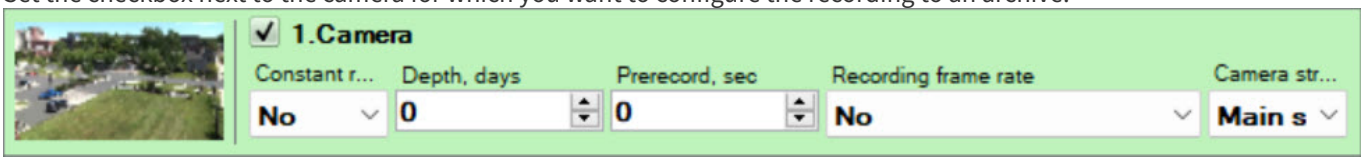
Video and audio streams are recorded to an archive synchronously.

You can configure recording to an archive both for one camera and for several cameras, using the same parameters.

19.3.11.1.2 Configuring recording to an archive for a camera

To configure recording to an archive for one camera, do the following:

1. Go to the **Archive** tab.
2. Select the created archive.
3. Set the checkbox next to the camera for which you want to configure the recording to an archive.



4. From the **Constant recording** list, select the mode for recording to an archive.
   a. If you select **No**, a video stream is recorded to an archive only when an operator manually initiates an alarm or an automatic rule is run.
   b. If you select **Always**, a video stream is constantly recorded to an archive.
   c. If you select a time schedule (see Configuring schedules(see page 1012)), a video stream is constantly recorded to an archive within the selected time schedule. Recording to an archive can also be initiated by the operator or an automatic rule.
5. In the **Depth, days** field, specify the maximum archive depth of the given camera in days. If you set the **0** value, archive depth is unlimited. As a result, the archive will only contain recordings within the specified depth. The recordings that are outside of the specified archive depth are unavailable for viewing.

Attention!

- If you set an unlimited archive depth for one or several cameras, at some point the archive becomes full, and FIFO based re-recording is automatically started—the oldest recordings in the archive will be replaced with the new ones, regardless of the depth setting. In this case, the set archive depth for other cameras cannot be maintained and can be reduced. Therefore, if you set an unlimited archive depth for at least one camera, limiting the archive depth for other cameras is unnecessary.

- When you configure the archive depth for each camera, we recommend calculating the storage size of an archive (see Disk storage subsystem requirements(see page 88)) to avoid situations when an archive is stored for fewer days than specified.
- When you specify the archive depth for a particular camera, note that the priority of the total archive depth is higher (see Configuring access restrictions to an archive(see page 298)). If the archive depth of a camera is 20 days and the total archive depth is 10 days, the archive depth of a camera won't exceed 10 days.
- Later, if you change the available archive depth of a camera upwards or to **0**, the setting will apply only to new recordings. Earlier recordings outside the initial archive depth don't become available.

6. In the **Prerecord, sec** field, enter the prerecord time in seconds of a video stream. This value must be in the range [0; 30].

Attention!

- Prerecord is a period of prerecording that is added to the beginning of an alarm event recording.
- If recording to an archive is initiated by a macro, the prerecord time can be longer, according to the specified settings (see Start recording to archive(see page 866)).

7. If it is necessary to use decimation when recording to the archive, select the required value from the **Recording frame rate** list:
   - **By keyframes** (for all video streams except MJPEG);
   - **1** frame **per 240/120/60/30/20 seconds**;

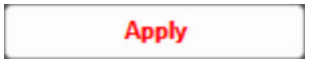
Note

- Recording frame rate 1 frame per 30 seconds is available starting with *Axxon One* 2.0.12.
- Recording frame rate 1 frame per 20 seconds is available starting with *Axxon One* 2.0.14.

   - specific value of frames per second (for MJPEG video stream).
   Decimation reduces the size of an archive, but a video is less "smooth".
8. In the **Camera stream** parameter, select a stream for recording to an archive.

Note

This setting is relevant for cameras that support multistreaming.

9. Click the **Apply** 

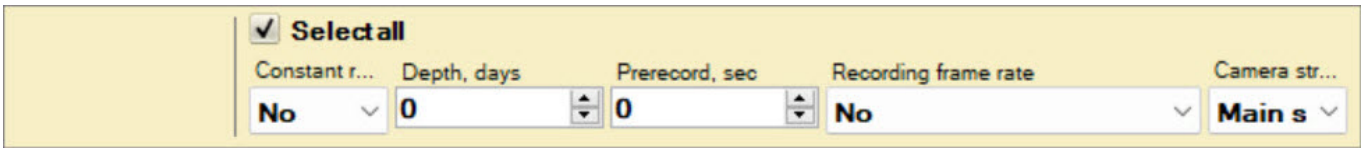
button.

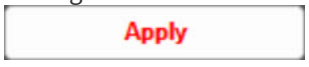
Configuration of recording to an archive for a camera is complete.

19.3.11.1.3 Configuring recording to an archive for several camera

To configure recording to an archive for several cameras, do the following:

1. Set the checkboxes next to the cameras for which you want to configure recording to an archive. To select all cameras, set the **Select all** checkbox.



2. Configure the archive recording parameters in the group setting form that is highlighted in yellow. The specified settings are automatically applied to all cameras.
3. Perform custom configuration of camera recording settings, if necessary.
4. Click the **Apply** 

button.

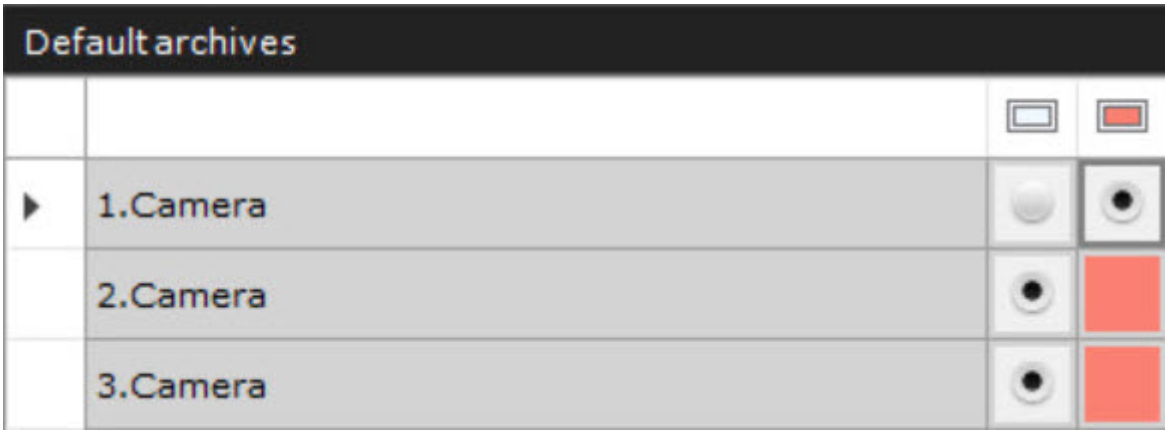
Configuration of recording to an archive for several cameras is complete.

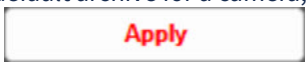
19.3.11.2 Configuring the default archive

The default archive is used to record videos of alarms that are initiated by the user for a camera. You must set only one default archive for each camera. The first archive to which recording of a video stream from a camera was configured automatically becomes the default archive (see Configuring recording to an archive(see page 295)).

To change the default archive for a camera, do the following:

1. Go to the **Archive** tab.
2. Select the **Server** object.
   The **Default archives** form displays a list of cameras and archives that are marked with corresponding colors. Each camera for which you configured recording to at least one archive has a corresponding archive that is the default archive for this camera.



3. To change the default archive for a camera, select the relevant archive.
4. Click the **Apply** 

button.

Configuration of the default archive for a camera is complete.

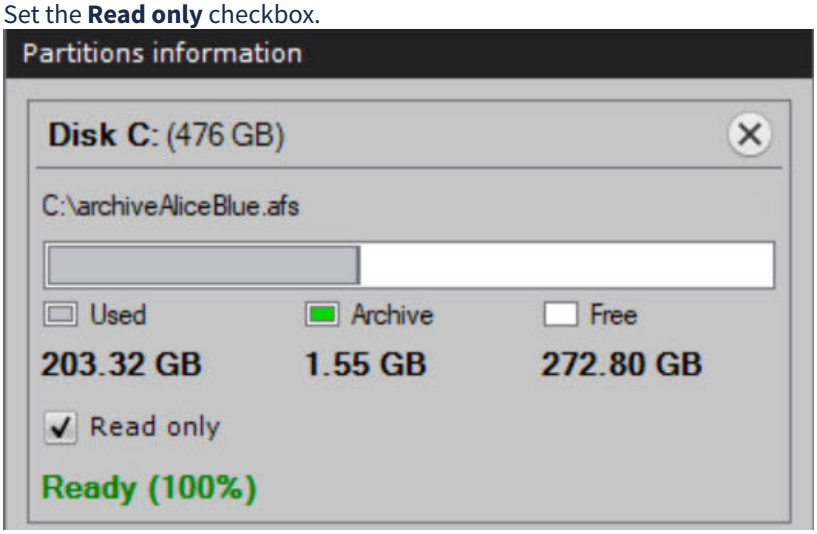
19.3.11.3 Configuring a write limit on an archive volume

You can stop writing to a certain volume of an archive. In this case, the data previously written to it will be available for viewing.

> **Note**
>
> This setting is useful when you need to replace the disk if it has some bad sectors, but there mustn't be any "gaps" in the archive. In this case, you must add a volume to an archive on a new disk and set the volume on the damaged disk to the **Read only** mode.

To do this, do the following:

1. Set the **Read only** checkbox.



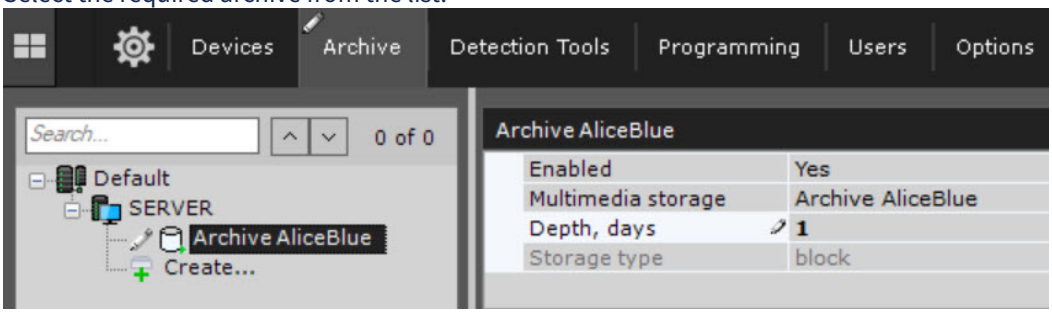
2. Click the **Apply** Apply button.

Writing to a specific archive volume is terminated.

19.3.11.4 Configuring access restrictions to an archive

You can restrict the availability of an archive for viewing by system users. To do this, do the following:

1. Go to the **Archive** tab.
2. Select the required archive from the list.



3. In the **Depth, days** field, specify the available archive depth in days.

> **Note**
>
> If you set the **0** value, the entire archive will be available for viewing.

4. Click the **Apply** Apply button.

As a result, only the recordings within the specified depth are available in an archive. The recordings that are outside the specified archive depth won't be available for viewing.

> **Attention!**
>
> Later, if you change the available archive depth upwards or to **0**, the setting will apply only to new recordings. Earlier recordings outside the initial archive depth don't become available.

19.3.11.5 Configuring data replication

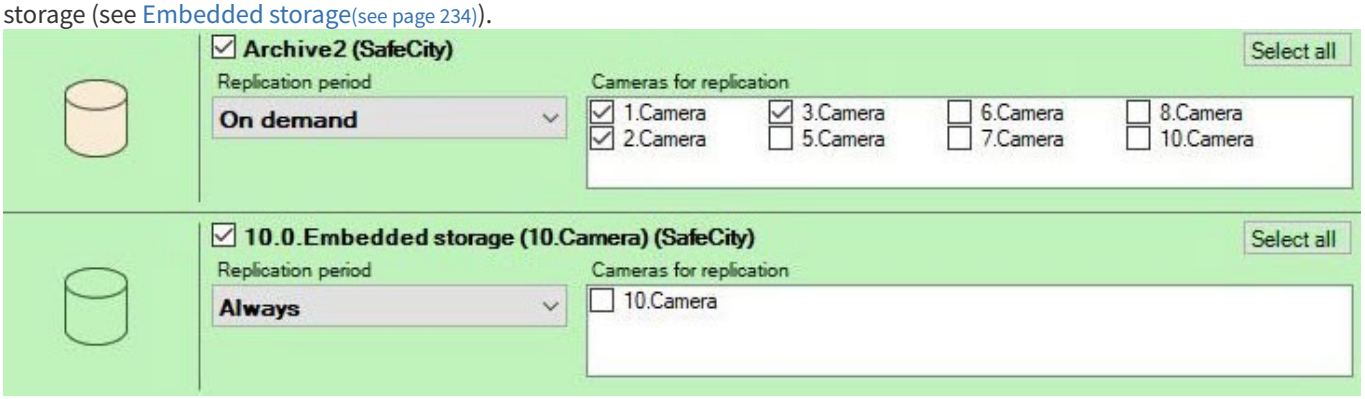
Replication of the archive data refers to the copying of fixed-size blocks of information (video, audio, metadata) from one archive to another within the same domain. The primary purpose of data replication is to ensure long-term storage and access to multimedia data on remote storage devices. Every archive can be both the sender and receiver of data.

Attention!

- In a block archive, replication is performed as blocks of information accumulate and only to the end of an archive. In an object archive, blocks of information can be replicated to any part of an archive. To transfer the old data from **Archive 1** to **Archive 2** and continue recording new data to **Archive 2**, do the following:
  - Replicate the data from **Archive 1** to **Archive 2**, recording isn't performed to **Archive 2**.
  - Configure the camera recording to **Archive 2**.
    The events indicating the start and successful completion of data replication are generated in the system (see Event control(see page 1317)). These events can be used in macros (see Programming(see page 828)).
- Archives can use block or object type of storage (see General information about server archives(see page 272)). To successfully replicate data from an object archive to a block archive, you must create the **NGP_ARCHIVE_REPLICATE_FRAME_BY_FRAME** environment variable with the value **1** (see Creating system variable(see page 126)).

To configure data replication, do the following:

1. In the list of archives of the domain, select the archive to which you want to copy data from other archives.
2. Select one or more archives from which you want to copy data. You can also replicate video from the embedded camera storage (see Embedded storage(see page 234)).



3. In the **Replication period** parameter, select the replication period:
   a. **Always**—replication is performed continuously.
   b. **Time schedule**—replication is performed within the specified time schedule (see Creating schedules(see page 1012)). For example, to distribute the CPU load, you can configure replication to run at night.
   c. **On demand**—replication is started manually or using macros (see Manual archive replication(see page 1205), Start replication(see page 870)).

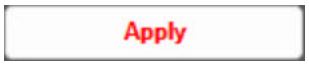
   Attention!

   - If you change the replication period in an existing replication archive, the archive recordings for the previous period are deleted.
   - If you use an object archive, it is possible to record data and replicate it to the same archive at a time if you select the **On demand** replication period. For example, in the case of continuous recording and a short-term (for example, five minutes) loss of connection with the camera, you can use a macro to replicate the data from the embedded storage to the same archive to which the continuous recording is made.

4. In the **Cameras for replication** parameter, for each archive, select cameras from which data are copied to the replication archive. To select all cameras, click the **Select all** button.

   Note

   - Data from a particular camera can be copied to the replication archive only from one archive. When you select a camera for replication from an archive, the camera becomes unavailable for replication from any other archive.
   - You cannot select cameras if they are already recording to the replication archive.

5. Click the **Apply** 

button.

Configuring data replication is complete. If the replication period is set to **Always**, data replication starts immediately after the settings are applied.

19.3.11.5.1 Data replication from the block archive to the object archive

If *Axxon One* performs continuous recording of streams from cameras to the block archive and you want to transfer data from the block archive to the object archive, you must:

1. Create a new object archive.
2. Replicate previously recorded data from the block archive to the object archive.
3. Disable replication and bind cameras to the object archive for subsequent recording.
4. Unbind cameras from the block archive, leaving only the object archive active.

As a result, all old recordings transferred from the block archive to the object archive are saved. New camera recordings are saved directly to the object archive.

19.3.11.6 Encrypting a volume of an object archive

On the page:

- General Information(see page 300)
- Licensing(see page 300)
- Encrypting a volume of an object archive(see page 301)
- Moving an encrypted archive volume(see page 302)

Creating a local archive(see page 276)
Creating a remote archive(see page 280)
Creating a cloud archive(see page 284)
Statuses of archive volumes(see page 306)

19.3.11.6.1 General Information

The AES-256-GCM algorithm is used to encrypt the object archive.

Encryption of an object archive allows you to:

- ensure protection of data written to archive volumes;
- keep confidentiality;
- protect data from unauthorized access.

19.3.11.6.2 Licensing

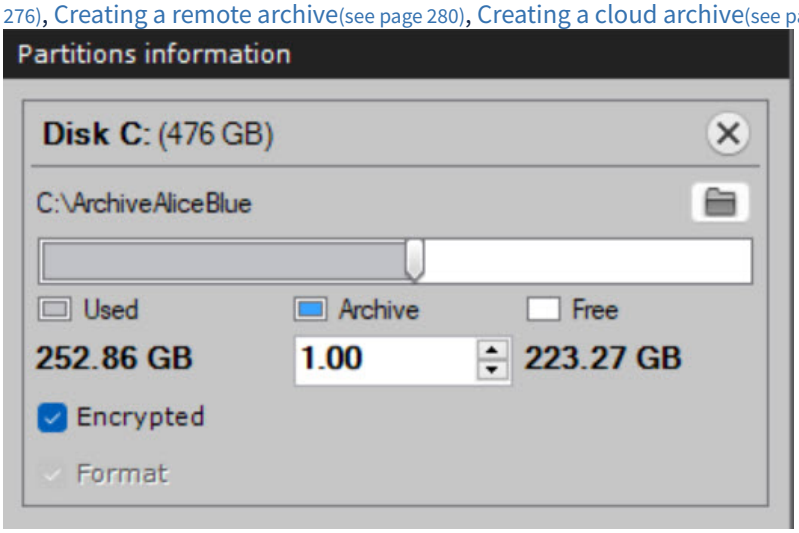
A separate license module is required for each archive volume. Encryption of a volume of an object archive is available for *Axxon One* **Professional**, **Enterprise** and **Unified** licenses (see Types of licenses[113]). To obtain the modules, contact an AxxonSoft manager.

113 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

19.3.11.6.3 Encrypting a volume of an object archive

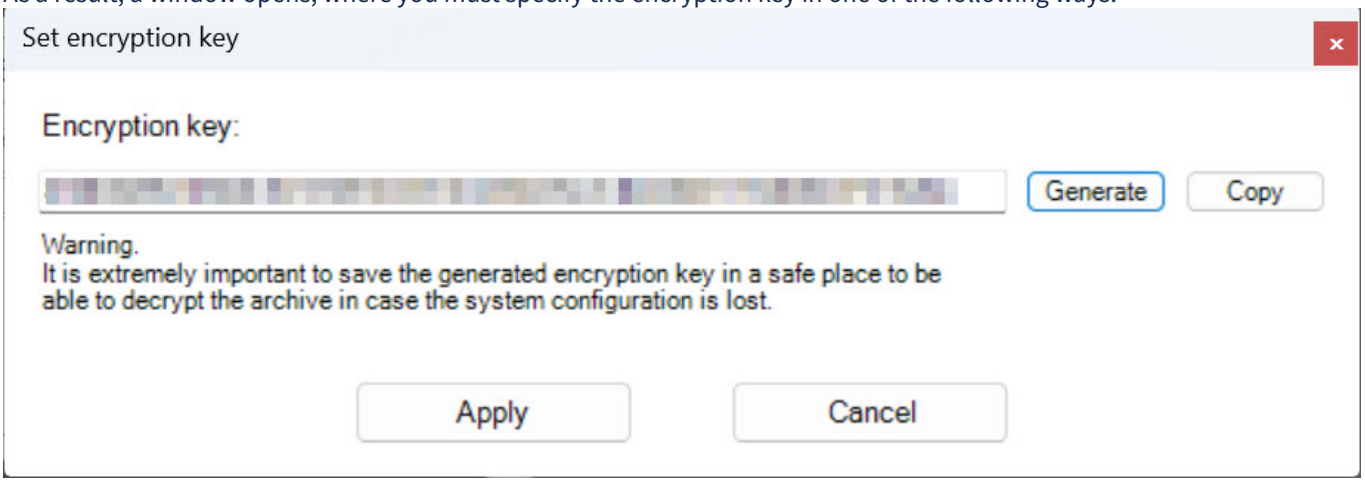
To encrypt a volume of an object archive, do the following:

1. Set the **Encrypted** checkbox when you create or edit a volume of an object archive (see Creating a local archive(see page 276), Creating a remote archive(see page 280), Creating a cloud archive(see page 284)).



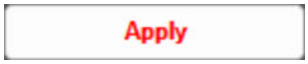
> **Note**
>
> In the **Cloud** archives, you must click the three-dot button in the **AES key** parameter to apply encryption:
> - Configuring an archive volume based on the Microsoft Azure solution(see page 286)
> - Configuring an archive volume based on the Amazon solution(see page 287)
> - Configuring an archive volume based on the Seagate Lyve Cloud solution(see page 289)
> - Configuring an archive volume based on the Wasabi solution(see page 290)
> - Configuring an archive volume based on the MinIO solution(see page 291)

As a result, a window opens, where you must specify the encryption key in one of the following ways:



   a. Enter a **32-byte** custom encryption key generated using a third-party application.
   b. Generate the key using the embedded generation function by clicking the **Generate** button.
2. Click the **Copy** button to copy the key to the clipboard.

> **Attention!**
>
> You must save the generated key in a safe place on a separate medium. This will allow you to restore access to the data in case the archive is transferred to another machine or access to the server is lost.

3. Click the **Apply** 

button.

As a result, after you apply the encryption key, all video data written to the volume is stored in encrypted form. The volume is labeled **Encrypted**.

Attention!

- Encryption is only applied to video data recorded after you applied the encryption key.
- Already existing data in the volume remains unencrypted.

19.3.11.6.4 Moving an encrypted archive volume

If you physically move a disk with an archive to a new machine, the system marks an encrypted volume as inaccessible (displayed in red) with the label **Encrypted**. To restore access, do the following:

1. Open the archive volume and set the **Encrypted** checkbox.
2. Enter the previously saved encryption key in the window that opens.
3. Click the **Apply** 

button.

After the key is successfully entered, the volume becomes available, and its color changes from red to green in the interface.

19.3.11.7 Extending the space of an archive volume

You can extend the space of an archive volume.

19.3.11.7.1 Extending the space of an archive volume as a partition

You can extend the space of an archive volume as a partition only on standard storage media. You cannot extend a volume on a RAID array.

Attention!

AxxonSoft cannot guarantee archive data integrity after this action is complete.

To extend the space, do the following:

1. Stop the *Axxon One* server (see Stop the server(see page 146)).
2. Use the Windows Disk Management utility to extend[114] the space of a volume.
3. Start the server (see Starting the server(see page 137)).

19.3.11.7.2 Extending the space of an archive volume as a file

To extend the space of an archive volume as a file, use the **-expand** parameter in the console utility for working with archives (see Console utility for working with archives (vfs_format.exe)(see page 1422)).

19.3.11.7.3 Extending the space of an object archive volume

You can extend the space of an object archive volume by using the **Archive size** parameter in the interface (see Creating a cloud archive(see page 284)), and via the gRPC API (see Resize cloud archive using gRPC API methods[115]).

19.3.11.8 Saving an archive when replacing a video signal device

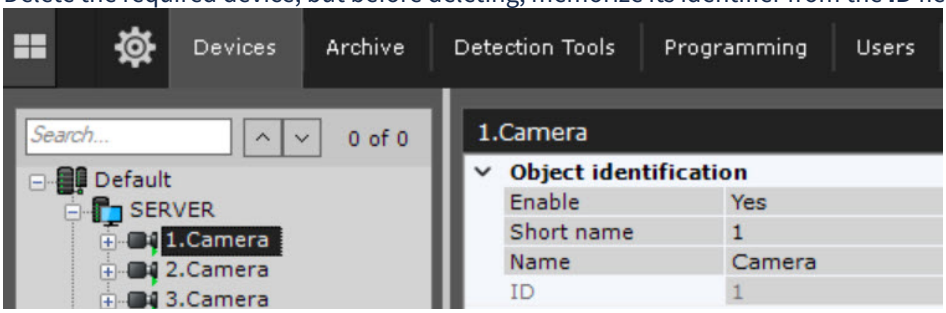
In *Axxon One*, you can save an archive in case you want to replace a camera, NVR, or any other source of video signal.

To do this, do the following:

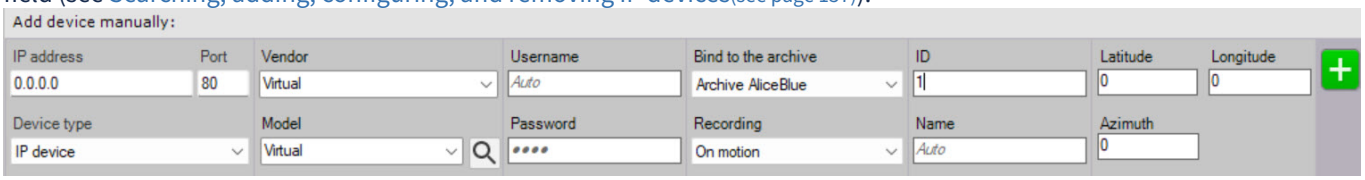
1. Go to the **Devices** tab.

114 https://docs.microsoft.com/en-us/windows-server/storage/disk-management/extend-a-basic-volume
115 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246488511/Resize+cloud+archive+using+gRPC+API+methods

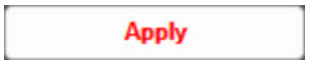
2. Delete the required device, but before deleting, memorize its identifier from the **ID** field.



3. Create a new device in the system. Specify the same identifier in the **ID** field and an old archive in the **Bind to the archive** field (see Searching, adding, configuring, and removing IP devices(see page 157)).



> **Attention!**
>
> - Device model, IP address, and any other device parameters can differ from the previous one.
> - If you replace NVR, cameras must be connected to the same channels as before.

4. Click the **Apply**  button.

After you create a new device with the old ID, the archive recorded earlier will be available in the system.

19.3.11.9 Protecting video recordings from FIFO overwriting

In *Axxon One*, data is recorded to an archive in a loop. Old archive videos can be replaced with newer videos.

You can protect selected videos from being overwritten. A macro copies protected recordings to another archive.

To protect videos, do the following:

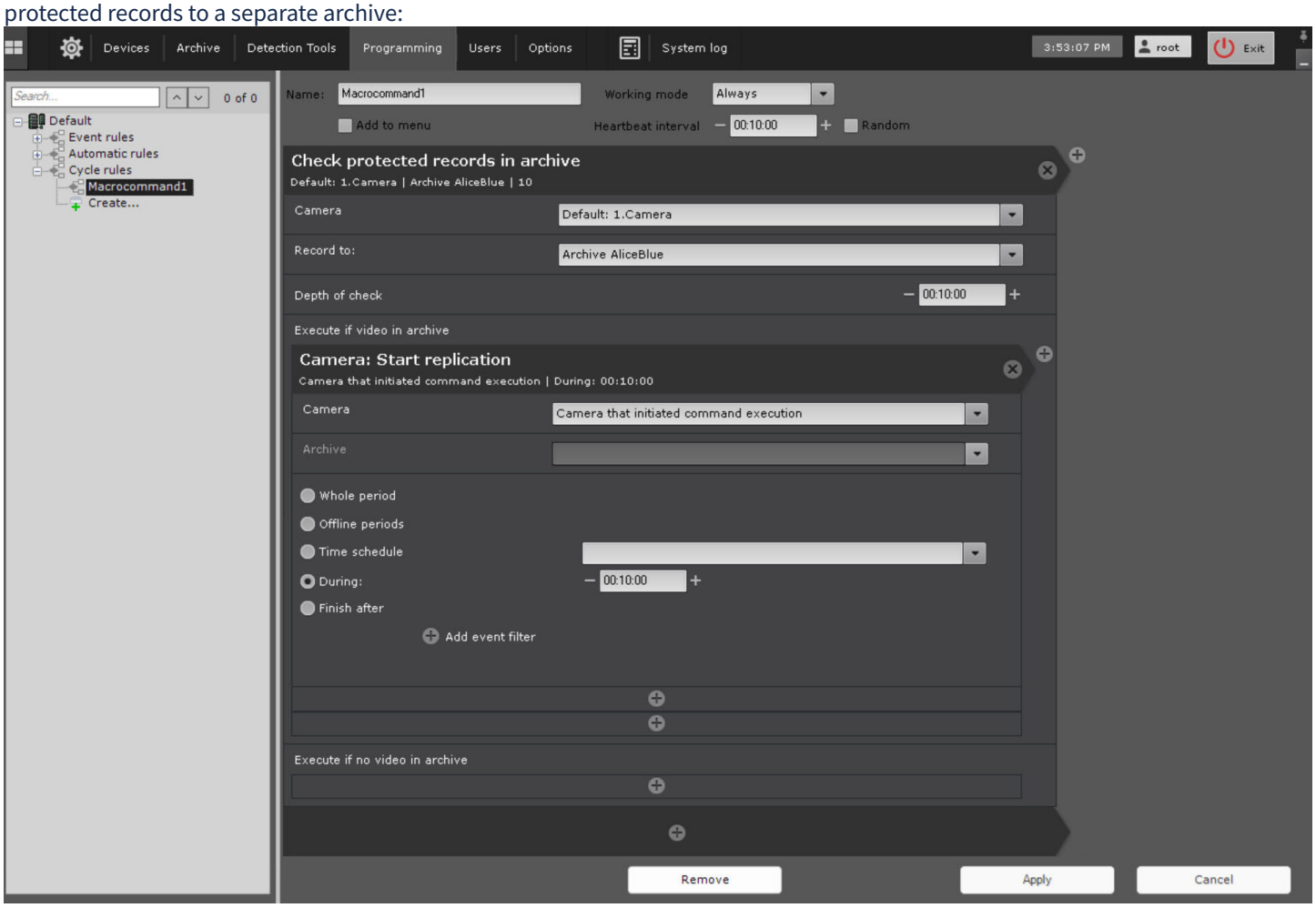
1. Configure on-demand replication (see Configuring data replication(see page 298)).
2. Configure a macro (see Configuring a macro to automatically copy protected videos(see page 303)).
3. Configure protection for the required videos (see Configuring video protection(see page 304)).

You can further edit protected recordings in the Web-Client (see Working with bookmarks in the Web-Client(see page 1374)).

19.3.11.9.1 Configuring a macro to automatically copy protected videos

> **Attention!**
>
> A macro to replicate protected records starts working when the archive reaches its limit and FIFO overwriting starts (see Configuring recording to an archive(see page 295))

You must create and configure a **Cycle rules** macro (see General information about macros(see page 829)) to automatically copy protected records to a separate archive:



1. The first action in the macro must be **Check protected records in archive**. In this action, do the following:
    a. In the **Camera** field, select a camera or a group of cameras, the archive of which must be checked for protected records.
    b. If you select a specific camera, in the **Record to** field, specify the archive that you want to check for protected records. If you select a group of cameras in the previous step, only the default archive is checked (see Configuring the default archive(see page 297)).
    c. In the **Depth of check** field, specify the depth of check in HH:MM:SS format. The time interval between checks is calculated as follows: [starting time of the earliest recording in an archive, starting time of the earliest recording in an archive + depth of check].
    d. Add **Start replication** as an action that must be performed when there are protected records within the check interval (see Start replication(see page 870)).
    e. Select **During** as the replication period. Replication duration determines the time interval from which protected records are copied to another archive. All protected intervals starting within the [starting time of the earliest recording in an archive; starting time of the earliest recording in an archive + replication duration] interval are copied to the replication archive. In general cases, the replication duration must be the same as the **Depth of check** parameter.

The screenshot shows the settings that make the system check for protected records in **1. Camera** in the archive **AliceBlue** within the [starting time of the earliest recording in archive; starting time of the earliest recording in archive + 10 minutes] time interval every 10 minutes. If there are protected records in this interval, replication starts, and all protected records, the start of which is in the [starting time of the earliest recording in an archive; starting time of the earliest recording in an archive + 10 minutes] interval, are copied to the replication archive.

19.3.11.9.2 Configuring video protection

To protect a video, create a bookmark—a special case of the operator comment (see Operator comments(see page 1153)).

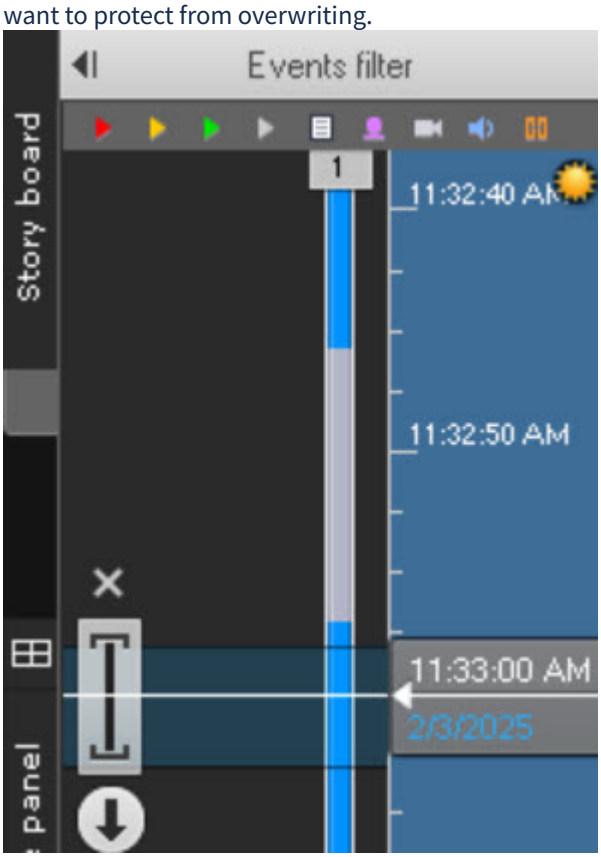
To create a bookmark, do the following:

1. Select the required camera on the layout and switch to the Archive mode (see Switching to the Archive mode(see page 1187)).

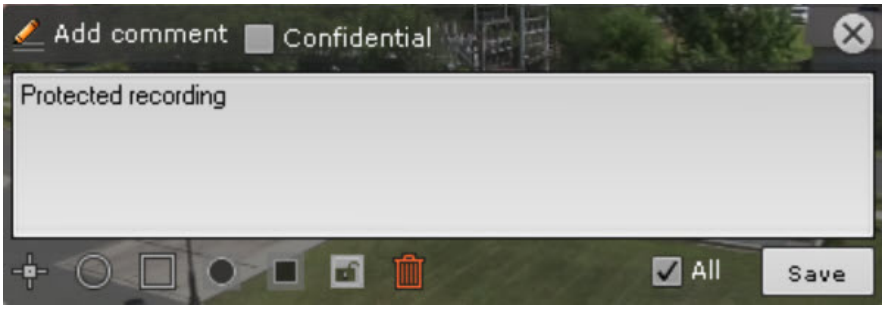
   Note

   If you need to protect the same archive interval for several cameras, switch the necessary cameras to the Archive mode.

2. On the timeline (see The Timeline(see page 1122)), use the  and  buttons to specify the archive interval that you want to protect from overwriting.

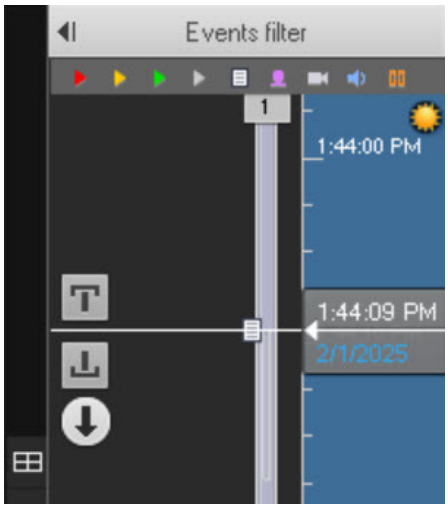


3. Click the  button in the Surveillance window.
4. Enter a comment.



5. Click the  button.
6. Set the **All** checkbox if you want to protect the specified interval in the archive of all cameras that are currently in the Archive mode.
7. Click the **Save** button.

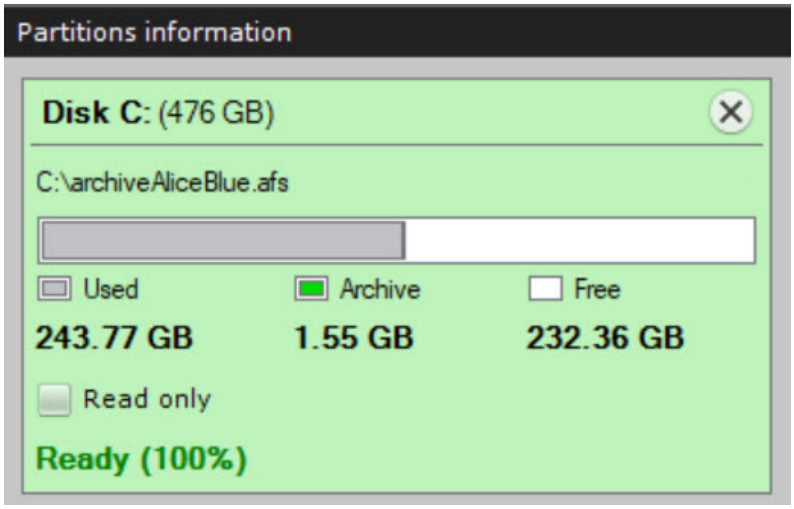
The newly created bookmark appears on the timeline.



The protected interval is highlighted in light grey, and its beginning is marked with the icon. Click the button to delete the specified protected interval in the archive.

19.3.12 Statuses of archive volumes

When working with archives, you can see the statuses of archive volumes in the lower part of the **Partitions information** section. They show the status of an archive and allow you to evaluate its readiness for operation (read, write, or restore data).



The table describes possible statuses of the archive volumes:

Status	Description
Ready (X %)	Archive volume is ready for use. The percentage of used space of an archive volume is indicated in brackets. If a volume is 100% full, it means that new data is written over the old data
Formatting	Archive volume is in the process of being formatted
Opening	Archive volume is opening
Disabled	Archive volume is disabled
Background maintenance (X %)	Archive volume is in the process of being restored or re-indexed. The percentage in brackets indicates how much of the recorded volume has been restored at the moment

Status	Description
Partition should be formatted or recovered	Archive volume is found, but isn't ready for use. The file system structure can be damaged, missing, or needs to be formatted. If necessary, you must restore or format the archive volume
Error	An error related to the operation of the archive volume has occurred. You must check the system log to eliminate the cause of the error (see System log(see page 1318)). If the problem persists, you must contact AxxonSoft technical support
Encrypted	Archive volume is encrypted (see Encrypting a volume of an object archive(see page 300))

19.3.13 Removing archive volumes

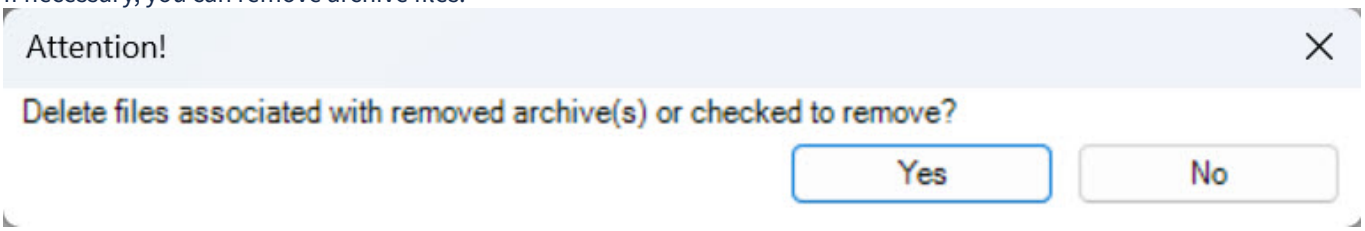
To remove an archive volume, do the following:

1. Go to the **Archive** tab.
2. Select the required archive from the list.
3. Select the required archive volume.
4. Click the  button.

   Note

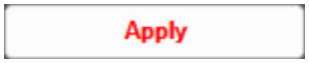
   If there is only one volume in the archive, you cannot remove it.

5. If necessary, you can remove archive files.



   Attention!

   - If you remove archive files, then all archive records that they contained will be lost.
   - If you don't delete archive files, you can re-use them to create another archive (see Creating an archive based on existing archive volumes(see page 293)). You can also use a partition to re-create an archive.

6. Click the **Apply**  button.

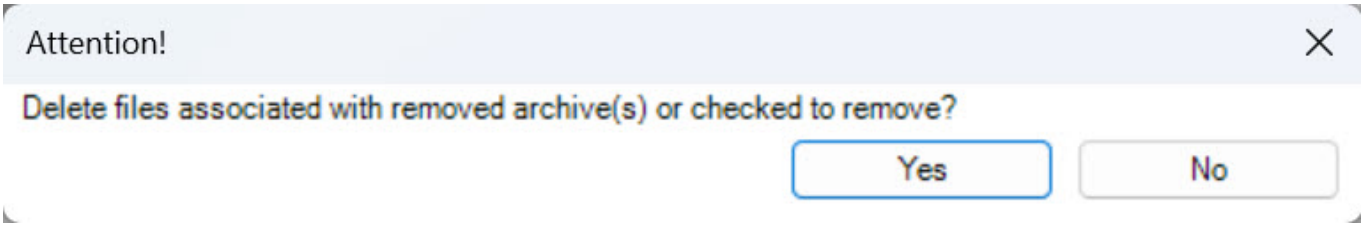
Removing an archive volume is complete.

19.3.14 Removing archives

To remove an archive, do the following:

1. Go to the **Archive** tab.
2. Select the archive that you want to remove in the list.

3. Click the **Remove** Remove button.



Attention!

- If you remove archive files, then all archive records that they contained will be lost.
- If you don't delete archive files, you can re-use them to create another archive (see Creating an archive based on existing archive volumes(see page 293)). You can also use a partition to re-create an archive.

4. Click the **Apply** Apply button.

Removing an archive is complete.

19.4 Detectors

19.4.1 General information about detectors and their sub-detectors

19.4.2 Processors used for detectors operation

19.4.3 Hardware requirements for GPU-based video decoding

19.4.4 Installing DetectorPack add-ons

19.4.5 Configuring detectors and their sub-detectors

19.4.6 Metadata database

19.4.7 Neural analytics

- General information on neural analytics(see page 337)
- Hardware requirements for neural analytics operation(see page 339)
- Data collection requirements for neural network training(see page 341)
- Optimizing the operation of neural analytics on GPU in Windows OS(see page 342)
- Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)

19.4.8 General settings of the detectors

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- Configuring the ignore area(see page 350)
- Configuring a detection area(see page 351)
- Configuring the scanning mode(see page 353)
- Displaying the number of detected objects(see page 355)
- Configuring the Input object(see page 356)
- Checking events of a detector(see page 357)
- Automatic rules(see page 358)

19.4.9 Standard sub-detectors

- General information on the standard sub-detectors(see page 359)
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- Configuring Line crossing(see page 362)
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- Configuring Motion in area(see page 374)
- Configuring Entrance in area(see page 377)
- Configuring Exit from area(see page 380)
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19.4.10 Category: Trackers

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    - Functions of the Abandoned object detector VI(see page 389)
    - Video stream and scene requirements for the Abandoned object detector VI(see page 389)
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    - Licensing of the software module for the Abandoned object detector VI in Windows OS(see page 390)
    - Licensing of the software module for the Abandoned object detector VI in Linux OS(see page 391)
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- Abandoned object detector VI (Street)(see page 396)
    - Functions of the Abandoned object detector VI (Street)(see page 396)
    - Video stream and scene requirements for the Abandoned object detector VI (Street)(see page 396)
    - Image requirements for the Abandoned object detector VI (Street)(see page 396)
    - Licensing of the software module for the Abandoned object detector VI (Street) in Windows OS(see page 397)
    - Licensing of the software module for the Abandoned object detector VI (Street) in Linux OS(see page 397)
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- Neural tracker(see page 402)
    - Functions of the Neural tracker(see page 402)
    - Video stream and scene requirements for the Neural tracker and its sub-detectors(see page 402)
    - Image requirements for the Neural tracker and its sub-detectors(see page 404)
    - Configuring the Neural tracker(see page 405)
- Object tracker(see page 414)
    - Functions of the Object tracker(see page 414)
    - Video stream and scene requirements for the Object tracker and its sub-detectors(see page 414)
    - Image requirements for the Object tracker and its sub-detectors(see page 414)
    - Configuring the Object tracker(see page 415)
    - Abandoned object(see page 423)
- Human tracker VL(see page 425)
    - Functions of the Human tracker VL(see page 425)
    - Video stream and scene requirements for the Human tracker VL and its sub-detectors(see page 425)
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    - Activating the license for the Human tracker VL in Windows OS(see page 427)
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            - Configuring the Human tracker VL standard sub-detectors(see page 440)
- Stopped object detector(see page 440)
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- Motion detector(see page 446)
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    - Video stream and scene requirements for the Privacy masking(see page 450)
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- Motion in area detector VI(see page 455)
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    - Video stream and scene requirements for the Motion in area detector VI(see page 455)
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    - Licensing of the software module for the Motion in area detector VI in Windows OS(see page 456)
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- Movement in prohibited direction VI(see page 460)
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    - Video stream and scene requirements for the Movement in prohibited direction VI detector(see page 460)
    - Image requirements for the Movement in prohibited direction VI detector(see page 461)
    - Licensing of the software module for the Movement in prohibited direction VI detector in Windows OS(see page 461)
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- Line crossing VI(see page 466)
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19.4.11 Category: Face

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    - Hardware requirements for the Face detector VL and its sub-detectors(see page 473)
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- Face detector VA(see page 485)
    - Functions of the Face detector VA(see page 485)
    - Manual for switching from the Face detector TV to Face detector VA(see page 485)
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    - Optimizing the operation of the Face detector VA on GPU in Windows OS(see page 487)
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- Face detector TV(see page 500)
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19.4.12 Category: Vehicle

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- License plate recognition IV(see page 519)
  - Functions of the License plate recognition IV(see page 519)
  - Hardware requirements for the License plate recognition IV(see page 521)
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- License plate recognition RR(see page 535)
  - Functionality of License plate recognition RR(see page 535)
  - Hardware requirements for License plate recognition RR(see page 543)
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    - Recommendations for configuring the speed detection area for License plate recognition RR(see page 547)
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- License plate recognition RR—Search in archive(see page 561)
  - Functionality of License plate recognition RR—Search in archive(see page 561)
  - Hardware requirements for License plate recognition RR—Search in archive(see page 561)
  - Camera requirements for License plate recognition RR—Search in archive and its sub-detectors(see page 562)
  - Optimizing the operation of License plate recognition RR—Search in archive on GPU in Windows OS(see page 563)
  - Optimizing the operation of License plate recognition RR—Search in archive on GPU in Linux OS(see page 565)
  - Configuring License plate recognition RR—Search in archive(see page 569)
- License plate recognition RR—Parking(see page 574)
  - Functionality of License plate recognition RR—Parking(see page 574)
  - Hardware requirements for License plate recognition RR—Parking(see page 582)
  - Camera requirements for License plate recognition RR—Parking and its sub-detectors(see page 583)
    - Recommendations for configuring the speed detection area for License plate recognition RR—Parking(see page 586)
  - Optimizing the operation of License plate recognition RR—Parking on GPU in Windows OS(see page 588)
  - Optimizing the operation of License plate recognition RR—Parking on GPU in Linux OS(see page 590)
  - Configuring License plate recognition RR—Parking(see page 594)
- Vehicle recognition RR(see page 600)
  - Functionality of Vehicle recognition RR(see page 600)
  - Hardware requirements for Vehicle recognition RR(see page 608)
  - Camera requirements for Vehicle recognition RR and its sub-detectors(see page 609)
    - Recommendations for configuring the speed detection area for Vehicle recognition RR(see page 610)
  - Optimizing the operation of Vehicle recognition RR on GPU in Windows OS(see page 612)
  - Optimizing the operation of Vehicle recognition RR on GPU in Linux OS(see page 613)
  - Configuring Vehicle recognition RR(see page 615)
- License plate recognition XR(see page 620)
  - Functions of the License plate recognition XR(see page 620)
  - Hardware requirements for the License plate recognition XR(see page 621)
  - Video stream and scene requirements for the License plate recognition XR(see page 621)
  - Image requirements for the License plate recognition XR(see page 622)
  - Licensing of the software module for the License plate recognition XR in Windows OS(see page 623)

    - Configuring the License plate recognition XR(see page 625)
    - Installing and configuring Vaxtor License Server using Docker for License plate recognition XR(see page 631)
- License plate recognition VT(see page 636)
    - Functions of the License plate recognition VT(see page 636)
    - Hardware requirements for the License plate recognition VT(see page 638)
    - Video stream and scene requirements for the License plate recognition VT and its sub-detectors(see page 638)
    - Image requirements for the License plate recognition VT and its sub-detectors(see page 642)
    - Optimizing the operation of the License plate recognition VT on GPU in Windows OS(see page 643)
    - Optimizing the operation of the License plate recognition VT on GPU in Linux OS(see page 646)
    - Licensing of the software module for the License plate recognition VT in Windows OS(see page 650)
    - Licensing of the software module for the License plate recognition VT in Linux OS(see page 655)
    - Configuring the License plate recognition VT(see page 659)
- Checking in lists of LPs(see page 668)

19.4.13 Category: Poses

- Human pose detector(see page 669)
    - Functions of the Human pose detector and its sub-detectors(see page 669)
    - Video stream and scene requirements for the Human pose detector and its sub-detectors(see page 669)
    - Image requirements for the Human pose detector and its sub-detectors(see page 671)
    - Configuring the Human pose detector(see page 672)
    - Configuring the Human pose detector sub-detectors(see page 678)
        - Sitting person detector(see page 678)
        - Person down detector(see page 681)
        - Hands up detector(see page 684)
        - Shooter detector(see page 685)
        - Handrail holding detector(see page 686)
        - People counter(see page 688)
        - Close-standing people detector(see page 689)
        - People masking(see page 693)
        - Configuring the standard sub-detectors of the Human pose detector(see page 694)
- Person-based privacy masking(see page 694)
    - Functions of the Person-based privacy masking(see page 694)
    - Video stream and scene requirements for the Person-based privacy masking(see page 694)
    - Configuring the Person-based privacy masking(see page 695)

19.4.14 Category: Production Safety

- Audio classification IV(see page 698)
    - Functions of the Audio classification IV(see page 698)
    - Hardware and audio data requirements for the operation of the Audio classification IV(see page 698)
    - Configuring the Audio classification IV(see page 699)
- Neural classifier(see page 701)
    - Functions of the Neural classifier(see page 701)
    - Video stream and scene requirements for the Neural classifier(see page 701)
    - Configuring the Neural classifier(see page 702)
- Fire detector(see page 706)
    - Functions of the Fire detector(see page 706)
    - Video stream and scene requirements for the Fire detector(see page 706)
    - Configuring the Fire detector(see page 707)
- Equipment detector(see page 711)
    - Functions of the Equipment detector(see page 711)
    - Video stream and scene requirements for the Equipment detector and its sub-detectors(see page 711)
    - Image requirements for the Equipment detector and its sub-detectors(see page 713)
    - Example of providing a list of valid equipment at the facility for the Equipment detector(see page 714)
    - Configuring the Equipment detector(see page 717)
- Smoke detector(see page 725)

    - Functions of the Smoke detector(see page 725)
    - Video stream and scene requirements for the Smoke detector(see page 725)
    - Configuring the Smoke detector(see page 726)
- Water level detector(see page 729)
    - Functions of the Water level detector(see page 729)
    - Video stream requirements for the Water level detector(see page 730)
    - Image requirements for the Water level detector(see page 730)
    - Configuring the Water level detector(see page 730)
- Glow detector(see page 736)
    - Functions of the Glow detector(see page 736)
    - Video stream and scene requirements for the Glow detector(see page 736)
    - Image requirements for the Glow detector(see page 736)
    - Configuring the Glow detector(see page 736)
- Equipment detector VL(see page 738)
    - Functions of the Equipment detector VL(see page 738)
    - Video stream and scene requirements for the Equipment detector VL and its sub-detectors(see page 738)
    - Image requirements for the Equipment detector VL and its sub-detectors(see page 739)
    - Example of providing a list of valid equipment at the facility for the Equipment detector VL(see page 740)
    - Activating the license for the Equipment detector VL in Windows OS(see page 743)
    - Activating the license for the Equipment detector VL in Linux OS(see page 748)
    - Configuring the Equipment detector VL(see page 753)

19.4.15 Category: Retail

- Area occupancy detector(see page 756)
    - Functions of the Area occupancy detector(see page 756)
    - Video stream and scene requirements for the Area occupancy detector(see page 756)
    - Configuring the Area occupancy detector(see page 756)
- Barcode detector(see page 760)
    - Functions of the Barcode detector(see page 760)
    - Video stream and scene requirements for the Barcode detector and its sub-detectors(see page 760)
    - Image requirements for the Barcode detector and its sub-detectors(see page 761)
    - Configuring the Barcode detector(see page 761)
- Crowd estimation VA(see page 765)
    - Functions of the Crowd estimation VA(see page 765)
    - Video stream and scene requirements for the Crowd estimation VA(see page 765)
    - Image requirements for the Crowd estimation VA(see page 765)
    - Configuring the Crowd estimation VA(see page 766)
- Meta-detector(see page 768)
    - Functions of the Meta-detector(see page 768)
    - Video stream and scene requirements for the Meta-detector(see page 768)
    - Image requirements for the Meta-detector(see page 769)
    - Configuring the Meta-detector(see page 769)
- Neural counter(see page 771)
    - Functions of the Neural counter(see page 771)
    - Video stream and scene requirements for the Neural counter operation(see page 771)
    - Image requirements for the Neural counter operation(see page 772)
    - Configuring the Neural counter(see page 773)
- Queue detector(see page 779)
    - Functions of the Queue detector(see page 779)
    - Video stream and scene requirements for the Queue detector(see page 779)
    - Image requirements for the Queue detector(see page 779)
    - Configuring the Queue detector(see page 780)
- Visitors counter(see page 782)
    - Functions of the Visitors counter(see page 782)
    - Video stream and scene requirements for the Visitors counter(see page 782)
    - Image requirements for the Visitors counter(see page 783)
    - Configuring the Visitors counter(see page 785)

19.4.16 Category: Service

- Audio loss detector(see page 788)
  - Functions of the Audio loss detector(see page 788)
  - Configuring the Audio loss detector(see page 788)
- Noise detector(see page 789)
  - Functions of the Noise detector(see page 789)
  - Configuring the Noise detector(see page 789)
- Signal detector(see page 790)
  - Functions of the Signal detector(see page 790)
  - Configuring the Signal detector(see page 790)
- Video clarity detector(see page 790)
  - Functions of the Video clarity detector(see page 790)
  - Video stream and scene requirements for the Video clarity detector(see page 791)
  - Image requirements for the Video clarity detector(see page 791)
  - Configuring the Video clarity detector(see page 792)
- Detector of atypical changes in the scene VI(see page 794)
  - Functions of the Detector of atypical changes in the scene VI(see page 794)
  - Video stream and scene requirements for the Detector of atypical changes in the scene VI(see page 794)
  - Image requirements for the Detector of atypical changes in the scene VI(see page 795)
  - Licensing of the software module for the Detector of atypical changes in the scene VI in Windows OS(see page 795)
  - Licensing of the software module for the Detector of atypical changes in the scene VI in Linux OS(see page 795)
  - Configuring the Detector of atypical changes in the scene VI(see page 797)

19.4.17 Category: Other

- Fight detector VL(see page 799)
  - Functions of the Fight detector VL(see page 799)
  - Video stream and scene requirements for the Fight detector VL(see page 799)
  - Image requirements for the Fight detector VL(see page 800)
  - Activating the license for the Fight detector VL in Windows OS(see page 800)
  - Activating the license for the Fight detector VL in Linux OS(see page 804)
  - Configuring the Fight detector VL(see page 809)

19.4.18 Category: Embedded

- General information about embedded detectors(see page 811)
- Embedded IVA analytics(see page 812)
- Embedded ONVIF analytics(see page 812)
- Adding the ONVIF Profile M embedded detection tools(see page 813)
- Embedded license plate recognition detectors(see page 813)
- Embedded vehicle speed measurement radar(see page 813)
- Embedded temperature detector(see page 817)
- Face detection and temperature control with Mobotix M16 TR cameras(see page 818)
  - Functionality of the Face detector and temperature control(see page 818)
  - Camera requirements for Face detector and temperature control(see page 818)
  - Temperature screening protocol(see page 819)
  - Pre-configuration of the Mobotix M16 TR camera(see page 819)
  - Configuring Face detector and temperature control(see page 822)
- AxxonSoft Tracker in Axis devices(see page 825)

19.4.19 General information about detectors and their sub-detectors

Detector is a software object (part of the software environment) that represents an algorithm or a set of algorithms that allows analyzing video and audio streams according to a predefined scenario and signals about the analysis results by creating events within the software environment.

Sub-detector is a detector that processes the data received from the parent detector.

Attention!

- To configure detectors and their sub-detectors, you must have permissions to configure them (see Users(see page 917)).
- You can create detectors and their sub-detectors for the cameras connected to *Axxon One* (see Camera(see page 171)).
- You can configure detectors and their sub-detectors on the **Settings** tab → **Detectors** (see Configuring detectors and their sub-detectors(see page 328)).

By default, no action is performed in the system when an event from a detector or sub-detector is received. To perform an action, you must create an automatic rule (see Automatic rules(see page 358)) or macro (see Programming(see page 828)).

All *Axxon One* detectors and their sub-detectors:

Installing DetectorPack add-ons(see page 321)

Category	Detectors	Sub-detectors
Category: Trackers(see page 389)	Motion detector(see page 446)	• **Line crossing**(see page 362) • **Loitering in area**(see page 367) • **Stop in area**(see page 370) • **Track masking**(see page 373) • **Motion in area**(see page 374) • **Entrance in area**(see page 377) • **Exit from area**(see page 380) • **Multiple objects**(see page 383) • **Move from area to area**(see page 385) • Abandoned object(see page 423) (for Object tracker(see page 414) only)
	Neural tracker(see page 402)	
	Privacy masking(see page 450) (doesn't have sub-detectors)	
	Object tracker(see page 414)	
	Human tracker VL(see page 425)	
	Stopped object detector(see page 440) (doesn't have sub-detectors)	
	Abandoned object detector VI(see page 389) (doesn't have sub-detectors)	
	Abandoned object detector VI (Street)(see page 396) (doesn't have sub-detectors)	
	Motion in area detector VI(see page 455) (doesn't have sub-detectors)	
	Line crossing VI(see page 466) (doesn't have sub-detectors)	
	Movement in prohibited direction VI(see page 460) (doesn't have sub-detectors)	

Category	Detectors	Sub-detectors
Category: Service(see page 788)	Audio loss detector(see page 788)	• NA
	Noise detector(see page 789)	
	Signal detector(see page 790)	
	Video clarity detector(see page 790)	
	Detector of atypical changes in the scene VI(see page 794)	
Category: Face(see page 473)	Face detector VL(see page 473)	• Line crossing(see page 362) • Loitering in area(see page 367) • Entrance in area(see page 377) • Mask detector VL(see page 483) (for Face detector VL(see page 473) only) • Mask detector VA(see page 497) (for Face detector VA(see page 485) only) • Mask detector TV(see page 512) (for Face detector TV(see page 500) only)
	Face detector VA(see page 485)	
	Face detector TV(see page 500)	
Category: Vehicle(see page 514)	License plate recognition BRS(see page 514) **Attention!** Starting with *Detector Pack* 3.14, the **License plate recognition BRS** isn't supported.	• Line crossing(see page 362) • Loitering in area(see page 367) • Stop in area(see page 370) • Track masking(see page 373) • Motion in area(see page 374) • Entrance in area(see page 377) • Exit from area(see page 380) • Multiple objects(see page 383) • Move from area to area(see page 385)
	License plate recognition IV(see page 519)	
	License plate recognition RR(see page 535)	
	License plate recognition RR—Search in archive(see page 561)	
	License plate recognition RR—Parking(see page 574)	
	License plate recognition VT(see page 636)	
	Vehicle recognition RR(see page 600)	
	License plate recognition XR(see page 620)	• NA
Category: Poses(see page 669)	Person-based privacy masking(see page 694)	• NA

<table>
<tr><th>Category</th><th>Detectors</th><th>Sub-detectors</th></tr>
<tr><td></td><td>Human pose detector(see page 669)</td><td>

Sitting person detector(see page 678)
Person down detector(see page 681)
Hands up detector(see page 684)
Handrail holding detector(see page 686)
People counter(see page 688)
Close-standing people detector(see page 689)
People masking(see page 693)

Attention!
Starting with DetectorPack 3.13, the People masking(see page 693) is no longer supported. We replaced it with the Track masking(see page 373).

Line crossing(see page 362)
Loitering in area(see page 367)
Stop in area(see page 370)
Track masking(see page 373)
Motion in area(see page 374)
Entrance in area(see page 377)
Exit from area(see page 380)
Multiple objects(see page 383)
Move from area to area(see page 385)

</td></tr>
<tr><td rowspan="7">Category: Production Safety(see page 698)</td><td>Audio classification IV(see page 698)</td><td rowspan="7">For Equipment detector(see page 711) and Equipment detector VL(see page 738) only:

Line crossing(see page 362)
Loitering in area(see page 367)
Stop in area(see page 370)
Track masking(see page 373)
Motion in area(see page 374)
Entrance in area(see page 377)
Exit from area(see page 380)
Multiple objects(see page 383)
Move from area to area(see page 385)

</td></tr>
<tr><td>Fire detector(see page 706)</td></tr>
<tr><td>Glow detector(see page 736)</td></tr>
<tr><td>Equipment detector(see page 711)</td></tr>
<tr><td>Neural classifier(see page 701)</td></tr>
<tr><td>Smoke detector(see page 725)</td></tr>
<tr><td>Water level detector(see page 729)</td></tr>
<tr><td>Equipment detector VL(see page 738)</td></tr>
<tr><td rowspan="5">Category: Retail(see page 756)</td><td>Barcode detector(see page 760)</td><td rowspan="5">For Barcode detector(see page 760) only:

Line crossing(see page 362)
Loitering in area(see page 367)
Stop in area(see page 370)
Track masking(see page 373)
Motion in area(see page 374)
Entrance in area(see page 377)
Exit from area(see page 380)
Multiple objects(see page 383)
Move from area to area(see page 385)

</td></tr>
<tr><td>Meta-detector(see page 768)</td></tr>
<tr><td>Neural counter(see page 771)</td></tr>
<tr><td>Queue detector(see page 779)</td></tr>
<tr><td>Visitors counter(see page 782)</td></tr>
</table>

Category	Detectors	Sub-detectors
	Crowd estimation VA(see page 765)	
Category: Other(see page 799)	Fight detector VL(see page 799)	• NA
Category: Embedded(see page 811)	**Embedded motion detector**	• NA
	Embedded vehicle speed measurement radar(see page 813)	
	Embedded tampering detector	
	Embedded audio detector	
	Embedded face detector	
	Embedded intrusion detector	
	Embedded line crossing detector	
	Embedded entrance in area detector	
	Embedded exit from area detector	
	Embedded abandoned object detector	
	Embedded object disappearance detector	
	ROI compression	
	Embedded GPS tracker	
	Embedded license plate recognition detectors(see page 813)	
	Embedded temperature detector	• Face detector and temperature control(see page 818)
	Embedded body temperature detector	• NA
	Tracker Analytics	• **Line crossing** • **Loitering in area** • **Stop in area** • **Track masking** • **Motion in area** • **Entrance in area** • **Exit from area** • **Multiple objects** • **Move from area to area**
	Embedded analytics	

Also, the default detector list displays camera inputs (see Configuring the Input object(see page 356)) that you can use in an automatic rule.

19.4.20 Processors used for detectors operation

> **Attention!**
>
> Starting with *Detector Pack* 3.10, working on VPU (Intel HDDL, Intel Movidius) isn't supported.

Refer to the following table to check the compatibility of detectors and processors.

Category	Detector	Windows x64			Linux AMD64		
		CPU	GPU	VPU	CPU	GPU	VPU
Category: Trackers(see page 389)	Motion detector(see page 446)	✓	✓	⛔	✓	✓	⛔
	Neural tracker(see page 402)	✓	✓	✓	✓	✓	✓
	Privacy masking(see page 450)	✓	✓	✓	✓	✓	✓
	Object tracker(see page 414)	✓	⛔	⛔	✓	⛔	⛔
	Human tracker VL(see page 425)	✓	✓	⛔	✓	✓	⛔
	Stopped object detector(see page 440)	✓	✓	⛔	✓	✓	⛔
	Abandoned object detector VI(see page 389)	✓	✓	⛔	✓	✓	⛔
	Abandoned object detector VI (Street)(see page 396)	✓	✓	⛔	✓	✓	⛔
	Line crossing VI(see page 466)	✓	✓	⛔	✓	✓	⛔
	Movement in prohibited direction VI(see page 460)	✓	✓	⛔	✓	✓	⛔
	Motion in area detector VI(see page 455)	✓	✓	⛔	✓	✓	⛔
Category: Service(see page 788)	Video clarity detector(see page 790)	✓	⛔	⛔	✓	⛔	⛔
	Audio loss detector(see page 788)	✓	⛔	⛔	✓	⛔	⛔
	Noise detector(see page 789)	✓	⛔	⛔	✓	⛔	⛔
	Signal detector(see page 790)	✓	⛔	⛔	✓	⛔	⛔
	Detector of atypical changes in the scene VI(see page 794)	✓	✓	⛔	✓	✓	⛔

Category: Face(see page 473)	Face detector VA(see page 485)	✓	✓	⊖	✓	✓	⊖
	Face detector VL(see page 473)	✓	✓	⊖	✓	✓	⊖
	Face detector TV(see page 500)	✓	✓	⊖	✓	✓	⊖
Category: Vehicle(see page 514)	License plate recognition BRS(see page 514)	✓	⊖	⊖	✓	⊖	⊖
	License plate recognition IV(see page 519)	✓	✓	⊖	✓	✓	⊖
	License plate recognition RR(see page 535)	✓	✓	⊖	✓	✓	⊖
	License plate recognition RR—Search in archive(see page 561)	✓	✓	⊖	✓	✓	⊖
	License plate recognition RR—Parking(see page 574)	✓	✓	⊖	✓	✓	⊖
	License plate recognition VT(see page 636)	✓	✓	✓	✓	⊖	✓
	Vehicle recognition RR(see page 600)	✓	✓	⊖	✓	✓	⊖
	License plate recognition XR(see page 620)	✓	⊖	⊖	✓	⊖	⊖
Category: Poses(see page 669)	Person-based privacy masking(see page 694)	✓	✓	✓	✓	✓	✓
	Human pose detector(see page 669)	✓	✓	✓	✓	✓	✓
Category: Production Safety(see page 698)	Audio classification IV(see page 698)	✓	⊖	⊖	✓	⊖	⊖
	Fire detector(see page 706)	✓	✓	✓	✓	✓	✓
	Glow detector(see page 736)	✓	⊖	⊖	✓	⊖	⊖
	Neural classifier(see page 701)	✓	✓	✓	✓	✓	✓
	Equipment detector(see page 711)	✓	✓	✓	✓	⊖	⊖
	Smoke detector(see page 725)	✓	✓	✓	✓	✓	✓
	Equipment detector VL(see page 738)	✓	✓	✓	✓	⊖	⊖
	Water level detector(see page 729) without a neural network	✓	⊖	⊖	✓	⊖	⊖
	Water level detector(see page 729) with a neural network	✓	✓	✓	✓	✓	✓

Category: Retail(see page 756)	Barcode detector(see page 760)	✓	✓	✓	✓	✓	✓
	Meta-detector(see page 768)	✓	✓	⛔	⛔	⛔	⛔
	Neural counter(see page 771)	✓	✓	✓	✓	✓	✓
	Queue detector(see page 779)	✓	⛔	⛔	✓	⛔	⛔
	Visitors counter(see page 782)	✓	⛔	⛔	✓	⛔	⛔
	Crowd estimation VA(see page 765)	✓	✓	⛔	✓	✓	⛔
Category: Other(see page 799)	Fight detector VL(see page 799)	✓	✓	⛔	✓	✓	⛔

19.4.21 Hardware requirements for GPU-based video decoding

✓ Hardware requirements(see page 87)
Processors used for detectors operation(see page 319)

If detection tools use GPU for video decoding (see Processors used for detectors operation(see page 319)), the following hardware requirements must be met:

For Nvidia GPUs	• CUDA 11.1–11.8 • Support for the required codec in NVDEC (see here[116]) • Compute Capability 3.5–8.9 ⚠ **Attention!** • CUDA is compatible with generations of computers with the following architectures: Kepler (partially), Maxwell, Pascal, Volta, Turing, Ampere (partially), Ada Lovelace (see CUDA[117]). • You can check the GPU Compute Capability version on the manufacturer's[118] website. • When using Nvidia GPUs, we recommend installing the latest driver from the official website[119]. • To decode video in *Axxon One*, you can use up to four Nvidia GPUs (see Selecting Nvidia GPU when configuring detectors(see page 348)) installed on the Server (Nvidia GPU 0, Nvidia GPU 1, Nvidia GPU 2, Nvidia GPU 3).
For the integrated Intel GPUs	• 6th generation CPU or higher • Support for the required codec in Quick Sync Video

116 https://developer.nvidia.com/video-encode-and-decode-gpu-support-matrix-new
117 https://en.wikipedia.org/wiki/CUDA
118 https://developer.nvidia.com/cuda-gpus
119 https://www.nvidia.com/Download/index.aspx?lang=en-us

19.4.22 Installing DetectorPack add-ons

General information about detectors and their sub-detectors(see page 314)

By default, the *Axxon One* distribution package includes only the basic *DetectorPack* (see Installation(see page 98), Installing Axxon One in Linux OS[120]).

To install add-ons to the basic package, do the following:

1. Download the required packages from the official website[121].
2. Stop the Server (see Stop the server(see page 146)).
3. Run the executable file and wait for the installation to complete.
4. Start the Server (see Starting the server(see page 137)).

Attention!

Versions of the basic *DetectorPack* and the *DetectorPack* add-ons must be the same. If versions differ, you must update the version of the basic *DetectorPack*, so it matches the version of the *DetectorPack* add-ons.

All packages of the *DetectorPack* with detectors and their sub-detectors are described in the table:

Package	Detectors	Sub-detectors
Basic *DetectorPack*	• **Motion detector**(see page 446) • Object tracker(see page 414) (without Neural filter) **Note** You need to install the Neuro Pack add-on for the Neural filter operation. • Video clarity detector(see page 790) • Audio loss detector(see page 788) • Noise detector(see page 789) • Signal detector(see page 790) • Queue detector(see page 779) • Glow detector(see page 736) • Visitors counter(see page 782)	• **Line crossing**(see page 362) • **Loitering in area**(see page 367) • **Stop in area**(see page 370) • **Track masking**(see page 373) • **Motion in area**(see page 374) • **Entrance in area**(see page 377) • **Exit from area**(see page 380) • **Multiple objects**(see page 383) • **Move from area to area**(see page 385) • Abandoned objects detection(see page 423) (for Object tracker(see page 414) only)

120 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486750/Installing+Axxon+One+in+Linux+OS
121 https://www.axxonsoft.com/support/downloads/detector-pack

<table>
<tr><th>Package</th><th>Detectors</th><th>Sub-detectors</th></tr>
<tr>
<td>Neuro Pack add-on</td>
<td>
Note
For the face and people masking function to work when exporting a video, you must install Neuro Pack add-on

Neural filter
Neural tracker(see page 405)
Neural counter(see page 771)
Human pose detector(see page 669)
Neural classifier(see page 701)
Stopped object detector(see page 440)
Smoke detector(see page 725)
Fire detector(see page 706)
Water level detector(see page 729)
Equipment detector(see page 711)
Barcode detector(see page 760)
Meta-detector(see page 768)
Privacy masking(see page 450)
Person-based privacy masking(see page 694)

</td>
<td>
For Human pose detector(see page 669) only:

Sitting person detector(see page 678)
Person down detector(see page 681)
Hands up detector(see page 684)
Handrail holding detector(see page 686)
People counter(see page 688)
Close-standing people detector(see page 689)
People masking(see page 693)

Attention!
Starting with DetectorPack 3.13, the People masking(see page 693) is no longer supported. We replaced it with the Track masking(see page 373).
</td>
</tr>
<tr>
<td>VL Face Recognition Pack add-on</td>
<td>

Face detector VL(see page 473)

Attention!

For the Face detector VL(see page 473) to work, you must install two packages from the DetectorPack:

VL Face Recognition Pack add-on;
VL SDK Pack.

You can install only one of the optional Face Recognition packs: VA Face Recognition Pack add-on, VL Face Recognition Pack add-on, or TV Face Recognition Pack add-on. You cannot install several packs in the same system.

</td>
<td>

Mask detector VL(see page 483)

</td>
</tr>
</table>

Package	Detectors	Sub-detectors
VA Face Recognition Pack add-on	• Face detector VA(see page 485) **Attention!** • You can install only one of the optional Face Recognition packs: VA Face Recognition Pack add-on, VL Face Recognition Pack add-on, or TV Face Recognition Pack add-on. You cannot install several packs in the same system. • VA Face Recognition Pack is guaranteed to work on Linux Debian 11 and Ubuntu 20. Face Recognition Packs isn't guaranteed to work on Linux Debian 9/10, Ubuntu 18 and Ubuntu 19 (see Operating system requirements(see page 86)).	• **Mask detector VA**(see page 497)
TV Face Recognition Pack add-on	• **Face detector TV**(see page 500) **Attention!** • You can install only one of the optional Face Recognition packs: VA Face Recognition Pack add-on, VL Face Recognition Pack add-on or TV Face Recognition Pack add-on. You cannot install several packs in the same system. • TV Face Recognition Pack is guaranteed to work on Linux Debian 11 and Ubuntu 20. Face Recognition Packs isn't guaranteed to work on Linux Debian 9/10, Ubuntu 18 and Ubuntu 19 (see Operating system requirements(see page 86)).	• **Mask detector TV**(see page 512)

Package	Detectors	Sub-detectors

VL SDK Pack (must be installed when you install VL Face Recognition Pack and VL PPE)	**Attention!**
	• For the Face detector VL(see page 473) to work, you must install two packages from the *DetectorPack*:
	  • VL Face Recognition Pack add-on;
	  • VL SDK Pack.
	• For the Equipment detector VL(see page 738) to work, you must install two packages from the *DetectorPack*:
	  • VL PPE add-on;
	  • VL SDK Pack.
	• For the Fight detector VL(see page 799) to work, you must install two packages from the *DetectorPack*:
	  • VL Fight add-on;
	  • VL SDK Pack.
		• NA

RR LPR add-on	• **License plate recognition RR**(see page 535)
	• **License plate recognition RR—Parking**(see page 574)
	• **License plate recognition RR—Search in archive**(see page 561)
	• **Vehicle recognition RR**(see page 600)
	Attention!
	Starting with *Detector Pack* 3.14,
	• you must install two *Detector Packs* for License plate recognition RR(see page 535) to operate:
	  • RR LPR add-on;
	  • RR SDK Pack.
	• you must install two *Detector Packs* for License plate recognition RR—Search in archive(see page 561) to operate:
	  • RR LPR add-on;
	  • RR SDK Pack.
	• you must install two *Detector Packs* for License plate recognition RR—Parking(see page 574) to operate:
	  • RR LPR add-on;
	  • RR SDK Pack.
	• you must install two *Detector Packs* for Vehicle recognition RR(see page 600) to operate:
	  • RR LPR add-on;
	  • RR SDK Pack.
		• NA

Package	Detectors	Sub-detectors

RR SDK Pack	• License plate recognition RR(see page 535)
	• License plate recognition RR—Search in archive(see page 561)
	• License plate recognition RR—Parking(see page 574)
	• Vehicle recognition RR(see page 600)
	
	Attention!
	Starting with *Detector Pack* 3.14,
	• you must install two *Detector Packs* for License plate recognition RR(see page 535) to operate:
	  • RR LPR add-on;
	  • RR SDK Pack.
	• you must install two *Detector Packs* for License plate recognition RR—Search in archive(see page 561) to operate:
	  • RR LPR add-on;
	  • RR SDK Pack.
	• you must install two *Detector Packs* for License plate recognition RR—Parking(see page 574) to operate:
	  • RR LPR add-on;
	  • RR SDK Pack.
	• you must install two *Detector Packs* for Vehicle recognition RR(see page 600) to operate:
	  • RR Vehicle Recognition add-on;
	  • RR SDK Pack.
		• NA

RR Vehicle Recognition add-on	• Vehicle recognition RR(see page 600) **Attention!** Starting with *Detector Pack* 3.14, you must install two *Detector Packs* for Vehicle recognition RR(see page 600) to operate: • RR Vehicle Recognition add-on; • RR SDK Pack.	• NA
XR LPR add-on	• License plate recognition XR(see page 620)	• NA
VT LPR add-on	• **License plate recognition VT**(see page 636)	• NA
IV Analytics Pack add-on	• **License plate recognition IV**(see page 519)	• NA

Package	Detectors	Sub-detectors
BRS LPR add-on	• **License plate recognition BRS**(see page 514) **Attention!** Starting with *Detector Pack* 3.14, the **License plate recognition BRS** isn't supported.	• NA
VA Crowd Estimation Pack add-on	• **Crowd estimation VA**(see page 765)	• NA
VL PPE add-on	• Equipment detector VL(see page 738) **Attention!** For the Equipment detector VL(see page 738) to work, you must install two packages from the *DetectorPack*: • VL PPE add-on; • VL SDK Pack.	• NA
IV Audio Analytics Pack add-on	• Audio classification IV(see page 698)	• NA
VI Analytics Pack add-on	• Abandoned object detector VI(see page 389) • Abandoned object detector VI (Street)(see page 396) • Motion in area detector VI(see page 455) • Detector of atypical changes in the scene VI(see page 794) • Line crossing VI(see page 466) • Movement in prohibited direction VI(see page 460)	• NA
VL Analytics Pack add-on	• Human tracker VL(see page 425) **Attention!** For the Human tracker VL(see page 425) to work, you must install two packages from the *DetectorPack*: • VL Analytics Pack add-on; • VL SDK Pack.	• NA
VL Fight add-on	• Fight detector VL(see page 799) **Attention!** For the Fight detector VL(see page 799) to work, you must install two packages from the *DetectorPack*: • VL Fight add-on; • VL SDK Pack.	• NA

19.4.23 Configuring detectors and their sub-detectors

On the page:

- General information(see page 328)
- Creating a detector(see page 329)
- Creating a sub-detector(see page 329)
- Removing a detector/sub-detector(see page 330)
- Bulk creation of detectors/ sub-detectors of the same type for different cameras(see page 331)
- Bulk application of settings for detectors/sub-detectors of the same type(see page 331)
- Bulk removal of detectors/ sub-detectors(see page 332)

19.4.23.1 General information

In *Axxon One*, you can create and configure detectors and their sub-detectors (child detectors). Sub-detectors process the data received from parent detectors.

To create and configure detectors, you must have permissions to do so (see Users(see page 917)).

Attention!

- You can create detectors and sub-detectors for enabled and disabled cameras if camera video streams are enabled (see Configuring video stream settings(see page 175)).
- You cannot create sub-detectors if the parent detectors don't have the settings applied (you must click the **Apply** button).

Several identical detectors can operate on the same camera stream:

Detectors	Number of identical detectors for one camera
Motion detector(see page 446), Neural tracker(see page 402), Object tracker(see page 414), Neural counter(see page 771)	10
Water level detector(see page 729), Queue detector(see page 779), Visitors counter(see page 782), Mask detector VL(see page 483)	Unlimited

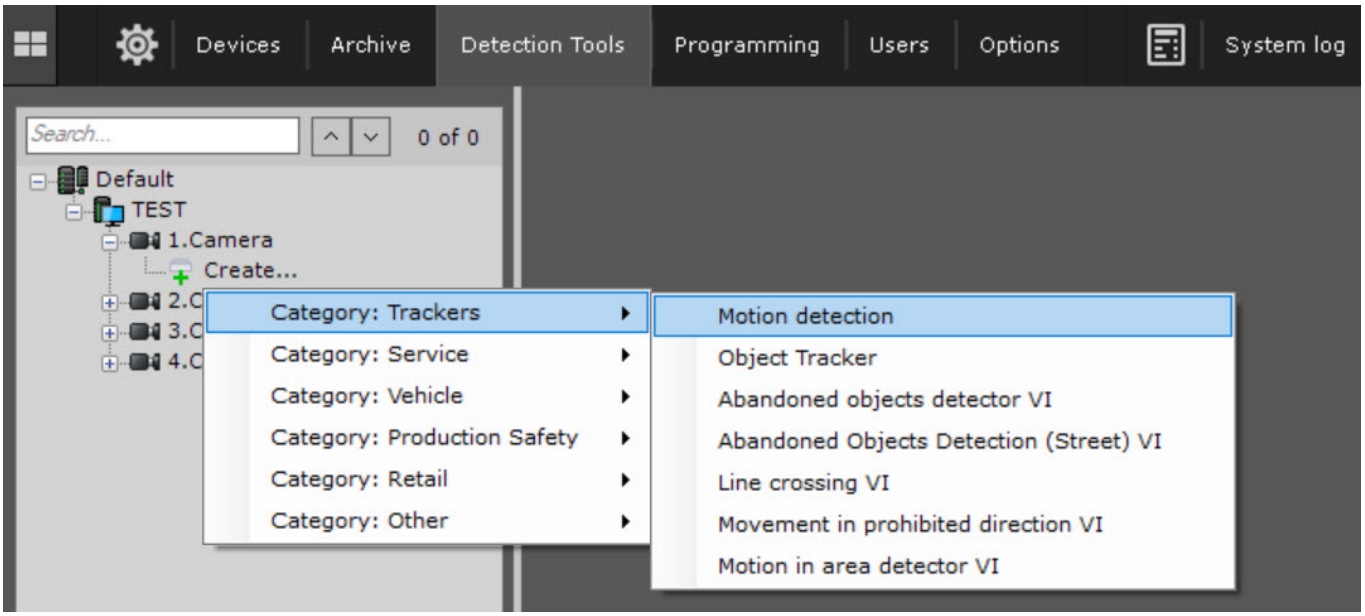
Attention!

For other detectors and their sub-detectors, you cannot create identical detectors and their sub-detectors for one camera.

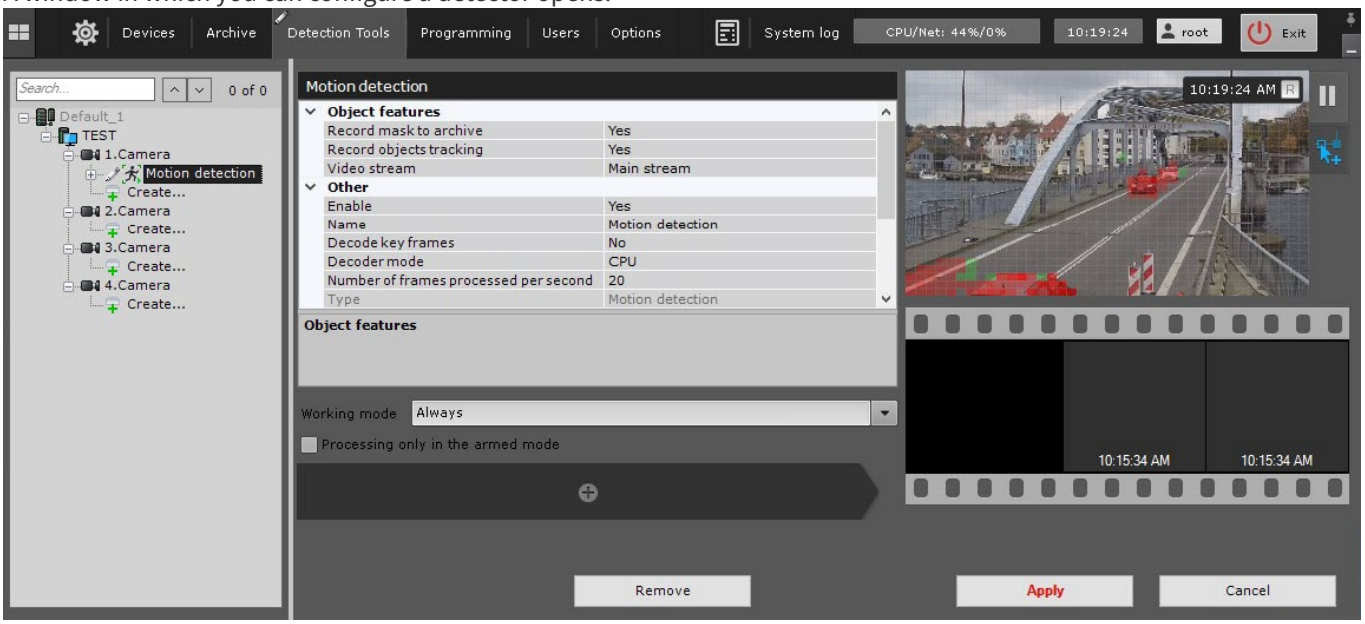
19.4.23.2 Creating a detector

To create a detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…**. The list of available categories of detectors will be displayed (see General information about detectors and their sub-detectors(see page 314)).
3. Select a detector.



A window in which you can configure a detector opens:



4. Click the **Apply** button.

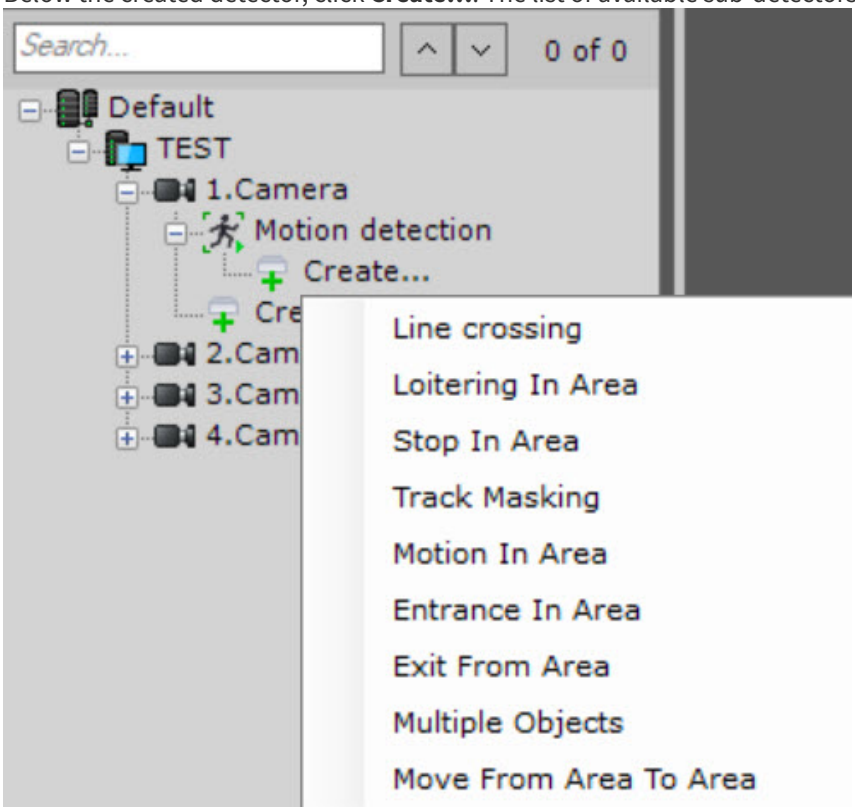
Creation of a detector is complete. The detector is displayed below the selected camera in the object tree.

19.4.23.3 Creating a sub-detector

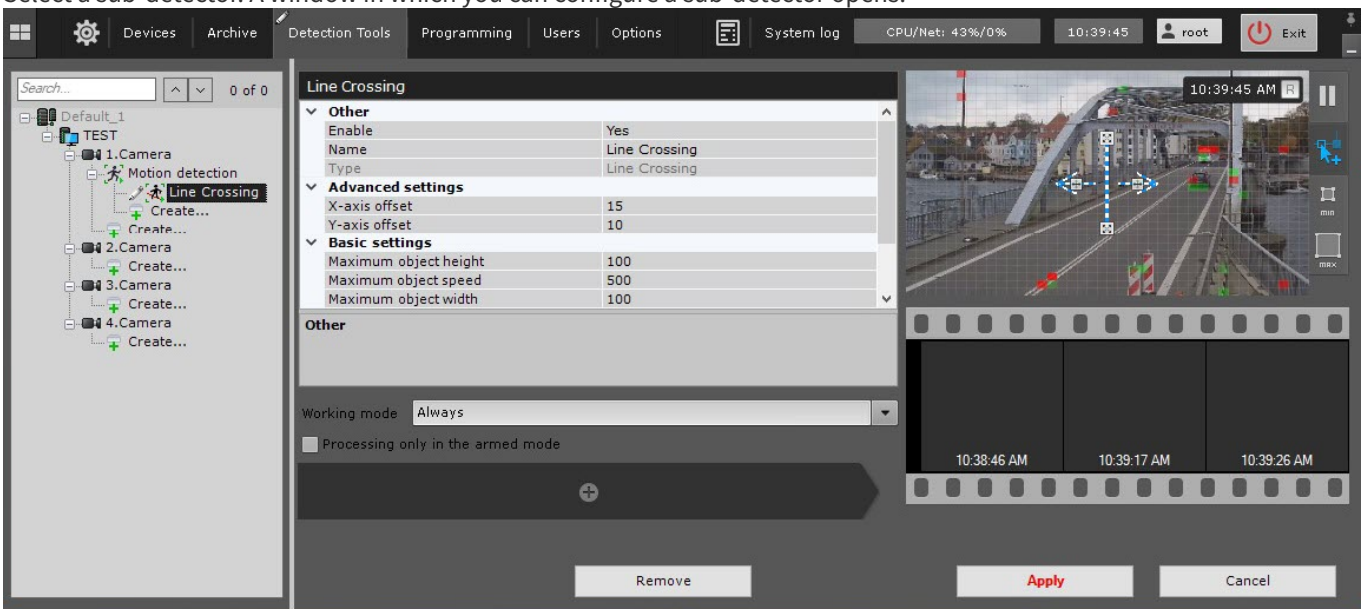
To create a sub-detector, do the following:

1. Create the required detector and specify its parameters (see General information about detectors and their sub-detectors(see page 314)).

2. Below the created detector, click **Create...**. The list of available sub-detectors is displayed.



3. Select a sub-detector. A window in which you can configure a sub-detector opens.

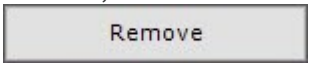


4. Click the **Apply** button.

Creation of a sub-detector is complete. The sub-detector is displayed below the selected camera and below the detector in the object tree.

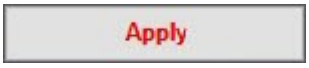
19.4.23.4 Removing a detector/sub-detector

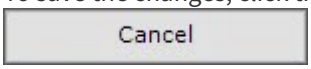
To remove a detector/sub-detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, select the detector/sub-detector.
3. Click the **Remove** 

button.

> **Attention!**
>
> If you created sub-detectors for the detector, they also will be removed from the existing configuration.

4. To save the changes, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Removing a detector/sub-detector is complete. The removed detector/sub-detector won't be displayed below the camera in the object tree.

19.4.23.5 Bulk creation of detectors/sub-detectors of the same type for different cameras

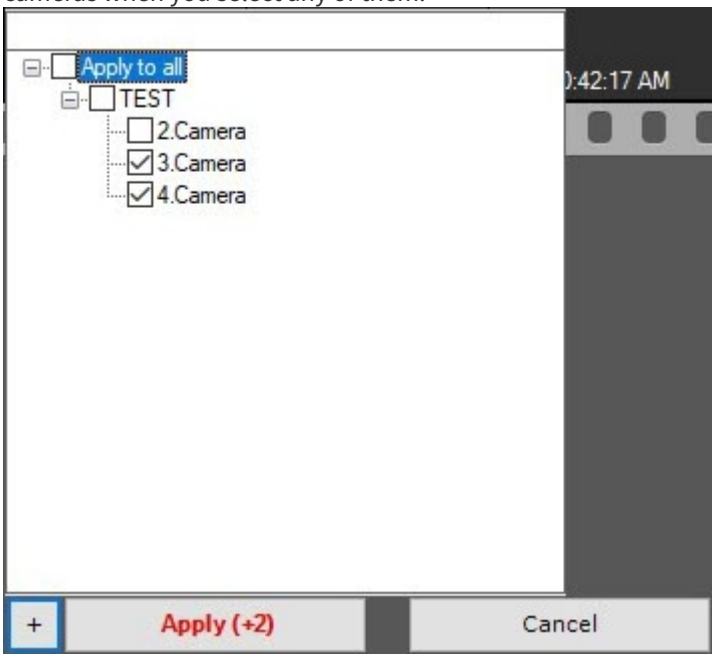
To bulk create detectors/sub-detectors of the same type for different cameras, do the following:

1. Create and configure the required detectors/sub-detectors for one camera or select the existing detector/sub-detectors in the object tree.
2. Click the 

button in the lower right corner.

> **Note**
>
> When you select a sub-detector, in the camera list, only those cameras that have the same parent detector will be available.

3. Set the checkbox next to the required cameras. To quickly select a large number of cameras, press the **Shift** key, select the first and the last cameras for which you want to create a detector/sub-detector. The checkbox will be set for all selected cameras when you select any of them.



4. Click the **Apply** button. The number of cameras for which the detector/sub-detector is created is indicated in brackets.

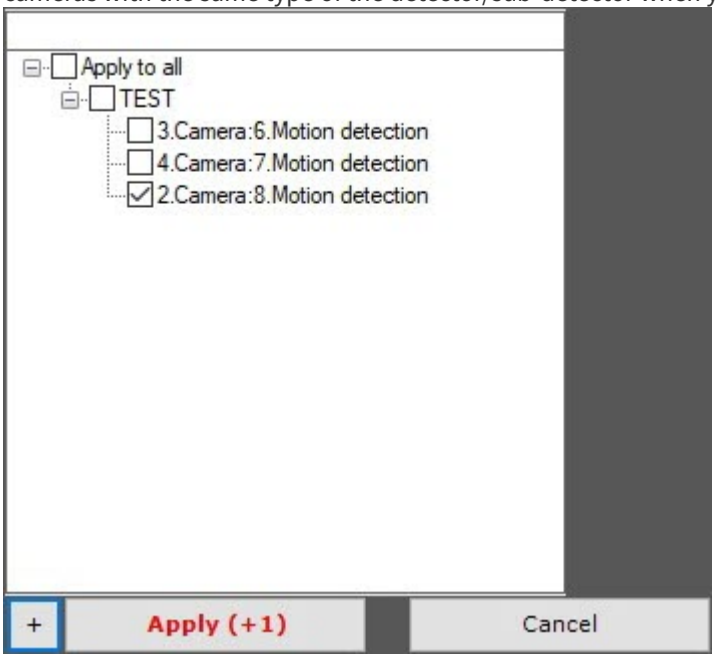
Bulk creation of detectors/sub-detectors of the same type for different cameras is complete. The detectors/sub-detectors of the selected cameras will be displayed in the object tree.

19.4.23.6 Bulk application of settings for detectors/sub-detectors of the same type

For bulk application of settings for detectors/sub-detectors of the same type, do the following:

1. Change the values of the parameters in the settings of one detectors/sub-detector.

2. Click the + button in the lower right corner.
3. Set the checkbox next to the required cameras with the same type of the detector/sub-detector. To quickly select a large number of cameras with the same type of the detector/sub-detector, press the **Shift** key, select the first and the last cameras for which you want to change settings of a detector/sub-detector. The checkbox will be set for all selected cameras with the same type of the detector/sub-detector when you select any of them.



> **Attention!**
>
> You cannot bulk change detection areas (see Configuring a detection area(see page 351)) and ignore areas (see Configuring the ignore area(see page 350)).

4. Click the **Apply** button. The number of cameras with the same type of detector/sub-detector for which the settings are applied is indicated in brackets.

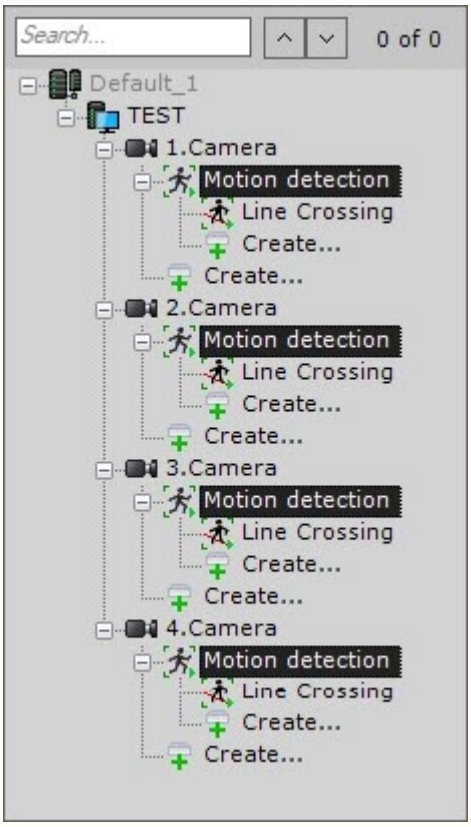
Bulk application of settings for detectors/sub-detectors of the same type is complete. In the settings of the detectors/sub-detectors, the selected cameras will have the same values of the parameters.

19.4.23.7 Bulk removal of detectors/sub-detectors

To bulk remove detectors/sub-detectors, do the following:

1. Go to the **Detectors** tab.
2. Use the **Ctrl** key to select the detectors/sub-detectors that you want to delete in the object tree.

> **Attention!**
>
> You can select detectors of one level only. For example, if you select **Motion detector**, you cannot select **Line crossing** and vice versa.



3. Click the **Remove** Remove button.
4. Click the **Apply** Apply button to save the changes. Click the **Cancel** Cancel button to cancel the changes.

Bulk removal of detectors/sub-detectors is complete. The removed detectors/sub-detectors won't be displayed in the object tree.

19.4.24 Metadata database

Metadata is any accompanying data to any basic information. Metadata refers to additional information about the content or object. It reveals information about the attributes and properties that characterize an entity, allowing you to automatically search and manage it in large information flows.

In *Axxon One*, you can get metadata in two ways:

1. By analyzing video on the server by detectors (see General information about detectors and their sub-detectors(see page 314)).
2. By receiving ready metadata from the embedded camera analytics (see General information about embedded detectors(see page 811)).

Attention!

To get metadata, video is decompressed and analyzed, which leads to a heavy load on the server and limits the number of cameras that you can use on it.

Metadata are VMDADB files and are stored in the object tracks database. Path to the metadata folder: <Local directory of the server selected when installing *Axxon One* (see Installation(see page 98))>\vmda_db\VMDA_DB.0\vmda_schema.

Note

If necessary, you can place metadata in network storage (see Data storage(see page 1009)).

The following detectors are used for the server-side analysis and metadata generation:

Detector	Possible information about an object contained in metadata from the detector
Neural tracker(see page 402)	• Object type • Object size • Object color • Position of an object in the frame • Object speed • Direction of movement of an object
Object tracker(see page 414)	
Human tracker VL(see page 425)	
Stopped object detector(see page 440)	• Object type • Object size • Position of an object in the frame
Motion detector(see page 446)	• Object type • Object color
Face detector VA(see page 485)	• Face vector • Face bounding box • Gender • Age • Position of a face bounding box in the frame
Face detector TV(see page 500)	
Face detector VL(see page 473)	
License plate recognition BRS(see page 514)	• Vehicle license plate • License plate bounding box • Position of a license plate bounding box in the frame • Direction of vehicle movement • Region • Country • License plate type • Vehicle manufacturer • Vehicle model • Vehicle color • Vehicle class • Vehicle bounding box • Position of a vehicle bounding box in the frame
License plate recognition IV(see page 519)	
License plate recognition RR(see page 535)	
License plate recognition RR—Search in archive(see page 561)	
License plate recognition RR—Parking(see page 574)	
License plate recognition VT(see page 636)	
License plate recognition XR(see page 620)	
Vehicle recognition RR(see page 600)	• Vehicle manufacturer • Vehicle model • Vehicle color • Vehicle class • Vehicle bounding box • Position of a vehicle bounding box in the frame • Direction of vehicle movement

Detector	Possible information about an object contained in metadata from the detector
Human pose detector(see page 669) and its sub-detectors: • **Sitting person detector**(see page 678) • **Person down detector**(see page 681) • **Hands up detector**(see page 684) • **Handrail holding detector**(see page 686) • **People counter**(see page 688) • **Close-standing people detector**(see page 689) • People masking(see page 693) **Attention!** Starting with *DetectorPack* 3.13, the People masking[122] is no longer supported. We replaced it with the Track masking[123].	• Position of an object in the frame • Pose of an object in the frame
Equipment detector(see page 711)	• Position of an object in the frame
Equipment detector VL(see page 738)	
Barcode detector(see page 760)	• Contents of a barcode in the frame

Metadata is used for the following system options to work:

Option	Required source of metadata
Standard sub-detectors(see page 359)	• Object tracker(see page 414) • Neural tracker(see page 402) • Human tracker VL(see page 425) • Motion detector(see page 446) • Embedded detector(see page 811)
Search in archive(see page 1216)	• Object tracker(see page 414) • Neural tracker(see page 402), • Motion detector(see page 446) • Face detector TV(see page 500) • Face detector VA(see page 485) • Face detector VL(see page 473) • License plate recognition BRS(see page 514) • License plate recognition IV(see page 519) • License plate recognition RR(see page 535) • License plate recognition RR—Search in archive(see page 561) • License plate recognition RR—Parking(see page 574) • License plate recognition VT(see page 636) • Human pose detector(see page 669) • Equipment detector(see page 711) • Equipment detector VL(see page 738) • Embedded detector(see page 811)

122 https://docs.axxonsoft.com/confluence/display/one20en/Configuring+the+People+masking
123 https://docs.axxonsoft.com/confluence/display/one20en/Configuring+the+Track+masking

Option	Required source of metadata
Face search(see page 1233)	• Face detector TV(see page 500) • Face detector VA(see page 485) • Face detector VL(see page 473)
Search by LPs(see page 1227)	• License plate recognition BRS(see page 514) • License plate recognition IV(see page 519) • Vehicle recognition RR(see page 600) • License plate recognition RR—Search in archive(see page 561) • License plate recognition RR—Parking(see page 574) • License plate recognition VT(see page 636)
Vehicle search(see page 1230)	• Vehicle recognition RR(see page 600)
Search by barcode(see page 1243)	• Barcode detector(see page 760)
TimeCompressor(see page 1191)	• Object tracker(see page 414) • Neural tracker(see page 402) • Motion detector(see page 446) • Embedded detector(see page 811)
Features for tracking moving objects(see page 253)	• Object tracker(see page 414) • Neural tracker(see page 402) • Human tracker VL(see page 425) • Motion detector(see page 446) • Embedded detector(see page 811)
Object tracking(see page 1148)	• Neural tracker(see page 402) • Object tracker(see page 414) • Motion detector(see page 446) • Face detector TV(see page 500) • Face detector VA(see page 485) • Face detector VL(see page 473) • License plate recognition BRS(see page 514) • License plate recognition IV(see page 519) • License plate recognition RR(see page 535) • License plate recognition RR—Search in archive(see page 561) • License plate recognition RR—Parking(see page 574) • License plate recognition VT(see page 636) • Vehicle recognition RR(see page 600) • Human pose detector(see page 669) • Equipment detector(see page 711) • Equipment detector VL(see page 738) • Barcode detector(see page 760) • Embedded detector(see page 811)

Option	Required source of metadata
Autozoom(see page 1164)	• **Neural tracker**(see page 402) • **Object tracker**(see page 414) • **Motion detector**(see page 446) • **Face detector TV**(see page 500) • **Face detector VA**(see page 485) • **Face detector VL**(see page 473) • **License plate recognition BRS**(see page 514) • **License plate recognition IV**(see page 519) • **License plate recognition RR**(see page 535) • **License plate recognition RR—Search in archive**(see page 561) • **License plate recognition RR—Parking**(see page 574) • **License plate recognition VT**(see page 636) • **Vehicle recognition RR**(see page 600) • **Human pose detector**(see page 669) • **Equipment detector**(see page 711) • **Equipment detector VL**(see page 738) • **Barcode detector**(see page 760) • **Embedded detector**(see page 811)

19.4.25 Neural analytics

19.4.25.1 General information on neural analytics

Hardware requirements for neural analytics operation(see page 339)

Neural analytics is a detector, the algorithms of which use neural networks (see General information about detectors and their sub-detectors(see page 314)).

Neural network is a mathematical model[124], as well as its software or hardware content, built on the principle of organization and functioning of biological neural networks (networks of neurons[125] of a living organism). Within the context of the described software environment, neural networks are file models that have the .ann extension that you can use in the detectors' operation.

The table lists the detectors that use neural networks in their operation:

Detector that uses neural network	Action of the neural network
Face detector TV(see page 500)	Detection of faces and masks
Face detector VA(see page 485)	
Face detector VL(see page 473)	
Mask detector VL(see page 483)	
Mask detector VA(see page 497)	
Mask detector TV(see page 512)	

124 https://en.wikipedia.org/wiki/Mathematical_model
125 https://en.wikipedia.org/wiki/Neuron

Detector that uses neural network	Action of the neural network
License plate recognition BRS(see page 514)	Detection of vehicle license plates
License plate recognition IV(see page 519)	
License plate recognition RR(see page 535)	
License plate recognition RR—Search in archive(see page 561)	
License plate recognition RR—Parking(see page 574)	
License plate recognition VT(see page 636)	
License plate recognition XR(see page 620)	
Vehicle recognition RR(see page 600)	Detection of vehicle attributes
Object tracker(see page 414) with a neural network filter	Processes tracker results and filters out objects of no interest in a complex video image (foliage, glare, and so on)
Human tracker VL(see page 425)	Detection of people in the frame
Fight detector VL(see page 799)	Detection of fights in the frame
Stopped object detector(see page 440)	Detection of stopped objects in the frame
Abandoned object detector VI(see page 389)	Detection of abandoned objects or objects that disappeared in the frame
Abandoned object detector VI (Street)(see page 396)	
Line crossing VI(see page 466)	Detection of object movement in the prohibited direction
Movement in prohibited direction VI(see page 460)	
Motion in area detector VI(see page 455)	Detection of object movement in a given area
Detector of atypical changes in the scene VI(see page 794)	Detection of changes not typical for the scene, such as overexposure, darkening, or defocusing
Neural tracker(see page 402)	Detection of the position of only the required objects in the frame
Neural counter(see page 771)	Counts the number of objects
Fire detector(see page 706)	Detection of fire
Smoke detector(see page 725)	Detection of smoke
Neural classifier(see page 701)	Detection of a specific object

Detector that uses neural network	Action of the neural network
Human pose detector(see page 669) and its sub-detectors: • **Sitting person detector**(see page 678) • **Person down detector**(see page 681) • **Hands up detector**(see page 684) • **Handrail holding detector**(see page 686) • **People counter**(see page 688) • **Close-standing people detector**(see page 689) • People masking(see page 693) **Attention!** Starting with *DetectorPack* 3.13, the People masking[126] is no longer supported. We replaced it with the Track masking[127].	Identifies each person's "skeleton" and detects poses that can represent a security threat
Equipment detector(see page 711)	Detection of necessary equipment and personal protective equipment. Segmenting and classification neural networks are used for the operation of the Equipment detector(see page 711) (see Functions of the Equipment detector(see page 711))
Equipment detector VL(see page 738)	
Person-based privacy masking(see page 694)	Segmenting neural network breaks down the human body into areas
Privacy masking(see page 450)	Detection and masking of moving and stationary objects
Water level detector(see page 729)	Increases the accuracy of water level detection in difficult conditions. For example, in scenes with clear water
Audio classification IV(see page 698)	Detection of different sounds: from a baby cry to the sound of a gunshot
Crowd estimation VA(see page 765)	Counts crowds of people in a specified area
Barcode detector(see page 760)	Detection of a specific type of barcode
Meta-detector(see page 768)	Analyzes text queries and images to identify a match between them

19.4.25.2 Hardware requirements for neural analytics operation

Hardware requirements(see page 87)
Processors used for detectors operation(see page 319)

When you use neural analytics (see General information on neural analytics(see page 337)), the hardware requirements are the following:

1. Take into account NVIDIA SDK limitations. The neural analytics can operate on the GPU only in the operating systems specified in the Operating system requirements(see page 86) page.
2. VPU requirements (Intel NCS[128]):
    a. Connect a device to the computer USB port.

126 https://docs.axxonsoft.com/confluence/display/one20en/Configuring+the+People+masking
127 https://docs.axxonsoft.com/confluence/display/one20en/Configuring+the+Track+masking
128 https://software.intel.com/en-us/neural-compute-stick

b. Make sure that the Windows system identifies a device as Movidius, Myriad X, or VSC Loopback Device.
c. Use it on the computers that meet the Hardware requirements(see page 87).
d. Apply no more than one Intel NCS device on the server.

3. Supported CPUs and requirements:

CPU type	Supported generations/models	Key requirements and conditions
Intel® Core™	6th generation (Skylake) and higher	• Support the AVX2 or AVX512 instruction set (see ark.intel.com[129]) • We don't guarantee the detector operation on CPUs lower than 6th generation
Intel® Xeon®	v5 family (Broadwell) and v6 (Skylake)	• Support the AVX2 or AVX512 instruction set (see ark.intel.com[130]). • CPU compatibility with the used OpenVINO tool version (see software.intel.com[131])
Intel VPU devices	Movidius™ Neural Compute Stick, Neural Compute Stick 2, Vision Accelerator Design with Intel® Movidius™ VPUs	Support from the used OpenVINO tool version (see software.intel.com[132])

4. Requirements for NVIDIA GPU:

Parameter	Minimal/recommended requirements
GPU model	NVIDIA GeForce GTX 1650 and higher
Memory space	At least 2 GB. For the accurate calculation, we recommend using AxxonSoft Platform Calculator[133] (see AxxonSoft Platform Calculator documentation[134])
CUDA version	12.8.1
Compute Capability	Not lower than 7.5. You can check a version on the page[135] or on the manufacturer's[136] website.

129 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3533&1_Filter-Family=595
130 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3533&1_Filter-Family=595
131 https://software.intel.com/content/www/us/en/develop/tools/openvino-toolkit/system-requirements.html
132 https://software.intel.com/content/www/us/en/develop/tools/openvino-toolkit/system-requirements.html
133 https://sale.axxonsoft.com/calc/calculator.jsf
134 https://docs.axxonsoft.com/confluence/spaces/apc/pages/189622025/Documentation
135 https://en.wikipedia.org/wiki/CUDA#:~:text=Pegasus%2C%0AClara%20AGX-,7.5,-Turing
136 https://developer.nvidia.com/cuda/gpus

Parameter	Minimal/recommended requirements

Supported architectures	• Turing, Ampere, Ada Lovelace (partially)
	• In Windows OS, starting from the *Detector Pack* 3.15.2 version, the Hopper and Blackwell support is added for the following detectors:
	  • Neural tracker(see page 402)
	  • Neural counter(see page 771)
	  • Human pose detector(see page 669)
	  • Equipment detector(see page 711)
	  • Fire detector(see page 706)
	  • Smoke detector(see page 725)
	  • Neural classifier(see page 701)
	  • Barcode detector(see page 760)
	  • Water level detector(see page 729)
	  • Stopped object detector(see page 440)
	  • Privacy masking(see page 450)
	  • Person-based privacy masking(see page 694)
	• Starting from the *Detector Pack* 3.15.2 version, Kepler (late), Maxwell, Pascal, Volta are no longer supported

Drivers	We recommend installing the latest driver version from the official website[137]
Configuration	You can use several GPUs in one system

For proper operation, each detector must meet individual specific requirements (see Detectors(see page 308)) to:

- Hardware,
- Video stream and scene,
- Image settings.

19.4.25.3 Data collection requirements for neural network training

Description	To train neural networks, you must collect and submit to AxxonSoft videos and images from your actual cameras taken in the same resolution and in the same conditions as in your future application. For example, if you need your neural network to work outdoors, videos must contain all weather conditions (sun, rain, snow, fog, and so on) at different times of day (morning, afternoon, evening, and night). If the collection requirements for the data submitted for training the neural network model are met, and if you operate the neural network in conditions that are as similar as possible to the conditions in which the data was collected, we guarantee the overall accuracy (training in operating conditions) of neural network analytics from 90% to 97% and the percentage of false positives of 5-7%. For standard neural networks (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20%. The standard neural networks are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. The requirements can be changed or added to at any time

137 https://www.nvidia.com/en-us/drivers/

<table>
<tr><td>General requirements for collected data</td><td>

When collecting data, specific requirements for object images, scene, angle, lighting, and video stream must be met for those detectors that you plan to use (see Detectors(see page 308)).
If it is required to train a neural network in different conditions of time of day, lighting, angle, object types, or weather, you must collect video data in equal proportions for each condition, that is, it must be balanced.

Example. It is necessary to detect a person in the surveillance area at night and during the day.

Data collected correctly:

four videos of the surveillance area, each five minutes long are submitted for training;
the object of interest appears in the frame in each video;
two videos are recorded in nighttime conditions, two—in daytime conditions.

Data collected incorrectly:

three videos of the surveillance area, each five minutes long are submitted for training;
the object of interest appears in the frame in each video;
two fragments are recorded in nighttime conditions, one—in daytime conditions

</td></tr>
<tr><td>Additional requirements for collected data for each neural analytics tool</td><td>
<table>
<tr><th>Detector</th><th>Requirements</th></tr>
<tr><td>Neural filter</td><td>At least 1000 frames containing different objects of interest in the given scene conditions, and the same number of frames containing no objects (noise frames)</td></tr>
<tr><td>Neural tracker(see page 402)</td><td rowspan="2">3–5 minutes of videos containing objects of interest in the given scene conditions. The greater the number and variability of situations in the scene, the better</td></tr>
<tr><td>Stopped object detector(see page 440)</td></tr>
<tr><td>Human pose detector(see page 669)</td><td>10 second video of a scene with no persons.
At least 100 different persons in the given scene conditions.
Attention! Different conditions mean, among others, different positions of a person in a scene (bending, different positions of body parts, and so on)</td></tr>
<tr><td>Equipment detector(see page 711)</td><td rowspan="2">A list of all reference equipment with examples must be collected from the object and coordinated with the analytics manufacturer (see Example of providing a list of valid equipment at the facility for the Equipment detector(see page 714)).
3-5 minutes of videos with personnel in the given scene conditions.
Personnel must move and change positions in the collected videos, as well as remove and put on equipment at intervals of 30 seconds.
Since the equipment detectors are designed for artificial constant lighting, videos in other lighting conditions aren't required</td></tr>
<tr><td>Equipment detector VL(see page 738)</td></tr>
<tr><td>Fire detector(see page 706)</td><td rowspan="2">At least 1000 frames containing different objects of interest in the given scene conditions, and the same number of frames containing no objects (noise frames)</td></tr>
<tr><td>Smoke detector(see page 725)</td></tr>
<tr><td>Neural classifier(see page 701)</td><td>At least 1000 frames containing different objects of interest in the given scene conditions, and the same number of frames containing no objects (noise frames)</td></tr>
</table>
</td></tr>
</table>

19.4.25.4 Optimizing the operation of neural analytics on GPU in Windows OS

On the page:

- General information(see page 343)
- Optimizing the operation of neural analytics on GPU(see page 343)
- Creating GPU neural network caches using parameters(see page 344)

19.4.25.4.1 General information

It can take several minutes to launch neural analytics algorithms on NVIDIA GPU after server restart. At this time, the neural models are optimized for the current GPU type.

You can use the caching function to ensure that this operation is performed only once. Caching saves the optimization results on the hard drive and uses it for the subsequent analytics runs.

Starting with *DetectorPack* 3.9, a utility was added to the Neuro Pack add-ons (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

19.4.25.4.2 Optimizing the operation of neural analytics on GPU

To optimize the operation of the neural analytics on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

   Attention!

   If the system has the software running on GPU, it is necessary to stop its operation.
2. In Windows OS, go to **Settings** → **System** → **Display** → **Graphics Settings**. Turn off the **Hardware-accelerated GPU scheduling** toggle. This option increases the load on the server.
3. Create the **GPU_CACHE_DIR** system variable (see Creating system variable(see page 126)) by specifying in the **Variable value** field the path to the cache location with an arbitrary folder name. For example, D:\GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
   The cache size depends on the number of neural networks used and their type. The minimum size is 70 MB.
4. Run the command prompt as administrator.
5. To call the utility, in the command prompt, enter C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroPackGpuCacheGenerator.exe.
6. Press **Enter**.
7. Specify the ID of the required Nvidia GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
8. Press **Enter**.

Optimizing the operation of the neural analytics on GPU is complete. The utility will create the caches of four neural networks included in the Neuro Pack add-ons:

- **GeneralNMHuman_v1.0GPU_onnx.ann**—human;
- **smokeScanned_v1_onnx.ann** (or **bestSmoke_v1.ann** starting with *Detector Pack* 3.14) —smoke detection;
- **fireScanned_v1_onnx.ann** (or **bestFire_v1.ann** starting with *Detector Pack* 3.14) —fire detection;
- **reid_15_0_256__osnetfpn_segmentation_noise_20_common_29_onnx.ann**—search for the similar in the Neural tracker(see page 402) (see page 402)(see Similitude search(see page 1240)).

Attention!

The cache must be recreated in the following cases:
- if you update the Neuro Pack add-ons (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,

- if you update the Nvidia GPU drivers.

19.4.25.4.3 Creating GPU neural network caches using parameters

1. **-p** is a parameter to create a cache for a particular neural network.
   Command example:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroPackGpuCacheGenerator.exe -p
   "<System disk>\<Neural network location directory>\Neural_network_name.ann"
   ```

   To create a cache for multiple neural networks, list the paths to the selected neural networks, separated by a space.
   Example of a command:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroPackGpuCacheGenerator.exe -p
   "<System disk>\<Neural network location directory>\Neural_network_name.ann" "C:\Program
   Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK\WaterLevelRuleNet_origin_onnx.ann"
   ```

2. **-v** is a parameter to output the procedure log to the console during cache generation.
   Example of a command to automatically create caches of four neural networks included in the Neuro Pack add-ons with log output:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroPackGpuCacheGenerator.exe -v
   ```

   Example of a command:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroPackGpuCacheGenerator.exe -p
   "<System disk>\<Neural network location directory>\Neural_network_name.ann" -v
   ```

3. **--int8=1** is a parameter to create a cache for those neural networks for which quantization is available. Neural networks for which the quantization mode is available are included in the Neuro Pack add-ons together with the *.info file. By default, the **--int8=0** parameter is disabled.
   Example of a command:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroPackGpuCacheGenerator.exe --
   int8=1
   ```

4. **-f** is a parameter to save logs of the caching procedure to files. It is available starting with *DetectorPack* 3.15. When you use the **-v** and **-f** parameters together, logs for each created cache are saved to: <Path to the cache folder created for the **GPU_CACHE_DIR** system variable>\caching-utility-log. A separate log file is created for each neural network. Log files created during previous runs of the utility are deleted.
   Example of a command for creating a cache with detailed logging to the console and saving logs to files:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroPackGpuCacheGenerator.exe -v -f
   ```

The neural networks for which the quantization mode is available (see Neural tracker(see page 402), Stopped object detector(see page 440), Neural counter(see page 771)):

- **GeneralNMCar_v1.0GPU_onnx.ann**—Vehicle.
- **GeneralNMHuman_v1.0GPU_onnx.ann**—Person.
- **GeneralNMHumanTopView_v0.8GPU_onnx.ann**—Person (top-down view).

Starting with *DetectorPack* 3.11, the following neural networks were added:

- **GeneralNMHumanAndVehicle_Nano_v1.0_GPU_onnx.ann**—Person and vehicle (Nano).

- **GeneralNMHumanAndVehicle_Medium_v1.0_GPU_onnx.ann**—Person and vehicle (Medium).
- **GeneralNMHumanAndVehicle_Large_v1.0_GPU_onnx.ann**—Person and vehicle (Large).

Starting with *DetectorPack* 3.12, the following neural networks were added:

- **GeneralNMHumanTopView_Nano_v1.0_GPU_onnx.ann**—Person (top-down view Nano).
- **GeneralNMHumanTopView_Medium_v1.0_GPU_onnx.ann**—Person (top-down view Medium).
- **GeneralNMHumanTopView_Large_v1.0_GPU_onnx.ann**—Person (top-down view Large).

19.4.25.5 Optimizing the operation of neural analytics on GPU in Linux OS

On the page:

- General information(see page 345)
- Optimizing the operation of neural analytics on GPU(see page 345)
- Creating GPU neural network caches using parameters(see page 347)

Creating system variables for the Axxon One server in Linux OS[138]
Creating system variables for the Axxon One server in the failover mode in Linux OS[139]

19.4.25.5.1 General information

It can take several minutes to launch neural analytics algorithms on Nvidia GPU after server restart. Meanwhile, the neural models are optimized for the current GPU type.

You can use the caching function to ensure that this operation is performed only once. Caching saves the optimization results on the hard drive and uses them for the subsequent analytics runs.

Starting with *DetectorPack* 3.9, a utility was added to the Neuro Pack add-ons (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

19.4.25.5.2 Optimizing the operation of neural analytics on GPU

To optimize the operation of the neural analytics on GPU, do the following:

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[140]).

   Attention!

   If the system has the software running on GPU, you must stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

138 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
139 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS
140 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

```
sudo su ngp
```

b. Enter the password for the superuser.

3. Create a folder with a custom name to store the cache. For example:

```
mkdir /opt/AxxonSoft/AxxonOne/gpucache
```

4. Change folder permissions:

```
chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

```
cd /opt/AxxonSoft/AxxonOne
```

6. Open the server configuration file for editing:

```
nano instance.conf
```

Attention!

When you use the server in failover mode, you should:

a. Open the **/etc/AxxonSoft** folder:

```
cd /etc/AxxonSoft
```

b. Open the server configuration file for editing:

```
nano axxon-one.conf
```

Attention!

Before you make changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[141].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

d. Save the changes in the server configuration file.

e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

141 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit file editing mode using the **Ctrl+X** keyboard shortcut.

> **Attention!**
>
> When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[142]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[143]).

10. In the command prompt, run the command that was used to add the system variable with the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./NeuroPackGpuCacheGenerator
```

> **Attention!**
>
> If more than one Nvidia GPU is available, you will be able to select one. To do this, specify a number from 0 to 3, which corresponds to the required device in the list.

Optimizing the operation of the neural analytics on GPU is complete. The utility will create the caches of four neural networks included in the Neuro Pack add-ons:

- **GeneralNMHuman_v1.0GPU_onnx.ann**—person;
- **smokeScanned_v1_onnx.ann** (or **bestSmoke_v1.ann** starting with *Detector Pack* 3.14)—smoke detection;
- **fireScanned_v1_onnx.ann** (or **bestFire_v1.ann** starting with *Detector Pack* 3.14)—fire detection;
- **reid_15_0_256__osnetfpn_segmentation_noise_20_common_29_onnx.ann**—search for the similar in the Neural tracker(see page 402) (see Similitude search(see page 1240)).

19.4.25.5.3 Creating GPU neural network caches using parameters

1. **-p** is a parameter to create a cache for a particular neural network.
   Example of a command:

142 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS
143 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

```
./NeuroPackGpuCacheGenerator -p /opt/AxxonSoft/DetectorPack/NeuroSDK/
GeneralNMHumanAndVehicle_Nano_v1.0_GPU_onnx.ann
```

2. **-v** is a parameter to output the procedure log to the console during cache generation.
   Example of a command to automatically create caches of four neural networks included in the Neuro Pack add-ons with log output:

   ```
   ./NeuroPackGpuCacheGenerator -v
   ```

3. **--int8=1** is a parameter to create a quantized version of the cache for those neural networks for which quantization is available. By default, the **--int8=0** parameter is disabled.
   Example of a command:

   ```
   ./NeuroPackGpuCacheGenerator -p /opt/AxxonSoft/DetectorPack/NeuroSDK/
   GeneralNMHumanAndVehicle_Nano_v1.0_GPU_onnx.ann --int8=1
   ```

   Attention!

   The neural networks for which the quantization mode is available are included in the Neuro Pack add-ons together with the *.info file.

4. **-f** is a parameter to save logs of the caching procedure to files. It is available starting with *DetectorPack* 3.15. When you use the **-v** and **-f** parameters together, logs for each created cache are saved to: <Path to the cache folder created for the **GPU_CACHE_DIR** system variable>\caching-utility-log. A separate log file is created for each neural network. Log files created during previous runs of the utility are deleted.
   Example of a command for creating a cache with detailed logging to the console and saving logs to files:

   ```
   ./NeuroPackGpuCacheGenerator -v -f
   ```

The neural networks for which the quantization mode is available (see Neural tracker(see page 402), Stopped object detector(see page 440), Neural counter(see page 771)):

- **GeneralNMCar_v1.0GPU_onnx.ann**—Vehicle.
- **GeneralNMHuman_v1.0GPU_onnx.ann**—Person.
- **GeneralNMHumanTopView_v0.8GPU_onnx.ann**—Person (top-down view).

Starting with *DetectorPack* 3.11, the following neural networks were added:

- **GeneralNMHumanAndVehicle_Nano_v1.0_GPU_onnx.ann**—Person and vehicle (Nano).
- **GeneralNMHumanAndVehicle_Medium_v1.0_GPU_onnx.ann**—Person and vehicle (Medium).
- **GeneralNMHumanAndVehicle_Large_v1.0_GPU_onnx.ann**—Person and vehicle (Large).

Starting with *DetectorPack* 3.12, the following neural networks were added:

- **GeneralNMHumanTopView_Nano_v1.0_GPU_onnx.ann**—Person (top-down view Nano).
- **GeneralNMHumanTopView_Medium_v1.0_GPU_onnx.ann**—Person (top-down view Medium).
- **GeneralNMHumanTopView_Large_v1.0_GPU_onnx.ann**—Person (top-down view Large).

19.4.26 General settings of the detectors

19.4.26.1 Selecting Nvidia GPU when configuring detectors

When you configure detectors, select Nvidia GPUs one by one.

Attention!

- If only one Nvidia GPU is installed, select **Nvidia GPU 0**.
- If several Nvidia GPUs are installed, select the graphics card on which you want to perform the detection process.
- If you select an uninstalled Nvidia GPU, detection isn't performed.

The table lists the parameter names and detectors, configuring which you can select the required Nvidia GPU:

Parameter	Detector
Neural tracker mode	• Configuring the Neural tracker(see page 405)
Neural network mode	• Configuring the Water level detector(see page 730) • Configuring the Privacy masking(see page 451) • Configuring the Equipment detector(see page 717)
Mode	• Configuring the Equipment detector VL(see page 753) • Configuring the Neural counter(see page 773) • Configuring the Smoke detector(see page 726) • Configuring the Fire detector(see page 707) • Configuring the Neural classifier(see page 702)
Detection mode	• Configuring Vehicle recognition RR(see page 615) • Configuring the License plate recognition VT(see page 659) • Configuring the License plate recognition IV(see page 524) • Configuring License plate recognition RR(see page 555) • Configuring License plate recognition RR—Parking(see page 594) • Configuring License plate recognition RR—Search in archive(see page 569) • Configuring the Face detector VA(see page 491) • Configuring the Face detector TV(see page 505) • Configuring the Face detector VL(see page 478) • Configuring the Stopped object detector(see page 441) • Configuring the Abandoned object detector VI(see page 392) • Configuring the Abandoned object detector VI (Street)(see page 399) • Configuring the Motion in area detector VI(see page 458) • Configuring the Detector of atypical changes in the scene VI(see page 797) • Configuring the Fight detector VL(see page 809) • Configuring the Line crossing VI detector(see page 469) • Configuring the Movement in prohibited direction VI detector(see page 463) • Configuring the Motion in area detector VI(see page 458) • Configuring the Detector of atypical changes in the scene VI(see page 797) • Configuring the Crowd estimation VA(see page 766) • Configuring the Person-based privacy masking(see page 695) • Configuring the Meta-detector(see page 769)
Moving object filter mode	• Configuring the Object tracker(see page 415)
Abandoned object filter mode	
Segmentation neural network mode	• Configuring the Area occupancy detector(see page 756)

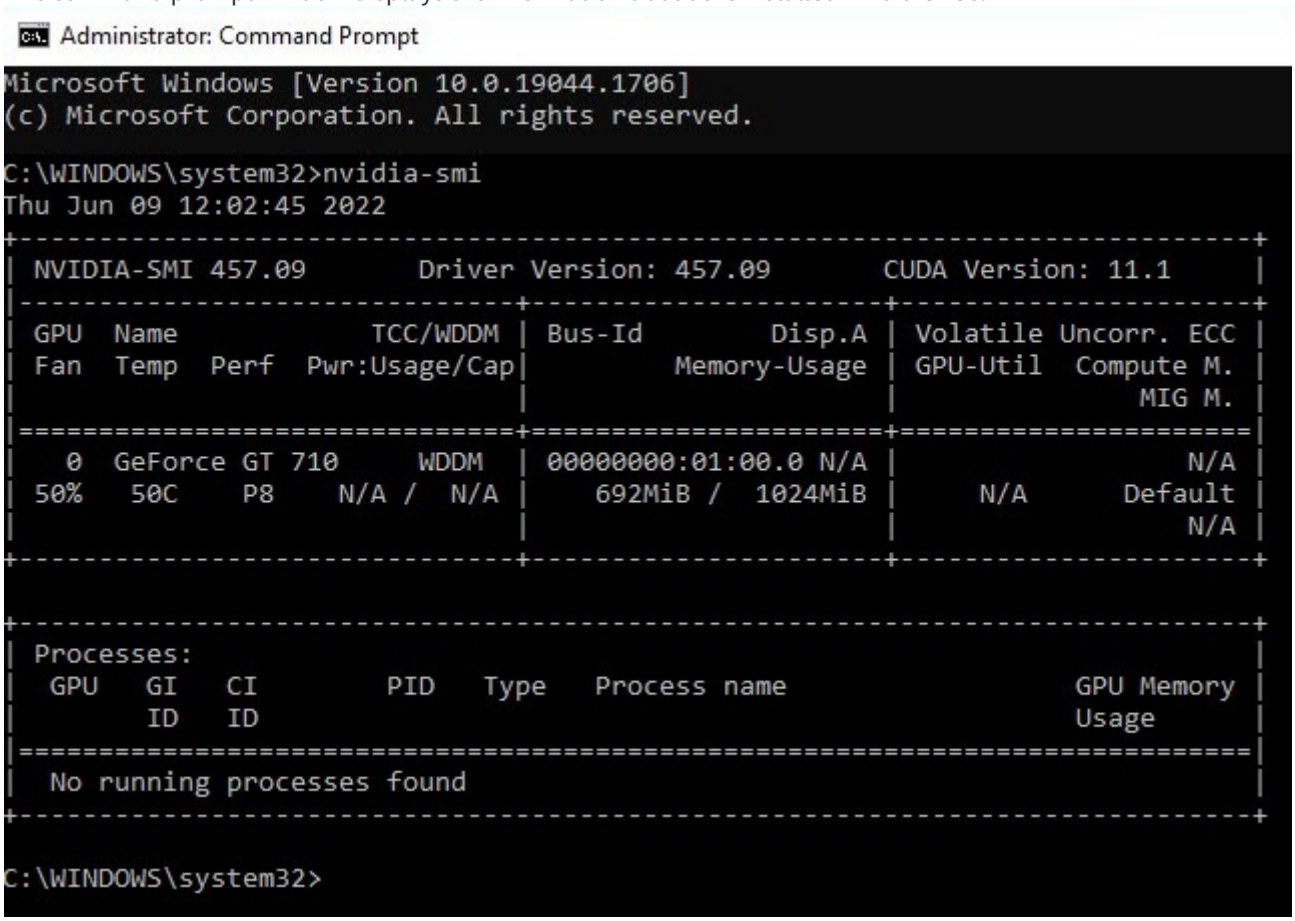
You can change the order of the Nvidia GPU display using the **CUDA_DEVICE_ORDER** system variable (see Creating system variable(see page 126)) by specifying the required value:

1. The **FASTEST_FIRST** value numbers the GPUs from the most powerful card to the less powerful ones, that is, **Nvidia GPU 0** is the most powerful card.
2. The **PCI_BUS_ID** value numbers the GPUs according to the physical location of the cards in the PCI-E slots on the motherboard, that is, **Nvidia GPU 0** is the card in the highest slot.

To find out information about the availability, quantity, and numbering of Nvidia GPUs, do the following:

1. Run the command prompt as administrator.
2. In the command prompt, enter the Nvidia-smi query.
3. Press **Enter**.

The command prompt window displays the information about the installed Nvidia GPUs.

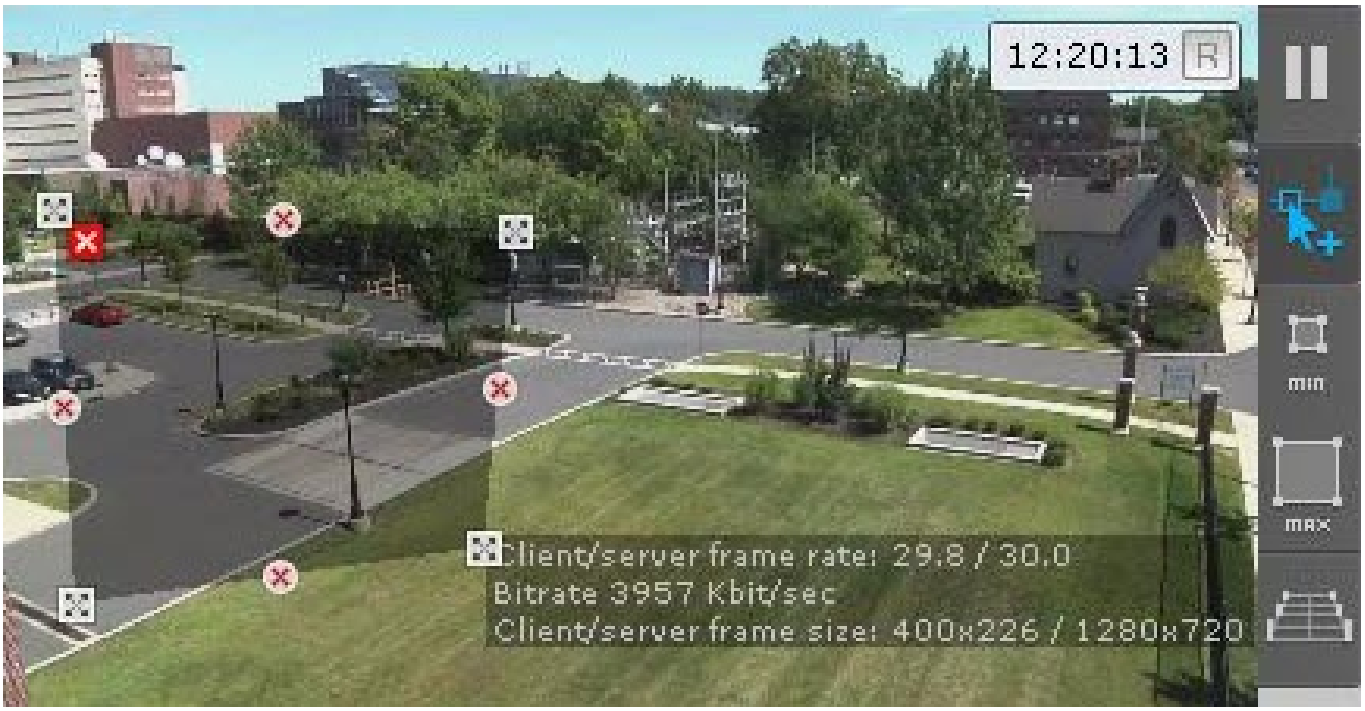


19.4.26.2 Configuring the ignore area

By default, the entire frame is analyzed. If you want to exclude difficult areas in the camera FOV (foliage, water, and so on) from the analysis, you must specify one or more areas where detection and metadata generation won't be performed.

To do this, do the following:

1. Select a detector and click the  button.
2. In the surveillance window, click the mouse button.
3. Select **Ignore area** in the list.
4. Set the anchor points of the area within which the detection won't be performed.



Note

- Depending on the detector being configured, the area can be either rectangular or polygonal.
- When you set anchor points, they are connected by a two-color dashed line outlining the border of the area.
- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- Once the area is closed, the buttons are available on its borders between the anchor points. When you click them, a new anchor point is added, allowing you to specify the most precise areas possible.
- To delete a selected area, click the button.

Action	Result
Left-click or right-click in the surveillance window	Creates a new anchor point of the area
Right-click a created anchor point	Deletes an anchor point of the area
Hover the mouse cursor over an anchor point and, holding down the left mouse button, move the mouse	Moves an anchor point of the area

5. Specify all required areas.
6. Click the **Apply** button. To cancel the changes, click the **Cancel** button.

Configuration of the ignore area is complete. Ignore areas are relevant for all sub-detectors created on the basis of the parent detector.

19.4.26.3 Configuring a detection area

By default, the entire frame is analyzed. If you want to analyze only a certain area, you must specify one or more areas where detection and metadata generation will be performed.

To do this, do the following:

1. Select a detector and click the button.
2. In the surveillance window, click the mouse button.
3. Select **Detection area** in the list.
4. In the surveillance window, set the anchor points of the area within which the detection will be performed.

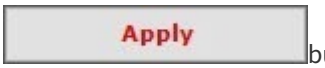


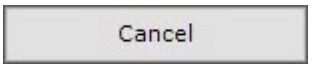
Note

- Depending on the detector being configured, the area can be either rectangular or polygonal.
- When you set anchor points, they are connected by a two-color dashed line outlining the border of the area.
- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- Once the area is closed, the buttons are available on its borders between the anchor points. When you click them, a new anchor point is added, allowing you to specify the most precise areas possible.
- To delete a selected area, click the button.

Action	Result
Left-click or right-click in the surveillance window	Creates a new anchor point of the area
Right-click a created anchor point	Deletes an anchor point of the area
Hover the mouse cursor over an anchor point and, holding down the left mouse button, move the mouse	Moves an anchor point of the area

5. Specify all required detection areas.

6. Click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of a detection area is complete. Detection areas are relevant for all sub-detectors (except for Line crossing(see page 362)) created on the basis of the parent detector.

19.4.26.4 Configuring the scanning mode

On the page:

- General information(see page 353)
- Configuring the scanning mode(see page 353)
- Recommendations for configuring the scanning mode(see page 354)
- Example of configuring the scanning mode(see page 354)

19.4.26.4.1 General information

The scanning mode in *Axxon One* can improve detection of small objects or objects in areas far away from the camera. For example, when the camera is placed at a long distance and objects (such as people, smoke, fire) are small in the frame, scanning mode can improve detection.

In the scanning mode, the frame is divided into an arbitrary number of scanning windows for detection accuracy.

Scanning windows are parts of the frame that are analyzed separately and all together at the same time. Scanning windows allow the detector to receive more events, which improves the accuracy of detecting distant or small objects that otherwise can be missed.

Attention!

The scanning mode doesn't provide absolute detection accuracy, regardless of the number of windows.

The scanning mode is available for:

1. Fire detector(see page 706).
2. Smoke detector(see page 725).
3. Human pose detector(see page 669).
4. Neural counter(see page 771).
5. Neural tracker(see page 402).

19.4.26.4.2 Configuring the scanning mode

You can configure the scanning mode using the parameters of the corresponding detector. The list of required parameters and their values are presented in the table below.

Parameter	Value	Description
Scanning window	Yes	Select the **Yes** value to enable the scanning mode

Parameter	Value	Description
	No	
Scanning window height	Numeric value (in pixels)	The height and width of the scanning window are determined according to the actual size of the frame and the required number of windows. For example, the real frame size is 1920×1080 pixels. To divide the frame into four equal windows, set the width of the scanning window to 960 pixels and the height to 540 pixels
Scanning window width		
Scanning window step height		The scanning step determines the relative offset of the windows. If the step is equal to the height and width of the scanning window respectively, the segments will line up one after another. Reducing the height or width of the scanning step increases the number of windows due to their overlapping each other with an offset. This increases the detection accuracy, but also increases the CPU load **Attention!** The height and width of the scanning step must not be greater than the height and width of the scanning window—detector doesn't operate with such settings.
Scanning window step width		

19.4.26.4.3 Recommendations for configuring the scanning mode

1. Set the same values for the window height and scanning step, as well as the window width and scanning step.
2. Set the optimal number of scanning windows—from four to eight. The number of windows depends on specific purposes, quality of the original frame, capabilities of devices. If the original frame is of low quality or small size, a large number of windows won't increase the detection accuracy, but can lead to false events from a detector or no detection. You must select the number of scanning windows experimentally.
3. If you don't get events from a detector at the same values of window and step, you must experimentally reduce the scanning steps relative to the height or width.

Attention!

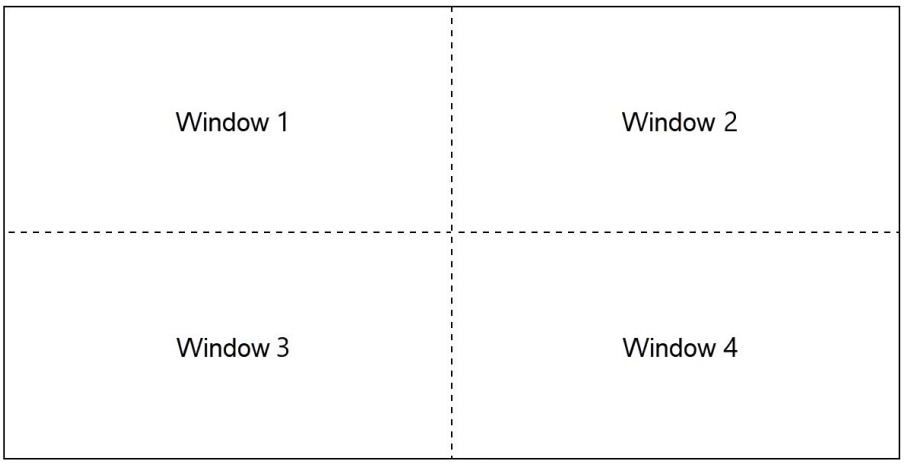
Increasing the number of windows increases the load on the device.

19.4.26.4.4 Example of configuring the scanning mode

It is necessary to configure the scanning mode for the smoke detector to detect smoke in the distance. If the actual frame size is 1920×1080 pixels, set the following values in the detector settings to divide the frame into four equal windows:

1. **Scanning window**—Yes.
2. **Scanning window height**—540.
3. **Scanning window width**—960.
4. **Scanning window step height**—540.
5. **Scanning window step width**—960.

As a result, the frame is conditionally divided into four equal windows that are analyzed separately and all together at the same time. If smoke is detected in any of these windows, the detector can generate an event.



19.4.26.5 Displaying the number of detected objects

In the **Surveillance window**, on the layout, you can display the detector icon and the number of objects in the detection area (see Configuring a detection area(see page 351)). The number of detected objects can be displayed for the following detectors:

1. Neural counter(see page 771).
2. People counter(see page 688).
3. Crowd estimation VA(see page 765).

Configure the display of the number of detected objects as follows:

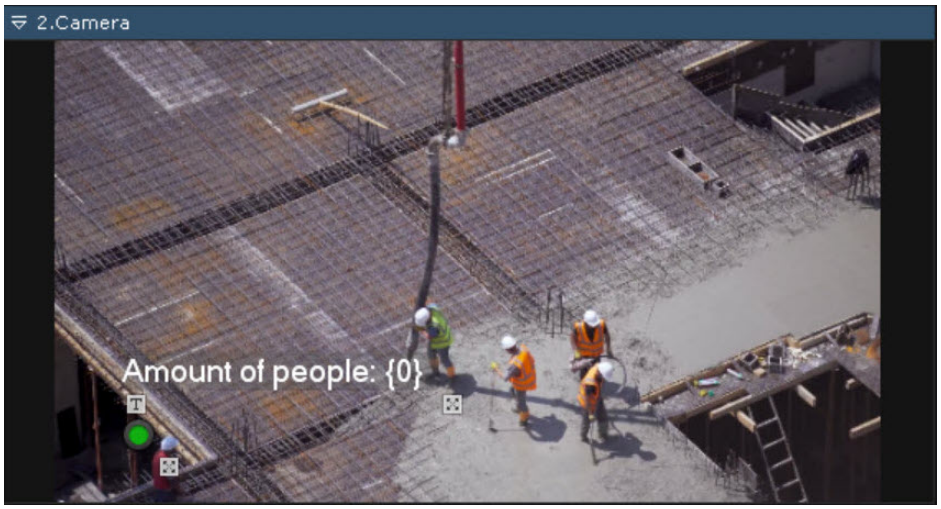
1. Go to layout editing mode with the selected camera (see Switching to layout editing mode(see page 945)).
2. Move the detector icon to an arbitrary location in the cell.
3. If necessary, adjust the font by clicking the T button.
4. To add text, click the gray area.
5. In an arbitrary place in the gray area, specify a template for displaying the number of objects in curly brackets:
   - {0}—integer;
   - {0.0}—fractional number with one digit after the point;

   > **Note**
   >
   > The template expands to {0.0000} to display the number with four digits after the point. If user text contains more digits after the point than received from the detector, the missing low-order digits are filled with zeros. If a template for displaying the number of objects is not added, then the number can be displayed as an integer or a fraction (with an accuracy of no more than four digits after the point).
6. If necessary, scale up/down the text and the sensor icon, click the button.
7. Save the layout (see Exiting Layout Editing mode(see page 972)).

After saving the layout, the detector icon and the number of objects will be displayed in the **Surveillance window**.

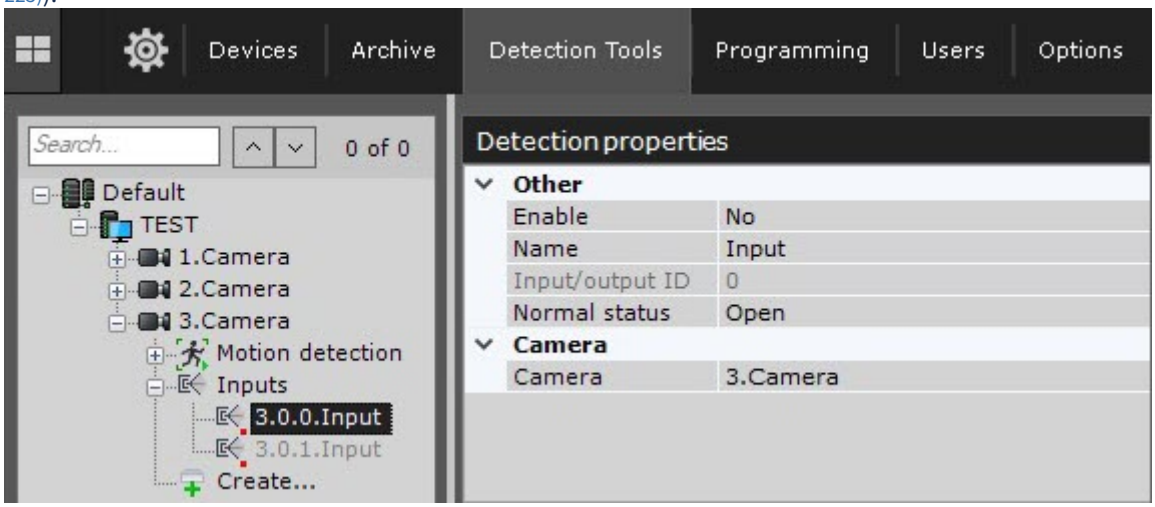
An example of configured display of the number of objects in the detection area based on the **People counter**:





19.4.26.6 Configuring the Input object

The **Input** object is displayed on the **Detection Tools** tab after you enable it on the **Hardware** tab (see The Input object(see page 225)).



You must configure the **Input** object on the **Hardware** tab.

On the **Detection Tools** tab, you can perform the following actions for the **Input** object:

1. You can check events from a detector using the event feed (optional) (see Checking events of a detector(see page 357)).
2. Configure **Automatic rules** that are executed when an event is received from a detector (see Automatic rules(see page 358)).

19.4.26.7 Checking events of a detector

On the **Detectors** tab, you can check events of detectors. To do this, do the following:

1. In the list of detectors, select the detector, which events you want to check.

   Attention!

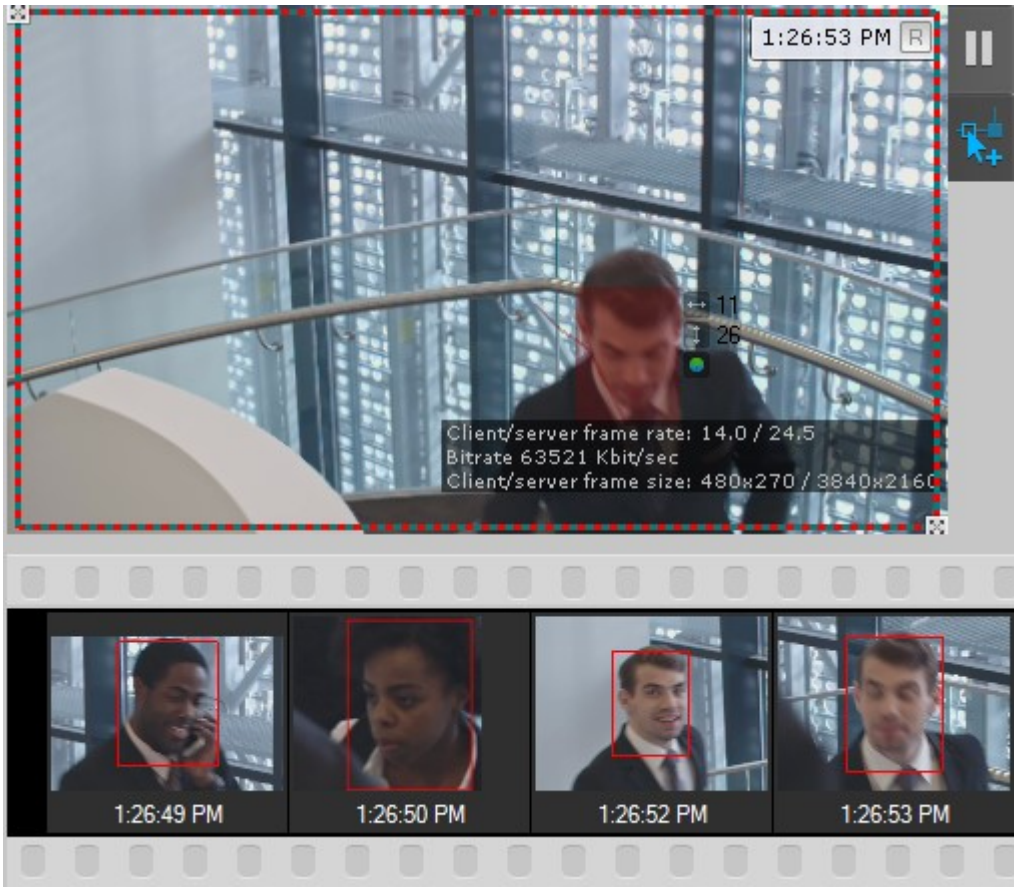
   The detector must be enabled and configured.

2. Reproduce an event upon the occurrence of which the detector must display a frame in the event feed: start of motion in the frame, camera rotation, sending sound to an audio device, and so on.

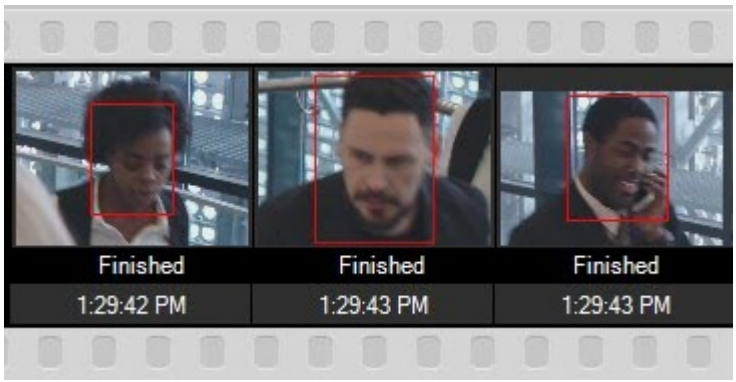
If the detector is configured correctly, frames from the camera that corresponds to the detector are displayed in the event feed, indicating the time they were received.

Note

- If archive recording isn't configured for the camera that corresponds to the detector (see Configuring recording to an archive(see page 295)), then there are no frames in the events from the detector, because frames are taken from archive recordings.
- If a detector has a start and end event, the current state of such a detector is monitored.



After an event finishes, the **Finished** caption is displayed below the frame in the event feed.



Checking events of a detector is complete.

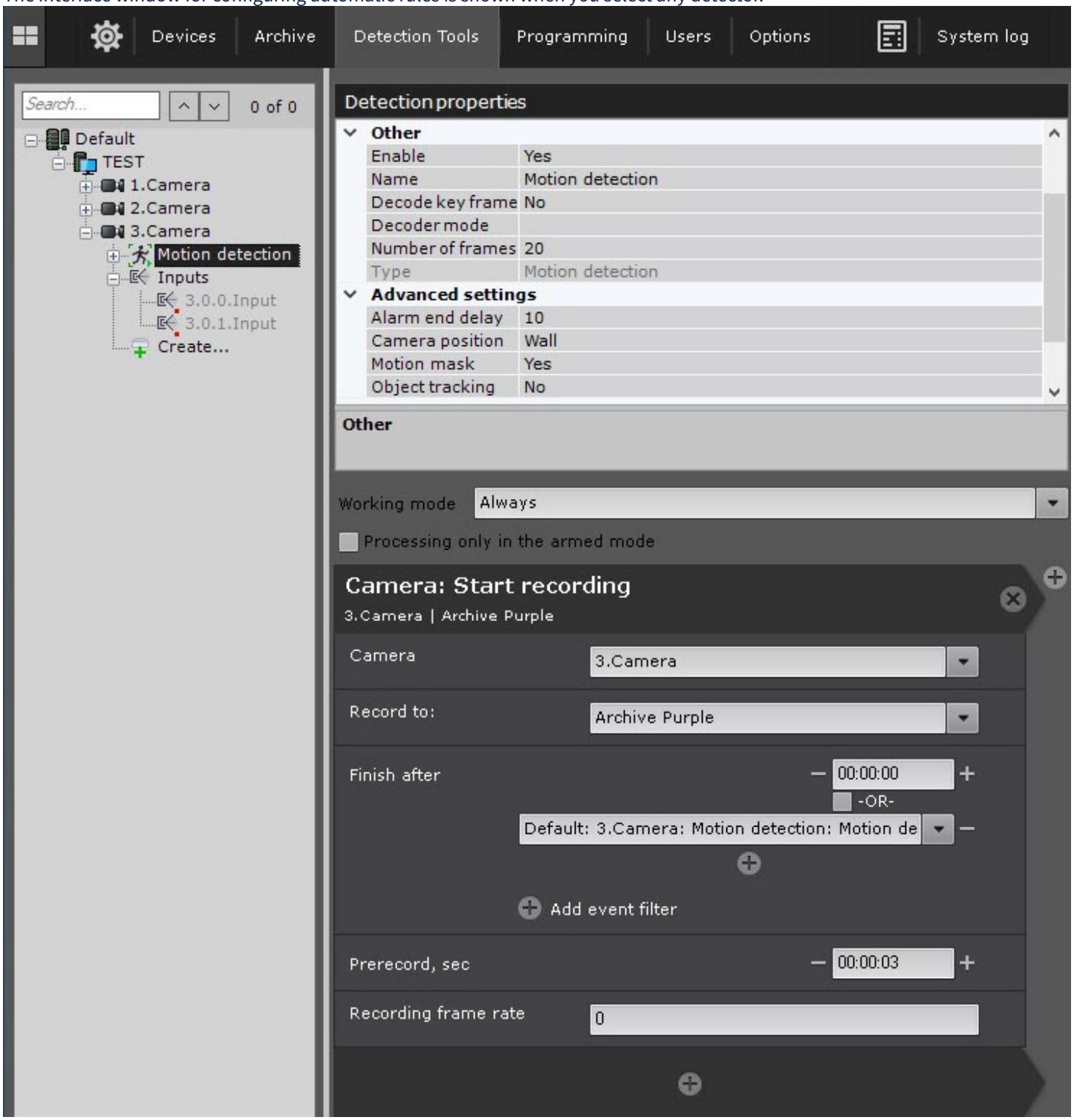
19.4.26.8 Automatic rules

Automatic rules are particular actions that are performed when a detector generates an event. You can set one or several automatic rules for each detector.

You can configure automatic rules and their mode of operation in the same way as configuring macros (see Programming(see page 828)).

Created **Automatic rules** are displayed in the corresponding list on the **Programming** tab (see General information about macros(see page 829)).

The interface window for configuring automatic rules is shown when you select any detector.



19.4.27 Standard sub-detectors

19.4.27.1 General information on the standard sub-detectors

Hardware requirements for neural analytics operation(see page 339)
Metadata database(see page 333)

The standard sub-detectors generate events at certain actions of objects in the camera FOV:

Name of the sub-detector	Description
Line crossing(see page 362)	Detector generates an event when an object track crosses a virtual line
Loitering in area(see page 367)	Detector generates an event when an object stays in a specified area for a long period of time. The event stops when an object leaves the area or disappears inside the area
Stop in area(see page 370)	Detector generates an event when an object stops moving in a specified area. The event stops when an object leaves the area or disappears inside the area
Track masking(see page 373)	Detector that allows you to mask objects
Abandoned object(see page 423)	Detector generates an event when there is an abandoned object in a specified area
Motion in area(see page 374)	Detector generates an event when an object starts moving in a specified area. The event stops when an object stops in the area, leaves the area, or disappears inside the area
Entrance in area(see page 377)	Detector generates an event when an object enters a specified area
Exit from area(see page 380)	Detector generates an event when an object leaves a specified area
Multiple objects(see page 383)	Detector generates an event when the number of objects in a specified area exceeds the set value
Move from area to area(see page 385)	Detector generates an event when an object leaves one area and enters another area of the frame

To operate the standard sub-detectors, you can use the metadata from the sources:

Category	Detector
Category: Trackers(see page 389)	• **Motion detector**(see page 446) • **Neural tracker**(see page 402) • **Object tracker**(see page 414) • **Human tracker VL**(see page 425)
Category: Face(see page 473) (reduced set of sub-detectors: Line crossing(see page 362), Loitering in area(see page 367), Entrance in area(see page 377))	• Face detector VA(see page 485) • Face detector TV(see page 500) • Face detector VL(see page 473)

Category	Detector
Category: Vehicle(see page 514)	• **License plate recognition BRS**(see page 514) • **License plate recognition IV**(see page 519) • **License plate recognition RR**(see page 535) • **License plate recognition RR—Search in archive**(see page 561) • **License plate recognition RR—Parking**(see page 574) • **License plate recognition VT**(see page 636) • **Vehicle recognition RR**(see page 600)
Category: Poses(see page 669)	• Human pose detector(see page 669)
Category: Production Safety(see page 698)	• Equipment detector(see page 711) • Equipment detector VL(see page 738)
Category: Retail(see page 756)	• Barcode detector(see page 760)

The standard sub-detectors can operate on the basis of all of the above objects.

Note

You can track up to 25 objects at the same time.



19.4.27.2 Video stream and scene requirements for the standard sub-detectors

For the standard sub-detectors to operate correctly, it is necessary to meet the camera requirements of the detectors for which they are created.

- Video stream and scene requirements for the Motion detector and its sub-detectors(see page 446)
- Video stream and scene requirements for the Neural tracker and its sub-detectors(see page 402)
- Video stream and scene requirements for the Object tracker and its sub-detectors(see page 414)
- Video stream and scene requirements for the Human tracker VL and its sub-detectors(see page 425)
- Video stream and scene requirements for the Face detector VA and its sub-detectors(see page 486)
- Video stream and scene requirements for the Face detector TV and its sub-detectors(see page 501)
- Video stream and scene requirements for the Face detector VL and its sub-detectors(see page 474)
- Video stream and scene requirements for the License plate recognition BRS and its sub-detectors(see page 514)
- Video stream and scene requirements for the License plate recognition IV and its sub-detectors(see page 521)
- Camera requirements for License plate recognition RR and its sub-detectors(see page 544)
- Camera requirements for License plate recognition RR—Search in archive and its sub-detectors(see page 562)
- Camera requirements for License plate recognition RR—Parking and its sub-detectors(see page 583)
- Camera requirements for Vehicle recognition RR and its sub-detectors(see page 609)
- Video stream and scene requirements for the License plate recognition VT and its sub-detectors(see page 638)
- Video stream and scene requirements for the Human pose detector and its sub-detectors(see page 669)
- Video stream and scene requirements for the Equipment detector and its sub-detectors(see page 711)
- Video stream and scene requirements for the Equipment detector VL and its sub-detectors(see page 738)
- Video stream and scene requirements for the Barcode detector and its sub-detectors(see page 760)

19.4.27.3 Image requirements for the standard sub-detectors

For the standard sub-detectors to operate correctly, it is necessary to meet the image requirements of the detectors for which they are created.

- Image requirements for the Motion detector and its sub-detectors(see page 446)
- Image requirements for the Neural tracker and its sub-detectors(see page 404)
- Image requirements for the Object tracker and its sub-detectors(see page 414)
- Image requirements for the Human tracker VL and its sub-detectors(see page 427)
- Image requirements for the Face detector VA and its sub-detectors(see page 487)
- Image requirements for the Face detector VL and its sub-detectors(see page 474)
- Image requirements for the Face detector TV and its sub-detectors(see page 502)
- Image requirements for the License plate recognition BRS and its sub-detectors(see page 515)
- Image requirements for the License plate recognition IV and its sub-detectors(see page 522)
- Camera requirements for License plate recognition RR and its sub-detectors(see page 544)
- Camera requirements for License plate recognition RR—Parking and its sub-detectors(see page 583)
- Camera requirements for License plate recognition RR—Search in archive and its sub-detectors(see page 562)
- Camera requirements for Vehicle recognition RR and its sub-detectors(see page 609)
- Image requirements for the License plate recognition VT and its sub-detectors(see page 642)
- Image requirements for the Human pose detector and its sub-detectors(see page 671)
- Image requirements for the Equipment detector and its sub-detectors(see page 713)
- Image requirements for the Equipment detector VL and its sub-detectors(see page 739)
- Image requirements for the Barcode detector and its sub-detectors(see page 761)

19.4.27.4 Configuring Line crossing

On the page:

- Configuring the parameters(see page 362)

- Configuring a virtual line(see page 364)

19.4.27.4.1 Configuring the parameters

To create the **Line crossing** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create…** → **Line crossing**.

By default, the detector is enabled and set to generate events when an object crosses a virtual line.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Line crossing**	Enter the detector name or leave the default name
Type	**Line crossing**	Name of the detector type (non-editable field)
Advanced settings		
X-axis offset	**15**	Specify the X-axis and Y-axis offsets as a percentage of the track area to receive events from the specified area. The values must be in the range [1, 40]
Y-axis offset	**10**	
Basic settings		
Maximum object height	**100**	Specify the maximum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object height must be equal in the settings of the **Object tracker** and **Line crossing**.

Parameter	Value	Description
Maximum object speed	**500**	Specify the maximum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Maximum object width	**100**	Specify the maximum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object width must be equal in the settings of the **Object tracker** and **Line crossing**.
Minimum object height	**0.1**	Specify the minimum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object height must be equal in the settings of the **Object tracker** and **Line crossing**.
Minimum object speed	**0**	Specify the minimum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Minimum object width	**0.1**	Specify the minimum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object width must be equal in the settings of the **Object tracker** and **Line crossing**.

Parameter	Value	Description
Object class	**All classes** **Vehicle** **Person**	Select the object class that must generate an event. The default value is **All classes** **Note** • When you create the **Line crossing** detector as a child object of the Object tracker(see page 414) and select the **Person** value, there won't be any events if the tracker detects the movement of several people nearby. • When you create the **Line crossing** detector as a child object of the Category: Face(see page 473) and Category: Vehicle(see page 514) detectors, the **Object class** parameter must have the **All classes** value.

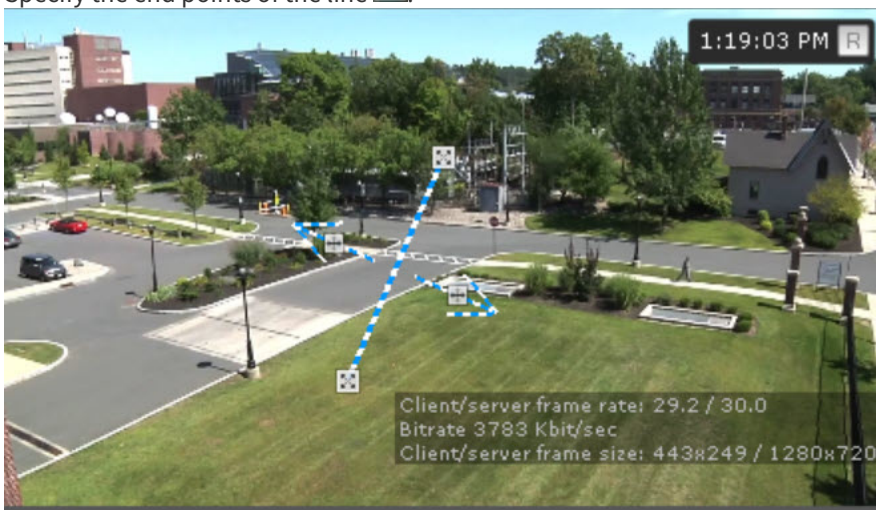
By default, the entire frame is a detection area. If necessary, in the preview window, you can set one or more ignore areas (see Configuring the ignore area(see page 350)).

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

19.4.27.4.2 Configuring a virtual line

To configure a virtual line, do the following:

1. In the preview window:
   a. Specify the end points of the line :



Note

- The end points are connected by a two-color dashed line. The directions of object movement through the line are indicated by dotted arrows.
- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- To hide the virtual line, click the button. To cancel the action, click this button again.

Action	Result
Hover the cursor over the end point and, holding down the left mouse button, move the mouse	Moving the end point of a line
Hover the cursor over the line and, holding down the left mouse button, move the mouse	Moving the line

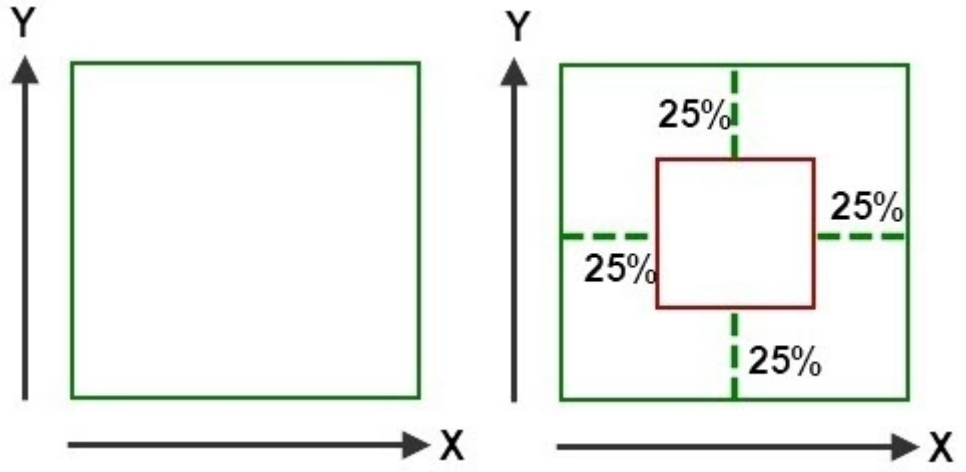
b. By default, both directions of object movement through the line are detected. To stop the detection in the required direction, click the button corresponding to this direction.

Attention!

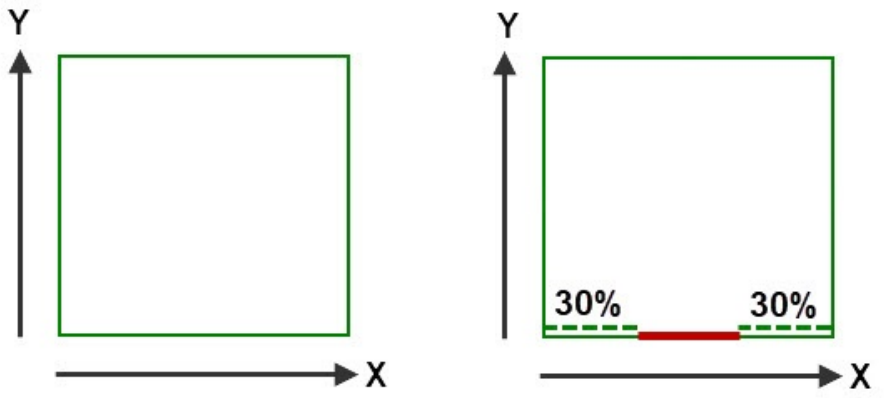
- You must select at least one direction for detection.
- An unmonitored direction of object movement is indicated by a dimmed arrow.



2. In the frame, there can be situations when one and the same object frequently moves near the virtual line, which can cause the generation of excessive events. In this situation, we recommend specifying the area of the object track that completely crosses the line to receive an event from the detector. For this, in the detector parameters, specify the X-axis and Y-axis offsets as a percentage of the track area width and height.
Configuration of the X-axis and Y-axis offsets depends on the **Camera position** parameter of the parent detector below which the **Line crossing** detector is created. For example, **Neural tracker** has the **Camera position** parameter (see Configuring the Neural tracker(see page 405)).
   a. The **Ceiling** camera position:
   For example, the green rectangle is the object track. If the X-axis and Y-axis offsets are set to 25%, an event is generated only if the red rectangle completely crosses the line.



b. The **Wall** camera position:
For example, the green rectangle is the object track. If the X-axis offset is set to 30%, an event is generated only if the red segment completely crosses the line.



3. Click the **Apply** button. Click the **Cancel** button to cancel the changes.

Configuration of the **Line crossing** detector is complete.

19.4.27.5 Configuring Loitering in area

To create the **Loitering in area** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create...** → **Loitering in area**.

By default, the detector is enabled and set to generate events when an object leaves the detection area after spending some time there.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Loitering in area**	Enter the detector name or leave the default name
Event hold time (sec)	**2**	**Note** The parameter is taken into account only if the **Trigger on group of objects** parameter is enabled. This is the time period during which the detector waits for the next objects after the first object in the group is detected. If the specified number of objects (specified in the **Number of alarm objects** parameter) are detected within this time period, the detector generates an event. If no additional objects are detected within the specified time period, the detector doesn't generate an event. Specify the time period in seconds when events will be held when responding to a group of objects. The value must be in the range [0, 86400]
Type	**Loitering in area**	Name of the detector type (non-editable field)

Parameter	Value	Description
Advanced settings		
X-axis offset	**15**	Specify the X-axis and Y-axis offsets as a percentage of the track area to receive events from the specified area. The values must be in the range [1, 40]
Y-axis offset	**10**	
Basic settings		
Event duration to trigger detection (sec)	**30**	Specify the time of the object staying in the detection area in seconds. The value must be in the range [0, 172800]
Maximum object height	**100**	Specify the maximum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object height must be equal in the settings of the **Object tracker** and **Loitering in area**.
Maximum object speed	**500**	Specify the maximum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Maximum object width	**100**	Specify the maximum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object width must be equal in the settings of the **Object tracker** and **Loitering in area**.
Minimum object height	**0.1**	Specify the minimum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object height must be equal in the settings of the **Object tracker** and **Loitering in area**.

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Minimum object speed</td><td>0</td><td>Specify the minimum object speed per second for the detector to generate an event. The value must be in the range [0, 500]

Note
• In Axxon One, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height.
• For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).</td></tr>
<tr><td>Minimum object width</td><td>0.1</td><td>Specify the minimum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100]

Attention!
The values of the minimum object width must be equal in the settings of the Object tracker and Loitering in area.</td></tr>
<tr><td>Number of alarm objects</td><td>2</td><td>Note
The parameter is taken into account only if the Trigger on group of objects parameter is enabled.

This number determines the minimum number of objects that are considered a group and can generate an event.
Specify the number of objects that can cause the detector to generate an event. The value must be in the range [1, 100]</td></tr>
<tr><td rowspan="3">Object class</td><td>All classes</td><td rowspan="3">Select the object class that must generate an event. The default value is All classes

Note
• When you create the Loitering in area detector as a child object of the Object tracker(see page 414) and select the Person value, there won't be any events if the tracker detects the movement of several people nearby.
• When you create the Loitering in area detector as a child object of the Category: Face(see page 473) and Category: Vehicle(see page 514) detectors, the Object class parameter must have the All classes value.</td></tr>
<tr><td>Vehicle</td></tr>
<tr><td>Person</td></tr>
<tr><td rowspan="3">Time detection mode</td><td>Specified time</td><td>The detector generates an event after the object leaves the area after spending there the time specified in the Event duration to trigger detection (sec) parameter (default value)</td></tr>
<tr><td>Longer than specified time</td><td>The detector generates an event after the object leaves the area after spending more time there than specified in the Event duration to trigger detection (sec) parameter. If an event has already been generated and the track is still in the area after an event, the event won't be generated again until the track leaves the area and enters it again</td></tr>
<tr><td>Shorter than specified time</td><td>The detector generates an event after the object leaves the area after spending there less time than specified in the Event duration to trigger detection (sec) parameter</td></tr>
</table>

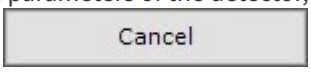
Parameter	Value	Description
Trigger on group of objects	**Yes**	The parameter is disabled by default. If you want the detector to generate an event only for a group of objects, select the **Yes** value
	No	**Note** • The group of objects that must cause the detector to generate an event is specified in the **Object class** parameter. • The number of objects that are considered a group is specified in the **Number of alarm objects** parameter. • Waiting time for the next objects after the first object from the group is detected is specified in the **Event hold time (sec)** parameter. For example, you select the **Person** object class, the **Number of alarm objects** is **3**, the **Event hold time (sec)** is **2** seconds, and the **Trigger on group of objects** parameter is enabled. If the detector detects the first person and detects others within two seconds, these people are considered a group, and the detector generates an event.

By default, the entire frame is a detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or set one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Loitering in area** detector is complete.

19.4.27.6 Configuring Stop in area

To create the **Stop in area** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create…** → **Stop in area**.

By default, the detector is enabled and set to generate events when an object stops moving in the area and remains stationary for a specified time.

Note

Slight shaking of an object is allowed.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		

Parameter	Value	Description
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Stop in area**	Enter the detector name or leave the default name
Event hold time (sec)	**2**	**Note** The parameter is taken into account only if the **Trigger on group of objects** parameter is enabled. This is the time period during which the detector waits for the next objects after the first object in the group is detected. If the specified number of objects (specified in the **Number of alarm objects** parameter) are detected within this time period, the detector generates an event. If no additional objects are detected within the specified time period, the detector doesn't generate an event. Specify the time period in seconds when events will be held when responding to a group of objects. The value must be in the range [0, 86400]
Type	**Stop in area**	Name of the detector type (non-editable field)
Advanced settings		
X-axis offset	**15**	Specify the X-axis and Y-axis offsets as a percentage of the track area to receive events from the specified area. The values must be in the range [1, 40]
Y-axis offset	**10**	
Basic settings		
Maximum object height	**100**	Specify the maximum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object height must be equal in the settings of the **Object tracker** and **Stop in area**.
Maximum object width	**100**	Specify the maximum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object width must be equal in the settings of the **Object tracker** and **Stop in area**.
Minimum object height	**0.1**	Specify the minimum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object height must be equal in the settings of the **Object tracker** and **Stop in area**.

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Minimum object width</td><td>0.1</td><td>Specify the minimum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100]

Attention!
The values of the minimum object width must be equal in the settings of the Object tracker and Stop in area.</td></tr>
<tr><td>Number of alarm objects</td><td>2</td><td>Note
The parameter is taken into account only if the Trigger on group of objects parameter is enabled.

This number determines the minimum number of objects that are considered a group and can generate an event.
Specify the number of objects that can cause the detector to generate an event. The value must be in the range [1, 100]</td></tr>
<tr><td>Object class</td><td>All classes
Vehicle
Person</td><td>Select the object class that must generate an event. The default value is All classes

Note
• When you create the Stop in area detector as a child object of the Object tracker(see page 414) and select the Person value, there won't be any events if the tracker detects the movement of several people nearby.
• When you create the Stop in area detector as a child object of the Category: Face(see page 473) and Category: Vehicle(see page 514) detectors, the Object class parameter must have the All classes value.</td></tr>
<tr><td>Stop in area duration</td><td>0</td><td>Specify the time in seconds during which the object is stationary for the detector to generate an event. The value must be in the range [0, 3600]

Attention!
• The value of this parameter must be less than the value of the Time of object in DB parameter in the settings of the Object tracker (see Configuring the Object tracker(see page 415)).
• If the detector uses the metadata from the Motion detector (see Configuring the Motion detector(see page 447)), the value of the Stop in area duration parameter must be 0. Otherwise, the detector won't work.</td></tr>
</table>

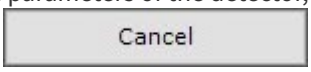
Parameter	Value	Description
Trigger on group of objects	**Yes**	The parameter is disabled by default. If you want the detector to generate an event only for a group of objects, select the **Yes** value
	No	**Note** • The group of objects that must cause the detector to generate an event is specified in the **Object class** parameter. • The number of objects that are considered a group is specified in the **Number of alarm objects** parameter. • Waiting time for the next objects after the first object from the group is detected is specified in the **Event hold time (sec)** parameter. For example, you select the **Person** object class, the **Number of alarm objects** is **3**, the **Event hold time (sec)** is **2** seconds, and the **Trigger on group of objects** parameter is enabled. If the detector detects the first person and detects others within two seconds, these people are considered a group, and the detector generates an event.

By default, the entire frame is a detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or set one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Stop in area** detector is complete.

19.4.27.7 Configuring Track masking

Attention!

Starting with *DetectorPack* 3.13, the **People masking**(see page 693) is no longer supported. We replaced it with the **Track masking**.

The **Track masking** allows you to hide objects in the video image:

1. in real time;
2. in the archive;
3. during the search in the archive;
4. when exporting from the archive.

Attention!

Objects are hidden in the video image only for users who have the **View masked video** parameter disabled in the role settings (see Roles(see page 920)).

To configure the **Track masking** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create...** → **Track masking**.

By default, the detector is enabled and set to mask object tracks.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

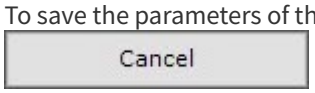
Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	Mask is recorded to the archive by default. To disable the parameter, select the **No** value
	No	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Track masking**	Enter the detector name or leave the default name
Masking area height (%)	**100**	Specify the height of the mask as a percentage of its original size. The value must be in the range [100, 200]
Masking area width (%)	**100**	Specify the width of the mask as a percentage of its original size. The value must be in the range [100, 200]
Type	**Track masking**	Name of the detector type (non-editable field)

By default, the entire frame is a detection area. If necessary, in the preview window, you can set one or more ignore areas (see Configuring the ignore area(see page 350))—objects within these areas will not be masked.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- Detection area is displayed by default. To hide the detection area, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Track masking** detector is complete.

19.4.27.8 Configuring Motion in area

To create the **Motion in area** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create…** → **Motion in area**.

By default, the detector is enabled and set to generate events when an object starts moving in the area.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Motion in area**	Enter the detector name or leave the default name
Type	**Motion in area**	Name of the detector type (non-editable field)
Advanced settings		
X-axis offset	**15**	Specify the X-axis and Y-axis offsets as a percentage of the track area to receive events from the specified area. The values must be in the range [1, 40]
Y-axis offset	**10**	
Basic settings		
Maximum object height	**100**	Specify the maximum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object height must be equal in the settings of the **Object tracker** and **Motion in area**.
Maximum object speed	**500**	Specify the maximum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Maximum object width	**100**	Specify the maximum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object width must be equal in the settings of the **Object tracker** and **Motion in area**.

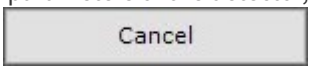
Parameter	Value	Description
Minimum object height	**0.1**	Specify the minimum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object height must be equal in the settings of the **Object tracker** and **Motion in area**.
Minimum object speed	**0**	Specify the minimum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Minimum object width	**0.1**	Specify the minimum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object width must be equal in the settings of the **Object tracker** and **Motion in area**.
Number of alarm objects	**2**	**Note** The parameter is taken into account only if the **Trigger on group of objects** parameter is enabled. This number determines the minimum number of objects that are considered a group and can generate an event. Specify the number of objects that can cause the detector to generate an event. The value must be in the range [1, 100]
Object class	**All classes** **Vehicle** **Person**	Select the object class that must generate an event. The default value is **All classes** **Note** • When you create the **Motion in area** detector as a child object of the Object tracker(see page 414) and select the **Person** value, there won't be any events if the tracker detects the movement of several people nearby. • When you create the **Motion in area** detector as a child object of the Category: Face(see page 473) and Category: Vehicle(see page 514) detectors, the **Object class** parameter must have the **All classes** value.

Parameter	Value	Description
Trigger on group of objects	**Yes**	The parameter is disabled by default. If you want the detector to generate an event only for a group of objects, select the **Yes** value
	No	**Note** • The group of objects that must cause the detector to generate an event is specified in the **Object class** parameter. • The number of objects that are considered a group is specified in the **Number of alarm objects** parameter.

By default, the entire frame is a detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or set one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuration of the **Motion in area** detector is complete.

19.4.27.9 Configuring Entrance in area

To create the **Entrance in area** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create...** → **Entrance in area**.

By default, the detector is enabled and set to generate events when an object enters the detection area.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Entrance in area**	Enter the detector name or leave the default name

Parameter	Value	Description
Event hold time (sec)	**2**	**Note** The parameter is taken into account only if the **Trigger on group of objects** parameter is enabled. This is the time period during which the detector waits for the next objects after the first object in the group is detected. If the specified number of objects (specified in the **Number of alarm objects** parameter) are detected within this time period, the detector generates an event. If no additional objects are detected within the specified time period, the detector doesn't generate an event. Specify the time period in seconds when events will be held when responding to a group of objects. The value must be in the range [0, 86400]
Type	**Entrance in area**	Name of the detector type (non-editable field)
Advanced settings		
X-axis offset	**15**	Specify the X-axis and Y-axis offsets as a percentage of the track area to receive events from the specified area. The values must be in the range [1, 40]
Y-axis offset	**10**	
Basic settings		
Maximum object height	**100**	Specify the maximum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object height must be equal in the settings of the **Object tracker** and **Entrance in area**.
Maximum object speed	**500**	Specify the maximum object speed per second for the detector to generate an event. The value must be in the range [0, 500]. **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Maximum object width	**100**	Specify the maximum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object width must be equal in the settings of the **Object tracker** and **Entrance in area**.
Minimum object height	**0.1**	Specify the minimum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object height must be equal in the settings of the **Object tracker** and **Entrance in area**.

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Minimum object width</td><td>0.1</td><td>Specify the minimum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100]

Attention!
The values of the minimum object width must be equal in the settings of the Object tracker and Entrance in area.</td></tr>
<tr><td>Minimum speed</td><td>0</td><td>Specify the minimum object speed per second for the detector to generate an event. The value must be in the range [0, 500]

Note
• In Axxon One, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height.
• For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).</td></tr>
<tr><td>Number of alarm objects</td><td>2</td><td>Note
The parameter is taken into account only if the Trigger on group of objects parameter is enabled.

This number determines the minimum number of objects that are considered a group and can generate an event. Specify the number of objects that can cause the detector to generate an event. The value must be in the range [1, 100]</td></tr>
<tr><td rowspan="3">Object class</td><td>All classes</td><td rowspan="3">Select the object class that must generate an event. The default value is All classes

Note
• When you create the Entrance in area detector as a child object of the Object tracker(see page 414) and select the Person value, there won't be any events if the tracker detects the movement of several people nearby.
• When you create the Entrance in area detector as a child object of the Category: Face(see page 473) and Category: Vehicle(see page 514) detectors, the Object class parameter must have the All classes value.</td></tr>
<tr><td>Vehicle</td></tr>
<tr><td>Person</td></tr>
<tr><td rowspan="2">Trigger on group of objects</td><td>Yes</td><td rowspan="2">The parameter is disabled by default. If you want the detector to generate an event only for a group of objects, select the Yes value

Note
• The group of objects that must cause the detector to generate an event is specified in the Object class parameter.
• The number of objects that are considered a group is specified in the Number of alarm objects parameter.
• Waiting time for the next objects after the first object from the group is detected is specified in the Event hold time (sec) parameter.

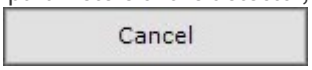
For example, you select the Person object class, the Number of alarm objects is 3, the Event hold time (sec) is 2 seconds, and the Trigger on group of objects parameter is enabled. If the detector detects the first person and detects others within two seconds, these people are considered a group, and the detector generates an event.</td></tr>
<tr><td>No</td></tr>
</table>

By default, the entire frame is a detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or set one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Entrance in area** detector is complete.

19.4.27.10 Configuring Exit from area

To create the **Exit from area** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create...** → **Exit from area**.

By default, the detector is enabled and set to generate events when an object leaves the detection area.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Exit from area**	Enter the detector name or leave the default name
Type	**Exit from area**	Name of the detector type (non-editable field)
Advanced settings		
X-axis offset	**15**	Specify the X-axis and Y-axis offsets as a percentage of the track area to receive events from the specified area. The values must be in the range [1, 40]
Y-axis offset	**10**	
Basic settings		

Parameter	Value	Description
Event hold time (sec)	**2**	**Note** The parameter is taken into account only if the **Trigger on group of objects** parameter is enabled. This is the time period during which the detector waits for the next objects after the first object in the group is detected. If the specified number of objects (specified in the **Number of alarm objects** parameter) are detected within this time period, the detector generates an event. If no additional objects are detected within the specified time period, the detector doesn't generate an event. Specify the time period in seconds when events will be held when responding to a group of objects. The value must be in the range [0, 86400]
Maximum object height	**100**	Specify the maximum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object height must be equal in the settings of the **Object tracker** and **Exit from area**.
Maximum object speed	**500**	Specify the maximum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Maximum object width	**100**	Specify the maximum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object width must be equal in the settings of the **Object tracker** and **Exit from area**.
Minimum object height	**0.1**	Specify the minimum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object height must be equal in the settings of the **Object tracker** and **Exit from area**.

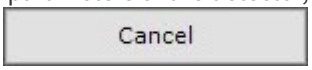
Parameter	Value	Description
Minimum object speed	**0**	Specify the minimum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Minimum object width	**0.1**	Specify the minimum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object width must be equal in the settings of the **Object tracker** and **Exit from area**.
Number of alarm objects	**2**	**Note** The parameter is taken into account only if the **Trigger on group of objects** parameter is enabled. This number determines the minimum number of objects that are considered a group and can generate an event. Specify the number of objects that can cause the detector to generate an event. The value must be in the range [1, 100]
Object class	**All classes** **Vehicle** **Person**	Select the object class that must generate an event. The default value is **All classes** **Note** • When you create the **Exit from area** detector as a child object of the Object tracker(see page 414) and select the **Person** value, there won't be any events if the tracker detects the movement of several people nearby. • When you create the **Exit from area** detector as a child object of the Category: Face(see page 473) and Category: Vehicle(see page 514) detectors, the **Object class** parameter must have the **All classes** value.
Trigger on group of objects	**Yes** **No**	The parameter is disabled by default. If you want the detector to generate an event only for a group of objects, select the **Yes** value **Note** • The group of objects that must cause the detector to generate an event is specified in the **Object class** parameter. • The number of objects that are considered a group is specified in the **Number of alarm objects** parameter. • Waiting time for the next objects after the first object from the group is detected is specified in the **Event hold time (sec)** parameter. For example, you select the **Person** object class, the **Number of alarm objects** is **3**, the **Event hold time (sec)** is **2** seconds, and the **Trigger on group of objects** parameter is enabled. If the detector detects the first person and detects others within two seconds, these people are considered a group, and the detector generates an event.

By default, the entire frame is a detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or set one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Exit from area** detector is complete.

19.4.27.11 Configuring Multiple objects

To create the **Multiple objects** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create...** → **Multiple objects**.

By default, the detector is enabled and set to generate events when the number of objects in the detection area exceeds the value specified in the detector settings.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Multiple objects**	Enter the detector name or leave the default name
Type	**Multiple objects**	Name of the detector type (non-editable field)
Basic settings		
Maximum object height	**100**	Specify the maximum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object height must be equal in the settings of the **Object tracker** and **Multiple objects**.

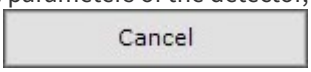
Parameter	Value	Description
Maximum object speed	**500**	Specify the maximum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Maximum object width	**100**	Specify the maximum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object width must be equal in the settings of the **Object tracker** and **Multiple objects**.
Minimum object height	**0.1**	Specify the minimum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object height must be equal in the settings of the **Object tracker** and **Multiple objects**.
Minimum object speed	**0**	Specify the minimum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Minimum object width	**0.1**	Specify the minimum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object width must be equal in the settings of the **Object tracker** and **Multiple objects**.
Number of alarm objects	**10**	Specify the number of objects for the detector to generate an event. The value must be in the range [1, 100]. When the specified number of objects is exceeded, the detector generates the **Triggering start** event. When the number of objects becomes less than the specified value, the **Triggering end** event is generated

Parameter	Value	Description
Object class	**All classes** **Vehicle** **Person**	Select the object class that must generate an event. The default value is **All classes** **Note** • When you create the **Multiple objects** detector as a child object of the Object tracker(see page 414) and select the **Person** value, there won't be any events if the tracker detects the movement of several people nearby. • When you create the **Multiple objects** detector as a child object of the Category: Vehicle(see page 514) detectors, the **Object class** parameter must have the **All classes** value.

By default, the entire frame is a detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or set one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuration of the **Multiple objects** detector is complete.

19.4.27.12 Configuring Move from area to area

On the page:

- Configuring the parameters(see page 385)
- Configuring detection areas(see page 388)

19.4.27.12.1 Configuring the parameters

To create the **Move from area to area** detector, do the following:

1. Create the required detector and specify its parameters (see Configuring detectors and their sub-detectors(see page 328)).
2. Below the created detector, click **Create...** → **Move from area to area**.

By default, the detector is enabled and set to generate events when an object leaves one area and enters another area.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Move from area to area**	Enter the detector name or leave the default name
Type	**Move from area to area**	Name of the detector type (non-editable field)
Advanced settings		
X-axis offset	**15**	Specify the X-axis and Y-axis offsets as a percentage of the track area to receive events from the specified area. The values must be in the range [1, 40]
Y-axis offset	**10**	
Event duration for detection triggering (sec)	**0**	Specify the maximum duration of an event in seconds for the detector to generate an event. The value must be in the range [0, 172800]
Time detection mode	**Longer than specified time**	Select the mode for determining the time it takes for an object to move from one area to another. The default value is **Longer than specified time**. If you select **Less than specified time**, the **Event duration for detection triggering (sec)** parameter must be greater than **0**
	Less than specified time	
Basic settings		
Event hold time (sec)	**2**	**Note** The parameter is taken into account only if the **Trigger on group of objects** parameter is enabled. This is the time period during which the detector waits for the next objects after the first object in the group is detected. If the specified number of objects (specified in the **Number of alarm objects** parameter) are detected within this time period, the detector generates an event. If no additional objects are detected within the specified time period, the detector doesn't generate an event. Specify the time period in seconds when events will be held when responding to a group of objects. The value must be in the range [0, 86400]
Maximum object height	**100**	Specify the maximum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object height must be equal in the settings of the **Object tracker** and **Move from area to area**.

Parameter	Value	Description
Maximum object width	**100**	Specify the maximum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the maximum object width must be equal in the settings of the **Object tracker** and **Move from area to area**.
Maximum speed	**500**	Specify the maximum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Minimum object height	**0.1**	Specify the minimum object height as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object height must be equal in the settings of the **Object tracker** and **Move from area to area**.
Minimum object width	**0.1**	Specify the minimum object width as a percentage of the frame size for the detector to generate an event. The value must be in the range [0.05, 100] **Attention!** The values of the minimum object width must be equal in the settings of the **Object tracker** and **Move from area to area**.
Minimum speed	**0**	Specify the minimum object speed per second for the detector to generate an event. The value must be in the range [0, 500] **Note** • In *Axxon One*, speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and its height. • For a visual understanding of the speed values, we recommend specifying the speed when searching the archive (see Configuring minimum and maximum object speed(see page 1223)).
Number of alarm objects	**2**	**Note** The parameter is taken into account only if the **Trigger on group of objects** parameter is enabled. This number determines the minimum number of objects that are considered a group and can generate an event. Specify the number of objects that can cause the detector to generate an event. The value must be in the range [1, 100]

Parameter	Value	Description
Object class	**All classes** **Vehicle** **Person**	Select the object class that must generate an event. The default value is **All classes** **Note** • When you create the **Move from area to area** detector as a child object of the Object tracker(see page 414) and select the **Person** value, there won't be any events if the tracker detects the movement of several people nearby. • When you create the **Move from area to area** detector as a child object of the Category: Vehicle(see page 514) detectors, the **Object class** parameter must have the **All classes** value.
Trigger on group of objects	**Yes** **No**	The parameter is disabled by default. If you want the detector to generate an event only for a group of objects, select the **Yes** value **Note** • The group of objects that must generate an event is specified in the **Object class** parameter. • The number of objects that are considered a group is specified in the **Number of alarm objects** parameter. • Waiting time for the next objects after the first object from the group is detected is specified in the **Event hold time (sec)** parameter. For example, you select the **Person** object class, the **Number of alarm objects** is **3**, the **Event hold time (sec)** is **2** seconds, and the **Trigger on group of objects** parameter is enabled. If the detector detects the first person and detects others within two seconds, these people are considered a group, and the detector generates an event.

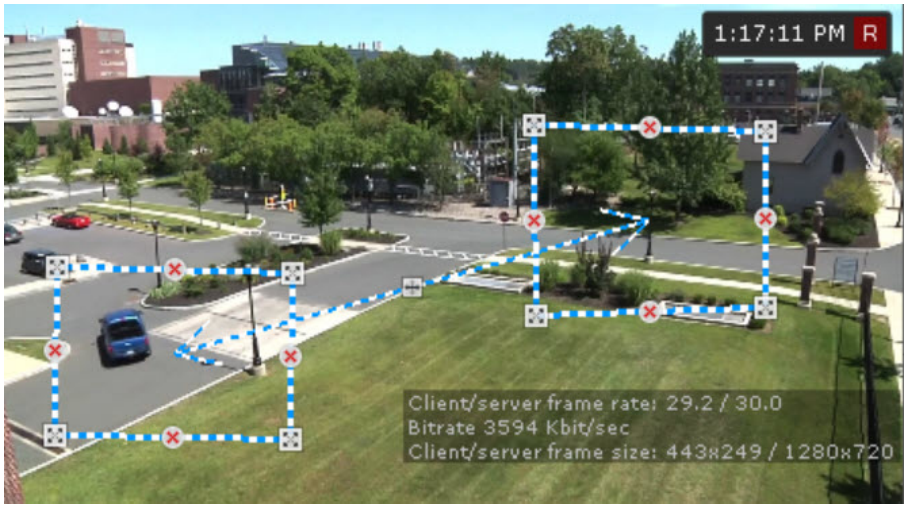
To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

19.4.27.12.2 Configuring detection areas

To configure detection areas, do the following:

1. In the preview window, specify two areas. The detector generates an event if any object moves from one area to the other in the specified direction.
   By default, the areas are located on the right side and the left side of the video image. The anchor points of each area are connected by a two-color dotted line. You can resize the area by dragging its anchor points. To move the entire area, left-click and drag its border. To add anchor points, click .
2. In the preview window, specify the directions of the object movement. The direction of movement between the areas is indicated by a dotted arrow. To change the direction of movement, click on the direction arrow. The available directions are:
   a. Left.
   b. Right.

c. Both directions.



3. Click the **Apply** button. To cancel the changes, click the **Cancel** button.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

Configuration of the **Move from area to area** detector is complete.

19.4.28 Category: Trackers

19.4.28.1 Abandoned object detector VI

19.4.28.1.1 Functions of the Abandoned object detector VI

Description	The **Abandoned object detector VI** is used to automatically detect abandoned or disappeared objects that remain stationary for a certain period of time in the camera FOV. You can use the detection tool to detect abandoned/disappeared objects in a room
Licensing	To operate the detection tool, you need to contact an AxxonSoft manager and get a license file (see Types of licenses[144], Licensing of the software module for the Abandoned object detector VI in Windows OS(see page 390), Licensing of the software module for the Abandoned object detector VI in Linux OS(see page 391))
Add-ons	For the detection tool to work, you must install the VI Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.1.2 Video stream and scene requirements for the Abandoned object detector VI

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Abandoned object detector VI(see page 390)

Requirements for the operation of the **Abandoned object detector VI** are given in the table:

144 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Camera	• Pitch angle of the camera optical axis relative to the horizontal plane:
	  • at least 15 degrees (for the inclined method of placement);
	  • from 80 to 100 degrees (for placement on ceiling).
	• Resolution is from 640x360 to 1920×1080 pixels. Resolution can be:
	  • lower for close-up scenes (2–7 meters for cameras with standard focal length) without loss of recognition quality;
	  • higher for scenes far from camera (from 10 meters).
	• FPS is at least 25
	• Color image only

Lighting	• Lighting in the scene is from 100 to 1000 lux
Scene and camera angle	• Shooting distance is from 5 to 30 meters • Density of people flow is no more than one person per square meter • Volume of the abandoned object is from 3 cubic decimeters • Background texture: moving, random and inhomogeneous background with contrast variations from 0.2 to 0.8

19.4.28.1.3 Image requirements for the Abandoned object detector VI

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Abandoned object detector VI(see page 389)

Requirements for the operation of the **Abandoned object detector VI** are given in the table:

Object images	• For abandoned objects, the optimum density is 100 pixels per meter • Maximum signal-to-noise ratio (without the function of automatic signal amplification) is at least 42 dB • Image isn't noisy and isn't distorted by artifacts of the compression algorithm • Distortion is no more than 10% (at the edges of the frame—at a distance of one third from its center in width, height and diagonal)

19.4.28.1.4 Licensing of the software module for the Abandoned object detector VI in Windows OS

Starting with *Detector Pack* 3.13, to license the detector, you must insert a Guardant USB key with a license that you got from the AxxonSoft sales department. Once you insert the key, the licensing process is complete.

If the license isn't installed in the USB key, do the following to activate the license:

1. Contact the AxxonSoft manager to obtain the serial number for the Guardant hardware protection key.
2. Download the archive containing the **Guardant License Wizard** utility.
3. Unzip the downloaded archive.
4. Open the unzipped folder and launch the **Guardant License Wizard** utility.
5. Go to **Settings** and in the **Server address** field, enter the licensing server address:

```
https://gkey.videointellect.com:9000
```

6. Return to the main window of the utility and click **License activation**.
7. In the **On which computer do you want to use the license?** section, select **On this**.
8. In the **Serial number** field, enter the serial number provided by the AxxonSoft manager.
9. Click **Get license**.

The license activation for the **Abandoned object detector VI** is complete.

19.4.28.1.5 Licensing of the software module for the Abandoned object detector VI in Linux OS

On the page:

- License activation using the Guardant dongle(see page 391)
- License activation and update for Detector Pack 3.13 and earlier(see page 391)
- Deleting the license for Detector Pack 3.13 and earlier(see page 392)

19.4.28.1.5.1 License activation using the Guardant dongle

Starting with *Detector Pack 3.14*, to operate with the license keys of the **Abandoned object detector VI** and activate the license, do the following:

1. Connect the Guardant USB dongle to the device on which you installed *Axxon One.*
2. Install the driver:
   a. Download the archive.
   b. Unzip the content.
   c. Go to the directory with the archive contents.
   d. Run the driver installation script.

```
sudo ./install.sh
```

If you successfully install the driver, the license keys are displayed on the page http://127.0.0.1:3189/#/dongles/list.

License activation is complete.

For *Detector Pack 3.13* and earlier, use the following manual to activate and update the license:

License activation and update for Detector Pack 3.13 and earlier

19.4.28.1.5.2 License activation and update for *Detector Pack* 3.13 and earlier

To operate with the license keys of the **Abandoned object detector VI** and activate/update the license, do the following:

1. Download the archive.
2. Unzip the content.
3. Open a terminal.
4. Go to the directory with the archive contents:

```
cd /AxxonSoft/DetectorPack/VLSdk/distrib
```

   where instead of **/AxxonSoft/DetectorPack/VLSdk**, you must specify the actual path.
5. Grant permissions to run the script for driver installation:

```
chmod 777 install.sh
```

6. Run the driver installation script.

```
sudo ./install.sh
```

7. Open a browser and go to the page http://127.0.0.1:1947/checkin.html.
8. On the page that opens, in the **Select File:** line, select the key with the v2c extension.

> **Attention!**
>
> To get the key with the v2c extension, you need to contact the AxxonSoft manager.

9. Click the **Apply File** button. If activation is successful, the key is displayed on the page http://127.0.0.1:1947/devices.html.

The license activation/update is complete. After activation, in the /SafeNet Sentinel/Sentinel LDK directory, the **installed** folder appears.

19.4.28.1.5.3 Deleting the license for *Detector Pack* 3.13 and earlier

To delete the license, do the following:

1. Delete the license file with the v2c extension from the **installed** folder in the /SafeNet Sentinel/Sentinel LDK directory.
2. Restart the OS.

> **Note**
>
> - When you delete the license, only the key is deleted. All license restriction counters remain in the secure storage.
> - If you return the key to the root directory, it will be fully restored. Its counters will continue counting license restrictions from the moment when they stopped when the license file with the v2c. extension was deleted. The validity time of the license continues to count down even when the key is missing.

The license deletion is complete.

19.4.28.1.6 Configuring the Abandoned object detector VI

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Abandoned object detector VI(see page 389)
Image requirements for the Abandoned object detector VI(see page 390)
Licensing of the software module for the Abandoned object detector VI in Windows OS(see page 390)
Licensing of the software module for the Abandoned object detector VI in Linux OS(see page 391)

To configure the **Abandoned object detector VI**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Trackers** → **Abandoned object detector VI**.

By default, the detector is enabled and set to detect abandoned objects.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed

Parameter	Value	Description
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Abandoned object detector VI**	Enter the detector name or leave the default name
Background accumulation	**Yes**	By default, scene background accumulation is enabled. To disable, select the **No** value
	No	
Background training period (sec) (starting with Detector Pack 3.14)	**25**	Specify the time period in seconds during which the background is analyzed. The value must be in the range [-1, 10000000]
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Detection area sensitivity	**Medium level**	Select the detection area sensitivity. The **Medium level** of sensitivity is selected by default. Additional neural network processing is applied in this area
	Low level	
Detection mode	**CPU**	Select the processor for the detector operation (see Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
Detection sensitivity (%)	**70**	Specify the sensitivity level of the detector as a percentage. The value must be in the range [0, 100]
Error tolerance (starting with Detector Pack 3.14)	**128**	Specify the tolerance level. The lower the value, the higher the recognition accuracy, but the longer the processing time. The value must be in the range [32, 256]

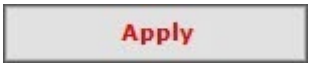
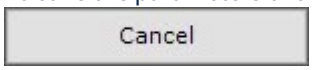
Parameter	Value	Description
Event intersection time (sec)	**0.01**	Specify the time interval in seconds during which events aren't processed after successful detection when the event results match. The parameter determines the level of intersection between new and previous events. If the specified value is exceeded, it is considered that these events refer to the same real object. The parameter is necessary to reduce the total number of events, since the analysis is performed continuously and the duration of real events can be several seconds. You must select the required value empirically. The value must be in the range [0, 1]
False detection filtering algorithm (starting with Detector Pack 3.14)	**Accurate** **Quick**	Select the false detection filtering algorithm
False detection filtering level (starting with Detector Pack 3.14)	**8**	Specify the level of filtering for monotonous and single-color triggers caused by changes in lighting. The value must be in the range [0, 100]
Foreground sensitivity	**70**	Specify the sensitivity of primary detection of objects in the foreground. The value must be in the range [0, 100]
Frame picking period (starting with Detector Pack 3.14)	**67**	Specify the time period in seconds between selection of frames for analysis. The value must be in the range [1,10000000]
Frame size change	**640**	Specify the size to which the video is compressed before analysis. The value must be in the range [480, 960]
Ignore time (sec)	**0**	Specify the time interval in seconds during which events aren't processed after successful detection. The parameter is necessary to reduce the total number of events, since the analysis is performed continuously and the duration of real events can be several seconds. You must select the required value empirically. The value must be in the range [0, 9999]
Maximum size of detected objects	**100**	Specify the maximum size of an object as a percentage to get an event from the detector. If objects are larger than specified, there are no events from the detector. The value must be in the range [0, 100]
Minimum size of detected objects	**0**	Specify the minimum size of an object as a percentage to get an event from the detector. If objects are smaller than specified, there are no events from the detector. The value must be in the range [0, 100]
Monotony filter	**1**	Specify the value of monotonous/single-color events filtering (for example, spots on the floor). The value must be in the range [0, 10]
Number of execution threads	**4**	Specify the number of execution threads. The value must be in the range [0, 100]
Number of frames processed per second	**12**	Specify the number of frames processed per second. The value must be in range [0.016, 100] **Attention!** The detector operates optimally with the default value for most use cases. Changing this value may reduce the detector's performance quality.
Object filter	**Yes** **No**	By default, the neural network object filter is disabled. To enable, select the **Yes** value

Parameter	Value	Description
People flow intensity (%)	**99**	Specify the value as a percentage that is responsible for the detector's ability to detect objects when the camera FOV is heavily overlapped by people walking by. The value must be in the range [0, 100]
Person filter	**Yes**	By default, objects near people aren't ignored. To ignore objects near people, select the **Yes** value
	No	
Saving background	**Yes**	By default, saving the scene background is enabled. To disable, select the **No** value **Attention!** Background files are automatically saved to the directory C:\ProgramData\VideoIntellect\. The size of this folder can quickly increase, potentially filling up all available space on the C drive. It isn't possible to set a limit on the maximum volume of this directory, so it's important to periodically check its contents and clear it if necessary.
	No	
Scene training period (sec) (starting with Detector Pack 3.14)	**-1**	Specify the time period during which the scene is analyzed. With the **-1** value, the system automatically selects the time period. The value must be in the range [-1, 10000000]
Sensitivity of slight changes in background (%)	**95**	Controls the sensitivity to object contrast. Specify the value as a percentage that is responsible for the detector's ability to distinguish between objects that are less visible (that blend into the background). The higher the value, the less noticeable object can be detected. The value must be in the range [0, 100]
State saving interval	**0**	Specify the state saving interval in seconds. The value must be in the range [0, 9999]
Time for detection (sec)	**120**	Specify the time in seconds after which the object is considered abandoned. The value must be in the range [0, 9999]
Type	**Abandoned object detector VI**	Name of the detector's type (non-editable field)

In the preview window, specify the area in which the objects must be detected. You can set this area by using the anchor points  (see Configuring a detection area(see page 351)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button (see Configuring a detection area(see page 351)). To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuring the Abandoned object detector VI is complete.

19.4.28.2 Abandoned object detector VI (Street)

19.4.28.2.1 Functions of the Abandoned object detector VI (Street)

Description	The **Abandoned object detector VI (Street)** is used to automatically detect abandoned or disappeared objects that remain stationary for a certain period of time in the camera FOV. You can use the detection tool to detect abandoned/disappeared objects in an area with changes in the scene due to weather conditions or unstable lighting
Licensing	To operate the detection tool, you need to contact an AxxonSoft manager and get a license file (see Types of licenses[145], Licensing of the software module for the Abandoned object detector VI (Street) in Windows OS(see page 397), Licensing of the software module for the Abandoned object detector VI (Street) in Linux OS(see page 397))
Add-ons	For the detection tool to work, you must install the VI Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.2.2 Video stream and scene requirements for the Abandoned object detector VI (Street)

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Abandoned object detector VI (Street)(see page 396)

Requirements for the operation of the **Abandoned object detector VI (Street)** are given in the table:

Camera	• Pitch angle of the camera optical axis relative to the horizontal plane:
	  • at least 15 degrees (for the inclined method of placement);
	  • from 80 to 100 degrees (for placement on ceiling).
	• Resolution is from 640x360 to 1920×1080 pixels. Resolution can be:
	  • lower for close-up scenes (2–7 meters for cameras with standard focal length) without loss of recognition quality;
	  • higher for scenes far from camera (from 10 meters).
	• FPS is at least 25
	• Color image only

Lighting	• Lighting in the scene is from 100 to 1000 lux
Scene and camera angle	• Shooting distance is from 5 to 30 meters • Density of people flow is no more than one person per square meter • Volume of the abandoned object is from 3 cubic decimeters • Background texture: moving, random and inhomogeneous background with contrast variations from 0.2 to 0.8

19.4.28.2.3 Image requirements for the Abandoned object detector VI (Street)

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Abandoned object detector VI (Street)(see page 396)

Requirements for the operation of the **Abandoned object detector VI (Street)** are given in the table:

145 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Object images	• For abandoned objects, the optimum density is 100 pixels per meter • Maximum signal-to-noise ratio (without the function of automatic signal amplification) is at least 42 dB • Image isn't noisy and isn't distorted by artifacts of the compression algorithm • Distortion is no more than 10% (at the edges of the frame—at a distance of one third from its center in width, height and diagonal)

19.4.28.2.4 Licensing of the software module for the Abandoned object detector VI (Street) in Windows OS

Starting with *Detector Pack* 3.13, to license the detector, you must insert a Guardant USB key with a license that you got from the AxxonSoft sales department. Once you insert the key, the licensing process is complete.

If the license isn’t installed in the USB key, do the following to activate the license:

1. Contact the AxxonSoft manager to obtain the serial number for the Guardant hardware protection key.
2. Download the archive containing the **Guardant License Wizard** utility.
3. Unzip the downloaded archive.
4. Open the unzipped folder and launch the **Guardant License Wizard** utility.
5. Go to **Settings** and in the **Server address** field, enter the licensing server address:

   ```
   https://gkey.videointellect.com:9000
   ```
6. Return to the main window of the utility and click **License activation**.
7. In the **On which computer do you want to use the license?** section, select **On this**.
8. In the **Serial number** field, enter the serial number provided by the AxxonSoft manager.
9. Click **Get license**.

The license activation for the **Abandoned object detector VI (Street)** is complete.

19.4.28.2.5 Licensing of the software module for the Abandoned object detector VI (Street) in Linux OS

On the page:

- License activation using the Guardant dongle(see page 397)
- License activation and update for Detector Pack 3.13 and earlier(see page 398)
- Deleting the license for Detector Pack 3.13 and earlier(see page 398)

19.4.28.2.5.1 License activation using the Guardant dongle

Starting with *Detector Pack 3.14*, to operate with the license keys of the **Abandoned object detector VI (Street)** and activate the license, do the following:

1. Connect the Guardant USB dongle to the device on which you installed *Axxon One.*
2. Install the driver:
   a. Download the archive.
   b. Unzip the content.
   c. Go to the directory with the archive contents.
   d. Run the driver installation script.

```
sudo ./install.sh
```

If you successfully install the driver, the license keys are displayed on the page http://127.0.0.1:3189/#/dongles/list.

License activation is complete.

For *Detector Pack 3.13* and earlier, use the following manual to activate and update the license:

License activation and update for Detector Pack 3.13 and earlier

19.4.28.2.5.2 License activation and update for *Detector Pack* 3.13 and earlier

To operate with the license keys of the **Abandoned object detector VI (Street)** and activate/update the license, do the following:

1. Download the archive.
2. Unzip the content.
3. Open a terminal.
4. Go to the directory with the archive contents:

   ```
   cd /AxxonSoft/DetectorPack/VLSdk/distrib
   ```

   where instead of **/AxxonSoft/DetectorPack/VLSdk**, you must specify the actual path.
5. Grant permissions to run the script for driver installation:

   ```
   chmod 777 install.sh
   ```
6. Run the driver installation script.

   ```
   sudo ./install.sh
   ```
7. Open a browser and go to the page http://127.0.0.1:1947/checkin.html.
8. On the page that opens, in the **Select File:** line, select the key with the v2c extension.

   Attention!

   To get the key with the v2c extension, you need to contact the AxxonSoft manager.
9. Click the **Apply File** button. If activation is successful, the key is displayed on the page http://127.0.0.1:1947/devices.html.

The license activation/update is complete. After activation, in the /SafeNet Sentinel/Sentinel LDK directory, the **installed** folder appears.

19.4.28.2.5.3 Deleting the license for *Detector Pack* 3.13 and earlier

To delete the license, do the following:

1. Delete the license file with the v2c extension from the **installed** folder in the /SafeNet Sentinel/Sentinel LDK directory.
2. Restart the OS.

Note

- When you delete the license, only the key is deleted. All license restriction counters remain in the secure storage.
- If you return the key to the root directory, it will be fully restored. Its counters will continue counting license restrictions from the moment when they stopped when the license file with the v2c. extension was deleted. The validity time of the license continues to count down even when the key is missing.

The license deletion is complete.

19.4.28.2.6 Configuring the Abandoned object detector VI (Street)

Licensing of the software module for the Abandoned object detector VI (Street) in Windows OS(see page 397)
Licensing of the software module for the Abandoned object detector VI (Street) in Linux OS(see page 397)
Video stream and scene requirements for the Abandoned object detector VI (Street)(see page 396)
Image requirements for the Abandoned object detector VI (Street)(see page 396)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Abandoned object detector VI (Street)**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Trackers** → **Abandoned object detector VI (Street)**.

By default, the detector is enabled and set to detect abandoned objects.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Abandoned object detector VI (Street)**	Enter the detector name or leave the default name
Background accumulation	**Yes**	By default, scene background accumulation is enabled. To disable, select the **No** value
	No	
Background sensitivity (%)	**100**	Controls the sensitivity to object contrast. Specify the value as a percentage that is responsible for the detector ability to distinguish the level of object contrast relative to the background. The higher the value, the object with less contrast can be detected. The value must be in the range [0, 100]
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	

Parameter	Value	Description
	HuaweiNPU	
Detection area sensitivity	**Medium level**	Select the detection area sensitivity. The **Medium level** of sensitivity is selected by default. Additional neural network processing is applied in this area
	Low level	
Detection mode	**CPU**	Select the processor for the detector operation (see Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
Detection sensitivity	**70**	Specify the level of the detection sensitivity. The value must be in the range [0, 255]
Event intersection time (sec)	**0.01**	Specify the time interval in seconds during which events won't be processed after successful detection when the event results match. The parameter determines the level of intersection between new and previous events. If the specified value is exceeded, it is considered that these events refer to the same real object. The parameter is necessary to reduce the total number of events, since the analysis is performed continuously and the duration of real events can be several seconds. You must select the required value empirically. The value must be in the range [0, 1]
Frame size change	**640**	Specify the size to which the video is compressed before analysis. The value must be in the range [480, 960]
Ignore time (sec)	**5**	Specify the time interval in seconds during which events won't be processed after successful detection. The parameter is necessary to reduce the total number of events, since the analysis is performed continuously and the duration of real events can be several seconds. You must select the required value empirically. The value must be in the range [0, 9999]
Maximum brightness	**255**	Specify the maximum brightness of an object to trigger detection. The value must be in the range [0, 255]
Maximum object height (%)	**100**	Specify the maximum object height as a percentage of the frame height to get an event from the detector. If the object height is greater than specified, there won't be any events from the detector. The value must be in the range [0, 100]
Maximum object width (%)	**100**	Specify the maximum object width as a percentage of the frame width to get an event from the detector. If the object width is greater than specified, there won't be any events from the detector. The value must be in the range [0, 100]
Minimum object area (%)	**0**	Specify the minimum object area as a percentage of the frame area to get an event from the detector. If the object area is smaller, there won't be any events from the detector. The value must be in the range [0, 100]
Number of execution threads	**4**	Specify the number of execution threads. The value must be in the range [0, 100]

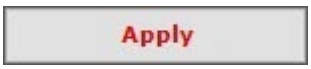
Parameter	Value	Description
Number of frames processed per second	**12**	Specify the number of frames processed per second. The value must be in the range [0.016, 100] **Attention!** The detector operates optimally with the default value for most use cases. Changing this value may reduce the detector's performance quality.
Object filter	**Yes** **No**	By default, the neural network object filter is disabled. To enable, select the **Yes** value
Object frame intersection	**0**	Specify the percentage of the object frame intersection that must be merged into one object. The value must be in the range [0, 100]
Person filter	**Yes** **No**	By default, objects near people aren't ignored. To ignore objects near people, select the **Yes** value
Ratio of object height to width	**90**	Specify the maximum level of object extension to get an event from the detector. The value must be in the range [0, 100]
Saving background	**Yes** **No**	By default, saving the scene background is enabled. To disable, select the **No** value **Attention!** Background files are automatically saved to the directory C:\ProgramData\VideoIntellect\. The size of this folder can quickly increase, potentially filling up all available space on the C drive. It is not possible to set a limit on the maximum volume of this directory, so it's important to periodically check its contents and clear it if necessary.
Scene static (%)	**25**	Specify the scene static as a percentage. The higher the value of the parameter, the lower the scene dynamics. The value must be in the range [0, 100]
Scene update threshold	**10**	Specify the scene update threshold. If the number of changes in the frame exceeds the value of this parameter, the background is updated. The value must be in the range [0, 9999]
State saving interval	**0**	Specify the state saving interval in seconds. The value must be in the range [0, 9999]
Time for detection (sec)	**120**	Specify the time in seconds after which an object is considered abandoned. The value must be in the range [0, 9999]
Type	**Abandoned object detector VI (Street)**	Name of the detector type (non-editable field)

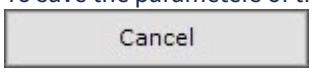
In the preview window, you can specify the detection areas using the anchor points  (see Configuring a detection area(see page 351)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.

- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

19.4.28.3 Neural tracker

19.4.28.3.1 Functions of the Neural tracker

Description	The **Neural tracker** allows you to detect moving and static objects in the frame
Add-ons	For the **Neural tracker** to operate, you must install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.3.2 Video stream and scene requirements for the Neural tracker and its sub-detectors

Image requirements for the Neural tracker and its sub-detectors(see page 404)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Neural tracker** and its sub-detectors are given in the table:

Camera

- The optimal resolution for solving typical tasks is 1280x720. We don't recommend using a resolution higher than 1920×1080, since a higher resolution doesn't increase the detection quality but significantly increases the consumption of resources. The minimum resolutions for each neural network are listed in the table:

Name of the neural network	Neural network	Minimum resolution
Vehicle	GeneralNMCar_v1.0_onnx	300x300
	GeneralNMCar_v1.0_onnx__int8	
Person	GeneralNMHuman_v1.0_onnx_	
	GeneralNMHuman_v1.0_onnx_int8	
	GeneralNMHuman_v1.0GPU_onnx	
Person (top-down view)	GeneralNMHumanTopView_v0.8_onnx	
	GeneralNMHumanTopView_v0.8_onnx_int8	
Person (top-down view Nano)	GeneralNMHumanTopView_Nano_v1.0_onnx	576x320
Person (top-down view Medium)	GeneralNMHumanTopView_Medium_v1.0_onnx	
	GeneralNMHumanTopView_Medium_v1.0_GPU_onnx	
Person (top-down view Large)	GeneralNMHumanTopView_Large_v1.0_onnx	
Person and vehicle (Nano)	GeneralNMHumanAndVehicle_Nano_v1.0_GPU_onnx	1152x640
	GeneralNMHumanAndVehicle_Nano_v1.0_onnx	
	GeneralNMHumanAndVehicle_Nano_v1.0_onnx_int8	
Person and vehicle (Medium)	GeneralNMHumanAndVehicle_Medium_v1.0_onnx	
	GeneralNMHumanAndVehicle_Medium_v1.0_onnx__int	
Person and vehicle (Large)	GeneralNMHumanAndVehicle_Large_v1.0_onnx	
	GeneralNMHumanAndVehicle_Large_v1.0_onnx_int8	

- The frame rate per second in the video stream from the camera is at least 8 for solving typical tasks

	• Neural tracker-based analytics works with both colorless (gray) and color images. When you use a neural filter, we recommend using color cameras. When you use black-and-white cameras, the recognition quality can be noticeably worse **Attention!** • Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods. • Correct operation of the **Neural tracker** isn't guaranteed if you use a fisheye camera.
Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on) • The analyzed scene doesn't have reflective surfaces and sharp shadows from moving objects. If present, they must be masked • Camera shake doesn't result in image offsets greater than 1% of the frame size

19.4.28.3.3 Image requirements for the Neural tracker and its sub-detectors

Video stream and scene requirements for the Neural tracker and its sub-detectors(see page 402)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Neural tracker** and its sub-detectors are given in the table:

Object images

- The detected object must be clearly distinguishable by the human eye
- Width and height of objects in the image must not exceed 75% of the frame size
- When you use a neural filter, the minimum width or height of an object must be at least 5% of the width/height of the frame
- The image isn't noisy and not distorted by the artifacts of the compression algorithm
- The duration of the object visibility is at least six frames
- Between two frames, an object must move in the direction of a distance not exceeding its size. This condition is necessary for the correct calculation of the object track
- The minimum value of pixel density per meter is observed:

Image resolution	Object type	Minimum pixel density per meter (ratio of the object width in pixels to the object width in meters)	Minimum object size in pixels, width x height	Ratio of the object width to the frame width as a percentage
1920x1080	Human	55	~25x105	~3%
1280x720	Human	35	~17x70	~3%
640x360	Human	17	~10x42	~3%
1920x1080	Light vehicle (2 axles)	55	~354x300	~20%
1280x720	Light vehicle (2 axles)	35	~240x205	~20%
640x360	Light vehicle (2 axles)	17	~132x112	~20%

19.4.28.3.4 Configuring the Neural tracker

On the page:

- Configuring the detector(see page 406)
- System variables for the Neural tracker(see page 412)
- Example of configuring Neural tracker for solving typical tasks(see page 413)

Video stream and scene requirements for the Neural tracker and its sub-detectors(see page 402)
Image requirements for the Neural tracker and its sub-detectors(see page 404)
Hardware requirements for neural analytics operation(see page 339)
Data collection requirements for neural network training(see page 341)
Optimizing the operation of neural analytics on GPU in Windows OS(see page 342)
Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)

19.4.28.3.4.1 Configuring the detector

To configure the **Neural tracker**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Trackers** → **Neural tracker**.

By default, the detector is enabled and set to detect moving people.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record object trajectories	**Yes**	By default, metadata are recorded into the database. To disable metadata recording, select the **No** value
	No	**Attention!** To obtain metadata, video is decompressed and analyzed, which places a heavy load on the server and limits the number of cameras used on it.
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Neural tracker**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**6**	Specify the number of frames for the neural network to process per second. The higher the value, the more accurate the tracking, but the load on the CPU is also higher. The value must be in the range [0.016, 100] **Attention!** We recommend the value of at least **6** FPS. For fast-moving objects (running individuals, vehicles), you must set the frame rate at **12** FPS or above.
Type	**Neural tracker**	Name of the detector type (non-editable field)
Advanced settings		
Camera position	**Wall**	To sort out false events from the detector when using a fisheye camera, select the correct device location. For other devices, this parameter is irrelevant

Parameter	Value	Description
	Ceiling	
Hide moving objects	**Yes**	By default, the parameter is disabled. If you don't need to detect moving objects, select the **Yes** value. An object is considered static if it doesn't change its position more than 10% of its width or height during its track lifetime **Attention!** If a static object starts moving, the detector creates a track, and the object is no longer considered static.
	No	
Hide static objects	**Yes**	Starting with *Detector Pack* 3.14, the parameter is disabled by default. If you need to hide static objects, select the **Yes** value. This parameter lowers the number of false events from the detector when detecting moving objects. An object is considered static if it hasn't moved more than 10% of its width or height during the whole time of its track existence **Attention!** • If a static object starts moving, the detector creates a track, and the object is no longer considered static. • If you disable this parameter, the load on the CPU reduces. • Starting with *Detector Pack* 3.15, the feature of accumulation of a background mask of static objects has been moved to the **ENABLE_STATIC_OBJECTS_MASK** system variable (see System variables for the Neural tracker(see page 412)).
	No	
Minimum number of detection triggers	**6**	Specify the **Minimum number of detection triggers** for the Neural tracker to display the object's track. The higher the value, the longer the time interval between the detection of an object and the display of its track on the screen. Low values of this parameter can lead to false events from the detector. The value must be in the range [2, 100]
Model quantization	**Yes**	By default, the parameter is disabled. The parameter is applicable only to standard neural networks for Nvidia GPUs. It allows you to reduce the consumption of computation power. The neural network is selected automatically, depending on the value selected in the **Detection neural network** parameter. To quantize the model, select the **Yes** value **Attention!** AxxonSoft conducted a study in which a neural network model was trained to identify the characteristics of the detected object with quantization. The following results of the study were obtained: model quantization can lead to both an increase in the percentage of recognition and a decrease. This is due to the generalization of the mathematical model. The difference in detection ranges within ±1.5%, and the difference in object identification ranges within ±2%. • The first launch of a detector with the **Model quantization** parameter enabled can take longer than a standard launch. • If GPU caching(see page 342) is used, next time the detector with quantization runs without delay.
	No	

Parameter	Value	Description
Neural network file		If you use a custom neural network, select the corresponding file. **Attention!** • To train your neural network, contact AxxonSoft (see Data collection requirements for neural network training(see page 341)). • A trained neural network for a particular scene allows you to detect only objects of a certain type (for example, a person, a cyclist, a motorcyclist, and so on). • If you don't specify the neural network file, the default file is used that is selected automatically, depending on the selected value in the **Detection neural network** parameter and the selected processor for the neural network operation in the **Decoder mode** parameter. If you use a custom neural network, enter a path to the file. The selected detection neural network is ignored when you use a custom neural network. • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights.
Scanning mode	**Yes** **No**	By default, the parameter is disabled. To enable the scanning mode, select the **Yes** value (see Configuring the scanning mode(see page 353))
Scanning window height	**0**	The height and width of the scanning window are determined according to the actual size of the frame and the required number of windows. For example, the real frame size is 1920×1080 pixels. To divide the frame into four equal windows, set the width of the scanning window to 960 pixels and the height to 540 pixels **Attention!** If the set height of the scanning window exceeds the height of the initial video stream, the video stream height is applied automatically. The same rule is applied to the width. **Example 1**: the size of both windows exceeds the video stream. **Script**: the video stream resolution is 1920x1080, the set window size is 2500x2000 **Result**: the system automatically applies the 1920x1080 window size, as both set values (height and width) are greater than the corresponding size of the video stream. **Example 2**: the size of only one window exceeds the video stream. **Script**: the video stream resolution is 1920x1080, the set window size is 2500x900 **Result**: the system automatically corrects only the exceeding parameter. The 1920x900 window is applied where the width is taken from the video stream while the set height (900px) is lower than the stream height and remains unchanged.
Scanning window step height	**0**	The scanning step determines the relative offset of the windows. If the step is equal to the height and width of the scanning window, respectively, the segments are lined up one after another. Reducing the height or width of the scanning step increases the number of windows due to their overlapping each other with an offset. This increases the detection accuracy but can also increase the load on the CPU **Attention!** The height and width of the scanning step mustn't be greater than the height and width of the scanning window, since the detector doesn't operate with such settings.

Parameter	Value	Description
Scanning window width	**0**	The height and width of the scanning window are determined according to the actual size of the frame and the required number of windows. For example, the real frame size is 1920×1080 pixels. To divide the frame into four equal windows, set the width of the scanning window to 960 pixels and the height to 540 pixels **Attention!** If the set width of the scanning window exceeds the width of the initial video stream, the video stream width is applied automatically. The same rule is applied to the height. **Example 1**: the size of both windows exceeds the video stream. **Script**: the video stream resolution is 1920x1080, the set window size is 2500x2000 **Result**: the system automatically applies the 1920x1080 window size, as both set values (height and width) are greater than the corresponding size of the video stream. **Example 2**: the size of only one window exceeds the video stream. **Script**: the video stream resolution is 1600x1080, the set window size is 1600x2000 **Result**: the system automatically corrects only the exceeding parameter. The 1600x1080 window is applied where the height remains unchanged while the set width (2000px) is greater than the stream width and is taken from the video stream.
Scanning window step width	**0**	The scanning step determines the relative offset of the windows. If the step is equal to the height and width of the scanning window, respectively, the segments are lined up one after another. Reducing the height or width of the scanning step increases the number of windows due to their overlapping each other with an offset. This increases the detection accuracy but can also increase the load on the CPU **Attention!** The height and width of the scanning step mustn't be greater than the height and width of the scanning window, since the detector doesn't operate with such settings.
Selected object classes		If necessary, specify the class of the detected object. If you want to display tracks of several classes, specify them separated by a comma with a space. For example, **1**, **10** The numerical values of classes for the embedded neural networks: **1**—Human/Human (top-down view), **10**—Vehicle a. If you leave the field blank, the tracks of all available classes from the neural network are displayed (**Detection neural network**, **Neural network file**) b. If you specify a class/classes from the neural network, the tracks of the specified class/classes are displayed (**Detection neural network**, **Neural network file**) c. If you specify a class/classes from the neural network and a class/classes missing from the neural network, the tracks of a class/classes from the neural network are displayed (**Detection neural network**, **Neural network file**) d. If you specify a class/classes missing from the neural network, the tracks of all available classes from the neural network are displayed (**Detection neural network**, **Neural network file**) **Note** Starting with *Detector Pack* 3.10.2, if you specify a class/classes missing from the neural network, the tracks aren't displayed (**Detection neural network**, **Neural network file**).
Sensitivity of excluding static objects (starting with *Detector Pack* 3.14)	**25**	Specify the level of sensitivity of excluding static objects. The higher the value, the less sensitive to motion the algorithm becomes. The value must be in the range [0, 100]

Parameter	Value	Description
Similitude search	**Yes**	By default, the parameter is disabled. To enable the search for similar persons, select the **Yes** value. If you enable the parameter, it increases the load on the CPU
	No	**Attention!** The Similitude search(see page 1240) works only on tracks of people.
Time of processing similitude track (sec)	**0**	Specify the time in seconds for the algorithm to process the track to search for similar persons. The value must be in the range [0, 3600]
Time period of excluding static objects	**0**	Specify the time in seconds after which the track of the static object is hidden. If the value of the parameter is **0**, the track of the static object isn't hidden. The value must be in the range [0, 86 400]
Track lifespan (starting with *Detector Pack* 3.14)	**Yes**	By default, the parameter is disabled. If you want to display the track lifespan for an object in seconds, select the **Yes** value
	No	
Track retention time (sec)	**0.7**	Specify the time in seconds after which the object track is considered lost. This helps if objects in the scene temporarily overlap each other. For example, when a larger vehicle completely blocks the smaller one from view. The value must be in the range [0.3, 1000]
Basic settings		
Detection threshold	**30**	Specify the **Detection threshold** for objects in percent. If the recognition probability falls below the specified value, the data will be ignored. The higher the value, the higher the detection quality, but some events from the detector may not be considered. The value must be in the range [0.05, 100]
Neural tracker mode	**CPU**	Select the processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	**Attention!** • We recommend using the GPU. It can take several minutes to launch the algorithm on an Nvidia GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342)). • If the neural tracker is running on the GPU, object tracks can lag behind the objects in the Surveillance window. If this happens, set the camera buffer size to 1000 milliseconds (see Camera(see page 171)). • Starting with *Detector Pack* 3.11, **Intel HDDL** and **Intel NCS** aren't supported. • Starting with *Detector Pack* 3.14, **Intel Multi-GPU** and **Intel GPU 0-3** are supported.
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
	Intel NCS (not supported)	
	Intel HDDL (not supported)	
	Intel GPU	
	Intel Multi-GPU	
	Intel GPU 0	
	Intel GPU 1	

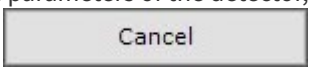
Parameter	Value	Description
	Intel GPU 2	
	Intel GPU 3	
	Huawei NPU	
Detection neural network	**Person**	Select the detection neural network from the list. By default, the **Person** detection neural network is selected. Neural networks are named taking into account the objects they detect. The names can include the size of the neural network (**Nano**, **Medium**, **Large**), which indicates the amount of consumed resources (see Video stream and scene requirements for the Neural tracker and its sub-detectors(see page 402)). The larger the neural network, the higher the accuracy of object recognition
	Person (top-down view)	
	Person (top-down view Nano)	
	Person (top-down view Medium)	
	Person (top-down view Large)	
	Vehicle	
	Person and vehicle (Nano)	
	Person and vehicle (Medium)	
	Person and vehicle (Large)	
Neural network filter		
Neural filter	**Yes**	By default, the parameter is disabled. To sort out parts of tracks, select the **Yes** value. For example: The **Neural tracker** detects all freight trucks, and the Neural filter sorts out only the tracks that contain trucks with cargo doors open
	No	

Parameter	Value	Description
Neural filter file		Select a neural network file. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. You cannot specify the network file in Windows OS **Attention!** • Starting with *Detector Pack* 3.12, the neural network file of the neural filter must match the processor type specified in the **Neural tracker mode** parameter. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee an overall accuracy of 80-95% and a percentage of false positives of 5-20%. The standard neural networks are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory.

By default, the entire frame is a detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or specify one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuring the **Neural tracker** is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of the neural tracker (see Standard sub-detectors(see page 359)).

Attention!

To get an event from the Motion in area(see page 374) sub-detector on the basis of the **Neural tracker**, an object must be displaced by at least 25% of its width or height in the frame.

19.4.28.3.4.2 System variables for the Neural tracker

Creating system variable(see page 126)

Variable	Starting with	Purpose	Value	Description
ENABLE_CALC_HSV	*Detector Pack* 3.14	Detect the color of an object	**0**	Disable color detection. When you select this value, the load on the CPU reduces, including when the detector operates in the **GPU-Nvidia GPU 0**, **1**, **2**, or **3** modes. By default, when you select **GPU-Nvidia GPU 0**, **1**, **2**, or **3** in the **Decoder mode** and **Neural tracker mode** parameters, the **ENABLE_CALC_HSV** system variable is set to **0**

Variable	Starting with	Purpose	Value	Description
			1	Enable color detection. The system collects data about object color. This data is required for further color-based archive searches (see Search in archive(see page 1216)). When you select this value, the load on the server increases and limits the number of cameras used. By default, when you select **CPU**-**CPU**, **CPU**-**Nvidia GPU 0**, **1**, **2**, or **3**, **GPU**-**CPU** in the **Decoder mode** and **Neural tracker mode** parameters, the **ENABLE_CALC_HSV** system variable is set to **1**
ENABLE_STATIC_OBJECTS_MASK	*Detector Pack* 3.15	Detection of accumulation of a background mask of static objects	**0**	Disable accumulation (default). When you select this value, the load on the CPU reduces, even when you select the **GPU** value in the **Decoder mode** parameter
			1	Enable accumulation. This value improves the quality of hiding static objects (the **Hide static objects** parameter). When you select this value, the load on the server increases

19.4.28.3.4.3 Example of configuring Neural tracker for solving typical tasks

Parameter	Task: detection of moving people	Task: detection of moving vehicles
Other		
Number of frames processed per second	**6**	**12**
Neural network filter		
Neural filter	**No**	**No**
Basic settings		
Detection threshold	**30**	**30**
Advanced settings		
Minimum number of detection triggers	**6**	**6**
Camera position	**Wall**	**Wall**
Hide static objects	**Yes**	**Yes**
Neural network file	Path to the *.ann neural network file. You can also select the value in the **Detection neural network** parameter. In this case, this field must be left blank	Path to the *.ann neural network file. You can also select the value in the **Detection neural network** parameter. In this case, this field must be left blank

19.4.28.4 Object tracker

19.4.28.4.1 Functions of the Object tracker

Description	The **Object tracker** allows you to detect moving objects in the frame, on the basis of which their tracks are created
Add-ons	For the detection tool to work, you must install the Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.4.2 Video stream and scene requirements for the Object tracker and its sub-detectors

Image requirements for the Object tracker and its sub-detectors(see page 414)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Object tracker** and its sub-detectors are given in the table:

Camera	• Resolution must be at least 640x360 pixels. We also don't recommend using a resolution higher than 800×600 **Attention!** Higher resolution doesn't increase the detection quality, but significantly increases the CPU and RAM load. • FPS is at least 6 • Tracker-based analytics works with both colorless (gray) and color images. If you use neural filter, we recommend using color cameras. When you use black-and-white cameras, the recognition quality can be noticeably worse • Camera shake must not result in image offsets greater than 1% of the frame size
Lighting	• Moderate lighting. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting

Scene and camera angle	• Moving objects are visually separable from each other
	• The background is mostly static and doesn't change abruptly
	• Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on)
	• Analytics can work incorrectly if:
	  • the analyzed scene have reflective surfaces and sharp shadows from moving objects
	  • there are extended monochromatic objects in the frame
	• When using the Abandoned object(see page 423) detector, abandoned objects can be obscured by moving objects no more than 10% of the time

19.4.28.4.3 Image requirements for the Object tracker and its sub-detectors

Video stream and scene requirements for the Object tracker and its sub-detectors(see page 414)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Object tracker** and its sub-detectors are given in the table:

Object images	• Image isn't noisy and isn't distorted by artifacts of the compression algorithm
	• The width or height of objects in the image must not:
	  • be less than 1% of the frame size (at resolutions no less than 1920x1080 pixels) or 15 pixels (at lower resolutions)
	  • exceed 75% of the frame size
	• When you use a neural filter, the minimum width or height of an object must be at least 5% of the width/height of the frame
	• When using the Abandoned object(see page 423) detector:
	  • abandoned objects must be clearly visible in the image
	  • the width and height of objects in the image must not exceed 25% of the frame size
	• The speed of movement of objects in the image must not be less than 1 pixel per second
	• For the object to be detected, the duration of its visibility must be at least 8 frames
	• When the object moves between two adjacent frames in a certain direction, its distance of movement must not exceed its size. This condition is necessary for the correct calculation of the object's trajectory (track)

19.4.28.4.4 Configuring the Object tracker

Video stream and scene requirements for the Object tracker and its sub-detectors(see page 414)
Image requirements for the Object tracker and its sub-detectors(see page 414)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Object tracker** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Trackers** → **Object tracker**.

By default, the detector is enabled and set to detect moving objects in the frame, on the basis of which their tracks are created.

Some parameters are set for all sub-detectors of the **Object tracker** simultaneously.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	By default, objects' tracks are recorded to the database. To disable the recording, select the **No** value
	No	**Attention!** To obtain metadata, the video is decompressed and analyzed, which results in a heavy load on the server and limits the number of cameras that can be used on it.
Video stream	**Main stream**	For multi-stream cameras, select a stream for detection. Selecting a low-quality video stream reduces the server load **Attention!** For the correct display of tracks in a multi-stream camera, all video streams must have the same aspect ratio.
Other		
Enable	**Yes**	By default, the detector is enabled. To disable it, select the **No** value

Parameter	Value	Description
	No	
Name	**Object tracker**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processor for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**Object tracker**	Name of the detector type (non-editable field)
Neural network filter		
Enable filter	**Yes**	By default, the neural network filter is disabled. To filter out false tracks on a complex video image (foliage, glare, and so on), set the value to **Yes** (see Hardware requirements for neural analytics operation(see page 339)) **Attention!** You can use a neural network filter either for the analysis of moving objects or for the analysis of abandoned objects. You cannot use two neural network filters simultaneously.
	No	

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="13">Moving object filter mode</td><td>CPU</td><td rowspan="26">Select the processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).

Attention!
• If you specify another processor than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
• It can take several minutes to launch the algorithm on the NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
• Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
• Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Huawei NPU</td></tr>
<tr><td rowspan="13">Abandoned object filter mode</td><td>CPU</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
</table>

Parameter	Value	Description
	Intel GPU 2	
	Intel GPU 3	
	Huawei NPU	
Moving object filter file		Select the required neural network. To obtain a neural network, contact AxxonSoft technical support[146]. If the neural network file isn't selected or selected incorrectly, the filter doesn't work **Attention!** • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights.
Abandoned object filter file		
Basic settings		
Long-time abandoned object detection	**Yes**	By default, the parameter is disabled. To use the long-time abandoned object detection, select the **Yes** value. If you enable the **Long-time abandoned object detection** and the **Enable filter** parameters, it can reduce the number of false positives during detection
	No	
Abandoned object detection	**Yes**	By default, the parameter is disabled. To use the abandoned object detection, select the **Yes** value. Objects abandoned for 10 seconds or longer are detected
	No	
Max. object height	**100**	Enter the maximum height and width of the detected object as a percentage of the frame height/width. We recommend specifying the value so that it is slightly larger than the typical object in the image, taking into account its shadow. The detector doesn't generate an event if an object is larger or smaller. The value must be in the range [0.05, 100] **Attention!** If you enable the **Object calibration** parameter in the tracker settings, then the maximum and minimum sizes of the objects are set in **decimeters** in the **Leveling rod height** parameter and not as a percentage of the frame size.
Max. object width	**100**	
Alarm on object's max. idle time in area	**60**	Specify the time in seconds exceeding which the object is detected. This value must be in the range [15, 1800] **Note** This parameter is used only for the **Long-time abandoned object detection**. We recommend selecting the parameter value starting from **15**.

146 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Min. object height</td><td>2</td><td rowspan="2">Enter the minimum height and width of the detected object as a percentage of the height/width of the frame. We recommend specifying the value so that it is slightly smaller than the typical object in the image. The detector doesn't generate an event if an object is larger or smaller. The value must be in the range [0.05, 100]

Attention!
If you enable the Object calibration parameter in the tracker settings, then the maximum and minimum sizes of the objects are set in decimeters in the Leveling rod height parameter and not as a percentage of the frame size.</td></tr>
<tr><td>Min. object width</td><td>2</td></tr>
<tr><td>Motion detection sensitivity</td><td>25</td><td>Enter the sensitivity of the motion sub-detectors as a percentage. To detect objects with low contrast, the recommended sensitivity value is 35, for high-contrast objects, it is 15. The higher the sensitivity, the fewer changes in the frame are detected. The value must be in the range [0, 100]</td></tr>
<tr><td>Abandoned object detection sensitivity</td><td>9</td><td>Enter the sensitivity for abandoned object detection and long-time abandoned object detection as a percentage. The value must be in the range [0, 100]

Note
The abandoned object detection sensitivity depends on the lighting conditions and is selected empirically. We recommend selecting the parameter value starting from 20. To detect objects with low contrast, the recommended sensitivity value is 35, for high-contrast objects, it is 15.</td></tr>
<tr><td colspan="3">Advanced settings</td></tr>
<tr><td>Auto sensitivity</td><td>Yes

No</td><td>By default, the Auto sensitivity is enabled. We recommend enabling this parameter if the lighting changes significantly. To disable automatic adjustment of the sensitivity of the Object tracker sub-detectors, select the No value

Note
We recommend enabling this parameter if the lighting changes significantly during the camera operation (for example, if the camera operates outdoors).</td></tr>
<tr><td>Track lifespan (starting with Detector Pack 3.14)</td><td>Yes

No</td><td>By default, the parameter is disabled. If you want to display the track lifespan for an object in seconds, select the Yes value</td></tr>
<tr><td>Leveling rod height</td><td>20</td><td>Enter the actual height of an object in decimeters that will be used as a reference (for example, the average height of a person). The value must be in the range [1, 100]</td></tr>
</table>

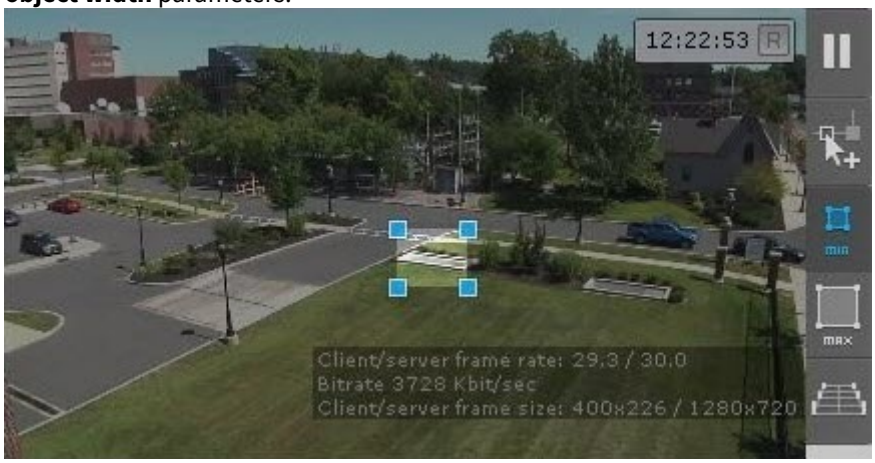
Parameter	Value	Description
Frame size change	**1280**	By default, during the analysis, the frame is compressed to the specified size (by default, **1280** pixels on the larger side). The following algorithm is used: • If the original resolution on the larger side of the frame is greater than the resolution specified in the **Frame size change** parameter, then it is divided in half. • If the resulting resolution becomes less than the specified one, then the algorithm stops and the resulting resolution is used. • If the resulting resolution is still greater than the specified one, then it is divided in half again until it becomes smaller. **Note** For example, the original video resolution is 2048x1536, the specified value is **1000**. In this case, the original resolution is divided in half (512x384) twice because after the first division, the value on the larger side of the frame is greater than the specified value (1024 > 1000). If detection errors occur when using a higher resolution stream, we recommend reducing compression.
Object calibration	**Yes** **No**	By default, object calibration is disabled. To estimate the actual sizes of objects in a scene (for example, a height of a person) when analyzing a video image taking into account perspective distortions, select the **Yes** value **Attention!** • If you select the **Yes** value for the **Object calibration** parameter but don't set any leveling rod, the Object tracker(see page 414) is inoperable and doesn't generate tracks (track objects). • The correct **Object calibration** is impossible when you use cameras with optical distortions (for example, fisheye cameras).
Camera position	**Wall** **Ceiling**	To filter out false events when using a fisheye camera, select the correct location of the device. The default value is **Wall**. This parameter isn't relevant for all other devices
Antishaker	**Yes** **No**	By default, the parameter is disabled. To reduce camera shake, select the **Yes** value. We recommend using this parameter only when there is significant camera shake

By default, the entire frame is a detection area. If necessary, in the preview window, set:

- one or more detection areas (see Configuring a detection area(see page 351)),
- one or more ignore areas (see Configuring the ignore area(see page 350)).
- visual size of objects (the **No** value is selected in the **Object calibration** parameter):
  - Click the **min** 

button in the preview window. A rectangular area appears in the frame. Drag the anchor points to adjust the area to the minimum object size. The values update automatically in the **Min. object height** and **Min.**

object width parameters.

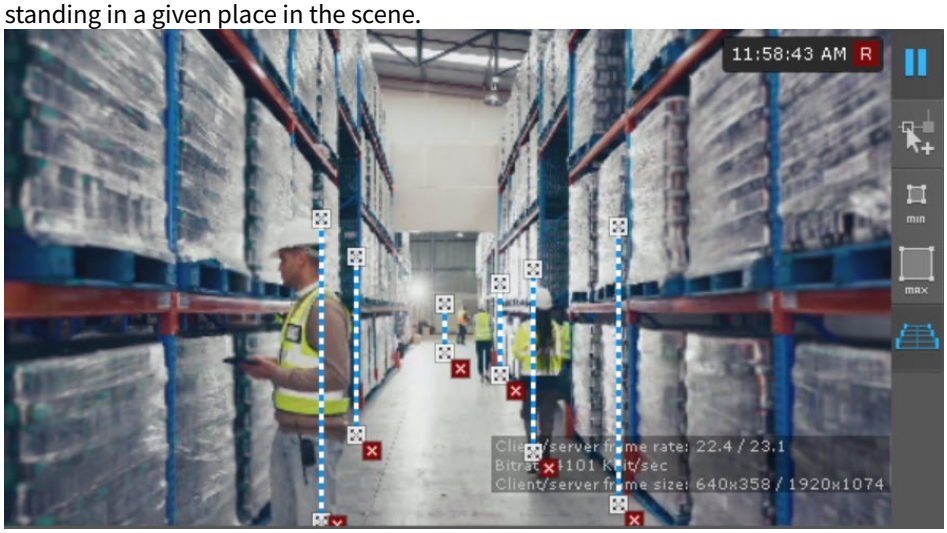


- Click the **max** button in the preview window. A rectangular area appears in the frame. Drag the anchor points to adjust the area to the maximum object size. The values update automatically in the **Max. object height** and **Max. object width** parameters.



- leveling rods (the **Yes** value is selected in the **Object calibration** parameter. The height of an object in **decimeters** is specified in the **Leveling rod height** parameter):
  a. Click the button in the preview window.
  b. In the window, click the mouse button.
  c. From the list, select **Leveling rod position**.
  d. Click the button in the preview window.
  e. Specify visually the dimensions of the same object in different parts of the frame. To ensure accurate calibration, the following conditions must be met:

i. The leveling rod is set precisely according to a reference object (for example, the height of a person) standing in a given place in the scene.



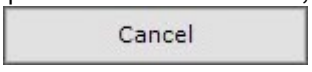
ii. You set at least three leveling rods in the frame.
iii. All bottom points (bases) of the leveling rods are on the same physical plane (for example, the floor).
iv. The bottom anchor points of any three leveling rods aren't positioned on the same line (horizontal, vertical, inclined, and so on).
v. Leveling rods are evenly distributed across the entire frame, covering the areas where objects are expected to appear. The larger the coverage area, the higher the accuracy.
vi. Objects located at the same distance from the camera are marked in the frame with leveling rods of the same height.
vii. For simple scenes, 3-5 leveling rods are set. For complex scenes with deep perspective, we recommend setting up to 10-15 leveling rods.

To create one leveling rod, add two anchor points by left-clicking in the frame:

- The first point is the base of an object (for example, a person's feet).
- The second point is the top of an object (for example, the top of a person's head).

Note

- To stop the video, click the  button . Click this button again to resume playback.
- To hide detection and/or ignore areas, click the  button . Click this button again to display the areas.
- To resize a leveling rod, click and hold down the anchor point and drag it in the required direction.
- You can move the leveling rod by drag-and-dropping[147] it.
- To delete a created leveling rod or area, click the  button.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuration of the **Object tracker** detector is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of the **Object tracker** (see Abandoned object(see page 423), Standard sub-detectors(see page 359)). General parameters are set for all its sub-detectors.

147 https://en.wikipedia.org/wiki/Drag_and_drop

19.4.28.4.5 Abandoned object

Attention!

The **Abandoned object** detector operates only with the Object tracker(see page 414) detector. If the requirements for the Object tracker(see page 414) are met (see Video stream and scene requirements for the Object tracker and its sub-detectors(see page 414), Image requirements for the Object tracker and its sub-detectors(see page 414)), the following performance parameters of the Abandoned object(see page 423) detector are guaranteed:

- Of 100 abandoned objects, the detector detects 92 objects.
- Of 100 events, 80 events are due to actual abandoned objects, and 20 events are due to other changes in the observed scene.

Before you create and configure the **Abandoned object** detector, do the following:

1. Create the Object tracker(see page 414) detector and set its general parameters (see Configuring the Object tracker(see page 415)).
2. Configure some parameters of the **Object tracker** detector as follows:

Parameter	Value	Description
Auto sensitivity	**Yes**	If auto sensitivity is enabled, sensitivity adjustments for moving and abandoned objects are not applied. To apply manual sensitivity adjustments, it is necessary to disable the auto sensitivity
Long-time abandoned object detection	**Yes**	If you enable this and the **Enable filter** parameter (see Configuring the Object tracker(see page 415)), it can reduce the number of false positives during detection
Abandoned object detection	**Yes**	Objects abandoned for 10 seconds or longer will be detected
Alarm on object's max. idle time in area	**60**	Specify the time in seconds—if the object remains idle for the time longer than the specified, it will be detected. This value must be in the range [15, 1800]. **Note** This parameter is used only for the **Long-time abandoned object detection**. It is recommended to select the parameter value starting from **15**.
Abandoned object detection sensitivity	**20**	For this parameter to work, it is necessary to first disable the **Auto sensitivity** parameter. Set the sensitivity for abandoned object detector and long-time abandoned object detection in the range [1, 100]. **Note** This parameter depends on the lighting conditions and must be chosen empirically. It is recommended to select the parameter value starting from 20.

3. Save the detector parameters by clicking the **Apply** 

button.

To create the **Abandoned object** detector, below the **Object tracker** detector, click **Create...** → **Abandoned Object**.

By default, the detector is enabled and set to detect brought and abandoned objects.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

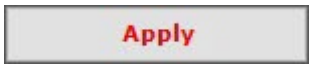
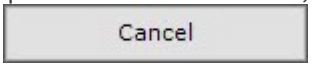
Parameter	Value	Description
Other		

Parameter	Value	Description
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Abandoned Object**	Enter a detector name or leave the default name
Type	**Abandoned Object**	Detector type name (non-editable field)
Basic settings		
Maximum object height	**100**	Set the maximum height of the object that must generate an event from the detector as a percentage of the frame size. The value must be in the range [0.05, 100]
Maximum object width	**100**	Set the maximum width of the object that must generate an event from the detector as a percentage of the frame size. The value must be in the range [0.05, 100]
Minimum object height	**0,1**	Set the minimum height of the object that must generate an event from the detector as a percentage of the frame size. The value must be in the range [0.05, 100]
Minimum object width	**0,1**	Set the minimum width of the object that must generate an event from the detector as a percentage of the frame size. The value must be in the range [0.05, 100]
Attention! In the settings of the **Object tracker** detector and the **Abandoned object** sub-detector, the values of the maximum and minimum height and width of the object must be equal.		
Object type	**Any**	Select this value if it is necessary to detect both taken and abandoned objects
	Abandoned	Select a value if it is necessary to detect an object that has disappeared from the monitored area and crossed its borders
	Taken	

By default, the entire frame is a detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or set one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

The **Abandoned object** detector is now configured.

19.4.28.5 Human tracker VL

19.4.28.5.1 Functions of the Human tracker VL

Description	**Human tracker VL** allows you to detect people in the frame. Based on this, the trajectory of people's movement (tracks) is built
Licensing	To operate the detector, you need to contact a manager of AxxonSoft and get a license file (see Types of licenses[148])
Add-ons	For the detector to work, you must install the VL SDK Pack and VL Analytics Pack add-ons (see Installing DetectorPack add-ons(see page 321))

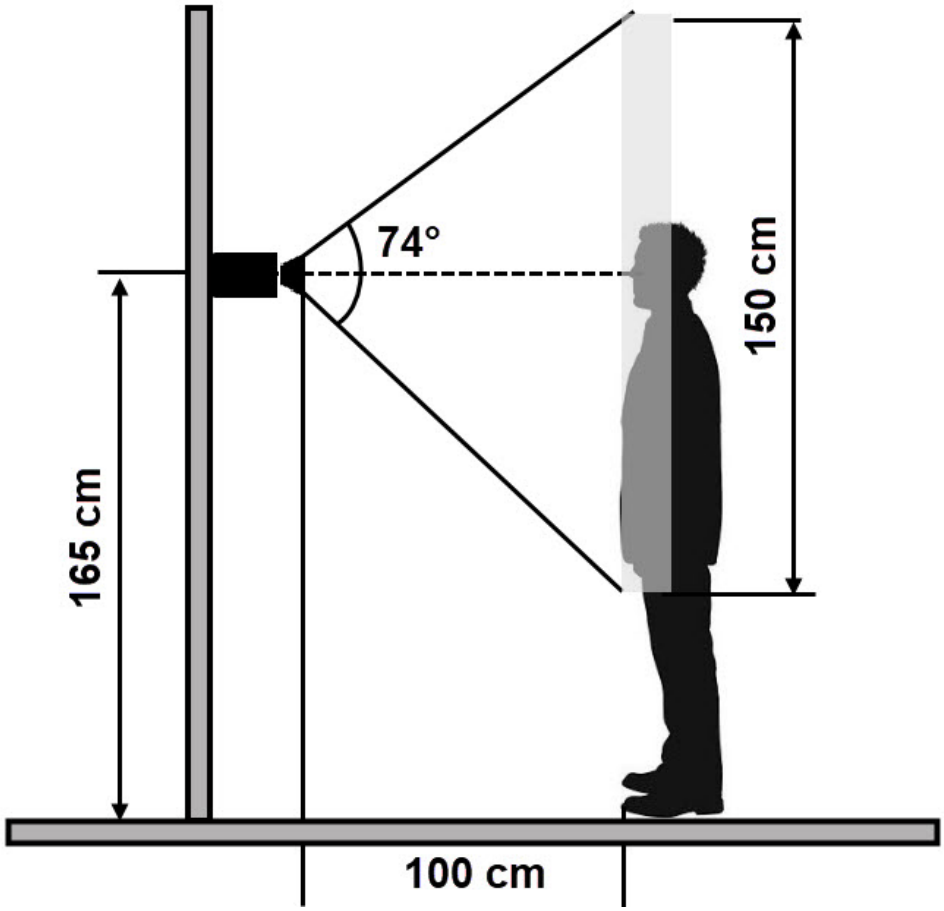
19.4.28.5.2 Video stream and scene requirements for the Human tracker VL and its sub-detectors

Image requirements for the Human tracker VL and its sub-detectors(see page 427)
Hardware requirements for neural analytics operation(see page 339)

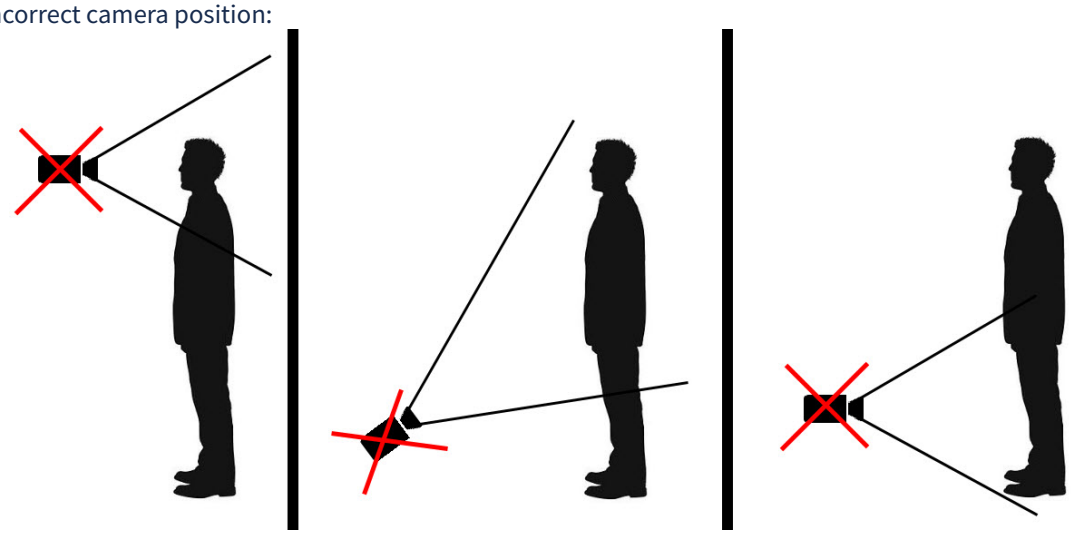
Requirements for the operation of the **Human tracker VL** and its sub-detectors are given in the table:

148 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Camera	• Resolution must be at least 640x360 pixels • Tracker-based analytics works with both colorless (gray) and color images. We recommend using color cameras. When you use black-and-white cameras, the recognition quality can be noticeably worse • The camera angle must be as horizontal as possible • The recommended camera tilt angle is from 0 (parallel to the ground) to 60 degrees • The camera position for human detection must be as shown in the image below:



Incorrect camera position:



Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on) • The analyzed scene doesn't have reflective surfaces and sharp shadows from moving objects. If present, they must be masked • Camera shake doesn't result in image offsets greater than 1% of the frame size

19.4.28.5.3 Image requirements for the Human tracker VL and its sub-detectors

Video stream and scene requirements for the Human tracker VL and its sub-detectors(see page 425)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Human tracker VL** and its sub-detectors are given in the table:

Object images	• The person must be facing the camera
	• At least 60% of the person's body (upper body) must be visible in the frame
	• No objects must obscure the human body in the frame
	• The image isn't noisy and not distorted by the artifacts of the compression algorithm
	• The analytics quality is decreased by the following factors:
	  • Non-standard poses (head tilt, splits, lying position, and so on)
	  • Camera position from above at a high angle

19.4.28.5.4 Activating the license for the Human tracker VL in Windows OS

Attention!

Starting with *Detector Pack* 3.12, a demo license has been added to the VL Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321)). The demo license is valid for 30 days after installation on one server or a virtual machine.

To activate a license for the **Human tracker VL** (see Configuring the Human tracker VL(see page 437)), do the following:

1. Request **EID** and **ProductID** from technical support[149].

   Attention!

   EID and **ProductID** are linked with the MAC address of the server. If the MAC address changes, you need to request **EID** and **ProductID** again.

2. Open the following file in a text editor: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\data\license.conf.
3. Enter the received **EID** and **ProductID**.

```
<param name="EID" type="Value::String" text="received EID"/>
<param name="ProductID" type="Value::String" text="received ProductID"/>
```

149 https://visionlabs.ai/contacts

```xml
<?xml version="1.0"?>
<settings>
        <section name="Licensing::Settings">
                <param name="Server" type="Value::String" text="https://visionlabsbv.prod.sentinelcloud.com"/>
                <param name="EID" type="Value::String" text="[redacted]"/>
                <param name="ProductID" type="Value::String" text="[redacted]"/>
                <param name="Filename" type="Value::String" text="licenseFile.v2c"/>
                <param name="ContainerMode" type="Value::Int1" x="0"/>
        </section>
</settings>
```

4. Save the file: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\data\license.conf.
5. In the command line, run the following file as administrator: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\FingerprintViewer.exe. You will receive the **FingerPrint** data.

```
C:\Program Files\Common Files\[redacted]\DetectorPack\VLSdk\gpu>FingerprintViewer.exe
Using license file: ./data/license.conf
To run with default license file path:
        FingerprintViewer.exe
If you want to specify license file:
        FingerprintViewer.exe <path to license.conf>
[04.05.2023 09:28:42] [Debug] [createLicense] creation of the FitLicense license!
[04.05.2023 09:28:42] [Debug] [FitLicense Windows] deviceId = [redacted]
Fingerprint for the current device:
[redacted]
```

6. Go to the website[150].

> **Attention!**
>
> If you fail to log in to the website, contact the technical support[151].

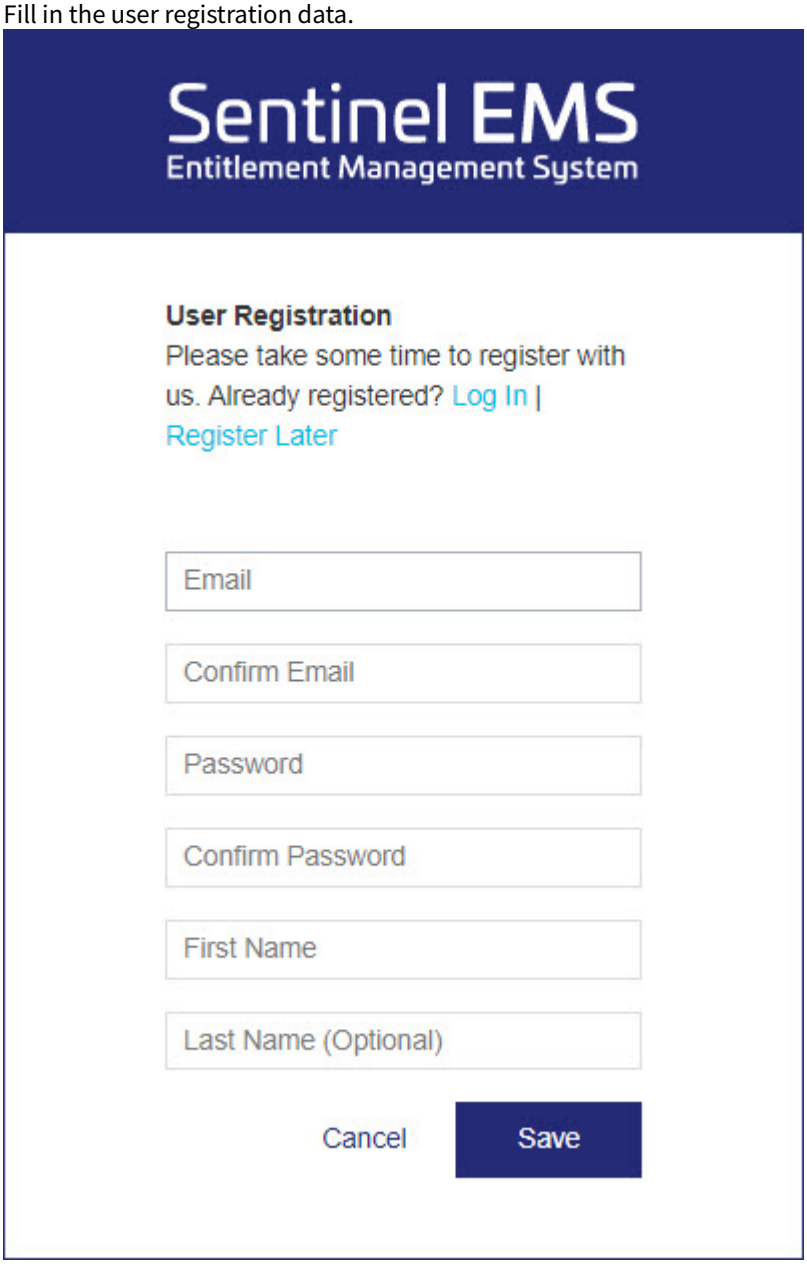
> Guide to the Sentinel EMS Customer Portal[152]

150 https://license.visionlabs.ai/ems/customerLogin.html
151 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3
152 https://docs.sentinel.thalesgroup.com/softwareandservices/ems/EMSdocs/CPUG/CPhome.htm

7. Log in using the received **EID**.

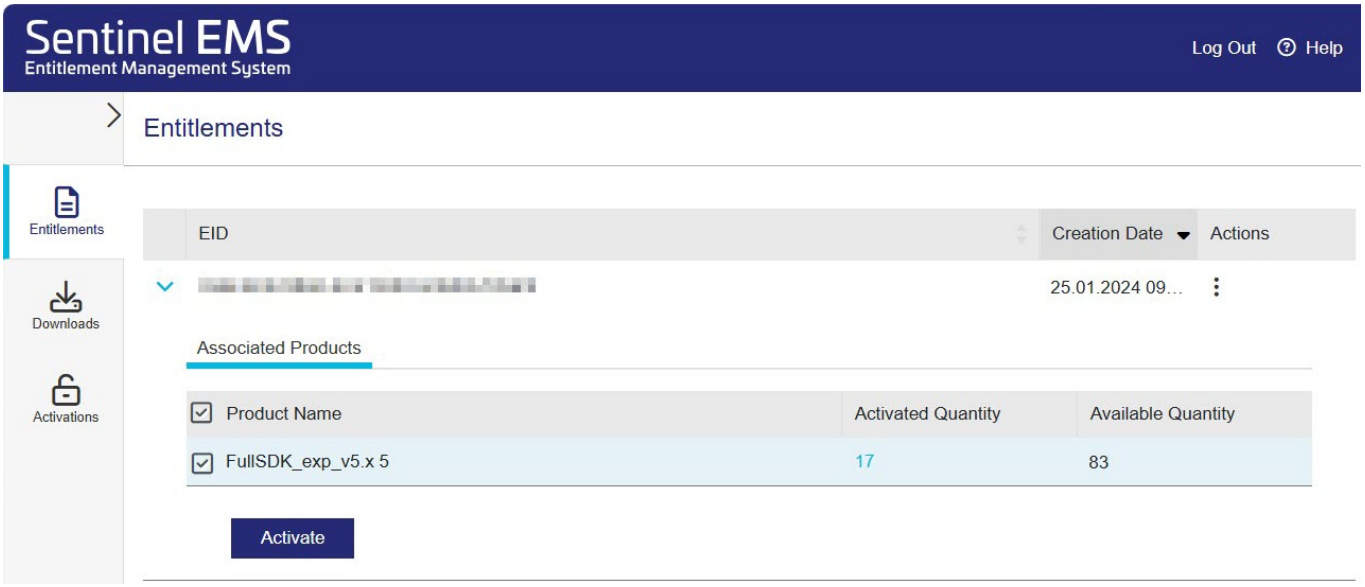


8. Fill in the user registration data.

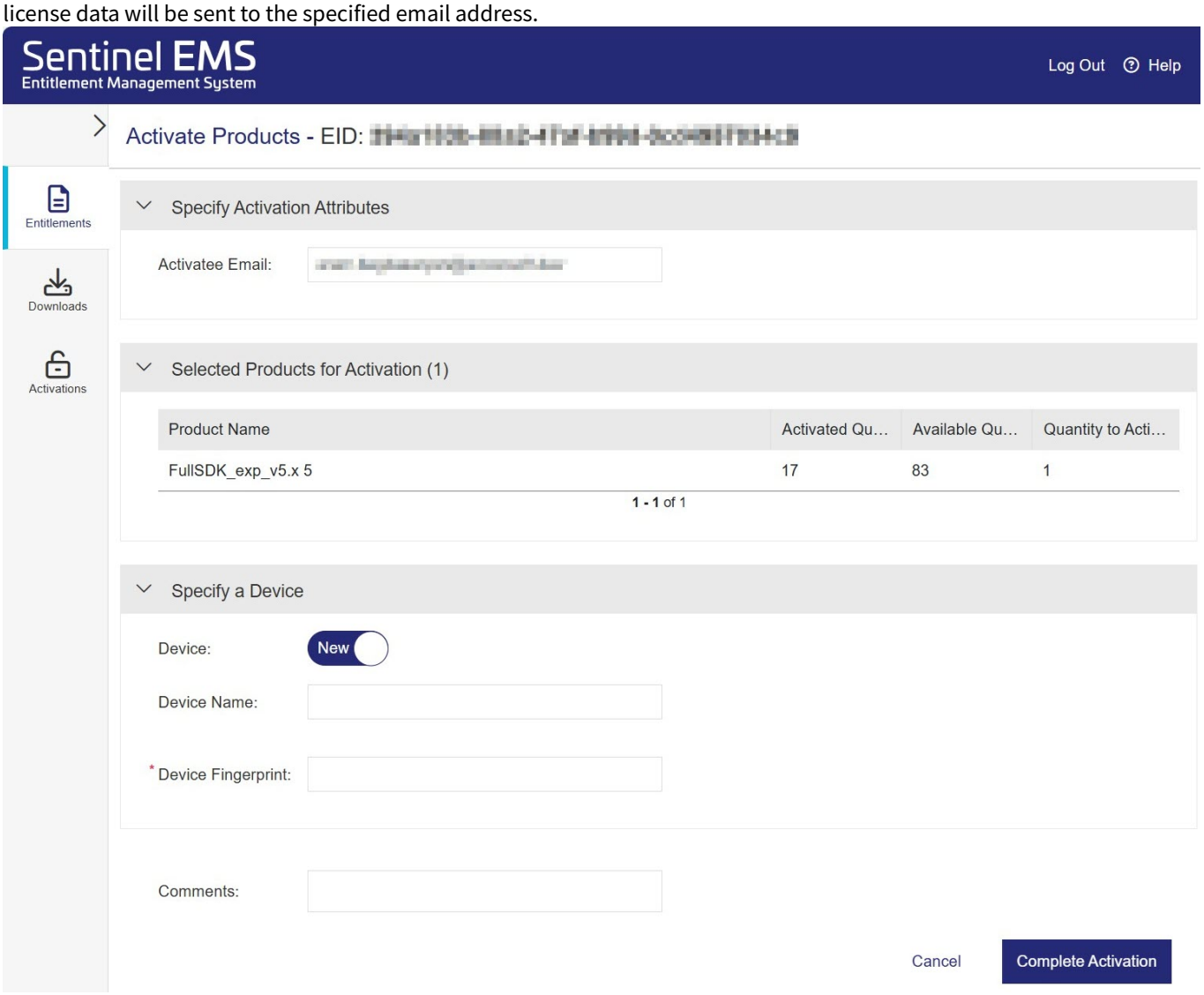


9. Click the **Save** button.

10. Click the **Activate** button to activate the license.



11. In the **Activatee Email** field, specify the email address to confirm the license activation. The **licenseFile.v2c** file with license data will be sent to the specified email address.



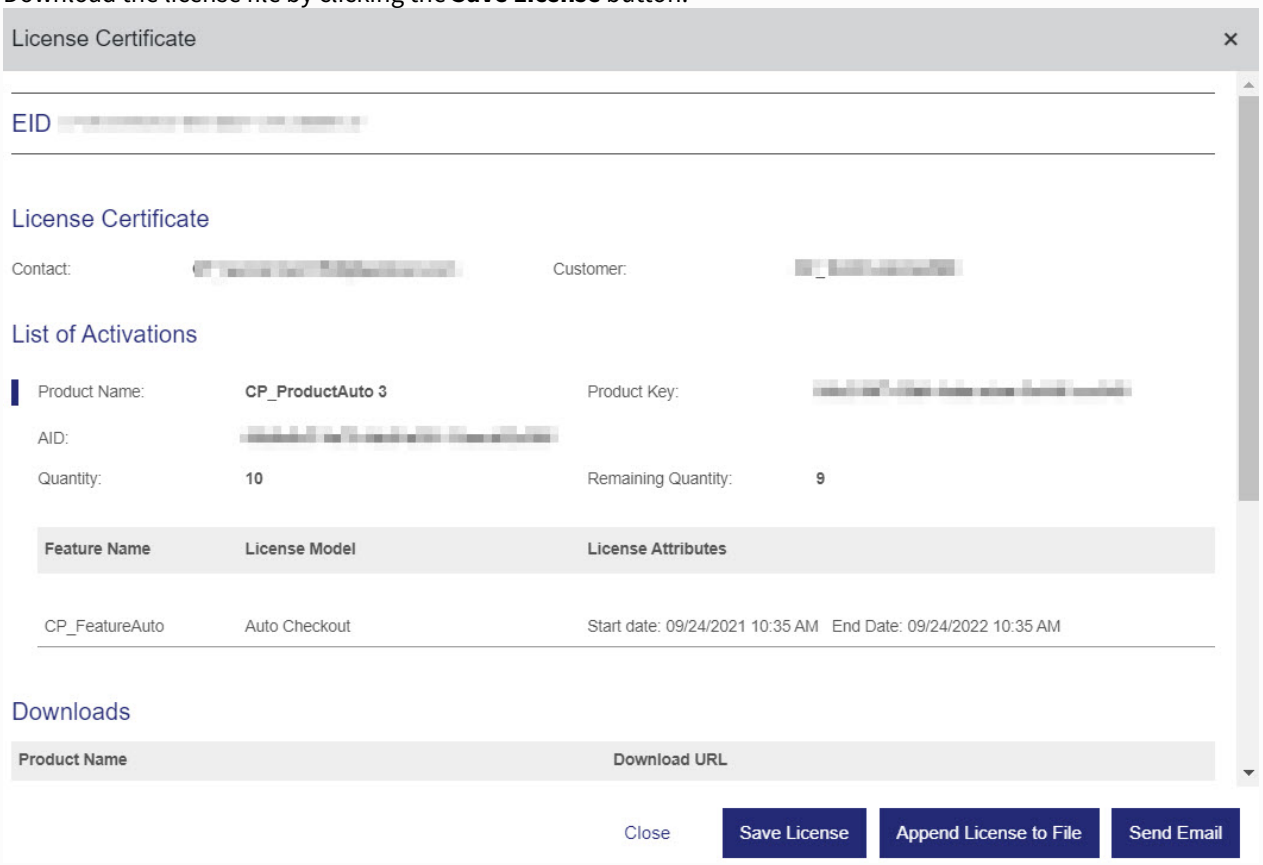
12. In the **Device FingerPrint** field, specify the **FingerPrint** data.
13. Click the **Complete Activation** button.

14. Place the downloaded **licenseFile.v2c** file on the server in the folder: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\.
15. Make sure the license is successfully activated. If the server is connected to the internet, the license will be checked automatically.

Note

If the server doesn't have an internet connection, do the following:

1. Do steps 2–5, 14 on the server where the license will be used.
2. Do steps 1, 6–13, 15 on any computer connected to the internet.
3. Click the **View License Certificate** button.
4. Download the license file by clicking the **Save License** button.



The license is activated on the server with no internet connection.

The **Human tracker VL** license is activated.

19.4.28.5.5 Activating the license for the Human tracker VL in Linux OS

Attention!

A demo license has been added to the VL Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321)). The demo license is valid for 30 days after installation on one server or a virtual machine.

To activate a license for the **Human tracker VL** (see Configuring the Human tracker VL(see page 437)), do the following:

1. Request **EID** and **ProductID** from technical support[153].

Attention!

153 https://visionlabs.ai/contacts

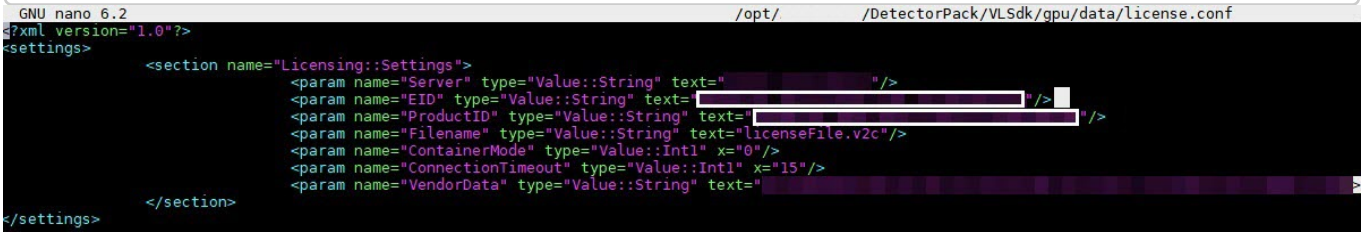
EID and **ProductID** are linked with the MAC address of the server. If the MAC address changes, you need to request **EID** and **ProductID** again.

2. Open the **license.conf** file.

```
sudo nano /opt/AxxonSoft/DetectorPack/VLSdk/gpu/data/license.conf
```

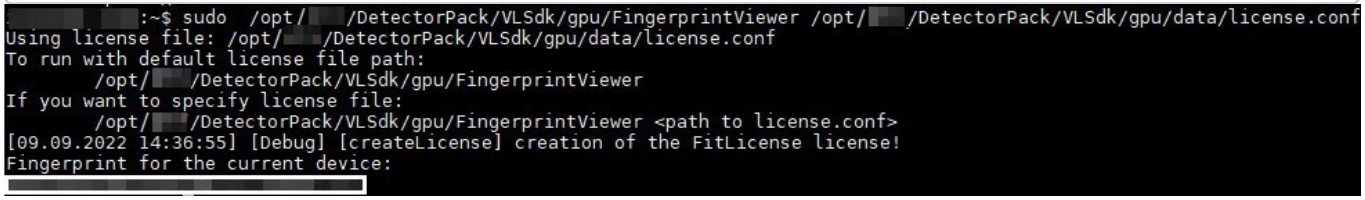
3. Enter the received **EID** and **ProductID**.

```
<param name="EID" type="Value::String" text="received EID"/>
<param name="ProductID" type="Value::String" text="received ProductID"/>
```



4. Save the file.
5. Run the **FingerprintViewer** file. You will receive the **FingerPrint** data.

```
sudo /opt/AxxonSoft/DetectorPack/VLSdk/gpu/FingerprintViewer /opt/AxxonSoft/DetectorPack/
VLSdk/gpu/data/license.conf
```



6. Go to the website[154].

Attention!

If you fail to log in to the website, contact the technical support[155].

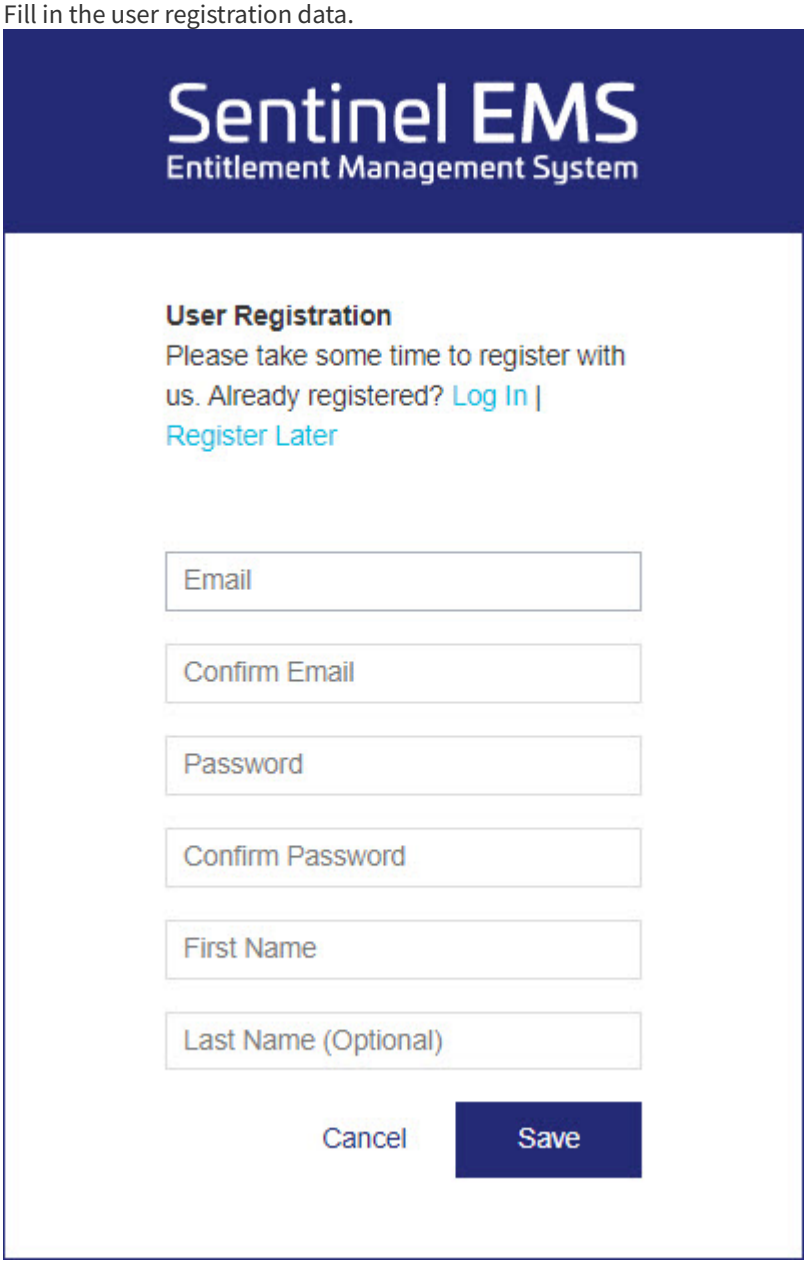
Guide to the Sentinel EMS Customer Portal[156]

154 https://license.visionlabs.ai/ems/customerLogin.html
155 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3
156 https://docs.sentinel.thalesgroup.com/softwareandservices/ems/EMSdocs/CPUG/CPhome.htm

7. Log in using the received **EID**.

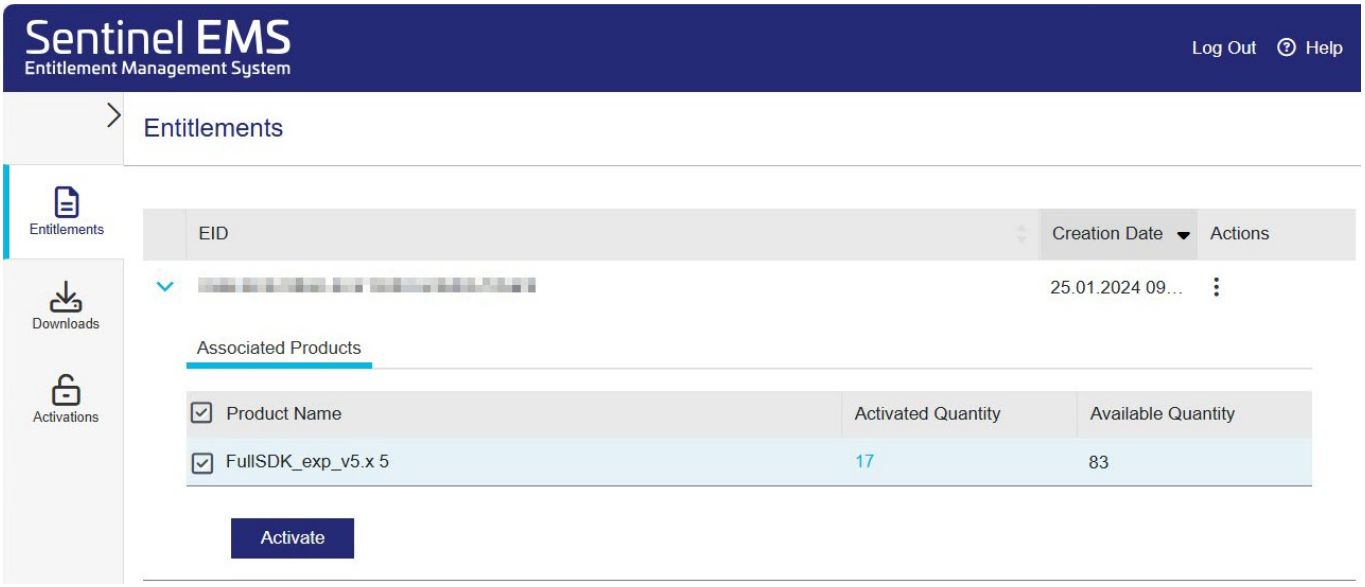


8. Fill in the user registration data.

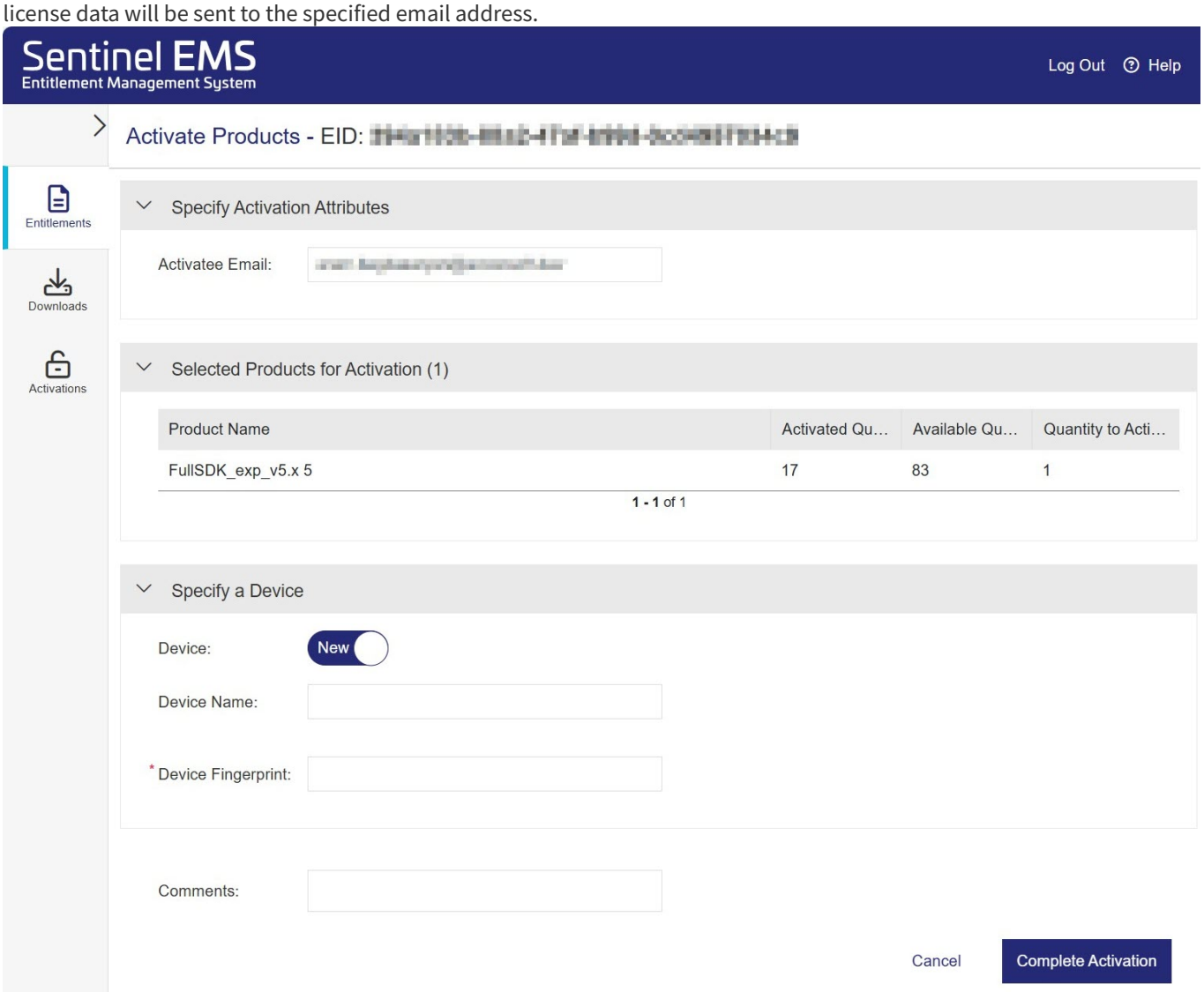


9. Click the **Save** button.

10. Click the **Activate** button to activate the license.



11. In the **Activatee Email** field, specify the email address to confirm the license activation. The **licenseFile.v2c** file with license data will be sent to the specified email address.



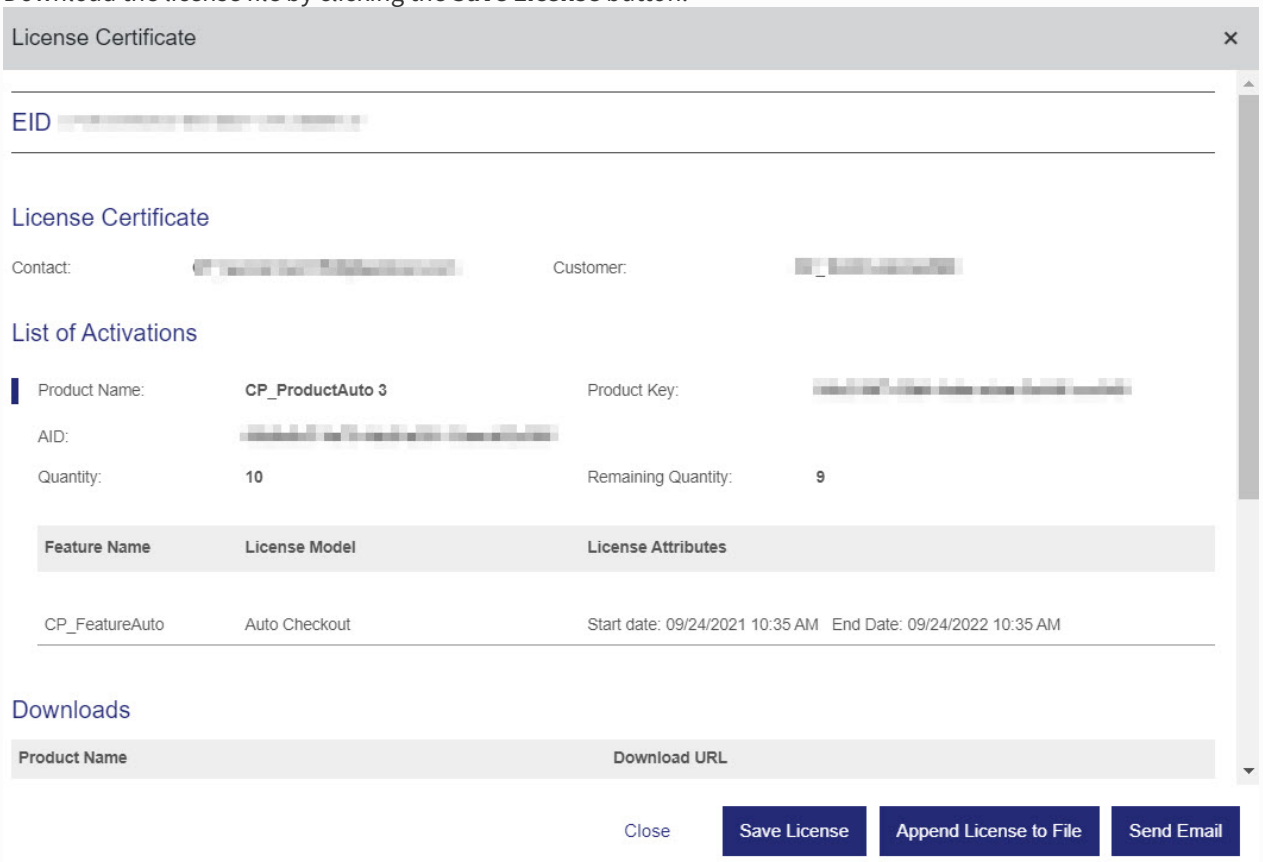
12. In the **Device FingerPrint** field, specify the **FingerPrint** data.
13. Click the **Complete Activation** button.

14. Place the **licenseFile.v2c** file in the required directory: /opt/AxxonSoft/DetectorPack/VLSdk/.
15. Make sure the license is successfully activated. If the server is connected to the internet, the license will be checked automatically.

Note

If the server doesn't have an internet connection, do the following:

1. Do steps 2–5, 14 on the server where the license will be used.
2. Do steps 1, 6–13, 15 on any computer connected to the internet.
3. Click the **View License Certificate** button.
4. Download the license file by clicking the **Save License** button.



The license is activated on the server with no internet connection.

The **Human tracker VL** license is activated.

19.4.28.5.6 Configuring the Human tracker VL

Video stream and scene requirements for the Human tracker VL and its sub-detectors(see page 425)
Image requirements for the Human tracker VL and its sub-detectors(see page 427)
Hardware requirements for neural analytics operation(see page 339)
Activating the license for the Human tracker VL in Windows OS(see page 427)
Activating the license for the Human tracker VL in Linux OS(see page 432)

To configure the **Human tracker VL**, do the following:

1. Go to the **Detection Tools** tab.
2. Below the required camera, click **Create…** → **Category: Trackers** → **Human tracker VL**.

By default, the detection tool is enabled and set to detect people in the frame and generate events.

If necessary, you can change the detection tool parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. **Attention!** To ensure the correct display of streams on a multi-stream camera, all video streams must have the same frame aspect ratio.
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value. **Attention!** To obtain metadata, the video is decompressed and analyzed, which results in a heavy load on the Server and limits the number of video cameras that can be used on it.
	No	
Other		
Enable	**Yes**	The **Human tracker VL** detection tool is enabled by default. To disable the detection tool, select the **No** value
	No	
Name	**Human tracker VL**	Enter the detection tool name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**Human tracker VL**	Name of the detection tool type (non-editable field)
Advanced settings		
Frame size change	**640**	Select the resolution to which the video will be compressed before analysis
	960	
	1280	
	1920	
	2560	
	3840	

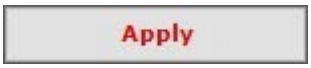
Parameter	Value	Description
	5120	
	7680	
	15360	
Number of frames without detections	**18**	Specify the number of frames without objects detection. If no object is detected in the designated area, the neural network algorithm will continue to process the specified number of frames before it considers the track lost and terminated. The value must be in the range [1, 10 000]
Number of frames between detections	**7**	Specify the number of frames between detections. The lower the value, the higher the probability that the neural network algorithm will detect a new object as soon as it appears in the designated area. The value must be in the range [1, 10 000]
Minimum number of detections	**1**	Specify the minimum number of detections after which a track will be considered a detected object. The value must be in the range [1, 10 000]
Track lifespan (starting with *Detector Pack* 3.14)	**Yes**	By default, the parameter is disabled. If you want to display the track lifespan for an object in seconds, select the **Yes** value
	No	
Basic settings		
Minimum threshold of object authenticity	**60**	Specify the minimum threshold of object authenticity in percent, at which an object is considered detected. The higher the value, the fewer objects are detected, but the more reliable the detected objects are. The value must be in the range [1, 100]
Mode	**CPU**	Select a processor for the detection tool operation (see Selecting Nvidia GPU when configuring detectors(see page 348)). **Attention!** If you specify other processing resource than the CPU, this device will carry the most of computing load. However, the CPU will also be used to run the detection tool.
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
	Huawei NPU	

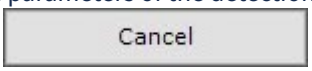
If necessary, in the preview window, set an area of the frame, in which you want to detect objects. You can specify the area by moving the anchor points  (see Configuring the Detection Zone[157]).

Note

157 https://docs.axxonsoft.com/confluence/display/one20en/Configuring+the+Detection+Zone

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide detection area, click the  button. To cancel the action, click this button again.

To save the parameters of the detection tool, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

The **Human tracker VL** is configured. If necessary, you can create and configure the necessary sub-tools on the basis of the **Human tracker VL** (see Standard detection sub-tools[158]).

19.4.28.5.6.1 Configuring the Human tracker VL sub-detectors

Configuring the Human tracker VL standard sub-detectors

Configuration of the standard sub-detectors of the **Human tracker VL** is described in the Standard sub-detectors(see page 359) section.

19.4.28.6 Stopped object detector

19.4.28.6.1 Functions of the Stopped object detector

Description	The **Stopped object detector** is used to detect stopped objects in the camera FOV
Add-ons	For the detection tool to work, you must install the Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.6.2 Video stream and scene requirements for the Stopped object detector

Image requirements for the Stopped object detector(see page 441)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Stopped object detector** are given in the table:

Camera	• Resolution must be at least 640x360 pixels. We also don't recommend using a resolution higher than 1920×1080, since higher resolution doesn't increase the detection quality, but significantly increases the consumption of resources. The optimal resolution for solving typical tasks is 1280x720 • The frame rate per second in the video stream from the camera is at least 8 for solving typical tasks • Stopped object detector-based analytics works with both colorless (gray) and color images. We recommend using color cameras. When you use black-and-white cameras, the recognition quality can be noticeably worse **Attention!** • Correct operation of the detection tool **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods. • Correct operation of the **Stopped object detector** isn't guaranteed if you use a fisheye camera.

158 https://docs.axxonsoft.com/confluence/display/one20en/Standard+detection+sub-tools

Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on) • The analyzed scene doesn't have reflective surfaces and sharp shadows from moving objects. If present, they must be masked • Camera shake doesn't result in image offsets greater than 1% of the frame size

19.4.28.6.3 Image requirements for the Stopped object detector

Video stream and scene requirements for the Stopped object detector(see page 440)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Stopped object detector** are given in the table:

Object images

- The detected object must be clearly distinguishable by the human eye
- Width and height of objects in the image must not exceed 75% of the frame size
- When you use a neural filter, the minimum width or height of an object must be at least 5% of the width/height of the frame
- The image isn't noisy and not distorted by the artifacts of compression algorithm
- The duration of the object visibility is at least six frames
- Between two frames, an object must move in the direction of a distance not exceeding its size. This condition is necessary for the correct calculation of object track
- The minimum value of pixel density per meter is observed:

Image resolution	Object type	Minimum pixel density per meter (ratio of the object width in pixels to the object width in meters)	Minimum object size in pixels, width x height	Ratio of the object width to the frame width as a percentage
1920x1080	Human	55	~25x105	~3%
1280x720	Human	35	~17x70	~3%
640x360	Human	17	~10x42	~3%
1920x1080	Light vehicle (2 axles)	55	~354x300	~20%
1280x720	Light vehicle (2 axles)	35	~240x205	~20%
640x360	Light vehicle (2 axles)	17	~132x112	~20%

19.4.28.6.4 Configuring the Stopped object detector

Hardware requirements for neural analytics operation(see page 339)

Video stream and scene requirements for the Stopped object detector(see page 440)
Image requirements for the Stopped object detector(see page 441)

To configure the **Stopped object detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Trackers** → **Stopped object detector**.

By default, the detector is enabled and set to detect stopped objects.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	By default, metadata are recorded into the database. To disable metadata recording, select the **No** value.
	No	**Attention!** To obtain metadata, video is decompressed and analyzed, which results in a heavy load on the server and limits the number of cameras that you can use on it.
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
	Second stream	
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Stopped object detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**Stopped object detector**	Name of the detector type (non-editable field)
Basic settings		
Detection threshold	**30**	Specify the **Detection threshold** for objects in percent. If the recognition probability falls below the specified value, the data will be ignored. The higher the value, the higher the accuracy, but some events from the detector may not be considered. The value must be in the range [1, 100]

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="13">Detector mode</td><td>CPU</td><td rowspan="13">Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).

Attention!
• It may take several minutes to launch the algorithm on Nvidia GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
• Starting with Detector Pack 3.11, Intel HDDL is not supported.
• Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Huawei NPU</td></tr>
<tr><td rowspan="11">Detection neural network</td><td>Person</td><td rowspan="11">Select the detection neural network from the list. Neural networks are named taking into account the objects they detect. The names can include the size of the neural network (Nano, Medium, Large), which indicates the amount of consumed resources. The larger the neural network, the higher the accuracy of object recognition</td></tr>
<tr><td>Person (top-down view)</td></tr>
<tr><td>Person (top-down view Nano)</td></tr>
<tr><td>Person (top-down view Medium)</td></tr>
<tr><td>Person (top-down view Large)</td></tr>
<tr><td>Vehicle</td></tr>
<tr><td>Person and vehicle (Nano)</td></tr>
<tr><td>Person and vehicle (Medium)</td></tr>
<tr><td>Person and vehicle (Large)</td></tr>
</table>

Parameter	Value	Description
Advanced settings		
Wait time (sec)	**3**	Specify the waiting time for the reappearance of a disappeared stopped object in seconds. The value must be in the range [1, 60]
Stop time (sec)	**5**	Specify the time in seconds after which the object is considered stopped. The value must be in the range [1, 60]
Selected object classes		If necessary, specify the class of the detected object. If you want to display tracks of several classes, specify them separated by a comma with a space. For example, **1**, **10**. The numerical values of classes for the embedded neural networks: **1**—Human/Human (top-down view), **10**—Vehicle. a. If you leave the field blank, the tracks of all available classes from the neural network are displayed (**Detection neural network**, **Neural network file**). b. If you specify a class/classes from the neural network, the tracks of the specified class/classes are displayed (**Detection neural network**, **Neural network file**). c. If you specify a class/classes from the neural network and a class/classes missing from the neural network, the tracks of a class/classes from the neural network are displayed (**Detection neural network**, **Neural network file**). d. If you specify a class/classes missing from the neural network, the tracks of all available classes from the neural network are displayed (**Detection neural network**, **Neural network file**) **Note** Starting with *Detector Pack* 3.10.2, if you specify a class/classes missing from the neural network, the tracks aren't displayed (**Detection neural network**, **Neural network file**).
Camera position	**Wall**	To eliminate false events from the detector when using a fisheye camera, select the correct device location. For other devices, this parameter is irrelevant
	Ceiling	

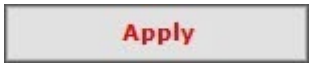
Parameter	Value	Description
Neural network file		If you use a custom neural network, select the corresponding file. **Attention!** • To train your neural network, contact AxxonSoft (see Data collection requirements for neural network training(see page 341)). • A trained neural network for a particular scene allows you to detect only objects of a certain type (for example, a person, a cyclist, a motorcyclist, and so on). • If you don't specify the neural network file, the default file is used that is selected automatically depending on the selected value in the **Detection neural network** parameter and the selected processor for the neural network operation in the **Decoder mode** parameter. If you use a custom neural network, enter a path to the file. The selected detection neural network is ignored when you use a custom neural network. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20%. The standard neural networks are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights.

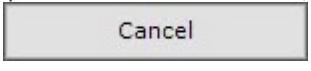
By default, the entire frame is a detection area. If necessary, in the preview window, you can set one or more:

- detection areas (see Configuring a detection area(see page 351)),
- ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the **Stopped object detector** is complete.

19.4.28.7 Motion detector

19.4.28.7.1 Functions of the Motion detector

Description	The **Motion detector** is based on detecting differences between the current frame and the static background, and it generates an event when there is a movement in the camera FOV. You can use the metadata from the **Motion detector** to operate its sub-detectors (see Standard sub-detectors(see page 359))

Attention!

- If you plan to use the metadata of the **Motion detector** for Search in archive (see Search in archive(see page 1216)), you may need to update the license file. Contact a manager of AxxonSoft to get detailed information and a license file.
- You cannot determine the object type and color based on metadata from the **Motion detector**.

19.4.28.7.2 Video stream and scene requirements for the Motion detector and its sub-detectors

Image requirements for the Motion detector and its sub-detectors(see page 446)

Requirements for the operation of the **Motion detector** and its sub-detectors are given in the table:

Camera	• Camera shake must not result in image offsets greater than 1% of the frame size
Lighting	• Moderate lighting. In conditions of insufficient (night) or excessive lighting (light-striking), the quality of analytics performance can decrease • No abrupt changes in lighting

Scene and camera angle	• Moving objects are visually separable from each other
	• The background is mostly static and doesn't change abruptly
	• Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on)
	• Analytics can work incorrectly if:
	  • the analyzed scene have reflective surfaces and sharp shadows from moving objects
	  • there are extended monochromatic objects in the frame

Some requirements depend on whether you use the **Motion detector** only or its sub-detectors (see Standard sub-detectors(see page 359)). The difference in requirements is shown in the table:

Requirements	Motion detector	Motion detector sub-detectors
Resolution in pixels	At least 320x240	At least 640x360
FPS	At least 1	At least 6
Work with image	Analytics only works with color images	Analytics works with both gray and color images

19.4.28.7.3 Image requirements for the Motion detector and its sub-detectors

Video stream and scene requirements for the Motion detector and its sub-detectors(see page 446)

Requirements for the operation of the **Motion detector** and its sub-detectors are given in the table:

Object images	• Image isn't noisy and isn't distorted by artifacts of the compression algorithm • The speed of object movement in the image must not be less than 1 pixel per second • For the object to be detected, the duration of its visibility must be at least 8 frames • When the object moves between two adjacent frames in a certain direction, its distance of movement must not exceed its size. This condition is necessary for the correct calculation of the object's trajectory (track)

Some requirements depend on whether you use the **Motion detector** only or its sub-detectors (see Standard sub-detectors(see page 359)). The difference in requirements is shown in the table:

Requirements	Motion detector	Motion detector sub-detectors
Size of objects in the image	The width and height of the objects in the image must be not less than 1% of the frame size (if resolution is over 704x576 pixels) or 15 pixels for lower resolution	The width or height of the objects in the image must be not less than 1% of the frame size (if resolution is over 1920x1080 pixels) or 15 pixels for lower resolution

19.4.28.7.4 Configuring the Motion detector

Video stream and scene requirements for the Motion detector and its sub-detectors(see page 446)
Image requirements for the Motion detector and its sub-detectors(see page 446)

To configure the **Motion detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Trackers** → **Motion detector**.

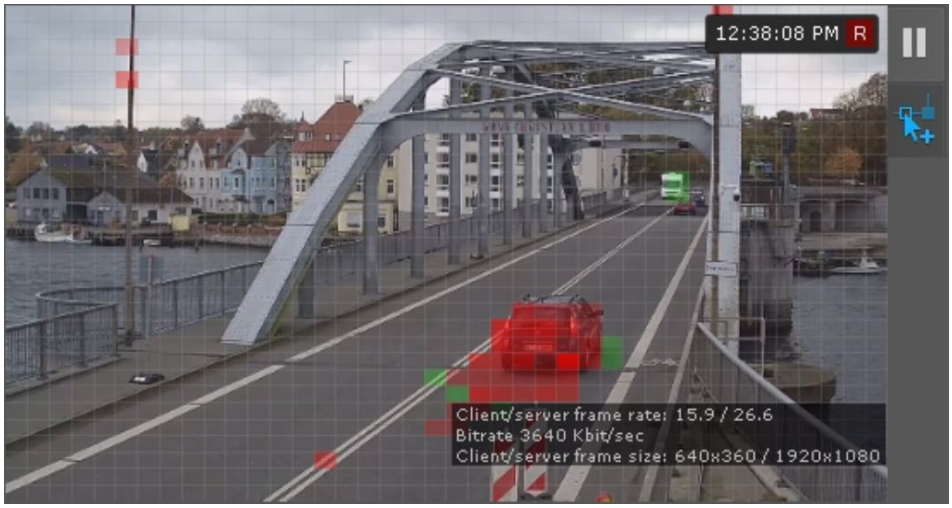
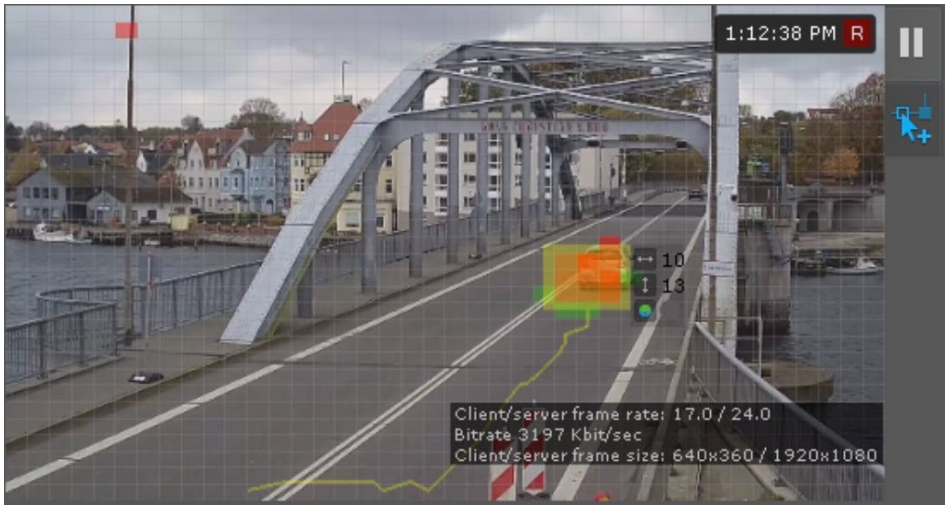
The **Motion detector** is based on detecting differences between the current frame and the static background, and it generates an event when there is a movement in the camera FOV.

You can set a number of parameters for all sub-detectors of the **Motion detector** at the same time.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, mask is recorded to the archive. To disable the parameter, select the **No** value
	No	
Record objects tracking	**Yes**	By default, object tracks are recorded to the database. To disable the parameter, select the **No** value. **Attention!** To obtain metadata, video is decompressed and analyzed, which results in a heavy load on the server and limits the number of cameras that you can use on it.
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low quality video stream reduces the load on the server. **Attention!** To ensure the correct display of streams on a multi-stream camera, all video streams must have the same frame aspect ratio.
Other		

Parameter	Value	Description
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Motion detector**	Enter the detector name or leave the default name
Decode key frames	**Yes**	By default, the parameter is disabled. This parameter reduces the load on the server, but at the same time the detection quality decreases. If you want to decode key frames only, select the **Yes** value. We recommend enabling this parameter for "blind" (without video image display) servers, on which you want to perform detection. For the MJPEG codec, decoding isn't relevant, as each frame is considered a key frame. **Attention!** The **Number of frames processed per second** and **Decode key frames** parameters are interrelated. If a local client isn't connected to the server, the following rules work for remote clients: • If the key frame rate is less than the value specified in the **Number of frames processed per second** field, the detector will work by key frames. • If the key frame rate is greater than the value specified in the **Number of frames processed per second** field, the detection will be performed according to the set period. If a local client is connected to the server, the detector will always work according to the set period. After disconnecting the local client, the above rules will be relevant again.
	No	
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**Motion detector**	Name of the detector type (non-editable field)
Advanced settings		
Alarm end delay	**10**	Enter the time in seconds during which the generation of an event won't stop after the motion stops. If motion is detected again within the specified time, it will be considered as one event
Camera position	**Wall**	To eliminate false events from the detector when using a fisheye camera (see Configuring fisheye cameras(see page 183)), select the correct device location
	Ceiling	

Parameter	Value	Description
Motion mask	**Yes**	By default, motion mask is enabled.  • If motion doesn't exceed the **Sensitivity: Contrast** and **Sensitivity: Size** parameters, the mask cells are colored green. • If motion generates an event, the cells are colored red. To disable the parameter, select the **No** value.
	No	
Object tracking	**Yes**	By default, the parameter is disabled. Select the **Yes** value to operate the sub-detectors and to display tracks and parameters (width and height as a percentage of the frame width or height and color) of tracking objects in the preview window: 
	No	
Track lifespan (starting with *Detector Pack* 3.14)	**Yes**	By default, the parameter is disabled. If you want to display the track lifespan for an object in seconds, select the **Yes** value
	No	
Basic settings		

Parameter	Value	Description
Sensitivity: Contrast	**12**	Specify the values of sensitivity to contrast and object size depending on the scene in the frame: • **Sensitivity: Contrast**. The value must be in the range [0, 20] • **Sensitivity: Size**. The value must be in the range [0, 20] By default, the values of medium sensitivity are used. These values are recommended for most scenes: • **Sensitivity: Contrast**—**12**. • **Sensitivity: Size**—**9**. If objects are far away and small in size, the maximum sensitivity is required. Recommended values: • **Sensitivity: Contrast**—**16**. • **Sensitivity: Size**—**10**. If a camera is located indoors with a distance to objects of about four meters, the minimum sensitivity is required. Recommended values: • **Sensitivity: Contrast**—**8**. • **Sensitivity: Size**—**8**.
Sensitivity: Size	**9**	

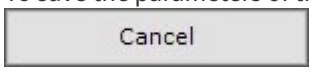
By default, the entire frame is a detection area. If necessary, in the preview window, set:

- one or more detection areas (see Configuring a detection area(see page 351)),
- one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.

The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuration of the **Motion detector** is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of the **Motion detector** (see Standard sub-detectors(see page 359)).

19.4.28.8 Privacy masking

19.4.28.8.1 Functions of the Privacy masking

Description	The **Privacy masking** allows you to hide moving objects in the video. When you use a neural network in the **Privacy masking** operation, the accuracy of working with moving objects improves, and stationary objects are hidden as well
Add-ons	For the detection tool to work, you must install the Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.8.2 Video stream and scene requirements for the Privacy masking

Image requirements for the Privacy masking(see page 451)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Privacy masking** are given in the table:

Camera	• Resolution is at least 320x240 pixels • FPS is at least 1 • Camera shake doesn't result in image offsets greater than 1% of the frame size **Attention!** Correct operation of the detection tool **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Lighting	• Moderate lighting. In conditions of insufficient (night) or excessive lighting (light-striking), the quality of analytics performance can decrease • No abrupt changes in lighting

Scene and camera angle	• Moving objects are visually separable from each other
	• Background is mostly static and doesn't change abruptly
	• Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on)
	• Analytics may not work correctly if:
	  • the analyzed scene have reflective surfaces and sharp shadows from moving objects
	  • there are extended monochromatic objects in the frame

19.4.28.8.3 Image requirements for the Privacy masking

Video stream and scene requirements for the Privacy masking(see page 450)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Privacy masking** are given in the table:

Object images	• Image isn't noisy and isn't distorted by artifacts of the compression algorithm
	• The width and height of objects in the image must not:
	  • be less than 1% of the frame size (at resolutions no less than 1920x1080 pixels) or 15 pixels (at lower resolutions)
	  • exceed 75% of the frame size
	• The speed of movement of objects in the image must not be less than 1 pixel per second
	• For the object to be detected, the duration of its visibility must be at least 8 frames

19.4.28.8.4 Configuring the Privacy masking

Video stream and scene requirements for the Privacy masking(see page 450)
Image requirements for the Privacy masking(see page 451)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Privacy masking** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Trackers** → **Privacy masking**.

By default, the detector is enabled and set to hide stationary objects.

Attention!

We don't guarantee the correctness of detector operation earlier than 10 minutes from the moment of detector creation or making any changes in the detector settings.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the mask is recorded to the archive. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server. **Attention!** To ensure the correct display of streams on a multi-stream camera, all video streams must have the same frame aspect ratio.
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Privacy masking**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**25**	Specify the number of frames for the detector to process per second. For sub-detectors to work correctly, the **Privacy masking** detector must analyze frames at least every **0.5** seconds. The value must be in the range [0.016, 100]
Type	**Privacy Masking**	Name of the detector type (non-editable field)
Basic settings		
Detection threshold	**15**	Specify the **Detection threshold** for objects in percent. If the recognition probability falls below the specified value, the data is ignored. The higher the value, the higher the sensitivity to recognizing and masking objects. The value must be in the range [5, 100]

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="12">Neural network mode</td><td>CPU</td><td rowspan="12">Select a processing resource for neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors[159]).

Attention!
If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
It may take several minutes to launch the algorithm on the Nvidia GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Huawei NPU</td></tr>
<tr><td colspan="3">Neural network filter</td></tr>
<tr><td>Neural network</td><td>Yes

No</td><td>By default, the parameter is disabled. The detector works on the basis of an algorithm without a neural network, ignoring the value specified in the Neural network file parameter. If the detector cannot correctly detect an object in the frame, select the Yes value. In the Neural network file parameter, select a custom neural network that is a privacy mask neural network. A detector with a neural network algorithm based on this neural network is created</td></tr>
</table>

159 https://docs.axxonsoft.com/confluence/display/one20en/Selecting+Nvidia+GPU+when+configuring+detection+tools

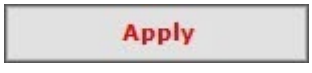
Parameter	Value	Description
Neural network file		If you use a custom neural network, select the corresponding file. **Attention!** • To train your neural network, contact AxxonSoft (see Data collection requirements for neural network training(see page 341)). • If you don't specify the neural network file, the default file is used that is selected automatically depending on the selected processor for the neural network operation (**Decoder mode**). If you use a custom neural network, enter a path to the file. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee an overall accuracy of 80-95% and a percentage of false positives of 5-20%. The standard neural networks are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights.
Neural network recognition threshold (starting with Detector Pack 3.15)	**0**	Specify the neural network recognition threshold in percentage. If the probability of neural network recognition is lower than the specified one, this data is ignored. The higher the value, the higher the sensitivity to the recognition. The value must be in the range [0, 100]
Selected object classes *(starting with Detector Pack 3.15)*		If necessary, specify the object class of the detection neural network (the **Neural network file** parameter)

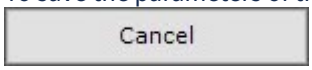
By default, the entire frame is a detection area. If necessary, in the preview window, set one or more:

- detection areas (see Configuring a detection area(see page 351)),
- ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the privacy masking is complete.



19.4.28.9 Motion in area detector VI

19.4.28.9.1 Functions of the Motion in area detector VI

Description	The **Motion in area detector VI** is used to detect the movement of objects in a given area
Licensing	To operate the detection tool, you need to contact an AxxonSoft manager and get a license file (see Types of licenses[160], Licensing of the software module for the Motion in area detector VI in Windows OS(see page 456), Licensing of the software module for the Motion in area detector VI in Linux OS(see page 456))
Add-ons	For the detection tool to work, you must install the VI Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.9.2 Video stream and scene requirements for the Motion in area detector VI

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Motion in area detector VI(see page 456)

Requirements for the operation of the **Motion in area detector VI** are given in the table:

Camera	• Pitch angle of the camera optical axis relative to the horizontal plane: from 15 to 90 degrees (for the inclined method of placement) • Resolution is from 640x360 to 1920×1080 pixels
Lighting	• Lighting in the scene is from 100 to 1000 lux
Scene and camera angle	• Shooting distance is from 5 to 30 meters

160 https://docs.axxonsoft.com/confluence/display/one20en/Types+of+licenses

19.4.28.9.3 Image requirements for the Motion in area detector VI

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Motion in area detector VI(see page 455)

Requirements for the operation of the **Motion in area detector VI** are given in the table:

Object images	• Image isn't noisy and isn't distorted by artifacts of the compression algorithm • The speed of movement of objects in the image must not be less than 1 pixel per second • For the object to be detected, the duration of its visibility must be at least 6 frames

19.4.28.9.4 Licensing of the software module for the Motion in area detector VI in Windows OS

Starting with *Detector Pack* 3.13, to license the detector, you must insert a Guardant USB key with a license that you got from the AxxonSoft sales department. Once you insert the key, the licensing process is complete.

If the license isn’t installed in the USB key, do the following to activate the license:

1. Contact the AxxonSoft manager to obtain the serial number for the Guardant hardware protection key.
2. Download the archive containing the **Guardant License Wizard** utility.
3. Unzip the downloaded archive.
4. Open the unzipped folder and launch the **Guardant License Wizard** utility.
5. Go to **Settings** and in the **Server address** field, enter the licensing server address:

   ```
   https://gkey.videointellect.com:9000
   ```
6. Return to the main window of the utility and click **License activation**.
7. In the **On which computer do you want to use the license?** section, select **On this**.
8. In the **Serial number** field, enter the serial number provided by the AxxonSoft manager.
9. Click **Get license**.

The license activation for the **Motion in area detector VI** is complete.

19.4.28.9.5 Licensing of the software module for the Motion in area detector VI in Linux OS

On the page:

- License activation using the Guardant dongle(see page 456)
- License activation and update for Detector Pack 3.13 and earlier(see page 457)
- Deleting the license for Detector Pack 3.13 and earlier(see page 457)

19.4.28.9.5.1 License activation using the Guardant dongle

Starting with *Detector Pack 3.14*, to operate with the license keys of the **Motion in area detector VI** and activate the license, do the following:

1. Connect the Guardant USB dongle to the device on which you installed *Axxon One.*

2. Install the driver:
    a. Download the archive.
    b. Unzip the content.
    c. Go to the directory with the archive contents.
    d. Run the driver installation script.

```
sudo ./install.sh
```

If you successfully install the driver, the license keys are displayed on the page http://127.0.0.1:3189/#/dongles/list.

License activation is complete.

For *Detector Pack 3.13* and earlier, use the following manual to activate and update the license:

License activation and update for Detector Pack 3.13 and earlier

19.4.28.9.5.2 License activation and update for *Detector Pack* 3.13 and earlier

To operate with the license keys of the **Motion in area detector VI** and activate/update the license, do the following:

1. Download the archive.
2. Unzip the content.
3. Open a terminal.
4. Go to the directory with the archive contents:

```
cd /AxxonSoft/DetectorPack/VLSdk/distrib
```

where instead of **/AxxonSoft/DetectorPack/VLSdk**, you must specify the actual path.

5. Grant permissions to run the script for driver installation:

```
chmod 777 install.sh
```

6. Run the driver installation script.

```
sudo ./install.sh
```

7. Open a browser and go to the page http://127.0.0.1:1947/checkin.html.
8. On the page that opens, in the **Select File:** line, select the key with the v2c extension.

> **Attention!**
>
> To get the key with the v2c extension, you need to contact the AxxonSoft manager.

9. Click the **Apply File** button. If activation is successful, the key is displayed on the page http://127.0.0.1:1947/devices.html.

The license activation/update is complete. After activation, in the /SafeNet Sentinel/Sentinel LDK directory, the **installed** folder appears.

19.4.28.9.5.3 Deleting the license for *Detector Pack* 3.13 and earlier

To delete the license, do the following:

1. Delete the license file with the v2c extension from the **installed** folder in the /SafeNet Sentinel/Sentinel LDK directory.
2. Restart the OS.

> **Note**

- When you delete the license, only the key is deleted. All license restriction counters remain in the secure storage.
- If you return the key to the root directory, it will be fully restored. Its counters will continue counting license restrictions from the moment when they stopped when the license file with the v2c. extension was deleted. The validity time of the license continues to count down even when the key is missing.

The license deletion is complete.

19.4.28.9.6 Configuring the Motion in area detector VI

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Motion in area detector VI(see page 455)
Image requirements for the Motion in area detector VI(see page 456)
Licensing of the software module for the Motion in area detector VI in Windows OS(see page 456)
Licensing of the software module for the Motion in area detector VI in Linux OS(see page 456)

To configure the **Motion in area detector VI**, do the following:

1. Go to the **Detection Tools** tab.
2. Below the required camera, click **Create...** → **Category: Trackers** → **Motion in area detector VI**.

By default, the detection tool is enabled and set to generate events when an object starts moving within the specified area.

If necessary, you can change the detection tool parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detection tool is enabled. To disable, select the **No** value
	No	
Name	**Motion in area detector VI**	Enter the detection tool name or leave the default name
Background accumulation	**Yes**	By default, scene background accumulation is enabled. To disable, select the **No** value
	No	
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	

Parameter	Value	Description
	HuaweiNPU	
Detection mode	**CPU**	Select the processor for the detection tool operation (see Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
Detection sensitivity (%)	**10**	Specify the detection tool sensitivity level as a percentage of detected moving objects within the specified area. The higher the sensitivity value, the more subtle the movement that can be detected. The value must be in the range [0, 100]
Frame size change	**640**	Specify the size to which the video is compressed before analysis. The value must be in the range [480, 960]
Head size	**50**	Specify the size of a person's head in the frame. The value should be given as a percentage of the frame's vertical side and must be in the range [1, 100]
Ignore time (sec)	**0**	Specify the time interval in seconds during which events won't be processed after successful detection. The value must be in the range [0, 9999]
Initiate event after (sec)	**5**	Specify in seconds, in what time interval the event should be generated after it begins. The value must be in the range [0, 9999]
Minimum number of objects	**0**	Specify the minimum number of objects required to trigger the detection tool. The value must be in the range [0, 20]
Minimum threshold (%)	**30**	Specify the minimum threshold percentage at which an event is created. The value must be in the range [0, 100]
Number of execution threads	**4**	Specify the number of execution threads. The value must be in the range [0, 100]
Number of frames processed per second	**12**	Specify the number of frames processed per second. Value should be in range [0.016, 100] **Attention!** The detector operates optimally with the default value for most use cases. Changing this value may reduce the detector's performance quality.
Saving background	**Yes**	By default, saving the scene background is enabled. To disable, select the **No** value
	No	**Attention!** Background files are automatically saved to the directory C:\ProgramData\VideoIntellect\. The size of this folder can quickly increase, potentially filling up all available space on the C drive. It is not possible to set a limit on the maximum volume of this directory, so it's important to periodically check its contents and clear it if necessary.
State saving interval	**0**	Specify the state saving interval in seconds. The value must be in the range [0, 9999]

Parameter	Value	Description
Type	**Motion in area detector VI**	Name of the detection tool type (non-editable field)

In the preview window, you can specify the detection areas using the anchor points (see Configuring a detection area(see page 351)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the button (see Configuring a detection area(see page 351)). To cancel the action, click this button again.

To save the parameters of the detection tool, click the **Apply** button. To cancel the changes, click the **Cancel** button.

19.4.28.10 Movement in prohibited direction VI

19.4.28.10.1 Functions of the Movement in prohibited direction VI detector

Description	The **Movement in prohibited direction VI** detector is used to detect the object (person) movement in the prohibited direction through the virtual line in the given area
Licensing	To operate the detector, you must contact the AxxonSoft manager and get the license file (see Types of licenses[161], Licensing of the software module for the Movement in prohibited direction VI detector in Windows OS(see page 461), Licensing of the software module for the Movement in prohibited direction VI detector in Linux OS(see page 461))
Add-ons	For the detector to work, you must install the VI Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.10.2 Video stream and scene requirements for the Movement in prohibited direction VI detector

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Movement in prohibited direction VI detector(see page 461)

Requirements for the operation of the **Movement in prohibited direction VI** detector are given in the table:

Camera	• Pitch angle of the camera optical axis relative to the horizontal plane: from 15 to 90 degrees (for the inclined method of placement) • Resolution is from 640x360 to 1920×1080 pixels
Lighting	• Lighting in the scene is from 100 to 1000 lux
Scene and camera angle	• Shooting distance is from 5 to 30 meters

161 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

19.4.28.10.3 Image requirements for the Movement in prohibited direction VI detector

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Movement in prohibited direction VI detector(see page 460)

Requirements for the operation of the **Movement in prohibited direction VI** detector are given in the table:

Object images	• Image isn't noisy and isn't distorted by artifacts of the compression algorithm • The speed of movement of objects in the image must not be less than 1 pixel per second • For the object to be detected, the duration of its visibility must be at least 6 frames

19.4.28.10.4 Licensing of the software module for the Movement in prohibited direction VI detector in Windows OS

Starting with *Detector Pack* 3.13, to license the detector, you must insert a Guardant USB key with a license that you got from the AxxonSoft sales department. Once you insert the key, the licensing process is complete.

If the license isn’t installed in the USB key, do the following to activate the license:

1. Contact the AxxonSoft manager to obtain the serial number for the Guardant hardware protection key.
2. Download the archive containing the **Guardant License Wizard** utility.
3. Unzip the downloaded archive.
4. Open the unzipped folder and launch the **Guardant License Wizard** utility.
5. Go to **Settings** and in the **Server address** field, enter the licensing server address:

   ```
   https://gkey.videointellect.com:9000
   ```

6. Return to the main window of the utility and click **License activation**.
7. In the **On which computer do you want to use the license?** section, select **On this**.
8. In the **Serial number** field, enter the serial number provided by the AxxonSoft manager.
9. Click **Get license**.

The license activation for the **Movement in prohibited direction VI** detector is complete.

19.4.28.10.5 Licensing of the software module for the Movement in prohibited direction VI detector in Linux OS

On the page:

- License activation using the Guardant dongle(see page 462)
- License activation and update for Detector Pack 3.13 and earlier(see page 462)
- Deleting the license for Detector Pack 3.13 and earlier(see page 462)

19.4.28.10.5.1 License activation using the Guardant dongle

Starting with *Detector Pack 3.14*, to operate with the license keys of the **Movement in prohibited direction VI** and activate the license, do the following:

1. Connect the Guardant USB dongle to the device on which you installed *Axxon One*.
2. Install the driver:
   a. Download the archive.
   b. Unzip the content.
   c. Go to the directory with the archive contents.
   d. Run the driver installation script.

```
sudo ./install.sh
```

If you successfully install the driver, the license keys are displayed on the page http://127.0.0.1:3189/#/dongles/list.

License activation is complete.

For *Detector Pack 3.13* and earlier, use the following manual to activate and update the license:

License activation and update for Detector Pack 3.13 and earlier

19.4.28.10.5.2 License activation and update for *Detector Pack* 3.13 and earlier

To operate with the license keys of the **Movement in prohibited direction VI** and activate/update the license, do the following:

1. Download the archive.
2. Unzip the content.
3. Open a terminal.
4. Go to the directory with the archive contents:

```
cd /AxxonSoft/DetectorPack/VLSdk/distrib
```

   where instead of **/AxxonSoft/DetectorPack/VLSdk**, you must specify the actual path.
5. Grant permissions to run the script for driver installation:

```
chmod 777 install.sh
```

6. Run the driver installation script.

```
sudo ./install.sh
```

7. Open a browser and go to the page http://127.0.0.1:1947/checkin.html.
8. On the page that opens, in the **Select File:** line, select the key with the v2c extension.

> **Attention!**
>
> To get the key with the v2c extension, you need to contact the AxxonSoft manager.

9. Click the **Apply File** button. If activation is successful, the key is displayed on the page http://127.0.0.1:1947/devices.html.

The license activation/update is complete. After activation, in the /SafeNet Sentinel/Sentinel LDK directory, the **installed** folder appears.

19.4.28.10.5.3 Deleting the license for *Detector Pack* 3.13 and earlier

To delete the license, do the following:

1. Delete the license file with the v2c extension from the **installed** folder in the /SafeNet Sentinel/Sentinel LDK directory.
2. Restart the OS.

Note

- When you delete the license, only the key is deleted. All license restriction counters remain in the secure storage.
- If you return the key to the root directory, it will be fully restored. Its counters will continue counting license restrictions from the moment when they stopped when the license file with the v2c. extension was deleted. The validity time of the license continues to count down even when the key is missing.

The license deletion is complete.

19.4.28.10.6 Configuring the Movement in prohibited direction VI detector

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Movement in prohibited direction VI detector(see page 460)
Image requirements for the Movement in prohibited direction VI detector(see page 461)
Licensing of the software module for the Movement in prohibited direction VI detector in Windows OS(see page 461)
Licensing of the software module for the Movement in prohibited direction VI detector in Linux OS(see page 461)

To configure the **Movement in prohibited direction VI** detector, do the following:

1. Go to the **Detection Tools** tab.
2. Below the required camera, click **Create…** → **Category: Trackers** → **Movement in prohibited direction VI**.

By default, the detection tool is enabled and set to generate events when an object crosses the virtual line in any direction.

If necessary, you can change the detection tool parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detection tool is enabled. To disable, select the **No** value
	No	
Name	**Movement in prohibited direction VI**	Enter the detection tool name or leave the default name
Background accumulation	**Yes**	By default, scene background accumulation is enabled. To disable, select the **No** value
	No	

Parameter	Value	Description
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Detection mode	**CPU**	Select the processor for the detection tool operation (see Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
Duration	**40**	Specify the duration of the object's movement in the prohibited direction. This parameter can be useful when analyzing dense passenger flows, in which an object moving in the opposite direction appears in the camera's field of view only for short periods of time. The rest of the time, it is hidden from the camera's view by the crowd. The value must be in the range [1, 100]
Frame size change	**640**	Specify the size to which the video is compressed before analysis. The value must be in the range [480, 960]
Head size	**50**	Specify the size of a person's head in the frame. The value should be given as a percentage of the frame's vertical side and must be in the range [1, 100]
Intensity	**10**	Specify the value that can characterize the threshold visibility of the object's movement in the area. When this value is exceeded, the detector is triggered. The value must be in the range [1, 50]
Minimum number of objects	**0**	Specify the minimum number of objects required to trigger the detection tool. The value must be in the range [0, 20]
Number of execution threads	**4**	Specify the number of execution threads. The value must be in the range [0, 100]
Number of frames processed per second	**12**	Specify the number of frames processed per second. Value should be in range [0.016, 100] **Attention!** The detector operates optimally with the default value for most use cases. Changing this value may reduce the detector's performance quality.
Permissible angle of deviation from specified direction	**45**	Specify the angle in degrees indicating the permissible range of the object's direction of movement in the prohibited direction from the direction specified by the arrow. The so-called "detection cone". The value must be in the range [1, 180]

Parameter	Value	Description
Saving background	**Yes**	By default, saving the scene background is enabled. To disable, select the **No** value
	No	**Attention!** Background files are automatically saved to the directory C:\ProgramData\VideoIntellect\. The size of this folder can quickly increase, potentially filling up all available space on the C drive. It is not possible to set a limit on the maximum volume of this directory, so it's important to periodically check its contents and clear it if necessary.
State saving interval	**0**	Specify the state saving interval in seconds. The value must be in the range [0, 9999]
Type	**Movement in prohibited direction VI**	Name of the detection tool type (non-editable field)

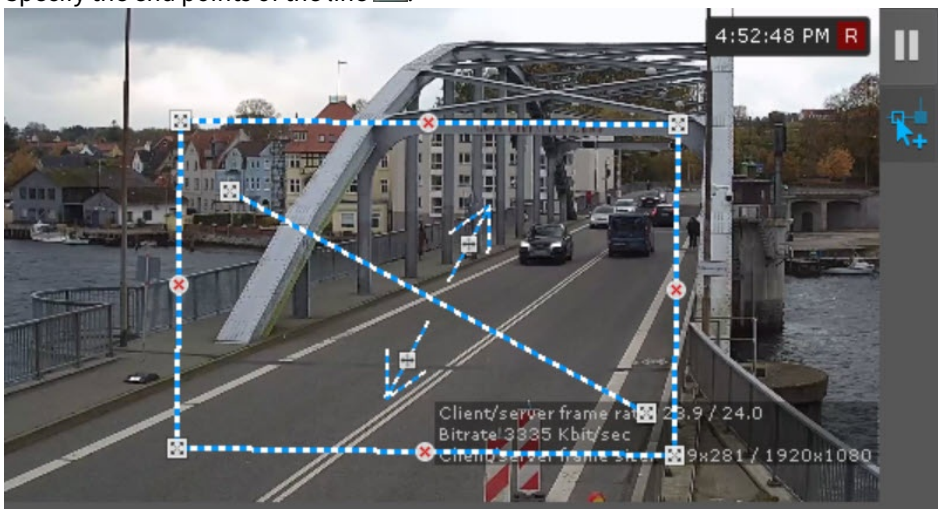
To save the parameters of the detection tool, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

The **Movement in prohibited direction VI** detector is configured.

19.4.28.10.6.1 Configuring detection area and virtual line

By default, the detector is configured to generate events when an object crosses a virtual line in any direction in a given area. To configure the virtual line and detection area, in the preview window do the following:

1. Set the area in which objects will be detected by moving the nodes. By default, the entire frame is the detection area.
2. Set the virtual line:
   a. Specify the end points of the line:

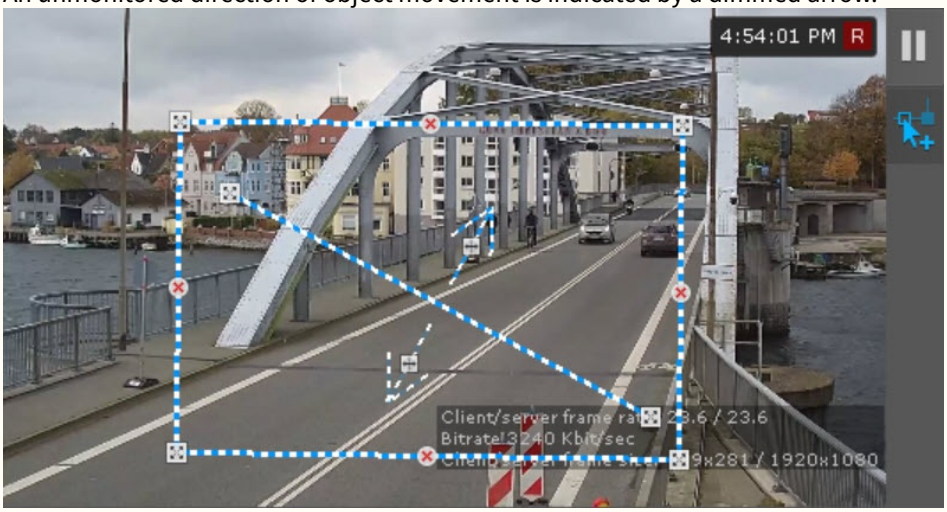


Action	Result
Hover the cursor over the end point and, holding down the left mouse button, move the mouse	Moving the end point of a line
Hover the cursor over the line and, holding down the left mouse button, move the mouse	Moving the line

   b. By default, both directions of object movement through the line are detected. To stop the detection in the required direction, click the button corresponding to this direction.

Attention!

- You must select at least one direction for detection.
- An unmonitored direction of object movement is indicated by a dimmed arrow.



Note

- The end points are connected by a two-color dashed line. The directions of object movement through the line are indicated by dotted arrows.
- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide the virtual line and detection area, click the  button. To cancel the action, click this button again.

3. Click **Apply** 

.

The detection area and virtual line configuration is complete.

19.4.28.11 Line crossing VI

19.4.28.11.1 Functions of the Line crossing VI detector

Description	The **Line crossing VI** detector is used to detect the object movement in the prohibited direction through a virtual line
Licensing	To operate the detection tool, you need to contact an AxxonSoft manager and get a license file (see Types of licenses[162], Licensing of the software module for the Line crossing VI detector in Windows OS(see page 467), Licensing of the software module for the Line crossing VI detector in Linux OS(see page 467))
Add-ons	For the detection tool to work, you must install the VI Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.28.11.2 Video stream and scene requirements for the Line crossing VI detector

Hardware requirements for neural analytics operation(see page 339)

162 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Image requirements for the Line crossing VI detector(see page 467)

Requirements for the operation of the **Line crossing VI** detector are given in the table:

Camera	• Pitch angle of the camera optical axis relative to the horizontal plane: from 15 to 90 degrees (for the inclined method of placement) • Resolution is from 640x360 to 1920×1080 pixels
Lighting	• Lighting in the scene is from 100 to 1000 lux
Scene and camera angle	• Shooting distance is from 5 to 30 meters

19.4.28.11.3 Image requirements for the Line crossing VI detector

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Line crossing VI detector(see page 466)

Requirements for the operation of the **Line crossing VI** detector are given in the table:

Object images	• Image isn't noisy and isn't distorted by artifacts of the compression algorithm • The speed of movement of objects in the image must not be less than 1 pixel per second • For the object to be detected, the duration of its visibility must be at least 6 frames

19.4.28.11.4 Licensing of the software module for the Line crossing VI detector in Windows OS

Starting with *Detector Pack* 3.13, to license the detector, you must insert a Guardant USB key with a license that you got from the AxxonSoft sales department. Once you insert the key, the licensing process is complete.

If the license isn’t installed in the USB key, do the following to activate the license:

1. Contact the AxxonSoft manager to obtain the serial number for the Guardant hardware protection key.
2. Download the archive containing the **Guardant License Wizard** utility.
3. Unzip the downloaded archive.
4. Open the unzipped folder and launch the **Guardant License Wizard** utility.
5. Go to **Settings** and in the **Server address** field, enter the licensing server address:

   ```
   https://gkey.videointellect.com:9000
   ```

6. Return to the main window of the utility and click **License activation**.
7. In the **On which computer do you want to use the license?** section, select **On this**.
8. In the **Serial number** field, enter the serial number provided by the AxxonSoft manager.
9. Click **Get license**.

The license activation for the **Line crossing VI** detector is complete.

19.4.28.11.5 Licensing of the software module for the Line crossing VI detector in Linux OS

On the page:

• License activation using the Guardant dongle(see page 468)

- License activation and update for Detector Pack 3.13 and earlier(see page 468)
- Deleting the license for Detector Pack 3.13 and earlier(see page 469)

19.4.28.11.5.1 License activation using the Guardant dongle

Starting with *Detector Pack 3.14*, to operate with the license keys of the **Line crossing VI** and activate the license, do the following:

1. Connect the Guardant USB dongle to the device on which you installed *Axxon One.*
2. Install the driver:
   a. Download the archive.
   b. Unzip the content.
   c. Go to the directory with the archive contents.
   d. Run the driver installation script.

```
sudo ./install.sh
```

If you successfully install the driver, the license keys are displayed on the page http://127.0.0.1:3189/#/dongles/list.

License activation is complete.

For *Detector Pack 3.13* and earlier, use the following manual to activate and update the license:

License activation and update for Detector Pack 3.13 and earlier

19.4.28.11.5.2 License activation and update for *Detector Pack* 3.13 and earlier

To operate with the license keys of the **Line crossing VI** and activate/update the license, do the following:

1. Download the archive.
2. Unzip the content.
3. Open a terminal.
4. Go to the directory with the archive contents:

```
cd /AxxonSoft/DetectorPack/VLSdk/distrib
```

   where instead of **/AxxonSoft/DetectorPack/VLSdk**, you must specify the actual path.
5. Grant permissions to run the script for driver installation:

```
chmod 777 install.sh
```

6. Run the driver installation script.

```
sudo ./install.sh
```

7. Open a browser and go to the page http://127.0.0.1:1947/checkin.html.
8. On the page that opens, in the **Select File:** line, select the key with the v2c extension.

> **Attention!**
>
> To get the key with the v2c extension, you need to contact the AxxonSoft manager.

9. Click the **Apply File** button. If activation is successful, the key is displayed on the page http://127.0.0.1:1947/devices.html.

The license activation/update is complete. After activation, in the /SafeNet Sentinel/Sentinel LDK directory, the **installed** folder appears.

19.4.28.11.5.3 Deleting the license for *Detector Pack* 3.13 and earlier

To delete the license, do the following:

1. Delete the license file with the v2c extension from the **installed** folder in the /SafeNet Sentinel/Sentinel LDK directory.
2. Restart the OS.

Note

- When you delete the license, only the key is deleted. All license restriction counters remain in the secure storage.
- If you return the key to the root directory, it will be fully restored. Its counters will continue counting license restrictions from the moment when they stopped when the license file with the v2c. extension was deleted. The validity time of the license continues to count down even when the key is missing.

The license deletion is complete.

19.4.28.11.6 Configuring the Line crossing VI detector

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Line crossing VI detector(see page 466)
Image requirements for the Line crossing VI detector(see page 467)
Licensing of the software module for the Line crossing VI detector in Windows OS(see page 467)
Licensing of the software module for the Motion in area detector VI in Linux OS(see page 456)

To configure the **Line crossing VI** detector, do the following:

1. Go to the **Detection Tools** tab.
2. Below the required camera, click **Create...** → **Category: Trackers** → **Line crossing VI**.

By default, the detection tool is enabled and set to generate events when an object crosses the virtual line in any direction.

If necessary, you can change the detection tool parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detection tool is enabled. To disable, select the **No** value
	No	

Parameter	Value	Description
Name	**Line crossing VI**	Enter the detection tool name or leave the default name
Background accumulation	**Yes**	By default, scene background accumulation is enabled. To disable, select the **No** value
	No	
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Detection mode	**CPU**	Select the processor for the detection tool operation (see Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
Detection sensitivity (%)	**10**	Specify the sensitivity level of the detector as a percentage for detecting moving objects in the analyzed direction. The higher the sensitivity value, the less noticeable the moving object can be detected. The value must be in the range [0, 100]
Frame size change	**640**	Specify the size to which the video is compressed before analysis. The value must be in the range [480, 960]
Minimum number of objects	**0**	Specify the minimum number of objects required to trigger the detection tool. The value must be in the range [0, 20]
Number of execution threads	**4**	Specify the number of execution threads. The value must be in the range [0, 100]
Number of frames processed per second	**12**	Specify the number of frames processed per second. Value should be in range [0.016, 100] **Attention!** The detector operates optimally with the default value for most use cases. Changing this value may reduce the detector's performance quality.
Saving background	**Yes**	By default, saving the scene background is enabled. To disable, select the **No** value **Attention!** Background files are automatically saved to the directory C:\ProgramData\VideoIntellect\. The size of this folder can quickly increase, potentially filling up all available space on the C drive. It is not possible to set a limit on the maximum volume of this directory, so it's important to periodically check its contents and clear it if necessary.
	No	

Parameter	Value	Description
State saving interval	**0**	Specify the state saving interval in seconds. The value must be in the range [0, 9999]
Type	**Line crossing VI**	Name of the detection tool type (non-editable field)

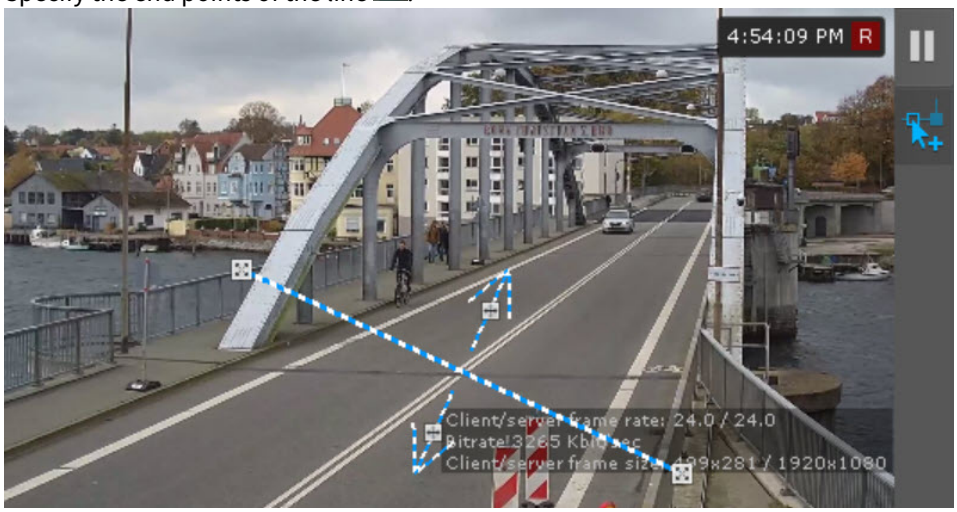
To save the parameters of the detection tool, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

The **Line crossing VI** detector is configured.

19.4.28.11.6.1 Configuring virtual line

By default, the detector is configured to generate events when an object crosses a virtual line in any direction. To configure a virtual line, do the following:

1. In the preview window:
   a. Specify the end points of the line :

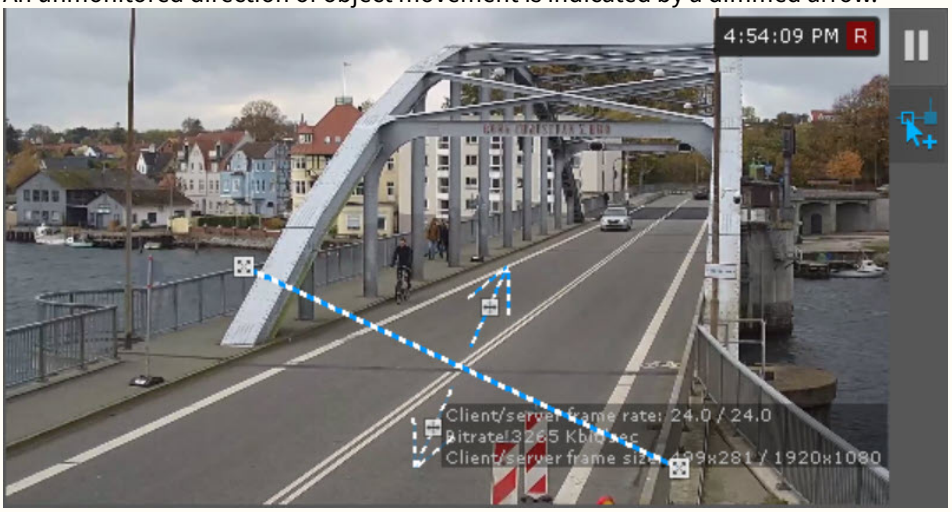


Action	Result
Hover the cursor over the end point and, holding down the left mouse button, move the mouse	Moving the end point of a line
Hover the cursor over the line and, holding down the left mouse button, move the mouse	Moving the line

   b. By default, both directions of object movement through the line are detected. To stop the detection in the required direction, click the button corresponding to this direction.

> **Attention!**
>
> - You must select at least one direction for detection.

- An unmonitored direction of object movement is indicated by a dimmed arrow.



2. If necessary, you can add additional virtual lines at any location in the preview window.

Note

- Additional virtual lines are created single-directional by default. To enable the second direction, click the button next to the corresponding direction line.
- The end points are connected by a two-color dashed line. The directions of object movement through the line are indicated by dotted arrows.
- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- To hide the virtual line, click the button. To cancel the action, click this button again.
- To delete a virtual line, click the button.

3. Click **Apply** Apply.

The virtual line configuration is complete.

19.4.29 Category: Face

19.4.29.1 Face detector VL

19.4.29.1.1 Functions of the Face detector VL

Description	The **Face detector VL** generates an event every time a face is captured in the frame. The *Axxon One* database stores all faces in binary form: 1. All captured faces are stored as biometric vectors (see Face search(see page 1233)) in the **t_face_vector** table, and their corresponding capture events are stored in the **t_json_event** table. **Attention!** The default storage depth of face vectors is 24 hours. To specify the storage depth of face vectors, you must add the NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS system variable (see Creating system variable(see page 126)). The values of the variable are specified in hours. For example, if you set NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS = 1, face vectors are deleted from RAM in one hour. If the value of the NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS variable isn't set, the storage depth of face vectors is 24 hours. 2. All reference faces from the lists (see Faces[163]) are stored in the **t_face_listed** table. **Attention!** When the number of faces in the database increases, the statistical error increases: the more faces in the database, the more often similar faces are recognized when searching in the archive. Accordingly, the degree of similarity when comparing the reference face with the captured face decreases. This error is relevant if: 1. The Video stream and scene requirements for the Face detector VL and its sub-detectors(see page 474) are met. 2. The database contains over a million faces. Example of the error calculation results: The mugshot dataset (good quality photo), 12 million faces in the database, and probability of false matching is 0.003%. With these initial data, the researchers obtained an identification error of 0.81%.
Licensing	To operate the detector, contact an AxxonSoft manager and get a license file (see Types of licenses[164])
Add-ons	For the **Face detector VL** to work, you must install VL Face Recognition Pack and VL SDK Pack (see Installing DetectorPack add-ons(see page 321)). **Attention!** You can install only one Face Recognition Pack: VA Face Recognition Pack, TV Face Recognition Pack, or VL Face Recognition Pack. You cannot install several packages in the same system.

19.4.29.1.2 Hardware requirements for the Face detector VL and its sub-detectors

Hardware requirements(see page 87)
Hardware requirements for neural analytics operation(see page 339)

The **Face detector VL** and its sub-detectors require a CPU supporting the AVX2.0 instruction set.

If the **Face detector VL** runs on GPU, the following hardware requirements must be met:

1. The detector can run only on NVIDIA devices with at least 6 GB of video memory or more. We recommend 8 GB of video memory or more.
2. NVIDIA driver version is 452.39 or higher.
3. Compute Capability 6.1 or higher.

163 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
164 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Note

You can check the GPU Compute Capability version on the manufacturer's[165] website.

19.4.29.1.3 Video stream and scene requirements for the Face detector VL and its sub-detectors

Hardware requirements for the Face detector VL and its sub-detectors(see page 473)
Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Face detector VL and its sub-detectors(see page 474)

Requirements for the operation of the **Face detector VL** and its sub-detectors are given in the table:

Camera	• FPS is at least 12. For face recognition at turnstiles, FPS is at least 6 **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Lighting	• Faces must be evenly illuminated with diffused light of at least 200 lux. Directional side lighting isn't allowed • Contrast of the captured faces must be over 64 grayscale • Insufficient or excessive lighting isn't allowed • There must be no backlighting and sharp gradients of light and shade
Scene and camera angle	• Maximum angle of frontal perspective of the photos of people's faces received from cameras must not exceed +/- 15° • Mutual faces overlapping must be minimal **Note** You can specify the required distance between the camera and the face using a lens with the required focal length.

19.4.29.1.4 Image requirements for the Face detector VL and its sub-detectors

Hardware requirements for the Face detector VL and its sub-detectors(see page 473)
Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Face detector VL and its sub-detectors(see page 474)

Requirements for the operation of the **Face detector VL** and its sub-detectors are given in the table:

Object images	• Photos of the captured faces received from cameras must be clear. Image blurring caused by motion isn't allowed • To create a face vector, the distance between the pupils on the photos of people's faces received from cameras must be at least 32 pixels • To create face tracks, the face width must be at least 16 pixels

19.4.29.1.5 Optimizing the operation of the Face detector VL on GPU in Windows OS

Configuring the Face detector VL(see page 478)

165 https://developer.nvidia.com/cuda-gpus

The VL Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)) includes a utility that allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization, optimizes video memory consumption, and ensures the start and correct operation of the **Face detector VL** on the GPU.

Attention!

You must recreate the cache when:
- updating the VL face recognition pack add-on (see Installing DetectorPack add-ons(see page 321)),
- changing the resolution of the video stream for which the cache is created,
- changing the Nvidia GPU model,
- updating Nvidia GPU drivers.

To optimize the operation of the **Face detector VL** on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

   Attention!

   If the system uses the software that is running on the GPU, you must stop its operation.

2. Create the **GPU_CACHE_DIR** system variable (see Creating system variable(see page 126)). In the **Variable value** field, specify the path to the cache location in Latin characters only. For example, D:\GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
3. Run the command line as administrator.
4. Starting with *Detector Pack* 3.14:
   a. Call the utility, specifying the required video stream resolutions in the **XxX** or **XxX XxX** format via the **-r** key. In this case you must not further specify the video stream resolution.
   Example:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\VlFaceGpuCacheGenerator.exe -r 3840x2160 2688x1520
   ```

   If you don't specify the resolution explicitly, the utility uses the default **1920x1080** resolution for creating the cache.

   Note

   To get help information, you can enter the query in the command line:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\VlFaceGpuCacheGenerator.exe --help
   ```

   b. Press **Enter**.
   c. Specify the ID of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
   d. Press **Enter**. As a result, the process of creating the cache starts. If you get the "0" value, it means that the cache is created successfully.
5. For *Detector Pack* 3.13 and older:
   a. In the command line, enter the **C:\Program Files\Common Files\AxxonSoft\DetectorPack\VlFaceGpuCacheGenerator.exe** query to call the utility.
   b. Press **Enter**.
   c. Specify the ID of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
   d. Press **Enter**.
   e. If you want to change the resolution of the video stream:
      i. Enter **y**. If you don't want to change the resolution of the video stream, enter **n**.
      ii. Specify the required resolution. For example, **3840x2160 2688x1520**. The GPU uses the default **1920x1080** video stream resolution. If you change the resolution of the video stream from **1920x1080** and higher, it increases the percentage of face detection.

6. Press **Enter**. As a result, the process of creating the cache starts. If you get the **0** value, it means that the cache is created successfully.

Optimizing the operation of the **Face detector VI** on the GPU is complete.

19.4.29.1.6 Optimizing the operation of the Face detector VL on GPU in Linux OS

Configuring the Face detector VL(see page 478)
Creating system variables for the Axxon One server in Linux OS[166]
Creating system variables for the Axxon One server in the failover mode in Linux OS[167]

The VL Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)) includes a utility that allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization, optimizes video memory consumption, and ensures the start and correct operation of the **Face detector VL** on the GPU.

Attention!

You must recreate the cache when:
- updating the VL face recognition pack add-on (see Installing DetectorPack add-ons(see page 321)),
- changing the resolution of the video stream for which the cache is created,
- changing the Nvidia GPU model,
- updating Nvidia GPU drivers.

To optimize the operation of the **Face detector VL** on GPU, do the following:

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[168]).

   Attention!

   If the system uses the software that is running on the GPU, you must stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

   ```
   sudo su ngp
   ```

   b. Enter the password for the superuser.
3. Create a folder with a custom name to store the cache. For example:

   ```
   mkdir /opt/AxxonSoft/AxxonOne/gpucache
   ```

4. Change folder permissions:

   ```
   chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
   ```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

   ```
   cd /opt/AxxonSoft/AxxonOne
   ```

6. Open the server configuration file for editing:

166 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
167 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS
168 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

```
nano instance.conf
```

Attention!

When you use the server in the failover mode, you must:

a. Open the **/etc/AxxonSoft** folder:

```
cd /etc/AxxonSoft
```

b. Open the server configuration file for editing:

```
nano axxon-one.conf
```

Note

Before you make changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[169].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

d. Save the changes in the file.

e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file.

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit the file editing mode using the **Ctrl+X** keyboard shortcut.

Attention!

When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[170]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[171]).

169 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS

170 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS

171 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

10. In the terminal, run the command that was used to add the system variable with the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./VlFaceGpuCacheGenerator
```

13. Press **Enter**.
14. Specify the ID of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
15. Press **Enter**.
16. If you want to change the resolution of the video stream:
    a. Enter **y**. If you don't want to change the resolution of the video stream, enter **n**
    b. Specify the required resolution. For example, **3840x2160 2688x1520**. The GPU uses the default **1920x1080** video stream resolution. If you change the resolution of the video stream from **1920x1080** and higher, it increases the percentage of face detection
17. Press **Enter**. As a result, the process of creating the cache starts. If you get the **0** value, it means that the cache is created successfully.

Optimizing the operation of the **Face detector VL** on the GPU is complete.

19.4.29.1.7 Configuring the Face detector VL

Hardware requirements for the Face detector VL and its sub-detectors(see page 473)
Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Face detector VL and its sub-detectors(see page 474)
Image requirements for the Face detector VL and its sub-detectors(see page 474)
Checking in lists of faces(see page 499)
Examples of macros used when working with lists of faces(see page 906)

To configure the **Face detector VL**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Face** → **Face detector VL**.

By default, the detector is enabled and set to detect faces.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The parameter is disabled by default. If you want to use this detector to check in lists of faces, select the **Yes** value (see Checking in lists of faces(see page 499))
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	

Parameter	Value	Description
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. For the correct operation of the **Face detector VL**, we recommend using a high-quality video stream
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Face detector VL**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processor for decoding video. When you select: • **Auto**: GPU takes priority (decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding uses the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding; • **CPU**: CPU is used for decoding; • **GPU**: GPU is used for decoding (decoding with Nvidia NVDEC chips); • **HuaweiNPU**: HuaweiNPU is used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**Face detector VL**	Name of the detector type (non-editable field)
Use camera transform	**Yes**	The parameter is disabled by default. If you use a XingYun bispherical lens (see Configuring fisheye cameras(see page 183)), by default the detector receives the image of two spheres of 180° each to analyze. In this case, the recognition quality can deteriorate. To send the dewarped image to the detector, select the **Yes** value. This parameter is also valid for other transformations
	No	
Advanced settings **Attention!** You must perform the advanced configuration of the detector only with the assistance of AxxonSoft technical experts.		
Analyze face rotation angle	**Yes**	The parameter is disabled by default. If you want to detect the face rotation angle, select the **Yes** value. This parameter allows you to filter out results that have a rotation and tilt angle greater than the specified values in a search for a specific face (see Search for similar face(see page 1234))
	No	**Note** The **Analyze face rotation angle** parameter affects the filtering of face detection events in the Event Board (see Configuring an Event Board(see page 962), Working with Event Boards(see page 1266)). When you use the following filters: • **Triggered detection**—all detected faces are displayed regardless of the face angle settings, even if the **Analyze face rotation angle** parameter is enabled. • **Triggered specified detection**—only faces that are within allowable rotation angles specified in the settings of the detector are displayed.

Parameter	Value	Description
Face detection algorithm	**Algorithm 1** **Algorithm 2** **Algorithm 3**	Select the face recognition algorithm: • **Algorithm 1**—the recognition speed depends on the background and the number of faces in the frame. Works slower than **Algorithm 3**. • **Algorithm 2**—high speed, low accuracy. The recognition speed depends on the number of faces in the frame. • **Algorithm 3**—medium speed, high accuracy. The recognition speed depends on the resolution of the image. Optimal for most scenes
Face rotation pitch (°)	**45**	Specify the allowable angle of face pitch in degrees. You must select the required value empirically. The value must be in the range [0, 90]
Face rotation roll (°)	**45**	Specify the allowable angle of face roll in degrees. You must select the required value empirically. The value must be in the range [0, 90]
Face rotation yaw from (°)	**-45**	Specify the minimum allowable angle of face rotation to the right or left. You must select the required value empirically. The value must be in the range [-90, 90]
Face rotation yaw to (°)	**45**	Specify the maximum allowable angle of face rotation to the right or left. You must select the required value empirically. The value must be in the range [-90, 90]
Frame size change	**640**	The analyzed frames are scaled down to a specified resolution (640 pixels on the longer side) by default. The value must be in the range [640, 10 000]. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops and this resolution is used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution **Note** For example, the source image resolution is 2048*1536, and the specified value is set to 1000. In this case, the source resolution is halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
Minimum image quality	**30**	Specify the minimum image quality for face detection. You must select the required value empirically. The value must be in the range [1, 100]
Minimum number of detections	**1**	Specify the minimum number of detections after which a track is considered a detected face. You must select the required value empirically. The value must be in the range [1, 10 000]
Number of frames between detections	**3**	Specify the number of frames between detections. The lower the value, the higher the probability that TrackEngine detects a new face as soon as it appears in the selected area. The value must be in the range [1, 10 000] **Note** TrackEngine doesn't perform face recognition. It tracks the position of one person's face in a sequence of frames, choosing the best frame and preparing the necessary data for external systems. TrackEngine is based on face detection and analysis methods provided by the FaceEngine library.

Parameter	Value	Description
Number of frames without detections	**18**	Specify the number of frames without detections. If face detection isn't performed in the selected area, TrackEngine continues processing the specified number of frames before it considers the track lost. You must select the required value empirically. The value must be in the range [1, 10 000]
Send face images	**Yes**	The parameter is disabled by default. If you want to send face images to *Axxon PSIM*, select the **Yes** value
	No	
Track lifespan (*starting with Detector Pack 3.14*)	**Yes**	By default, the parameter is disabled. If it is necessary to display track lifespan for an object in seconds, select the **Yes** value
	No	
Track retention time (sec)	**2**	Specify the minimum track's lifetime in seconds. After the specified time, the face detection result appears. If a track ends earlier, the result also appears. The value must be in the range [1, 60]
Basic settings		
Biometric data	**Yes**	The parameter is enabled by default. When you search for faces (see Face search(see page 1233)), the search results display found faces that are similar to an attached photo or track, taking into account the specified minimum level of similarity (in percent). For the correct check in lists of faces, you must also enable this parameter. If you want to keep the biometric data private, select the **No** value. In this case, when you search for faces (see Face search(see page 1233)) using an attached photo or track as well as check in lists of faces, the search doesn't return any result
	No	
Detection mode	**CPU**	Select a processor for the detector operation—CPU or Nvidia GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)) **Attention!** It can take several minutes to launch the algorithm on an Nvidia GPU after you apply the settings.
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
	Huawei NPU	
Face attributes recognition βeta	**Yes**	The parameter is disabled by default. If you want to save the gender and age information for each captured face to the database, select the **Yes** value **Note** The average error in age recognition is 5 years.
	No	
Medical mask detection	**Yes**	The parameter is disabled by default. If you use mask detector, select the **Yes** value (see Mask detector VL(see page 483))
	No	

Parameter	Value	Description
Minimum face size	**20**	Specify the minimum size of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Minimum threshold of face authenticity	**60**	Specify the minimum level of face recognition accuracy for the creation of a track. You must select the required value empirically. We recommend specifying the value of not less than 90. The higher the value, the fewer faces are detected, while the recognition accuracy increases. The value must be in the range [1, 100]

Attention!

You can enable the advanced logging for SDK using the VL_SDK_VERBOSE_LOGGING=1 system variable (see Creating system variable(see page 126)).

In the preview window, set the rectangular area of the frame in which you want to detect faces. You can specify the area by moving the anchor points .



Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuration of the **Face detector VL** is complete. If necessary, you can create and configure sub-detectors on the basis of the **Face detector VL** based on metadata (see Metadata database(see page 333)):

1. Line crossing(see page 362)—detector generates an event when a person moves across a line in the specified area of the frame and their face is detected.
2. Entrance in area(see page 377)—detector generates an event when a person appears in the specified area of the frame and their face is detected.
3. Loitering in area(see page 367)—detector generates an event when a person stays in the specified area of the frame for a long time and their face is detected.
4. Mask detector VL(see page 483)—detector generates an event when it captures a face with or without a mask.

19.4.29.1.8 Mask detector VL

To configure the **Mask detector VL**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera in the settings of the **Face detector VL** (see Configuring the Face detector VL(see page 478)), enable the **Medical mask detection** parameter.
3. Below the **Face detector VL**, click **Create…** → **Mask detector VL**.

By default, the detector is enabled and set to detect faces without masks.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Mask detector VL**	Enter the detector name or leave the default name
Type	**Mask detector VL**	Name of the detector type (non-editable field)
Basic settings		

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Full face masking</td><td>Presence</td><td rowspan="9">Depending on a particular task, specify the parameters values according to the table:
<table>
<tr><th rowspan="2">Event that detector generates</th><th colspan="3">Value</th></tr>
<tr><th>Full face masking</th><th>Lower face part masking</th><th>No mask</th></tr>
<tr><td>No mask of any kind</td><td>Absence</td><td>Absence</td><td>Presence</td></tr>
<tr><td>No medical mask</td><td>Presence</td><td>Absence</td><td>Presence</td></tr>
<tr><td>No balaclava</td><td>Absence</td><td>Presence</td><td>Presence</td></tr>
<tr><td>Any mask present</td><td>Presence</td><td>Presence</td><td>Absence</td></tr>
<tr><td>Medical mask present</td><td>Absence</td><td>Presence</td><td>Absence</td></tr>
<tr><td>Balaclava present</td><td>Presence</td><td>Absence</td><td>Absence</td></tr>
</table></td></tr>
<tr><td></td><td>Not selected</td></tr>
<tr><td></td><td>Absence</td></tr>
<tr><td>Lower face part masking</td><td>Presence</td></tr>
<tr><td></td><td>Not selected</td></tr>
<tr><td></td><td>Absence</td></tr>
<tr><td>No mask</td><td>Presence</td></tr>
<tr><td></td><td>Not selected</td></tr>
<tr><td></td><td>Absence</td></tr>
<tr><td>Number of consecutive mask detections</td><td>2</td><td>Specify the minimum number of frames in which the detector must detect a mask in order to generate an event. The value must be in the range [0, 100]</td></tr>
<tr><td>Other types of masks</td><td>Presence</td><td rowspan="3">Note
The Other types of masks parameter isn't supported in this software version.</td></tr>
<tr><td></td><td>Not selected</td></tr>
<tr><td></td><td>Absence</td></tr>
</table>

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuration of the **Mask detector VL** is complete.

19.4.29.2 Face detector VA

19.4.29.2.1 Functions of the Face detector VA

Description	The **Face detector VA** generates an event every time a face is captured in the frame. The *Axxon One* database stores all faces in binary form: 1. All captured faces are stored as biometric vectors (see Face search(see page 1233)) in the **t_face_vector** table, and their corresponding capture events are stored in the **t_json_event** table. **Attention!** The default storage depth of face vectors is 24 hours. To specify the storage depth of face vectors, you must add the NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS system variable (see Creating system variable(see page 126)). The values of the variable are specified in hours. For example, if you set NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS = 1, face vectors are deleted from RAM in one hour. If the value of the NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS variable isn't set, the storage depth of face vectors is 24 hours. 2. All reference faces from the lists (see Faces[172]) are stored in the **t_face_listed** table. **Attention!** When the number of faces in the database increases, the statistical error increases: the more faces in the database, the more often similar faces are recognized when searching in the archive. Accordingly, the degree of similarity when comparing the reference face with the captured face decreases. This error is relevant if: 1. The Video stream and scene requirements for the Face detector VA and its sub-detectors(see page 486) are met. 2. The database contains over a million faces. Example of error calculation results: The mugshot dataset (good quality photo), 12 million faces in the database, and probability of false matching is 0.003%. With these initial data, the researchers obtained an identification error of 0.76%.
Licensing	To operate the detector, contact an AxxonSoft manager and get a license file (see Types of licenses[173])
Add-ons	For the **Face detector VA** to work, you must install VA Face Recognition Pack (see Installing DetectorPack add-ons(see page 321)). **Attention!** • You can install only one Face Recognition Pack: VA Face Recognition Pack, VL Face Recognition Pack or TV Face Recognition Pack. You cannot install several packages in the same system. • VA Face Recognition Pack is guaranteed to work on Linux Debian 11 and Ubuntu 20. VA Face Recognition Packs isn't guaranteed to work on Linux Debian 9/10, Ubuntu 18 and Ubuntu 19 (see Operating system requirements(see page 86)).

19.4.29.2.2 Manual for switching from the Face detector TV to Face detector VA

Attention!

- Starting with *DetectorPack* 3.11.1, the **Face detector TV** is no longer supported. We replaced it with the **Face detector VA**. You cannot use the **Face detector TV** and the **Face detector VA** at the same time (see DetectorPack 3.11.1 Release Notes[174]).
- After you switch from the **Face detector TV** to the **Face detector VA**, the results of the previously recognized persons will no longer be available. If you need to save the previously recognized persons, don't update the analytics package.

172 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
173 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses
174 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/280166405/DetectorPack+3.11.1+Release+Notes

- You cannot use the previously created cache for optimizing the operation of the **Face detector TV** on GPU. To optimize the operation of the **Face detector VA** on GPU, you must create a new cache (see Optimizing the operation of the Face detector VA on GPU in Windows OS(see page 487)).

To switch from the **Face detector TV** to the **Face detector VA**, do the following:

1. Contact an AxxonSoft manager to get a new license file with the **Face detection VA** support.
2. Remove previously created **Face detector TV** from *Axxon One* (see Configuring detectors and their sub-detectors(see page 328)).
3. Go to **Control Panel** → **Apps** → **Apps & Features** and uninstall *DetectorPack Addon Face Recognition Pack*.
4. Install DetectorPack: Add-ons VA Face Recognition Pack v.3.11.1[175] (see Installing DetectorPack add-ons(see page 321)).
5. Create cache for the **Face detector VA** (see Optimizing the operation of the Face detector VA on GPU in Windows OS(see page 487)).
6. Create and configure the required number of the **Face detectors VA** in *Axxon One* (see Configuring the Face detector VA(see page 491)).

Switching from the **Face detector TV** to the **Face detector VA** is complete.

19.4.29.2.3 Hardware requirements for the Face detector VA and its sub-detectors

Hardware requirements(see page 87)
Hardware requirements for neural analytics operation(see page 339)

The **Face detector VA** and its sub-detectors require a CPU supporting the SSE4.2, FMA3, or AVX2.0 instruction set.

If the **Face detector VA** runs on GPU, the following hardware requirements must be met:

1. The detector can run only on Nvidia devices with at least 6 GB of video memory or more.
2. Nvidia driver version is 418.39 or higher.
3. Compute Capability 6.0 or higher.

Note

You can check the GPU Compute Capability version on the manufacturer's[176] website.

19.4.29.2.4 Video stream and scene requirements for the Face detector VA and its sub-detectors

Hardware requirements for the Face detector VA and its sub-detectors(see page 486)
Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Face detector VA and its sub-detectors(see page 487)

Requirements for the operation of the **Face detector VA** and its sub-detectors are given in the table:

Camera	• FPS is at least 12. For face recognition at turnstiles, FPS is at least 6 • Camera must have lenses that don't produce significant distortion of the face, especially in the centre of the frame **Attention!** • Correct operation of the detector has a strong dependence on the optical distortion of the lens. The less distortion in the frame, the higher the accuracy of the algorithms. • Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.

175 https://dl.axxonsoft.com/software/Axxon-One/Axxon-One-DetectorPack/3.11.1/rls/win/DetectorPack-Addon-VA-Face-Recognition-3.11.1.124-x64.zip
176 https://developer.nvidia.com/cuda-gpus

Lighting	• Faces must be evenly illuminated with diffused light of at least 200 lux. Directional side lighting isn't allowed • Contrast of the captured faces must be over 64 grayscale • Insufficient or excessive lighting isn't allowed • There must be no backlighting and sharp gradients of light and shade
Scene and camera angle	• Maximum angle of frontal perspective of the photos of people's faces received from cameras must not exceed +/- 15° • Mutual faces overlapping must be minimal • We recommend using the centre of the frame for analysis, as this is the area where distortion of the face image is minimized **Note** You can specify the required distance between the camera and the face using a lens with the required focal length.

19.4.29.2.5 Image requirements for the Face detector VA and its sub-detectors

Hardware requirements for the Face detector VA and its sub-detectors(see page 486)
Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Face detector VA and its sub-detectors(see page 486)

Requirements for the operation of the **Face detector VA** and its sub-detectors are given in the table:

Object images	• Photos of the captured faces received from cameras must be clear. Image blurring caused by motion isn't allowed • To create a face vector, the distance between the pupils on the photos of people's faces received from cameras must be at least 32 pixels • To create face tracks, the face width must be at least 16 pixels

19.4.29.2.6 Optimizing the operation of the Face detector VA on GPU in Windows OS

Configuring the Face detector VA(see page 491)

The VA Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)) includes a utility that allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization, optimizes video memory consumption, and ensures the start and correct operation of the **Face detector VA** on the GPU.

Attention!

You must recreate the cache when:
- updating the VA face recognition pack add-on (see Installing DetectorPack add-ons(see page 321)),
- changing the resolution of the video stream for which the cache is created,
- changing the Nvidia GPU model,
- updating Nvidia GPU drivers.

To optimize the operation of the **Face detector VA** on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

   Attention!

   If the system uses the software that is running on the GPU, you must stop its operation.

2. Create the **GPU_CACHE_DIR** system variable (see Creating system variable(see page 126)). In the **Variable value** field, specify the path to the cache location in Latin characters only. For example, D:\GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
3. Run the command line as administrator.
4. Starting with *Detector Pack* 3.14:
   a. Call the utility, specifying the required video stream resolutions in the **XxX** or **XxX XxX** format via the **-r** key. In this case you must not further specify the video stream resolution.
   Example:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\VaFaceGpuCacheGenerator.exe -r 3840x2160 2688x1520
   ```

   If you don't specify the resolution explicitly, the utility uses the default **1920x1080** resolution for creating the cache.

   Note

   To get help information, you can enter the query in the command line:

   ```
   C:\Program Files\Common Files\AxxonSoft\DetectorPack\VaFaceGpuCacheGenerator.exe --help
   ```

   b. Press **Enter**.
   c. Specify the ID of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
   d. Press **Enter**. As a result, the process of creating the cache starts. If you get the "0" value, it means that the cache is created successfully.
5. For *Detector Pack* 3.13 and older:
   a. In the command line, enter the **C:\Program Files\Common Files\AxxonSoft\DetectorPack\VaFaceGpuCacheGenerator.exe** query to call the utility.
   b. Press **Enter**.
   c. Specify the ID of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
   d. Press **Enter**.
   e. If you want to change the resolution of the video stream:
      i. Enter **y**. If you don't want to change the resolution of the video stream, enter **n**.
      ii. Specify the required resolution. For example, **3840x2160 2688x1520**. The GPU uses the default **1920x1080** video stream resolution. If you change the resolution of the video stream from **1920x1080** and higher, it increases the percentage of face detection.
6. Press **Enter**. As a result, the process of creating the cache starts. If you get the **0** value, it means that the cache is created successfully.

Optimizing the operation of the **Face detector VA** on the GPU is complete.

19.4.29.2.7 Optimizing the operation of the Face detector VA on GPU in Linux OS

Configuring the Face detector VA(see page 491)
Creating system variables for the Axxon One server in Linux OS[177]
Creating system variables for the Axxon One server in the failover mode in Linux OS[178]

The VA Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)) includes a utility that allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization, optimizes video memory consumption, and ensures the start and correct operation of the **Face detector VA** on the GPU.

177 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
178 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS

Attention!

You must recreate the cache when:
- updating the VA face recognition pack add-on (see Installing DetectorPack add-ons(see page 321)),
- changing the resolution of the video stream for which the cache is created,
- changing the Nvidia GPU model,
- updating Nvidia GPU drivers.

To optimize the operation of the **Face detector VA** on GPU, do the following:

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[179]).

   Attention!

   If the system uses the software that is running on the GPU, you must stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

   ```
   sudo su ngp
   ```

   b. Enter the password for the superuser.
3. Create a folder with a custom name to store the cache. For example:

   ```
   mkdir /opt/AxxonSoft/AxxonOne/gpucache
   ```

4. Change folder permissions:

   ```
   chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
   ```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

   ```
   cd /opt/AxxonSoft/AxxonOne
   ```

6. Open the server configuration file for editing:

   ```
   nano instance.conf
   ```

   Attention!

   When you use the server in the failover mode, you must:
   a. Open the **/etc/AxxonSoft** folder:

   ```
   cd /etc/AxxonSoft
   ```

   b. Open the server configuration file for editing:

   ```
   nano axxon-one.conf
   ```

179 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

> **Note**
>
> Before you make changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[180].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

d. Save the changes in the file.

e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file.

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit the file editing mode using the **Ctrl+X** keyboard shortcut.

> **Attention!**
>
> When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[181]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[182]).

10. In the terminal, run the command that was used to add the system variable with the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./VaFaceGpuCacheGenerator
```

13. Press **Enter**.

180 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS
181 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS
182 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

14. Specify the ID of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
15. Press **Enter**.
16. If you want to change the resolution of the video stream:
    a. Enter **y**. If you don't want to change the resolution of the video stream, enter **n**
    b. Specify the required resolution. For example, **3840x2160 2688x1520**. The GPU uses the default **1920x1080** video stream resolution. If you change the resolution of the video stream from **1920x1080** and higher, it increases the percentage of face detection
17. Press **Enter**. As a result, the process of creating the cache starts. If you get the **0** value, it means that the cache is created successfully.

Optimizing the operation of the **Face detector VA** on the GPU is complete.

19.4.29.2.8 Configuring the Face detector VA

Hardware requirements for the Face detector VA and its sub-detectors(see page 486)
Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Face detector VA and its sub-detectors(see page 486)
Image requirements for the Face detector VA and its sub-detectors(see page 487)
Optimizing the operation of the Face detector VA on GPU in Windows OS(see page 487)
Checking in lists of faces(see page 499)
Examples of macros used when working with lists of faces(see page 906)

Attention!

To start and correctly operate the **Face detector VA** on GPU, you must create cache beforehand (see Optimizing the operation of the Face detector VA on GPU in Windows OS(see page 487)).

To configure the **Face detector VA**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create… → Category: Face → Face detector VA**.

By default, the detector is enabled and set to detect faces.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The parameter is disabled by default. If you want to use this detector to check in lists of faces, select the **Yes** value (see Checking in lists of faces(see page 499))
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. For the correct operation of the **Face detector TV**, we recommend using a high-quality video stream
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value

Parameter	Value	Description
	No	
Name	**Face detector TV**	Enter the detector name or leave the default name
Decoder mode	**Auto** **CPU** **GPU** **HuaweiNPU**	Select a processor for decoding video. When you select: • **Auto**: GPU takes priority (decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding uses the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding; • **CPU**: CPU is used for decoding; • **GPU**: GPU is used for decoding (decoding with Nvidia NVDEC chips); • **HuaweiNPU**: HuaweiNPU is used for decoding
Type	**Face detector TV**	Name of the detector type (non-editable field)
Use camera transform	**Yes** **No**	The parameter is disabled by default. If you use a XingYun bispherical lens (see Configuring fisheye cameras(see page 183)), by default the detector receives the image of two spheres of 180° each to analyze. In this case, the recognition quality can deteriorate. To send the dewarped image to the detector, select the **Yes** value. This parameter is also valid for other transformations
Advanced settings		
		Attention! You must perform the advanced configuration of the detector only with the assistance of AxxonSoft technical experts.
Analyze face rotation angle	**Yes** **No**	The parameter is disabled by default. If you want to detect the face rotation angle, select the **Yes** value. This parameter allows you to filter out results that have a rotation and tilt angle greater than the specified values in a search for a specific face (see Search for similar face(see page 1234)) **Note** The **Analyze face rotation angle** parameter affects the filtering of face detection events in the Event Board (see Configuring an Event Board(see page 962), Working with Event Boards(see page 1266)). When you use the following filters: • **Triggered detection**—all detected faces are displayed regardless of the face angle settings, even if the **Analyze face rotation angle** parameter is enabled. • **Triggered specified detection**—only faces that are within allowable rotation angles specified in the settings of the detector are displayed.
Face detection algorithm	**ALG1 (high speed, low accuracy)** **ALG2 (medium speed, medium accuracy)** **ALG3 (low speed, high accuracy)**	Select the face detection algorithm: • **ALG1 (high speed, low accuracy)** is the fastest, reduced accuracy. Recognition speed depends on the number of faces in the frame. Optimal for many scenes. • **ALG2 (medium speed, medium accuracy)**—recognition speed depends on the background and the number of faces in the frame. • **ALG3 (low speed, high accuracy)** is the most accurate, reduced speed. Recognition speed depends on the image resolution

Parameter	Value	Description
Face detection period (msec)	**250**	Specify the time in milliseconds between face search operations in a video frame. The larger the value, the less load on the server, but some faces may not be recognized. The value must be in the range [1, 10 000]
Face occlusion threshold (*starting with Detector Pack 3.14*)	**0**	Specify the face occlusion threshold at which a face that is partially or fully overlapped by objects (for example, glasses, masks, hair, and so on) is ignored. By default, the parameter is disabled (the value is **0**). At any value greater than **0**, the parameter is considered enabled. Select the appropriate value empirically. The value must be in the range [0, 100]
Face rotation pitch (°)	**45**	Specify the allowable angle of face pitch in degrees. You must select the required value empirically. The value must be in the range [0, 90]
Face rotation roll (°)	**45**	Specify the allowable angle of face roll in degrees. You must select the required value empirically. The value must be in the range [0, 90]
Face rotation yaw from (°)	**-45**	Specify the minimum allowable angle of face rotation to the right or left. You must select the required value empirically. The value must be in the range [-90, 90]
Face rotation yaw to (°)	**45**	Specify the maximum allowable angle of face rotation to the right or left. You must select the required value empirically. The value must be in the range [-90, 90]
False mask detections filtering	**Yes**	The parameter is enabled by default. The additional algorithm considers that the track is a face of a person with a mask. If the algorithm considers that the track is a face with a mask with a lower probability, this track is disregarded (see the **Minimum filtering threshold for face mask detection** parameter). If you don't need to use the parameter, select the **No** value
	No	
Filter false alarms	**Yes**	In some cases, the detector can mistake other objects for a face. The **Filter false alarms** parameter is enabled by default. If the parameter is enabled, false results of the face recognition appear in the detection feed (see Face recognition and search(see page 1260)), but they are ignored when searching for faces in the archive. This parameter filters out objects that aren't faces at the stage of face vector construction and its recording to the metadata database. If you don't need to use this parameter, select the **No** value
	No	
Frame size change	**1920**	By default, during the analysis, the frame is compressed to the specified resolution (1920 pixels on the longer side, by default). The value must be in the range [640, 10 000]. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops, and this resolution is used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution is halved two times (512*384), since after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
Ignore repeated recognitions	**Yes**	The parameter is disabled by default. If you want to ignore repeated recognitions of the same face, select the **Yes** value
	No	

Parameter	Value	Description
Liveness threshold	**30**	Specify the minimum threshold value in percent at which a face is defined as liveless. The higher the value, the more captured faces are detected as a photo. At the same time, the quality of recognizing (photo/real face) is higher. You must select the required value empirically. The value must be in the range [1, 100]
Minimum face masking threshold	**70**	Specify the minimum threshold for recognizing a mask on the face. You must select the required value empirically. We recommend specifying the value of not less than 70. The value must be in the range [1, 100]
Minimum face quality for face mask detection	**30**	Specify the minimum quality of the face image when recognizing masks (see Mask detector VA(see page 497)). You must select the required value empirically. We recommend specifying the value of not less than 30. The value must be in the range [1, 100]
Minimum face recognition quality	**50**	Specify the minimum quality of the face image when recognizing faces without masks. You must select the required value empirically. We recommend specifying the value of not less than 50. The value must be in the range [1, 100]
Minimum filtering threshold	**50**	If you use the **Filter false alarms** parameter, specify the minimum percentage at which the additional algorithm considers the track to be a person's face. If the algorithm considers the track to be a face with a lower probability, this track is disregarded. You must select the required value empirically. We recommend specifying the value of not less than 50. The value must be in the range [1, 100]
Minimum filtering threshold for face mask detection	**30**	If you use the **False mask detections filtering** parameter, specify the minimum percentage at which the additional algorithm considers the track to be a person's face with a mask. If the algorithm considers the track to be a face with a mask with a lower probability, this track will be disregarded. You must select the required value empirically. We recommend specifying the value of not less than 30. The value must be in the range [1, 100]
Open eyes threshold (*starting with Detector Pack 3.14*)	**0**	Specify the open eyes threshold at which a face is recognized. By default, the parameter is disabled (the value is **0**). At any value greater than **0**, the parameter is considered enabled. Select the appropriate value empirically. The value must be in the range [0, 100]
Period of ignoring repeated recognitions	**2**	To adjust this parameter, you must enable the **Ignore repeated recognitions** parameter. Specify the period in minutes during which new recognized faces are compared with the previous ones to detect similarities. The value must be in the range [2, 30]
Process color frames	**Yes**	A black and white frame is processed by default. If you want the detector to use a color frame for processing, select the **Yes** value
	No	
Repeated recognitions similarity threshold	**85**	To adjust this parameter, you must enable the **Ignore repeated recognitions** parameter. Specify the similarity threshold of the face to the previously recognized faces in percent. If the similarity threshold is lower than the specified value, the face is recognized as a new one. The value must be in the range [1, 100]
Send face images	**Yes**	The parameter is disabled by default. If you want to send face images to *Axxon PSIM*, select the **Yes** value
	No	
Track lifespan (*starting with Detector Pack 3.14*)	**Yes**	By default, the parameter is disabled. If it is necessary to display track lifespan for an object in seconds, select the **Yes** value
	No	

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Track loss time (msec)</td><td>500</td><td>Specify the time in milliseconds after which the track of the captured face is considered to be lost. This parameter applies when a captured face moves in the frame and hides behind an obstacle for some time. If this time is less than the specified value, the face is recognized as the same thing. The value must be in the range [1, 10 000]</td></tr>
<tr><td colspan="3">Basic settings</td></tr>
<tr><td>Age and gender</td><td>Yes

No</td><td>The parameter is disabled by default. If you need to save age and gender information for each captured face in the database, select the Yes value

Note
The average error in age recognition is 5 years.</td></tr>
<tr><td>Algorithm of liveness detection</td><td>Not selected

Algorithm 1 (Photo I)

Algorithm 2 (Photo I, Textures I)

Algorithm 3 (Photo II, Textures II)

Algorithm 4 (Comprehensive)</td><td>Attention!
The algorithm is sensitive to the position of the face in the frame and optic distortion. The algorithm operates correctly only when a face is located in the center of the frame where distortion is minimal. The lower the distortion in the frame, the higher the accuracy of the algorithm operation.

The Not selected value is selected by default. Liveless face is a photo of a face instead of a live person. You can use a photo, mask, or video as an image. If necessary, select the algorithm for detecting a liveless face:

• Algorithm 1 (Photo I) is used for processors with small processing power in access control systems (ACS). A simplified, fast box model is used to speed up processing.
• Algorithm 2 (Photo I, Textures I) is used for most other ACSs, including a combination of a fast box model and texture model.
• Algorithm 3 (Photo II, Textures II) is used for remote authorization scenarios. It uses a more detailed and slower box model with a slower texture model, which improves verification accuracy.
• Algorithm 4 (Comprehensive) is a mode for fine-tuning for specific conditions. We recommend using this mode if you can adjust the parameters to a specific domain and select threshold values. This approach increases accuracy, but the threshold can vary significantly depending on the conditions.

You must configure the parameter empirically.

Algorithm for determining a liveless face:

The algorithm assigns to each face a Liveness score—a value in the range [0, 100]. The decision on the liveness of a face is made based on the value specified in the Liveness threshold parameter according to the following logic:

• liveless if a Liveness score is less than or equal to the threshold value of the parameter.
• live if a Liveness score exceeds the threshold value of the parameter.

Example:

1. The Liveness threshold parameter = 30.
2. In the logs, the algorithm assigned a Liveness score = 78.
3. Since 78 > 30, the face is determined as live</td></tr>
</table>

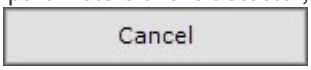
Parameter	Value	Description
Biometric data	**Yes**	The parameter is enabled by default. When you search for faces (see Face search(see page 1233)), the search results display found faces that are similar to an attached photo or track, taking into account the specified minimum level of similarity (in percent). For the correct check in lists of faces, you must also enable this parameter. If you want to keep the biometric data private, select the **No** value. In this case, when you search for faces (see Face search(see page 1233)) using an attached photo or track as well as check in lists of faces, the search doesn't return any result
	No	
Detection mode	**CPU**	Select a processor for the detector operation—CPU or Nvidia GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)) **Attention!** It can take several minutes to launch the algorithm on an Nvidia GPU after you apply the settings.
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
	Huawei NPU	
Face attributes recognition βeta	**Not selected**	The **Not selected** value is selected by default. If necessary, select the βeta face attributes recognition algorithm: • **Algorithm 1 (Fast recognition)** is used for fast recognition and assessment. • **Algorithm 2 (Accurate recognition)** is used for a more accurate recognition and assessment
	Algorithm 1 (Fast recognition)	
	Algorithm 2 (Accurate recognition)	
Face mask detection	**Yes**	The parameter is disabled by default. If you use mask detector, select the **Yes** value (see Mask detector VA(see page 497))
	No	
Maximum face height	**100**	Specify the maximum height of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Maximum face width	**100**	Specify the maximum width of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Minimum face height	**5**	Specify the minimum height of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Minimum face width	**5**	Specify the minimum width of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Minimum threshold of face authenticity	**90**	Specify the minimum level of face recognition accuracy for the creation of a track. You must select the required value empirically. We recommend specifying the value of not less than 90. The higher the value, the fewer faces are detected, while the recognition accuracy increases. The value must be in the range [1, 100]

In the preview window, set the rectangular area of the frame in which you want to detect faces. You can specify the area by moving the anchor points  .



Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuration of the **Face detector VA** is complete. If necessary, you can create and configure sub-detectors on the basis of the **Face detector VA** based on metadata (see Metadata database(see page 333)):

1. Line crossing(see page 362)—detector generates an event when a person moves across a line in the specified area of the frame and their face is detected.
2. Entrance in area(see page 377)—detector generates an event when a person appears in the specified area of the frame and their face is detected.
3. Loitering in area(see page 367)—detector generates an event when a person stays in the specified area of the frame for a long time and their face is detected.
4. Mask detector VA(see page 497)—detector generates an event when it captures a face with or without a mask.

19.4.29.2.9 Mask detector VA

To configure the **Mask detector VA**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera in the settings of the **Face detector VA** (see Configuring the Face detector VA(see page 491)), enable the **Face mask detection** parameter.
3. Below the **Face detector VA**, click **Create…** → **Mask detector VA**.

By default, the detector is enabled and set to detect faces without masks.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td colspan="3">Other</td></tr>
<tr><td>Enable</td><td>Yes
No</td><td>The detector is enabled by default. To disable the detector, select the No value</td></tr>
<tr><td>Name</td><td>Mask detector VA</td><td>Enter the detector name or leave the default name</td></tr>
<tr><td>Type</td><td>Mask detector VA</td><td>Name of the detector type (non-editable field)</td></tr>
<tr><td colspan="3">Basic settings</td></tr>
<tr><td>Full face masking</td><td>Presence
Not selected
Absence</td><td rowspan="6">Depending on a particular task, specify the parameters values according to the table:
<table>
<tr><th rowspan="2">Event that detector generates</th><th colspan="3">Value</th></tr>
<tr><th>Full face masking</th><th>Lower face part masking</th><th>No mask</th></tr>
<tr><td>No mask of any kind</td><td>Absence</td><td>Absence</td><td>Presence</td></tr>
<tr><td>No medical mask</td><td>Presence</td><td>Absence</td><td>Presence</td></tr>
<tr><td>No balaclava</td><td>Absence</td><td>Presence</td><td>Presence</td></tr>
<tr><td>Any mask present</td><td>Presence</td><td>Presence</td><td>Absence</td></tr>
<tr><td>Medical mask present</td><td>Absence</td><td>Presence</td><td>Absence</td></tr>
<tr><td>Balaclava present</td><td>Presence</td><td>Absence</td><td>Absence</td></tr>
</table></td></tr>
<tr><td>Lower face part masking</td><td>Presence
Not selected
Absence</td></tr>
<tr><td>No mask</td><td>Presence
Not selected
Absence</td></tr>
<tr><td>Number of consecutive mask detections</td><td>2</td><td>Specify the minimum number of frames in which the detector must detect a mask in order to generate an event. The value must be in the range [0, 100]</td></tr>
<tr><td>Other types of masks</td><td>Presence
Not selected
Absence</td><td>Note
The Other types of masks parameter isn't supported in this software version.</td></tr>
</table>

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuration of the **Mask detector VA** is complete.

19.4.29.3 Checking in lists of faces

In *Axxon One*, you can configure macros to run the automatic system reactions based on the created lists of faces (see Faces[183] (*AxxonNet*), Faces in Axxon Datacenter[184] (*Axxon Datacenter*), Faces in AxxonData[185] (*AxxonData*)), when:

- the recognized face is present in the selected list;
- the recognized face is absent in the selected list;
- it is necessary to recognize the presence of the specific face from a list;
- it is necessary to recognize the absence of the specific face from a list;
- the recognized face is absent in all created lists.

To do this, do the following:

1. Connect Axxon-domain to *AxxonNet/AxxonData/Axxon Datacenter* (see Configuring a domain in AxxonNet[186], Configuring a domain in AxxonData[187], Configuring a domain in Axxon Datacenter[188]).
2. Create a face detector (see Category: Face(see page 473)).
3. Enable the **Check in lists** parameter in the settings of the face detector (see Configuring the Face detector VL(see page 478), Configuring the Face detector VA(see page 491), Configuring the Face detector TV(see page 505)).
4. Create one or more lists of faces in *AxxonNet/AxxonData/Axxon Datacenter* (see Faces[189] (*AxxonNet*), Faces in AxxonData[190], Faces in Axxon Datacenter[191]).
5. Synchronize created lists of faces with a specific domain (see Synchronizing a list of faces with the domain[192] (*AxxonNet*), Synchronizing a list of faces with the domain in AxxonData[193], Synchronizing a list of faces with the domain in Axxon Datacenter[194]).
6. Select the condition to start the automatic system reaction (see Configuring start conditions(see page 834), Configuring macros when working with lists of faces(see page 845)).
7. Select one or more actions for the automatic system reaction (see Examples of macros(see page 856)).
8. If necessary, configure information boards to display the information from the automatic system reaction (see Examples of macros used when working with lists of faces(see page 906), Configuring an Event Board(see page 962), Configuring a Dialog Board(see page 966)).

19.4.29.4 FaceCube+ external face recognition system

Axxon One supports FaceCube+ external face recognition system.

FaceCube+ external face recognition system works as follows:

1. *Axxon One* recognizes a face, then sends it to FaceCube+.
2. FaceCube+ checks the face with reference faces in its own database.
3. If a match is found, FaceCube+ sends the information to *Axxon One* (see Face recognition and search(see page 1260)).

To configure integration with FaceCube+, do the following:

1. Configure FaceCube+ and add reference faces to it.
2. In *Axxon One,* in the **Server** object (see The Server object(see page 164)), create a list of faces (see Faces[195] (*AxxonNet*), Faces in Axxon Datacenter[196] (*Axxon Datacenter*), Faces in AxxonData[197] (*AxxonData*)) and enter the address of FaceCube+ into the **Li**

183 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
184 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248425814/Faces+in+Axxon+Datacenter
185 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426275/Faces+in+AxxonData
186 https://docs.axxonsoft.com/confluence/spaces/anet/pages/157697082/Configuring+a+domain+in+AxxonNet
187 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426254/Configuring+a+domain+in+AxxonData
188 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248424576/Configuring+a+domain+in+Axxon+Datacenter
189 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
190 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426275/Faces+in+AxxonData
191 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248425814/Faces+in+Axxon+Datacenter
192 https://docs.axxonsoft.com/confluence/spaces/anet/pages/184380350/Synchronizing+a+list+of+faces+with+the+domain
193 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426304/Synchronizing+a+list+of+faces+with+the+domain+in+AxxonData
194 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248425843/Synchronizing+a+list+of+faces+with+the+domain+in+Axxon+Datacenter
195 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
196 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248425814/Faces+in+Axxon+Datacenter
197 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426275/Faces+in+AxxonData

st settings field.

	Delete	Face lists	%	List settings
	×	Wanted	80	http://127.0.0.1:10111/FaceCubePlus

3. Enable the **Check in lists** and **Send face images** parameters in the face detector settings (see Configuring the Face detector VL(see page 478), Configuring the Face detector VA(see page 491), Configuring the Face detector TV(see page 505).
4. Configure macros (see Configuring macros when working with lists of faces(see page 845)).

Configuration of collaboration between *Axxon One* and FaceCube+ is complete.

19.4.29.5 Face detector TV

19.4.29.5.1 Functions of the Face detector TV

Description	**Attention!** Starting with *DetectorPack* 3.11.1, the **Face detector TV** is no longer supported. We replaced it with the **Face detector VA**. You cannot use the **Face detector TV** and the **Face detector VA** at the same time (see Manual for switching from the Face detector TV to Face detector VA(see page 485)). The **Face detector TV** generates an event every time a face is captured in the frame. The *Axxon One* database stores all faces in binary form: 1. All captured faces are stored as biometric vectors (see Face search(see page 1233)) in the **t_face_vector** table, and their corresponding capture events are stored in the **t_json_event** table. **Attention!** The default storage depth of face vectors is 24 hours. To specify the storage depth of face vectors, you must add the NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS system variable (see Creating system variable(see page 126)). The values of the variable are specified in hours. For example, if you set NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS = 1, face vectors are deleted from RAM in one hour. If the value of the NGP_FACE_VECTORS_IN_RAM_DEPTH_HOURS variable isn't set, the storage depth of face vectors is 24 hours. 2. All reference faces from the lists (see Faces[198]) are stored in the **t_face_listed** table **Attention!** When the number of faces in the database increases, the statistical error increases: the more faces in the database, the more often similar faces are recognized when searching in the archive. Accordingly, the degree of similarity when comparing the reference face with the captured face decreases. This error is relevant if: 1. The Video stream and scene requirements for the Face detector TV and its sub-detectors(see page 501) are met. 2. The database contains over a million faces. Example of error calculation results: The mugshot dataset (good quality photo), 12 million faces in the database, and probability of false matching is 0.003%. With these initial data, the researchers obtained an identification error of 0.76%.
Licensing	To operate the detector, contact an AxxonSoft manager and get a license file (see Types of licenses[199])

198 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
199 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Add-ons	For the **Face detector TV** to work, you must install TV Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)). **Attention!** • You can install only one Face Recognition Pack: VA Face Recognition Pack, VL Face Recognition Pack, or TV Face Recognition Pack. You cannot install several packages in the same system. • TV Face Recognition Pack is guaranteed to work on Linux Debian 11 and Ubuntu 20. TV Face Recognition Packs isn't guaranteed to work on Linux Debian 9/10, Ubuntu 18 and Ubuntu 19 (see Operating system requirements(see page 86)).

19.4.29.5.2 Hardware requirements for the Face detector TV and its sub-detectors

Hardware requirements(see page 87)
Hardware requirements for neural analytics operation(see page 339)

The **Face detector TV** and its sub-detectors require a CPU supporting the SSE4.2, FMA3, or AVX2.0 instruction set.

If the **Face detector TV** runs on GPU, the following hardware requirements must be met:

1. The detector can run only on Nvidia devices with at least 6 GB of video memory or more.
2. Nvidia driver version is 418.39 or higher.
3. Compute Capability 6.0 or higher.

Note

You can check the GPU Compute Capability version on the manufacturer's[200] website.

19.4.29.5.3 Video stream and scene requirements for the Face detector TV and its sub-detectors

Hardware requirements for the Face detector TV and its sub-detectors(see page 501)
Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Face detector TV and its sub-detectors(see page 502)

Requirements for the operation of the **Face detector TV** and its sub-detectors are given in the table:

Camera	• FPS is at least 12. For face recognition at turnstiles, FPS is at least 6 • Camera must have lenses that don't produce significant distortion of the face, especially in the centre of the frame **Attention!** • Correct operation of the detector has a strong dependence on the optical distortion of the lens. The less distortion in the frame, the higher the accuracy of the algorithms. • Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Lighting	• Faces must be evenly illuminated with diffused light of at least 200 lux. Directional side lighting isn't allowed • Contrast of the captured faces must be over 64 grayscale • Insufficient or excessive lighting isn't allowed • There must be no backlighting and sharp gradients of light and shade

200 https://developer.nvidia.com/cuda-gpus

Scene and camera angle	• Maximum angle of frontal perspective of the photos of people's faces received from cameras must not exceed +/- 15° • Mutual faces overlapping must be minimal • We recommend using the centre of the frame for analysis, as this is the area where distortion of the face image is minimized **Note** You can specify the required distance between the camera and the face using a lens with the required focal length.

19.4.29.5.4 Image requirements for the Face detector TV and its sub-detectors

Hardware requirements for the Face detector TV and its sub-detectors(see page 501)
Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Face detector TV and its sub-detectors(see page 501)

Requirements for the operation of the **Face detector TV** and its sub-detectors are given in the table:

Object images	• Photos of the captured faces received from cameras must be clear. Image blurring caused by motion isn't allowed • To create a face vector, the distance between the pupils on the photos of people's faces received from cameras must be at least 32 pixels • To create face tracks, the face width must be at least 16 pixels

19.4.29.5.5 Optimizing the operation of the Face detector TV on GPU in Windows OS

Attention!

Starting with *DetectorPack* 3.11.1, the **Face detector TV** is no longer supported. We replaced it with the **Face detector VA**. You cannot use the **Face detector TV** and the **Face detector VA** at the same time (see Manual for switching from the Face detector TV to Face detector VA(see page 485)).

Configuring the Face detector TV(see page 505)

The TV Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)) includes a utility that allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization, optimizes video memory consumption and ensures the start and correct operation of the **Face detector TV** on GPU.

To optimize the operation of the **Face detector TV** on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

   Attention!

   If the system has the software running on GPU, it is necessary to stop its operation.

2. Create the **GPU_CACHE_DIR** system variable (see Creating system variable(see page 126)). In the **Variable value** field, specify the path to the cache location in Latin characters only. For example, D:\GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
3. Run the command line as administrator.
4. To call the utility, enter in the command line: C:\Program Files\Common Files\AxxonSoft\DetectorPack\TvaFaceGpuCacheGenerator.exe.
5. Press **Enter**.
6. Specify the ID of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
7. Press **Enter**.
8. If you want to change the resolution of the video stream for the **Face detector TV**:

   a. Enter **y**.
   b. Specify the required resolution. For example, **3840x2160 2688x1520**. GPU uses the default video stream resolutions. Changing the resolution of the video stream from **1920*1080** and higher, increases the percentage of face detection.
9. If you don't want to change the resolution of the video stream for the **Face detector TV**, enter **n**.
10. Press **Enter**. The cache creation process starts. The cache creation is successful if the result value is "0".

Optimizing the operation of the **Face detector TV** on GPU is complete.

Attention!

The cache must be recreated in the following cases:
- if you update the TV Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update the Nvidia GPU drivers.

19.4.29.5.6 Optimizing the operation of the Face detector TV on GPU in Linux OS

Attention!

Starting with *DetectorPack* 3.11.1, the **Face detector TV** is no longer supported. We replaced it with the **Face detector VA**. You cannot use the **Face detector TV** and the **Face detector VA** at the same time (see Manual for switching from the Face detector TV to Face detector VA(see page 485)).

Configuring the Face detector TV(see page 505)

The TV Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)) includes a utility that allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization, optimizes video memory consumption, and ensures the start and correct operation of the **Face detector TV** on GPU.

To optimize the operation of the **Face detector TV** on GPU, do the following:

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[201]).

   Attention!

   If the system has the software running on GPU, you must stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

   ```
   sudo su ngp
   ```

   b. Enter the password for the superuser.
3. Create a folder with a custom name to store the cache. For example:

   ```
   mkdir /opt/AxxonSoft/AxxonOne/gpucache
   ```

4. Change folder permissions:

   ```
   chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
   ```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

201 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

```
cd /opt/AxxonSoft/AxxonOne
```

6. Open the server configuration file for editing:

```
nano instance.conf
```

Attention!

When you use the server in failover mode, you should:

a. Open the **/etc/AxxonSoft** folder:

```
cd /etc/AxxonSoft
```

b. Open the server configuration file for editing:

```
nano axxon-one.conf
```

Note

Before you make changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[202].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

d. Save the changes in the file.

e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file.

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit file editing mode using the **Ctrl+X** keyboard shortcut.

Attention!

202 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[203]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[204]).

10. In the command prompt, run the command that was used to add the system variable with the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./TvaFaceGpuCacheGenerator
```

13. Press **Enter**.
14. Specify the ID of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
15. Press **Enter**.
16. If you want to change the resolution of the video stream for the **Face detector TV**, do the following:
    a. Enter **y**.
    b. Specify the required resolution. For example, **3840x2160 2688x1520**. The GPU uses the default video stream resolutions. Changing the resolution of the video stream from **1920*1080** and higher increases the percentage of face detection.
17. If you don't want to change the resolution of the video stream for the **Face detector TV**, enter **n**.
18. Press **Enter**. The cache creation process starts. The cache creation is successful if the result value is "0".

Optimizing the operation of the **Face detector TV** on GPU is complete.

Attention!

The cache must be recreated in the following cases:
- if you update the TV Face Recognition Pack add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update the Nvidia GPU drivers.

19.4.29.5.7 Configuring the Face detector TV

Hardware requirements for the Face detector TV and its sub-detectors(see page 501)
Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Face detector TV and its sub-detectors(see page 501)
Image requirements for the Face detector TV and its sub-detectors(see page 502)
Optimizing the operation of the Face detector TV on GPU in Windows OS(see page 502)
Checking in lists of faces(see page 499)
Examples of macros used when working with lists of faces(see page 906)

Attention!

203 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS
204 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

- Starting with *DetectorPack* 3.11.1, the **Face detector TV** is no longer supported. We replaced it with the **Face detector VA**. You cannot use the **Face detector TV** and the **Face detector VA** at the same time (see Manual for switching from the Face detector TV to Face detector VA(see page 485)).
- To start and correctly operate the **Face detector TV** on GPU, you must create cache beforehand (see Optimizing the operation of the Face detector TV on GPU in Windows OS(see page 502)).

To configure the **Face detector TV**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Face** → **Face detector TV**.

By default, the detector is enabled and set to detect faces.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The parameter is disabled by default. If you want to use this detector to check in lists of faces, select the **Yes** value (see Checking in lists of faces(see page 499))
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. For the correct operation of the **Face detector TV**, we recommend using a high-quality video stream
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Face detector TV**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processor for decoding video. When you select: • **Auto**: GPU takes priority (decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding uses the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding; • **CPU**: CPU is used for decoding; • **GPU**: GPU is used for decoding (decoding with Nvidia NVDEC chips); • **HuaweiNPU**: HuaweiNPU is used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**Face detector TV**	Name of the detector type (non-editable field)
Use camera transform	**Yes**	The parameter is disabled by default. If you use a XingYun bispherical lens (see Configuring fisheye cameras(see page 183)), by default the detector receives the image of two spheres of 180° each to analyze. In this case, the recognition quality can deteriorate. To send the dewarped image to the detector, select the **Yes** value. This parameter is also valid for other transformations
	No	

Parameter	Value	Description
Advanced settings **Attention!** You must perform the advanced configuration of the detector only with the assistance of AxxonSoft technical experts.		
Analyze face rotation angle	**Yes** **No**	The parameter is disabled by default. If you want to detect the face rotation angle, select the **Yes** value. This parameter allows you to filter out results that have a rotation and tilt angle greater than the specified values in a search for a specific face (see Search for similar face(see page 1234)) **Note** The **Analyze face rotation angle** parameter affects the filtering of face detection events in the Event Board (see Configuring an Event Board(see page 962), Working with Event Boards(see page 1266)). When you use the following filters: • **Triggered detection**—all detected faces are displayed regardless of the face angle settings, even if the **Analyze face rotation angle** parameter is enabled. • **Triggered specified detection**—only faces that are within allowable rotation angles specified in the settings of the detector are displayed.
Face detection algorithm	**ALG1 (high speed, low accuracy)** **ALG2 (medium speed, medium accuracy)** **ALG3 (low speed, high accuracy)**	Select the face detection algorithm: • **ALG1 (high speed, low accuracy)** is the fastest, reduced accuracy. Recognition speed depends on the number of faces in the frame. Optimal for many scenes. • **ALG2 (medium speed, medium accuracy)**—recognition speed depends on the background and the number of faces in the frame. • **ALG3 (low speed, high accuracy)** is the most accurate, reduced speed. Recognition speed depends on the image resolution
Face detection period (msec)	**250**	Specify the time in milliseconds between face search operations in a video frame. The larger the value, the less load on the server, but some faces may not be recognized. The value must be in the range [1, 10 000]
Face occlusion threshold (*starting with Detector Pack 3.14*)	**0**	Specify the face occlusion threshold at which a face that is partially or fully overlapped by objects (for example, glasses, masks, hair, and so on) is ignored. By default, the parameter is disabled (the value is **0**). At any value greater than **0**, the parameter is considered enabled. Select the appropriate value empirically. The value must be in the range [0, 100]
Face rotation pitch (°)	**45**	Specify the allowable angle of face pitch in degrees. You must select the required value empirically. The value must be in the range [0, 90]
Face rotation roll (°)	**45**	Specify the allowable angle of face roll in degrees. You must select the required value empirically. The value must be in the range [0, 90]
Face rotation yaw from (°)	**-45**	Specify the minimum allowable angle of face rotation to the right or left. You must select the required value empirically. The value must be in the range [-90, 90]
Face rotation yaw to (°)	**45**	Specify the maximum allowable angle of face rotation to the right or left. You must select the required value empirically. The value must be in the range [-90, 90]
False mask detections filtering	**Yes** **No**	The parameter is enabled by default. The additional algorithm considers that the track is a face of a person with a mask. If the algorithm considers that the track is a face with a mask with a lower probability, this track is disregarded (see the **Minimum filtering threshold for face mask detection** parameter). If you don't need to use the parameter, select the **No** value

Parameter	Value	Description
Filter false alarms	**Yes** **No**	In some cases, the detector can mistake other objects for a face. The **Filter false alarms** parameter is enabled by default. If the parameter is enabled, false results of the face recognition appear in the detection feed (see Face recognition and search(see page 1260)), but they are ignored when searching for faces in the archive. This parameter filters out objects that aren't faces at the stage of face vector construction and its recording to the metadata database. If you don't need to use this parameter, select the **No** value
Frame size change	**1920**	By default, during the analysis, the frame is compressed to the specified resolution (1920 pixels on the longer side, by default). The value must be in the range [640, 10 000]. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops, and this resolution is used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution is halved two times (512*384), since after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
Ignore repeated recognitions	**Yes** **No**	The parameter is disabled by default. If you want to ignore repeated recognitions of the same face, select the **Yes** value
Liveness threshold	**30**	Specify the minimum threshold value in percent at which a face is defined as liveless. The higher the value, the more captured faces are detected as a photo. At the same time, the quality of recognizing (photo/real face) is higher. You must select the required value empirically. The value must be in the range [1, 100]
Minimum face masking threshold	**70**	Specify the minimum threshold for recognizing a mask on the face. You must select the required value empirically. We recommend specifying the value of not less than 70. The value must be in the range [1, 100]
Minimum face quality for face mask detection	**30**	Specify the minimum quality of the face image when recognizing masks (see Mask detector TV(see page 512)). You must select the required value empirically. We recommend specifying the value of not less than 30. The value must be in the range [1, 100]
Minimum face recognition quality	**50**	Specify the minimum quality of the face image when recognizing faces without masks. You must select the required value empirically. We recommend specifying the value of not less than 50. The value must be in the range [1, 100]
Minimum filtering threshold	**50**	If you use the **Filter false alarms** parameter, specify the minimum percentage at which the additional algorithm considers the track to be a person's face. If the algorithm considers the track to be a face with a lower probability, this track is disregarded. You must select the required value empirically. We recommend specifying the value of not less than 50. The value must be in the range [1, 100]
Minimum filtering threshold for face mask detection	**30**	If you use the **False mask detections filtering** parameter, specify the minimum percentage at which the additional algorithm considers the track to be a person's face with a mask. If the algorithm considers the track to be a face with a mask with a lower probability, this track will be disregarded. You must select the required value empirically. We recommend specifying the value of not less than 30. The value must be in the range [1, 100]
Open eyes threshold (*starting with Detector Pack 3.14*)	**0**	Specify the open eyes threshold at which a face is recognized. By default, the parameter is disabled (the value is **0**). At any value greater than **0**, the parameter is considered enabled. Select the appropriate value empirically. The value must be in the range [0, 100]

Parameter	Value	Description
Period of ignoring repeated recognitions	**2**	To adjust this parameter, you must enable the **Ignore repeated recognitions** parameter. Specify the period in minutes during which new recognized faces are compared with the previous ones to detect similarities. The value must be in the range [2, 30]
Process color frames	**Yes**	A black and white frame is processed by default. If you want the detector to use a color frame for processing, select the **Yes** value
	No	
Repeated recognitions similarity threshold	**85**	To adjust this parameter, you must enable the **Ignore repeated recognitions** parameter. Specify the similarity threshold of the face to the previously recognized faces in percent. If the similarity threshold is lower than the specified value, the face is recognized as a new one. The value must be in the range [1, 100]
Send face images	**Yes**	The parameter is disabled by default. If you want to send face images to *Axxon PSIM*, select the **Yes** value
	No	
Track lifespan (*starting with Detector Pack 3.14*)	**Yes**	By default, the parameter is disabled. If it is necessary to display track lifespan for an object in seconds, select the **Yes** value
	No	
Track loss time	**500**	Specify the time in milliseconds after which the track of the captured face is considered to be lost. This parameter applies when a captured face moves in the frame and hides behind an obstacle for some time. If this time is less than the specified value, the face is recognized as the same thing. The value must be in the range [1, 10 000]
Basic settings		
Age and gender	**Yes**	The parameter is disabled by default. If you need to save age and gender information for each captured face in the database, select the **Yes** value
	No	**Note** The average error in age recognition is 5 years.

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Algorithm of liveness detection</td><td>Not selected
Algorithm 1 (Photo I)
Algorithm 2 (Photo I, Textures I)
Algorithm 3 (Photo II, Textures II)
Algorithm 4 (Comprehensive)</td><td>Attention!
The algorithm is sensitive to the position of the face in the frame and optic distortion. The algorithm operates correctly only when a face is located in the center of the frame where distortion is minimal. The lower the distortion in the frame, the higher the accuracy of the algorithm operation.

The Not selected value is selected by default. Liveless face is a photo of a face instead of a live person. You can use a photo, mask, or video as an image. If necessary, select the algorithm for detecting a liveless face:
• Algorithm 1 (Photo I) is used for processors with small processing power in access control systems (ACS). A simplified, fast box model is used to speed up processing.
• Algorithm 2 (Photo I, Textures I) is used for most other ACSs, including a combination of a fast box model and texture model.
• Algorithm 3 (Photo II, Textures II) is used for remote authorization scenarios. It uses a more detailed and slower box model with a slower texture model, which improves verification accuracy.
• Algorithm 4 (Comprehensive) is a mode for fine-tuning for specific conditions. We recommend using this mode if you can adjust the parameters to a specific domain and select threshold values. This approach increases accuracy, but the threshold can vary significantly depending on the conditions.

You must configure the parameter empirically.

Algorithm for determining a liveless face:

The algorithm assigns to each face a Liveness score—a value in the range [0, 100]. The decision on the liveness of a face is made based on the value specified in the Liveness threshold parameter according to the following logic:
• liveless if a Liveness score is less than or equal to the threshold value of the parameter.
• live if a Liveness score exceeds the threshold value of the parameter.

Example:
1. The Liveness threshold parameter = 30.
2. In the logs, the algorithm assigned a Liveness score = 78.
3. Since 78 > 30, the face is determined as live</td></tr>
<tr><td>Biometric data</td><td>Yes
No</td><td>The parameter is enabled by default. When you search for faces (see Face search(see page 1233)), the search results display found faces that are similar to an attached photo or track, taking into account the specified minimum level of similarity (in percent). For the correct check in lists of faces, you must also enable this parameter.
If you want to keep the biometric data private, select the No value. In this case, when you search for faces (see Face search(see page 1233)) using an attached photo or track as well as check in lists of faces, the search doesn't return any result</td></tr>
<tr><td>Detection mode</td><td>CPU
Nvidia GPU 0
Nvidia GPU 1
Nvidia GPU 2
Nvidia GPU 3</td><td>Select a processor for the detector operation—CPU or Nvidia GPU (see Selecting Nvidia GPU when configuring detectors(see page 348))

Attention!
It can take several minutes to launch the algorithm on an Nvidia GPU after you apply the settings.</td></tr>
</table>

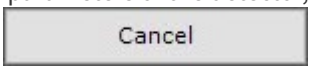
Parameter	Value	Description
	Huawei NPU	
Face attributes recognition βeta	**Not selected**	The **Not selected** value is selected by default. If necessary, select the βeta face attributes recognition algorithm: • **Algorithm 1 (Fast recognition)** is used for fast recognition and assessment. • **Algorithm 2 (Accurate recognition)** is used for a more accurate recognition and assessment
	Algorithm 1 (Fast recognition)	
	Algorithm 2 (Accurate recognition)	
Face mask detection	**Yes**	The parameter is disabled by default. If you use mask detector, select the **Yes** value (see Mask detector TV(see page 512))
	No	
Maximum face height	**100**	Specify the maximum height of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Maximum face width	**100**	Specify the maximum width of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Minimum face height	**5**	Specify the minimum height of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Minimum face width	**5**	Specify the minimum width of the captured faces as a percentage of the frame size. You must select the required value empirically. The value must be in the range [1, 100]
Minimum threshold of face authenticity	**90**	Specify the minimum level of face recognition accuracy for the creation of a track. You must select the required value empirically. We recommend specifying the value of not less than 90. The higher the value, the fewer faces are detected, while the recognition accuracy increases. The value must be in the range [1, 100]

In the preview window, set the rectangular area of the frame in which you want to detect faces. You can specify the area by moving the anchor points  .



Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuration of the **Face detector TV** is complete. If necessary, you can create and configure sub-detectors on the basis of the **Face detector TV** based on metadata (see Metadata database(see page 333)):

1. Line crossing(see page 362)—detector generates an event when a person moves across a line in the specified area of the frame and their face is detected.
2. Entrance in area(see page 377)—detector generates an event when a person appears in the specified area of the frame and their face is detected.
3. Loitering in area(see page 367)—detector generates an event when a person stays in the specified area of the frame for a long time and their face is detected.
4. Mask detector TV(see page 512)—detector generates an event when it captures a face with or without a mask.

19.4.29.5.8 Mask detector TV

To configure the **Mask detector TV**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera in the settings of the **Face detector TV** (see Configuring the Face detector TV(see page 505)), enable the **Face mask detection** parameter.
3. Below the **Face detector TV**, click **Create...** → **Mask detector TV**.

By default, the detector is enabled and set to detect faces without masks.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td colspan="3">Other</td></tr>
<tr><td>Enable</td><td>Yes
No</td><td>The detector is enabled by default. To disable the detector, select the No value</td></tr>
<tr><td>Name</td><td>Mask detector VA</td><td>Enter the detector name or leave the default name</td></tr>
<tr><td>Type</td><td>Mask detector VA</td><td>Name of the detector type (non-editable field)</td></tr>
<tr><td colspan="3">Basic settings</td></tr>
<tr><td>Full face masking</td><td>Presence
Not selected
Absence</td><td rowspan="6">Depending on a particular task, specify the parameters values according to the table:
<table>
<tr><th rowspan="2">Event that detector generates</th><th colspan="3">Value</th></tr>
<tr><th>Full face masking</th><th>Lower face part masking</th><th>No mask</th></tr>
<tr><td>No mask of any kind</td><td>Absence</td><td>Absence</td><td>Presence</td></tr>
<tr><td>No medical mask</td><td>Presence</td><td>Absence</td><td>Presence</td></tr>
<tr><td>No balaclava</td><td>Absence</td><td>Presence</td><td>Presence</td></tr>
<tr><td>Any mask present</td><td>Presence</td><td>Presence</td><td>Absence</td></tr>
<tr><td>Medical mask present</td><td>Absence</td><td>Presence</td><td>Absence</td></tr>
<tr><td>Balaclava present</td><td>Presence</td><td>Absence</td><td>Absence</td></tr>
</table></td></tr>
<tr><td>Lower face part masking</td><td>Presence
Not selected
Absence</td></tr>
<tr><td>No mask</td><td>Presence
Not selected
Absence</td></tr>
<tr><td>Number of consecutive mask detections</td><td>2</td><td>Specify the minimum number of frames in which the detector must detect a mask in order to generate an event. The value must be in the range [0, 100]</td></tr>
<tr><td>Other types of masks</td><td>Presence
Not selected
Absence</td><td>Note
The Other types of masks parameter isn't supported in this software version.</td></tr>
</table>

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuration of the **Mask detector TV** is complete.

19.4.30 Category: Vehicle

19.4.30.1 License plate recognition BRS

19.4.30.1.1 Functions of the License plate recognition BRS

Attention!

Starting with *Detector Pack* 3.14, the **License plate recognition BRS** isn't supported.

Description	**License plate recognition BRS** is used to implement the following functions: 1. Recognize license plates of vehicles. List of supported countries: Hong Kong, China, Taiwan. 2. Write a recognized license plate to a database. 3. Check the recognized license plates of vehicles in the lists of license plates
Add-ons	For the operation of the **License plate recognition BRS**, you must install the BRS LPR add-on (see Installing DetectorPack add-ons(see page 321))

19.4.30.1.2 Video stream and scene requirements for the License plate recognition BRS and its sub-detectors

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the License plate recognition BRS and its sub-detectors(see page 515)

Requirements for the operation of the **License plate recognition BRS** and its sub-detectors are given in the table:

Camera	• Minimum video resolution is 640*480, recommended resolution is 720p or 1080p • Minimum frame rate is 15 FPS, recommended frame rate is 25–30 FPS • Autofocus and zoom would be useful for making small adjustments after configuring the detector • Auto white balance • IR for night mode with good contrast of license plate images • HDR or WDR • In order to recognize state license plates on high-speed roads, the camera must have the Global Shutter mode **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Camera must be mounted at 0.6–2.4 meters above the ground • Angle formed by the lower line of the license plate and the horizon line must be from 0 to 20 degrees

19.4.30.1.3 Image requirements for the License plate recognition BRS and its sub-detectors

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the License plate recognition BRS and its sub-detectors(see page 514)

Requirements for the operation of the **License plate recognition BRS** and its sub-detectors are given in the table:

Object images	• Image must be clear, contrasting, without distortion, not blurred • Image must have minimum noise in low light conditions • Size of a license plate must be 15–70% of the total size of the image • License plate must contain no more than two rows of characters

19.4.30.1.4 Configuring the License plate recognition BRS

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the License plate recognition BRS and its sub-detectors(see page 514)
Image requirements for the License plate recognition BRS and its sub-detectors(see page 515)
Checking in lists of LPs(see page 668)
Examples of macros used when working with lists of license plates(see page 911)

To configure the **License plate recognition BRS** detector, do the following:

1. Submit to the technical support the MAC address of the server on which you will use the detector.

   Attention!

   The detector won't operate on the server with a different MAC address.

2. Copy the license received from technical support into the C:\Program Files\Common Files\AxxonSoft\DetectorPack\BioirisSDK\License.txt file.
3. Restart the server (see Stop the server(see page 146), Starting the server(see page 137)).

To create the **License plate recognition BRS** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Vehicle** → **License plate recognition BRS**.

By default, the detector is enabled and set to recognize vehicle license plates.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The parameter is disabled by default. If you want to use this detector to check in lists of vehicle license plates, select the **Yes** value (see Configuring vehicle license plate recognition based on the created lists[205])
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the Server

205 https://docs.axxonsoft.com/confluence/display/one20en/Configuring+vehicle+license+plate+recognition+based+on+the+created+lists

Parameter	Value	Description
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**License plate recognition BRS**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**License plate recognition BRS**	Name of the detector type (non-editable field)
Advanced settings		
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (**1920** pixels on the longer side) by default. The following algorithm is used: a. If the longer side of the source image exceeds the value specified in the **Frame size change** parameter, it is divided by two. b. If the resulting resolution falls below the specified value, the algorithm stops, and this resolution will be used further. c. If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
GDPR policy	-	By default, on the layout and in the archive, the characters of a license plate are completely hidden "GDPR ON". To display the characters of a license plate, you must enter a value: • "**-**"—hide all characters (default value), • " (blank field of a parameter value)"—show all characters, • "**N-**"—hide the first N characters, • "**-N**"—hide the last N characters, where **N** is the number of characters

Parameter	Value	Description
Minimum recognition quality, in %	**80**	Specify the minimum quality of license plate recognition as a percentage. The higher the minimum recognition quality, the fewer false events. The value must be in the range [0, 100]
Event timeout	**3**	Specify the time in seconds after which an event must be generated after recognizing a license plate in the frame. The value must be in the range [1, 3600]. If the value is **0**, an event will be generated after the track with a license plate is lost
Tracker timeout	**3**	Specify the time in seconds after which the vehicle track is considered lost. The value must be in the range [0, 3600]. **Note** You can use this parameter to avoid double events that can occur, for example, when a license plate is recognized when it appears in the frame, then it is overlapped by a visual obstacle and then recognized by the detector again. If you specify the timeout longer than the time of possible overlapping of the license plate in the frame, the detector will generate an event only once.
Basic settings		
Maximum LP width	**10**	Specify the maximum and minimum width of the license plate as a percentage according to the actual size of the license plate in the frame. The value must be in the range [0, 100]. **Attention!** • Specified values must exclude omissions in license plate recognition, that is, the values must not be smaller than the real size of the license plate in the frame. Otherwise, the license plates won't be recognized. • The **Minimum LP width** parameter affects the CPU load: the higher the value, the lower the load. • Reducing the difference between the maximum and minimum width reduces the CPU load.
Minimum LP width	**1**	

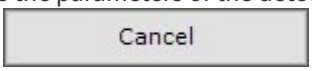
In the window, specify the area in which license plate detection and recognition will be performed. You can adjust the area by moving the anchor points .



Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **License plate recognition BRS** is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of the **License plate recognition BRS** (see Standard sub-detectors(see page 359)).

19.4.30.2 License plate recognition IV

19.4.30.2.1 Functions of the License plate recognition IV

Description	**License plate recognition IV** is used to implement the following functions: 1. Recognition of vehicle license plates in the following countries: • **Australia, high load, high recognition accuracy** • **Australia, medium load, medium recognition accuracy** • **Austria, high load, high recognition accuracy** • **Austria, medium load, medium recognition accuracy** • **Bangladesh, high load, high recognition accuracy** • **Bangladesh, medium load, medium recognition accuracy** • **Belarus, high load, high recognition accuracy** • **Belarus, medium load, medium recognition accuracy** • **Belgium, high load, high recognition accuracy** • **Belgium, medium load, medium recognition accuracy** • **Brazil, high load, high recognition accuracy** • **Brazil, medium load, medium recognition accuracy** • **China, high load, high recognition accuracy** • **China, medium load, medium recognition accuracy** • **Costa Rica, high load, high recognition accuracy** • **Costa Rica, medium load, medium recognition accuracy** • **Czech Republic, high load, high recognition accuracy** • **Czech Republic, medium load, medium recognition accuracy** • **Dubai, high load, high recognition accuracy** • **Dubai, medium load, medium recognition accuracy** • **Egypt, high load, high recognition accuracy** • **Egypt, medium load, medium recognition accuracy** • **Finland, high load, high recognition accuracy** • **Finland, medium load, medium recognition accuracy** • **France, high load, high recognition accuracy** • **France, medium load, medium recognition accuracy** • **Germany, high load, high recognition accuracy** • **Germany, medium load, medium recognition accuracy** • **Hong Kong, high load, high recognition accuracy** • **Hong Kong, medium load, medium recognition accuracy** • **India, high load, high recognition accuracy** • **India, medium load, medium recognition accuracy** • **Indonesia, high load, high recognition accuracy** • **Indonesia, medium load, medium recognition accuracy** • **Iraq, high load, high recognition accuracy** • **Iraq, medium load, medium recognition accuracy** • **Israel, high load, high recognition accuracy** • **Israel, medium load, medium recognition accuracy** • **Italy, high load, high recognition accuracy** • **Italy, medium load, medium recognition accuracy** • **Japan, high load, high recognition accuracy** • **Japan, medium load, medium recognition accuracy** • **Kazakhstan, high load, high recognition accuracy** • **Kazakhstan, medium load, medium recognition accuracy** • **Kuwait, high load, high recognition accuracy** • **Kuwait, medium load, medium recognition accuracy** • **Luxembourg, high load, high recognition accuracy** • **Luxembourg, medium load, medium recognition accuracy** • **Macau, high load, high recognition accuracy** • **Macau, medium load, medium recognition accuracy**

- **Mexico, high load, high recognition accuracy**
- **Mexico, medium load, medium recognition accuracy**
- **Monaco, high load, high recognition accuracy**
- **Monaco, medium load, medium recognition accuracy**
- **Mongolia, high load, high recognition accuracy**
- **Mongolia, medium load, medium recognition accuracy**
- **Netherlands, high load, high recognition accuracy**
- **Netherlands, medium load, medium recognition accuracy**
- **Pakistan, high load, high recognition accuracy**
- **Pakistan, medium load, medium recognition accuracy**
- **Poland, high load, high recognition accuracy**
- **Poland, medium load, medium recognition accuracy**
- **Portugal, high load, high recognition accuracy**
- **Portugal, medium load, medium recognition accuracy**
- **Qatar, high load, high recognition accuracy**
- **Qatar, medium load, medium recognition accuracy**
- **Russia, high load, high recognition accuracy**
- **Russia, medium load, medium recognition accuracy**
- **Saudi Arabia, high load, high recognition accuracy**
- **Saudi Arabia, medium load, medium recognition accuracy**
- **Slovenia, high load, high recognition accuracy**
- **Slovenia, medium load, medium recognition accuracy**
- **South Africa, high load, high recognition accuracy**
- **South Africa, medium load, medium recognition accuracy**
- **South Korea, high load, high recognition accuracy**
- **South Korea, medium load, medium recognition accuracy**
- **Spain, high load, high recognition accuracy**
- **Spain, medium load, medium recognition accuracy**
- **Sri Lanka, medium load, medium recognition accuracy**
- **Switzerland, high load, high recognition accuracy**
- **Switzerland, medium load, medium recognition accuracy**
- **Taiwan, high load, high recognition accuracy**
- **Taiwan, medium load, medium recognition accuracy**
- **Thailand, high load, high recognition accuracy**
- **Thailand, medium load, medium recognition accuracy**
- **Turkey, high load, high recognition accuracy**
- **Turkey, medium load, medium recognition accuracy**
- **UK, high load, high recognition accuracy**
- **UK, medium load, medium recognition accuracy**
- **Ukraine, high load, high recognition accuracy**
- **Ukraine, medium load, medium recognition accuracy**
- **USA, high load, high recognition accuracy**
- **USA, medium load, medium recognition accuracy**
- **Uzbekistan, high load, high recognition accuracy**
- **Uzbekistan, medium load, medium recognition accuracy**
- **Vietnam, high load, high recognition accuracy**
- **Vietnam, medium load, medium recognition accuracy**

	2. Recognition of vehicle license plates in conglomerates: • **European Union, high load, high recognition accuracy (Austria, Germany)** • **European Union, medium load, medium recognition accuracy (Austria, Germany)** • **K.U.B.R., high load, high recognition accuracy (Kazakhstan, Ukraine, Belarus, Russia)** • **K.U.B.R., medium load, medium recognition accuracy (Kazakhstan, Ukraine, Belarus, Russia)** • **Malaysia, Singapore, high load, high recognition accuracy** • **Malaysia, Singapore, medium load, medium recognition accuracy** • **Middle East, high load, high recognition accuracy (Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen)** • **Middle East, medium load, medium recognition accuracy (Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen)** • **North America, high load, high recognition accuracy (Canada, Mexico, United States)** • **North America, medium load, medium recognition accuracy (Canada, Mexico, United States)** 3. Motorcycle license plate recognition is only for Brazil. 4. Write a recognized license plate to a database. 5. Check the recognized license plates of vehicles in the lists of license plates
Licensing	To operate the detector, you need to contact a manager of AxxonSoft and get a license file (see Types of licenses[206])
Add-ons	For the **License plate recognition IV** to work, you must install the IV Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.30.2.2 Hardware requirements for the License plate recognition IV

Hardware requirements(see page 87)
Hardware requirements for neural analytics operation(see page 339)

If **License plate recognition IV** runs on GPU, the following hardware requirements must be met:

1. Support for TensorRT 7.2.1 (see documentation[207]).
2. Nvidia driver version 450.36.06 or higher.
3. CPUs that support the AVX2 instruction set, see the list[208].
4. Compute Capability 3.5 or higher, recommended 5.0 or higher.

> **Note**
>
> You can check the GPU Compute Capability version on the manufacturer's[209] website.

19.4.30.2.3 Video stream and scene requirements for the License plate recognition IV and its sub-detectors

Hardware requirements for neural analytics operation(see page 339)
Hardware requirements for the License plate recognition IV(see page 521)
Image requirements for the License plate recognition IV and its sub-detectors(see page 522)

Requirements for the operation of the **License plate recognition IV** and its sub-detectors are given in the table:

206 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses
207 https://docs.nvidia.com/deeplearning/tensorrt/archives/tensorrt-721/support-matrix/index.html
208 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3532
209 https://developer.nvidia.com/cuda-gpus

Camera	• Minimum video resolution is 640*480, recommended resolution is 720p or 1080p • Minimum frame rate is 15 FPS, recommended frame rate is 25–30 FPS • Autofocus and zoom would be useful for making small adjustments after configuring the detector • IR for night mode with good contrast of license plate images • HDR or WDR • In order to recognize state license plates on high-speed roads, the camera must have the Global Shutter mode **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Camera must be mounted at 0.6–2.4 meters above the ground • Angle formed by the lower line of the license plate and the horizon line must be from 0 to 20 degrees

19.4.30.2.4 Image requirements for the License plate recognition IV and its sub-detectors

Hardware requirements for neural analytics operation(see page 339)
Hardware requirements for the License plate recognition IV(see page 521)
Video stream and scene requirements for the License plate recognition IV and its sub-detectors(see page 521)

Requirements for the operation of the **License plate recognition IV** and its sub-detectors are given in the table:

Object images	• Image must be clear, contrasting, without distortion, not blurred • Image must have minimum noise in low light conditions • Size of a license plate must be 15–70% of the total size of the image • License plate must contain no more than two rows of characters

Images that meet the requirements:























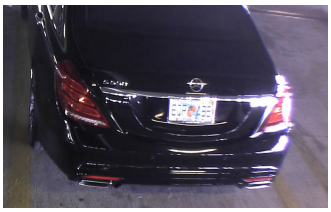


Images that don't meet the requirements:











19.4.30.2.5 Activating the license for the License plate recognition IV in Windows OS

To activate the license of the **License plate recognition IV**, do the following:

1. Submit to the technical support the MAC address of the server where the detector will be used.

   Attention!

   The detector won't work on the server with a different MAC address.

2. Get the license activation key from the technical support.
3. Copy the license to the C:\Program Files\Common Files\AxxonSoft\DetectorPack\LicenseFile_LprIV.txt file.
4. Restart the server (see Stop the server(see page 146), Starting the server(see page 137)).

Activating the license of the **License plate recognition IV** is complete.

19.4.30.2.6 Activating the license for the License plate recognition IV in Linux OS

To activate the license of the **License plate recognition IV**, do the following:

1. Submit to the technical support the MAC address of the server where the detector will be used.

   Attention!

   The detector won't work on the server with a different MAC address.

2. Get the license activation key from the technical support.
3. Create the LicenseFile_LprIV.txt file and put it into the /opt/AxxonSoft/DetectorPack/ folder.

```
sudo touch /opt/AxxonSoft/DetectorPack/LicenseFile_LprIV.txt
```

4. Enter the received key into the LicenseFile_LprIV.txt file.

```
echo '<License activation key>' | sudo tee -a /opt/AxxonSoft/DetectorPack/
LicenseFile_LprIV.txt
```

5. Restart the server.

```
sudo reboot
```

Activating the license of the **License plate recognition IV** is complete.

19.4.30.2.7 Configuring the License plate recognition IV

Hardware requirements for neural analytics operation(see page 339)
Hardware requirements for the License plate recognition IV(see page 521)
Video stream and scene requirements for the License plate recognition IV and its sub-detectors(see page 521)
Image requirements for the License plate recognition IV and its sub-detectors(see page 522)
Activating the license for the License plate recognition IV in Windows OS(see page 523)
Activating the license for the License plate recognition IV in Linux OS(see page 523)
Checking in lists of LPs(see page 668)
Examples of macros used when working with lists of license plates(see page 911)

Attention!

For the **License plate recognition IV** to work, you must activate the license (see Activating the license for the License plate recognition IV in Windows OS(see page 523), Activating the license for the License plate recognition IV in Linux OS(see page 523)).

To configure the **License plate recognition IV** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Vehicle** → **License plate recognition IV**.

By default, the detector is enabled and set to recognize vehicle license plates.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The parameter is disabled by default. If you want to use this detector to check in lists of vehicle license plates, select the **Yes** value (see Checking in lists of LPs(see page 668))
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server

Parameter	Value	Description
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**License plate recognition IV**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Period of ignoring repeated recognitions (sec) (starting with *Detector Pack* 3.14)	**0**	Specify the period in seconds during which re-recognized license plates are ignored. The value must be in the range [0, 86400]
Type	**License plate recognition IV**	Name of the detector type (non-editable field)
Advanced settings		
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (**1920** pixels on the longer side) by default. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** parameter, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops and this resolution will be used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.

Parameter	Value	Description
GDPR policy	-	By default, on the layout and in the archive, the characters of a license plate are completely hidden "GDPR ON". To display the characters of a license plate, you must enter a value: • "**-**"—hide all characters (default value), • " (blank field of a parameter value)"—show all characters, • "**N-**"—hide the first N characters, • "**-N**"—hide the last N characters, where **N** is the number of characters
Initiate event in (sec)	**1**	Specify the time in seconds after which an event must be generated after recognizing a license plate in the frame. The value must be in the range [0, 3600]. If the value is **0**, an event will be generated after the track with a license plate is lost
Maximal number of characters in LP	**10**	Specify the maximum number of characters in the license plate. The value must be in the range [1, 20]
Minimal number of characters in LP	**5**	Specify the minimum number of characters in the license plate. The value must be in the range [1, 20]
Minimum recognition quality, in %	**80**	Specify the minimum quality of license plates recognition as a percentage. The higher the minimum recognition quality, the fewer false events. The value must be in the range [0, 100]
Track retention time (sec)	**3**	Specify the time in seconds after which the vehicle track is considered lost. The value must be in the range [0, 3600]. **Note** You can use this parameter to avoid double events that can occur, for example, when a license plate is recognized when it appears in the frame, then it is overlapped by a visual obstacle and then recognized by the detector again. If you specify the timeout longer than the time of possible overlapping of the license plate in the frame, the detector will generate an event only once.
Basic settings		
Algorithm for detecting vehicle direction	**By LP coordinates** **By LP scale change**	The **By LP coordinates** algorithm is used by default. It works as follows: if the coordinates of the vehicle license plate shift from top to bottom (the vehicle moves towards the camera) and if the coordinates of the vehicle license plate shift from bottom to top (the vehicle moves away from the camera). Select the **By LP scale change** parameter if in the Surveillance window, the scale of the vehicle license plate increases (the vehicle moves towards the camera) and if the scale of the vehicle license plate decreases (the vehicle moves away from the camera)
Direction of movement (starting with *Detector Pack* 3.14)	**Both** **Outgoing** **Incoming**	By default, an event is created when a vehicle moves in **Both** directions. If you want the event to be created when a vehicle moves from the camera (**Outgoing**) or to the camera (**Incoming**), select the corresponding value

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Maximum LP width</td><td>10</td><td rowspan="2">Specify the maximum and minimum width of the license plate as a percentage according to the actual size of the license plate in the frame. The value must be in the range [0, 100].

Attention!
Specified values must exclude omissions in license plate recognition, that is the values must not be smaller than the real size of the license plate in the frame. Otherwise, the license plates won't be recognized.
The Minimum LP width parameter affects the CPU load: the higher the value, the lower the load.
Reducing the difference between the maximum and minimum width reduces the CPU load.</td></tr>
<tr><td>Minimum LP width</td><td>1</td></tr>
<tr><td rowspan="5">Detection mode</td><td>CPU</td><td rowspan="5">Select a processor for the detector operation (see Selecting Nvidia GPU when configuring detectors(see page 348)).

Attention!
It can take several minutes to launch the algorithm on NVIDIA GPU.
If you have multiple graphics cards in your system, you can assign a specific NVIDIA GPU value to each License plate recognition IV detector.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td colspan="3">Country selection</td></tr>
</table>

Parameter	Value	Description
Country name	• **Australia, high load, high recognition accuracy** • **Australia, medium load, medium recognition accuracy** • **Austria, high load, high recognition accuracy** • **Austria, medium load, medium recognition accuracy** • **Bangladesh, high load, high recognition accuracy** • **Bangladesh, medium load, medium recognition accuracy** • **Belarus, high load, high recognition accuracy** • **Belarus, medium load, medium recognition accuracy** • **Belgium, high load, high recognition accuracy** • **Belgium, medium load, medium recognition accuracy** • **Brazil, high load, high recognition accuracy** • **Brazil, medium load, medium recognition accuracy** • **Canada, high load, high recognition accuracy** • **Canada, not supported** • **Canada, medium load, medium recognition accuracy** • **China, high load, high recognition accuracy** • **China, medium load, medium recognition accuracy** • **Costa Rica, high load, high recognition accuracy** • **Costa Rica, medium load, medium recognition accuracy** • **Czech Republic, high load, high recognition accuracy**	Select from the list the country whose license plates you want to recognize and select the recognition accuracy: a. **High load, high recognition**—provides maximum recognition accuracy, but creates a high load on the CPU and/or graphics processing unit (GPU). b. **Medium load, medium recognition**—provides high recognition accuracy, requires less computing resources than at maximum accuracy. c. **Low load, low recognition**—provides the fastest recognition speed, while lowering recognition accuracy

Parameter	Value	Description
	• **Czech Republic, medium load, medium recognition accuracy** • **Dubai, high load, high recognition accuracy** • **Dubai, medium load, medium recognition accuracy** • **Egypt, high load, high recognition accuracy** • **Egypt, medium load, medium recognition accuracy** • **European Union, high load, high recognition accuracy** • **European Union, not supported** • **European Union, medium load, medium recognition accuracy** • **Finland, high load, high recognition accuracy** • **Finland, medium load, medium recognition accuracy** • **France, high load, high recognition accuracy** • **France, medium load, medium recognition accuracy** • **Germany, high load, high recognition accuracy** • **Germany, medium load, medium recognition accuracy** • **Hong Kong, high load, high recognition accuracy** • **Hong Kong, medium load, medium recognition accuracy** • **India, high load, high recognition accuracy** • **India, medium load, medium recognition accuracy** • **Indonesia, high load, high recognition accuracy** • **Indonesia, medium load, medium recognition accuracy**	

Parameter	Value	Description
	• **Iraq, high load, high recognition accuracy** • **Iraq, medium load, medium recognition accuracy** • **Israel, high load, high recognition accuracy** • **Israel, medium load, medium recognition accuracy** • **Italy, high load, high recognition accuracy** • **Italy, medium load, medium recognition accuracy** • **Japan, high load, high recognition accuracy** • **Japan, medium load, medium recognition accuracy** • **K.U.B.R., high load, high recognition accuracy (Kazakhstan, Ukraine, Belarus, Russia)** • **K.U.B.R., medium load, medium recognition accuracy (Kazakhstan, Ukraine, Belarus, Russia)** • **Kazakhstan, high load, high recognition accuracy** • **Kazakhstan, medium load, medium recognition accuracy** • **Kuwait, high load, high recognition accuracy** • **Kuwait, medium load, medium recognition accuracy** • **Luxembourg, high load, high recognition accuracy** • **Luxembourg, medium load, medium recognition accuracy** • **Macau, high load, high recognition accuracy** • **Macau, medium load, medium recognition accuracy** • **Malaysia, Singapore, high load, high recognition accuracy**	

Parameter	Value	Description
	• **Malaysia, Singapore, medium load, medium recognition accuracy** • **Mexico, high load, high recognition accuracy** • **Mexico, medium load, medium recognition accuracy** • **Middle East, high load, high recognition accuracy (Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen)** • **Middle East, medium load, medium recognition accuracy (Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates, Yemen)** • **Monaco, high load, high recognition accuracy** • **Monaco, medium load, medium recognition accuracy** • **Mongolia, high load, high recognition accuracy** • **Mongolia, medium load, medium recognition accuracy** • **Netherlands, high load, high recognition accuracy** • **Netherlands, medium load, medium recognition accuracy** • **North America, high load, high recognition accuracy (Canada, Mexico, United States)** • **North America, medium load, medium recognition accuracy (Canada, Mexico, United States)** • **Pakistan, high load, high recognition accuracy**	

Parameter	Value	Description
	• **Pakistan, medium load, medium recognition accuracy** • **Poland, high load, high recognition accuracy** • **Poland, medium load, medium recognition accuracy** • **Portugal, high load, high recognition accuracy** • **Portugal, medium load, medium recognition accuracy** • **Russia, high load, high recognition accuracy** • **Russia, not supported** • **Russia, medium load, medium recognition accuracy** • **Saudi Arabia, high load, high recognition accuracy** • **Saudi Arabia, medium load, medium recognition accuracy** • **Singapore, high load, high recognition accuracy** • **Singapore, medium load, medium recognition accuracy** • **Slovenia, high load, high recognition accuracy** • **Slovenia, medium load, medium recognition accuracy** • **South Africa, high load, high recognition accuracy** • **South Africa, not supported** • **South Africa, medium load, medium recognition accuracy** • **South Korea, high load, high recognition accuracy** • **South Korea, medium load, medium recognition accuracy** • **Spain, high load, high recognition accuracy**	

Parameter	Value	Description
	• **Spain, medium load, medium recognition accuracy** • **Sri Lanka, not supported** • **Sri Lanka, medium load, medium recognition accuracy** • **Switzerland, high load, high recognition accuracy** • **Switzerland, medium load, medium recognition accuracy** • **Taiwan, high load, high recognition accuracy** • **Taiwan, not supported** • **Taiwan, medium load, medium recognition accuracy** • **Thailand, high load, high recognition accuracy** • **Thailand, medium load, medium recognition accuracy** • **Turkey, high load, high recognition accuracy** • **Turkey, medium load, medium recognition accuracy** • **Ukraine, high load, high recognition accuracy** • **Ukraine, medium load, medium recognition accuracy** • **United Kingdom, high load, high recognition accuracy** • **United Kingdom, medium load, medium recognition accuracy** • **United States, high load, high recognition accuracy** • **United States, not supported** • **United States, medium load, medium recognition accuracy** • **Uzbekistan, high load, high recognition accuracy**	

Parameter	Value	Description
	• **Uzbekistan, medium load, medium recognition accuracy** • **Vietnam, high load, high recognition accuracy** • **Vietnam, medium load, medium recognition accuracy**	

In the window, specify the area in which license plate detection and recognition will be performed. You can adjust the area by moving the anchor points .



Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuration of the **License plate recognition IV** is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of the **License plate recognition IV** (see Standard sub-detectors(see page 359)).

19.4.30.3 License plate recognition RR

19.4.30.3.1 Functionality of License plate recognition RR

Description

The **License plate recognition RR** detector is used to:

1. Recognize license plates of vehicles. List of supported countries:
   Armenia, Austria, Azerbaijan, Argentina, Belarus, Belize (starting with *Detector Pack* 3.14) Belgium, Brazil, Brunei, Bulgaria, Chili (starting with *Detector Pack* 3.13), China, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Indonesia, Italy, Ivory Coast, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mexico, Moldova, Myanmar, Netherlands, New Zealand (starting with *Detector Pack* 3.14), Panama, Paraguay, Peru, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sri Lanka (starting with *Detector Pack* 3.13), Sweden, Tajikistan, Tunisia (starting with *Detector Pack* 3.13), Turkey (starting with *Detector Pack* 3.14), Turkmenistan, UAE (starting with *Detector Pack* 3.14), Ukraine, Uruguay, USA (starting with *Detector Pack* 3.12), Uzbekistan, Venezuela, Vietnam
2. Write the recognized license plates into a database
3. Check the recognized license plates in the lists of license plates
4. Recognize license plates based on the created lists of LPs. Recognition is performed in the Fast mode (video stream processing at a speed of up to 30 FPS)
5. Determine the vehicle driving direction
6. Recognize the color, make, model, headlight condition, class of a vehicle

Make	Model	Vehicle class
Acura	MDX, RDX, TLX, ZDX	Car
Alfa Romeo	147, 159, Brera, Giulietta, MiTo	
Asia	Rocsta	
Aston Martin	DB11, DB9, Rapide, V8 Vantage, Vanquish	
Audi	100, 80, 90, A1, A3, A4, A5, A6, A7, A8, Cabriolet, Q3, Q5, Q7, R8, RS4, RS5, RS6, RS Q3, S3, S5, S6, S8, SQ5, TT	
Autosan	H10 12	Bus
Avia	D Series	Truck
BAW	Fenix	
BAZ	A079 Etalon	Bus
BMW	1 Series, 2 Series, 3 Series, 4 Series, 5 Series, 6 Series, 7 Series, X1, X3, X4, X5, X6, Z3, Z4	Car
BYD	F3	
Beifang Benchi	BFC6123C	Truck
Bentley	Arnage, Bentayga, Continental, Flying Spur, Mulsanne	Car

Make	Model	Vehicle class
Berkhof	Axial, Excellence	Bus
Beulas	Eurostar	
Bogdan	2110, 2310, Lada 2310 Pickup, Lada 2312	Car
	A092, A201, A202	Bus
Brilliance	V5	Car
Bronto	Niva	
Buerstner	Ixeo	Mini truck
CNHTC	Howo ZZ Series	Truck
Cadillac	ATS, CTS, Escalade, SRX, STS, XT5	Car
Carrus	Regal, Star	Bus
Changan	CS35	Car
Chery	A13, A15, A21, Amulet A15, Arrizo 7, Fora, Indis, Kimo S12, S12, S18D, T11, T21, Tiggo, Tiggo 5	
Chevrolet	Aveo, Blazer, Camaro, Caprice, Captiva, Cobalt, Cruze, Epica, Express, Lacetti, Lanos, Malibu, Niva, Orlando, Rezzo, Spark, Suburban, Tahoe, TrailBlazer, Viva	
Chrysler	300, 300C, Concorde, Grand Voyager, PT Cruiser, Pacifica, Sebring, Town and Country, Voyager	
Citroen	BX, Berlingo, C1, C2, C3, C3 Picasso, C4, C4 AirCross, C4 Picasso, C5, C Crosser, C Elysee, DS3, DS4, DS5, Grand C4 Picasso, Xantia, Xsara, Xsara Picasso	
	Jumper, Jumpy	Mini truck
DAF	95, 95 XF, CF, FT, FT CF, FT XF, XF	Truck
DS	4	Car
DW Hower	H3	
Dacia	Logan MCV, Sandero	
Daewoo	BS106	Bus
	Espero, Gentra, Lanos, Leganza, Matiz, Nexia, Nubira	Car

Make	Model	Vehicle class
Daihatsu	Materia, Mira, Move, Sirion, Tanto, Terios, YRV	
Datsun	mi DO, on DO	
Derways	Plutus	
Dodge	Caliber, Caravan, Challenger, Durango, Grand Caravan, Intrepid, Journey, Magnum, Neon, Nitro, Ram, Stratus	
DongFeng	DFL	Truck
	H30 Cross, S30	Car
Doninvest	Kondor	
Drogmoller	EuroComet	Bus
EOS	200, 233, 90	
Elnagh	Baron, Nobel Art	Mini truck
Emgrand	EC7, X7, Phantom	Car
FAW	Besturn B50, Besturn X80, V5	
FIAT	500, Albea, Brava, Bravo, Doblo, Grande Punto, Linea, Panda, Punto, Stilo Uno	
	Ducato, Scudo	Mini truck
Ferrari	458, 488, 612, California, F12, F141, F149, F430, GTC4 Lusso	Car
Ford	C Max, EcoSport, Edge, Escape, Escort, Expedition, Explorer, F 150, Fiesta, Focus, Focus C Max, Freestar, Fusion, Galaxy, Granada, Grand C Max, Ka, Kuga, Maverick, Mondeo, Mustang, Probe, Ranger, S Max, Scorpio, Sierra, Taunus, Taurus, Tourneo Connect, Transit Connect	
	Cargo	Truck
	Tourneo, Transit, Transit Custom	Mini truck
Foton	1049, Auman, Aumark, BJ	Truck
FoxBus	22501	Bus
Freightliner	Argosy, Business Class, CL Series, CST, Century, Century Class, Columbia, FLC, FLD, FLD SD, FL Series, M2, ST Series	Truck

Make	Model	Vehicle class
GAZ	172200 Volga, 24 Volga, 31 Volga, 69, Volga Siber	Car
	1724 Gazel, 22 Gazel, 23 Gazel, 27 Gazel, 3221 Gazel, 32 Gazel, 3302 Gazel, 3310 Valday, 33 Gazel, GAZel Biznes, GAZon Next, Gazel, Gazel Next	Mini truck
	3307, 3308 Sadko, 3309, 52, 53, 66, SAZ 2507, SAZ 3507	Truck
GolAZ	5291 Cruise	Bus
Golden Dragon	XML6126, XML6957	
GMC	Yukon	Car
Geely	CK, Emgrand, GC6, MK	
Genesis	G80	
Great Wall	Hover, Hover H3, Hover H5, Hover H6, Hover M2, Hover M4	
HUMMER	H2, H3	
Hafei	Simbo	
Haima	3, 7	
Haval	H6, H9	
Higer	A80, KLQ	Bus
Hino	300 Series, 500 Series, Profia, Ranger	Truck
Honda	Accord, Accord Crosstour, Airwave, CR V, Civic, Civic Ferio, Crossroad, Crosstour, Element, Freed, Freed Spike, HR V, Integra, Jazz, Legend, Odyssey, Pilot, Prelude, Stepwgn, Stream, Torneo	Car
Hymer	Mobil	Mini truck
Hyundai	Accent, Avante, Coupe, Creta, Elantra, Equus, Galloper, Genesis, Genesis Coupe, Getz, Grand Santa Fe, Grand Starex, Grandeur, H 1, Matrix, NF, Santa Fe, Solaris, Sonata, Starex, Terracan, Tiburon, Trajet, Tucson, Tuscani, Veloster, i20, i30, i40, ix35, ix55	Car
	Aero City, County, Universe, Universe Space	Bus
	HD	Truck
	Porter	Mini truck
Ikarus	250, 256, 260, 280	Bus

Make	Model	Vehicle class
Infiniti	EX Series, FX Series, G Series, JX Series, M Series, QX Series, Q Series	Car
International	9000 Series	Truck
Iran Khodro	Samand	Car
Irisbus	Crossway, Magelys	Bus
Isuzu	Axiom	Car
	AF, Elf, F Series, Forward, NPR, N Series	Truck
Iveco	AMT, EuroCargo, EuroStar, EuroTech, Stralis, Trakker	Truck
	Daily, TurboDaily	Mini truck
Izh	2125, 2126, 21261 Fabula, 2715, 2717, 412	Car
JAC	HK6120 KY	Bus
	S5	Car
JMC	Carrying	Truck
Jaguar	F Pace, F Type, S Type, XE, XF, XJ, XK, XKR, X Type	Car
Jeep	Cherokee, Commander, Compass, Grand Cherokee, Liberty, Renegade, Wrangler	
Jonckheere	Deauville	Bus
KAvZ	3976, 4235, 4238	
KIA	Bongo	Mini truck
	Carens, Carnival, Ceed, Cerato, Magentis, Mohave, Opirus, Optima, Picanto, Quoris, Rio, Rio X Line, Sorento, Soul, Spectra, Sportage, Stinger, Venga, Pro ceed	Car
	Granbird	Bus
KamAZ	4308, 4310, 44108, 4539, 5308, 5321, 5410, 5411, 5460, 5490, 551, 5511, 6460, 6511, 6520, 6522, NefAz 4208	Truck
Kenworth	T2000, W900	
King Long	XMQ	Bus

Make	Model	Vehicle class
KrAZ	6322	Truck
LDV	Maxus	Mini truck
Lamborghini	Aventador, Gallardo	Car
Lancia	Delta	
Land Rover	Defender, Discovery, Discovery Sport, Freelander, Range Rover, Range Rover Evoque, Range Rover Sport, Range Rover Velar	
Lexus	CT, ES, GS, GX, IS, LC, LS, LX, NX, RX, SC	
LiAZ	4292, 5256, 5292, 5293, 6213, 677	
Liebherr	LTM	Truck
Lifan	Breez, Cebrium, Smily, Solano, Solano II, X60	Car
Lincoln	Aviator, Continental, LS, MKS, MKT, MKX, Navigator, Town Car	
MAN	F2000, F90, L2000, LE2000, M2000, M90, ME2000, TGA, TGL, TGM, TGS, TGX	Truck
	Lions Coach, Lions Regio, Lions Top Star	Bus
MAZ	103, 107, 152, 203, 206	
	43, 53, 54, 55, 63, 64, 65	Truck
MG	ZT T	Car
MINI	Clubman, Cooper, Countryman, Hatch	
Marcopolo	Andare, Bravis	Bus
Maserati	Ghibli, Levante, Quattroporte	Car
Maybach	57, 62	
Mazda	2, 3, 323, 5, 6, 626, BT 50, Bongo, Bongo Friendee, CX 5, CX 7, CX 9, Capella, Demio, Familia, MPV, MX 5, Premacy, RX 8, Titan, Tribute	
Mercedes Benz	A Klasse, B Klasse, CLA Klasse, CLK Klasse, CLS Klasse, CL Klasse, C Klasse, Citan, E Klasse, GLA Klasse, GLC Klasse, GLE Klasse, GLK Klasse, GLS Klasse, GL Klasse, G Klasse, M Klasse, R Klasse, SLK Klasse, SL Klasse, S Klasse, X Klasse	
	Actros, Atego, Axor, LK Series, SK Series	Truck

Make	Model	Vehicle class
	MB Series, Sprinter, T1, T2, V Klasse, Vario, Viano, Vito	Mini truck
	Travego, Conecto, O303, O330, O350 Tourismo, O403, O404, O405, O560 Intouro	Bus
Mercury	Grand Marquis, Mariner, Mystique, Villager	Car
Mitsubishi	ASX, Airtrek, Carisma, Colt, Delica, Delica Space Gear, Eclipse, Galant, Grandis, L200, Lancer, Lancer Cargo, Lancer Cedia, Lancer Evolution, Legnum, Outlander, Outlander XL, Pajero, Pajero Mini, Pajero Pinin, Pajero Sport, Pajero iO, RVR, Space Gear, Space Wagon	
	Canter, Fuso Canter, Fuso Fighter	Truck
Moskvich	2137, 2140, 2141, 403, 408, 412	Car
Multicar	M25, M26	Mini truck
Nefaz	5299	Bus
Neoplan	Cityliner, Euroliner, Jetliner, Skyliner, Spaceliner, Starliner, Transliner	
Nissan	AD, Almera, Almera Classic, Atlas, Avenir, Bluebird, Bluebird Sylphy, Cedric, Cefiro, Cube, Expert, GT R, Juke, Laurel, Liberty, March, Maxima, Maxima QX, Micra, Murano, NP300 Pickup, Navara, Note, Pathfinder, Patrol, Presage, Primera, Pulsar, Qashqai, Qashqai 2, Safari, Sentra, Serena, Skyline, Sunny, Teana, Terrano, Terrano II, Tiida, Vanette, Wingroad, X Trail	Car
	Cabstar, Diesel Condor	Mini truck
Noge	Vesubio	Bus
Oldsmobile	Alero	Car
Opel	Antara, Ascona, Astra, Calibra, Combo, Corsa, Frontera, Insignia, Kadett, Meriva, Mokka, Monterey, Omega, Rekord, Tigra, Vectra, Zafira	
	Movano, Vivaro	Mini truck
Oshan	X5, X7	Car
PAZ	3203, 3204, 3205, 4230 Avrora, 4234, Vector Next	Bus
Peugeot	1007, 106, 107, 2008, 205, 206, 207, 208, 3008, 301, 306, 307, 308, 4007, 4008, 405, 406, 407, 408, 5008, 508, 605, 607, 806, 807, Partner, RCZ	Car
	Boxer, Expert, Expert Tepee, Traveller	Mini truck
Plymouth	Neon, Voyager	Car

Make	Model	Vehicle class
Pontiac	Bonneville, Firebird, Grand Am, Grand Prix, Solstice, Sunfire, Trans Sport, Vibe	Car
Porsche	911, 924, 928, Boxster, Cayenne, Cayman, Macan, Panamera, Taycan	Car
RAM	ProMaster City	Mini truck
Ravon	Gentra, Matiz, Nexia, Nexia R3, R2, R4	Car
Renault	19, 21, 25, Arkana, Captur, Clio, Dokker, Duster, Espace, Fluence, Grand Scenic, Kadjar, Kangoo, Koleos, Kwid, Laguna, Latitude, Logan, Logan Stepway, Megane, Modus, Oroch, SR, Safrane, Sandero, Sandero Stepway, Scenic, Symbol, Talisman, Twingo, Vel Satis, Wind, ZOE	Car
	Kerax, Magnum, Midlum, Premium, T Series	Truck
	Mascott, Master, Trafic	Mini truck
Skoda	Citigo, Fabia, Favorit, Felicia, Forman, Kamiq, Karoq, Kodiaq, Octavia, Praktik, Rapid, Roomster, Superb, Yeti	Car
Subaru	Ascent, B9 Tribeca, BRZ, Crosstrek, Domingo, Exiga, Forester, Impreza, Impreza WRX, Impreza WRX, Impreza XV, Justy, Legacy, Legacy Lancaster, Legacy Outback, Leone, Levorg, Outback, Pleo, Pleo Plus, R1, R2, SVX, Sambar, Stella, Traviq, Trezia, Tribeca, Vivio, WRX, XV	Car
Suzuki	Aerio, Alto, Baleno, Cervo, Ciaz, Cultus, Ertiga, Escudo, Esteem, Every, Forenza, Grand Vitara, Hustler, Ignis, Jimny, Kei, Kizashi, Landy, Liana, Palette, SX4, SX4 S Cross, Samurai, Sidekick, Solio, Splash, Swift, Vitara, Wagon R, XL7, Xbee	Car
	Spacia	Mini truck
Toyota	4Runner, Agya, Allex, Allion, Alphard, Altezza, Aqua, Aristo, Auris, Avalon, Avanza, Avensis, Avensis Verso, Aygo, Belta, Blade, Brevis, C HR, Caldina, Cami, Camry, Camry Gracia, Camry Solara, Carina, Carina E, Carina ED, Cavalier, Celica, Celsior, Chaser, Corolla, Corolla Allex, Corolla Axio, Corolla Ceres, Corolla Cross, Corolla Fielder, Corolla II, Corolla Levin, Corolla Rumion, Corolla Runx, Corolla Spacio, Corolla Verso, Corona, Corona Exiv, Corona Premio, Corsa, Cresta, Crown, Crown Majesta, Curren, Cynos, Duet, Echo, Esquire, Estima, Estima Emina, Estima Lucida, Etios, FJ Cruiser, Fortuner, Fun Cargo, GT86, Gaia, Grand Hiace, Hiace Regius, Highlander, Hilux, Hilux Surf, Innova, Ipsum, Isis, Ist, Kijang, Kluger, Land Cruiser, Land Cruiser Prado, Lite Ace, Lite Ace Noah, MR2, MR S, Mark II, Mark II Blit, Mark II Qualis, Mark X, Mark X Zio, Master Ace Surf, Matrix, Nadia, Noah, Opa, Paseo, Passo, Passo Sette, Picnic, Pixis Epoch, Pixis Joy, Pixis Space, Pixis Van, Platz, Porte, Premio, Previa, Prius, Probox, Progres, Pronard, RAV4, Ractis, Raize, Raum, Roomy, Rush, Sai, Scepter, Sequoia, Sera, Sienna, Sienta, Soarer, Spade, Sparky, Sprinter, Sprinter Carib, Sprinter Marino, Sprinter Trueno, Starlet, Succeed, Supra, Tacoma, Tank, Tercel, Town Ace, Town Ace Noah, Tundra, Urban Cruiser, Vanguard, Vellfire, Venza, Verossa, Verso, Vios, Vista, Vista Ardeo, Vitz, Voltz, Voxy, Will, Windom, Wish, Yaris, Yaris Verso	Car
	Dyna, Granvia, Hiace, ProAce, Regius, Regius Ace, Toyo Ace	Mini truck

Make	Model	Vehicle class
UAZ	315, 316, 469, 2360, 2363, 3151, 23602 Cargo, 23632 Pickup, Hunter, Patriot	Car
	452, 2206, 2989, 3303, 3741, 3909, 3962, AC B1, Profi, TC 17144	Mini truck
Volkswagen	Amarok, Arteon, Atlas, Beetle, Bora, Caddy, Corrado, CrossPolo, Eos, EuroVan, Fox, Fusca, Gol, Golf, Golf, ID3, ID4, ID6, Jetta, Lavida, Lupo, Multivan, New Beetle, Nivus, Parati, Passat, Passat Alltrack, Passat CC, Phaeton, Pointer, Polo, Routan, Santana, Saveiro, Scirocco, Sharan, Spacefox, T Cross, T Roc, Talagon, Taos, Tavendor, Tayron, Teramont, Tharu, Tiguan, Touareg, Touran, Type 1, Type 2, Up, Vento, Viloran, Virtus, Voyage	Car
	California, Caravelle, Crafter, LT, Transporter	Mini truck
Volvo	240 Series, 300, 440, 460, 740, 760, 850, 940, 960, C30, C70, S40, S60, S70, S80, S90, V40, V40 Cross Country, V50, V60 Cross Country, V70, V70XC, V90 Cross Country, XC40, XC60, XC70, XC90	Car
	7300, 7350, 8900, 9500, 9700, 9900, B10	Bus
	F12, FE, FH, FL, FM, FMX, VN Series	Truck

Licensing

For the **License plate recognition RR** detector to operate, contact an AxxonSoft manager and get a license file (see Types of licenses[210])

Add-ons

For the **License plate recognition RR** detector to operate, you must install the RR LPR add-on (see Installing DetectorPack add-ons(see page 321))

Attention!

Starting with *Detector Pack* 3.14, you must install two *Detector Packs* for the detector to operate:

- RR LPR add-on;
- RR SDK Pack.

19.4.30.3.2 Hardware requirements for License plate recognition RR

Hardware requirements(see page 87)

If you use the **License plate recognition RR** detector, the following hardware requirements must be met:

Device	Requirements for the supported model
CPU	• Intel Core 6th generation and newer, Intel Xeon v4 and newer • Support for the AVX2 instruction set that is listed here[211] • Movidius/Neural Compute Stick devices are formally supported but currently don't undergo the regular testing

210 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses
211 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3532

Device	Requirements for the supported model
Nvidia GPU	• NVIDIA GTX 1050 Ti and newer • At least 2 GB of video memory • Compute Capability: from 3.5 to 8.6. You can check the GPU Compute Capability version on the manufacturer's[212] website • Support for CUDA 11.8. CUDA is compatible with generations of computers on the following architectures: Kepler (partially), Maxwell, Pascal, Volta, Turing, Ampere (partially) (see CUDA[213]). NVIDIA drivers version 450.36.06 and higher are required. We recommend installing the latest driver version from the official website[214]
Intel GPU	• Intel Arc Family, Intel Data Center GPU Flex Series (including 140/170 models) • Intel HD Graphics, Intel UHD Graphics, Intel Iris Xe Graphics and newer • Support for other platforms listed in the official OpenVINO documentation is possible, but they aren't tested for compatibility with the detector

Attention!

To use the capabilities of the GPU (both NVIDIA and Intel), you must manually install the necessary drivers and runtime components (for example, CUDA for NVIDIA), as they aren't included in the software package.

19.4.30.3.3 Camera requirements for License plate recognition RR and its sub-detectors

You must install and configure the cameras in such a way that the following requirements are met:

Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection	
Basic requirements	To ensure the recognition of state license plates and vehicles	Camera	• Minimum resolution is 1280*720, recommended resolution is 1920*1080 and more • Video codec: MJPEG minimum, H.264 or H.265 are recommended, preferably uncompressed • Bitrate: depends on the frame (license plate must be readable) • Minimum frame rate: at least 5 FPS at speed up to 20 km/h (Slow mode), from 20 FPS at speed over 20 km/h (Fast mode) • Maximum horizontal angle is 30°, recommended angle is 0° • Maximum vertical angle is 45°, recommended angle is 20° • Maximum camera rotation angle is 20°, recommended angle is 0° • In order to recognize state license plates on high-speed roads, the camera must have the Global Shutter mode **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.

212 https://developer.nvidia.com/cuda-gpus
213 https://en.wikipedia.org/wiki/CUDA
214 https://www.nvidia.com/en-us/drivers/

Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection	
		Lighting	• Illuminated control area. We recommend using conventional spotlights and/or cameras with IR illumination for additional illumination • Expected image contrast: the contrast difference between characters of the license plate and the background must be at least 20 units with the image brightness scale from 0 to 255 • During daytime and nighttime, we recommend selecting the values of the light sensitivity (ISO) parameter separately with the minimum exposure time (maximum shutter speed)
		Scene and camera angle	• We recommend installing a camera in such a way that various objects that block the vehicle during its recognition are not in the frame. For example, a barrier or fence • The state license plate must be readable • Height of characters (letters and digits) on the state license plates is at least 10px and not more than 60px. Preferably 20px or more • Width of the dashboard: minimum 80 pixels, recommended 100 pixels • Thickness of the character line: minimum 1 pixel, recommended 2 pixels • Vehicles during the passage must be completely within the camera FOV for at least five frames • The size of the vehicle's bounding rectangle: a. Minimum: height/width is at least 150px and at least 15% of the frame height/width. Recommended: 250px/30%. b. Maximum: height/width isn't limited, but no more than 80% of the height/width of the frame
		Object images	• To avoid blurring of the image, you must set the camera to a slow shutter speed. We recommend keeping the shutter speed at no more than three ms. The exact value depends on the camera angle and vehicle speed

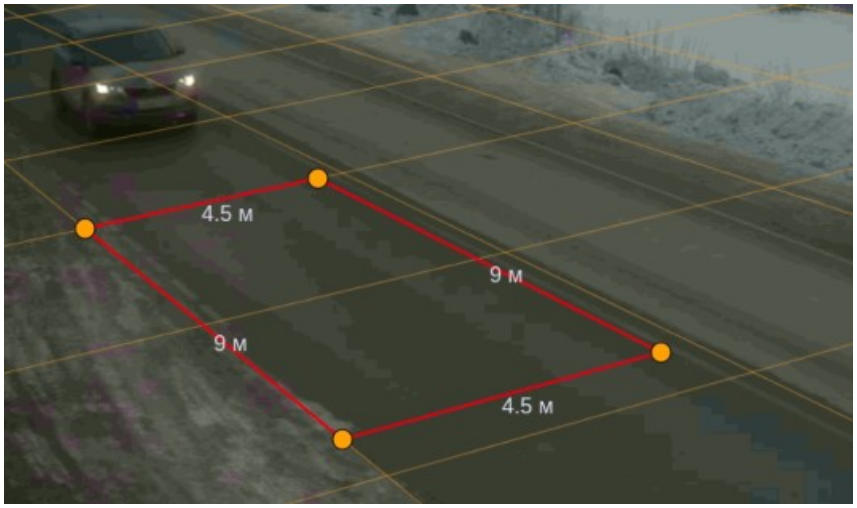
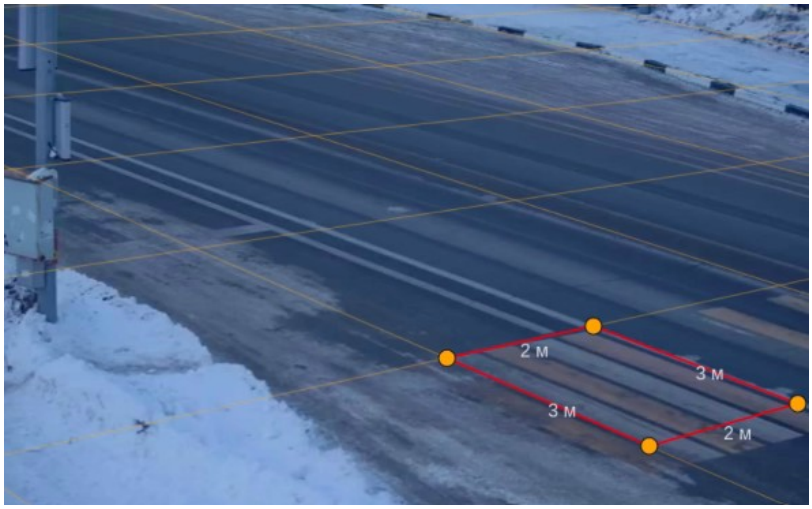
Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection

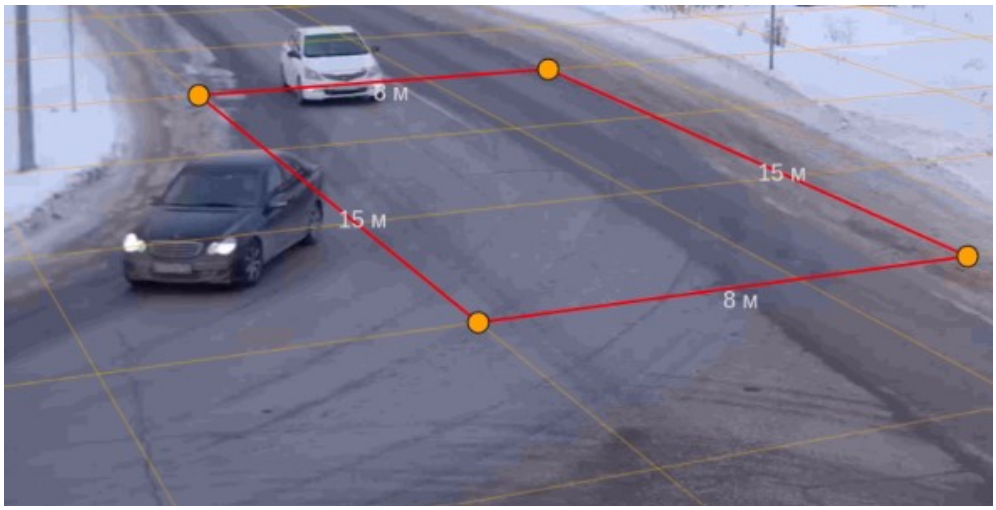
Additional requirements	To determine the speed of the vehicle	• Camera installation height is at least four meters
		• The time period when a vehicle is in front of the camera with a fully readable state license plate, or when a vehicle that is fully in the frame and accurately recognized must be at least 500 ms
		• Time stamps for frames must not differ from the real time by more than two ms
		• When calibrating values, the measured road section must be at least three meters wide and five meters long. In this case, the key points in the image must be at least 300 pixels apart. The measurement error during calibration (difference between actual and entered measured values) must not exceed 1%
		• Camera must be rigidly fixed and must not move during gusts of wind and other physical forces
		• All of the following rules must be followed by default:
		  • The bounding rectangle of the state license plates doesn't touch the bottom part of the frame in both selected frames for speed calculation
		  • The offset of the center of the rectangle between the two selected frames is at least four meters and 100 pixels
		  • The time difference between two selected frames is at least 100 ms
		Recommendations for configuring the speed detection area for License plate recognition RR(see page 547)

	To determine the driving direction of the vehicle	• Camera installation height is at least three meters • Angle between camera and road direction is not more than 30° • Minimum camera tilt
	To recognize the make and model of the vehicle	• Visible width of the vehicle is from 100px • Color or black and white image • Front view of the vehicle
	To recognize the color of the vehicle	• Visible width of the vehicle is from 100px • The scene illumination must be at least 50 lux. Under low or excessive illumination (night or backlight), the stability of the analytics operation is not guaranteed. There are no abrupt changes in illumination • Color image with a normal color grade
	To determine the condition of the headlights	• Visible width of the vehicle is from 100px • Front view of the vehicle • Evening, night or foggy shooting conditions are required

19.4.30.3.3.1 Recommendations for configuring the speed detection area for License plate recognition RR

Recommendations	1. You must install the camera according to the requirements (see Camera requirements for License plate recognition RR and its sub-detectors(see page 544)). 2. You must select an area in the frame that meets the following conditions: a. The sides of the selected area (**Speed detection area height** and **Speed detection area width**) must be equal in pairs. b. The angles of the selected area must be 90° in the real world. 3. When you specify the area in the Surveillance window, you must focus on: a. Traffic lanes (solid and broken lines on the roadway). b. Road curbs. c. Vehicle bumpers and wheel contact points with the roadway. d. Crosswalks. 4. The quality of vehicle recognition is higher if the selected area occupies a significant part of the frame and is as close to the camera as possible. 5. You can use the dimensions of a particular vehicle as a reference point. For example, Hyundai Solaris: length (**Speed detection area heigh**)—2.6 meters, width (**Speed detection area width**)—1.73 meters **Attention!** Margin of error in determining the speed of vehicles is about 5% with a good calibration, as this function gives only a general idea of the situation. The consumption of resources doesn't change when the **Speed detection** parameter is enabled.

Examples of the corresponding selected area	Lines are parallel to road markings and vehicle bumpers:   



19.4.30.3.4 Optimizing the operation of License plate recognition RR on GPU in Windows OS

Starting with *DetectorPack* 3.10, a utility was added to the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the **License plate recognition RR** detector on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

   Attention!

   If the system has the software running on GPU, it is necessary to stop its operation.

2. Create the **GPU_CACHE_DIR** system variable (see Creating system variable(see page 126)) by specifying the path to the cache location with an arbitrary folder name in the **Variable value** field. For example, D:\AO_GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
3. To call the utility, open in the command line: **C:\Program Files\Common Files\AxxonSoft\DetectorPack\RRGpuCacheGenerator.exe** and press **Enter**.
4. Select the required cache sets by specifying the **y** value:
   a. **lpr recognition**—recognition of a vehicle license plate;
   b. **vehicle recognition**—recognition of a vehicle.
   When you select the **lpr recognition** cache set, you need to specify the required countries in numeric or alphabetic form. After you select all required countries, enter the **done** value.
   Expand the list of countries

   AM (Armenia)
   AR (Argentina)
   AT (Austria)
   AZ (Azerbaijan)
   BE (Belgium)
   BG (Bulgaria)
   BN (Brunei)
   BR (Brazil)
   BY (Belarus)
   CI (Ivory Coast)
   CN (China)
   CO (Colombia)
   CY (Cyprus)
   CZ (Czech Republic)
   DE (Germany)
   DK (Denmark)

EE (Estonia)
EG (Egypt)
ES (Spain)
FI (Finland)
FR (France)
GE (Georgia)
GR (Greece)
HR (Croatia)
HU (Hungary)
ID (Indonesia)
IE (Ireland)
IT (Italy)
KG (Kyrgyzstan)
KZ (Kazakhstan)
LT (Lithuania)
LU (Luxembourg)
LV (Latvia)
MD (Moldova)
MM (Myanmar)
MT (Malta)
MX (Mexico)
MY (Malaysia)
NL (Netherlands)
PE (Peru)
PL (Poland)
PT (Portugal)
PA (Panama)
PY (Paraguay)
RO (Romania)
RS (Serbia)
RU (Russia)
SE (Sweden)
SI (Slovenia)
SK (Slovakia)
TJ (Tajikistan)
TM (Turkmenistan)
UA (Ukraine)
UZ (Uzbekistan)
UY (Uruguay)
VN (Venezuela)
VN (Vietnam)
US (USA)
LK (Sri Lanka)
CL (Chile)
TN (Tunisia)

   c. When you select the **vehicle recognition** cache set without **lpr recognition**, you must choose the territory where vehicle recognition is going to be performed:
      i. **CIS countries**—**1**;
      ii. **Other countries**—**2**.
5. Select one of the accuracy and performance values by specifying the corresponding number:
   a. **Medium accuracy, high performance**—**1**, provides medium recognition accuracy and high performance of the GPU (less load on the GPU);
   b. **High accuracy, medium performance**—**2**, provides high recognition accuracy and medium performance of the GPU (high load on the GPU).
6. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
7. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the **License plate recognition RR** detector on GPU is complete.

Attention!

You must recreate the cache:
- if you update the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, accuracy value, and so on).

19.4.30.3.5 Optimizing the operation of License plate recognition RR on GPU in Linux OS

Creating system variables for the Axxon One server in Linux OS[215]
Creating system variables for the Axxon One server in the failover mode in Linux OS[216]

Starting with *DetectorPack* 3.10, a utility was added to the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the **License plate recognition RR** detector on GPU, do the following

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[217]).

   Attention!

   If the system has the software running on GPU, you must stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

   ```
   sudo su ngp
   ```

   b. Enter the password for the superuser.
3. Create a folder with a custom name to store the cache. For example:

   ```
   mkdir /opt/AxxonSoft/AxxonOne/gpucache
   ```

4. Change folder permissions:

   ```
   chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
   ```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

   ```
   cd /opt/AxxonSoft/AxxonOne
   ```

6. Open the server configuration file for editing:

215 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
216 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS
217 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

```
nano instance.conf
```

Attention!

When you use the server in failover mode, you must:

a. Open the **/etc/AxxonSoft** folder:

```
cd /etc/AxxonSoft
```

b. Open the server configuration file for editing:

```
nano axxon-one.conf
```

Note

Before you make the changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[218].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

d. Save the changes in the file.

e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file.

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit file editing mode using the **Ctrl+X** keyboard shortcut.

Attention!

218 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[219]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[220]).

10. In the command prompt, run the command that was used to add the system variable with the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./RRGpuCacheGenerator
```

13. Select the required cache sets by specifying the **y** value:
    a. **lpr recognition**—recognition of a vehicle license plate;
    b. **vehicle recognition**—recognition of a vehicle.
    When you select the **lpr recognition** cache set, you need to specify the required countries in the numeric or alphabetic form. After you select all required countries, enter the **done** value.
    Expand the list of countries

    AM (Armenia)
    AR (Argentina)
    AT (Austria)
    AZ (Azerbaijan)
    BE (Belgium)
    BG (Bulgaria)
    BN (Brunei)
    BR (Brazil)
    BY (Belarus)
    CI (Ivory Coast)
    CN (China)
    CO (Colombia)
    CY (Cyprus)
    CZ (Czech Republic)
    DE (Germany)
    DK (Denmark)
    EE (Estonia)
    EG (Egypt)
    ES (Spain)
    FI (Finland)
    FR (France)
    GE (Georgia)
    GR (Greece)
    HR (Croatia)
    HU (Hungary)
    ID (Indonesia)
    IE (Ireland)
    IT (Italy)

219 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS
220 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

KG (Kyrgyzstan)
KZ (Kazakhstan)
LT (Lithuania)
LU (Luxembourg)
LV (Latvia)
MD (Moldova)
MM (Myanmar)
MT (Malta)
MX (Mexico)
MY (Malaysia)
NL (Netherlands)
PE (Peru)
PL (Poland)
PT (Portugal)
PA (Panama)
PY (Paraguay)
RO (Romania)
RS (Serbia)
RU (Russia)
SE (Sweden)
SI (Slovenia)
SK (Slovakia)
TJ (Tajikistan)
TM (Turkmenistan)
UA (Ukraine)
UZ (Uzbekistan)
UY (Uruguay)
VN (Venezuela)
VN (Vietnam)
US (USA)
LK (Sri Lanka)
CL (Chile)
TN (Tunisia)

c. When you select the **vehicle recognition** cache set without **lpr recognition**, you must specify the territory where vehicle recognition is going to be performed:
   i. **CIS countries**—**1**;
   ii. **Other countries**—**2**.

14. Select one of the accuracy and performance values by specifying the corresponding number:
    a. **Medium accuracy, high performance**—**1**, provides medium recognition accuracy and high performance of the GPU (less load on the GPU);
    b. **High accuracy, medium performance**—**2**, provides high recognition accuracy and medium performance of the GPU (high load on the GPU).
15. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
16. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the **License plate recognition RR** detector on GPU is complete.

Attention!

You must recreate the cache:
- if you update the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, accuracy value, and so on).

19.4.30.3.6 Configuring License plate recognition RR

Hardware requirements for License plate recognition RR(see page 543)
Camera requirements for License plate recognition RR and its sub-detectors(see page 544)
Recommendations for configuring the speed detection area for License plate recognition RR(see page 547)
Optimizing the operation of License plate recognition RR on GPU in Windows OS(see page 549)
Optimizing the operation of License plate recognition RR on GPU in Linux OS(see page 551)
Parameters that specify the conditions for starting a macro when recognizing a vehicle(see page 852)
Checking in lists of LPs(see page 668)
Examples of macros used when working with lists of license plates(see page 911)

To configure the **License plate recognition RR** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Vehicle** → **License plate recognition RR**.

By default, the detector is enabled and set to recognize vehicle license plates.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The parameter is disabled by default. If you want to use this detector to check in lists of vehicle license plates, select the **Yes** value (see Checking in lists of LPs(see page 668))
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**License plate recognition RR**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	

Parameter	Value	Description
	HuaweiNPU	
Period of ignoring repeated recognitions (sec) (starting with *Detector Pack* 3.14)	**0**	Specify the period in seconds during which re-recognized license plates are ignored. The value must be in the range [0, 86400]
Type	**License plate recognition RR**	Name of the detector type (non-editable field)
Advanced settings		
Accuracy and performance	**Medium accuracy and high performance** **High accuracy and medium performance**	Select vehicle recognition accuracy and performance: • **Medium accuracy and high performance**—provides medium recognition accuracy and high GPU performance (lower GPU load); • **High accuracy and medium performance**—provides maximum recognition accuracy and medium GPU performance (high GPU load)
Calibration area height (m)	**0**	Specify the height of the calibration area in meters. The value must be in the range [0, 500]
Calibration area width (m)	**0**	Specify the width of the calibration area in meters. The value must be in the range [0, 500]
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (1920 pixels on the longer side) by default. The value must be in the range [640, 10000]. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops, and this resolution will be used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
GDPR policy	**-**	By default, on the layout and in the archive, the characters of a license plate are completely hidden "GDPR ON". To display the characters of a license plate, you must enter a value: • "**-**"—hide all characters (default value), • " (blank field of a parameter value)"—show all characters, • "**N-**"—hide the first N characters, • "**-N**"—hide the last N characters, where **N** is the number of characters

Parameter	Value	Description
Initiate event in (sec)	**0**	Specify the time in seconds after which an event must be generated after recognizing a license plate in the frame. If the value is **0**, an event is generated after the track with a license plate is lost. The value must be in the range [1, 3600]
Minimum LP recognition quality (%)	**80**	Specify the minimum quality of license plate recognition as a percentage. The higher the minimum recognition quality, the fewer false events. The value must be in the range [0, 100]
Minimum vehicle recognition quality (%) (starting with *Detector Pack* 3.14)	**30**	Specify the minimum quality of vehicle recognition as a percentage. The lower the minimum recognition quality, the more events are created, but the lower the reliability of recognition. The higher the value, the stricter the filtering and the higher the accuracy. The value must be in the range [0, 100]
Number of frames for analysis (Intel GPU only) (starting with *Detector Pack* 3.15)	**8 (low latency and low performance)** **16 (medium latency and medium performance)** **32 (high latency and high performance)**	**Attention!** The parameter is active only if you select the **Intel GPU 0**, **1**, **2**, or **3** values in the **Detection mode** parameter. The parameter determines how many frames are buffered before being sent simultaneously to the neural network model for processing. This mechanism optimizes the load on the Intel GPU. The higher the value, the higher the latency and performance. The default value is **8 (low latency and low performance)**
Speed detection	**Off** **Kmph** **Mph**	Select from the list the mode for determining the speed unit of vehicles. **Attention!** Margin of error in determining the speed of vehicles is about 5% with a good calibration, as this function gives only a general idea of the situation. The consumption of resources doesn't change when the **Speed detection** parameter is enabled. **Note** For the correct display of the speed measurement unit, you must create the MEASUREMENT_UNIT system variable (see Creating system variable(see page 126)) and specify the value: • 0—to display kmph; • 1—to display mph.
Track lifespan (starting with *Detector Pack* 3.14)	**Yes** **No**	By default, the parameter is disabled. If you want to view the track lifespan for an object in seconds, select the **Yes** value
Vehicle recognition period (ms) (starting with *Detector Pack* 3.14)	**750**	Specify the period in milliseconds during which the vehicle is recognized. The value must be in the range [1, 10000]
Basic settings		
Algorithm for detecting vehicle direction	**By LP coordinates** **By LP scale change**	The **By LP coordinates** algorithm is used by default. It works as follows: if the coordinates of the vehicle license plate shift from top to bottom (the vehicle moves towards the camera) and if the coordinates of the vehicle license plate shift from bottom to top (the vehicle moves away from the camera). Select the **By LP scale change** parameter if in the Surveillance window, the scale of the vehicle license plate increases (the vehicle moves towards the camera), and if the scale of the vehicle license plate decreases (the vehicle moves away from the camera)

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="8">Detection mode</td><td>CPU</td><td rowspan="8">Select a processor for the detector operation (see Selecting Nvidia GPU when configuring detectors(see page 348))

Attention!
It can take several minutes to launch the algorithm on Nvidia GPU. You can use caching to speed up future launches (see Optimizing the operation of License plate recognition RR on GPU in Windows OS(see page 549), Optimizing the operation of License plate recognition RR on GPU in Linux OS(see page 551)).</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td rowspan="3">Direction of movement (starting with Detector Pack 3.14)</td><td>Both</td><td rowspan="3">By default, an event is created when a vehicle moves in Both directions. If you want the event to be created when a vehicle moves from the camera (Outgoing) or to the camera (Incoming), select the corresponding value</td></tr>
<tr><td>Outgoing</td></tr>
<tr><td>Incoming</td></tr>
<tr><td rowspan="2">Info on unrecognized LPs</td><td>Yes</td><td rowspan="2">The parameter is disabled by default. If it is necessary to determine all possible information about a vehicle with unrecognized license plate, select the Yes value

Attention!
For the parameter to work correctly, you also need to enable the Vehicle recognition parameter.</td></tr>
<tr><td>No</td></tr>
<tr><td rowspan="2">Vehicle recognition</td><td>Yes</td><td rowspan="2">The parameter is disabled by default. If you want to search for vehicles in the archive by vehicle make, model, vehicle class, or other specified criteria, select the Yes value (see Search by LPs(see page 1227))

Note
The accuracy of the Vehicle recognition parameter is:
• Make recognition: 0.992;
• Model recognition: 0.951.

Recognition accuracy is affected by the camera angle, the illumination in the detection area, as well as compliance with camera requirements and video stream quality (see Camera requirements for License plate recognition RR and its sub-detectors(see page 544)).</td></tr>
<tr><td>No</td></tr>
<tr><td colspan="3">Country selection

Attention!
The more countries you select, the slower the recognition process and the higher the probability of errors in recognizing license plates.</td></tr>
</table>

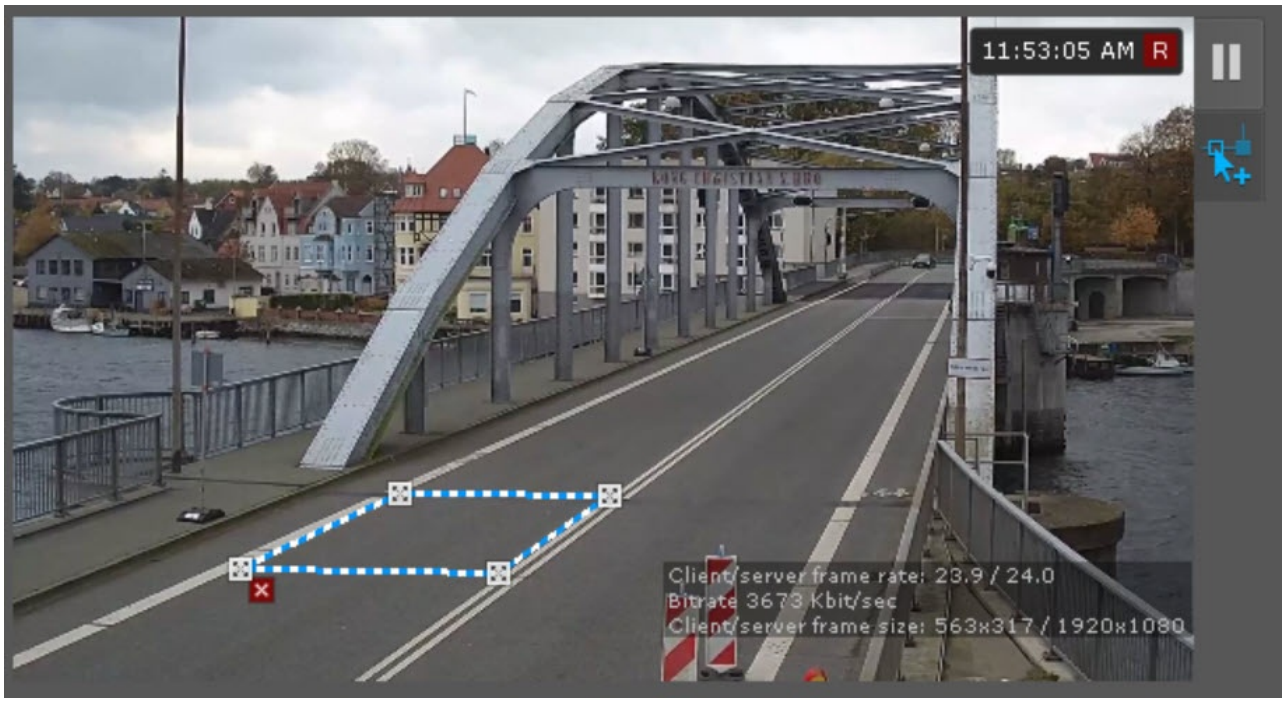
Parameter	Value	Description
Country 1 name	**Argentina**, **Armenia**, **Austria**, **Azerbaijan**, **Belarus**, **Belize** (starting with *Detector Pack* 3.14), **Belgium**, **Brazil**, **Brunei**, **Bulgaria**, **Chile** (starting with *Detector Pack* 3.13), **China**, **Colombia**, **Croatia**, **Cyprus**, **Czechia**, **Côte d'Ivoire**, **Denmark**, **Egypt**, **Estonia**, **Finland**, **France**, **Georgia**, **Germany**, **Greece**, **Hungary**, **Indonesia**, **Ireland**, **Italy**, **Kazakhstan**, **Kyrgyzstan**, **Latvia**, **Lithuania**, **Luxembourg**, **Malaysia**, **Malta**, **Mexico**, **Moldova**, **Myanmar**, **Netherlands**, **New Zealand** (starting with *Detector Pack* 3.14), **Panama**, **Paraguay**, **Peru**, **Poland**, **Portugal**, **Romania**, **Russia**, **Serbia**, **Slovakia**, **Slovenia**, **Spain**, **Sri Lanka** (starting with *Detector Pack* 3.13), **Sweden**, **Tajikistan**, **Tunisia** (starting with *Detector Pack* 3.13), **Turkey** (starting with *Detector Pack* 3.14), **Turkmenistan**, **UAE** (starting with *Detector Pack* 3.14), **Ukraine**, **Uruguay**, **USA** (starting with *Detector Pack* 3.12), **Uzbekistan**, **Venezuela**, **Vietnam**, **Not used**	By default, **Armenia** is selected. From the drop-down list, select a country whose license plates are actually found in the detection area and which need to be recognized
Country 2 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 3 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 4 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 5 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country βeta (starting with *Detector Pack* 3.14)		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized

If necessary, in the preview window, you can set:

1. The calibration area of the road scene. To do this, do the following:
   a. Click in the camera preview window and select **Calibration area**.

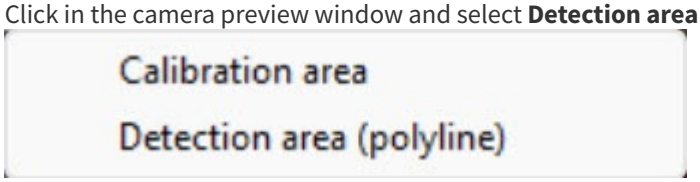


   You can configure the calibration area by moving the anchor points . The calibration area is used to match the camera coordinates with the real road scene. The calibration area must also be set in cases where it is necessary to determine the vehicle speed. It is necessary to set an area that corresponds to a certain real rectangle of known dimensions in the frame. For example, road markings, a vehicle, and so on. You must configure the calibration area so that it is parallel to the ground surface.



b. Specify the dimensions of the real rectangle on the frame. This rectangle corresponds to the area marked in the **Calibration area height (m)** and **Calibration area width (m)** parameters.

2. The detection area. To do this, do the following:
   a. Click in the camera preview window and select **Detection area (polyline)**.



You can configure the detection area by moving the anchor points. The detection area is used to detect vehicles or license plates and generate corresponding events.

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- To hide the area, click the button. To cancel the action, click this button again.
- To delete a selected area, click the button.

To save the parameters of the detector, click the **Apply** button. To cancel the changes, click the **Cancel** button.

Configuration of the **License plate recognition RR** detector is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of **License plate recognition RR** (see Standard sub-detectors(see page 359)).

19.4.30.4 License plate recognition RR—Search in archive

19.4.30.4.1 Functionality of License plate recognition RR—Search in archive

Description	The **License plate recognition RR—Search in archive** detector is used to: 1. Recognize license plates of vehicles. List of supported countries: Armenia, Austria, Azerbaijan, Argentina, Belarus, Belize (starting with *Detector Pack* 3.14) Belgium, Brazil, Brunei, Bulgaria, Chili (starting with *Detector Pack* 3.13), China, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Indonesia, Italy, Ivory Coast, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mexico, Moldova, Myanmar, Netherlands, New Zealand (starting with *Detector Pack* 3.14), Panama, Paraguay, Peru, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sri Lanka (starting with *Detector Pack* 3.13), Sweden, Tajikistan, Tunisia (starting with *Detector Pack* 3.13), Turkey (starting with *Detector Pack* 3.14), Turkmenistan, UAE (starting with *Detector Pack* 3.14), Ukraine, Uruguay, USA (starting with *Detector Pack* 3.12), Uzbekistan, Venezuela, Vietnam 2. Write the recognized license plates into a database 3. Check the recognized license plates in the lists of license plates 4. Determine the vehicle's driving direction 5. Search for recognized license plates in the archive. Recognition is performed in the Fast mode (video stream processing at a speed of up to 30 FPS). This detector generates events with a 30-second delay after the license plate recognition
Licensing	The **License plate recognition RR—Search in archive** detector is available in the **Axxon One Demo** license type. For the detector to operate, contact an AxxonSoft manager and get a license file (see Types of licenses[221])
Add-ons	For the **License plate recognition RR—Search in archive** detector to operate, you must install the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)) **Attention!** Starting with *Detector Pack* 3.14, you must install two *Detector Packs* for the detector to operate: • RR LPR add-on; • RR SDK Pack.

19.4.30.4.2 Hardware requirements for License plate recognition RR—Search in archive

Hardware requirements(see page 87)

If you use the **License plate recognition RR—Search in archive** detector, the following hardware requirements must be met:

Device	Requirements for the supported model
CPU	• Intel Core 6th generation and newer, Intel Xeon v4 and newer • Support for the AVX2 instruction set that is listed here[222] • Movidius/Neural Compute Stick devices are formally supported but currently don't undergo the regular testing

221 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses
222 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3532

Device	Requirements for the supported model
Nvidia GPU	• NVIDIA GTX 1050 Ti and newer • At least 2 GB of video memory • Compute Capability: from 3.5 to 8.6. You can check the GPU Compute Capability version on the manufacturer's[223] website • Support for CUDA 11.8. CUDA is compatible with generations of computers on the following architectures: Kepler (partially), Maxwell, Pascal, Volta, Turing, Ampere (partially) (see CUDA[224]). NVIDIA drivers version 450.36.06 and higher are required. We recommend installing the latest driver version from the official website[225]
Intel GPU	• Intel Arc Family, Intel Data Center GPU Flex Series (including 140/170 models) • Intel HD Graphics, Intel UHD Graphics, Intel Iris Xe Graphics and newer • Support for other platforms listed in the official OpenVINO documentation is possible, but they aren't tested for compatibility with the detector

Attention!

To use the capabilities of the GPU (both NVIDIA and Intel), you must manually install the necessary drivers and runtime components (for example, CUDA for NVIDIA), as they aren't included in the software package.

19.4.30.4.3 Camera requirements for License plate recognition RR—Search in archive and its sub-detectors

You must install and configure the cameras in such a way that the following requirements are met:

Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection	
Basic requirements	To ensure the recognition of state license plates and vehicles	Camera	• Minimum resolution is 1280*720, recommended resolution is 1920*1080 and more • Video codec: MJPEG minimum, H.264 or H.265 are recommended, preferably uncompressed • Bitrate: depends on the frame (license plate must be readable) • Minimum frame rate: at least five FPS at speed up to 20 km/h (Slow mode), from 20 FPS at speed over 20 km/h (Fast mode) • Maximum horizontal angle is 30°, recommended angle is 0° • Maximum vertical angle is 45°, recommended angle is 20° • Maximum camera rotation angle is 20°, recommended angle is 0° • In order to recognize state license plates on high-speed roads, the camera must have the Global Shutter mode **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.

223 https://developer.nvidia.com/cuda-gpus
224 https://en.wikipedia.org/wiki/CUDA
225 https://www.nvidia.com/en-us/drivers/

Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection	
		Lighting	• Illuminated control area. We recommend using conventional spotlights and/or cameras with IR illumination for additional illumination • Expected image contrast: the contrast difference between characters of the license plate and the background must be at least 20 units with the image brightness scale from 0 to 255 • During daytime and nighttime, we recommend selecting the values of the light sensitivity (ISO) parameter separately with the minimum exposure time (maximum shutter speed)
		Scene and camera angle	• We recommend installing a camera in such a way that various objects that block the vehicle during its recognition are not in the frame. For example, a barrier or fence • The state license plate must be readable • Height of characters (letters and digits) on the state license plates is at least 10px and not more than 60px. Preferably 20px or more • Width of the dashboard: minimum 80 pixels, recommended 100 pixels • Thickness of the character line: minimum 1 pixel, recommended 2 pixels • Vehicles during the passage must be completely within the camera FOV for at least five frames • The size of the vehicle's bounding rectangle: a. Minimum: height/width is at least 150px and at least 15% of the frame height/width. Recommended: 250px/30%. b. Maximum: height/width isn't limited, but no more than 80% of the height/width of the frame
		Object images	• To avoid blurring of the image, you must set the camera to a slow shutter speed. We recommend keeping the shutter speed at no more than three ms. The exact value depends on the camera angle and vehicle speed
Additional requirements	To determine the driving direction of the vehicle	• Camera installation height is at least three meters • Angle between camera and road direction is not more than 30° • Minimum camera tilt	

19.4.30.4.4 Optimizing the operation of License plate recognition RR—Search in archive on GPU in Windows OS

Starting with *DetectorPack* 3.10, a utility was added to the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the **License plate recognition RR—Search in archive** detector on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

> **Attention!**
>
> If the system has the software running on GPU, you must stop its operation.

2. Create the **GPU_CACHE_DIR** system variable (see Creating system variable(see page 126)) by specifying in the **Variable value** field the path to the cache location with an arbitrary folder name. For example, D:\AO_GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
3. To call the utility, open in the command line: **C:\Program Files\Common Files\AxxonSoft\DetectorPack\RRGpuCacheGenerator.exe** and press **Enter**.
4. Select the required cache sets by specifying the **y** or **n** value:
   a. **lpr recognition**—recognition of a vehicle license plate;
   b. **vehicle recognition**—recognition of a vehicle;

   > **Attention!**
   >
   > Vehicle recognition isn't available for the **License plate recognition RR—Search in archive**. Specify the **n** value for this item.

   c. When you select the **lpr recognition** cache set, you need to specify the required countries in the numeric or alphabetic form. After you select all required countries, enter the **done** value.
   Expand the list of countries

   AM (Armenia)
   AR (Argentina)
   AT (Austria)
   AZ (Azerbaijan)
   BE (Belgium)
   BG (Bulgaria)
   BN (Brunei)
   BR (Brazil)
   BY (Belarus)
   CI (Ivory Coast)
   CN (China)
   CO (Colombia)
   CY (Cyprus)
   CZ (Czech Republic)
   DE (Germany)
   DK (Denmark)
   EE (Estonia)
   EG (Egypt)
   ES (Spain)
   FI (Finland)
   FR (France)
   GE (Georgia)
   GR (Greece)
   HR (Croatia)
   HU (Hungary)
   ID (Indonesia)
   IE (Ireland)
   IT (Italy)
   KG (Kyrgyzstan)
   KZ (Kazakhstan)
   LT (Lithuania)
   LU (Luxembourg)
   LV (Latvia)
   MD (Moldova)
   MM (Myanmar)
   MT (Malta)
   MX (Mexico)

MY (Malaysia)
NL (Netherlands)
PE (Peru)
PL (Poland)
PT (Portugal)
PA (Panama)
PY (Paraguay)
RO (Romania)
RS (Serbia)
RU (Russia)
SE (Sweden)
SI (Slovenia)
SK (Slovakia)
TJ (Tajikistan)
TM (Turkmenistan)
UA (Ukraine)
UZ (Uzbekistan)
UY (Uruguay)
VN (Venezuela)
VN (Vietnam)
US (USA)
LK (Sri Lanka)
CL (Chile)
TN (Tunisia)

5. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
6. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the **License plate recognition RR—Search in archive** detector on GPU is complete.

Attention!

You must recreate the cache:
- if you update the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, accuracy value, and so on).

19.4.30.4.5 Optimizing the operation of License plate recognition RR—Search in archive on GPU in Linux OS

Creating system variables for the Axxon One server in Linux OS[226]
Creating system variables for the Axxon One server in the failover mode in Linux OS[227]

Starting with *DetectorPack* 3.10, a utility was added to the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the **License plate recognition RR—Search in archive** detector on GPU, do the following:

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[228]).

226 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
227 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS
228 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

Attention!

If the system has the software running on GPU, it is necessary to stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

```
sudo su ngp
```

   b. Enter the password for the superuser.
3. Create a folder with a custom name to store the cache. For example:

```
mkdir /opt/AxxonSoft/AxxonOne/gpucache
```

4. Change folder permissions:

```
chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

```
cd /opt/AxxonSoft/AxxonOne
```

6. Open the server configuration file for editing:

```
nano instance.conf
```

Attention!

When you use the server in failover mode, you must:

a. Open the **/etc/AxxonSoft** folder:

```
cd /etc/AxxonSoft
```

b. Open the server configuration file for editing:

```
nano axxon-one.conf
```

Note

Before you make the changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[229].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

229 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

d. Save the changes in the file.
e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file.

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit file editing mode using the **Ctrl+X** keyboard shortcut.

> **Attention!**
>
> When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[230]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[231]).

10. In the command prompt, run the command that was used to add the system variable with the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./RRGpuCacheGenerator
```

13. Select the required cache sets by specifying the **y** or **n** value:
    a. **lpr recognition**—recognition of a vehicle license plate;
    b. **vehicle recognition**—recognition of a vehicle;

    > **Attention!**
    >
    > Vehicle recognition isn't available for the **License plate recognition RR—Search in archive**. Specify the **n** value for this item.

    c. When you select the **lpr recognition** cache set, you need to specify the required countries in the numeric or alphabetic form. After you select all required countries, enter the **done** value.
    Expand the list of countries

230 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS
231 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

AM (Armenia)
AR (Argentina)
AT (Austria)
AZ (Azerbaijan)
BE (Belgium)
BG (Bulgaria)
BN (Brunei)
BR (Brazil)
BY (Belarus)
CI (Ivory Coast)
CN (China)
CO (Colombia)
CY (Cyprus)
CZ (Czech Republic)
DE (Germany)
DK (Denmark)
EE (Estonia)
EG (Egypt)
ES (Spain)
FI (Finland)
FR (France)
GE (Georgia)
GR (Greece)
HR (Croatia)
HU (Hungary)
ID (Indonesia)
IE (Ireland)
IT (Italy)
KG (Kyrgyzstan)
KZ (Kazakhstan)
LT (Lithuania)
LU (Luxembourg)
LV (Latvia)
MD (Moldova)
MM (Myanmar)
MT (Malta)
MX (Mexico)
MY (Malaysia)
NL (Netherlands)
PE (Peru)
PL (Poland)
PT (Portugal)
PA (Panama)
PY (Paraguay)
RO (Romania)
RS (Serbia)
RU (Russia)
SE (Sweden)
SI (Slovenia)
SK (Slovakia)
TJ (Tajikistan)
TM (Turkmenistan)
UA (Ukraine)
UZ (Uzbekistan)
UY (Uruguay)
VN (Venezuela)
VN (Vietnam)
US (USA)

LK (Sri Lanka)
CL (Chile)
TN (Tunisia)

14. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
15. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the **License plate recognition RR—Search in archive** detector on GPU is complete.

Attention!

You must recreate the cache:
- if you update the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, accuracy value, and so on).

19.4.30.4.6 Configuring License plate recognition RR—Search in archive

Hardware requirements for License plate recognition RR—Search in archive(see page 561)
Camera requirements for License plate recognition RR—Search in archive and its sub-detectors(see page 562)
Optimizing the operation of License plate recognition RR—Search in archive on GPU in Windows OS(see page 563)
Optimizing the operation of License plate recognition RR—Search in archive on GPU in Linux OS(see page 565)
Parameters that specify the conditions for starting a macro when recognizing a vehicle(see page 852)
Checking in lists of LPs(see page 668)
Examples of macros used when working with lists of license plates(see page 911)

To configure the **License plate recognition RR—Search in archive** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Vehicle** → **License plate recognition RR—Search in archive**.

By default, the detector is enabled and set to recognize vehicle license plates in the archive.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The **Check in lists** parameter is disabled by default. If you want to use this detector to check in lists of vehicle license plates, select the **Yes** value (see Checking in lists of LPs(see page 668))
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
	Second stream	
Other		

Parameter	Value	Description
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**License plate recognition RR—Search in archive**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Period of ignoring repeated recognitions (sec) (starting with *Detector Pack* 3.14)	**0**	Specify the period in seconds during which re-recognized license plates are ignored. The value must be in the range [0, 86400]
Type	**License plate recognition RR—Search in archive**	Name of the detector type (non-editable field)
Advanced settings		
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (1920 pixels on the longer side) by default. The value must be in the range [640, 10000]. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops, and this resolution will be used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
GDPR policy	**-**	By default, on the layout and in the archive, the characters of a license plate are completely hidden "GDPR ON". To display the characters of a license plate, you must enter a value: • "**-**"—hide all characters (default value), • " (blank field of a parameter value)"—show all characters, • "**N-**"—hide the first N characters, • "**-N**"—hide the last N characters, where **N** is the number of characters

Parameter	Value	Description
Minimum LP recognition quality (%)	**80**	Specify the minimum quality of license plate recognition as a percentage. The higher the minimum recognition quality, the fewer false events. The value must be in the range [0, 100]
Number of frames for analysis (Intel GPU only) (starting with Detector Pack 3.15)	**8 (low latency and low performance)**	**Attention!** The parameter is active only if you select the **Intel GPU 0**, **1**, **2**, or **3** values in the **Detection mode** parameter. The parameter determines how many frames are buffered before being sent simultaneously to the neural network model for processing. This mechanism optimizes the load on the Intel GPU. The higher the value, the higher the latency and performance. The default value is **8 (low latency and low performance)**
	16 (medium latency and medium performance)	
	32 (high latency and high performance)	
Track lifespan (starting with *Detector Pack* 3.14)	**Yes**	By default, the parameter is disabled. If you want to view the track lifespan for an object in seconds, select the **Yes** value
	No	
Basic settings		
Algorithm for detecting vehicle direction	**By LP coordinates**	The **By LP coordinates** algorithm is used by default. It works as follows: if the coordinates of the vehicle license plate shift from top to bottom (the vehicle moves towards the camera) and if the coordinates of the vehicle license plate shift from bottom to top (the vehicle moves away from the camera). Select the **By LP scale change** parameter if in the Surveillance window, the scale of the vehicle license plate increases (the vehicle moves towards the camera) and if the scale of the vehicle license plate decreases (the vehicle moves away from the camera)
	By LP scale change	
Detection mode	**CPU**	Select a processor for the detector operation (see Selecting Nvidia GPU when configuring detectors(see page 348)) **Attention!** It can take several minutes to launch the algorithm on Nvidia GPU. You can use caching to speed up future launches (see Optimizing the operation of License plate recognition RR—Search in archive on GPU in Windows OS(see page 563), Optimizing the operation of License plate recognition RR—Search in archive on GPU in Linux OS(see page 565)).
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
	Intel GPU 0	
	Intel GPU 1	
	Intel GPU 2	
	Intel GPU 3	
Direction of movement (starting with *Detector Pack* 3.14)	**Both**	By default, an event is created when a vehicle moves in **Both** directions. If you want the event to be created when a vehicle moves from the camera (**Outgoing**) or to the camera (**Incoming**), select the corresponding value
	Outgoing	
	Incoming	

Parameter	Value	Description
Country selection **Attention!** The more countries you select, the slower the recognition process and the higher the probability of errors in recognizing license plates.		
Country 1 name	**Armenia**, **Argentina**, **Austria**, **Azerbaijan**, **Bulgaria**, **Brunei**, **Belarus**, **Belize** (starting with *Detector Pack* 3.14), **Brazil**, **Belgium**, **Chile** (starting with *Detector Pack* 3.13), **China**, **Cyprus**, **Ivory Coast**, **Czech Republic**, **Germany**, **Colombia**, **Denmark**, **Estonia**, **Egypt**, **Finland**, **France**, **Georgia**, **Greece**, **Croatia**, **Hungary**, **Indonesia**, **Ireland**, **Italy**, **Kyrgyzstan**, **Kazakhstan**, **Lithuania**, **Luxembourg**, **Latvia**, **Malta**, **Malaysia**, **Mexico**, **Moldova**, **Myanmar**, **Netherlands**, **New Zealand** (starting with *Detector Pack* 3.14), **Panama**, **Paraguay**, **Peru**, **Poland**, **Portugal**, **Romania**, **Russia**, **Serbia**, **Spain**, **Sri Lanka** (starting with *Detector Pack* 3.13), **Sweden**, **Slovakia**, **Slovenia**, **Tunisia** (starting with *Detector Pack* 3.13), **Turkey** (starting with *Detector Pack* 3.14), **Turkmenistan**, **Tajikistan**, **UAE** (starting with *Detector Pack* 3.14), **Ukraine**, **Uruguay**, **USA** (starting with *Detector Pack* 3.12), **Uzbekistan**, **Venezuela**, **Vietnam**, **Not used**	By default, **Armenia** is selected. From the drop-down list, select a country whose license plates are actually found in the detection area and which need to be recognized
Country 2 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 3 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 4 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 5 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country βeta (starting with *Detector Pack* 3.14)		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized

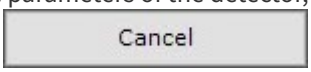
In the window, specify the area in which license plate detection and recognition is performed. To do this, click in the preview window and select **Detection area (polyline)**. You can adjust the area by moving the anchor points .



Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.
- To delete the selected area, click the  button.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **License plate recognition RR—Search in archive** detector is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of **License plate recognition RR—Search in archive** (see Standard sub-detectors(see page 359)).

19.4.30.5 License plate recognition RR—Parking

19.4.30.5.1 Functionality of License plate recognition RR—Parking

Description

The **License plate recognition RR—Parking** detector is used to:

1. Recognize license plates of vehicles. List of supported countries:
   Armenia, Austria, Azerbaijan, Argentina, Belarus, Belize (starting with *Detector Pack* 3.14), Belgium, Brazil, Brunei, Bulgaria, Chili (starting with *Detector Pack* 3.13), China, Colombia, Croatia, Cyprus, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Ireland, Indonesia, Italy, Ivory Coast, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Luxembourg, Malaysia, Malta, Mexico, Moldova, Myanmar, Netherlands, New Zealand (starting with *Detector Pack* 3.14), Panama, Paraguay, Peru, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sri Lanka (starting with *Detector Pack* 3.13), Sweden, Tajikistan, Tunisia (starting with *Detector Pack* 3.13), Turkey (starting with *Detector Pack* 3.14), Turkmenistan, UAE (starting with *Detector Pack* 3.14) Ukraine, Uruguay, USA (starting with *Detector Pack* 3.12), Uzbekistan, Venezuela, Vietnam
2. Write the recognized license plates into a database
3. Recognize license plates based on the created lists of LPs. Recognition is performed in the Slow mode (video stream processing at a speed of up to 6–7 FPS). The sampling rate for the detector is 150 milliseconds, all other frames are skipped
4. Check the recognized license plates in the lists of license plates
5. Determine the vehicle driving direction
6. Recognize the color, make, model, headlight condition, class of a vehicle

Make	Model	Vehicle class
Acura	MDX, RDX, TLX, ZDX	Car
Alfa Romeo	147, 159, Brera, Giulietta, MiTo	
Asia	Rocsta	
Aston Martin	DB11, DB9, Rapide, V8 Vantage, Vanquish	
Audi	100, 80, 90, A1, A3, A4, A5, A6, A7, A8, Cabriolet, Q3, Q5, Q7, R8, RS4, RS5, RS6, RS Q3, S3, S5, S6, S8, SQ5, TT	
Autosan	H10 12	Bus
Avia	D Series	Truck
BAW	Fenix	
BAZ	A079 Etalon	Bus
BMW	1 Series, 2 Series, 3 Series, 4 Series, 5 Series, 6 Series, 7 Series, X1, X3, X4, X5, X6, Z3, Z4	Car
BYD	F3	
Beifang Benchi	BFC6123C	Truck
Bentley	Arnage, Bentayga, Continental, Flying Spur, Mulsanne	Car

Make	Model	Vehicle class
Berkhof	Axial, Excellence	Bus
Beulas	Eurostar	
Bogdan	2110, 2310, Lada 2310 Pickup, Lada 2312	Car
	A092, A201, A202	Bus
Brilliance	V5	Car
Bronto	Niva	
Buerstner	Ixeo	Mini truck
CNHTC	Howo ZZ Series	Truck
Cadillac	ATS, CTS, Escalade, SRX, STS, XT5	Car
Carrus	Regal, Star	Bus
Changan	CS35	Car
Chery	A13, A15, A21, Amulet A15, Arrizo 7, Fora, Indis, Kimo S12, S12, S18D, T11, T21, Tiggo, Tiggo 5	
Chevrolet	Aveo, Blazer, Camaro, Caprice, Captiva, Cobalt, Cruze, Epica, Express, Lacetti, Lanos, Malibu, Niva, Orlando, Rezzo, Spark, Suburban, Tahoe, TrailBlazer, Viva	
Chrysler	300, 300C, Concorde, Grand Voyager, PT Cruiser, Pacifica, Sebring, Town and Country, Voyager	
Citroen	BX, Berlingo, C1, C2, C3, C3 Picasso, C4, C4 AirCross, C4 Picasso, C5, C Crosser, C Elysee, DS3, DS4, DS5, Grand C4 Picasso, Xantia, Xsara, Xsara Picasso	
	Jumper, Jumpy	Mini truck
DAF	95, 95 XF, CF, FT, FT CF, FT XF, XF	Truck
DS	4	Car
DW Hower	H3	
Dacia	Logan MCV, Sandero	
Daewoo	BS106	Bus
	Espero, Gentra, Lanos, Leganza, Matiz, Nexia, Nubira	Car

Make	Model	Vehicle class
Daihatsu	Materia, Mira, Move, Sirion, Tanto, Terios, YRV	
Datsun	mi DO, on DO	
Derways	Plutus	
Dodge	Caliber, Caravan, Challenger, Durango, Grand Caravan, Intrepid, Journey, Magnum, Neon, Nitro, Ram, Stratus	
DongFeng	DFL	Truck
	H30 Cross, S30	Car
Doninvest	Kondor	
Drogmoller	EuroComet	Bus
EOS	200, 233, 90	
Elnagh	Baron, Nobel Art	Mini truck
Emgrand	EC7, X7, Phantom	Car
FAW	Besturn B50, Besturn X80, V5	
FIAT	500, Albea, Brava, Bravo, Doblo, Grande Punto, Linea, Panda, Punto, Stilo Uno	
	Ducato, Scudo	Mini truck
Ferrari	458, 488, 612, California, F12, F141, F149, F430, GTC4 Lusso	Car
Ford	C Max, EcoSport, Edge, Escape, Escort, Expedition, Explorer, F 150, Fiesta, Focus, Focus C Max, Freestar, Fusion, Galaxy, Granada, Grand C Max, Ka, Kuga, Maverick, Mondeo, Mustang, Probe, Ranger, S Max, Scorpio, Sierra, Taunus, Taurus, Tourneo Connect, Transit Connect	
	Cargo	Truck
	Tourneo, Transit, Transit Custom	Mini truck
Foton	1049, Auman, Aumark, BJ	Truck
FoxBus	22501	Bus
Freightliner	Argosy, Business Class, CL Series, CST, Century, Century Class, Columbia, FLC, FLD, FLD SD, FL Series, M2, ST Series	Truck

Make	Model	Vehicle class
GAZ	172200 Volga, 24 Volga, 31 Volga, 69, Volga Siber	Car
	1724 Gazel, 22 Gazel, 23 Gazel, 27 Gazel, 3221 Gazel, 32 Gazel, 3302 Gazel, 3310 Valday, 33 Gazel, GAZel Biznes, GAZon Next, Gazel, Gazel Next	Mini truck
	3307, 3308 Sadko, 3309, 52, 53, 66, SAZ 2507, SAZ 3507	Truck
GolAZ	5291 Cruise	Bus
Golden Dragon	XML6126, XML6957	
GMC	Yukon	Car
Geely	CK, Emgrand, GC6, MK	
Genesis	G80	
Great Wall	Hover, Hover H3, Hover H5, Hover H6, Hover M2, Hover M4	
HUMMER	H2, H3	
Hafei	Simbo	
Haima	3, 7	
Haval	H6, H9	
Higer	A80, KLQ	Bus
Hino	300 Series, 500 Series, Profia, Ranger	Truck
Honda	Accord, Accord Crosstour, Airwave, CR V, Civic, Civic Ferio, Crossroad, Crosstour, Element, Freed, Freed Spike, HR V, Integra, Jazz, Legend, Odyssey, Pilot, Prelude, Stepwgn, Stream, Torneo	Car
Hymer	Mobil	Mini truck
Hyundai	Accent, Avante, Coupe, Creta, Elantra, Equus, Galloper, Genesis, Genesis Coupe, Getz, Grand Santa Fe, Grand Starex, Grandeur, H 1, Matrix, NF, Santa Fe, Solaris, Sonata, Starex, Terracan, Tiburon, Trajet, Tucson, Tuscani, Veloster, i20, i30, i40, ix35, ix55	Car
	Aero City, County, Universe, Universe Space	Bus
	HD	Truck
	Porter	Mini truck
Ikarus	250, 256, 260, 280	Bus

Make	Model	Vehicle class
Infiniti	EX Series, FX Series, G Series, JX Series, M Series, QX Series, Q Series	Car
International	9000 Series	Truck
Iran Khodro	Samand	Car
Irisbus	Crossway, Magelys	Bus
Isuzu	Axiom	Car
	AF, Elf, F Series, Forward, NPR, N Series	Truck
Iveco	AMT, EuroCargo, EuroStar, EuroTech, Stralis, Trakker	Truck
	Daily, TurboDaily	Mini truck
Izh	2125, 2126, 21261 Fabula, 2715, 2717, 412	Car
JAC	HK6120 KY	Bus
	S5	Car
JMC	Carrying	Truck
Jaguar	F Pace, F Type, S Type, XE, XF, XJ, XK, XKR, X Type	Car
Jeep	Cherokee, Commander, Compass, Grand Cherokee, Liberty, Renegade, Wrangler	
Jonckheere	Deauville	Bus
KAvZ	3976, 4235, 4238	
KIA	Bongo	Mini truck
	Carens, Carnival, Ceed, Cerato, Magentis, Mohave, Opirus, Optima, Picanto, Quoris, Rio, Rio X Line, Sorento, Soul, Spectra, Sportage, Stinger, Venga, Pro ceed	Car
	Granbird	Bus
KamAZ	4308, 4310, 44108, 4539, 5308, 5321, 5410, 5411, 5460, 5490, 551, 5511, 6460, 6511, 6520, 6522, NefAz 4208	Truck
Kenworth	T2000, W900	
King Long	XMQ	Bus

Make	Model	Vehicle class
KrAZ	6322	Truck
LDV	Maxus	Mini truck
Lamborghini	Aventador, Gallardo	Car
Lancia	Delta	
Land Rover	Defender, Discovery, Discovery Sport, Freelander, Range Rover, Range Rover Evoque, Range Rover Sport, Range Rover Velar	
Lexus	CT, ES, GS, GX, IS, LC, LS, LX, NX, RX, SC	
LiAZ	4292, 5256, 5292, 5293, 6213, 677	
Liebherr	LTM	Truck
Lifan	Breez, Cebrium, Smily, Solano, Solano II, X60	Car
Lincoln	Aviator, Continental, LS, MKS, MKT, MKX, Navigator, Town Car	
MAN	F2000, F90, L2000, LE2000, M2000, M90, ME2000, TGA, TGL, TGM, TGS, TGX	Truck
	Lions Coach, Lions Regio, Lions Top Star	Bus
MAZ	103, 107, 152, 203, 206	
	43, 53, 54, 55, 63, 64, 65	Truck
MG	ZT T	Car
MINI	Clubman, Cooper, Countryman, Hatch	
Marcopolo	Andare, Bravis	Bus
Maserati	Ghibli, Levante, Quattroporte	Car
Maybach	57, 62	
Mazda	2, 3, 323, 5, 6, 626, BT 50, Bongo, Bongo Friendee, CX 5, CX 7, CX 9, Capella, Demio, Familia, MPV, MX 5, Premacy, RX 8, Titan, Tribute	
Mercedes Benz	A Klasse, B Klasse, CLA Klasse, CLK Klasse, CLS Klasse, CL Klasse, C Klasse, Citan, E Klasse, GLA Klasse, GLC Klasse, GLE Klasse, GLK Klasse, GLS Klasse, GL Klasse, G Klasse, M Klasse, R Klasse, SLK Klasse, SL Klasse, S Klasse, X Klasse	
	Actros, Atego, Axor, LK Series, SK Series	Truck

Make	Model	Vehicle class
	MB Series, Sprinter, T1, T2, V Klasse, Vario, Viano, Vito	Mini truck
	Travego, Conecto, O303, O330, O350 Tourismo, O403, O404, O405, O560 Intouro	Bus
Mercury	Grand Marquis, Mariner, Mystique, Villager	Car
Mitsubishi	ASX, Airtrek, Carisma, Colt, Delica, Delica Space Gear, Eclipse, Galant, Grandis, L200, Lancer, Lancer Cargo, Lancer Cedia, Lancer Evolution, Legnum, Outlander, Outlander XL, Pajero, Pajero Mini, Pajero Pinin, Pajero Sport, Pajero iO, RVR, Space Gear, Space Wagon	
	Canter, Fuso Canter, Fuso Fighter	Truck
Moskvich	2137, 2140, 2141, 403, 408, 412	Car
Multicar	M25, M26	Mini truck
Nefaz	5299	Bus
Neoplan	Cityliner, Euroliner, Jetliner, Skyliner, Spaceliner, Starliner, Transliner	
Nissan	AD, Almera, Almera Classic, Atlas, Avenir, Bluebird, Bluebird Sylphy, Cedric, Cefiro, Cube, Expert, GT R, Juke, Laurel, Liberty, March, Maxima, Maxima QX, Micra, Murano, NP300 Pickup, Navara, Note, Pathfinder, Patrol, Presage, Primera, Pulsar, Qashqai, Qashqai 2, Safari, Sentra, Serena, Skyline, Sunny, Teana, Terrano, Terrano II, Tiida, Vanette, Wingroad, X Trail	Car
	Cabstar, Diesel Condor	Mini truck
Noge	Vesubio	Bus
Oldsmobile	Alero	Car
Opel	Antara, Ascona, Astra, Calibra, Combo, Corsa, Frontera, Insignia, Kadett, Meriva, Mokka, Monterey, Omega, Rekord, Tigra, Vectra, Zafira	
	Movano, Vivaro	Mini truck
Oshan	X5, X7	Car
PAZ	3203, 3204, 3205, 4230 Avrora, 4234, Vector Next	Bus
Peugeot	1007, 106, 107, 2008, 205, 206, 207, 208, 3008, 301, 306, 307, 308, 4007, 4008, 405, 406, 407, 408, 5008, 508, 605, 607, 806, 807, Partner, RCZ	Car
	Boxer, Expert, Expert Tepee, Traveller	Mini truck
Plymouth	Neon, Voyager	Car

Make	Model	Vehicle class
Pontiac	Bonneville, Firebird, Grand Am, Grand Prix, Solstice, Sunfire, Trans Sport, Vibe	Car
Porsche	911, 924, 928, Boxster, Cayenne, Cayman, Macan, Panamera, Taycan	Car
RAM	ProMaster City	Mini truck
Ravon	Gentra, Matiz, Nexia, Nexia R3, R2, R4	Car
Renault	19, 21, 25, Arkana, Captur, Clio, Dokker, Duster, Espace, Fluence, Grand Scenic, Kadjar, Kangoo, Koleos, Kwid, Laguna, Latitude, Logan, Logan Stepway, Megane, Modus, Oroch, SR, Safrane, Sandero, Sandero Stepway, Scenic, Symbol, Talisman, Twingo, Vel Satis, Wind, ZOE	Car
	Kerax, Magnum, Midlum, Premium, T Series	Truck
	Mascott, Master, Trafic	Mini truck
Skoda	Citigo, Fabia, Favorit, Felicia, Forman, Kamiq, Karoq, Kodiaq, Octavia, Praktik, Rapid, Roomster, Superb, Yeti	Car
Subaru	Ascent, B9 Tribeca, BRZ, Crosstrek, Domingo, Exiga, Forester, Impreza, Impreza WRX, Impreza WRX, Impreza XV, Justy, Legacy, Legacy Lancaster, Legacy Outback, Leone, Levorg, Outback, Pleo, Pleo Plus, R1, R2, SVX, Sambar, Stella, Traviq, Trezia, Tribeca, Vivio, WRX, XV	Car
Suzuki	Aerio, Alto, Baleno, Cervo, Ciaz, Cultus, Ertiga, Escudo, Esteem, Every, Forenza, Grand Vitara, Hustler, Ignis, Jimny, Kei, Kizashi, Landy, Liana, Palette, SX4, SX4 S Cross, Samurai, Sidekick, Solio, Splash, Swift, Vitara, Wagon R, XL7, Xbee	Car
	Spacia	Mini truck
Toyota	4Runner, Agya, Allex, Allion, Alphard, Altezza, Aqua, Aristo, Auris, Avalon, Avanza, Avensis, Avensis Verso, Aygo, Belta, Blade, Brevis, C HR, Caldina, Cami, Camry, Camry Gracia, Camry Solara, Carina, Carina E, Carina ED, Cavalier, Celica, Celsior, Chaser, Corolla, Corolla Allex, Corolla Axio, Corolla Ceres, Corolla Cross, Corolla Fielder, Corolla II, Corolla Levin, Corolla Rumion, Corolla Runx, Corolla Spacio, Corolla Verso, Corona, Corona Exiv, Corona Premio, Corsa, Cresta, Crown, Crown Majesta, Curren, Cynos, Duet, Echo, Esquire, Estima, Estima Emina, Estima Lucida, Etios, FJ Cruiser, Fortuner, Fun Cargo, GT86, Gaia, Grand Hiace, Hiace Regius, Highlander, Hilux, Hilux Surf, Innova, Ipsum, Isis, Ist, Kijang, Kluger, Land Cruiser, Land Cruiser Prado, Lite Ace, Lite Ace Noah, MR2, MR S, Mark II, Mark II Blit, Mark II Qualis, Mark X, Mark X Zio, Master Ace Surf, Matrix, Nadia, Noah, Opa, Paseo, Passo, Passo Sette, Picnic, Pixis Epoch, Pixis Joy, Pixis Space, Pixis Van, Platz, Porte, Premio, Previa, Prius, Probox, Progres, Pronard, RAV4, Ractis, Raize, Raum, Roomy, Rush, Sai, Scepter, Sequoia, Sera, Sienna, Sienta, Soarer, Spade, Sparky, Sprinter, Sprinter Carib, Sprinter Marino, Sprinter Trueno, Starlet, Succeed, Supra, Tacoma, Tank, Tercel, Town Ace, Town Ace Noah, Tundra, Urban Cruiser, Vanguard, Vellfire, Venza, Verossa, Verso, Vios, Vista, Vista Ardeo, Vitz, Voltz, Voxy, Will, Windom, Wish, Yaris, Yaris Verso	Car
	Dyna, Granvia, Hiace, ProAce, Regius, Regius Ace, Toyo Ace	Mini truck

Make	Model	Vehicle class
UAZ	315, 316, 469, 2360, 2363, 3151, 23602 Cargo, 23632 Pickup, Hunter, Patriot	Car
	452, 2206, 2989, 3303, 3741, 3909, 3962, AC B1, Profi, TC 17144	Mini truck
Volkswagen	Amarok, Arteon, Atlas, Beetle, Bora, Caddy, Corrado, CrossPolo, Eos, EuroVan, Fox, Fusca, Gol, Golf, Golf, ID3, ID4, ID6, Jetta, Lavida, Lupo, Multivan, New Beetle, Nivus, Parati, Passat, Passat Alltrack, Passat CC, Phaeton, Pointer, Polo, Routan, Santana, Saveiro, Scirocco, Sharan, Spacefox, T Cross, T Roc, Talagon, Taos, Tavendor, Tayron, Teramont, Tharu, Tiguan, Touareg, Touran, Type 1, Type 2, Up, Vento, Viloran, Virtus, Voyage	Car
	California, Caravelle, Crafter, LT, Transporter	Mini truck
Volvo	240 Series, 300, 440, 460, 740, 760, 850, 940, 960, C30, C70, S40, S60, S70, S80, S90, V40, V40 Cross Country, V50, V60 Cross Country, V70, V70XC, V90 Cross Country, XC40, XC60, XC70, XC90	Car
	7300, 7350, 8900, 9500, 9700, 9900, B10	Bus
	F12, FE, FH, FL, FM, FMX, VN Series	Truck

Licensing

For the **License plate recognition RR—Parking** detector to operate, contact an AxxonSoft manager and get a license file (see Types of licenses[232])

Add-ons

For the **License plate recognition RR—Parking** detector to operate, you must install the RR LPR add-on (see Installing DetectorPack add-ons(see page 321))

Attention!

Starting with *Detector Pack* 3.14, you must install two *Detector Packs* for the detector to operate:

- RR LPR add-on;
- RR SDK Pack.

19.4.30.5.2 Hardware requirements for License plate recognition RR—Parking

Hardware requirements(see page 87)

If you use the **License plate recognition RR—Parking** detector, the following hardware requirements must be met:

Device	Requirements for the supported model
CPU	• Intel Core 6th generation and newer, Intel Xeon v4 and newer • Support for the AVX2 instruction set that is listed here[233] • Movidius/Neural Compute Stick devices are formally supported but currently don't undergo the regular testing

232 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses
233 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3532

Device	Requirements for the supported model
Nvidia GPU	• NVIDIA GTX 1050 Ti and newer • At least 2 GB of video memory • Compute Capability: from 3.5 to 8.6. You can check the GPU Compute Capability version on the manufacturer's[234] website • Support for CUDA 11.8. CUDA is compatible with generations of computers on the following architectures: Kepler (partially), Maxwell, Pascal, Volta, Turing, Ampere (partially) (see CUDA[235]). NVIDIA drivers version 450.36.06 and higher are required. We recommend installing the latest driver version from the official website[236]
Intel GPU	• Intel Arc Family, Intel Data Center GPU Flex Series (including 140/170 models) • Intel HD Graphics, Intel UHD Graphics, Intel Iris Xe Graphics and newer • Support for other platforms listed in the official OpenVINO documentation is possible, but they aren't tested for compatibility with the detector

Attention!

To use the capabilities of the GPU (both NVIDIA and Intel), you must manually install the necessary drivers and runtime components (for example, CUDA for NVIDIA), as they aren't included in the software package.

19.4.30.5.3 Camera requirements for License plate recognition RR—Parking and its sub-detectors

You must install and configure the cameras in such a way that the following requirements are met:

Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection	
Basic requirements	To ensure the recognition of state license plates and vehicles	Camera	• Minimum resolution is 1280*720, recommended resolution is 1920*1080 and more • Video codec: MJPEG minimum, H.264 or H.265 are recommended, preferably uncompressed • Bitrate: depends on the frame (license plate must be readable) • Minimum frame rate: at least five FPS at speed up to 20 km/h (Slow mode), from 20 FPS at speed over 20 km/h (Fast mode) • Maximum horizontal angle is 30°, recommended angle is 0° • Maximum vertical angle is 45°, recommended angle is 20° • Maximum camera rotation angle is 20°, recommended angle is 0° • In order to recognize state license plates on high-speed roads, the camera must have the Global Shutter mode **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.

234 https://developer.nvidia.com/cuda-gpus
235 https://en.wikipedia.org/wiki/CUDA
236 https://www.nvidia.com/en-us/drivers/

Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection	
		Lighting	• Illuminated control area. We recommend using conventional spotlights and/or cameras with IR illumination for additional illumination • Expected image contrast: the contrast difference between characters of the license plate and the background must be at least 20 units with the image brightness scale from 0 to 255 • During daytime and nighttime, we recommend selecting the values of the light sensitivity (ISO) parameter separately with the minimum exposure time (maximum shutter speed)
		Scene and camera angle	• We recommend installing a camera in such a way that various objects that block the vehicle during its recognition are not in the frame. For example, a barrier or fence • The state license plate must be readable • Height of characters (letters and digits) on the state license plates is at least 10px and not more than 60px. Preferably 20px or more • Width of the dashboard: minimum 80 pixels, recommended 100 pixels • Thickness of the character line: minimum 1 pixel, recommended 2 pixels • Vehicles during the passage must be completely within the camera FOV for at least five frames • The size of the vehicle's bounding rectangle: a. Minimum: height/width is at least 150px and at least 15% of the frame height/width. Recommended: 250px/30%. b. Maximum: height/width isn't limited, but no more than 80% of the height/width of the frame
		Object images	• To avoid blurring of the image, you must set the camera to a slow shutter speed. We recommend keeping the shutter speed at no more than three ms. The exact value depends on the camera angle and vehicle speed

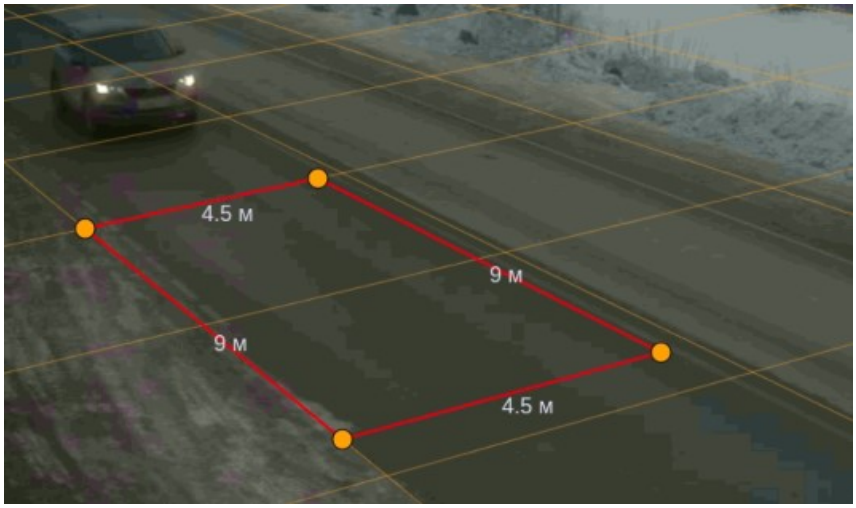
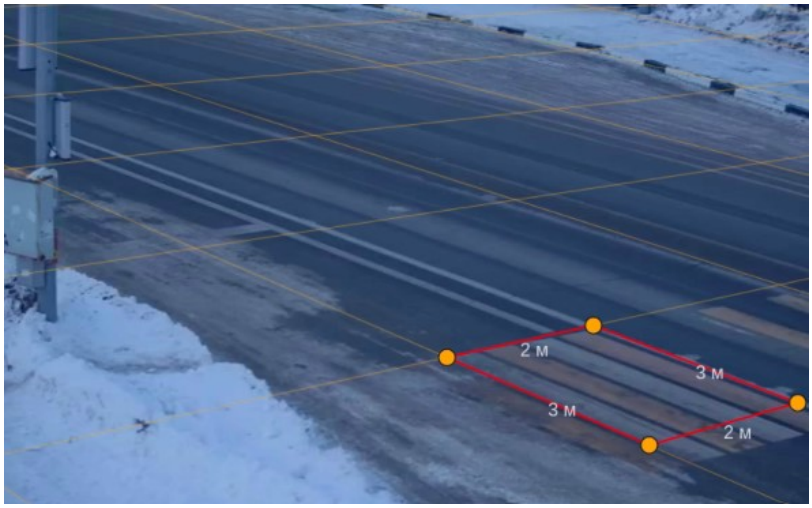
Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection

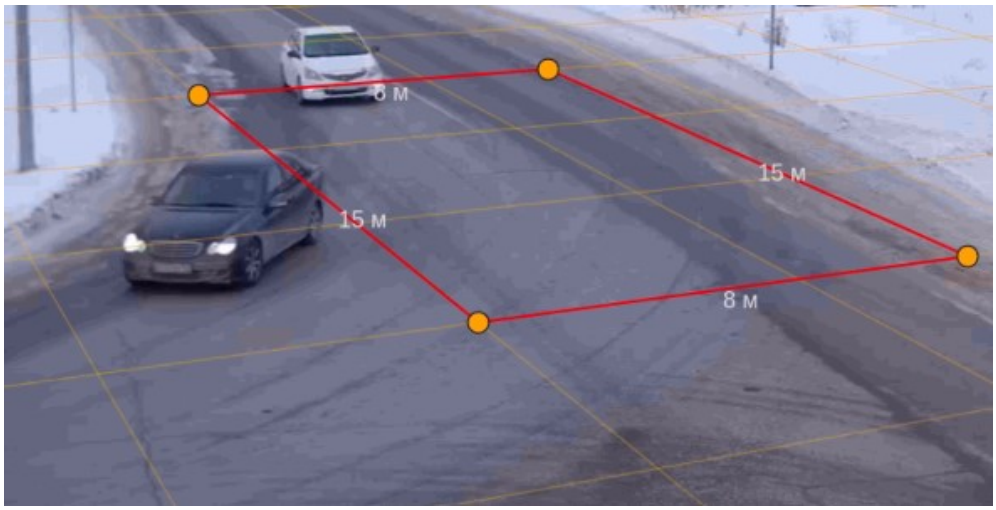
Additional requirements	To determine the speed of the vehicle	• Camera installation height is at least four meters
		• The time period when a vehicle is in front of the camera with a fully readable state license plate, or when a vehicle that is fully in the frame and accurately recognized must be at least 500 ms
		• Time stamps for frames must not differ from the real time by more than two ms
		• When calibrating values, the measured road section must be at least three meters wide and five meters long. In this case, the key points in the image must be at least 300 pixels apart. The measurement error during calibration (difference between actual and entered measured values) must not exceed 1%
		• Camera must be rigidly fixed and must not move during gusts of wind and other physical forces
		• All of the following rules must be followed by default:
		  • The bounding rectangle of the state license plates doesn't touch the bottom part of the frame in both selected frames for speed calculation
		  • The offset of the center of the rectangle between the two selected frames is at least four meters and 100 pixels
		  • The time difference between two selected frames is at least 100 ms
		Recommendations for configuring the speed detection area for License plate recognition RR—Parking(see page 586)

	To determine the driving direction of the vehicle	• Camera installation height is at least three meters • Angle between camera and road direction is not more than 30° • Minimum camera tilt
	To recognize the make and model of the vehicle	• Visible width of the vehicle is from 100px • Color or black and white image • Front view of the vehicle
	To recognize the color of the vehicle	• Visible width of the vehicle is from 100px • The scene illumination must be at least 50 lux. Under low or excessive illumination (night or backlight), the stability of the analytics operation is not guaranteed. There are no abrupt changes in illumination • Color image with a normal color grade
	To determine the condition of the headlights	• Visible width of the vehicle is from 100px • Front view of the vehicle • Evening, night or foggy shooting conditions are required

19.4.30.5.3.1 Recommendations for configuring the speed detection area for License plate recognition RR—Parking

Recommendations	1. You must install the camera according to the requirements (see Camera requirements for License plate recognition RR—Parking and its sub-detectors(see page 583)). 2. You must select an area in the frame that meets the following conditions: a. The sides of the selected area (**Speed detection area height** and **Speed detection area width**) must be equal in pairs. b. The angles of the selected area must be 90° in the real world. 3. When you specify the area in the Surveillance window, you must focus on: a. Traffic lanes (solid and broken lines on the roadway). b. Road curbs. c. Vehicle bumpers and wheel contact points with the roadway. d. Crosswalks. 4. The quality of vehicle recognition is higher if the selected area occupies a significant part of the frame and is as close to the camera as possible. 5. You can use the dimensions of a particular vehicle as a reference point. For example, Hyundai Solaris: length (**Speed detection area heigh**)—2.6 meters, width (**Speed detection area width**)—1.73 meters **Attention!** Margin of error in determining the speed of vehicles is about 5% with a good calibration, as this function gives only a general idea of the situation. The consumption of resources doesn't change when the **Speed detection** parameter is enabled.

Examples of the corresponding selected area	Lines are parallel to road markings and vehicle bumpers:   



19.4.30.5.4 Optimizing the operation of License plate recognition RR—Parking on GPU in Windows OS

Starting with *DetectorPack* 3.10, a utility was added to the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the **License plate recognition RR—Parking** detector on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

   Attention!

   If the system has the software running on GPU, it is necessary to stop its operation.

2. Create the **GPU_CACHE_DIR** system variable (see Creating system variable(see page 126)) by specifying the path to the cache location with an arbitrary folder name in the **Variable value** field. For example, D:\AO_GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
3. To call the utility, open in the command line: **C:\Program Files\Common Files\AxxonSoft\DetectorPack\RRGpuCacheGenerator.exe** and press **Enter**.
4. Select the required cache sets by specifying the **y** value:
   a. **lpr recognition**—recognition of a vehicle license plate;
   b. **vehicle recognition**—recognition of a vehicle.
   When you select the **lpr recognition** cache set, you need to specify the required countries in numeric or alphabetic form. After you select all required countries, enter the **done** value.
   Expand the list of countries

   AM (Armenia)
   AR (Argentina)
   AT (Austria)
   AZ (Azerbaijan)
   BE (Belgium)
   BG (Bulgaria)
   BN (Brunei)
   BR (Brazil)
   BY (Belarus)
   CI (Ivory Coast)
   CN (China)
   CO (Colombia)
   CY (Cyprus)
   CZ (Czech Republic)
   DE (Germany)
   DK (Denmark)

EE (Estonia)
EG (Egypt)
ES (Spain)
FI (Finland)
FR (France)
GE (Georgia)
GR (Greece)
HR (Croatia)
HU (Hungary)
ID (Indonesia)
IE (Ireland)
IT (Italy)
KG (Kyrgyzstan)
KZ (Kazakhstan)
LT (Lithuania)
LU (Luxembourg)
LV (Latvia)
MD (Moldova)
MM (Myanmar)
MT (Malta)
MX (Mexico)
MY (Malaysia)
NL (Netherlands)
PE (Peru)
PL (Poland)
PT (Portugal)
PA (Panama)
PY (Paraguay)
RO (Romania)
RS (Serbia)
RU (Russia)
SE (Sweden)
SI (Slovenia)
SK (Slovakia)
TJ (Tajikistan)
TM (Turkmenistan)
UA (Ukraine)
UZ (Uzbekistan)
UY (Uruguay)
VN (Venezuela)
VN (Vietnam)
US (USA)
LK (Sri Lanka)
CL (Chile)
TN (Tunisia)

   c. When you select the **vehicle recognition** cache set without **lpr recognition**, you must choose the territory where vehicle recognition is going to be performed:
      i. **CIS countries**—**1**;
      ii. **Other countries**—**2**.
5. Select one of the accuracy and performance values by specifying the corresponding number:
   a. **Medium accuracy, high performance**—**1**, provides medium recognition accuracy and high performance of the GPU (less load on the GPU);
   b. **High accuracy, medium performance**—**2**, provides high recognition accuracy and medium performance of the GPU (high load on the GPU).
6. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
7. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the **License plate recognition RR—Parking** detector on GPU is complete.

Attention!

You must recreate the cache:
- if you update the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, accuracy value, and so on).

19.4.30.5.5 Optimizing the operation of License plate recognition RR—Parking on GPU in Linux OS

Creating system variables for the Axxon One server in Linux OS[237]
Creating system variables for the Axxon One server in the failover mode in Linux OS[238]

Starting with *DetectorPack* 3.10, a utility was added to the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the **License plate recognition RR—Parking** detector on GPU, do the following:

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[239]).

   Attention!

   If the system has the software running on GPU, you must stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

   ```
   sudo su ngp
   ```

   b. Enter the password for the superuser.
3. Create a folder with a custom name to store the cache. For example:

   ```
   mkdir /opt/AxxonSoft/AxxonOne/gpucache
   ```

4. Change folder permissions:

   ```
   chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
   ```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

   ```
   cd /opt/AxxonSoft/AxxonOne
   ```

6. Open the server configuration file for editing:

237 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
238 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS
239 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

```
nano instance.conf
```

Attention!

When you use the server in failover mode, you must:

a. Open the **/etc/AxxonSoft** folder:

```
cd /etc/AxxonSoft
```

b. Open the server configuration file for editing:

```
nano axxon-one.conf
```

Note

Before you make the changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[240].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

d. Save the changes in the file.

e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file.

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit file editing mode using the **Ctrl+X** keyboard shortcut.

Attention!

240 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[241]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[242]).

10. In the command prompt, run the command that was used to add the system variable with the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./RRGpuCacheGenerator
```

13. Select the required cache sets by specifying the **y** value:
    a. **lpr recognition**—recognition of a vehicle license plate;
    b. **vehicle recognition**—recognition of a vehicle.
    When you select the **lpr recognition** cache set, you need to specify the required countries in numeric or alphabetic form. After you select all required countries, enter the **done** value.
    Expand the list of countries

    AM (Armenia)
    AR (Argentina)
    AT (Austria)
    AZ (Azerbaijan)
    BE (Belgium)
    BG (Bulgaria)
    BN (Brunei)
    BR (Brazil)
    BY (Belarus)
    CI (Ivory Coast)
    CN (China)
    CO (Colombia)
    CY (Cyprus)
    CZ (Czech Republic)
    DE (Germany)
    DK (Denmark)
    EE (Estonia)
    EG (Egypt)
    ES (Spain)
    FI (Finland)
    FR (France)
    GE (Georgia)
    GR (Greece)
    HR (Croatia)
    HU (Hungary)
    ID (Indonesia)
    IE (Ireland)
    IT (Italy)

241 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS
242 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

KG (Kyrgyzstan)
KZ (Kazakhstan)
LT (Lithuania)
LU (Luxembourg)
LV (Latvia)
MD (Moldova)
MM (Myanmar)
MT (Malta)
MX (Mexico)
MY (Malaysia)
NL (Netherlands)
PE (Peru)
PL (Poland)
PT (Portugal)
PA (Panama)
PY (Paraguay)
RO (Romania)
RS (Serbia)
RU (Russia)
SE (Sweden)
SI (Slovenia)
SK (Slovakia)
TJ (Tajikistan)
TM (Turkmenistan)
UA (Ukraine)
UZ (Uzbekistan)
UY (Uruguay)
VN (Venezuela)
VN (Vietnam)
US (USA)
LK (Sri Lanka)
CL (Chile)
TN (Tunisia)

c. When you select the **vehicle recognition** cache set without **lpr recognition**, you must specify the territory where vehicle recognition is going to be performed:
   i. **CIS countries**—**1**;
   ii. **Other countries**—**2**.

14. Select one of the accuracy and performance values by specifying the corresponding number:
   a. **Medium accuracy, high performance**—**1**, provides medium recognition accuracy and high performance of the GPU (less load on the GPU);
   b. **High accuracy, medium performance**—**2**, provides high recognition accuracy and medium performance of the GPU (high load on the GPU).
15. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
16. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the **License plate recognition RR—Parking** detector on GPU is complete.

Attention!

You must recreate the cache:
- if you update the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, accuracy value, and so on).

19.4.30.5.6 Configuring License plate recognition RR—Parking

Hardware requirements for License plate recognition RR—Parking(see page 582)
Camera requirements for License plate recognition RR—Parking and its sub-detectors(see page 583)
Recommendations for configuring the speed detection area for License plate recognition RR—Parking(see page 586)
Optimizing the operation of License plate recognition RR—Parking on GPU in Windows OS(see page 588)
Optimizing the operation of License plate recognition RR—Parking on GPU in Linux OS(see page 590)
Parameters that specify the conditions for starting a macro when recognizing a vehicle(see page 852)
Checking in lists of LPs(see page 668)
Examples of macros used when working with lists of license plates(see page 911)

To configure the **License plate recognition RR—Parking** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Vehicle** → **License plate recognition RR—Parking**.

By default, the detector is enabled and set to recognize vehicle license plates in the parking lot.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The parameter is disabled by default. If you want to use this detector to check in lists of vehicle license plates, select the **Yes** value (see Checking in lists of LPs(see page 668))
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**License plate recognition RR—Parking**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	

Parameter	Value	Description
Period of ignoring repeated recognitions (sec) (starting with *Detector Pack* 3.14)	**0**	Specify the period in seconds during which re-recognized license plates are ignored. The value must be in the range [0, 86400]
Type	**License plate recognition RR —Parking**	Name of the detector type (non-editable field)
Advanced settings		
Accuracy and performance	**Medium accuracy and high performance** **High accuracy and medium performance**	Select vehicle recognition accuracy and performance: • **Medium accuracy and high performance**—provides medium recognition accuracy and high GPU performance (lower GPU load); • **High accuracy and medium performance**—provides maximum recognition accuracy and medium GPU performance (high GPU load)
Calibration area height (m)	**0**	Specify the height of the calibration area in meters. The value must be in the range [0, 500]
Calibration area width (m)	**0**	Specify the width of the calibration area in meters. The value must be in the range [0, 500]
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (1920 pixels on the longer side) by default. The value must be in the range [640, 10000]. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops, and this resolution will be used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
GDPR policy	**-**	By default, on the layout and in the archive, the characters of a license plate are completely hidden "GDPR ON". To display the characters of a license plate, you must enter a value: • "**-**"—hide all characters (default value), • " (blank field of a parameter value)"—show all characters, • "**N-**"—hide the first N characters, • "**-N**"—hide the last N characters, where **N** is the number of characters
Initiate event in (sec)	**0**	Specify the time in seconds after which an event must be generated after recognizing a license plate in the frame. If the value is **0**, an event is generated after the track with a license plate is lost. The value must be in the range [1, 3600]

Parameter	Value	Description
Minimum LP recognition quality (%)	**80**	Specify the minimum quality of license plate recognition as a percentage. The higher the minimum recognition quality, the fewer false events. The value must be in the range [0, 100]
Minimum vehicle recognition quality (%) (starting with *Detector Pack* 3.14)	**30**	Specify the minimum quality of vehicle recognition as a percentage. The lower the minimum recognition quality, the more events are created, but the lower the reliability of recognition. The higher the value, the stricter the filtering and the higher the accuracy. The value must be in the range [0, 100]
Number of frames for analysis (Intel GPU only) (starting with Detector Pack 3.15)	**8 (low latency and low performance)** **16 (medium latency and medium performance)** **32 (high latency and high performance)**	**Attention!** The parameter is active only if you select the **Intel GPU 0**, **1**, **2**, or **3** values in the **Detection mode** parameter. The parameter determines how many frames are buffered before being sent simultaneously to the neural network model for processing. This mechanism optimizes the load on the Intel GPU. The higher the value, the higher the latency and performance. The default value is **8 (low latency and low performance)**
Speed detection	**Off** **Kmph** **Mph**	Select from the list the mode for determining the speed unit of vehicles. **Attention!** Margin of error in determining the speed of vehicles is about 5% with a good calibration, as this function gives only a general idea of the situation. The consumption of resources doesn't change when the **Speed detection** parameter is enabled. **Note** For the correct displaying of the speed measurement unit, you must create the MEASUREMENT_UNIT system variable (see Creating system variable(see page 126)) and specify the value: • 0—to display kmph; • 1—to display mph.
Track lifespan (starting with *Detector Pack* 3.14)	**Yes** **No**	By default, the parameter is disabled. If you want to view the track lifespan for an object in seconds, select the **Yes** value
Vehicle recognition period (ms) (starting with *Detector Pack* 3.14)	**750**	Specify the period in milliseconds during which the vehicle is recognized. The value must be in the range [1, 10000]
Basic settings		
Algorithm for detecting vehicle direction	**By LP coordinates** **By LP scale change**	The **By LP coordinates** algorithm is used by default. It works as follows: if the coordinates of the vehicle license plate shift from top to bottom (the vehicle moves towards the camera) and if the coordinates of the vehicle license plate shift from bottom to top (the vehicle moves away from the camera). Select the **By LP scale change** parameter if in the Surveillance window, the scale of the vehicle license plate increases (the vehicle moves towards the camera) and if the scale of the vehicle license plate decreases (the vehicle moves away from the camera)

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="8">Detection mode</td><td>CPU</td><td rowspan="8">Select a processor for the detector operation (see Selecting Nvidia GPU when configuring detectors(see page 348))

Attention!
It can take several minutes to launch the algorithm on Nvidia GPU. You can use caching to speed up future launches (see Optimizing the operation of License plate recognition RR—Parking on GPU in Windows OS(see page 588), Optimizing the operation of License plate recognition RR—Parking on GPU in Linux OS(see page 590)).</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td rowspan="3">Direction of movement (starting with Detector Pack 3.14)</td><td>Both</td><td rowspan="3">By default, an event is created when a vehicle moves in Both directions. If you want the event to be created when a vehicle moves from the camera (Outgoing) or to the camera (Incoming), select the corresponding value</td></tr>
<tr><td>Outgoing</td></tr>
<tr><td>Incoming</td></tr>
<tr><td rowspan="2">Info on unrecognized LPs</td><td>Yes</td><td rowspan="2">The parameter is disabled by default. If it is necessary to determine all possible information about a vehicle with unrecognized license plate, select the Yes value

Attention!
For the parameter to work correctly, you also need to enable the Vehicle recognition parameter.</td></tr>
<tr><td>No</td></tr>
<tr><td rowspan="2">Vehicle recognition</td><td>Yes</td><td rowspan="2">The parameter is disabled by default. If you want to search for vehicles in the archive by vehicle make, model, vehicle class, or other specified criteria, select the Yes value (see Search by LPs(see page 1227))

Note
The accuracy of the Vehicle recognition parameter is:
• Make recognition: 0.992;
• Model recognition: 0.951.

Recognition accuracy is affected by the camera angle, the illumination in the detection area, as well as compliance with camera requirements and video stream quality (see Camera requirements for License plate recognition RR—Parking and its sub-detectors(see page 583)).</td></tr>
<tr><td>No</td></tr>
<tr><td colspan="3">Country selection

Attention!
The more countries you select, the slower the recognition process and the higher the probability of errors in recognizing license plates.</td></tr>
</table>

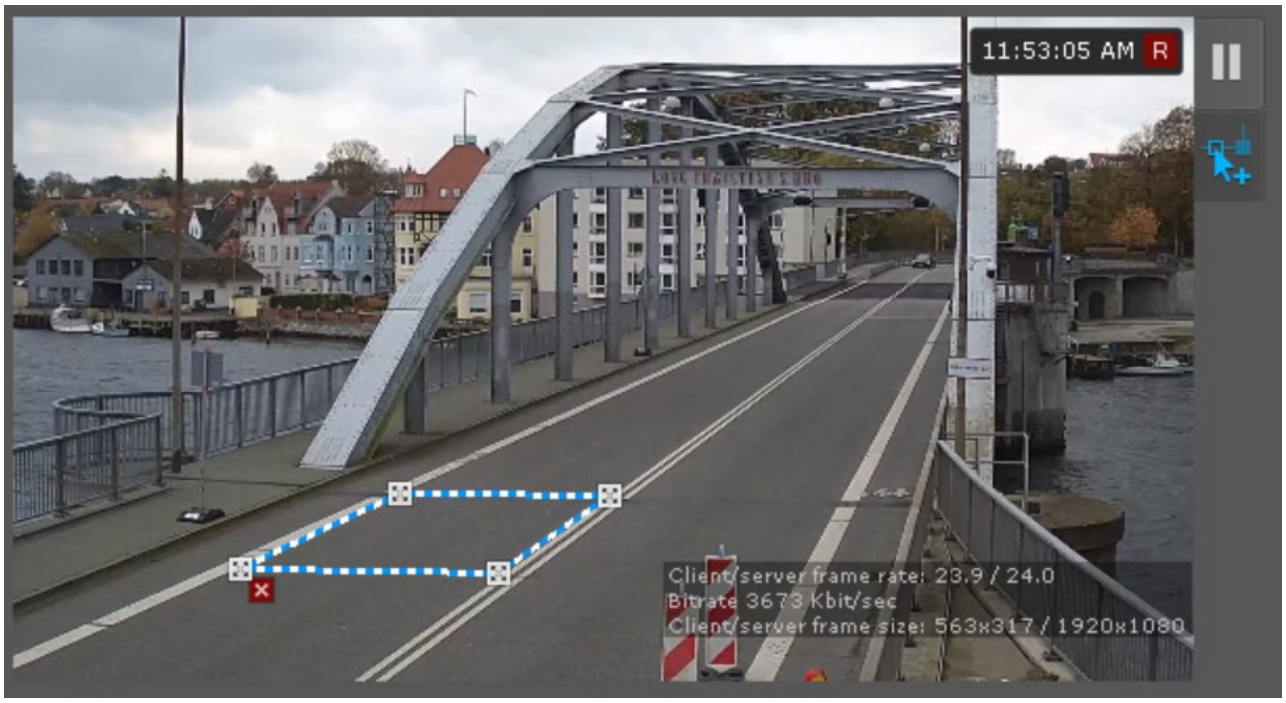
Parameter	Value	Description
Country 1 name	**Armenia**, **Argentina**, **Austria**, **Azerbaijan**, **Bulgaria**, **Brunei**, **Belarus**, **Belize** (starting with *Detector Pack* 3. 14), **Brazil**, **Belgium**, **Chile** (starting with *Detector Pack* 3.13), **China**, **Cyprus**, **Ivory Coast**, **Czech Republic**, **Germany**, **Colombia**, **Denmark**, **Estonia**, **Egypt**, **Finland**, **France**, **Georgia**, **Greece**, **Croatia**, **Hungary**, **Indonesia**, **Ireland**, **Italy**, **Kyrgyzstan**, **Kazakhstan**, **Lithuania**, **Luxembourg**, **Latvia**, **Malta**, **Malaysia**, **Mexico**, **Moldova**, **Myanmar**, **Netherlands**, **New Zealand** (starting with *Detector Pack* 3. 14), **Panama**, **Paraguay**, **Peru**, **Poland**, **Portugal**, **Romania**, **Russia**, **Serbia**, **Spain**, **Sri Lanka** (starting with *Detector Pack* 3.13), **Sweden**, **Slovakia**, **Slovenia**, **Tunisia** (starting with *Detector Pack* 3.13), **Turkey** (starting with *Detector Pack* 3.14), **Turkmenistan**, **Tajikistan**, **UAE** (starting with *Detector Pack* 3. 14), **Ukraine**, **Uruguay**, **USA** (starting with *Detector Pack* 3. 12), **Uzbekistan**, **Venezuela**, **Vietnam**, **Not used**	By default, **Armenia** is selected. From the drop-down list, select a country whose license plates are actually found in the detection area and which need to be recognized
Country 2 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 3 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 4 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country 5 name		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized
Country βeta (starting with *Detector Pack* 3.14)		By default, the **Not used** value is selected. If necessary, from the drop-down list, select one additional country whose license plates are actually found in the detection area and which need to be recognized

If necessary, in the preview window, you can set:

1. The calibration area of the road scene. To do this, do the following:
   a. Click in the camera preview window and select **Calibration area**.

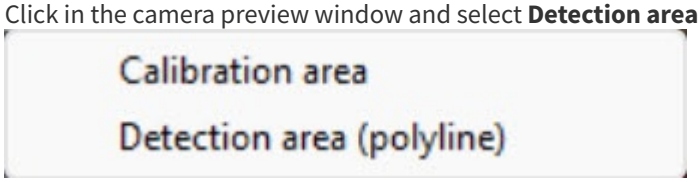


   You can configure the calibration area by moving the anchor points. The calibration area is used to match the camera coordinates with the real road scene. The calibration area must also be set in cases where it is necessary to determine the vehicle speed. It is necessary to set an area that corresponds to a certain real rectangle of known dimensions in the frame. For example, road markings, a vehicle, and so on. You must configure the calibration area so that it is parallel to the ground surface.



b. Specify the dimensions of the real rectangle on the frame. This rectangle corresponds to the area marked in the **Calibration area height (m)** and **Calibration area width (m)** parameters.

2. The detection area. To do this, do the following:
   a. Click in the camera preview window and select **Detection area (polyline)**.



You can configure the detection area by moving the anchor points. The detection area is used to detect vehicles or license plates and generate corresponding events.

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- To hide the area, click the button. To cancel the action, click this button again.
- To delete a selected area, click the button.

To save the parameters of the detector, click the **Apply** button. To cancel the changes, click the **Cancel** button.

Configuration of the **License plate recognition RR—Parking** detector is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of **License plate recognition RR—Parking** (see Standard sub-detectors(see page 359)).

19.4.30.6 Vehicle recognition RR

19.4.30.6.1 Functionality of Vehicle recognition RR

Description

The **Vehicle recognition RR** detector is used to:

1. Recognize the color of a vehicle: Beige, White, Yellow, Green, Brown, Red, Unknown, Orange, Gray, Blue, Purple, Black
2. Recognize the class of a vehicle: Bus, Car, Truck, Unknown, Mini truck, Motorcycle

> **Note**
> Starting with *Detector Pack* 3.13, Van, SUV and Sedan vehicle class recognition has been added for the USA and Mexico.

3. Recognize the make and model of a vehicle

Make	Model	Vehicle class
Acura	MDX, RDX, TLX, ZDX	Car
Alfa Romeo	147, 159, Brera, Giulietta, MiTo	
Asia	Rocsta	
Aston Martin	DB11, DB9, Rapide, V8 Vantage, Vanquish	
Audi	100, 80, 90, A1, A3, A4, A5, A6, A7, A8, Cabriolet, Q3, Q5, Q7, R8, RS4, RS5, RS6, RS Q3, S3, S5, S6, S8, SQ5, TT	
Autosan	H10 12	Bus
Avia	D Series	Truck
BAW	Fenix	
BAZ	A079 Etalon	Bus
BMW	1 Series, 2 Series, 3 Series, 4 Series, 5 Series, 6 Series, 7 Series, X1, X3, X4, X5, X6, Z3, Z4	Car
BYD	F3	
Beifang Benchi	BFC6123C	Truck
Bentley	Arnage, Bentayga, Continental, Flying Spur, Mulsanne	Car
Berkhof	Axial, Excellence	Bus
Beulas	Eurostar	
Bogdan	2110, 2310, Lada 2310 Pickup, Lada 2312	Car
	A092, A201, A202	Bus

Make	Model	Vehicle class
Brilliance	V5	Car
Bronto	Niva	
Buerstner	Ixeo	Mini truck
CNHTC	Howo ZZ Series	Truck
Cadillac	ATS, CTS, Escalade, SRX, STS, XT5	Car
Carrus	Regal, Star	Bus
Changan	CS35	Car
Chery	A13, A15, A21, Amulet A15, Arrizo 7, Fora, Indis, Kimo S12, S12, S18D, T11, T21, Tiggo, Tiggo 5	
Chevrolet	Aveo, Blazer, Camaro, Caprice, Captiva, Cobalt, Cruze, Epica, Express, Lacetti, Lanos, Malibu, Niva, Orlando, Rezzo, Spark, Suburban, Tahoe, TrailBlazer, Viva	
Chrysler	300, 300C, Concorde, Grand Voyager, PT Cruiser, Pacifica, Sebring, Town and Country, Voyager	
Citroen	BX, Berlingo, C1, C2, C3, C3 Picasso, C4, C4 AirCross, C4 Picasso, C5, C Crosser, C Elysee, DS3, DS4, DS5, Grand C4 Picasso, Xantia, Xsara, Xsara Picasso	
	Jumper, Jumpy	Mini truck
DAF	95, 95 XF, CF, FT, FT CF, FT XF, XF	Truck
DS	4	Car
DW Hower	H3	
Dacia	Logan MCV, Sandero	
Daewoo	BS106	Bus
	Espero, Gentra, Lanos, Leganza, Matiz, Nexia, Nubira	Car
Daihatsu	Materia, Mira, Move, Sirion, Tanto, Terios, YRV	
Datsun	mi DO, on DO	
Derways	Plutus	

Make	Model	Vehicle class
Dodge	Caliber, Caravan, Challenger, Durango, Grand Caravan, Intrepid, Journey, Magnum, Neon, Nitro, Ram, Stratus	
DongFeng	DFL	Truck
	H30 Cross, S30	Car
Doninvest	Kondor	
Drogmoller	EuroComet	Bus
EOS	200, 233, 90	
Elnagh	Baron, Nobel Art	Mini truck
Emgrand	EC7, X7, Phantom	Car
FAW	Besturn B50, Besturn X80, V5	
FIAT	500, Albea, Brava, Bravo, Doblo, Grande Punto, Linea, Panda, Punto, Stilo Uno	
	Ducato, Scudo	Mini truck
Ferrari	458, 488, 612, California, F12, F141, F149, F430, GTC4 Lusso	Car
Ford	C Max, EcoSport, Edge, Escape, Escort, Expedition, Explorer, F 150, Fiesta, Focus, Focus C Max, Freestar, Fusion, Galaxy, Granada, Grand C Max, Ka, Kuga, Maverick, Mondeo, Mustang, Probe, Ranger, S Max, Scorpio, Sierra, Taunus, Taurus, Tourneo Connect, Transit Connect	
	Cargo	Truck
	Tourneo, Transit, Transit Custom	Mini truck
Foton	1049, Auman, Aumark, BJ	Truck
FoxBus	22501	Bus
Freightliner	Argosy, Business Class, CL Series, CST, Century, Century Class, Columbia, FLC, FLD, FLD SD, FL Series, M2, ST Series	Truck
GAZ	172200 Volga, 24 Volga, 31 Volga, 69, Volga Siber	Car
	1724 Gazel, 22 Gazel, 23 Gazel, 27 Gazel, 3221 Gazel, 32 Gazel, 3302 Gazel, 3310 Valday, 33 Gazel, GAZel Biznes, GAZon Next, Gazel, Gazel Next	Mini truck
	3307, 3308 Sadko, 3309, 52, 53, 66, SAZ 2507, SAZ 3507	Truck

Make	Model	Vehicle class
GolAZ	5291 Cruise	Bus
Golden Dragon	XML6126, XML6957	
GMC	Yukon	Car
Geely	CK, Emgrand, GC6, MK	
Genesis	G80	
Great Wall	Hover, Hover H3, Hover H5, Hover H6, Hover M2, Hover M4	
HUMMER	H2, H3	
Hafei	Simbo	
Haima	3, 7	
Haval	H6, H9	
Higer	A80, KLQ	Bus
Hino	300 Series, 500 Series, Profia, Ranger	Truck
Honda	Accord, Accord Crosstour, Airwave, CR V, Civic, Civic Ferio, Crossroad, Crosstour, Element, Freed, Freed Spike, HR V, Integra, Jazz, Legend, Odyssey, Pilot, Prelude, Stepwgn, Stream, Torneo	Car
Hymer	Mobil	Mini truck
Hyundai	Accent, Avante, Coupe, Creta, Elantra, Equus, Galloper, Genesis, Genesis Coupe, Getz, Grand Santa Fe, Grand Starex, Grandeur, H 1, Matrix, NF, Santa Fe, Solaris, Sonata, Starex, Terracan, Tiburon, Trajet, Tucson, Tuscani, Veloster, i20, i30, i40, ix35, ix55	Car
	Aero City, County, Universe, Universe Space	Bus
	HD	Truck
	Porter	Mini truck
Ikarus	250, 256, 260, 280	Bus
Infiniti	EX Series, FX Series, G Series, JX Series, M Series, QX Series, Q Series	Car
International	9000 Series	Truck
Iran Khodro	Samand	Car

Make	Model	Vehicle class
Irisbus	Crossway, Magelys	Bus
Isuzu	Axiom	Car
	AF, Elf, F Series, Forward, NPR, N Series	Truck
Iveco	AMT, EuroCargo, EuroStar, EuroTech, Stralis, Trakker	Truck
	Daily, TurboDaily	Mini truck
Izh	2125, 2126, 21261 Fabula, 2715, 2717, 412	Car
JAC	HK6120 KY	Bus
	S5	Car
JMC	Carrying	Truck
Jaguar	F Pace, F Type, S Type, XE, XF, XJ, XK, XKR, X Type	Car
Jeep	Cherokee, Commander, Compass, Grand Cherokee, Liberty, Renegade, Wrangler	
Jonckheere	Deauville	Bus
KAvZ	3976, 4235, 4238	
KIA	Bongo	Mini truck
	Carens, Carnival, Ceed, Cerato, Magentis, Mohave, Opirus, Optima, Picanto, Quoris, Rio, Rio X Line, Sorento, Soul, Spectra, Sportage, Stinger, Venga, Pro ceed	Car
	Granbird	Bus
KamAZ	4308, 4310, 44108, 4539, 5308, 5321, 5410, 5411, 5460, 5490, 551, 5511, 6460, 6511, 6520, 6522, NefAz 4208	Truck
Kenworth	T2000, W900	
King Long	XMQ	Bus
KrAZ	6322	Truck
LDV	Maxus	Mini truck
Lamborghini	Aventador, Gallardo	Car

Make	Model	Vehicle class
Lancia	Delta	
Land Rover	Defender, Discovery, Discovery Sport, Freelander, Range Rover, Range Rover Evoque, Range Rover Sport, Range Rover Velar	
Lexus	CT, ES, GS, GX, IS, LC, LS, LX, NX, RX, SC	
LiAZ	4292, 5256, 5292, 5293, 6213, 677	
Liebherr	LTM	Truck
Lifan	Breez, Cebrium, Smily, Solano, Solano II, X60	Car
Lincoln	Aviator, Continental, LS, MKS, MKT, MKX, Navigator, Town Car	
MAN	F2000, F90, L2000, LE2000, M2000, M90, ME2000, TGA, TGL, TGM, TGS, TGX	Truck
	Lions Coach, Lions Regio, Lions Top Star	Bus
MAZ	103, 107, 152, 203, 206	
	43, 53, 54, 55, 63, 64, 65	Truck
MG	ZT T	Car
MINI	Clubman, Cooper, Countryman, Hatch	
Marcopolo	Andare, Bravis	Bus
Maserati	Ghibli, Levante, Quattroporte	Car
Maybach	57, 62	
Mazda	2, 3, 323, 5, 6, 626, BT 50, Bongo, Bongo Friendee, CX 5, CX 7, CX 9, Capella, Demio, Familia, MPV, MX 5, Premacy, RX 8, Titan, Tribute	
Mercedes Benz	A Klasse, B Klasse, CLA Klasse, CLK Klasse, CLS Klasse, CL Klasse, C Klasse, Citan, E Klasse, GLA Klasse, GLC Klasse, GLE Klasse, GLK Klasse, GLS Klasse, GL Klasse, G Klasse, M Klasse, R Klasse, SLK Klasse, SL Klasse, S Klasse, X Klasse	
	Actros, Atego, Axor, LK Series, SK Series	Truck
	MB Series, Sprinter, T1, T2, V Klasse, Vario, Viano, Vito	Mini truck
	Travego, Conecto, O303, O330, O350 Tourismo, O403, O404, O405, O560 Intouro	Bus
Mercury	Grand Marquis, Mariner, Mystique, Villager	Car

Make	Model	Vehicle class
Mitsubishi	ASX, Airtrek, Carisma, Colt, Delica, Delica Space Gear, Eclipse, Galant, Grandis, L200, Lancer, Lancer Cargo, Lancer Cedia, Lancer Evolution, Legnum, Outlander, Outlander XL, Pajero, Pajero Mini, Pajero Pinin, Pajero Sport, Pajero iO, RVR, Space Gear, Space Wagon	
	Canter, Fuso Canter, Fuso Fighter	Truck
Moskvich	2137, 2140, 2141, 403, 408, 412	Car
Multicar	M25, M26	Mini truck
Nefaz	5299	Bus
Neoplan	Cityliner, Euroliner, Jetliner, Skyliner, Spaceliner, Starliner, Transliner	
Nissan	AD, Almera, Almera Classic, Atlas, Avenir, Bluebird, Bluebird Sylphy, Cedric, Cefiro, Cube, Expert, GT R, Juke, Laurel, Liberty, March, Maxima, Maxima QX, Micra, Murano, NP300 Pickup, Navara, Note, Pathfinder, Patrol, Presage, Primera, Pulsar, Qashqai, Qashqai 2, Safari, Sentra, Serena, Skyline, Sunny, Teana, Terrano, Terrano II, Tiida, Vanette, Wingroad, X Trail	Car
	Cabstar, Diesel Condor	Mini truck
Noge	Vesubio	Bus
Oldsmobile	Alero	Car
Opel	Antara, Ascona, Astra, Calibra, Combo, Corsa, Frontera, Insignia, Kadett, Meriva, Mokka, Monterey, Omega, Rekord, Tigra, Vectra, Zafira	
	Movano, Vivaro	Mini truck
Oshan	X5, X7	Car
PAZ	3203, 3204, 3205, 4230 Avrora, 4234, Vector Next	Bus
Peugeot	1007, 106, 107, 2008, 205, 206, 207, 208, 3008, 301, 306, 307, 308, 4007, 4008, 405, 406, 407, 408, 5008, 508, 605, 607, 806, 807, Partner, RCZ	Car
	Boxer, Expert, Expert Tepee, Traveller	Mini truck
Plymouth	Neon, Voyager	Car
Pontiac	Bonneville, Firebird, Grand Am, Grand Prix, Solstice, Sunfire, Trans Sport, Vibe	Car
Porsche	911, 924, 928, Boxster, Cayenne, Cayman, Macan, Panamera, Taycan	Car
RAM	ProMaster City	Mini truck

Make	Model	Vehicle class
Ravon	Gentra, Matiz, Nexia, Nexia R3, R2, R4	Car
Renault	19, 21, 25, Arkana, Captur, Clio, Dokker, Duster, Espace, Fluence, Grand Scenic, Kadjar, Kangoo, Koleos, Kwid, Laguna, Latitude, Logan, Logan Stepway, Megane, Modus, Oroch, SR, Safrane, Sandero, Sandero Stepway, Scenic, Symbol, Talisman, Twingo, Vel Satis, Wind, ZOE	Car
	Kerax, Magnum, Midlum, Premium, T Series	Truck
	Mascott, Master, Trafic	Mini truck
Skoda	Citigo, Fabia, Favorit, Felicia, Forman, Kamiq, Karoq, Kodiaq, Octavia, Praktik, Rapid, Roomster, Superb, Yeti	Car
Subaru	Ascent, B9 Tribeca, BRZ, Crosstrek, Domingo, Exiga, Forester, Impreza, Impreza WRX, Impreza WRX, Impreza XV, Justy, Legacy, Legacy Lancaster, Legacy Outback, Leone, Levorg, Outback, Pleo, Pleo Plus, R1, R2, SVX, Sambar, Stella, Traviq, Trezia, Tribeca, Vivio, WRX, XV	Car
Suzuki	Aerio, Alto, Baleno, Cervo, Ciaz, Cultus, Ertiga, Escudo, Esteem, Every, Forenza, Grand Vitara, Hustler, Ignis, Jimny, Kei, Kizashi, Landy, Liana, Palette, SX4, SX4 S Cross, Samurai, Sidekick, Solio, Splash, Swift, Vitara, Wagon R, XL7, Xbee	Car
	Spacia	Mini truck
Toyota	4Runner, Agya, Allex, Allion, Alphard, Altezza, Aqua, Aristo, Auris, Avalon, Avanza, Avensis, Avensis Verso, Aygo, Belta, Blade, Brevis, C HR, Caldina, Cami, Camry, Camry Gracia, Camry Solara, Carina, Carina E, Carina ED, Cavalier, Celica, Celsior, Chaser, Corolla, Corolla Allex, Corolla Axio, Corolla Ceres, Corolla Cross, Corolla Fielder, Corolla II, Corolla Levin, Corolla Rumion, Corolla Runx, Corolla Spacio, Corolla Verso, Corona, Corona Exiv, Corona Premio, Corsa, Cresta, Crown, Crown Majesta, Curren, Cynos, Duet, Echo, Esquire, Estima, Estima Emina, Estima Lucida, Etios, FJ Cruiser, Fortuner, Fun Cargo, GT86, Gaia, Grand Hiace, Hiace Regius, Highlander, Hilux, Hilux Surf, Innova, Ipsum, Isis, Ist, Kijang, Kluger, Land Cruiser, Land Cruiser Prado, Lite Ace, Lite Ace Noah, MR2, MR S, Mark II, Mark II Blit, Mark II Qualis, Mark X, Mark X Zio, Master Ace Surf, Matrix, Nadia, Noah, Opa, Paseo, Passo, Passo Sette, Picnic, Pixis Epoch, Pixis Joy, Pixis Space, Pixis Van, Platz, Porte, Premio, Previa, Prius, Probox, Progres, Pronard, RAV4, Ractis, Raize, Raum, Roomy, Rush, Sai, Scepter, Sequoia, Sera, Sienna, Sienta, Soarer, Spade, Sparky, Sprinter, Sprinter Carib, Sprinter Marino, Sprinter Trueno, Starlet, Succeed, Supra, Tacoma, Tank, Tercel, Town Ace, Town Ace Noah, Tundra, Urban Cruiser, Vanguard, Vellfire, Venza, Verossa, Verso, Vios, Vista, Vista Ardeo, Vitz, Voltz, Voxy, Will, Windom, Wish, Yaris, Yaris Verso	Car
	Dyna, Granvia, Hiace, ProAce, Regius, Regius Ace, Toyo Ace	Mini truck
UAZ	315, 316, 469, 2360, 2363, 3151, 23602 Cargo, 23632 Pickup, Hunter, Patriot	Car
	452, 2206, 2989, 3303, 3741, 3909, 3962, AC B1, Profi, TC 17144	Mini truck

Make	Model	Vehicle class
Volkswagen	Amarok, Arteon, Atlas, Beetle, Bora, Caddy, Corrado, CrossPolo, Eos, EuroVan, Fox, Fusca, Gol, Golf, Golf, ID3, ID4, ID6, Jetta, Lavida, Lupo, Multivan, New Beetle, Nivus, Parati, Passat, Passat Alltrack, Passat CC, Phaeton, Pointer, Polo, Routan, Santana, Saveiro, Scirocco, Sharan, Spacefox, T Cross, T Roc, Talagon, Taos, Tavendor, Tayron, Teramont, Tharu, Tiguan, Touareg, Touran, Type 1, Type 2, Up, Vento, Viloran, Virtus, Voyage	Car
	California, Caravelle, Crafter, LT, Transporter	Mini truck
Volvo	240 Series, 300, 440, 460, 740, 760, 850, 940, 960, C30, C70, S40, S60, S70, S80, S90, V40, V40 Cross Country, V50, V60 Cross Country, V70, V70XC, V90 Cross Country, XC40, XC60, XC70, XC90	Car
	7300, 7350, 8900, 9500, 9700, 9900, B10	Bus
	F12, FE, FH, FL, FM, FMX, VN Series	Truck

Licensing	For the **Vehicle recognition RR** detector to operate, contact an AxxonSoft manager and get a license file (see Types of licenses[243])
Add-ons	For the **Vehicle recognition RR** detector to operate, you must install the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)) **Attention!** Starting with *Detector Pack* 3.14, you must install two *Detector Packs* for the detector to operate: • RR Vehicle Recognition add-on; • RR SDK Pack.

19.4.30.6.2 Hardware requirements for Vehicle recognition RR

Hardware requirements(see page 87)

If you use the **Vehicle recognition RR** detector, the following hardware requirements must be met:

Device	Requirements for the supported model
CPU	• Intel Core 6th generation and newer, Intel Xeon v4 and newer • Support for the AVX2 instruction set that is listed here[244] • Movidius/Neural Compute Stick devices are formally supported but currently don't undergo the regular testing
Nvidia GPU	• NVIDIA GTX 1050 Ti and newer • At least 2 GB of video memory • Compute Capability from 3.5. You can check the GPU Compute Capability version on the manufacturer's[245] website • Support for CUDA 11.8. NVIDIA drivers version 450.36.06 and higher are required

243 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses
244 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3532
245 https://developer.nvidia.com/cuda-gpus

Device	Requirements for the supported model
Intel GPU	• Intel Arc Family, Intel Data Center GPU Flex Series (including 140/170 models) • Intel HD Graphics, Intel UHD Graphics, Intel Iris Xe Graphics and newer • Support for other platforms listed in the official OpenVINO documentation is possible, but they aren't tested for compatibility with the detector

Attention!

To use the capabilities of the GPU (both NVIDIA and Intel), you must manually install the necessary drivers and runtime components (for example, CUDA for NVIDIA), as they aren't included in the software package.

19.4.30.6.3 Camera requirements for Vehicle recognition RR and its sub-detectors

You must install and configure the cameras in such a way that the following requirements are met:

Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection

Basic requirements	To determine the speed of the vehicle	• Camera installation height is at least four meters
		• The time period when a vehicle is in front of the camera with a fully readable state license plate, or when a vehicle that is fully in the frame and accurately recognized must be at least 500 ms
		• Time stamps for frames must not differ from the real time by more than two ms
		• When calibrating values, the measured road section must be at least three meters wide and five meters long. In this case, the key points in the image must be at least 300 pixels apart. The measurement error during calibration (difference between actual and entered measured values) must not exceed 1%
		• Camera must be rigidly fixed and must not move during gusts of wind and other physical forces
		• All of the following rules must be followed by default:
		  ◦ The bounding rectangle of the state license plates doesn't touch the bottom part of the frame in both selected frames for speed calculation
		  ◦ The offset of the center of the rectangle between the two selected frames is at least four meters and 100 pixels
		  ◦ The time difference between two selected frames is at least 100 ms
		Recommendations for configuring the speed detection area for Vehicle recognition RR(see page 610)

	To determine the driving direction of the vehicle	• Camera installation height is at least three meters • Angle between camera and road direction is not more than 30° • Minimum camera tilt
	To recognize the make and model of the vehicle	• Visible width of the vehicle is from 100px • Color or black and white image • Front view of the vehicle

Type of requirements	Purpose	Requirements for the video image from the camera that is used for detection
	To recognize the color of the vehicle	• Visible width of the vehicle is from 100px • The scene illumination must be at least 50 lux. Under low or excessive illumination (night or backlight), the stability of the analytics operation is not guaranteed. There are no abrupt changes in illumination • Color image with a normal color grade
	To determine the condition of the headlights	• Visible width of the vehicle is from 100px • Front view of the vehicle • Evening, night or foggy shooting conditions are required

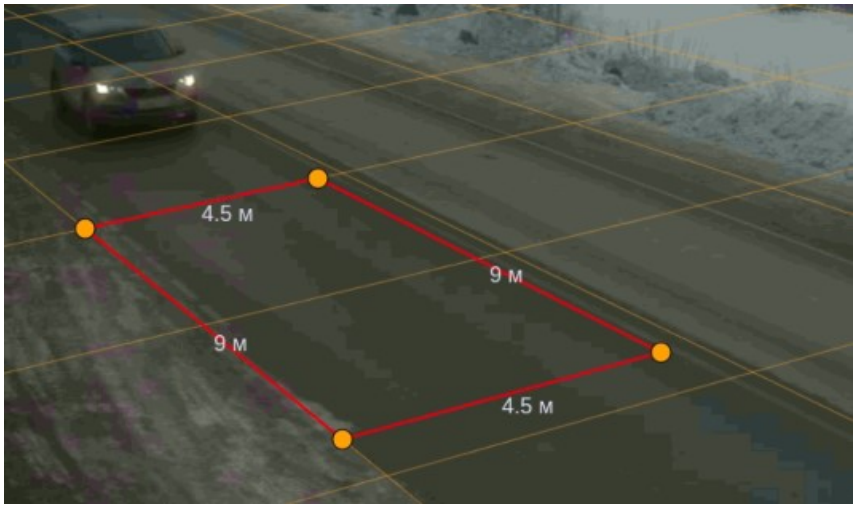
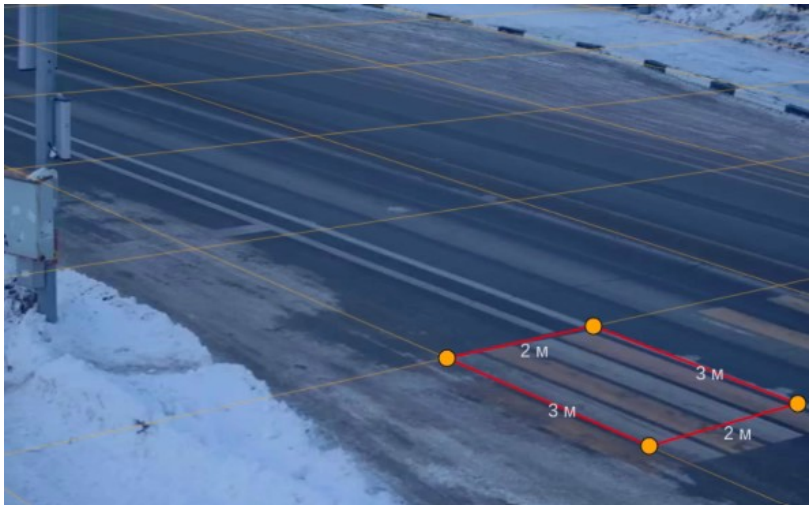
19.4.30.6.3.1 Recommendations for configuring the speed detection area for Vehicle recognition RR

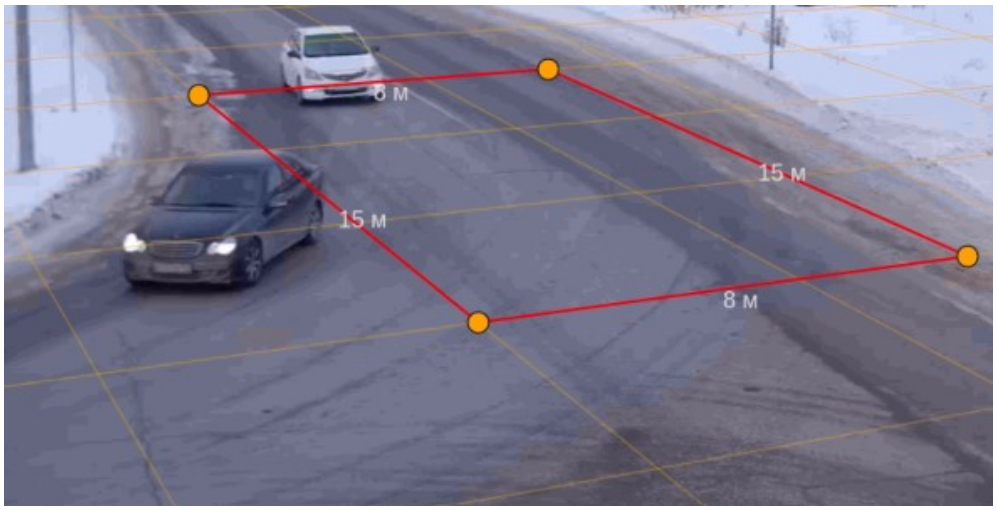
Recommendations

1. You must install the camera according to the requirements (see Camera requirements for Vehicle recognition RR and its sub-detectors(see page 609)).
2. You must select an area in the frame that meets the following conditions:
   a. The sides of the selected area (**Speed detection area height** and **Speed detection area width**) must be equal in pairs.
   b. The angles of the selected area must be 90° in the real world.
3. When you specify the area in the Surveillance window, you must focus on:
   a. Traffic lanes (solid and broken lines on the roadway).
   b. Road curbs.
   c. Vehicle bumpers and wheel contact points with the roadway.
   d. Crosswalks.
4. The quality of vehicle recognition will be higher if the selected area occupies a significant part of the frame and is as close to the camera as possible.
5. You can use the dimensions of a particular vehicle as a reference point. For example, Hyundai Solaris: length (**Speed detection area heigh**)—2.6 meters, width (**Speed detection area width**)—1.73 meters

Attention!

Margin of error in determining the speed of vehicles is about 5% with a good calibration, as this function gives only a general idea of the situation. The consumption of resources doesn't change when the **Speed detection** parameter is enabled.

Examples of the corresponding selected area	Lines are parallel to road markings and vehicle bumpers:   



19.4.30.6.4 Optimizing the operation of Vehicle recognition RR on GPU in Windows OS

Starting with *DetectorPack* 3.10, a utility was added to the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the **Vehicle recognition RR** detector on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

   > **Attention!**
   >
   > If the system has the software running on GPU, it is necessary to stop its operation.

2. Create the **GPU_CACHE_DIR** system variable (see Creating system variable(see page 126)) by specifying the path to the cache location with an arbitrary folder name in the **Variable value** field. For example, D:\AO_GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
3. To call the utility, open in the command line: **C:\Program Files\Common Files\AxxonSoft\DetectorPack\RRGpuCacheGenerator.exe** and press **Enter**.
4. Select the required cache sets by specifying the **y** or **n** value:
   a. **lpr recognition**—recognition of a vehicle license plate;

      > **Attention!**
      >
      > Vehicle license plate recognition isn't available for the **Vehicle recognition RR** detector. Specify the **n** value for this item.

   b. **vehicle recognition**—recognition of a vehicle;
   c. When you select the **vehicle recognition** cache set without **lpr recognition**, you must choose the territory where vehicle recognition is going to be performed:
      i. **CIS countries**—**1**;
      ii. **Other countries**—**2**.
5. Select one of the accuracy and performance values by specifying the corresponding number:
   a. **Medium accuracy, high performance**—**1**, provides medium recognition accuracy and high performance of the GPU (less load on the GPU);
   b. **High accuracy, medium performance**—**2**, provides high recognition accuracy and medium performance of the GPU (high load on the GPU).
6. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
7. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the **Vehicle recognition RR** detector on GPU is complete.

Attention!

You must recreate the cache:
- if you update the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, accuracy value, and so on).

19.4.30.6.5 Optimizing the operation of Vehicle recognition RR on GPU in Linux OS

Creating system variables for the Axxon One server in Linux OS[246]
Creating system variables for the Axxon One server in the failover mode in Linux OS[247]

Starting with *DetectorPack* 3.10, a utility was added to the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the **Vehicle recognition RR** detector on GPU, do the following:

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[248]).

   Attention!

   If the system has the software running on GPU, you must stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

   ```
   sudo su ngp
   ```

   b. Enter the password for the superuser.
3. Create a folder with a custom name to store the cache. For example:

   ```
   mkdir /opt/AxxonSoft/AxxonOne/gpucache
   ```

4. Change folder permissions:

   ```
   chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
   ```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

   ```
   cd /opt/AxxonSoft/AxxonOne
   ```

6. Open the server configuration file for editing:

   ```
   nano instance.conf
   ```

246 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
247 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS
248 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

Attention!

When you use the server in failover mode, you must:

a. Open the **/etc/AxxonSoft** folder:

```
cd /etc/AxxonSoft
```

b. Open the server configuration file for editing:

```
nano axxon-one.conf
```

Note

Before you make the changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[249].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

d. Save the changes in the file.

e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file.

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit file editing mode using the **Ctrl+X** keyboard shortcut.

Attention!

When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[250]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[251]).

249 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

250 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS

251 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

10. In the command prompt, run the command that was used to add the system variable with the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./RRGpuCacheGenerator
```

13. Select the required cache sets by specifying the **y** or **n** value:
    a. **lpr recognition**—recognition of a vehicle license plate;

    > **Attention!**
    >
    > Vehicle license plate recognition isn't available for the **Vehicle recognition RR** detector. Specify the **n** value for this item.

    b. **vehicle recognition**—recognition of a vehicle;
    c. When you select the **vehicle recognition** cache set without **lpr recognition**, you must specify the territory where vehicle recognition is going to be performed:
        i. **CIS countries**—**1**;
        ii. **Other countries**—**2**.
14. Select one of the accuracy and performance values by specifying the corresponding number:
    a. **Medium accuracy, high performance**—**1**, provides medium recognition accuracy and high performance of the GPU (less load on the GPU);
    b. **High accuracy, medium performance**—**2**, provides high recognition accuracy and medium performance of the GPU (high load on the GPU).
15. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
16. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the **Vehicle recognition RR** detector on GPU is complete

> **Attention!**
>
> You must recreate the cache:
> - if you update the RR LPR add-on (see Installing DetectorPack add-ons(see page 321)),
> - if you change the Nvidia GPU model,
> - if you update Nvidia GPU drivers,
> - if you change the previously specified parameters (for example, the list of countries, accuracy value, and so on).

19.4.30.6.6 Configuring Vehicle recognition RR

Hardware requirements for Vehicle recognition RR(see page 608)
Camera requirements for Vehicle recognition RR and its sub-detectors(see page 609)
Optimizing the operation of Vehicle recognition RR on GPU in Windows OS(see page 612)

Parameters that specify the conditions for starting a macro when recognizing a vehicle(see page 852)

To configure the **Vehicle recognition RR** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Vehicle** → **Vehicle recognition RR**.

By default, the detector is enabled and set to recognize vehicles. For the full list of possible vehicle classes, makes, and models, see here(see page 600).

Note

The accuracy of the **Vehicle recognition RR** detector is:
- Make recognition: 0.992;
- Model recognition: 0.951.

Recognition accuracy is affected by the camera angle, the illumination in the detection area, as well as compliance with camera requirements and video stream quality (see Camera requirements for Vehicle recognition RR and its sub-detectors(see page 609)).

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Vehicle recognition RR**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**Vehicle recognition RR**	Name of the detector type (non-editable field)
Advanced settings		

Parameter	Value	Description
Accuracy and performance	**Medium accuracy and high performance** **High accuracy and medium performance**	Select vehicle recognition accuracy and performance: • **Medium accuracy and high performance**—provides medium recognition accuracy and high GPU performance (lower GPU load); • **High accuracy and medium performance**—provides maximum recognition accuracy and medium GPU performance (high GPU load)
Calibration area height (m)	**0**	Specify the height of the calibration area in meters. The value must be in the range [0, 500]
Calibration area width (m)	**0**	Specify the width of the calibration area in meters. The value must be in the range [0, 500]
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (1920 pixels on the longer side) by default. The value must be in the range [640, 10 000]. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops, and this resolution will be used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
Initiate event in (sec)	**0**	Specify the time in seconds after which an event must be generated after recognizing a vehicle in the frame. If the value is **0**, an event is generated after the track with a vehicle is lost. The value must be in the range [1, 3600]
Minimum vehicle recognition quality (%) (starting with *Detector Pack* 3.14)		Specify the minimum quality of vehicle recognition as a percentage. The lower the minimum recognition quality, the more events are created, but the lower the reliability of recognition. The higher the value, the stricter the filtering and the higher the accuracy. The value must be in the range [0, 100]
Speed detection	**Off** **Kmph** **Mph**	Select from the list the mode for determining the speed unit of vehicles. **Attention!** Margin of error in determining the speed of vehicles is about 5% with a good calibration, as this function gives only a general idea of the situation. The consumption of resources doesn't change when the **Speed detection** parameter is enabled. **Note** For the correct display of the speed measurement unit, you must create the MEASUREMENT_UNIT system variable (see Creating system variable(see page 126)) and specify the value: • 0—to display kmph; • 1—to display mph.
Territory	**Countries of CIS**	Select the territory of vehicle recognition

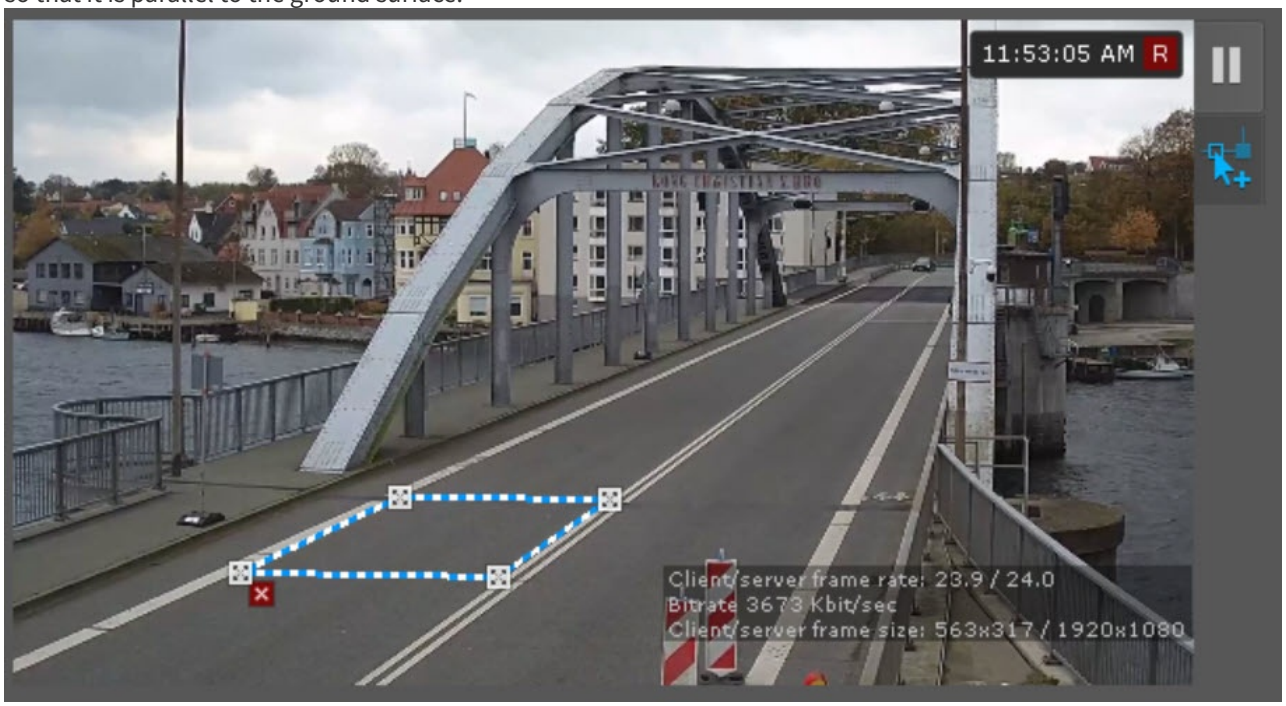
Parameter	Value	Description
	Other countries	
Track lifespan (starting with *Detector Pack* 3.14)	**Yes**	By default, the parameter is disabled. If you want to view the track lifespan for an object in seconds, select the **Yes** value
	No	
Vehicle recognition period (ms) (starting with *Detector Pack* 3.14)	**750**	Specify the time in milliseconds between the operations of vehicle search in the frame. The larger this value, the less load on the server, but some vehicles can be unrecognized. The value must be in the range [1, 10 000]
Basic settings		
Algorithm for detecting vehicle direction	**By LP coordinates**	The **By LP coordinates** algorithm is used by default. It works as follows: if the coordinates of the vehicle shift from top to bottom (the vehicle moves towards the camera) and if the coordinates of the vehicle shift from bottom to top (the vehicle moves away from the camera). Select the **By LP scale change** parameter if, in the Surveillance window, the scale of the vehicle increases (the vehicle moves towards the camera) and if the scale of the vehicle decreases (the vehicle moves away from the camera)
	By LP scale change	
Detection mode	**CPU**	Select a processor for the detector operation (see Selecting Nvidia GPU when configuring detectors(see page 348)) **Attention!** It can take several minutes to launch the algorithm on Nvidia GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of Vehicle recognition RR on GPU in Windows OS(see page 612), Optimizing the operation of Vehicle recognition RR on GPU in Linux OS(see page 613)).
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
	Intel GPU 0	
	Intel GPU 1	
	Intel GPU 2	
	Intel GPU 3	
Direction of movement (starting with *Detector Pack* 3.14)	**Both**	By default, an event is created when a vehicle moves in **Both** directions. If you want the event to be created when a vehicle moves from the camera (**Outgoing**) or to the camera (**Incoming**), select the corresponding value
	Outgoing	
	Incoming	

By default, the entire video frame is analyzed. If necessary, in the preview window, you can set:

1. The calibration area of the road scene. To do this, do the following:
   a. Click in the camera preview window and select **Calibration area**.

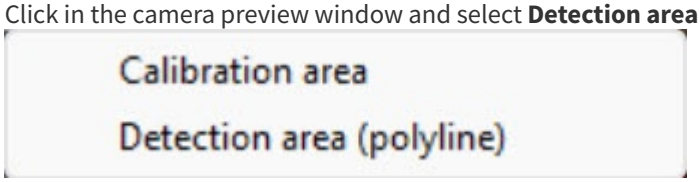


You can configure the calibration area by moving the anchor points . The calibration area is used to match the camera coordinates with the real road scene. The calibration area must also be set in cases where it is necessary to determine the vehicle speed. It is necessary to set an area that corresponds to a certain real rectangle of known dimensions in the frame. For example, road markings, a vehicle, and so on. You must configure the calibration area so that it is parallel to the ground surface.



b. Specify the dimensions of the real rectangle on the frame. This rectangle corresponds to the area marked in the **Calibration area height (m)** and **Calibration area width (m)** parameters.

2. The detection area. To do this, do the following:
   a. Click in the camera preview window and select **Detection area (polyline)**.



You can configure the detection area by moving the anchor points . The detection area is used to detect vehicles or license plates and generate corresponding events.

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- To hide the area, click the button. To cancel the action, click this button again.
- To delete a selected area, click the button.

To save the parameters of the detector, click the **Apply** button. To cancel the changes, click the **Cancel** button.

Configuration of the **Vehicle recognition RR** detector is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of **Vehicle recognition RR** (see Standard sub-detectors(see page 359)).

19.4.30.7 License plate recognition XR

19.4.30.7.1 Functions of the License plate recognition XR

Attention!

Starting with *Detector Pack* 3.14, the **Vehicle recognition XR** detector has been renamed to **License plate recognition XR**.

Description	The **License plate recognition XR** is used to: 1. Recognize license plates of vehicles. List of countries: Supported: Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Barbados, Belarus, Belgium, Benin, Bermuda, Bhutan, Bolivia, Bosnia, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, Christmas Island, Colombia, Comoros, Congo, Cook Islands, Croatia, Cyprus, Czech Republic, Denmark, Dominica, Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Estonia, Faroe Islands, Fiji, Finland, France, French Guiana, French Polynesia, French Southern Territories, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Great Britain, Greece, Greenland, Grenada, Guadeloupe, Guatemala, Guinea, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Ivory Coast, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kuwait, Kyrgyzstan, Laos, Latvia, Liberia, Liechtenstein, Lithuania, Luxembourg, Macau, Macedonia, Madagascar, Malawi, Malaysia, Mali, Malta, Marshall Islands, Martinique, Mauritania, Mauritius, Mayotte, Mexico, Micronesia, Moldova, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Netherlands, Netherlands Antilles, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, Northern Mariana Islands, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Reunion Island, Romania, Russia, Rwanda, Saint Kitts and Nevis, Saint Lucia, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Singapore, Slovakia, Slovenia, Solomon Islands, South Africa, South Sudan, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Turkey, Turkmenistan, Turks and Caicos Islands, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vatican, Venezuela, Vietnam, Virgin Islands British, Virgin Islands USA, Wallis and Futuna Islands, Zambia, Zimbabwe Unsupported: Afghanistan, Antarctica, Bangladesh, Belize, China, Cocos Islands, Costa Rica, Cuba, Djibouti, Eritrea, Ethiopia, Falkland Islands, Guam, Guinea Bissau, Iran, Iraq, Japan, Lebanon, Lesotho, Libya, Maldives, Montserrat, Myanmar, Nepal, Niue, North Korea, Palau, Palestine, Pitcairn Island, Saint Vincent and Grenadines, Sierra Leone, Somalia, South Korea, Sudan, Suriname, Syria, Tibet, Timor Leste, Tokelau, Tunisia, Tuvalu, Vanuatu, Western Sahara, Yemen 2. Recognize the class, make, model, color of a vehicle 3. Write the recognized license plates into a database 4. Check the recognized license plates in the lists of license plates
Licensing	For the detector to operate, contact a manager of AxxonSoft and get a license file (see Types of licenses[252], Licensing of the software module for the License plate recognition XR in Windows OS(see page 623))
Add-ons	For the detector to operate, install the XR LPR add-on (see Installing DetectorPack add-ons(see page 321)) **Attention!** Starting with *Detector Pack* 3.14, the XR Vehicle Recognition Pack has been renamed to XR LPR add-on.

252 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

19.4.30.7.2 Hardware requirements for the License plate recognition XR

Operating system and software	• Microsoft Windows 10 or higher (64-bit version, see Operating system requirements(see page 86)) • Microsoft Visual C++ 2015 Redistributable Package (x64) • .NET Framework 4.5.2 • Installed license (see Licensing of the software module for the License plate recognition XR in Windows OS(see page 623))
RAM usage	• Each camera requires at least 500 MB of RAM. This must be considered if you use many cameras on one computer **Note** For example, a configuration with 16 cameras requires at least 8 GB of RAM.
CPU	• Intel i7 or i9 of the latest-generation with a clock speed of at least 3.0 GHz • System must allocate one core per camera at 2 MP resolution (since the detection tool operates at 1 MP resolution, 20 cores aren't required for a 20-camera setup), plus two additional cores for operating system tasks. CPU must support AVX2 **Note** For example, a configuration with 20 cameras requires 16 GB of RAM and a CPU with the specified characteristics with at least 16 cores.

19.4.30.7.3 Video stream and scene requirements for the License plate recognition XR

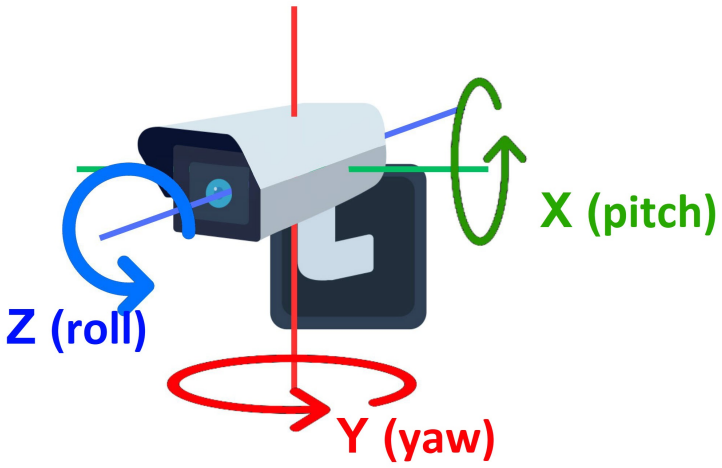
Requirements for the operation of the **License plate recognition XR** are given in the table:

Camera	• Minimum resolution is 640*480, recommended resolution is 1280x720px • Minimum frame rate is 15 FPS, recommended frame rate is 25–30 FPS • Autofocus and zoom functions are desirable (for making small adjustments after the detector is configured) **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting

Scene and camera angle	• To achieve the highest accuracy, set up the camera to capture only one lane of traffic, preferably the one closest to the camera (dual lanes are possible if the camera is positioned between two lanes)
	• Maximum horizontal tilt angle of the camera must be no more than 15°. This is the angle from the road to the capture point
	• Working distance from the camera to the capture point must be:
	  • 15–20 meters for urban conditions and low speed;
	  • 20–30 meters for higher speed measurements
	• Camera installation height is 4–6 meters above the ground
	• Angle formed by the bottom line of a license plate and the horizon line must be between 0° and 20°
	• Camera must not be installed near road bends, speed bumps, road junctions, traffic lights or roundabouts, as vehicles are likely to accelerate or decelerate at these locations. Detection area must not be on a curve in the road

19.4.30.7.4 Image requirements for the License plate recognition XR

Requirements for the operation of the **License plate recognition XR** are given in the table:

Image tilt	The following limits are recommended: • X-axis rotation (pitch): ± 35° • Y-axis rotation (yaw): ± 40° • Z-axis rotation (roll): ± 35°  Correct tilt    Incorrect tilt    If you exceed these values, the recognition accuracy can significantly reduce

Object images	• Clear, sharp, no distortion, no blurring • Image must have minimum noise in low light conditions • Size of license plate must be 15–70% of the total image size • License plate must have no more than two rows of characters on it • Optimal height of characters is 20–30 pixels

19.4.30.7.5 Licensing of the software module for the License plate recognition XR in Windows OS

On the page:

- Installation of the Sentinel LDK Run-time environment for license keys(see page 623)
- Installation of the demo license(see page 623)
- License activation using a License Code(see page 624)
- Delete the license(see page 624)

19.4.30.7.5.1 Installation of the Sentinel LDK Run-time environment for license keys

The Sentinel LDK Run-time environment is required for the operation of the license keys of the **License plate recognition XR**.

Attention!

Starting with *Detector Pack* 3.14, the Sentinel LDK Run-time environment and the demo license are installed and activated automatically with the XR LPR add-on (see Installing DetectorPack add-ons(see page 321)).

To install the Sentinel LDK Run-time environment manually:

1. Download the haspdinst.exe installer.
2. Run the command line as the system administrator.
3. Sequentially execute the following commands from the folder with the downloaded installer:

```
haspdinst -fr -purge
```

```
haspdinst -i
```

4. Restart the **Sentinel LDK License Manager** service or restart the OS.
5. Open the Sentinel Admin Control Center[253] web application.

Manual installation of the Sentinel LDK Run-time environment is complete.

19.4.30.7.5.2 Installation of the demo license

Attention!

- Before you install the demo license, you must install the Sentinel LDK Run-time environment (see Installation of the Sentinel LDK Run-time environment for license keys).

253 http://127.0.0.1:1947/_int_/devices.html

- The operation of the **License plate recognition XR** in demo mode isn't supported on virtual machines.

The demo license allows you to recognize license plates from all available countries for 30 days from activation. To install the demo license:

1. Download the archive with files to activate the demo license.
2. Unzip the downloaded file.
3. In the unzipped folder, run the file with the .bat extension as administrator.
4. Restart the **Sentinel LDK License Manager** service or restart the OS.
5. Open the Sentinel Admin Control Center[254] web application. Information about the installed demo license is displayed on the **Sentinel Keys** tab.

Installation of the demo license is complete.

19.4.30.7.5.3 License activation using a License Code

Attention!

- Before you activate the license, you must install the Sentinel LDK Run-time environment (see Installation of the Sentinel LDK Run-time environment for license keys).
- The activation process is tied to a specific server. You must perform all actions directly on the server where the **License plate recognition XR** will be running.

To activate the license:

1. Open the page on the target server in a browser: https://licensing.vaxtor.com/ems/customerLogin.html.
2. In the **Product Key** field, enter the serial number.
3. Select activation type:
    a. If you have internet access, click the **Online Activation** button and follow the instructions on the portal. Activation will occur automatically.
    b. If you don't have internet access, click the **Offline Activation** button.
        i. Download the **RUS (Remote Update System)** utility from the Vaxtor[255] portal.
        ii. Run the **RUS** utility on the target server to generate a **C2V request file**.
        iii. Upload the generated **C2V file** to the Vaxtor[256] portal.
        iv. Download the **V2C file** received from the portal.
        v. Open the following page in your browser on the target server: http://127.0.0.1:1947/ru.21.0.alp/checkin.html.
        vi. Click **Select File** and select the downloaded **V2C file**.
        vii. Click **Apply File**. After activation, an **installed** folder appears in the **C:\Program Files (x86)\Common Files\SafeNet Sentinel\Sentinel LDK** directory. The Sentinel Admin Control Center[257] web application will display information about the installed license key on the **Sentinel Keys** tab.

License activation is complete.

19.4.30.7.5.4 Delete the license

To delete the license:

1. Delete the **V2C license file** from the **C:\Program Files (x86)\Common Files\SafeNet Sentinel\Sentinel LDK\installed** directory.
2. Restart the OS.

Note

254 http://127.0.0.1:1947/_int_/devices.html
255 https://licensing.vaxtor.com/ems/customerLogin.html
256 https://licensing.vaxtor.com/ems/customerLogin.html
257 http://127.0.0.1:1947/_int_/devices.html

- When you delete the license, only the key is deleted. All counters of license restriction remain in the secure storage.
- If you return the key to the root directory, it will be fully restored. Its counters will continue counting license restrictions from the moment when they stopped when the **V2C** license file was deleted. The validity time of the license continues to count down even when the key is missing.

The license deletion is complete.

When you delete the **installed** folder with licenses, you must restart the **Sentinel LDK Run-time** environment:

1. Press the **Win + R** key combination.
2. In the window that opens, enter **services.msc** and press **Enter**.
3. In the **Services** window, find **Sentinel LDK License Manager**.
4. Right-click **Sentinel LDK License Manager** and select **Restart**.

The **Sentinel LDK License Manager** service will stop and then automatically start again.

19.4.30.7.6 Configuring the License plate recognition XR

Hardware requirements for the License plate recognition XR(see page 621)
Video stream and scene requirements for the License plate recognition XR(see page 621)
Image requirements for the License plate recognition XR(see page 622)
Licensing of the software module for the License plate recognition XR in Windows OS(see page 623)

To configure the **License plate recognition XR** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create… → Category: Vehicle → License plate recognition XR**.

By default, the detector is enabled and set to recognize vehicle license plates.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Check in lists	**Yes**	The **Check in lists** parameter is disabled by default. If you want to use this detector to check in lists of vehicle license plates, select the **Yes** value (see Checking in lists of LPs(see page 668))
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the Server
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**License plate recognition XR**	Enter the detector name or leave the default name

Parameter	Value	Description
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**License plate recognition XR**	Name of the detector type (non-editable field)
Basic settings		
Algorithm for detecting vehicle direction	**By LP coordinates**	The **By LP coordinates** algorithm is used by default. It works as follows: if the coordinates of the vehicle license plate shift from top to bottom (the vehicle moves towards the camera) and if the coordinates of the vehicle license plate shift from bottom to top (the vehicle moves away from the camera). Select the **By vehicle scale change** parameter if in the Surveillance window, the scale of the vehicle license plate increases (the vehicle moves towards the camera) and if the scale of the vehicle license plate decreases (the vehicle moves away from the camera)
	By vehicle scale change	
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (1920 pixels on the longer side) by default. The value must be in the range [640, 10000]. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops, and this resolution will be used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
Initiate event in (sec)	**0**	Specify the time in seconds after which an event must be generated after recognizing a license plate in the frame. If the value is **0**, an event is generated after the track with a license plate is lost. The value must be in the range [0, 60]
LP recognition advanced settings		
Country pattern compliance	**Yes**	The parameter is enabled by default. To disable the check of country pattern compliance, select the **No** value
	No	

Parameter	Value	Description
Extra processing for LP search	**Yes**	The parameter is disabled by default. To enable the extra processing for LP search, select the **Yes** value
	No	
Frame processing period (sec)	**1**	Specify the period of frame processing in seconds. The value must be in the range [0, 999]
GDPR policy	-	By default, on the layout and in the archive, the characters of a license plate are completely hidden "GDPR ON". To display the characters of a license plate, you must enter a value: • "**-**"—hide all characters (default value), • " (blank field of a parameter value)"—show all characters, • "**N-**"—hide the first N characters, • "**-N**"—hide the last N characters, where **N** is the number of characters
Maximum height of licence plate characters (pixels)	**70**	Specify the maximum height of licence plate characters in pixels. The value must be equal to or greater than the value in the **Minimum height of licence plate characters (pixels)** parameter. The value must be in the range [34, 70] **Note** • For license plates with different character size, such as those of Middle Eastern countries, the maximum height is applied to the largest set of characters found in the license plate. • The optimal character size for recognition is 22–24 pixels. • Characters less than 18 pixels high increase the likelihood of misrecognition as details of the character shape can be lost, especially if the image quality is poor: a 'G' can turn into a 'C', and so on. • Characters more than 55 pixels high can take much longer to process.

Parameter	Value	Description
Maximum Levenshtein distance	**1**	Specify the maximum Levenshtein distance between license plate characters. The value must be in the range [0, 999]. This parameter is used to determine what makes a license plate different from the previous license plate (Levenshtein distance). For two identical readings, the Levenshtein distance is zero. This parameter helps to reduce false positives when a license plate is read several times before a result is given and a partial reading still represents a valid license plate. Example: real license plate is "AB-4567". • reading 1: AB-4567 • reading 2: AB-456 If the maximum distance is set to **0** (exact match), the system reports two license plates. But if the distance is set to **1** (or greater), the system reports the first license plate, but not the second one. This is because a license plate with one distinct character is considered a readout of the same license plate, that is, a probable misreading has occurred **Note** • For the countries where the minimum number of characters in license plates is greater than 5, we recommend setting the value to 2 or greater. • For the countries where license plates can have 5 or fewer characters, set this value to 1.
Maximum LP slope angle	**40**	Specify the maximum slope angle of the license plate. The value must be in the range [0, 999]
Maximum number of same LP readings	**10**	Specify the maximum number of readings of the same license plate. The value must be in the range [1, 999]
Minimal number of characters in LP	**2**	Specify the minimum number of characters in a license plate. The value must be in the range [2, 16]
Minimum authenticity threshold	**80**	Specify the minimum value of recognition authenticity as a percentage. The value must be in the range [1, 100]
Minimum character confidence threshold	**80**	Specify the minimum threshold value of license plate recognition confidence as a percentage. The value must be in the range [1, 100]
Minimum height of licence plate characters (pixels)	**14**	Specify the minimum height of license plate characters in pixels. This is the distance between the top pixel of the character and the bottom pixel. The value must be in the range [14, 70]
Minimum number of same LP readings	**1**	Specify the minimum number of readings of the same license plate. For example, if you set the value to **2**, you will receive a massage about a license plate only if two identical readings have been made. The value must be in the range [1, 999]
Period of ignoring repeated recognitions (sec) (starting with *Detector Pack* 3.14)	**0**	Specify the period of time in seconds during which repeatedly recognized license plates will be ignored. The value must be in the range [0, 86400]

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="3">Recognition algorithm complexity</td><td>Low level</td><td rowspan="3">Select the complexity level of recognition algorithm from the list.
The Medium level is selected by default

Note
The higher the complexity of the algorithm, the longer the processing time.
Depending on the images, the difference between the low and high complexity level can be up to 4%, but on average the difference is about 2 or 3%.
If image is of high quality and license plates have a standard shape, the difference between medium and high level doesn't matter. You can set the Medium level to make license plate processing faster.
We recommend using the Low level only in complex scenes, low computing power, and when vehicle detection is preferred over license plate recognition.</td></tr>
<tr><td>Medium level</td></tr>
<tr><td>High level</td></tr>
<tr><td>Recognition timeout (sec)</td><td>0</td><td>Specify the recognition timeout in seconds. The value must be in the range [0, 999]</td></tr>
<tr><td colspan="3">LP recognition basic settings</td></tr>
</table>

Parameter	Value	Description
Countries βeta (starting with *Detector Pack* 3.14)	**Albania, Algeria, American Samoa, Andorra, Angola, Anguilla, Antigua and Barbuda, Argentina, Armenia, Aruba, Australia, Austria, Azerbaijan, Bahamas, Bahrain, Barbados, Belarus, Belgium, Benin, Bermuda, Bhutan, Bolivia, Bosnia, Botswana, Brazil, Brunei, Bulgaria, Burkina Faso, Burundi, Cambodia, Cameroon, Canada, Cape Verde, Cayman Islands, Central African Republic, Chad, Chile, Christmas Island, Colombia, Comoros, Congo, Cook Islands, Croatia, Cyprus, Czech Republic, Denmark, Dominica, Dominican Republic, East Timor, Ecuador, Egypt, El Salvador, Equatorial Guinea, Estonia, Faroe Islands, Fiji, Finland, France, French Guiana, French Polynesia, French Southern Territories, Gabon, Gambia, Georgia, Germany, Ghana, Gibraltar, Great Britain, Greece, Greenland, Grenada, Guadeloupe, Guatemala, Guinea, Guyana, Haiti, Honduras, Hong Kong, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Ivory Coast, Jamaica, Jordan, Kazakhstan, Kenya, Kiribati, Kosovo, Kuwait, Kyrgyzstan, Laos, Latvia, Liberia, Liechtenstein, Lithuania, Luxembourg, Macau, Macedonia, Madagascar, Malawi, Malaysia, Mali, Malta, Marshall Islands, Martinique, Mauritania, Mauritius, Mayotte, Mexico, Micronesia, Moldova, Monaco, Mongolia, Montenegro, Morocco, Mozambique, Namibia, Nauru, Netherlands, Netherlands Antilles, New Caledonia, New Zealand, Nicaragua, Niger, Nigeria, Northern Mariana Islands, Norway, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Portugal, Qatar, Reunion Island, Romania, Russia, Rwanda, Saint Kitts and Nevis, Saint Lucia, Samoa, San Marino, Sao Tome and Principe, Saudi Arabia, Senegal, Serbia, Seychelles, Singapore, Slovakia, Slovenia, Solomon Islands, South Africa, South Sudan, Spain, Sri Lanka, Swaziland, Sweden, Switzerland, Taiwan, Tajikistan, Tanzania, Thailand, Togo, Tonga, Trinidad and Tobago, Turkey, Turkmenistan, Turks and Caicos Islands, Uganda, Ukraine, United Arab Emirates, United Kingdom, United States, Uruguay, Uzbekistan, Vatican, Venezuela, Vietnam, Virgin Islands British, Virgin Islands USA, Wallis and Futuna Islands, Zambia, Zimbabwe, Not used**	In the corresponding fields, select from the list one or more countries, the license plates of which you want to recognize
Country 1 name		
Country 2 name		
Country 3 name		
Country 4 name		
Country 5 name		
Vehicle recognition advanced settings		
Minimum vehicle recognition confidence threshold	**50**	Specify the threshold value of the minimum vehicle recognition confidence as a percentage. The value must be in the range [1, 100]
Vehicle analytics quality	**Low level**	Select the quality of the vehicle analysis from the list. The **Medium level** is selected by default

Parameter	Value	Description
	Medium level	
	High level	
Vehicle recognition basic settings		
Vehicle recognition	**Yes**	The parameter is disabled by default. To enable the vehicle recognition, select the **Yes** value
	No	

By default, the entire frame is analyzed. If you want to analyze only a part of a frame, in the Surveillance window, specify the area in which detection and recognition of vehicles will be performed. You can adjust the area by moving the anchor points.

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- To hide the detection area, click the button. To cancel the action, click this button again.
- To delete the selected area, click the button.

To save the parameters of the detector, click the **Apply** button. To cancel the changes, click the **Cancel** button.

Configuration of the **License plate recognition XR** is complete.

19.4.30.7.7 Installing and configuring Vaxtor License Server using Docker for License plate recognition XR

On the page:

- Creating a Docker image(see page 632)
- Starting a container(see page 632)
- Accessing the Admin Control Center console(see page 632)
- Installing a license(see page 632)

Licensing of the software module for the License plate recognition XR in Windows OS(see page 623)

Attention!

- Installation and configuration of Vaxtor License Server is only required if *Axxon One* is installed in failover mode.
- This type of licensing is only available for ALPR channels licensing.

19.4.30.7.7.1 Creating a Docker image

To create a Docker image, do the following:

1. Download two files:
   - Dockerfile: contains the instructions for building a container.
   - hasplm.ini: configuration file for the **Admin Control Center** console.
2. Place both files in the same directory.
3. Run the following command to create a Docker image:

```
docker build -f Dockerfile -t vaxtor/licserver .
```

Creating a Docker image is complete.

19.4.30.7.7.2 Starting a container

To start a container, run the following command:

```
docker run -p 1947:1947/tcp -p 1947:1947/udp -d --name licserver -v lic:/var/hasplm vaxtor/licserver
```

The container will be named **licserver**, and ports 1947 TCP and UDP must be open for client connections. The **lic** volume will store licenses.

19.4.30.7.7.3 Accessing the Admin Control Center console

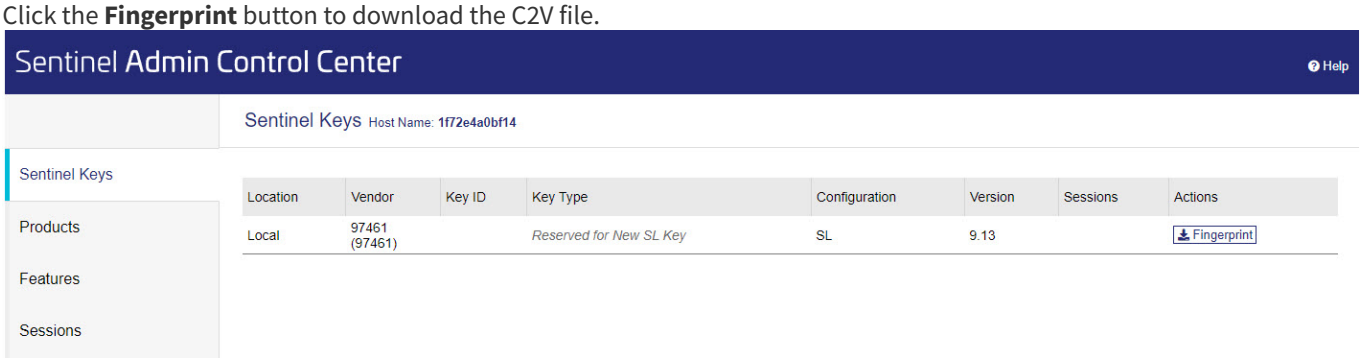
The **Admin Control Center** console is available at http://<server-IP>:1947. This console allows you to check the status of licenses as well as install and update licenses. The following credentials are used by default:

- login: **admin**
- password: **Vaxtor300**

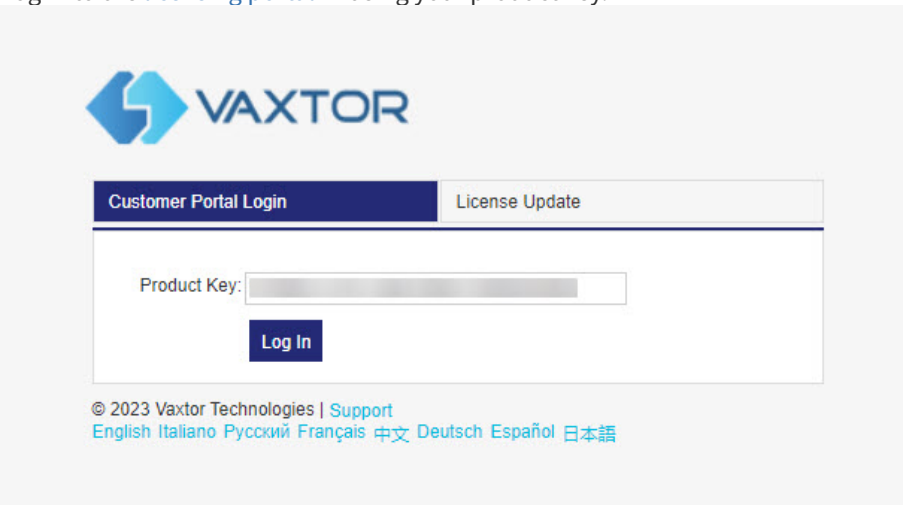
19.4.30.7.7.4 Installing a license

When you first access the console, do the following:

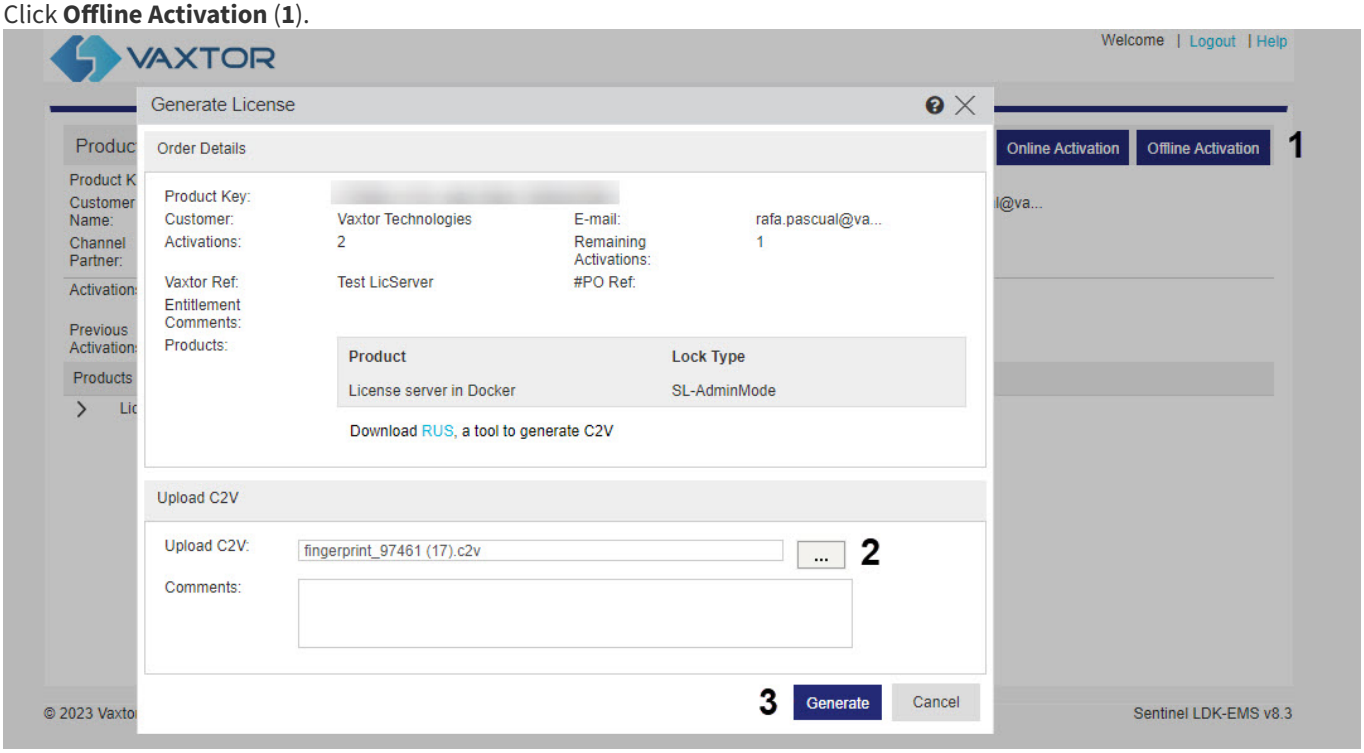
1. Click the **Fingerprint** button to download the C2V file.



2. Log in to the licensing portal[258] using your product key.



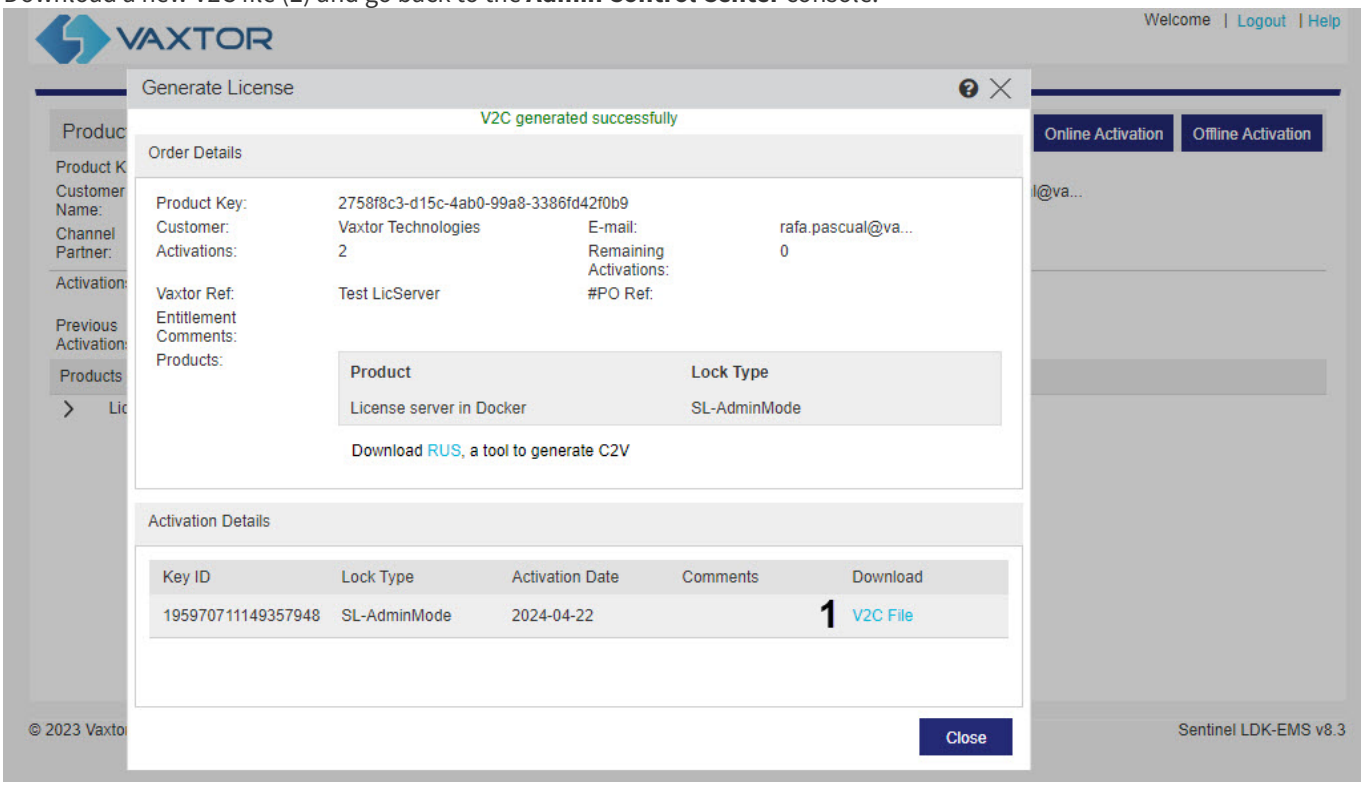
3. Click **Offline Activation** (**1**).



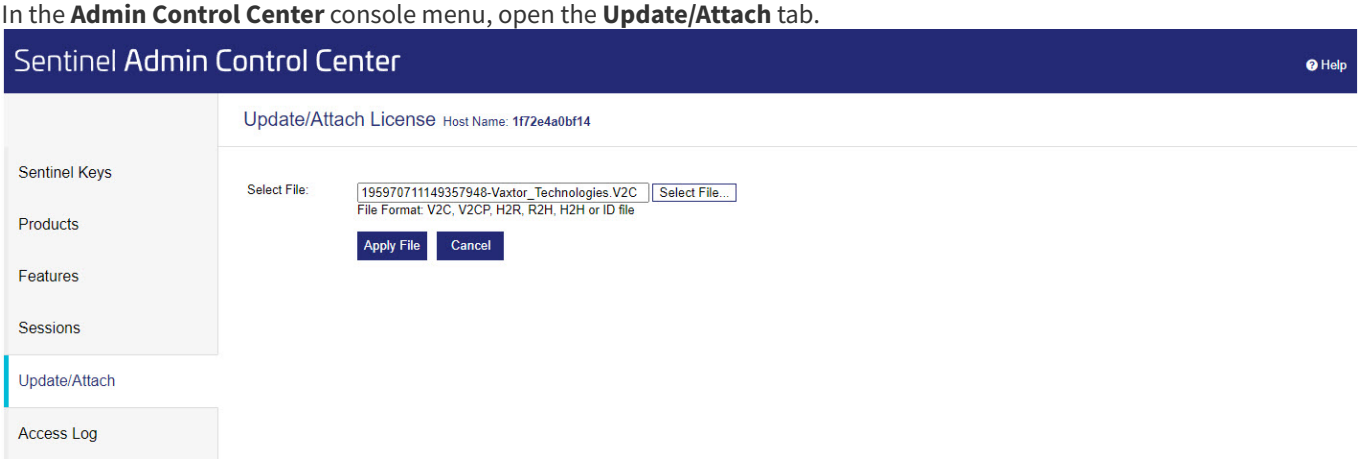
4. Upload the C2V file (**2**).
5. Click **Generate** (**3**).

258 https://licensing.vaxtor.com/ems/customerLogin.html

6. Download a new V2C file (**1**) and go back to the **Admin Control Center** console.

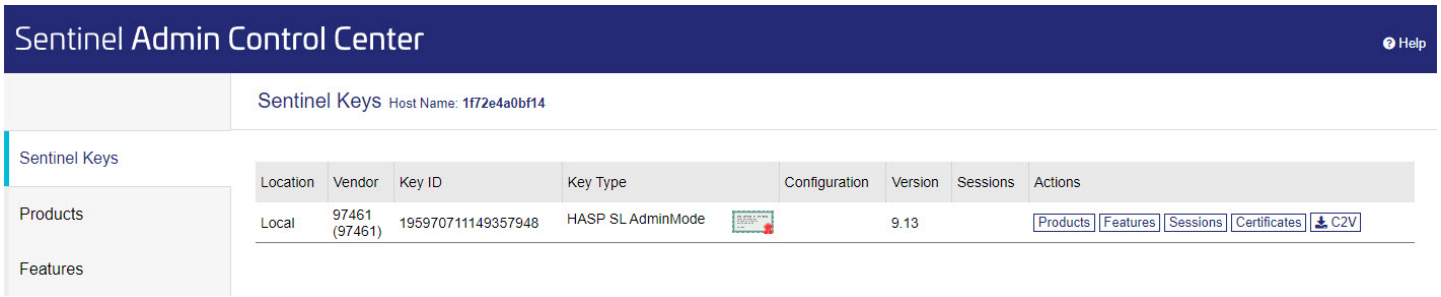


7. In the **Admin Control Center** console menu, open the **Update/Attach** tab.



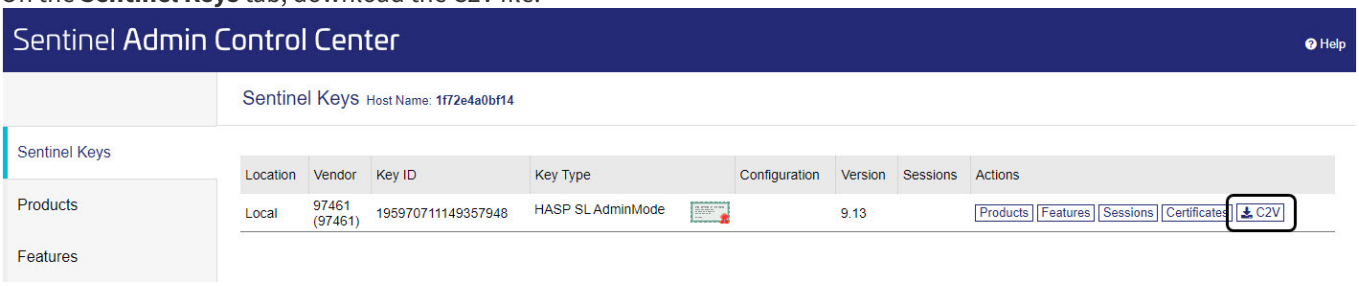
8. Click **Select File** and upload the V2C file.
9. Click **Apply File**.

As a result, after the license is successfully applied, a unique license identifier (Key ID) will be displayed on the main page of the **Admin Control Center** console.



Then, it is necessary to activate the network license for the licensing server to work correctly. To do this:

1. On the **Sentinel Keys** tab, download the C2V file.



2. Contact Vaxtor and transfer the downloaded C2V file.
3. Receive a new V2C file from Vaxtor.
4. In the **Admin Control Center** console menu, click **Update/Attach**.
5. Click **Select File** and upload the V2C file.
6. Click **Apply File**.

As a result, after the license is applied, the **License server in Docker** will be displayed on the **Products** tab.

19.4.30.8 License plate recognition VT

19.4.30.8.1 Functions of the License plate recognition VT

Description

License plate recognition VT is used to implement the following functions:

1. Recognize license plates of vehicles. List of supported countries:

Proven installations	**License plate recognition VT** is already used to recognize license plates of the listed countries	Albania, Argentina, Austria, Azerbaijan, Belarus, Belgium, Brazil, Bulgaria, Chile, Colombia, Czech Republic, France, Georgia, Guatemala, Hungary, Iran, Israel, Jordan, Kazakhstan, Latvia, Lithuania, Mexico, Moldova, Mongolia, Netherlands, Paraguay, Poland, Russia, Spain, Taiwan, Ukraine, United Kingdom, Uruguay, Uzbekistan

Tested	**License plate recognition VT** is comprehensively tested in recognition of license plates of the listed countries. The results quality obtained in the test environment is satisfactory. However, **License plate recognition VT** isn't yet used in actual installations in these countries	Algeria, Andorra, Armenia, Australia, Bahrain, Bolivia, Bosnia and Herzegovina, Botswana, Brunei, Canada, Croatia, Denmark, Ecuador, El Salvador, Estonia, Finland, Germany, Greece, Honduras, Hong Kong, India, Indonesia, Italy, Kenya, Korea Republic, Kyrgyzstan, Liechtenstein, Luxembourg, Malaysia, Malta, Monaco, Montenegro, New Zealand, Nicaragua, Nigeria, Norway, Panama, Peru, Philippines, Portugal, Romania, Serbia, Singapore, Slovakia, Slovenia, South Africa, Sri Lanka, Sweden, Switzerland, Tajikistan, Tanzania (starting with *Detector Pack* 3.14), Tunisia, Turkey, Turkmenistan, USA, Vietnam, Zambia

2. Write a recognized license plate to a database.
3. Check the recognized license plates of vehicles in the lists of license plates (see Configuring macros when working with lists of license plates(see page 849)).
4. Determine the direction of the vehicle movement

Modes of operation	**License plate recognition VT** works in one of the following modes (see Configuring the License plate recognition VT(see page 659)): 1. Fast—it processes a video stream at up to 25 FPS with a maximum vehicle speed of 180 km/h. 2. Slow—it processes a video stream at up to 6 FPS with a maximum vehicle speed of 20 km/h
Licensing	To operate the detector, you need to contact a manager of AxxonSoft and get a license file (see Types of licenses[259])

259 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Add-ons	For the detector to work, you must install the VT LPR add-on (see Installing DetectorPack add-ons(see page 321))

19.4.30.8.2 Hardware requirements for the License plate recognition VT

Hardware requirements(see page 87)

License plate recognition VT can run on the following devices: CPU, Intel GPU, VPU (IntelNCS).

For NVIDIA GPUs:

Attention!

GPUs with NVIDIA Ampere architecture aren't supported.

1. Compute Capability 3.5 and higher.

   Note

   You can check the GPU Compute Capability version on the manufacturer's[260] website.

2. Support for CUDA 10.2 or higher.
3. Processor with support for SSE4.1 / SSE4.2 instructions.

You can find the list of supported devices at OpenVINO™ toolkit[261].

19.4.30.8.3 Video stream and scene requirements for the License plate recognition VT and its sub-detectors

Hardware requirements for neural analytics operation(see page 339)
Hardware requirements for the License plate recognition VT(see page 638)
Image requirements for the License plate recognition VT and its sub-detectors(see page 642)

Requirements for the operation of the **License plate recognition VT** and its sub-detectors are given in the table:

260 https://developer.nvidia.com/cuda-gpus
261 https://docs.openvino.ai/latest/openvino_docs_OV_UG_supported_plugins_Supported_Devices.html

Camera	**Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods. • Camera must be permanently installed • In order to recognize state license plates on highways, camera must have the Global Shutter mode • Frame size is at least 704*288 px • Character height for IP cameras is at least 20-30 px, for analog cameras—at least 14-20 px, the stroke width is at least 2 px. If it is necessary to recognize two-line license plates, then these requirements are relevant for each line • Focal length of the camera must be set correctly. The table below provides an example of the correlation between the viewing angle, sensor size, and lens focal length. For calculations, a standard video surveillance calculator was used: Expand the table with focal length settings

Distance to the object, m	Object width, m	Focal length, mm	Viewing angle, degrees	Sensor size, inches
3	4	4	85	1/3
3	4	5	65	1/2
3	3	5	65	1/3
3	3	6	55	1/2
7	4	8	40	1/3
7	4	10	35	1/2
7	3	10	35	1/3
7	3	12	25	1/2
11	4	13	28	1/3
11	4	18	22	1/2
11	3	18	22	1/2
11	3	23	16	1/2
15	4	18	22	1/3
15	4	23	16	1/2
15	3	23	16	1/3
15	3	30	12	1/2

- Camera must have a lens with an aperture of f/1.0, f/1.2, f/1.3, f/1.4, or f/1.8
- Color space model: Y800, RGB32, RGB24, YUY2, or UYUY
- Camera must have infrared illumination (embedded or stand-alone IR projector) to ensure round-the-clock recognition in an area with changing lighting conditions
- Shutter speed settings of the camera must be correctly set depending on the level of the camera's tilt to the license plate as well as on the vehicle speed. The table below provides approximate shutter speeds for different vehicle speed:

  Expand the table with shutter speed settings

Shutter speed, s	Maximum vehicle speed in the surveillance area, km/h
1/200	18
1/250	22

Shutter speed, s	Maximum vehicle speed in the surveillance area, km/h
1/500	45
1/750	68
1/1000	90
1/1500	136
1/2000	181

- Camera must have a photomatrix suitable for license plate recognition. When selecting a camera, we recommend you to rely on a comparison of the photomatrix characteristics obtained as a result of measurements in accordance with the EMVA 1288[262] standard. This standard was developed by the EMVA (European Machine Vision Association) and it is offered to video camera manufacturers as a way to unify product evaluation methods. Requirements for the photomatrix for the **License plate recognition VT** are described in the table below:

Expand the table with requirements for photomatrix

Sensor type	Both CCD and CMOS sensors are suitable for license plate recognition. CMOS is preferred because it does not have the blur effect that is common with CCD sensors
Sensor size	1/3 inch or more. During recognition, the physical size (area) of an individual pixel in a sensor is more important than the physical size (area) of the sensor itself. Larger pixel size provides better recognition in low-light conditions
Pixel size	3.75 micrometers (µm) or more. The larger the sensor pixel size (area), the higher its sensitivity
Sensitivity	Dynamic range of 60 decibels or more (approximate contrast ratio of 1:1000). We recommend using the wide dynamic range (WDR) function. It improves the quality of recognition in high-contrast lighting conditions—it is possible to capture image details in both dark and bright areas of the field of view
Color depth	10 bits per pixel (bpp) or more

Recommendations for highways

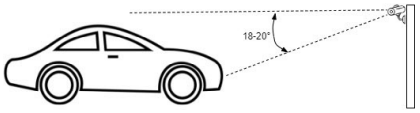
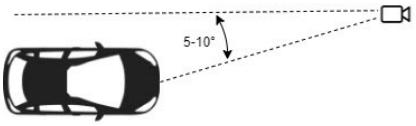
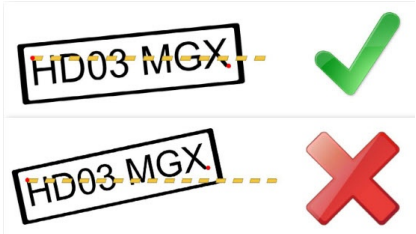
- Cameras must be mounted on L-shaped posts at the edge of the traffic lane or on arches above the middle of the lane
- Recommended installation height is 4-6 meters, maximum height is 20 meters
- Analog cameras have a relatively low resolution, so their surveillance area must not cover more than one traffic lane. IP cameras have a much higher resolution: their surveillance area can cover up to four traffic lanes
- The higher the camera is mounted, the higher the probability of capturing (and therefore detecting and recognizing) the license plates of vehicles moving at a short distance from each other (for example, during traffic jams). However, it is important to keep in mind that increasing the installation height leads to distortion of the license plate image, while the character size is almost at the minimum allowable level. In such cases, by reducing the vertical angle and changing the focal length (zoom), you can move the surveillance area to a greater distance so that the license plates can be recognized at the required installation height

Lighting	• Camera isn't pointed directly at a light source (sun, street lights) or reflective surfaces

262 https://www.emva.org/standards-technology/emva-1288/

Scene and camera angle

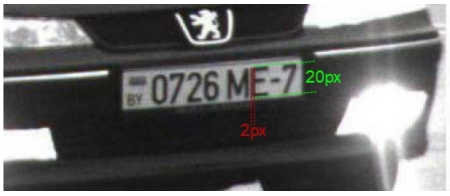
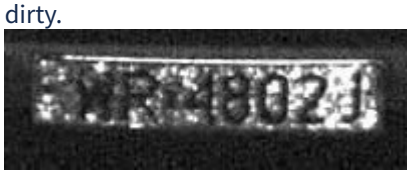
- Maximum vehicle speed for correct license plate recognition is limited to 180 km/h
- Minimum allowable contrast in case of even staining of the license plate must be at least 20% (contrast visibility of characters relative to the background is 25 units with a 256-point scale)
- Maximum allowable uneven staining is not more than 12% (the ratio of the stained area to the total area of the license plate)
- There are no high-contrast objects in the frame (for example, billboards, trees, wire fences)—they cause an increase in the number of false positives during recognition
- Geometric proportions of the image must not differ by more than 10% from the geometric proportions of the state license plate itself
- For MPEG-4 and H.264 formats, the recommended distance between key frames is no more than 4-8 frames in a stable connection
- For surveillance in gateway conditions, a camera is usually installed at the edge of the traffic lane. In this case:
  - Installation height must be above the headlights level
  - The distance between the installation site and the focal point must be at least three meters
- Camera tilt angles don't exceed the maximum values:

Angle	Recommended value	Maximum value	Scheme
Vertical angle (camera is tilted down to license plate)	18-20°	30°	
Horizontal angle (camera is tilted left/right towards license plate)	5-10°	20°	
Tilt of the license plate in relation to the road surface	0	5°	During recognition of a single-line license plate (with a minimum of six characters), the camera angle is checked by the "one-line rule": an imaginary horizontal line must cross both the first and last characters on the license plate: 

19.4.30.8.4 Image requirements for the License plate recognition VT and its sub-detectors

Hardware requirements for neural analytics operation(see page 339)
Hardware requirements for the License plate recognition VT(see page 638)
Video stream and scene requirements for the License plate recognition VT and its sub-detectors(see page 638)

Requirements for the operation of the **License plate recognition VT** and its sub-detectors are given in the table:

Object images	Example of license plate images that will be recognized correctly and completely:   **Attention!** Any deviation from the requirements below reduces the probability of correct license plate recognition. For correct license plate recognition, make sure that the image of the license plate isn't: • unevenly lit;  • overexposed;  • blurry (due to incorrect shutter speed setting that does not match the vehicle speed);  • distorted (due to incorrect camera position);  • interlaced;  • dirty. 

19.4.30.8.5 Optimizing the operation of the License plate recognition VT on GPU in Windows OS

Starting with *DetectorPack* 3.10, a utility was added to the VT LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the License plate recognition VT(see page 636) on GPU, do the following:

1. Stop the server (see Stop the server(see page 146)).

> **Attention!**
>
> If the system has the software running on GPU, it is necessary to stop its operation.

2. Create the **GPU_CACHE_DIR** system variable (see Appendix 9. Creating system variable[263]) by specifying in the **Variable value** field the path to the cache location with an arbitrary folder name. For example, D:\IX_GPU_cache. The specified directory will store the cache for all used detectors and neural networks.
3. To call the utility, open in the command line: **C:\Program Files\Common Files\AxxonSoft\DetectorPack\VTGpuCacheGenerator.exe** and press **Enter**.
4. Enter the required countries in the numeric or alphabetic form.
   Expand the list of countries

   0. ad (Andorra)
   1. al (Albania)
   2. am (Armenia)
   3. ar (Argentina)
   4. at (Austria)
   5. au (Australia)
   6. az (Azerbaijan)
   7. ba (Bosnia and Herzegovina)
   8. be (Belgium)
   9. bg Bulgaria
   10. bh (Bahrain)
   11. bn (Brunei)
   12. bo (Bolivia)
   13. br (Brazil)
   14. bw (Botswana)
   15. by (Belarus)
   16. ca (Canada)
   17. ch (Switzerland)
   18. cl (Chile)
   19. co (Colombia)
   20. cz (Czech Republic)
   21. de (Germany)
   22. dk (Denmark)
   23. dz (Algeria)
   24. ec (Ecuador)
   25. ee (Estonia)
   26. es (Spain)
   27. fi (Finland)
   28. fr (France)
   29. gb (Great Britain)
   30. ge (Georgia)
   31. gr (Greece)
   32. gt (Guatemala)
   33. hk (Hong Kong)
   34. hn (Honduras)
   35. hr (Croatia)
   36. hu (Hungary)
   37. id (Indonesia)
   38. il (Israel)
   39. in (India)
   40. ir (Iran)
   41. it (Italy)
   42. jo (Jordan)
   43. ke (Kenya)

263 https://docs.axxonsoft.com/confluence/display/one20en/Appendix+9.+Creating+system+variable

44. kg (Kyrgyzstan)
45. kr (Republic of Korea)
46. kz (Kazakhstan)
47. li (Liechtenstein)
48. lk (Sri Lanka)
49. lt (Lithuania)
50. lu (Luxembourg)
51. lv (Latvia)
52. mc (Monaco)
53. md (Moldavia)
54. me (Montenegro)
55. mn (Mongolia)
56. mt (Malta)
57. mx (Mexico)
58. my (Malaysia)
59. ng (Nigeria)
60. ni (Nicaragua)
61. nl (Netherlands)
62. no (Norway)
63. nz (New Zealand)
64. pa (Panama)
65. pe (Peru)
66. ph (Philippines)
67. pl (Poland)
68. pt (Portugal)
69. py (Paraguay)
70. ro (Romania)
71. rs (Serbia)
72. ru (Russia)
73. se (Sweden)
74. sg (Singapore)
75. si (Slovenia)
76. sk (Slovakia)
77. su (USSR)
78. sv (El Salvador)
79. tj (Tajikistan)
80. tm (Turkmenistan)
81. tn (Tunisia)
82. tr (Turkey)
83. tw (Taiwan)
84. ua (Ukraine)
85. us (USA)
86. uy (Uruguay)
87. uz (Uzbekistan)
88. vn (Vietnam)
89. za (Republic of South Africa)
90. zm (Jamaica)

5. After you select all required countries, enter **done**.
6. The default frame width is **1920** pixels. If necessary, enter **y** value and the required frame width. For example, **2048**.
7. To leave the default value, enter **n**.
8. Specify the minimum width of the license plate according to the actual size of the license plate in the frame as a percentage. The minimum allowed value is **0**, the maximum value is **100**.
9. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
10. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model.

Optimizing the operation of the License plate recognition VT(see page 636) on GPU is complete.

Attention!

Cache must be recreated:
- if you update the VT LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, resolution, and so on).

19.4.30.8.6 Optimizing the operation of the License plate recognition VT on GPU in Linux OS

Creating system variables for the Axxon One server in Linux OS[264]
Creating system variables for the Axxon One server in the failover mode in Linux OS[265]

Starting with *DetectorPack* 3.10, a utility was added to the VT LPR add-on (see Installing DetectorPack add-ons(see page 321)), which allows you to create GPU neural network caches without using *Axxon One*. The presence of the cache speeds up the initialization and optimizes video memory consumption.

To optimize the operation of the License plate recognition VT(see page 636) on GPU, do the following:

1. Stop the server (see Starting and stopping the Axxon One Server in Linux OS[266]).

   Attention!

   If the system has the software running on GPU, you must stop its operation.

2. Login as **ngp** superuser:
   a. In the command prompt, run the command:

   ```
   sudo su ngp
   ```

   b. Enter the password for the superuser.
3. Create a folder with a custom name to store the cache. For example:

   ```
   mkdir /opt/AxxonSoft/AxxonOne/gpucache
   ```

4. Change folder permissions:

   ```
   chmod -R 777 /opt/AxxonSoft/AxxonOne/gpucache
   ```

5. Go to the **/opt/AxxonSoft/AxxonOne** folder:

   ```
   cd /opt/AxxonSoft/AxxonOne
   ```

6. Open the server configuration file for editing:

   ```
   nano instance.conf
   ```

264 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
265 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520426/Creating+system+variables+for+the+Axxon+One+server+in+the+failover+mode+in+Linux+OS
266 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486771/Starting+and+stopping+the+Axxon+One+Server+in+Linux+OS

Attention!

When you use the server in failover mode, you must:

a. Open the **/etc/AxxonSoft** folder:

```
cd /etc/AxxonSoft
```

b. Open the server configuration file for editing:

```
nano axxon-one.conf
```

Note

Before you make the changes to the **axxon-one.conf** file, we recommend reading the instructions on the page Creating system variables for the Axxon One server in the failover mode in Linux OS[267].

c. Add the **GPU_CACHE_DIR** system variable in the configuration file, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

d. Save the changes in the file.

e. Add the **GPU_CACHE_DIR** system variable in the **/etc/profile** file.

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

f. Run the command:

```
source /etc/profile
```

7. Add the **GPU_CACHE_DIR** system variable, where the value will specify the path to the cache location folder. For example:

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

8. Save the server configuration file using the **Ctrl+O** keyboard shortcut.
9. Exit file editing mode using the **Ctrl+X** keyboard shortcut.

Attention!

When you change the server configuration (see Changing the configuration of the Axxon One Server in Linux OS[268]) or update to the new *Axxon One* version, the system variables previously added to the **instance.conf** configuration file will be deleted (see Creating system variables for the Axxon One server in Linux OS[269]).

10. In the command prompt, run the command that was used to add the system variable with the path to the cache location folder. For example:

267 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS
268 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS
269 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/314520424/Creating+system+variables+for+the+Axxon+One+server+in+Linux+OS

```
export GPU_CACHE_DIR="/opt/AxxonSoft/AxxonOne/gpucache"
```

11. Go to the **/opt/AxxonSoft/DetectorPack/** folder:

```
cd /opt/AxxonSoft/DetectorPack
```

12. Run the following command:

```
./VTGpuCacheGenerator
```

13. Enter the required countries in the numeric or alphabetic form.
Expand the list of countries

0. ad (Andorra)
1. al (Albania)
2. am (Armenia)
3. ar (Argentina)
4. at (Austria)
5. au (Australia)
6. az (Azerbaijan)
7. ba (Bosnia and Herzegovina)
8. be (Belgium)
9. bg Bulgaria
10. bh (Bahrain)
11. bn (Brunei)
12. bo (Bolivia)
13. br (Brazil)
14. bw (Botswana)
15. by (Belarus)
16. ca (Canada)
17. ch (Switzerland)
18. cl (Chile)
19. co (Colombia)
20. cz (Czech Republic)
21. de (Germany)
22. dk (Denmark)
23. dz (Algeria)
24. ec (Ecuador)
25. ee (Estonia)
26. es (Spain)
27. fi (Finland)
28. fr (France)
29. gb (Great Britain)
30. ge (Georgia)
31. gr (Greece)
32. gt (Guatemala)
33. hk (Hong Kong)
34. hn (Honduras)
35. hr (Croatia)
36. hu (Hungary)
37. id (Indonesia)
38. il (Israel)
39. in (India)
40. ir (Iran)
41. it (Italy)
42. jo (Jordan)

43. ke (Kenya)
44. kg (Kyrgyzstan)
45. kr (Republic of Korea)
46. kz (Kazakhstan)
47. li (Liechtenstein)
48. lk (Sri Lanka)
49. lt (Lithuania)
50. lu (Luxembourg)
51. lv (Latvia)
52. mc (Monaco)
53. md (Moldavia)
54. me (Montenegro)
55. mn (Mongolia)
56. mt (Malta)
57. mx (Mexico)
58. my (Malaysia)
59. ng (Nigeria)
60. ni (Nicaragua)
61. nl (Netherlands)
62. no (Norway)
63. nz (New Zealand)
64. pa (Panama)
65. pe (Peru)
66. ph (Philippines)
67. pl (Poland)
68. pt (Portugal)
69. py (Paraguay)
70. ro (Romania)
71. rs (Serbia)
72. ru (Russia)
73. se (Sweden)
74. sg (Singapore)
75. si (Slovenia)
76. sk (Slovakia)
77. su (USSR)
78. sv (El Salvador)
79. tj (Tajikistan)
80. tm (Turkmenistan)
81. tn (Tunisia)
82. tr (Turkey)
83. tw (Taiwan)
84. ua (Ukraine)
85. us (USA)
86. uy (Uruguay)
87. uz (Uzbekistan)
88. vn (Vietnam)
89. za (Republic of South Africa)
90. zm (Jamaica)

14. After you select all required countries, enter **done**.
15. The default frame width is **1920** pixels. If necessary, enter the **y** value and the required frame width. For example, **2048**.
16. To leave the default value, enter **n**.
17. Specify the minimum width of the license plate according to the actual size of the license plate in the frame as a percentage. The minimum allowed value is **0**, the maximum value is **100**.
18. Specify the **ID** of the required GPU (see Selecting Nvidia GPU when configuring detectors(see page 348)).
19. Press **Enter**.

As a result, the process of creating cache starts, which takes about 30 minutes. The duration of the process depends on the selected types of cache, number of countries, and Nvidia GPU model

Optimizing the operation of the License plate recognition VT(see page 636) on GPU is complete.

Attention!

Cache must be recreated:

- if you update the VT LPR add-on (see Installing DetectorPack add-ons(see page 321)),
- if you change the Nvidia GPU model,
- if you update Nvidia GPU drivers,
- if you change the previously specified parameters (for example, the list of countries, resolution, and so on).

19.4.30.8.7 Licensing of the software module for the License plate recognition VT in Windows OS

On this page:

- Installing the license key environment(see page 650)
- Installing a demo license(see page 651)
- Installing a hardware key(see page 651)
- Installing a software key(see page 652)
- Activating and updating the license(see page 653)
- Removing a license(see page 654)
- Checking a license(see page 654)

19.4.30.8.7.1 Installing the license key environment

The license keys for the License plate recognition VT(see page 636) require the Sentinel LDK Run-time environment. It is installed automatically with the VT LPR add-on (see Installing DetectorPack add-ons(see page 321)).

To manually install the Sentinel LDK Run-time environment, do the following:

1. Download the haspdinst_EOAWT.exe installer.
2. Run the command line as a system administrator.
3. Execute the **haspdinst_EOAWT.exe -i -fi -fss** command.
4. Restart the Sentinel LDK License Manage service or restart the OS.

Note

If the environment is successfully installed, the Sentinel Admin Control Center web application opens in the web browser at http://127.0.0.1:1947/.

Installation of the Sentinel LDK Run-time environment is complete.

19.4.30.8.7.2 Installing a demo license

Attention!

Before you install a demo license, you must install the Sentinel LDK Run-time environment.

The Sentinel LDK Run-time environment and a standard demo license for searching the recognized license plates in the archive are installed automatically with the VT LPR add-on (see Installing DetectorPack add-ons(see page 321)).

Attention!

If you use this license, note that there is a 30-second delay between the recognition of a license plate and the occurrence of a corresponding event (see Vehicle license plate recognition and search(see page 1259)).

With a demo license, the **License plate recognition VT** works for all available countries on 4 channels at 25 FPS or on 4 channels at 6 FPS. The demo license is valid for 60 days from the moment the demo key is activated.

Attention!

The demo mode of the **License plate recognition VT** isn't allowed on virtual machines.

To install a demo license, do the following:

1. Download the distribution package: 25 FPS or 6 FPS.
2. Run the command line as a system administrator.
3. Execute the **SDK_4hi_60d_WORLD.exe -i -fi -fss** command (for a 25 FPS demo license) or **SDK_4lo_60d_WORLD.exe -i -fi -fss** command (for a 6 FPS demo license).
4. Restart the Sentinel LDK License Manage service or restart the OS.

Note

Information about the installed demo license is displayed in the Sentinel Admin Control Center[270] web application, on the **Sentinel Keys** tab.

The installation of a demo license is now complete.

19.4.30.8.7.3 Installing a hardware key

Attention!

Before you install a hardware key, you must install the Sentinel LDK Run-time environment.

To install a hardware key, do the following:

1. Download and install the HASPUserSetup.exe driver distribution package.
2. Connect the hardware key to the server where you plan to use the **License plate recognition VT**. If the Sentinel LDK Run-time environment is successfully installed, the license is automatically recognized by *Axxon One,* and it is ready to use.

Note

Information about the installed hardware key is displayed in the Sentinel Admin Control Center[271] web application, on the **Sentinel Keys** tab.

The installation of the hardware key is now complete.

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271 http://127.0.0.1:1947/

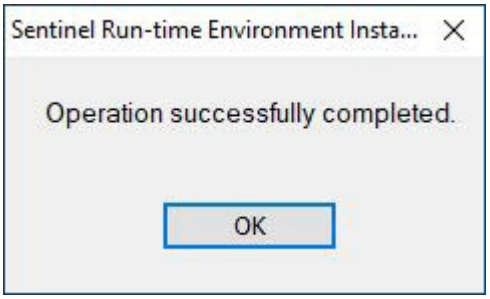
19.4.30.8.7.4 Installing a software key

Attention!

- Before you install a software key, you must install the Sentinel LDK Run-time environment.
- The license of the **License plate recognition VT** isn't automatically transferred to a new node in a failover system (see Configuring Failover VMS(see page 1064)). To ensure the operation of the **License plate recognition VT**, you must manually activate the license on the computer where the node is running.

To install a software key, do the following:

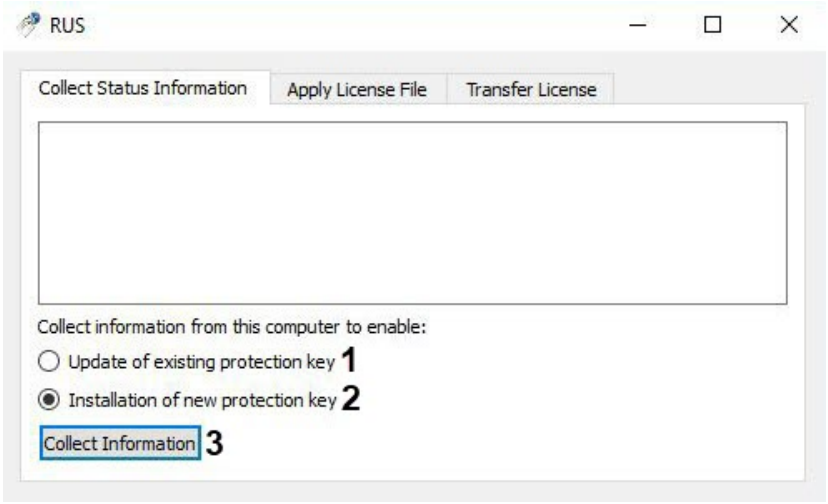
1. Download the RUS_EOAWT.exe.
2. Run the command line as a system administrator.
3. Execute the **haspdinst_EOAWT.exe -fr -purge** command.
4. Click the **OK** button in the window to confirm the installation is completed.



5. Run the RUS_EOAWT.exe file to start the Remote Update System. The **RUS** window opens.

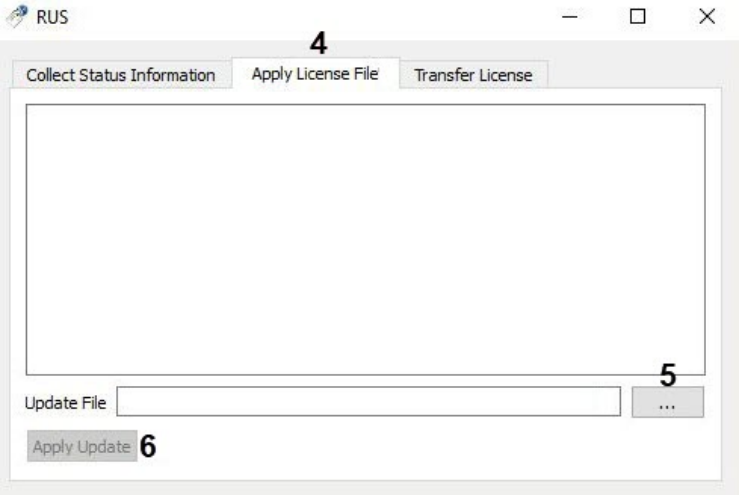
Note

The abbreviation RUS stands for "Remote Update System".



6. Set the **Collect information from this computer to enable** switch into one of the following positions:
   a. **Update of existing protection key** (**1**) if a demo license is already in use.
   b. **Installation of new protection key** (**2**) if a license for a "clean computer" is required, that is, if there is no demo license on the server.
7. Click the **Collect Information** button (**3**).
8. Save the file with the c2v extension to the required directory.
9. Close the RUS_EOAWT.exe utility.
10. Submit the created file with the c2v extension to the AxxonSoft manager.
11. Get a v2c file from the AxxonSoft manager.

12. Run the RUS_EOAWT.exe utility and go to the **Apply License File** tab (**4**).



13. Specify the location of the license file in the **Update File** field using the **...** button (**5**).
14. Click the **Apply Update** button (**6**).
15. Restart the Sentinel LDK License Manage service or restart the OS.

Note

Information about the installed software key is displayed in the Sentinel Admin Control Center[272] web application, on the **Sentinel Keys** tab.

The installation of the software key is now complete.

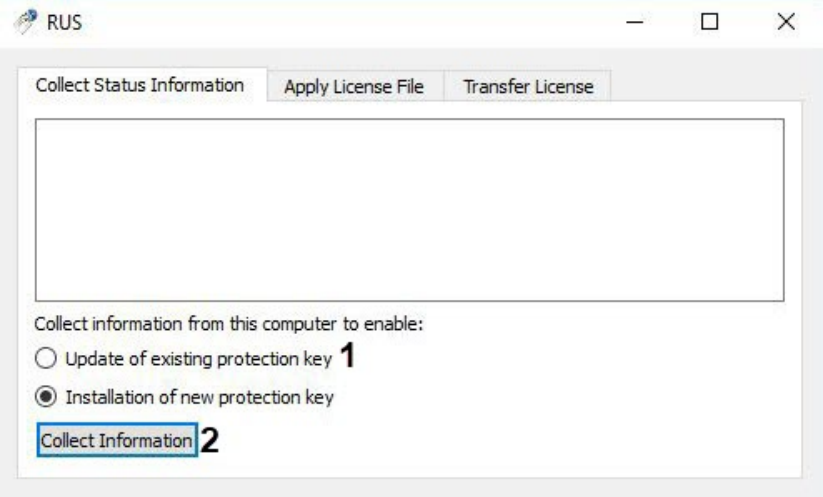
19.4.30.8.7.5 Activating and updating the license

Attention!

Before you install a software key, you must install the Sentinel LDK Run-time environment and the RUS_EOAWT.exe utility.

To activate/update the license, do the following:

1. Run the RUS_EOAWT.exe utility.
2. Set the **Collect information from this computer to enable** switch to the **Update of existing protection key** position (**1**).



3. Click the **Collect Information** button (**2**).
4. Save the file with the c2v extension to the required directory.

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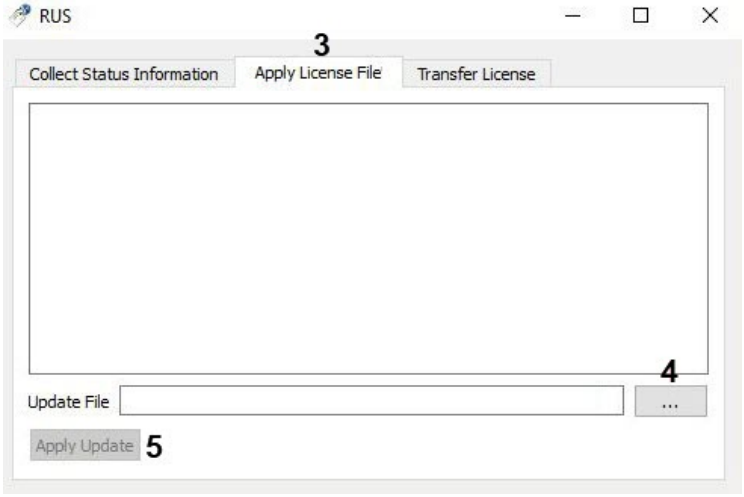
5. Close the RUS_EOAWT.exe utility.
6. Submit the created file with the c2v extension to the AxxonSoft manager.
7. Get a v2c file from the AxxonSoft manager.
8. Run the RUS_EOAWT.exe utility and go to the **Apply License File** tab (**3**).



9. Specify the location of the license file in the **Update File** field using the **...** button (**4**).
10. Click the **Apply Update** button (**5**).
11. Restart the Sentinel LDK License Manage service or restart the OS.

Note

Information about the activated/updated license is displayed in the Sentinel Admin Control Center[273] web application, on the **Sentinel Keys** tab.

The activation/update of the license is now complete.

19.4.30.8.7.6 Removing a license

To remove a license, do the following:

1. Delete the v2c license file from the C:\Program Files (x86)\Common Files\SafeNet Sentinel\Sentinel LDK\installed\ folder.
2. Restart the OS.

Note

- When you delete the license, only the key is deleted. All counters of license restriction remain in the secure storage.
- If you return the key to the root directory, it will be fully restored. Its counters will continue counting license restrictions from the moment when they stopped when the license file with v2c extension was deleted. The validity time of the license continues to count down even when the key is missing.

The removal of the license is now complete.

19.4.30.8.7.7 Checking a license

You can check the current license status on the server. To do this, open the Sentinel Admin Control Center[274] web application. The license information is displayed on the **Features** tab.

273 http://127.0.0.1:1947/
274 http://127.0.0.1:1947/

19.4.30.8.8 Licensing of the software module for the License plate recognition VT in Linux OS

On this page:

- General information(see page 655)
- Installing the Sentinel LDK Run-time environment(see page 655)
- Installing a hardware key(see page 656)
- Installing a software key(see page 656)
- Updating the license(see page 657)
- Removing a license(see page 658)
- Checking a license(see page 659)

19.4.30.8.8.1 General information

The software module for the **License plate recognition VT** in *Axxon One* is licensed by the processed video channels and by countries (see License plate recognition VT(see page 636)).

Attention!

You must run the commands as root user.

19.4.30.8.8.2 Installing the Sentinel LDK Run-time environment

To install the Sentinel LDK Run-time environment, do the following:

1. Upload the aksusbd-8.52.1.tar environment to the server on which the license will be used.
2. Unpack the archive.

```
sudo tar xvf ~/aksusbd-8.52.1.tar -C ~
```

3. Run the installation.

```
sudo ./aksusbd-8.52.1/dinst /home/<Username>/aksusbd-8.52.1
```

Installation of the Sentinel LDK Run-time environment is complete. Together with the Sentinel LDK Run-time environment, a standard demo license for searching the recognized license plates in the archive will be installed. When you use this license, note that there is a 30-second delay between the recognition of a license plate and the occurrence of a corresponding event (see Vehicle license plate recognition and search(see page 1259)).

Attention!

Demo mode of the **License plate recognition VT** isn't allowed on virtual machines.

Note

If the environment is successfully installed, the Sentinel Admin Control Center web application opens in the web browser at http://127.0.0.1:1947/. Information about the installed demo license will be displayed on the **Sentinel Keys** tab.

19.4.30.8.8.3 Installing a hardware key

Attention!

Before you install a hardware key, you must install the Sentinel LDK Run-time environment.

To ensure the hardware key operation, it is necessary to connect the hardware key to the server where you plan to use the **License plate recognition VT**. If the Sentinel LDK Run-time environment is successfully installed, the license is automatically recognized by *Axxon One,* and it is ready to use.

Note

Information about the installed hardware key is displayed in the Sentinel Admin Control Center[275] web application, on the **Sentinel Keys** tab.

The installation of the hardware key is now complete.

19.4.30.8.8.4 Installing a software key

Attention!

Before you install a software key, you must install the Sentinel LDK Run-time environment.

To install a software key, do the following:

1. Upload the hasp_SDK_2.14.tar.gz environment to the server on which the software key will be used.
2. Unzip the archive.

```
sudo tar zxvf ~/hasp_SDK_2.14.tar.gz -C ~
```

3. Create a snapshot of the server hardware. A snapshot is a file with the c2v extension. The created file fingerprint.c2v will be located in the current directory.

```
cd ~/hasp/bin
```

   a. for 64-bit system:

```
sudo ./hasp_update_x86_64 f > fingerprint.c2v
```

   b. for 32-bit system:

```
sudo ./hasp_update f > fingerprint.c2v
```

4. Submit the created file with the c2v extension to the AxxonSoft manager.
5. Get a v2c file from the AxxonSoft manager. The received file will contain license information that will be available for use only on your server.
6. Activate the license to install a software key.
   a. for 64-bit system:

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```
cd ./hasp/bin
```

```
sudo ./hasp_update_x86_64 u <Received file with the v2c extension>
```

b. for 32-bit system:

```
cd ./hasp/bin
```

```
sudo ./hasp_update u <Received file with the v2c extension>
```

7. After you activate the license, restart the hasplmd service:

```
sudo systemctl stop hasplmd.service
```

```
sudo systemctl start hasplmd.service
```

or restart the server:

```
sudo reboot
```

Note

Information about the installed software key is displayed in the Sentinel Admin Control Center[276] web application, on the **Sentinel Keys** tab.

The installation of the software key is now complete.

19.4.30.8.8.5 Updating the license

To update the license, do the following:

1. Create a snapshot of the server hardware. A snapshot is a file with the c2v extension. The created file haspinfo.c2v will be located in the current directory.

```
cd ~/hasp/bin
```

a. for 64-bit system:

```
sudo ./hasp_update_x86_64 i <HASP ID> > haspinfo.c2v
```

where <HASP ID>

```
hasp_update_x86_64 lf
```

b. for 32-bit system:

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```
sudo ./hasp_update i <HASP ID> > haspinfo.c2v
```

where <HASP ID>

```
hasp_update lf
```

2. Submit the created file with the c2v extension to the AxxonSoft manager.
3. Get a v2c file from the AxxonSoft manager. The received file will contain license information that will be available for use only on your server.
4. Update the license.

```
cd ./hasp/bin
```

a. for 64-bit system:

```
sudo ./hasp_update_x86_64 u <Received file with the v2c extension>
```

b. for 32-bit system:

```
sudo ./hasp_update u <Received file with the v2c extension>
```

5. After you update the license, restart the hasplmd service:

```
sudo systemctl stop hasplmd.service
```

```
sudo systemctl start hasplmd.service
```

or restart the server:

```
sudo reboot
```

Note

Information about the updated license is displayed in the Sentinel Admin Control Center[277] web application, on the **Sentinel Keys** tab.

The update of the license is now complete.

19.4.30.8.8.6 Removing a license

To remove a license, do the following:

1. Open the contents of the c2v file that was created for the installation, activation, or update of the current license. The license ID in the body of the key is indicated as <hasp id="Identifier of the current license">.
2. Delete the v2c file that has the same ID as the c2v file located in /var/hasplm/installed/107392/.
3. Stop the processes.

```
killall aksusbd
```

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```
killall haspmld
```

4. Start the services.

```
haspmld -s
aksusbd
```

5. After you remove the license, restart hasplmd service:

```
sudo systemctl stop hasplmd.service
```

```
sudo systemctl start hasplmd.service
```

or restart the Server:

```
sudo reboot
```

The removal of the license is now complete.

19.4.30.8.8.7 Checking a license

You can check the current license status on the server. To do this, open the Sentinel Admin Control Center[278] web application. The license information is displayed on the **Features** tab.

If there is no web browser on the server, execute the following two commands in the console one by one:

```
curl -X POST -d 'accremote=1' http://localhost:1947/_int_/config.html
wget --post-data 'accremote=1' http://localhost:1947/_int_/config.html
```

19.4.30.8.9 Configuring the License plate recognition VT

Hardware requirements for neural analytics operation(see page 339)
Hardware requirements for the License plate recognition VT(see page 638)
Video stream and scene requirements for the License plate recognition VT and its sub-detectors(see page 638)
Image requirements for the License plate recognition VT and its sub-detectors(see page 642)
Optimizing the operation of the License plate recognition VT on GPU in Windows OS(see page 643)
Optimizing the operation of the License plate recognition VT on GPU in Linux OS(see page 646)
Licensing of the software module for the License plate recognition VT in Windows OS(see page 650)
Licensing of the software module for the License plate recognition VT in Linux OS(see page 655)
Checking in lists of LPs(see page 668)
Examples of macros used when working with lists of license plates(see page 911)

To configure the **License plate recognition VT** detector, do the following:

1. Go to the **Detection Tools** tab.
2. Below the required camera, click **Create...** → **Category: Vehicle** → **License plate recognition VT**.

By default, the detector is enabled and set to recognize vehicle license plates.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

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Parameter	Value	Description
Object features		
Check in lists	**Yes**	The parameter is disabled by default. If you want to use this detector to check in lists of vehicle license plates, select the **Yes** value (see Checking in lists of LPs(see page 668))
	No	
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the Server
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**License plate recognition VT**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Direction of movement (starting with *Detector Pack* 3.14)	**Both**	By default, an event is created when a vehicle moves in **both** directions. If it is necessary to create an event when a vehicle moves only away from the camera, select **Outgoing**; if it is necessary to create an event when a vehicle moves only towards the camera, select **Incoming**
	Outgoing	
	Incoming	
Period of ignoring repeated recognitions	**0**	Specify the period in seconds during which re-recognized license plates will be ignored. The value must be in the range [0, 86400]
Type	**License plate recognition VT**	Name of the detector type (non-editable field)
Advanced SDK settings		
VodiCTL_VPW_DYNAMIC_ENABLE	**Yes**	By default, the license plate recognition dynamics is enabled, that is, tracking is enabled, and license plate recognition is based on a set of frames. To disable tracking and license plate recognition for each frame separately without reference to the previous frames, and the quality can vary from 0% to 100%, select the **No** value
	No	

Parameter	Value	Description
VodiCTL_VPW_DYNAMIC_OUTPUT_PERIOD	**0.5**	Specify the time period in seconds for which the recognition result must be output. You can use this parameter only if the **VodiCTL_VPW_DYNAMIC_WITH_DUPLICATE** parameter is enabled. The value must be in the range [0, 3600]
VodiCTL_VPW_DYNAMIC_OUTPUT_TIMEOUT	**1**	Specify the minimum required time of license plate monitoring in seconds before the recognition result is output to the user. You can use this parameter only if the **VodiCTL_VPW_DYNAMIC_ENABLE** parameter is enabled. In this mode, the vehicle track is monitored, and the user doesn't receive the license plate recognition result immediately, rather after the time specified in this parameter. In this case, the first recognition result will be replaced by a better one and subsequently output to the user. If you specify the **0** value for this parameter, you will receive the first recognition result. Note that after the time specified in this parameter has elapsed, the monitoring of the license plate track continues until it disappears from the frame. The value must be in the range [0, 3600]
VodiCTL_VPW_DYNAMIC_WITH_DUPLICATE	**Yes**	By default, periodic output of license plate recognition results is enabled. To disable the periodic output of results, select the **No** value
	No	
VodiCTL_VPW_IMAGE_BLUR	**13**	Parameter used for internal requirements. We recommend specifying the **13** value. The value must be in the range [0, 100000]
VodiCTL_VPW_LOG_SETTINGS	**Yes**	By default, the parameter is disabled. To enable logging of all recognition parameters to the log file, select the **Yes** value
	No	
VodiCTL_VPW_PLATE_FILTER_RODROPFACTOR	**0**	Specify the coefficient of license plates filtering by image density (second strategy). Type is unsigned. This coefficient is used during image binarization and has optimal values, which are determined by developers using their own test samples. The parameter is considered a service parameter, and its value must be set according to the recommendations of technical support specialists. The value must be in the range [0, 100000]
VodiCTL_VPW_PLATE_FILTER_ROFACTOR	**95**	Specify the coefficient of license plates filtering by the so-called image density—the ratio of white pixels to the total number of pixels (first strategy). Type is unsigned. This coefficient is used during image binarization and has optimal values, which are determined by developers using their own test samples. The parameter is considered a service parameter, and its value must be set according to the recommendations of technical support specialists. The value must be in the range [0, 100000]
VodiCTL_VPW_PLATE_FILTER_SYMCOUNT	**0**	Enable/disable the algorithm of simple license plate filtering by the minimum number of recognized characters on the plates. If the algorithm is enabled (the parameter value is greater than **0**), a basic search for characters on the license plate candidate (geometry, proportions) is performed. If fewer characters are detected on the candidate than the value of this parameter, this candidate isn't considered a license plate. That is, the value of this parameter is the minimum number of characters that must be present on a license plate candidate when the basic algorithm is running. The value must be in the range [0, 100000]

Parameter	Value	Description
VodiCTL_VPW_PLATE_STAR_MAX	**0**	Specify the maximum number of unrecognized characters on the license plate, at which the result is still considered the result of license plate recognition. The value must be in the range [0, 100000]
VodiCTL_VPW_TEXT_WITH_PUNCTUATION (Advanced) (starting with Detector Pack 3.12)	**Yes**	Only for **Germany** and **Taiwan**. The parameter divides the characters on the license plate by hyphens into groups that determine the city/area and a group of the unique part of the license plate. By default, recognized license plate characters are displayed without hyphen. If you want to display recognized license plate characters with a hyphen, select the **Yes** value
	No	
Advanced settings **Attention!** Advanced configuration of the detector must be performed with the assistance of AxxonSoft technical specialists.		
Advanced image analysis	**Yes**	By default, the parameter is disabled. Under normal conditions, this parameter doesn't affect the detection quality. Under poor conditions (for example, if the camera characteristics/settings don't fully meet the requirements, or detection occurs in bad weather), to improve the recognition quality, select the **Yes** value. This will increase the frame processing time by 20-30% depending on the frame size
	No	
Algorithm of recognition of distorted LP image	**Yes**	By default, the algorithm of recognition of distorted license plate image is disabled. If you want to recognize license plates that are at a sharp angle to the camera, select the **Yes** value
	No	
Contrast threshold	**40**	Specify the image contrast threshold. We recommend increasing the value up to **50-60** on a good quality image, on an image with poor contrast, the value must be reduced. The value must be in the range [0, 100]
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (**1920** pixels on the longer side) by default. The following algorithm is used: • If the longer side of the source image exceeds the value specified in the **Frame size change** parameter, it is divided by two. • If the resulting resolution falls below the specified value, the algorithm stops, and this resolution will be used further. • If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.

Parameter	Value	Description
GDPR policy	**-**	By default, on the layout and in the archive, the characters of a license plate are completely hidden "GDPR ON". To display the characters of a license plate, you must enter a value: • "**-**"—hide all characters (default value), • " (blank field of a parameter value)"—show all characters, • "**N-**"—hide the first N characters, • "**-N**"—hide the last N characters, where **N** is the number of characters
Initiate event in (sec)	**0**	By default, the license plate recognition event is generated after the license plate track disappears from the frame. It is possible to generate a recognition event either after expiration of the time specified in seconds in the **Event timeout** parameter, or after reaching the similarity percentage specified in the **LP display quality** parameter. If the value of both parameters is different from **0**, the recognition event will be generated when the first of the two conditions is met. The value must be in the range [0, 3600]
LP advanced search algorithm	**Yes** **No**	By default, the parameter is disabled. If license plates of different sizes will be present in the frame, select the **Yes** value. This parameter takes into account the specified maximum and minimum width of a license plate and, in some cases, can help to improve the recognition quality and optimize the processor load
LP display quality	**0**	**Attention!** The value of the **LP display quality** parameter must not be less than the value of the **Minimum similarity** parameter. By default, the license plate recognition event is generated after the license plate track disappears from the frame. It is possible to generate a recognition event either after expiration of the time specified in seconds in the **Event timeout** field, or after reaching the similarity percentage specified in the **LP display quality** field. If the value of both parameters is different from **0**, the recognition event will be generated when the first of the two conditions is met. The value must be in the range [0, 100]

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Maximum number of threads</td><td>1</td><td>Specify the maximum number of recognition threads. If the value is 0, the recognition process takes place in the same thread that starts it. The value must be in the range [0, 10].

Attention!
If you specify several countries, we recommend setting the value of the parameter to at least 4.
Increasing the number of recognition threads reduces possible drops in the frame rate, but at the same time increases the load on the device.
The total value of this parameter for all license plate recognition detectors must not exceed:
the number of recognition threads in the license (you can check it with the lsvpwc utility, see the manufacturer's documentation[279]);
number of logical processors;
100.</td></tr>
<tr><td>Minimum similarity</td><td>40</td><td>Specify the minimum percentage of similarity between the recognition result and the corresponding license plate template, at which this result can be considered a license plate recognition result. This parameter is used to filter the obtained results by validity. The value must be in the range [0, 100]</td></tr>
<tr><td rowspan="2">Track lifespan (starting with Detector Pack 3.14)</td><td>Yes</td><td rowspan="2">By default, the parameter is disabled. If you want to view the track lifespan for an object in seconds, select the Yes value</td></tr>
<tr><td>No</td></tr>
<tr><td>Track retention time (sec)</td><td>3</td><td>Specify the time in seconds after which the vehicle track is considered lost. The value must be in the range [0, 3600]

Note
You can use this parameter to avoid double events that can occur, for example, when a license plate is recognized when it appears in the frame, then it is overlapped by a visual obstacle and then recognized by the detector again.
If you specify the timeout longer than the time of possible overlapping of the license plate in the frame, the detector generates and event only once.</td></tr>
<tr><td colspan="3">Basic settings</td></tr>
</table>

279 https://vitcompany.atlassian.net/wiki/spaces/vitdocs/pages/35717150/AutoSDK?preview=/35717150/35717192/AutoSDK_v2.5_EN.pdf

Parameter	Value	Description
Algorithm for detecting vehicle direction	**By LP coordinates**	The **By LP coordinates** algorithm is used by default. It works as follows: if the coordinates of the vehicle license plate shift from top to bottom (the vehicle moves towards the camera) and if the coordinates of the vehicle license plate shift from bottom to top (the vehicle moves away from the camera). Select the **By LP scale change** parameter if in the Surveillance window, the scale of the vehicle license plate increases (the vehicle moves towards the camera) and if the scale of the vehicle license plate decreases (the vehicle moves away from the camera)
	By LP scale change	
Analysis mode	**Standard (Morph)**	Select the analysis mode of the detector: standard or neural network mode
	Advanced (DNN)	
Detection mode	**CPU**	Select the processor for the operation of the detector algorithm (see Hardware requirements for the License plate recognition VT(see page 638), Selecting Nvidia GPU when configuring detectors(see page 348)). • In the standard mode, the algorithm can only run on CPU. • In the neural network analysis mode, the algorithm can run on any of the supported processors
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
License type	**Search in archive**	Standard license for searching recognized license plates in the archive. **Attention!** This type of license provides a 30-second delay between the license plate recognition and the corresponding event (see Vehicle license plate recognition and search(see page 1259)).
	Normal (25 FPS or 6 FPS)	The 25 FPS license has a priority. If you don't have the 25 FPS license, the 6 FPS license is used. You cannot use the license plate recognition function if you haven't purchased both licenses
	Fast (25 FPS)	The Fast license allows you to process video streams at up to 25 FPS. License plate recognition for vehicles moving at speeds up to 150 km/h. You cannot use the license plate recognition function if you haven't purchased the license
	Slow (6 FPS)	The Slow license allows you to process video streams at up to 6 FPS. License plate recognition for vehicles moving at speeds up to 20 km/h. You cannot use the license plate recognition function if you haven't purchased the license

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td></td><td colspan="2">Attention!
All license types except the standard one (Search in archive) require the hardware key or the software key activation (see Licensing of the software module for the License plate recognition VT in Windows OS(see page 650)).
You can use a 60-day trial key (see Licensing of the software module for the License plate recognition VT in Windows OS(see page 650), Licensing of the software module for the License plate recognition VT in Linux OS(see page 655)).
You can use only a hardware key on virtual machines. To use a hardware key, select the Normal license type.</td></tr>
<tr><td>Maximum LP width</td><td>20</td><td rowspan="2">Specify the maximum and minimum width of the license plate as a percentage according to the actual size of the license plate in the frame. The value must be in the range [0, 100].
Attention!
Specified values must exclude omissions in license plate recognition, that is, the values must not be smaller than the real size of the license plate in the frame. Otherwise, the license plates won't be recognized.
The Minimum LP width parameter affects the CPU load: the higher the value, the lower the load.
Reducing the difference between the maximum and minimum width reduces the CPU load.</td></tr>
<tr><td>Minimum LP width</td><td>5</td></tr>
<tr><td>Minimum number of detection triggers</td><td>6</td><td>Specify the minimum number of events to display the object track. The higher the value of this parameter, the longer the time from object detection to displaying its track. A low value of this parameter can result in false events. The value must be in the range [1, 20]</td></tr>
<tr><td colspan="3">Country selection</td></tr>
</table>

Parameter	Value	Description
Country 1 name	**Albania**, **Algeria**, **Andorra**, **Argentina**, **Armenia**, **Australia**, **Austria**, **Azerbaijan**, **Bahrain**, **Brunei**, **Belarus**, **Belgium**, **Bolivia**, **Bosnia and Herzegovina**, **Botswana**, **Brazil**, **Bulgaria**, **Canada**, **Chile**, **Colombia**, **Croatia**, **Czech Republic**, **Denmark**, **Ecuador**, **El Salvador**, **Estonia**, **Finland**, **France**, **Georgia**, **Germany**, **Greece**, **Guatemala**, **Honduras**, **Hong Kong**, **Hungary**, **India**, **Indonesia**, **Iran**, **Israel**, **Italy**, **Jordan**, **Korea**, **Kazakhstan**, **Kenya**, **Kyrgyzstan**, **Latvia**, **Liechtenstein**, **Sri Lanka**, **Lithuania**, **Luxembourg**, **Malaysia**, **Malta**, **Mexico**, **Moldova**, **Monaco**, **Mongolia**, **Montenegro**, **Nicaragua**, **Nigeria**, **Norway**, **Panama**, **Paraguay**, **Peru**, **Philippines**, **Poland**, **Portugal**, **Romania**, **Russian Federation**, **Serbia**, **Singapore**, **Slovakia**, **Slovenia**, **South Africa**, **Spain**, **Sweden**, **Switzerland**, **Taiwan**, **Tajikistan**, **Tanzania** (starting with *Detector Pack* 3.14), **Tunisia**, **Turkey**, **Turkmenistan**, **USSR**, **Ukraine**, **United Kingdom of Great Britain and Northern Ireland**, **Uruguay**, **USA**, **Uzbekistan**, **Vietnam**, **Zambia**, **Not used**	In the corresponding fields, select from the list one or more countries whose license plates you want to recognize. **Attention!** • The more countries you select, the slower the recognition works and the higher the probability of license plate recognition error. • To recognize old USSR license plates, you must additionally select **USSR** in the list.
Country βeta (starting with *Detector Pack* 3.14)		Select one or more countries. The parameter is currently in beta

By default, the entire frame is the detection area. If necessary, in the preview window, you can reduce the rectangular detection area (see Configuring a detection area(see page 351)).

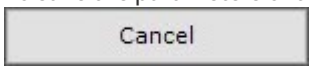


Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.

- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **License plate recognition VT** is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of the **License plate recognition VT** (see Standard sub-detectors(see page 359)).

19.4.30.9 Checking in lists of LPs

In *Axxon One*, you can configure macros to run the automatic system reactions based on the created lists of license plates (see LPs[280] (*AxxonNet*), LPs in Axxon Datacenter[281], LPs in AxxonData[282]), when:

- the recognized license plate is present in the selected list;
- the recognized license plate is absent in the selected list;
- it is necessary to recognize the presence of the specific license plate from a list;
- it is necessary to recognize the absence of the specific license plate from a list;
- the recognized license plate is absent in all created lists.

To do this, do the following:

1. Connect Axxon-domain to *AxxonNet*/*AxxonData*/*Axxon Datacenter* (see Configuring a domain in AxxonNet[283], Configuring a domain in AxxonData[284], Configuring a domain in Axxon Datacenter[285]).
2. Create a license plate detector (see Category: Vehicle(see page 514)).
3. Enable the **Check in lists** parameter in the settings of the license plate detector (see Configuring the License plate recognition VT(see page 659), Configuring the License plate recognition IV(see page 524), Configuring License plate recognition RR(see page 555), Configuring License plate recognition RR—Search in archive(see page 569), Configuring License plate recognition RR—Parking(see page 594), Configuring the License plate recognition BRS(see page 515)).
4. Create one or more lists of license plates in *AxxonNet*/*AxxonData* (see LPs[286] (*AxxonNet*), LPs in AxxonData[287], LPs in Axxon Datacenter[288]).
5. Synchronize created lists of license plates with a specific domain (see Synchronizing a list of LPs with the domain and exporting[289] (*AxxonNet*), Synchronizing a list of LPs with the domain and exporting in AxxonData[290], Synchronizing a list of LPs with the domain and exporting in Axxon Datacenter[291]).
6. Select the condition to start the macro (see Configuring start conditions(see page 834), Configuring macros when working with lists of license plates(see page 849)).
7. Select one or more actions to start the macro (see Examples of macros(see page 856)).
8. If necessary, configure information boards to display the information from the macro start (see Examples of macros used when working with lists of license plates(see page 911), Configuring an Event Board(see page 962), Configuring a Dialog Board(see page 966)).

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280 https://docs.axxonsoft.com/confluence/spaces/anet/pages/184380358/LPs
281 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248425848/LPs+in+Axxon+Datacenter
282 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426309/LPs+in+AxxonData
283 https://docs.axxonsoft.com/confluence/spaces/anet/pages/157697082/Configuring+a+domain+in+AxxonNet
284 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426254/Configuring+a+domain+in+AxxonData
285 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248424576/Configuring+a+domain+in+Axxon+Datacenter
286 https://docs.axxonsoft.com/confluence/spaces/anet/pages/184380358/LPs
287 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426309/LPs+in+AxxonData
288 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248425848/LPs+in+Axxon+Datacenter
289 https://docs.axxonsoft.com/confluence/spaces/anet/pages/184380371/Synchronizing+a+list+of+LPs+with+the+domain+and+exporting
290 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426341/Synchronizing+a+list+of+LPs+with+the+domain+and+exporting+in+AxxonData
291 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248425880/Synchronizing+a+list+of+LPs+with+the+domain+and+exporting+in+Axxon+Datacenter

19.4.31 Category: Poses

19.4.31.1 Human pose detector

19.4.31.1.1 Functions of the Human pose detector and its sub-detectors

Description	**Human pose detector** uses a neural network and sub-detectors to determine each person's skeleton and detect poses that can indicate a potentially dangerous situation
Sub-detectors	You can create the following sub-detectors on the basis of the **Human pose detector**: 1. Sitting person detection(see page 678)—detector generates an event when there is a sitting person in the frame. 2. Person down detection(see page 681)—detector generates an event when there is a prostrate person in the frame. 3. Hands up detection(see page 684)—detector generates an event when there is a person with one or two hands raised in the frame. A hand is considered raised if the forearm is parallel to the back. 4. Handrail holding detection(see page 686)—detector generates an event when there is a person in the specified part of the frame who doesn't hold any of the specified handrails. 5. People counter(see page 688)—detector counts objects in the specified area. Detector generates an event when the number of objects reaches or exceeds the specified limit. 6. Close-standing people detection(see page 689)—detector generates an event when the distance between people in the frame exceeds the specified minimum value. 7. People masking(see page 693)—detector masks people in the video image, it doesn't generate an event. **Attention!** Starting with *DetectorPack* 3.13, the People masking(see page 693) is no longer supported. We replaced it with the Track masking(see page 373). 8. **Standard sub-detectors**(see page 359)
Add-ons	For the **Human pose detector** and its sub-detectors to work, you must install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.31.1.2 Video stream and scene requirements for the Human pose detector and its sub-detectors

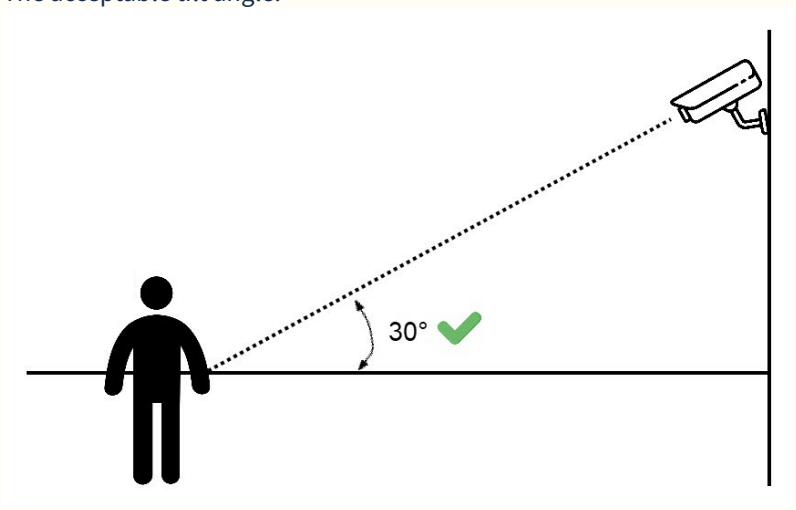
Image requirements for the Human pose detector and its sub-detectors(see page 671)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Human pose detector** and its sub-detectors are given in the table:

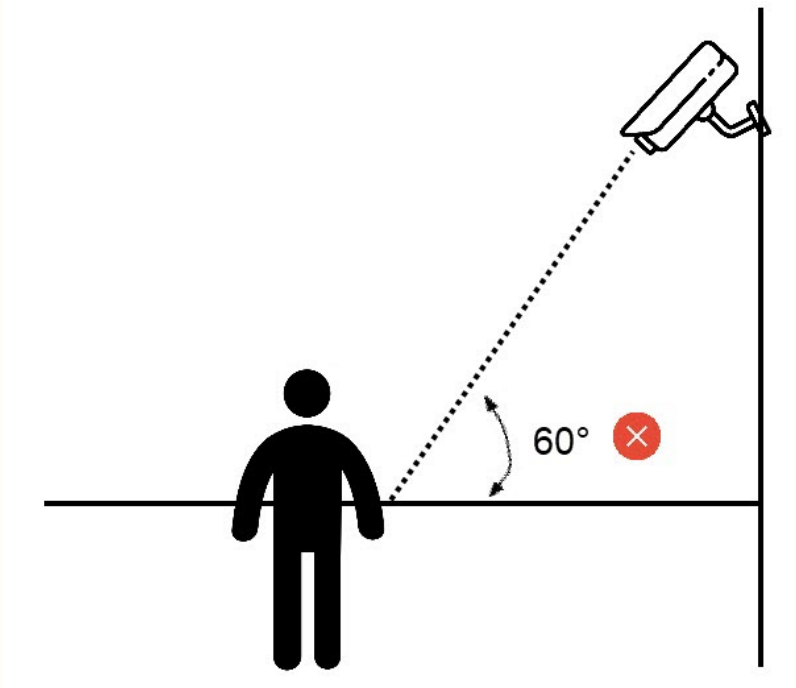
Camera	• Resolution must be at least 640x360 pixels. We also don't recommend using a resolution higher than 1920×1080, since higher resolution doesn't increase the detection quality, but significantly increases the consumption of resources. The optimal resolution for solving typical tasks is 1280x720 • The frame rate per second in the video stream from the camera is at least 8 • Color image only

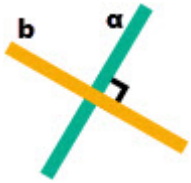
Attention!

- Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
- Correct operation of the **Human pose detector** sub-detectors isn't guaranteed if you use fisheye cameras and other cameras with strong image distortion.
- The camera tilt angle from top to bottom on a person must not exceed 30°. Otherwise, the detector won't operate correctly.
  The following diagrams show the examples of:
  - The acceptable tilt angle:



  - The unacceptable tilt angle:



Lighting	• Lighting in the scene is at least 50 lux per square meter. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on) • The analyzed scene doesn't have reflective surfaces and sharp shadows from moving objects. If present, they must be masked • Camera shake doesn't result in image offsets greater than 1% of the frame size • For the correct operation of the Sitting person detector(see page 678) and Person down detector(see page 681) sub-detectors, the area of interest must be covered from at least two perpendicular angles (a and b are the directional beams from the cameras and the point of their intersection is the area of interest):  The algorithms have a limitation and can work incorrectly if: • a person falls down or sits down with their head or face towards the camera, • a person falls down with their feet towards the camera (for the Person down detector(see page 681) sub-detector)

19.4.31.1.3 Image requirements for the Human pose detector and its sub-detectors

Video stream and scene requirements for the Human pose detector and its sub-detectors(see page 669)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Human pose detector** and its sub-detectors are given in the table:

<table>
<tr>
<td>Object images</td>
<td>

The detected object must be clearly distinguishable by the human eye
The detected object must be completely within the frame
The image isn't noisy and not distorted by the artifacts of compression algorithm
The duration of the object visibility is at least two frames
The minimum value of pixel density per meter is observed:

<table>
<tr><th>Image resolution</th><th>Object type</th><th>Minimum pixel density per meter (ratio of the object width in pixels to the object width in meters)</th><th>Minimum object size in pixels, width x height</th></tr>
<tr><td colspan="4">For Human pose detector sub-detectors (see Configuring the Human pose detector sub-detectors(see page 678))</td></tr>
<tr><td>1920x1080</td><td>Human</td><td>170</td><td>~102x309</td></tr>
<tr><td>1280x720</td><td>Human</td><td>128</td><td>~77x233</td></tr>
<tr><td>640x360</td><td>Human</td><td>80</td><td>~48x145</td></tr>
<tr><td colspan="4">For standard sub-detectors (see Standard sub-detectors(see page 359))</td></tr>
<tr><td>1920x1080</td><td>Human</td><td>100</td><td>~45x187</td></tr>
<tr><td>1280x720</td><td>Human</td><td>68</td><td>~31x134</td></tr>
<tr><td>640x360</td><td>Human</td><td>35</td><td>~15x65</td></tr>
</table>
</td>
</tr>
</table>

19.4.31.1.4 Configuring the Human pose detector

Video stream and scene requirements for the Human pose detector and its sub-detectors(see page 669)
Image requirements for the Human pose detector and its sub-detectors(see page 671)
Hardware requirements for neural analytics operation(see page 339)
Optimizing the operation of neural analytics on GPU in Windows OS(see page 342)
Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)

To configure the **Human pose detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Poses** → **Human pose detector**.

By default, the detector is enabled and set to detect poses.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value

Parameter	Value	Description
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream allows reducing the load on the server.
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable, select the **No** value
	No	
Name	**Human pose detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**3**	Specify the number of frames that the detector will process per second. The value must be in the range [0.016; 100] **Attention!** With static persons in the scene, set the FPS to no less than **2**. With moving persons in the scene, the FPS must be at least **4**. The higher the FPS value, the higher the accuracy of pose detection, but the load on the selected processor is higher as well. For FPS equal to **1**, the accuracy is no less than 70%. This parameter varies depending on the object speed of movement. To solve typical tasks, an FPS value from 3 to 20 is sufficient. Examples: • pose detection for moderately moving objects (without sudden movements)—FPS **3**; • pose detection for moving objects—FPS **12**.
Type	**Human pose detector**	Name of the detector type (non-editable field)
Advanced settings If detection of small objects or objects in areas far away from the camera is ineffective, you can use the scanning mode (see Configuring the scanning mode(see page 353)). This mode doesn't provide absolute detection accuracy but can improve detection performance		

Parameter	Value	Description
Neural network file		Specify a neural network file. The standard neural networks for different processor types are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select the standard neural networks in this field, the system will automatically select the required one. If you use a custom neural network, enter a path to the file. **Attention!** • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).
Scanning window	**Yes** **No**	The scanning mode is disabled by default. To enable the scanning mode, select the **Yes** value
Scanning window height	**540**	The height and width of the scanning window are determined according to the actual size of the frame and the required number of windows. For example, the real frame size is 1920×1080 pixels. To divide the frame into four equal windows, set the width of the scanning window to 960 pixels and the height to 540 pixels
Scanning window step height	**540**	The scanning step determines the relative offset of the windows. If the step is equal to the height and width of the scanning window, respectively, the segments will line up one after another. Reducing the height or width of the scanning step will increase the number of windows due to their overlapping each other with an offset. This will increase the detection accuracy but will also increase the CPU load **Attention!** The height and width of the scanning step must not be greater than the height and width of the scanning window. The detector won't operate with such settings.

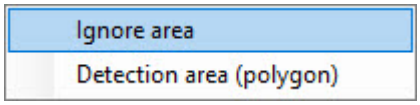
Parameter	Value	Description
Scanning window step width	**480**	The scanning step determines the relative offset of the windows. If the step is equal to the height and width of the scanning window, respectively, the segments will line up one after another. Reducing the height or width of the scanning step will increase the number of windows due to their overlapping each other with an offset. This will increase the detection accuracy but will also increase the CPU load **Attention!** The height and width of the scanning step must not be greater than the height and width of the scanning window. The detector won't operate with such settings.
Scanning window width	**480**	The height and width of the scanning window are determined according to the actual size of the frame and the required number of windows. For example, the real frame size is 1920×1080 pixels. To divide the frame into four equal windows, set the width of the scanning window to 960 pixels and the height to 540 pixels
Track lifespan (starting with *Detector Pack* 3.14)	**Yes**	By default, the parameter is disabled. If you want to display the track lifespan for an object in seconds, select the **Yes** value
	No	
Basic settings		

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="13">Mode</td><td>CPU</td><td rowspan="13">Select the operation mode of the detector and neural filter (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)). Neural filter operation mode is used only if you select the Yes value in the Neural filter parameter.

Attention!
It may take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
For the Person Down Detection and Sitting Person Detection, the accuracy can depend on the selected processor. If the recognition quality deteriorates when you change the processor, we recommend selecting the best values of the detector parameters and configuring perspective empirically (see Sitting person detector(see page 678), Person down detector(see page 681)).
Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Huawei NPU</td></tr>
<tr><td rowspan="4">Pose estimation neural network (starting with Detector Pack 3.14)</td><td>Pose estimation</td><td rowspan="4">Select a pose estimation neural network. The names may indicate the size of the neural network. The size (Nano, Middle, Large) of the neural network indicates the amount of resources consumed. The larger the neural network, the higher the accuracy but the higher the load on the processor</td></tr>
<tr><td>Pose estimation (Nano)</td></tr>
<tr><td>Pose estimation (Middle)</td></tr>
<tr><td>Pose estimation (Large)</td></tr>
</table>

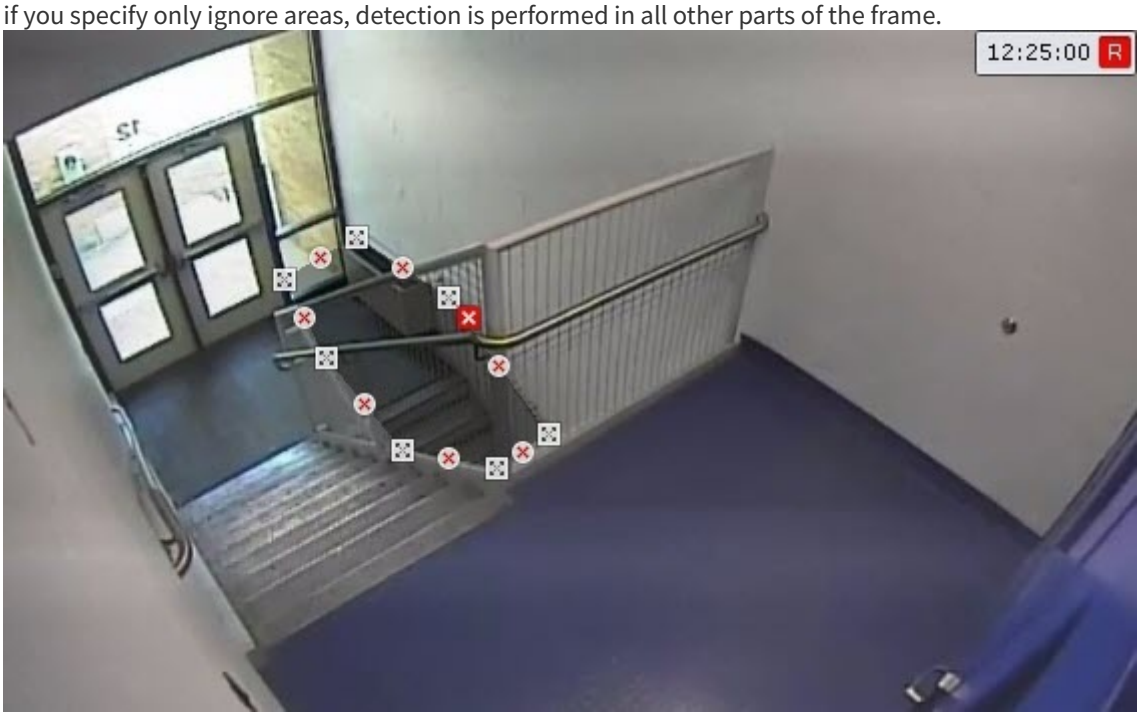
Parameter	Value	Description
Neural network filter		
Neural filter	**Yes**	Neural filter is disabled by default. To use the neural filter to filter out parts of tracks, select the **Yes** value
	No	
Neural filter file		Select a neural network file

By default, the entire frame is a detection area. In the preview window, you can specify the custom detection areas and ignore areas. To specify areas, right-click the frame and select the required area (see Configuring the ignore area(see page 350), Configuring a detection area(see page 351)).



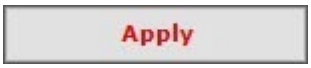
The following logic is used for this:

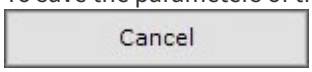
- if you specify only detection areas, no detection is performed in all other parts of the frame;
- if you specify only ignore areas, detection is performed in all other parts of the frame.



Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.
- To delete the selected area, click the  button.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the **Human pose detector** is complete. If necessary, you can create and configure the required sub-detectors on the basis of the Human pose detector (see Configuring the Human pose detector sub-detectors(see page 694)).

19.4.31.1.5 Configuring the Human pose detector sub-detectors

19.4.31.1.5.1 Sitting person detector

On the page:

- Configuring the parameters(see page 678)
- Configuring the detection area(see page 679)
- Configuring the frame perspective(see page 679)

Configuring the parameters

To create the **Sitting person detector**, do the following:

1. Create the **Human pose detector** (see Configuring the Human pose detector(see page 672)).
2. Below the **Human pose detector**, click **Create… → Sitting person detector**.

By default, the **Sitting person detector** generates an event if a sitting person is detected in the specified area.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

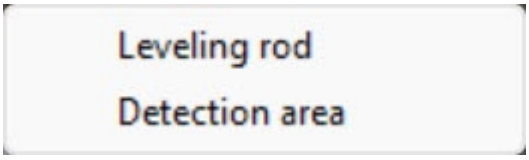
Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Sitting person detector**	Enter the detector name or leave the default name
Type	**Sitting person detector**	Name of the detector type (non-editable field)
Basic settings		
Number of measurements in a row to trigger detection	**2**	Specify the minimum number of frames with the corresponding pose or behavior for the detector to generate an event. The value must be in the range [1, 20]. The recommended (default) value is **2**. Increasing the value can help eliminate false events, but increases the risk of skips. Decreasing the value can help reduce skips, but increases the probability of false events

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuring the detection area

To configure the detection area, do the following:

1. In the preview window, click the  button.
2. Click in the preview window.
3. Select **Detection area**.



4. Using the anchor points  , set the detection area in which a sitting person must be detected.

> **Note**
>
> - For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
> - To hide the detection area, click the  button. To cancel the action, click this button again.
> - To delete the detection area, click the  button.

5. Click the **Apply** Apply button.

Configuration of the detection area is complete.

Configuring the frame perspective

If a camera angle doesn't meet the requirements (see Video stream and scene requirements for the Human pose detector and its sub-detectors(see page 669)), this can result in false events. In this case, we recommend configuring the frame perspective using the leveling rods.

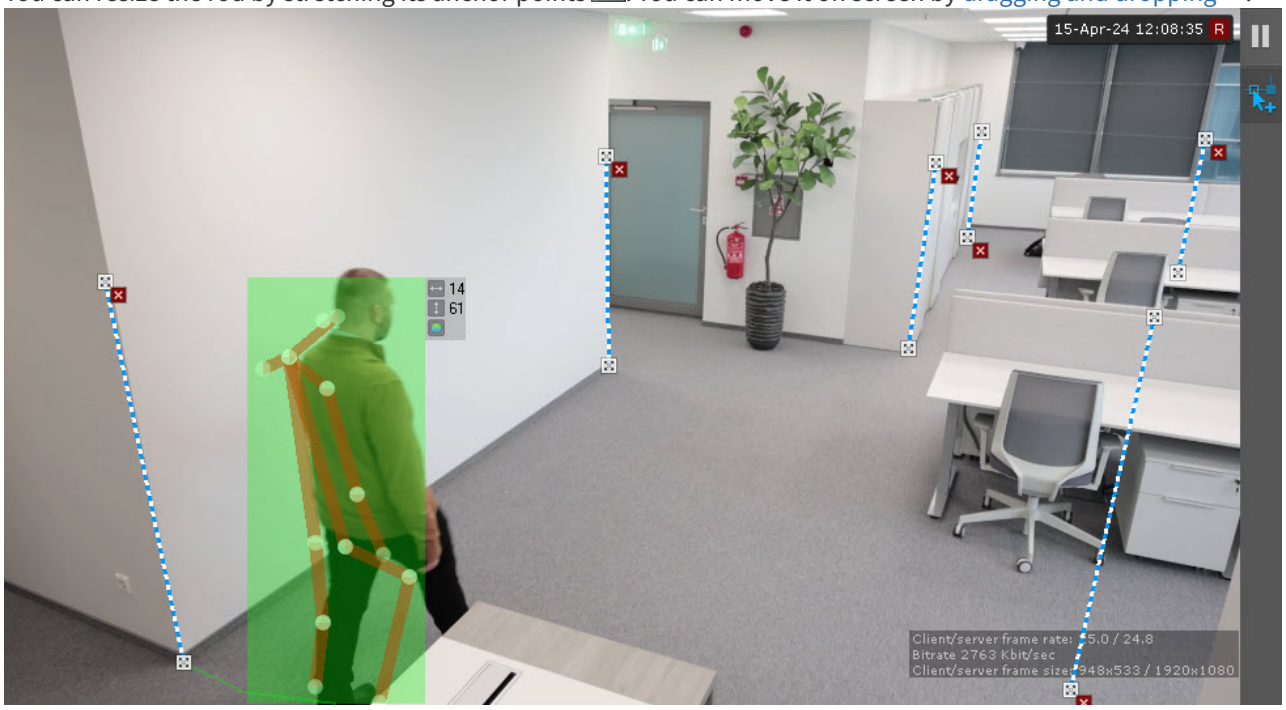
For this, do the following:

1. In the preview window, click the  button.
2. Click in the preview window.
3. Select **Leveling rod**.



4. Specify the size of the same person in different parts of the frame by eye:
   - To create a leveling rod, left-click the video image to add two anchor points.
   - Set at least three calibration rods. The lower anchor points of any three rods must not be located on the same line (horizontal, vertical, slanting, and so on).
   - The size of the leveling rod must be about the average height of a person at this part of the frame.

- You can resize the rod by stretching its anchor points . You can move it on screen by dragging and dropping[292].



Attention!

When you set up leveling rods, the following conditions must be met:

i. the rods that are located at the same distance from the camera lens must be of the same size;
ii. the feet of the rods must be located on the same surface (for example, floor);
iii. in complex scenes, we recommend adding more than three rods to increase the accuracy of the detection;
iv. in the parts of the frame where the lens vertical distortion is observed, the rods must be parallel to the nearest vertical objects (for example, door, wardrobe);
v. for portrait-oriented scenes (such as corridor, shopping aisle, warehouse aisle, and so on), the arrangement of the rods must form triangles.

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- The area for detection is displayed by default. To hide it, click the button. To cancel the action, click this button again.
- To delete a rod, click the button.

5. Click the **Apply** button.

Configuration of the **Sitting person detector** is complete.

292 https://ru.wikipedia.org/wiki/Drag-and-drop

19.4.31.1.5.2 Person down detector

On the page:

- Configuring the parameters(see page 681)
- Configuring the detection area(see page 681)
- Configuring the frame perspective(see page 682)

Configuring the parameters

> **Attention!**
>
> When a recumbent person is facing a camera or away from a camera, the correct operation of the detector isn't guaranteed.

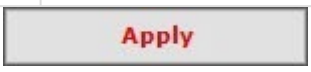
To create the **Person down detector**, do the following:

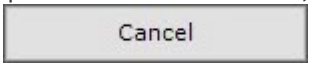
1. Create the **Human pose detector** (see Configuring the Human pose detector(see page 672)).
2. Below the **Human pose detector**, click **Create…** → **Person down detector**.

By default, the **Person down detector** generates an event if a recumbent person is detected in the specified area.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Person down detector**	Enter the detector name or leave the default name
Type	**Person down detector**	Name of the detector type (non-editable field)
Basic settings		
Number of measurements in a row to trigger detection	**2**	Specify the minimum number of frames with the corresponding pose or behavior for the detector to generate an event. The value must be in the range [1, 20]. The recommended (default) value is **2**. Increasing the value can help eliminate false events but increases the risk of skips. Decreasing the value can help reduce skips, but increases the probability of false events

To save the parameters of the detector, click the **Apply** 

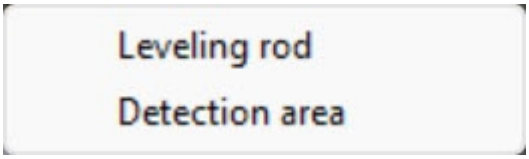
button. To cancel the changes, click the **Cancel** 

button.

Configuring the detection area

To configure the detection area, do the following:

1. In the preview window, click the  button.
2. Click in the preview window.
3. Select **Detection area**.



4. Using the anchor points  , set the detection area in which a recumbent person must be detected.

> **Note**
>
> - For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
> - To hide the detection area, click the  button. To cancel the action, click this button again.
> - To delete the detection area, click the  button.

5. Click the **Apply** 

button.

Configuration of the detection area is complete.

Configuring the frame perspective

For the **Person down detector** operation, you must configure the frame perspective first.

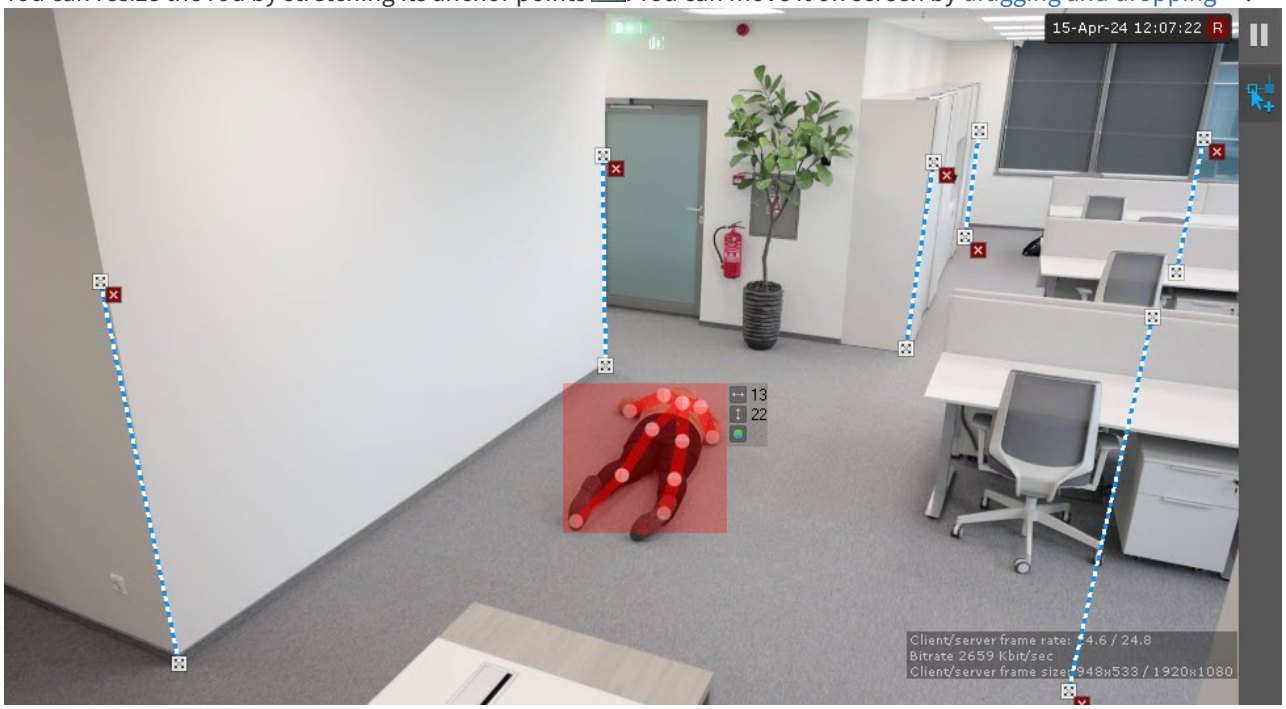
For this, do the following:

1. In the preview window, click the  button.
2. Click in the preview window.
3. Select **Leveling rod**.



4. Specify the size of the same person in different parts of the frame by eye:
   - To create a leveling rod, left-click the video image to add two anchor points.
   - Set at least three calibration rods. The lower anchor points of any three rods must not be located on the same line (horizontal, vertical, slanting, and so on).
   - The size of the leveling rod must be about the average height of a person at this part of the frame.

- You can resize the rod by stretching its anchor points . You can move it on screen by dragging and dropping[293].



Attention!

When you set up leveling rods, the following conditions must be met:

i. the rods that are located at the same distance from the camera lens must be of the same size;
ii. the feet of the rods must be located on the same surface (for example, floor);
iii. in complex scenes, we recommend adding more than three rods to increase the accuracy of the detection;
iv. in the parts of the frame where the lens vertical distortion is observed, the rods must be parallel to the nearest vertical objects (for example, door or wardrobe);
v. if you add only three leveling rods to a scene, you cannot remove them from the scene, you can resize them and change their location;
vi. if you add more than three leveling rods to a scene, you can resize them and change their location, and remove them from the scene;
vii. for portrait-oriented scenes (such as corridor, shopping aisle, warehouse aisle, and so on), the arrangement of the rods must form triangles.

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- The area for detection is displayed by default. To hide it, click the button. To cancel the action, click this button again.
- To delete a rod, click the button.

5. Click the **Apply** button.

293 https://ru.wikipedia.org/wiki/Drag-and-drop

Configuration of the **Person down detector** is complete.

19.4.31.1.5.3 Hands up detector

To create the **Hands up detector**, do the following:

1. Create the **Human pose detector** (see Configuring the Human pose detector(see page 672)).
2. Below the **Human pose detector**, click **Create...** → **Hands up detector**.

By default, the **Hands up detector** generates an event if there is a person with both hands raised in a specified area.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

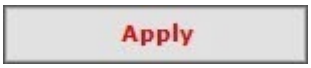
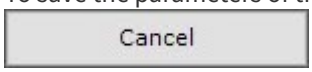
Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Hands up detector**	Enter the detector name or leave the default name
Type	**Hands up detector**	Name of the detector type (non-editable field)
Basic settings		
Event generation condition	**Both hands**	Select this value if you want the detector to generate an event only when a person has both hands raised
	One hand	Select this value if you want the detector to generate an event only when a person has either left or right hand raised
	Only left	Select this value if you want the detector to generate an event only when a person has one selected hand raised
	Only right	
	Left hand	Select this value if you want the detector to generate an event only when a selected hand is raised
	Right hand	
Number of measurements in a row to trigger detection	**2**	Specify the minimum number of frames with a person with a hand/hands raised for the detector to generate an event. The value must be in the range [1, 20]. The recommended (default) value is **2**. Increasing the value can help eliminate false events but increases the risk of skips. Decreasing the value can help reduce skips, but increases the probability of false events

If necessary, you can configure the detection area. For this, do the following:

1. Click in the preview window.
2. Select **Detection area**.
3. Using the anchor points  , set the detection area in which a person with both hands raised must be detected.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The area for detection is displayed by default. To hide it, click the  button. To cancel the action, click this button again.
- To delete the detection area, click the  button.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuration of the **Hands up detector** is complete.

19.4.31.1.5.4 Shooter detector

To create the Shooter detector, do the following:

1. Create the **Human pose detector** (see Configuring the Human pose detector[294]).
2. Below the **Human pose detector**, click **Create…** → **Shooter detector**.

By default, the **Shooter detector** generates an event if a person with an arm extended forward parallel to the floor is detected in the frame.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Shooter detector**	Enter the detector name or leave the default name
Type	**Shooter detector**	Name of the detector type (non-editable field)
Basic settings		
Number of measurements in a row to trigger detection	**2**	Specify the minimum number of frames with the corresponding pose or behavior for the detector to generate an event. The value must be in the range [1, 20]. The recommended (default) value is **2**. Increasing the value can help eliminate false events but increases the risk of skips. Decreasing the value can help reduce skips, but increases the probability of false events

If necessary, you can configure the detection area. For this, do the following:

1. Click in the preview window.
2. Select **Detection area**.
3. Using the anchor points  , set the detection area in which a person with an arm extended forward parallel to the floor must be detected.

294 https://docs.axxonsoft.com/confluence/display/ONE2025/Configuring+the+Human+pose+detector

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide the detection area, click the  button. To cancel the action, click this button again.
- To delete the detection area, click the  button.

Click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuration of the **Shooter detector** is complete.

19.4.31.1.5.5 Handrail holding detector

On the page:

- Configuring the parameters(see page 686)
- Configuring the detection area(see page 687)

Configuring the parameters

To create the **Handrail holding detector**, do the following:

1. Create the **Human pose detector** (see Configuring the Human pose detector(see page 672)).
2. Below the **Human pose detector**, click **Create...** → **Handrail holding detector**.

The **Handrail holding detector** generates an event if there is a person in the specified area of the frame who doesn't hold on to any of the specified handrails.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Handrail holding detector**	Enter the detector name or leave the default name
Type	**Handrail holding detector**	Name of the detector type (non-editable field)
Basic settings		

Parameter	Value	Description
Number of measurements in a row to trigger detection	**2**	Specify the minimum number of frames with the corresponding pose or behavior for the detector to generate an event. The value must be in the range [1, 20]. The recommended (default) value is **2**. Increasing the value can help eliminate false events, but increases the risk of skips. Decreasing the value can help reduce skips, but increases the probability of false events

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuring the detection area

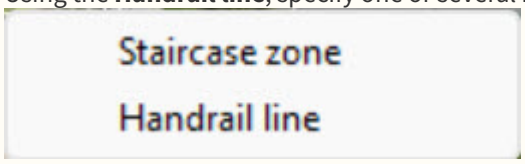
To configure the detection area of the **Handrail holding detector**, do the following:

1. Click in the preview window.

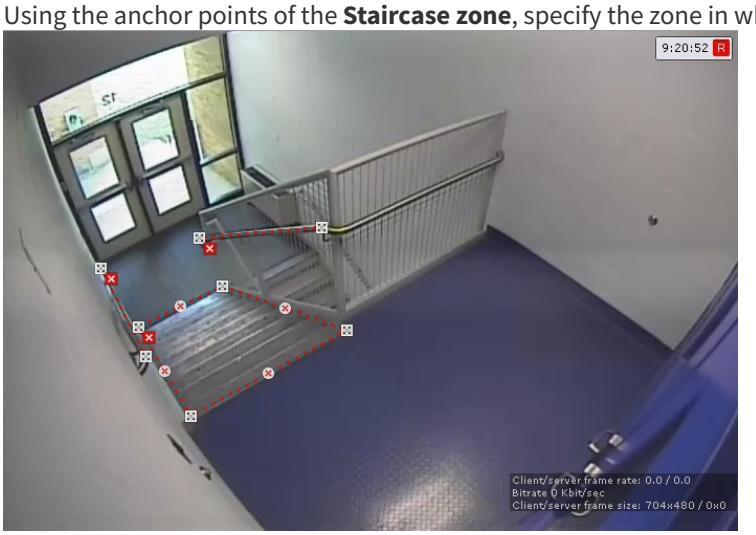
   Attention!

   - If lens distortion makes the handrail non-linear, use several lines to specify the handrail.
   - The presence of a person in the staircase zone is determined by their lower limbs.

   Using the **Handrail line**, specify one or several handrails in the frame.

2. Using the anchor points of the **Staircase zone**, specify the zone in which a person must hold on to the handrail.

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.

- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.
- To delete a line, click the  button.

Configuration of the **Handrail holding detector** is complete.

19.4.31.1.5.6 People counter

To create the **People counter** detector, do the following:

1. Create the **Human pose detector** (see Configuring the Human pose detector(see page 672)).
2. Below the **Human pose detector**, click **Create...** → **People counter**.

The **People counter** detector counts the number of people in the specified area using the metadata of the **Human pose detector**.

An event, on the basis of which a macro can be started (see Configuring start conditions(see page 834)), can be generated if the number of people in the frame meets the specified conditions.

Note

- Unlike the **Multiple objects** detector (see Configuring Multiple objects(see page 383)), the counter generates events of just one type—triggering.
- Unlike the **Neural counter** (see Configuring the Neural counter(see page 773)), **People counter** counts only people.

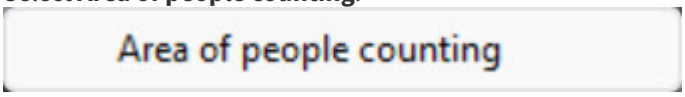
If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	Mask is recorded to the archive by default. To disable the parameter, select the **No value**
	No	
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**People counter**	Enter the detector name or leave the default name
Type	**People counter**	Name of the detector type (non-editable field)
Basic settings		
Alarm when value	**In range**	Specify when the detector must generate an event: when the number of people in the specified area is within the set range or out of the range
	Out of range	
End value of alarm range settings	**100**	Specify the range of the number of people in the frame. The value must be in the range [0, 100]

Parameter	Value	Description
Event interval	**1**	Specify the interval in seconds between two consecutive events of the detector when the number of people in the frame continuously meets the specified conditions. The value must be in the range [1, 10000]
Number of measurements in a row to trigger detection		Specify the minimum number of frames with the set number of people for the detector to generate an event. The value must be in the range [1, 20]. The recommended (default) value is **2**. Increasing the value can help eliminate false events but increases the risk of skips. Decreasing the value can help reduce skips, but increases the probability of false events
Start value of alarm range settings	**5**	Specify the range of the number of people in the frame. The value must be in the range [0, 100]

If necessary, you can configure the detection area. For this, do the following:

1. Click in the preview window.
2. Select **Area of people counting**.

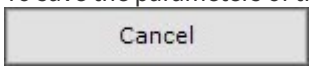


3. Set the detection area using the anchor points  . You can create multiple areas.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The area for detection is displayed by default. To hide it, click the  button. To cancel the action, click this button again.
- To delete the detection area, click the  button.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **People counter** is complete.

In the **Surveillance window** on the layout next to the counter icon, you can add text and the number of people counted by the detector (see Displaying the number of detected objects(see page 355)).

19.4.31.1.5.7 Close-standing people detector

On the page:

- Configuring the parameters(see page 690)
- Configuring the detection area(see page 690)
- Configuring the frame perspective(see page 691)

Configuring the parameters

To configure the **Close-standing people detector**, do the following:

1. Create the **Human pose detector** (see Configuring the Human pose detector(see page 672)).
2. Below the **Human pose detector**, click **Create...** → **Close-standing people detector**.

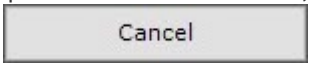
By default, the **Close-standing people detector** generates an event when "skeleton" bounding boxes around people collide.

> **Note**
>
> Bounding boxes are not displayed in the interface. They are usually a bit larger than the "skeletons" dimensions.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Close-standing people detector**	Enter the detector name or leave the default name
Type	**Close-standing people detector**	Name of the detector type (non-editable field)
Basic settings		
Distance sensitivity	**2**	Specify the distance between people in meters at which the detector must generate an event. An event is generated if the distance between people in the frame is equal to or less than the specified distance. The value must be in the range [0, 20]
Leveling rod length	**1.7**	Specify the average height of a person in meters, according to which the leveling rods are set. The value must be in the range [0, 3]
Number of measurements in a row to trigger detection	**4**	Specify the minimum number of frames with close-standing people for the detector to generate an event. The value must be in the range [1, 100]. Increasing the value can help eliminate false events but increases the risk of skips. Decreasing the value can help reduce skips, but increases the probability of false events

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

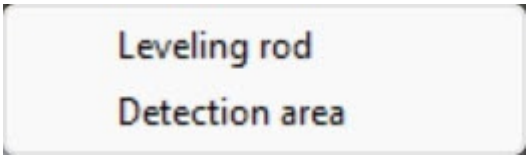
button.

Configuring the detection area

To configure the detection area, do the following:

1. Click in the preview window.

2. Select **Detection area**.



3. Set the detection area using the anchor points .

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- To hide the detection area, click the button. To cancel the action, click this button again.
- To remove the detection area, click the button.

4. Click the **Apply** button.

Configuration of the detection area is complete.

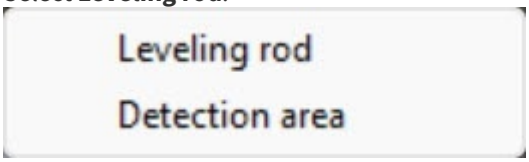
Configuring the frame perspective

If you want to change the distance that must generate an event, you must configure the frame perspective:

Attention!

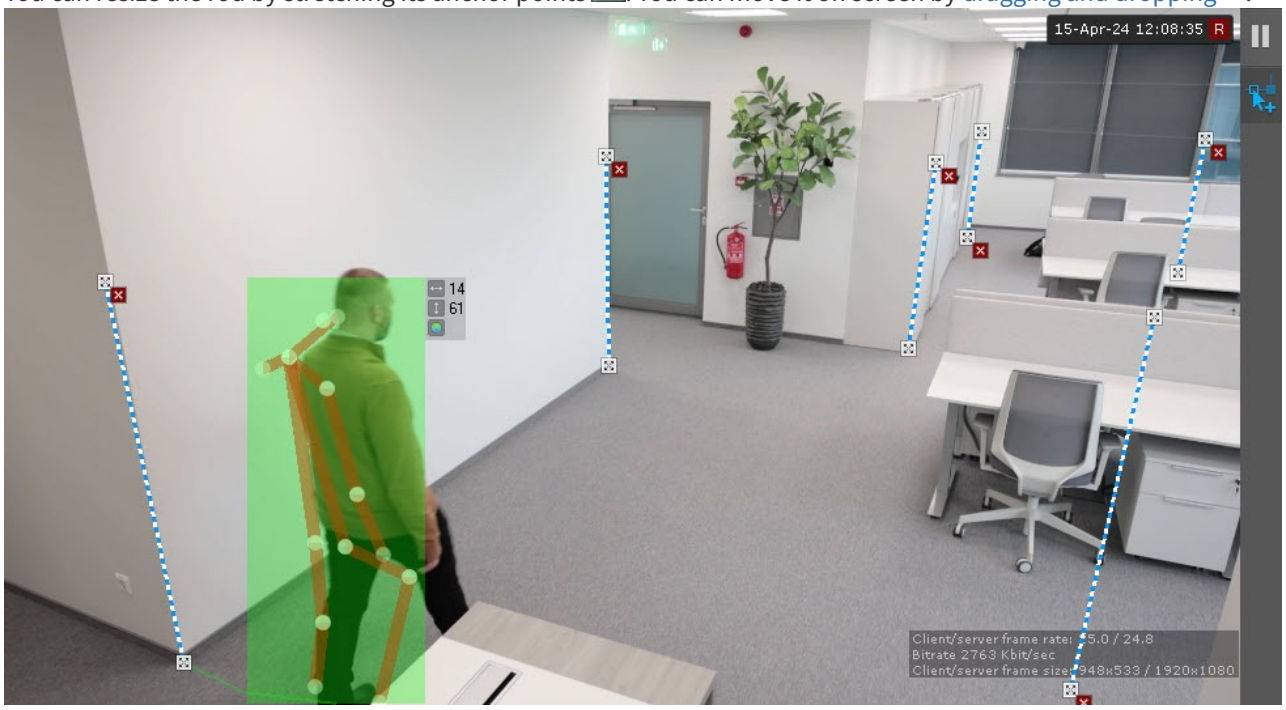
For portrait-oriented scenes (such as corridor, shopping aisle, warehouse aisle, and so on), we recommend configuring the perspective in any case.

1. In the preview window, click the button.
2. Click in the preview window.
3. Select **Leveling rod**.



4. Specify the size of the same object in different parts of the frame by eye:
   - To create a leveling rod, left-click the video image to add two anchor points.
   - Set at least three calibration rods. The lower anchor points of any three rods must not be located on the same line (horizontal, vertical, slanting, and so on).
   - The size of the leveling rod must be about the average height of a person at this part of the frame.

- You can resize the rod by stretching its anchor points . You can move it on screen by dragging and dropping[295].



Attention!

When you set up leveling rods, the following conditions must be met:

i. the rods that are located at the same distance from the camera lens must be of the same size;
ii. the feet of the rods must be located on the same surface (for example, floor);
iii. in complex scenes, we recommend adding more than three rods to increase the accuracy of the detection;
iv. in the parts of the frame where the lens vertical distortion is observed, the rods must be parallel to the nearest vertical objects (for example, door or wardrobe);
v. for portrait-oriented scenes (such as corridor, shopping aisle, warehouse aisle, and so on), the arrangement of the rods must form triangles.

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- The area for detection is displayed by default. To hide it, click the button. To cancel the action, click this button again.
- To delete a rod, click the button.

5. Click the **Apply** button.

Configuration of the **Close-standing people detector** is complete.

295 https://ru.wikipedia.org/wiki/Drag-and-drop

19.4.31.1.5.8 People masking

> **Attention!**
>
> Starting with *DetectorPack* 3.13, the **People masking** is no longer supported. We replaced it with the Track masking(see page 373).

To create the **People masking**, do the following:

1. Create the **Human pose detector** (see Configuring the Human pose detector(see page 672)).
2. Below the **Human pose detector**, click **Create...** → **People masking**.

People masking doesn't generate events. It uses the metadata from the **Human pose detector** to mask people on the video image:

- on live video;
- in the archive;
- when exporting from the archive.

> **Attention!**
>
> People masking works only for those users who have the **View masked video** parameter **disabled** in the role settings (see Roles(see page 920)).

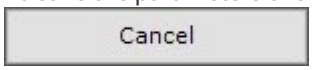


If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	Mask is recorded to the archive by default. To disable the parameter, select the **No** value
	No	

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**People masking**	Enter the detector name or leave the default name
Type	**People masking**	Name of the detector type (non-editable field)

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **People masking** is complete.

19.4.31.1.5.9 Configuring the standard sub-detectors of the Human pose detector

For the information on configuring the standard sub-detectors of the **Human pose detector**, see Standard sub-detectors(see page 359).

19.4.31.2 Person-based privacy masking

19.4.31.2.1 Functions of the Person-based privacy masking

Description	**Person-based privacy masking** allows you to hide specified parts of a person's body in a video
Neural networks	Detection tool uses a segmenting network that breaks the human body into zones (head, shoulders, forearms, hands, body, hips, shins, feet)
Add-ons	For the detection tool to work, you must install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.31.2.2 Video stream and scene requirements for the Person-based privacy masking

Hardware requirements for neural analytics operation(see page 339)

For the correct operation of the **Person-based privacy masking** the following requirements must be met:

Attention!

- Correct operation of the detection tool **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
- We cannot guarantee correct operation of the detection tool if you use a fisheye lens.

Camera	• FSP is at least 12 • Minimum value of pixel density per meter is 170
Lighting	• Average lighting of scenes with a person is at least 200 lux

19.4.31.2.3 Configuring the Person-based privacy masking

Video stream and scene requirements for the Person-based privacy masking(see page 694)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Person-based privacy masking** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Poses** → **Person-based privacy masking**.

By default, the detector is enabled and set to mask a person's head.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the recording of the mask to the archive is enabled. To disable, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream allows reducing the load on the server
	Second stream	
Other		
Enable	**Yes**	The detector is enabled by default. To disable, select the **No** value
	No	
Name	**Person-based privacy masking**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**1**	Specify the number of frames that the detector will process per second. The value must be in the range [0.016; 100]
Type	**Person-based privacy masking**	Name of the detector type (non-editable field)
Advanced settings		
Number of measurements in a row to trigger detection	**3**	Specify the minimum number of frames on which the detector must detect objects to generate an event. The value must be in the range [1, 20]

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Segmenting network file</td><td></td><td>Specify a neural network file.

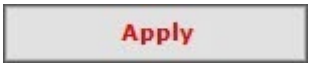
The standard neural networks for different processor types are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select the standard neural networks in this field, the system will automatically select the required one. If you use a custom neural network, specify the path to the file.

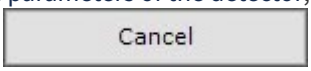
Attention!
You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install Axxon One.
For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights.
If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).</td></tr>
<tr><td colspan="3">Basic settings</td></tr>
<tr><td rowspan="13">Detection mode</td><td>CPU</td><td rowspan="13">Select the detector operation mode (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).

Attention!
It may take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
</table>

Parameter	Value	Description
Mask		
Body	**Yes**	By default, the detector masks only a person's head. To mask other parts of the body, select the **Yes** value for the corresponding parameters
	No	
Feet	**Yes**	
	No	
Forearms	**Yes**	
	No	
Hands	**Yes**	
	No	
Head	**Yes**	
	No	
Hips	**Yes**	
	No	
Shins	**Yes**	
	No	
Shoulders	**Yes**	
	No	

By default, the entire frame is a detection area.

To save the parameters of the detector, click the **Apply** 

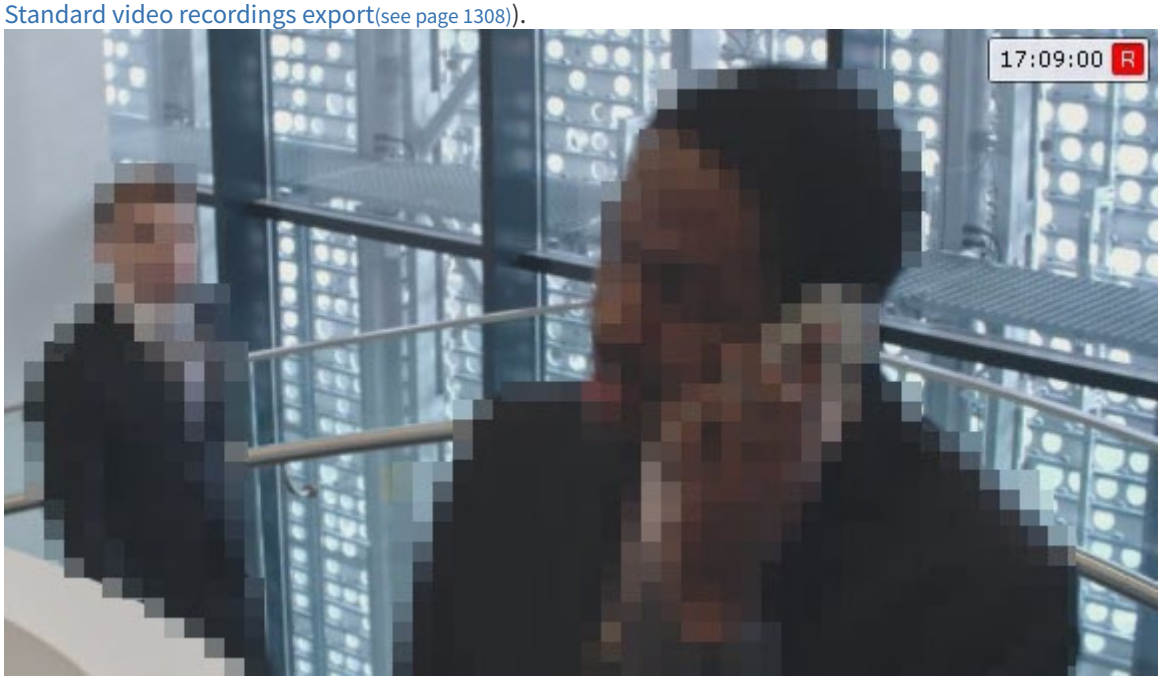
button. To cancel the changes, click the **Cancel** 

button.

Configuring the **Person-based privacy masking** is complete.

Selected body parts of all persons are hidden in the frame. For a user group with limited permissions to view masked video (see Roles(see page 920)), the mask is displayed on the video image of the selected camera in the **Detectors** and **Hardware** sections, on the layouts, in the archive, and when exporting. For the **admin** user group, the mask is displayed only on the video image of the selected camera in the **Detectors** and **Hardware** sections, and when exporting, if the **View masked video** checkbox is clear (see

Standard video recordings export(see page 1308)).



19.4.32 Category: Production Safety

19.4.32.1 Audio classification IV

19.4.32.1.1 Functions of the Audio classification IV

Description	The **Audio classification IV** is used to automatically recognize and detect various sounds at protected facilities (for example, the sound of broken glass, smoke alarm sound, and so on). When a target sound that meets the specified criteria is detected, the detector generates an event. You can use this event to start a macro (see Configuring start conditions(see page 834)), for example, to initiate an alarm, send a notification, or start recording
Add-ons	For the detector to work, you must install IV Audio Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321))
Licensing	The detector is bound to the MAC address of the server. You must provide this address to the technical support and get a license. You must place the license file (LicenseFile_AudioIV.txt) in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\ directory. After you install the license, you must restart the server (see Stop the server(see page 146), Starting the server(see page 137))

19.4.32.1.2 Hardware and audio data requirements for the operation of the Audio classification IV

Hardware and audio data requirements for the operation of the **Audio classification IV** are given in the table:

Microphone	The **Microphone** object must be enabled (see The Microphone object(see page 219))
Stream	The detector requires a single-channel (mono) audio stream
Audio data format	Audio data must be transferred in 16-bit signed integer PCM format
Sample rate	Supported sample rate: 8000, 16000, 32000, 48000 Hz. We recommend 16000 Hz

Hardware	For the correct operation of the audio analytics algorithms, you must disable all embedded DSP features of audio processing on your audio hardware or in drivers, as they can distort the original audio signal and interfere with recognition. These features include: • Automatic Gain Control (AGC) • Noise Suppression/Cancellation • Beamforming • Echo Cancellation • Equalizers (EQ) and High Pass Filters (HPF)
Sound pressure level (SPL)	For the detector to generate an event, the sound pressure level (SPL) from the target event must be within the following ranges (measured with a sound level meter): • In a noisy environment: at least 80–82 dB • In a quiet environment: at least 58–60 dB

19.4.32.1.3 Configuring the Audio classification IV

Hardware and audio data requirements for the operation of the Audio classification IV(see page 698)

To configure the **Audio classification IV**, do the following:

1. Submit to the technical support the MAC address of the server where the detector will be used.

   Attention!

   The detector will not work on the server with a different MAC address.

2. Copy the license received from the technical support into the C:\Program Files\Common Files\AxxonSoft\DetectorPack\LicenseFile_AudioIV.txt file.
3. Restart the server (see Stop the server(see page 146), Starting the server(see page 137)).
4. On the **Detectors** tab, below the required camera, click **Create…** → **Category: Production Safety** → **Audio classification IV**.

By default, the detector is set to recognize the following types of sounds:

- the sound of aggressive behavior,
- the sound of a gunshot,
- the sound of a smoke alarm,
- the sound of a child crying,
- the sound of breaking glass,
- the sound of a siren,
- the sound of a dog barking.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

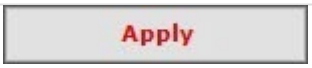
Attention!

Recommendation for the sound detection threshold parameters: start with a value of **0.99** and gradually lower it if the detector misses target events, or increase it if there are too many false events.
- A high value (close to **1**): lower sensitivity, fewer false events, but a higher risk of missing an event.
- A low value (close to **0.01**): high sensitivity, better detection, but more false events.

Parameter	Value	Description
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value

Parameter	Value	Description
	No	
Name	**Audio classification IV**	Enter the detector name or leave the default name
Aggression detection	**Yes**	By default, the aggression detection is enabled. To disable, select the **No** value
	No	
Aggression detection threshold	**0.99**	Specify the sensitivity threshold at which the sound is recognized as aggression. The value must be in the range [0.01, 1]
Baby cry detection	**Yes**	By default, the baby cry detection is enabled. To disable, select the **No** value
	No	
Baby cry detection threshold	**0.99**	Specify the sensitivity threshold at which the sound is recognized as a baby cry. The value must be in the range [0.01, 1]
Dog bark detection	**Yes**	By default, the dog bark detection is enabled. To disable, select the **No** value
	No	
Dog bark detection threshold	**0.99**	Specify the sensitivity threshold at which the sound is recognized as a dog bark. The value must be in the range [0.01, 1]
Glass break detection	**Yes**	By default, the glass break detection is enabled. To disable, select the **No** value
	No	
Glass break detection threshold	**0.99**	Specify the sensitivity threshold at which the sound is recognized as glass breaking. The value must be in the range [0.01, 1]
Gunshot detection	**Yes**	By default, the gunshot detection is enabled. To disable, select the **No** value
	No	
Gunshot detection threshold	**0.99**	Specify the sensitivity threshold at which the sound is recognized as a gunshot. The value must be in the range [0.01, 1]
Siren detection	**Yes**	By default, the siren detection is enabled. To disable, select the **No** value
	No	
Siren detection threshold	**0.99**	Specify the sensitivity threshold at which the sound is recognized as a siren. The value must be in the range [0.01, 1]
Smoke alarm detection	**Yes**	By default, the smoke alarm detection is enabled. To disable, select the **No** value
	No	

Parameter	Value	Description
Smoke alarm detection threshold	**0.99**	Specify the sensitivity threshold at which the sound is recognized as a smoke alarm. The value must be in the range [0.01, 1]
Type	**Audio classification IV**	Name of the detector type

To save the changes to the detector parameters, click the **Apply** 

button. To cancel the changes to the parameters, click the **Cancel** 

button.

Configuration of the **Audio classification IV** is complete.

If necessary, you can search the archive for events that were generated by the detector. You can search for all types of sounds or for a specific type of sound (see Events search(see page 1213)).

19.4.32.2 Neural classifier

19.4.32.2.1 Functions of the Neural classifier

Description	**Neural classifier** generates events when the required type of object appears in the camera field of view. **Attention!** The **Neural classifier** is based on a neural network[296], the basic principle of which is learnability. In order for the **Neural classifier** to respond to the required type of object in the camera field of view, you must record a video and send it to AxxonSoft[297]. In *Axxon One*, the detector will be refined (neural network training) based on the video data for the optimal operation in the specified conditions.
Add-ons	For the **Neural classifier** to work, you install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.32.2.2 Video stream and scene requirements for the Neural classifier

Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Neural classifier** are given in the table:

Camera	• We recommend using color cameras. With black and white cameras, the detection quality can be noticeably worse • Resolution must be at least 640x360 • FPS directly affects detection efficiency. In most cases, the default value (1 detection per 10 seconds) is sufficient to detect the appearance of an object that last more than one minute **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Scene and angle	• The minimum area of the object in the frame depends on the neural network that you use • The object must be visually separated from the background

296 https://en.wikipedia.org/wiki/Artificial_neural_network
297 https://support.axxonsoft.com/

Attention!

If you set a rectangular recognition area for the detector, the requirements apply to this area rather than to the entire frame (see Configuring the Neural classifier(see page 702)).

19.4.32.2.3 Configuring the Neural classifier

Video stream and scene requirements for the Neural classifier(see page 701)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Neural classifier**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Production Safety** → **Neural classifier**.

By default, the detector is enabled and set to detect objects in the frame.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the sensitivity scale of the detector is recorded to the archive (see Displaying information from a detector (mask)(see page 1152)). To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Neural classifier**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**0.1**	Specify the number of frames that the detector will process per second. The value must be in the range [0.016, 100]

Parameter	Value	Description
Selected object classes		If necessary, specify the class of the detected object. If you want to display tracks of several classes, specify them separated by a comma with a space. For example, **1**, **10**. a. If you leave the field blank, the tracks of all available classes from the neural network are displayed (**Neural network file**). b. If you specify a class/classes from the neural network, the tracks of the specified class/classes are displayed (**Neural network file**). c. If you specify a class/classes from the neural network and a class/classes missing from the neural network, the tracks of a class/classes from the neural network are displayed (**Neural network file**). d. If you specify a class/classes missing from the neural network, the tracks aren't displayed (**Neural network file**)
Type	**Neural classifier**	Name of the detector type (non-editable field)
Advanced settings		
Neural network file		Specify the path to the neural network file **Attention!** • To train your neural network, contact AxxonSoft (see Data collection requirements for neural network training(see page 341)). • A trained neural network for a particular scene allows you to detect only objects of a certain type (for example, a person, a cyclist, a motorcyclist, and so on). • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One.* • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights.
Number of measurements in a row to trigger detection	**5**	Specify the minimum number of frames on which the detector must detect an object to generate an event. The value must be in the range [5, 20]
Scanning mode	**Yes**	The parameter is disabled by default. To detect objects without changing the frame size, select the **Yes** value. To work in the scanning mode, the neural network must support the scanning mode
	No	
Basic settings		

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="14">Mode</td><td>CPU</td><td rowspan="14">Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).

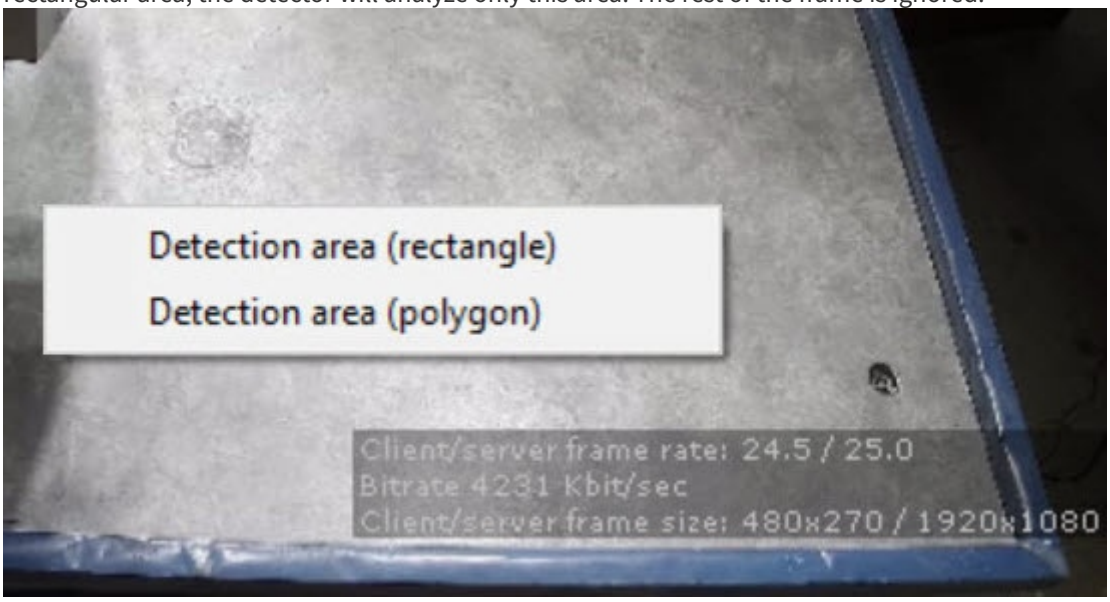
Attention!
• It can take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
• If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
• Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
• Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Huawei NPU</td></tr>
<tr><td>Sensitivity</td><td>33</td><td>Specify the sensitivity of the detector empirically. The value must be in the range [1, 99]. The preview window displays the sensitivity scale of the detector that relates to the sensitivity parameter. If the scale is green, the object isn't detected. If the scale is yellow, an object is detected, but not enough to generate an event. If the scale is red, an object is detected, and the detector will generate an event if the scale is red through the sampling period (50 seconds by default).

Note
The sensitivity parameter value of 40 means that the detector will generate an event when the scale has at least four divisions full over the entire detection period. An event will end when the scale has less than two divisions full over the detection period. The detector will generate an event again if the scale has at least four divisions full over the entire detection period.</td></tr>
</table>

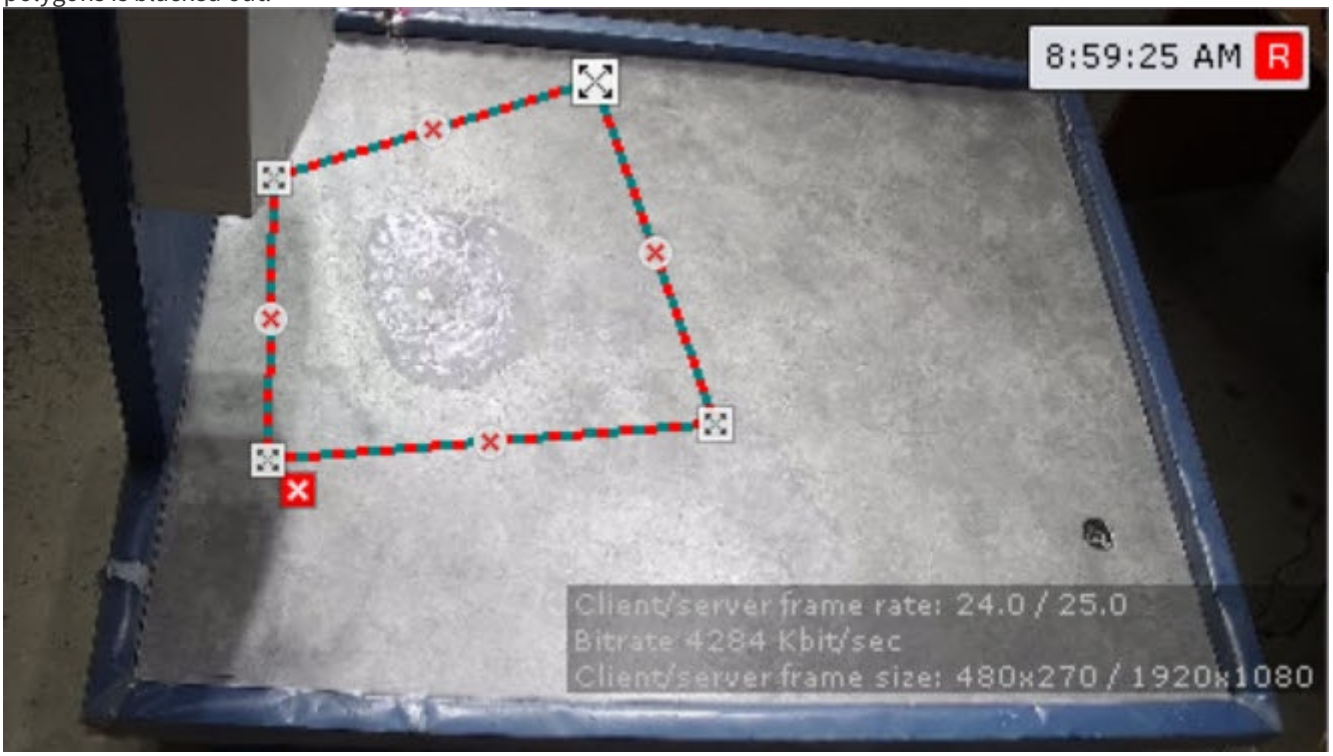
By default, the entire frame is a detection area. In the preview window, you can specify the detection areas using the anchor points  (see Configuring a detection area(see page 351)):

1. Right-click in the preview window.

2. If you want to specify the detection area by one or more rectangles, select **Detection area (rectangle)**. If you specify a rectangular area, the detector will analyze only this area. The rest of the frame is ignored.



3. If you want to specify the detection area by one or more polygons, select **Detection area (polygon)**. If you specify one or several polygonal areas, the detector will analyze the entire frame. The part of the frame not included in the specified polygons is blacked out.

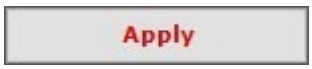
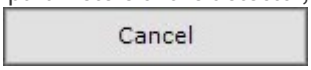


Attention!

You must select the detection area (polygon or rectangle) experimentally. For some neural networks, the quality of detection will be better with a rectangle, for others—with a polygon.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide the detection area, click the  button. To cancel the action, click this button again.
- To delete the selected area, click the  button.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuring the **Neural classifier** is complete.

19.4.32.3 Fire detector

19.4.32.3.1 Functions of the Fire detector

Description	Unlike standard fire detection systems, the **Fire detector** faces many issues with the scene and the background in the video image. We cannot guarantee that fire will be detected in all cases. The **Fire detector** is meant to increase the likelihood of detecting fire. However, there can be both false alarms and failures to detect actual fire in the camera FOV. The **Fire detector** is based on neural network[298], the basic principle of which is learnability. **Attention!** If the **Fire detector** doesn't respond to actual fire in the camera FOV, please record a video and send it to AxxonSoft[299]. We will update *Axxon One* to refine the detector (neural network training) based on the video data, and in the next versions of the product the detection operation in similar conditions will be optimal.
Add-ons	For the **Fire detector** to work, you must install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.32.3.2 Video stream and scene requirements for the Fire detector

Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Fire detector** are given in the table:

Camera	• We recommend using color cameras. With black and white cameras, the detection quality can be noticeably worse • Resolution must be at least 640x360 • FPS directly affects detection efficiency. In most cases, the default value (1 detection per 10 seconds) is sufficient to detect fires that last more than one minute **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.

298 https://en.wikipedia.org/wiki/Neural_network_(machine_learning)
299 https://support.axxonsoft.com/

Scene and angle	• The minimum fire area in the frame depends on the neural network that you use. For a standard neural network (see Configuring the Fire detector(see page 707)), the fire area must occupy at least 10% of the frame **Note** In some cases, when fire is clearly visible, the width/height of the fire area can be sufficient at 1-3% of the frame width/height. • Fire must be visually separated from the background

Attention!

If you set a rectangular recognition area for the detector, the requirements apply to this area rather than to the entire frame (see Configuring the Fire detector(see page 707)).

19.4.32.3.3 Configuring the Fire detector

Video stream and scene requirements for the Fire detector(see page 706)
Hardware requirements for neural analytics operation(see page 339)
Optimizing the operation of neural analytics on GPU in Windows OS(see page 342)
Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)

To configure the **Fire detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Production Safety** → **Fire detector**.

By default, the detector is enabled and set to detect fire.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the sensitivity scale of the detector is recorded to the archive (see Displaying information from a detector (mask)(see page 1152)). To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Fire detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	

Parameter	Value	Description
	GPU	
	HuaweiNPU	
Number of frames processed per second	**0.1**	Specify the number of frames that the detector will process per second. The value must be in the range [0.016, 100]
Type	**Fire detector**	Name of the detector type (non-editable field)
Advanced settings		
Neural network file		Select a neural network file. The standard neural networks for different processor types are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select the standard neural networks in this field, the system will automatically select the required one. If you use a custom neural network, enter a path to the file. **Attention!** • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One.* • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).
Ignore black and white image	**Yes**	The parameter is disabled by default. If you don't want the detector to generate an event when the image is black and white, select the **Yes** value
	No	
Number of measurements in a row to trigger detection	**5**	Specify the minimum number of frames in which the detector must detect fire to generate an event. The value must be in the range [5, 20]
Scanning mode	**Yes**	The parameter is disabled by default. You can use the scanning mode to detect small objects or objects in areas far away from the camera (see Configuring the scanning mode(see page 353)). For this, select the **Yes** value. This mode doesn't provide absolute detection accuracy but can improve detection performance
	No	
Basic settings		

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="12">Mode</td><td>CPU</td><td rowspan="12">Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).

Attention!
It may take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Huawei NPU</td></tr>
<tr><td>Sensitivity</td><td>33</td><td>Specify the sensitivity of the detector empirically. The value must be in the range [1, 99]. The default value is 33. The preview window displays the sensitivity scale of the detector that relates to the sensitivity parameter. If the scale is green, fire isn't detected. If the scale is yellow, fire is detected, but not enough to generate an event. If the scale is red, fire is detected, and the detector generates an event if the scale is red through the sampling period (50 seconds by default).

Note
The sensitivity parameter value of 40 means that the detector will generate an event when the scale has at least four divisions full over the entire detection period. An event will end when the scale has less than two divisions full over the detection period. The detector will generate an event again if the scale has at least four divisions full over the entire detection period.</td></tr>
</table>

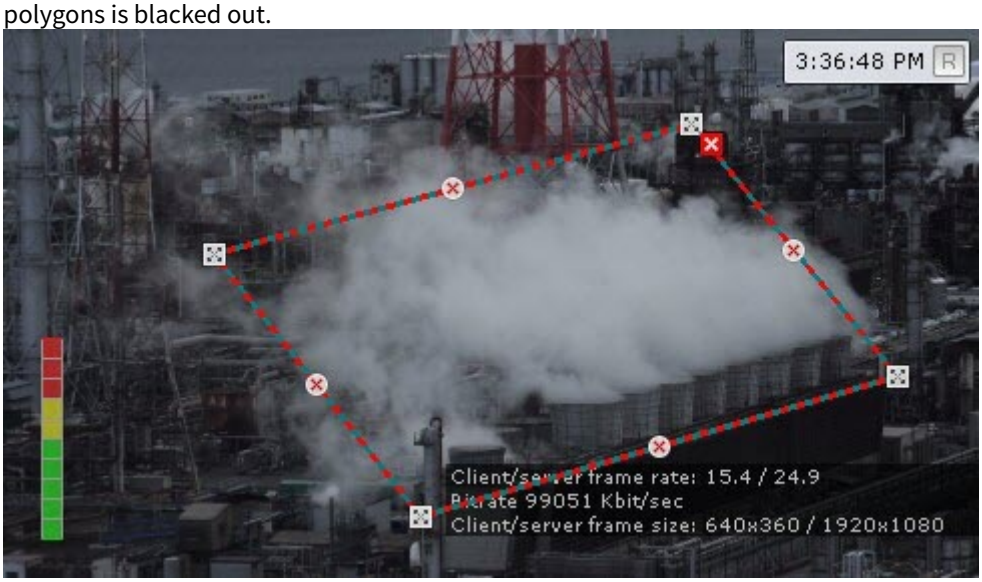
By default, the entire frame is the detection area. In the preview window, you can specify the detection areas using the anchor points  (see Configuring a detection area(see page 351)):

1. Right-click in the preview window.

2. If you want to specify the detection area by one or more rectangles, select **Detection area (rectangle)**. If you specify a rectangular area, the detector will analyze only this area. The rest of the frame is ignored.

   Detection area (polygon)
   Detection area (rectangle)

3. If you want to specify the detection area by one or more polygons, select **Detection area (polygon)**. If you specify one or several polygonal areas, the detector will analyze the entire frame. The part of the frame not included in the specified polygons is blacked out.



Attention!

You must select the detection area (polygon or rectangle) experimentally. For some neural networks, the quality of detection will be better with a rectangle, for others—with a polygon.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide the detection area, click the  button. To cancel the action, click this button again.
- To delete the selected area, click the  button.

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

Configuring the **Fire detector** is complete.

19.4.32.4 Equipment detector

19.4.32.4.1 Functions of the Equipment detector

Description	**Equipment detector** allows you to detect people who enter or stay in the protected area without the necessary equipment and personal protective equipment (PPE), and also people who wear improperly applied PPE. **Attention!** We recommend using the detection tool in "gateway" conditions: at the entrance to the area where the equipment or PPE is required, an employee stops for 5–10 seconds, during which the detection tool determines the presence of the necessary equipment (see Configuring the Equipment detector(see page 717)).
Neural networks	For detection tool operation, at least two separate neural networks are used: 1. Segmenting network divides the human body into zones (head, shoulders, arms, hands, body, thighs, legs, and feet). 2. Classification network detects equipment (PPE) on a specified body part, and checks if it's properly applied. **Attention!** To train a classification neural network, you must provide a list of equipment (see Example of providing a list of valid equipment at the facility for the Equipment detector(see page 714)).
Add-ons	For the **Equipment detector** to work, you must install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.32.4.2 Video stream and scene requirements for the Equipment detector and its sub-detectors

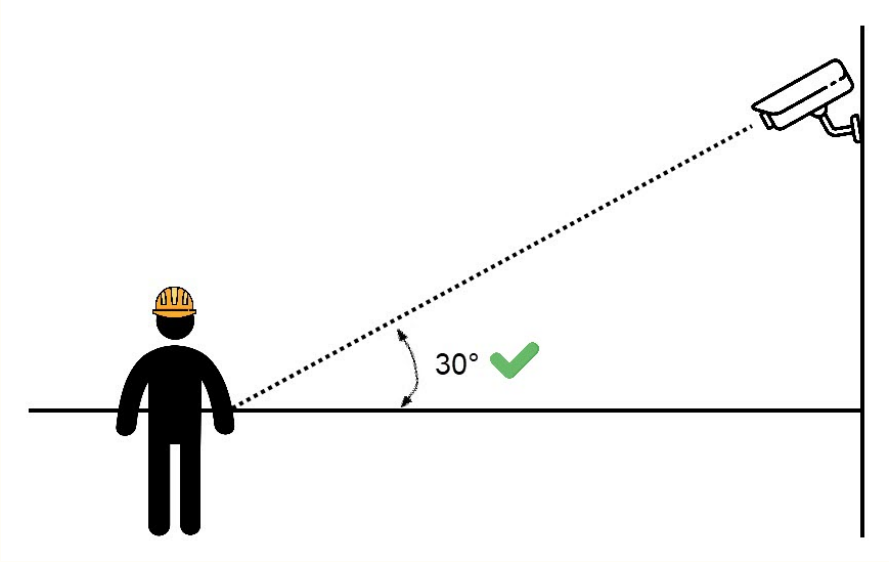
Image requirements for the Equipment detector and its sub-detectors(see page 713)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Equipment detector** are given in the table:

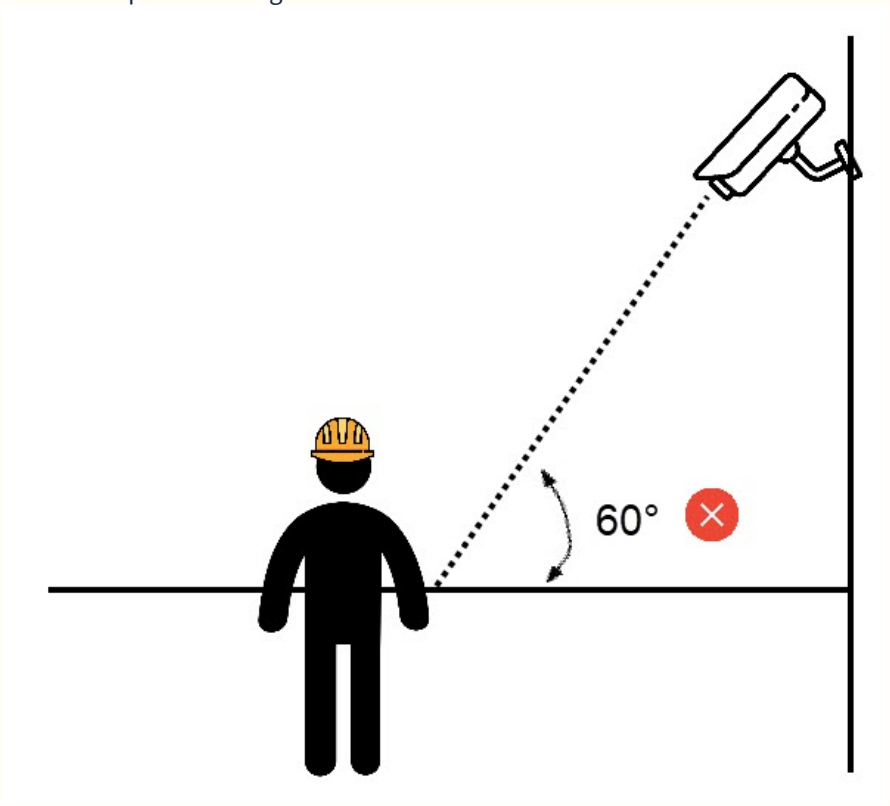
Camera	• Resolution must be at least 640x360. We also don't recommend using a resolution higher than 1920×1080, since higher resolution doesn't increase the detection quality, but significantly increases the consumption of resources. The optimal resolution for solving typical tasks is 1280x720 • The frame rate per second in the video stream from the camera is at least 3 for solving typical tasks • Detection-based analytics works with color images only

Attention!

- Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
- Correct operation of the detector isn't guaranteed if you use a fisheye lens.
- The camera tilt angle from top to bottom on a person wearing equipment must not exceed 30°. Otherwise, the detector won't operate correctly.
  The following diagrams show the examples of:
  - The acceptable tilt angle:



- The unacceptable tilt angle:



Lighting	• Lighting in the scene is at least 200 lux. The detector is applicable in conditions of artificial light. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • There are no products made of rods in the detection area • Moving objects are minimally obscured by static objects in the scene (columns, industrial products, and so on) • The analyzed scene doesn't have reflective surfaces. If present, they must be masked • Camera shake doesn't result in image offsets greater than 1% of the frame size

19.4.32.4.3 Image requirements for the Equipment detector and its sub-detectors

Video stream and scene requirements for the Equipment detector and its sub-detectors(see page 711)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Equipment detector** are given in the table:

Object images

- The detected object (equipment or PPE) must be clearly distinguishable by the human eye
- The image isn't noisy and not distorted by the artifacts of compression algorithm
- The width or height of the equipment doesn't exceed 75% of the frame size
- The duration of the object's visibility is at least 3–8 frames. The minimum number of frames depends on the task
- There are no visible physical barriers between the camera lens and the analyzed object
- The minimum sizes of equipment on body parts in pixels are observed. Example of equipment dimensions for a resolution of 1920x1080:
  - Upper body (torso) 75*100
  - Legs 75*105
  - Head 60*65
  - Hands 65*60
  - Feet 45*40
  - Set of equipment 165*295
- The minimum value of pixel density per meter is observed:

Image resolution	Object type	Minimum pixel density per meter (ratio of the object width in pixels to the object width in meters)	Minimum object size in pixels, width x height
1920x1080	Human	170	~102x309
1280x720	Human	128	~77x233
640x360	Human	80	~48x145

19.4.32.4.4 Example of providing a list of valid equipment at the facility for the Equipment detector

Data collection requirements for neural network training(see page 341)

For the correct detection, it is important to understand exactly what elements of equipment are used at the facility.

You must provide a complete list of equipment regardless of the current season of the year. This will help to reduce the number of false events from the **Equipment detector** and get the most positive experience from using this analytics.

Below are examples of lists:

Gloves #1





Gloves #2





Gloves #3





Gloves #4






Helmet #1:
Helmet #2:
Helmet #3:
Helmet #4:
Helmet #5 (#4 screen:)
Helmet #6 (#4 earmuffs):
UpperBody+Shoes
Helmets
Gloves



19.4.32.4.5 Configuring the Equipment detector

On the page:

- Configuring the detector(see page 718)
- Examples of configuring the Equipment detector for

solving typical tasks(see page 724)

Video stream and scene requirements for the Equipment detector and its sub-detectors(see page 711)
Image requirements for the Equipment detector and its sub-detectors(see page 713)
Hardware requirements for neural analytics operation(see page 339)

19.4.32.4.5.1 Configuring the detector

To configure the **Equipment detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Production Safety** → **Equipment detector**.

By default, the detector is enabled and set to detect people who enter or stay in the protected area without the necessary equipment and personal protective equipment (PPE).

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, mask is recorded to the archive (human body segmentation) (see Displaying information from a detector (mask)(see page 1152)). To disable the parameter, select the **No** value
	No	
Record objects tracking	**Yes**	The metadata is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	The detector is enabled by default. To disable, select the **No** value
	No	
Name	**Equipment detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td>Number of frames processed per second</td><td>1</td><td>Specify the number of frames that the detector will process per second. The value must be in the range [0.016, 100].

Attention!
To operate the detector in a "gateway" (see Examples of configuring the detector for solving typical tasks), we recommend using the standard settings of the detector: 1 FPS and 3 FPS for output.
In conditions of dynamically moving people, we recommend setting the delay to at least 4 FPS, and the number of frames for output to at least 6 FPS.</td></tr>
<tr><td>Type</td><td>Equipment detector</td><td>Name of the detector type (non-editable field)</td></tr>
<tr><td colspan="3">Advanced settings</td></tr>
<tr><td>Classification network 1 file</td><td></td><td rowspan="5">By default, the following neural networks are initialized: Classification neural network (equipment and PPE on the head) and Classification neural network (equipment and PPE on the body) according to the selected processing device in the Neural network mode parameter. To initialize only one item of equipment, select the required classification neural network file.
Each classification neural network recognizes equipment on the specific body segment. The standard classification neural networks for different processor types are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select the standard neural networks in this field, the system will automatically select the required one. If you use a custom neural network, specify the path to the file.

Attention!
• You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install Axxon One.
• For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights.
• If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).</td></tr>
<tr><td>Classification network 2 file</td><td></td></tr>
<tr><td>Classification network 3 file</td><td></td></tr>
<tr><td>Classification network 4 file</td><td></td></tr>
<tr><td>Classification network 5 file</td><td></td></tr>
<tr><td rowspan="2">Mask</td><td>Yes</td><td rowspan="2">The parameter is disabled by default. If you want to display the human body segmentation in the preview window, select the Yes value</td></tr>
<tr><td>No</td></tr>
</table>

Parameter	Value	Description
Number of measurements in a row to trigger detection	**3**	Specify the minimum number of frames on which the detector must detect a violation to generate an event. The value must be in the range [1, 20]. **Attention!** To operate the detection in a "gateway", we recommend using the standard settings of the detector: **1** FPS and **3** FPS for output. In conditions of dynamically moving people, we recommend setting the delay to at least **4** FPS, and the number of frames for output to at least **6** FPS.
One event per PPE element	**Yes** **No**	By default, the detector's event is generated once for each element of equipment within a track of a person. If you want the detector to generate an event for each equipment violation, select the **No** value. **Example** An individual not wearing a helmet appears in the frame, puts on a helmet, then puts it off. If the **One event per PPE element** parameter is enabled, you will have one alarm event, otherwise—two.
Segmenting network file		By default, the Segmenting neural network is initialized according to the selected processing device in the **Neural network mode** parameter. The standard segmenting neural networks for different processor types are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select the standard neural networks in this field, the system will automatically select the required one. If you use a custom neural network, specify the path to the file. **Attention!** • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).
Track lifespan (starting with *Detector Pack* 3.14)	**Yes** **No**	By default, the parameter is disabled. If you want to display the track lifespan for an object in seconds, select the **Yes** value

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td colspan="3">Basic settings</td></tr>
<tr><td>Min person height</td><td>0.01</td><td rowspan="2">Specify the minimum height and width of a person in the frame as a percentage of the frame height/width (0.15 = 15%). Objects that are smaller than the specified size aren't detected. The value must be in the range [0, 1]</td></tr>
<tr><td>Min person width</td><td>0.01</td></tr>
<tr><td>Neural network mode</td><td>CPU
Nvidia GPU 0
Nvidia GPU 1
Nvidia GPU 2
Nvidia GPU 3
Intel GPU
Intel NCS (not supported)
Intel HDDL (not supported)
Intel Multi-GPU
Intel GPU 0
Intel GPU 1
Intel GPU 2
Intel GPU 3
Huawei NPU</td><td>Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).
Attention!
• It may take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
• If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
• Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
• Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td colspan="3">Invert Results</td></tr>
<tr><td>Invert results of default network</td><td>No
OnlyHelmet
OnlySafetyVest
AllNet</td><td>The parameter is disabled by default. To receive events about the detection of equipment that are initialized in the Classification network file parameter by default (Classification neural network (equipment and PPE on the head) and Classification neural network (equipment and PPE on the body)), select the required value from the list</td></tr>
</table>

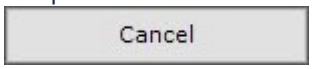
Parameter	Value	Description
Invert results of network 0	**Yes**	The parameter is disabled by default. To receive events about the detection of equipment specified in the **Classification network file** parameters, set the **Yes** value in the corresponding **Invert results of network** parameters
	No	
Invert results of network 1	**Yes**	
	No	
Invert results of network 2	**Yes**	
	No	
Invert results of network 3	**Yes**	
	No	
Invert results of network 4	**Yes**	
	No	

By default, the entire frame is the detection area. In the preview window, you can specify the detection areas using the anchor points  (see Configuring a detection area(see page 351)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide detection area, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the **Equipment detector** is complete. If necessary, you can create and configure the required sub-detectors on the basis of the Equipment detector (see Standard sub-detectors(see page 359)).

The **Equipment detector** generates an event when a person is in the frame without the necessary equipment and personal protective equipment on the specified parts of the body or when equipment and personal protective equipment is improperly applied.



The **Equipment detector** recognizes equipment of the following colors:

1. Helmets:
    a. Yellow.
    b. White.
    c. Blue.
    d. Green.
    e. Orange.
    f. Black.
    g. Red.



2. Vests:
    a. Yellow.

b. Orange.



Attention!

To ensure the correct reception of the Email notifications (see Email notification(see page 876)) after the detector's event is generated, you must configure a separate macro with an Email message for each item of equipment.

19.4.32.4.5.2 Examples of configuring the Equipment detector for solving typical tasks

Typical tasks for detecting equipment and personal protective equipment:

1. Detection in gateway conditions. A gateway is a border, which can either be a virtual line or a door, a barrier, a turnstile. The algorithm for working in gateway conditions is the following:
   a. A person stops in front of an area where equipment or PPE is required.
   b. A person poses in a way that it is possible to check the presence of all elements of equipment (the element must not be overlapped by the person, other elements of equipment, or items of clothing).
   c. Screening of a person. There must be no obstacles between the person and the camera, blocking the person for screening.
2. Detection in a production conditions: persons move freely in the detection area.

Note

By default, the **Equipment detector** is configured for detection in gateway conditions.

The recommended settings for solving typical tasks are as follows:

Parameters	Equipment detection in gateway conditions	Equipment detection in production conditions
Other		
Number of frames processed per second	**1**	**7**
Basic settings		
Min person height	**0.01**	**0.09**
Min person width	**0.01**	**0.03**
Advanced		

Parameters	Equipment detection in gateway conditions	Equipment detection in production conditions
Number of measurements in a row to trigger detection	**3**	**7**
Mask	**No**	**No**
One event per PPE element	**Yes**	**Yes**

19.4.32.5 Smoke detector

19.4.32.5.1 Functions of the Smoke detector

Description	Unlike standard smoke detection systems, the **Smoke detector** faces many issues with the scene and the background in the video image. We cannot guarantee that smoke will be detected in all cases. The **Smoke detector** is meant to increase the likelihood of detecting smoke. However, there can be both false alarms and failures to detect actual smoke in the camera FOV. The **Smoke detector** is based on neural network[300], the basic principle of which is learnability. **Attention!** If the **Smoke detector** doesn't respond to actual fire in the camera FOV, please record a video and send it to AxxonSoft[301]. We will update *Axxon One* to refine the detector (neural network training) based on the video data, and in the next versions of the product the detection operation in similar conditions will be optimal.
Add-ons	For the **Smoke detector** to work, you must install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.32.5.2 Video stream and scene requirements for the Smoke detector

Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Smoke detector** are given in the table:

Camera	• We recommend using color cameras. With black and white cameras, the detection quality can be noticeably worse • Resolution must be at least 640x360 • FPS directly affects detection efficiency. In most cases, the default value (1 detection per 10 seconds) is sufficient to detect smoke that lasts more than one minute **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.

300 https://en.wikipedia.org/wiki/Neural_network_(machine_learning)
301 https://support.axxonsoft.com/

Scene and camera angle	• The minimum smoke area in the frame depends on the neural network that you use. For a standard neural network (see Configuring the Smoke detector(see page 726)), the smoke area must occupy at least 10% of the frame **Note** In some cases, when smoke is clearly visible, the width/height of the smoke area can be sufficient at 1-3% of the frame width/height. • Smoke must be visually separated from the background

Attention!

If you set a rectangular recognition area for the detector, the requirements apply to this area rather than to the entire frame (see Configuring the Smoke detector(see page 726)).

19.4.32.5.3 Configuring the Smoke detector

Video stream and scene requirements for the Smoke detector(see page 725)
Hardware requirements for neural analytics operation(see page 339)
Optimizing the operation of neural analytics on GPU in Windows OS(see page 342)
Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)

To configure the **Smoke detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Production Safety** → **Smoke detector**.

By default, the detector is enabled and set to detect smoke.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the sensitivity scale of the detector is recorded to the archive (see Displaying information from a detector (mask)(see page 1152)). To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Smoke detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	

Parameter	Value	Description
	GPU	
	HuaweiNPU	
Number of frames processed per second	**0.1**	Specify the number of frames that the detector will process per second. The value must be in the range [0.016, 100]
Type	**Smoke detector**	Name of the detector type (non-editable field)
Advanced settings		
Neural network file		Select a neural network file. The standard neural networks for different processor types are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select the standard neural networks in this field, the system will automatically select the required one. If you use a custom neural network, enter a path to the file **Attention!** • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One.* • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).
Ignore black and white image	**Yes**	The parameter is disabled by default. If you don't want the detector to generate an event when the image is black and white, select the **Yes** value
	No	
Number of measurements in a row to trigger detection	**5**	Specify the minimum number of frames in which the detector must detect fire to generate an event. The value must be in the range [5, 20]
Scanning mode	**Yes**	The parameter is enabled by default. You can use the scanning mode to detect small objects or objects in areas far away from the camera (see Configuring the scanning mode(see page 353)). For this, select the **Yes** value. This mode doesn't provide absolute detection accuracy but can improve detection performance
	No	
Basic settings		

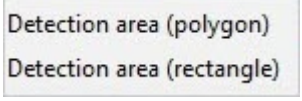
<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="13">Mode</td><td>CPU</td><td rowspan="13">Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).

Attention!
• It may take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
• If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
• Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
• Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>ntel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Huawei NPU</td></tr>
<tr><td>Sensitivity</td><td>33</td><td>Specify the sensitivity of the detector empirically. The value must be in the range [1, 99]. The default value is 33. The preview window displays the sensitivity scale of the detector that relates to the sensitivity parameter. If the scale is green, fire isn't detected. If the scale is yellow, fire is detected, but not enough to generate an event. If the scale is red, fire is detected, and the detector generates an event if the scale is red through the sampling period (50 seconds by default).

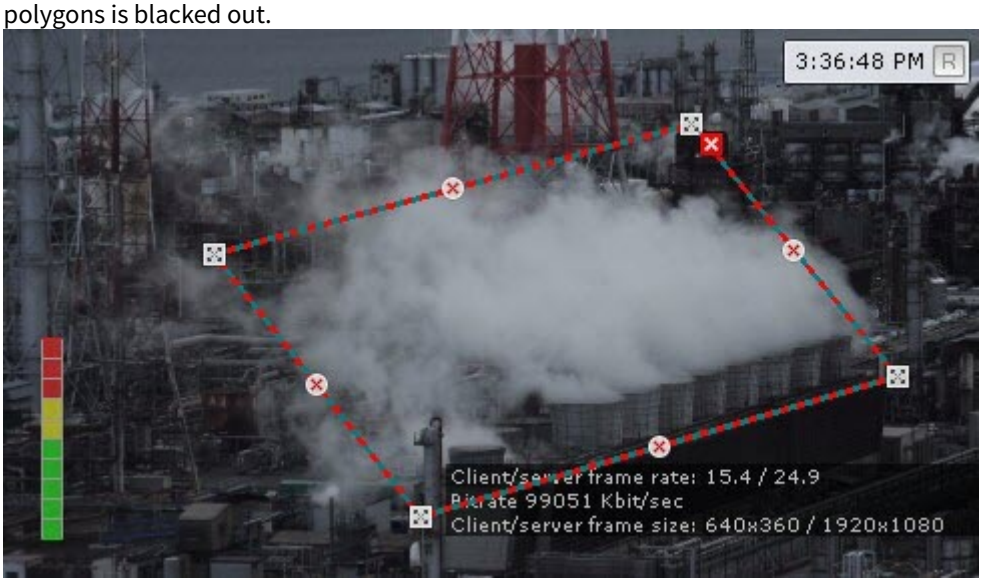
Note
The sensitivity parameter value of 40 means that the detector will generate an event when the scale has at least four divisions full over the entire detection period. An event will end when the scale has less than two divisions full over the detection period. The detector will generate an event again if the scale has at least four divisions full over the entire detection period.</td></tr>
</table>

By default, the entire frame is the detection area. In the preview window, you can specify the detection areas using the anchor points  (see Configuring a detection area(see page 351)):

1. Right-click in the preview window.
2. If you want to specify the detection area by one or more rectangles, select **Detection area (rectangle)**. If you specify a rectangular area, the detector will analyze only this area. The rest of the frame is ignored.



3. If you want to specify the detection area by one or more polygons, select **Detection area (polygon)**. If you specify one or several polygonal areas, the detector will analyze the entire frame. The part of the frame not included in the specified polygons is blacked out.

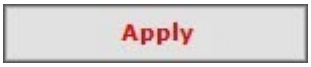
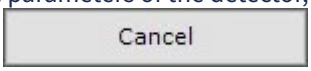


Attention!

You must select the detection area (polygon or rectangle) experimentally. For some neural networks, the quality of detection will be better with a rectangle, for others—with a polygon.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide the detection area, click the  button. To cancel the action, click this button again.
- To delete the selected area, click the  button.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuring the **Smoke detector** is complete.

19.4.32.6 Water level detector

19.4.32.6.1 Functions of the Water level detector

Description	**Water level detector** generates events when the water level exceeds the set level in a specified area
Add-ons	For the **Water level detector** to work, you must install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.32.6.2 Video stream requirements for the Water level detector

Image requirements for the Water level detector(see page 730)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Water level detector** are given in the table:

Camera	• You must use only color cameras • Resolution must be at least 640x360 • Camera shake must not result in image offsets greater than 1% of the frame size **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Lighting	• The measuring scale and its divisions for determining the water level must be clearly visible in the scene. In conditions of insufficient or excessive lighting (night or light-striking), we don't guarantee the stable operation of the analytics

19.4.32.6.3 Image requirements for the Water level detector

Video stream requirements for the Water level detector(see page 730)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Water level detector** are given in the table:

Video image	• No glare or shadows on the measuring scale

19.4.32.6.4 Configuring the Water level detector

Video stream requirements for the Water level detector(see page 730)
Image requirements for the Water level detector(see page 730)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Water level detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Production Safety** → **Water level detector**.

By default, the detector is enabled and set to detect the water level in the frame.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

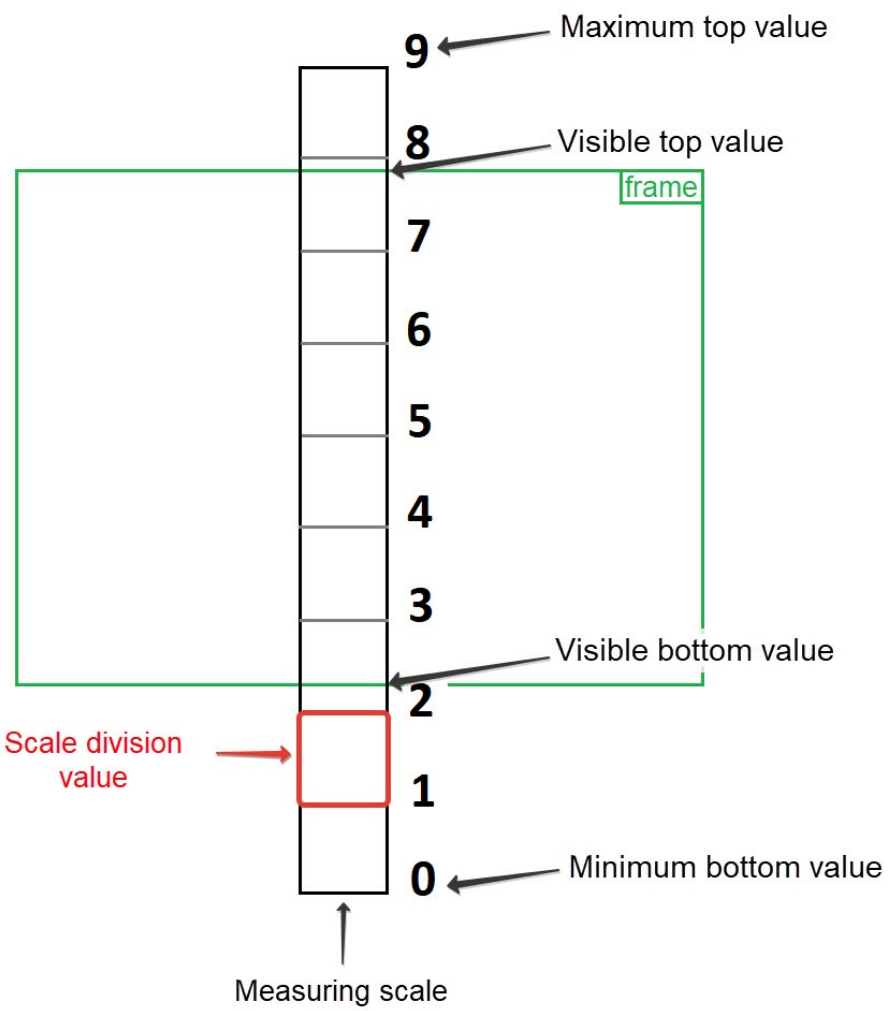
Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, recording of the water level indicator to the archive is enabled. To disable it, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Water level detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**10**	Specify the number of frames that the detector processes per second. The value must be in the range [0.016, 100] **Attention!** The **Number of frames processed per second** parameter determines the rate of transmitting the frames from the decoder to the detector and affects the water level update rate—the update occurs once per every 23 processed frames. As a result, at low parameter values, there can be a delay between the actual change of the water level value on the image and the generation of the corresponding event.
Type	**Water level detector**	Name of the detector type (non-editable field)
Advanced settings		
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (**1920** pixels on the longer side by default). The following algorithm is used: 1. If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. 2. If the resulting resolution falls below the specified value, the algorithm stops and this resolution is used further. 3. If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution is halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.

Parameter	Value	Description
Neural network file		Select a neural network file. The standard neural networks for different processor types are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select the standard neural networks in this field, the system automatically selects the required one. If you use a custom neural network, enter a path to the file. **Attention!** • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).
Basic settings		
Maximum top value	**20**	Specify the maximum top value of the measuring scale. The value must be in the range [-1000, 1000]
Minimum bottom value	**0**	Specify the minimum bottom value of the measuring scale. The value must be in the range [-1000, 1000]
Neural network	**Yes** **No**	If the water in the frame is transparent and the detector cannot correctly identify its level, use **Neural network**: 1. If you select the **No** value, the detector works on the basis of the algorithm without using the neural network on the CPU, ignoring the value specified in the **Neural network file** field. 2. If you select the **Yes** value: a. If you don't select the value in the **Neural network file** field, the system automatically selects the required standard neural network for the device specified in the **Neural network mode** field. b. If you select a custom neural network in the **Neural network file** field that corresponds to the device specified in the **Neural network mode** field and is a water-level neural network, a detector with a neural network algorithm based on this neural network is created. **Attention!** If you specify the neural network file incorrectly, the detector doesn't work. The neural network algorithm recreates itself every 60 seconds.

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="12">Neural network mode</td><td>CPU</td><td rowspan="12">Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).

Attention!
It can take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
</table>

Parameter	Value	Description
Scale division value	**1**	Specify the scale division value—the difference between the nearest divisions on the scale with numerical markings. The value must be in the range [0.001, 1000] 
Visible bottom value	**0**	Specify the visible bottom value under normal conditions on the measuring scale. The value must be in the range [-1000, 1000]
Visible top value	**1**	Specify the visible top value under normal conditions on the measuring scale. The value must be in the range [-1000, 1000]

In the preview window, by moving the anchor points :

1. Set the measuring scale in the frame.



2. Specify an upper line, exceeding which the detector generates an event.
3. Specify the lower line, exceeding which the detector gives a warning, using the orange color of the sensor in the **Surveillance window**.

Attention!

- When you specify the measuring scale, its top and bottom borders must match the values specified in the **Visible bottom value** and **Visible top value** parameters.
- The top and bottom borders **mustn't** be parallel to the lines of the measuring scale that determines its height. Otherwise, the detector doesn't work properly.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide the detection area, click the  button. To cancel the action, click this button again.
- The water level indicator appears in the lower left corner. If the indicator is green, the water level is below high and critical marks. If the indicator is orange, the water level exceeds the high mark but is below the critical mark. If the indicator is red, it means that the water level is above the critical mark.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the **Water level detector** is complete.

After you create the detector, you can see a sensor on the layout in the **Surveillance window** along with the indicator.

If the sensor icon is green  , the water level is lower than both critical and high marks. If the icon is orange  , the water level is above the high mark but below the critical mark. A red icon  means that the water level is above the critical mark.

If necessary, you can add a numerical value of the water level to the **Surveillance window** (see Configuring display of water level sensor(see page 959)).

19.4.32.7 Glow detector

19.4.32.7.1 Functions of the Glow detector

Description	**Glow detector** is used to track light sources (lamps) in the surveillance area

19.4.32.7.2 Video stream and scene requirements for the Glow detector

Image requirements for the Glow detector(see page 736)
Hardware requirements for neural analytics operation(see page 339)

Video stream and scene requirements for the **Glow detector** are given in the table:

Camera	• Resolution is at least 320x240 pixels • FPS is at least 6 • No camera shake
Scene and angle	• Camera is directed toward the plane in which the light sources are located (ideally, the optical axis of the camera is strictly perpendicular to this plane)

19.4.32.7.3 Image requirements for the Glow detector

Video stream and scene requirements for the Glow detector(see page 736)
Hardware requirements for neural analytics operation(see page 339)

Image requirements for the **Glow detector** are given in the table:

Object images	• Light sources in the video are visually distinguishable

19.4.32.7.4 Configuring the Glow detector

Video stream and scene requirements for the Glow detector(see page 736)
Image requirements for the Glow detector(see page 736)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Glow detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Production Safety** → **Glow detector**.

By default, the detector is enabled and set to track light sources (lamps).

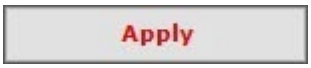
If necessary, you can change the detector parameters. The list of parameters is given in the table:

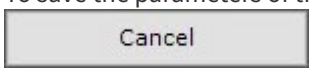
Parameter	Value	Description
Object features		
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the Server
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Glow detector**	Enter the detector name or leave the default name
Brightness threshold	**240**	Specify the sensitivity of the detector to changes in the state of the light source. You must select the required value empirically. For a dim light source, we recommend increasing the value of the parameter. The value must be in the range [0, 255]
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**20**	Specify the number of frames that the detector will process per second. The value must be in the range [0.016, 100]
Sensitivity	**99**	Specify the sensitivity of the detector as a percentage. You must select the required value empirically. The higher the sensitivity, the greater the probability of a false event. The lower the sensitivity, the greater the probability of missing an event. The value must be in the range [0, 100]
Time delta between frames	**100**	Specify the time interval between two measurements of light indication in milliseconds. The value must be in the range [0, 10000]
Type	**Glow detector**	Name of the detector type (non-editable field)

To ensure that you receive accurate events from the detector, in the preview window you can specify one or more detection areas using the anchor points  (see Configuring a detection area(see page 351)). Detection areas must be located on each light source (lamp) and their dimensions must match the dimensions of the light sources.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Glow detector** is complete.

19.4.32.8 Equipment detector VL

19.4.32.8.1 Functions of the Equipment detector VL

Description	The **Equipment detector VL** allows you to detect in the frame people who enter or stay in the protected area without the necessary equipment and personal protective equipment (PPE), and also people who wear improperly applied PPE. **Attention!** We recommend using the detector in "gateway" conditions: at the entrance to the area where the equipment or PPE is required, an employee stops for 5–10 seconds, during which the detector determines the presence of the necessary equipment. The **Equipment detector VL** uses an embedded neural network that detects the following types of equipment and PPE: • Helmet, • Hood, • Vest
Licensing	To operate the detector, contact an AxxonSoft manager and get a license file (see Types of licenses[302])
Add-ons	For the **Equipment detector VL** to work, you must install VL PPE add-on and SDK Pack (see Installing DetectorPack add-ons(see page 321))

19.4.32.8.2 Video stream and scene requirements for the Equipment detector VL and its sub-detectors

Image requirements for the Equipment detector VL and its sub-detectors(see page 739)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Equipment detector VL** and its sub-detectors are given in the table:

Camera	• Resolution must be at least 640x360. We also don't recommend using a resolution higher than 1920×1080, since higher resolution doesn't increase the detection quality, but significantly increases the consumption of resources. The optimal resolution for solving typical tasks is 1920x1080 • The frame rate per second in the video stream from the camera is at least 13 for solving typical tasks • Detection-based analytics works with color images only **Attention!** Correct operation of the detector isn't guaranteed when you use a fisheye lens.
Lighting	• Lighting in the scene is at least 200 lux. The detector is applicable in conditions of artificial light. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting

302 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • There are no products made of rods in the detection area • Moving objects are minimally obscured by static objects in the scene (columns, industrial products, and so on) • Avoid large obstructions in the camera FOV (columns, tower cranes, stacked materials, and so on). They will obscure the detected objects and cause track breaks. If obstructions cannot be avoided, we recommend not placing them in the center of the frame • The analyzed scene doesn't have reflective surfaces. If present, they must be masked • The analyzed scene doesn't have strong light flashes (spotlights, active welding zones) • Camera shake doesn't result in image offsets greater than 1% of the frame size • Shooting angle without a strong camera tilt • To improve the quality of the video stream, the camera lens must be cleaned of heavy dirt. We don't recommend locating cameras above the material unloading area or near ventilation shafts

19.4.32.8.3 Image requirements for the Equipment detector VL and its sub-detectors

Video stream and scene requirements for the Equipment detector VL and its sub-detectors(see page 738)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Equipment detector VL** and its sub-detectors are given in the table:

Attention!

Correct operation of the detector isn't guaranteed when you use a fisheye lens.

Object images	• The detected object (equipment or PPE) must be clearly distinguishable by the human eye
	• Color image, isn't noisy and isn't distorted by the artifacts of compression algorithm
	• Linear dimensions of equipment or PPE must not exceed 65% of the corresponding frame size
	• The duration of the object's visibility is at least 10–13 frames. The minimum number of frames depends on the task
	• There are no visible physical barriers between the camera lens and the analyzed object
	• Obscuring of a person and/or PPE by an obstruction and/or by another person, and/or cropping by frame boundaries must not exceed 25%
	• The minimum sizes of equipment on body parts in pixels are observed:
	  • Vest—at least 50 pixels
	  • Helmet/Hood—at least 20 pixels
	• PPE must have a standard look and shape, and have the following colors:
	  • Vest: green, yellow, orange
	  • Helmet/Hood: white, yellow, orange, red, blue, green
	• The minimum value of pixel density per meter is observed:

Image resolution	Minimum pixel density per meter (ratio of the object height in pixels to the object height in meters)	Minimum object height in pixels
1920x1080	60	100
1280x720	60	100
640x360	60	100

19.4.32.8.4 Example of providing a list of valid equipment at the facility for the Equipment detector VL

Data collection requirements for neural network training(see page 341)

For the correct detection, it is important to understand exactly what elements of equipment are used at the facility.

You must provide a complete list of equipment regardless of the current season of the year. This will help to reduce the number of false events from the **Equipment detector VL** and get the most positive experience from using this analytics.

Below are examples of lists:

Gloves #1





Gloves #2





Gloves #3





Gloves #4






Helmet #1:
Helmet #2:
Helmet #3:
Helmet #4:
Helmet #5 (#4 screen:)
Helmet #6 (#4 earmuffs):
UpperBody+Shoes
Helmets
Gloves



19.4.32.8.5 Activating the license for the Equipment detector VL in Windows OS

> **Attention!**
>
> Starting with *Detector Pack* 3.11, a demo license has been added to the VL PPE add-on (see Installing DetectorPack add-ons(see page 321)). The demo license is valid for 30 days after installation on one server or a virtual machine.

To activate a license for the **Equipment detector VL** (see Configuring the Equipment detector VL(see page 753)), do the following:

1. Request **EID** and **ProductID** from technical support[303].

303 https://visionlabs.ai/contacts

> **Attention!**
>
> **EID** and **ProductID** are linked with the MAC address of the server. If the MAC address changes, you need to request **EID** and **ProductID** again.

2. Open the following file in a text editor: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\data\license.conf.
3. Enter the received **EID** and **ProductID**.

```
<param name="EID" type="Value::String" text="received EID"/>
<param name="ProductID" type="Value::String" text="received ProductID"/>
```

```
<?xml version="1.0"?>
<settings>
        <section name="Licensing::Settings">
                <param name="Server" type="Value::String" text="https://visionlabsbv.prod.sentinelcloud.com"/>
                <param name="EID" type="Value::String" text="                                        "/>
                <param name="ProductID" type="Value::String" text="                                        "/>
                <param name="Filename" type="Value::String" text="licenseFile.v2c"/>
                <param name="ContainerMode" type="Value::Int1" x="0"/>
        </section>
</settings>
```

4. Save the file: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\data\license.conf.
5. In the command line, run the following file as administrator: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\FingerprintViewer.exe. You will receive the **FingerPrint** data.

```
C:\Program Files\Common Files\    \DetectorPack\VLSdk\gpu>FingerprintViewer.exe
Using license file: ./data/license.conf
To run with default license file path:
        FingerprintViewer.exe
If you want to specify license file:
        FingerprintViewer.exe <path to license.conf>
[04.05.2023 09:28:42] [Debug] [createLicense] creation of the FitLicense license!
[04.05.2023 09:28:42] [Debug] [FitLicense Windows] deviceId =
Fingerprint for the current device:
[redacted]
```

6. Go to the website[304].

> **Attention!**
>
> If you fail to log in to the website, contact the technical support[305].

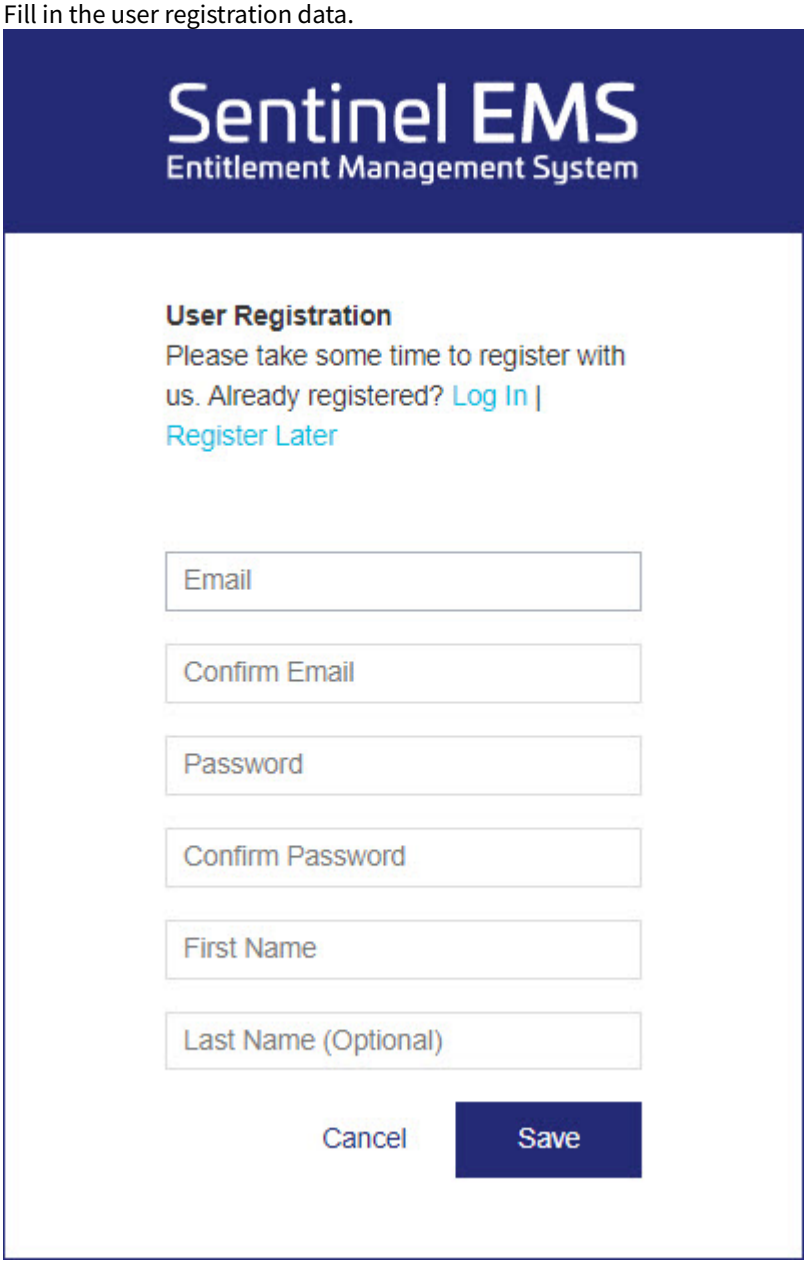
> Guide to the Sentinel EMS Customer Portal[306]

304 https://license.visionlabs.ai/ems/customerLogin.html
305 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3
306 https://docs.sentinel.thalesgroup.com/softwareandservices/ems/EMSdocs/CPUG/CPhome.htm

7. Log in using the received **EID**.

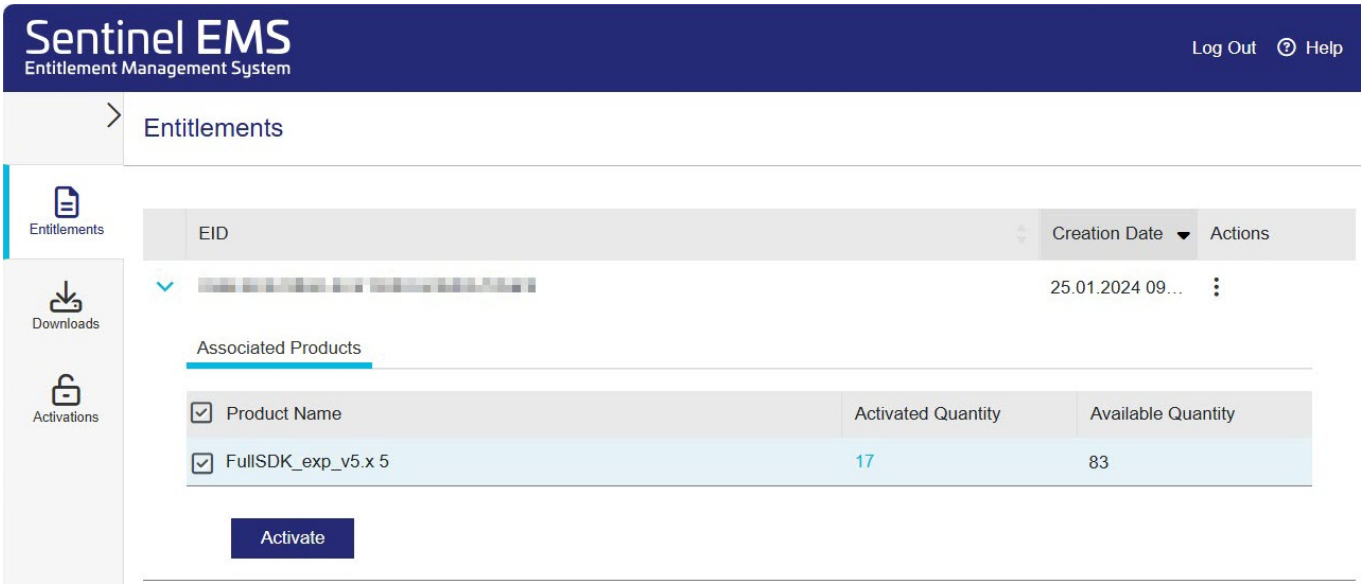


8. Fill in the user registration data.

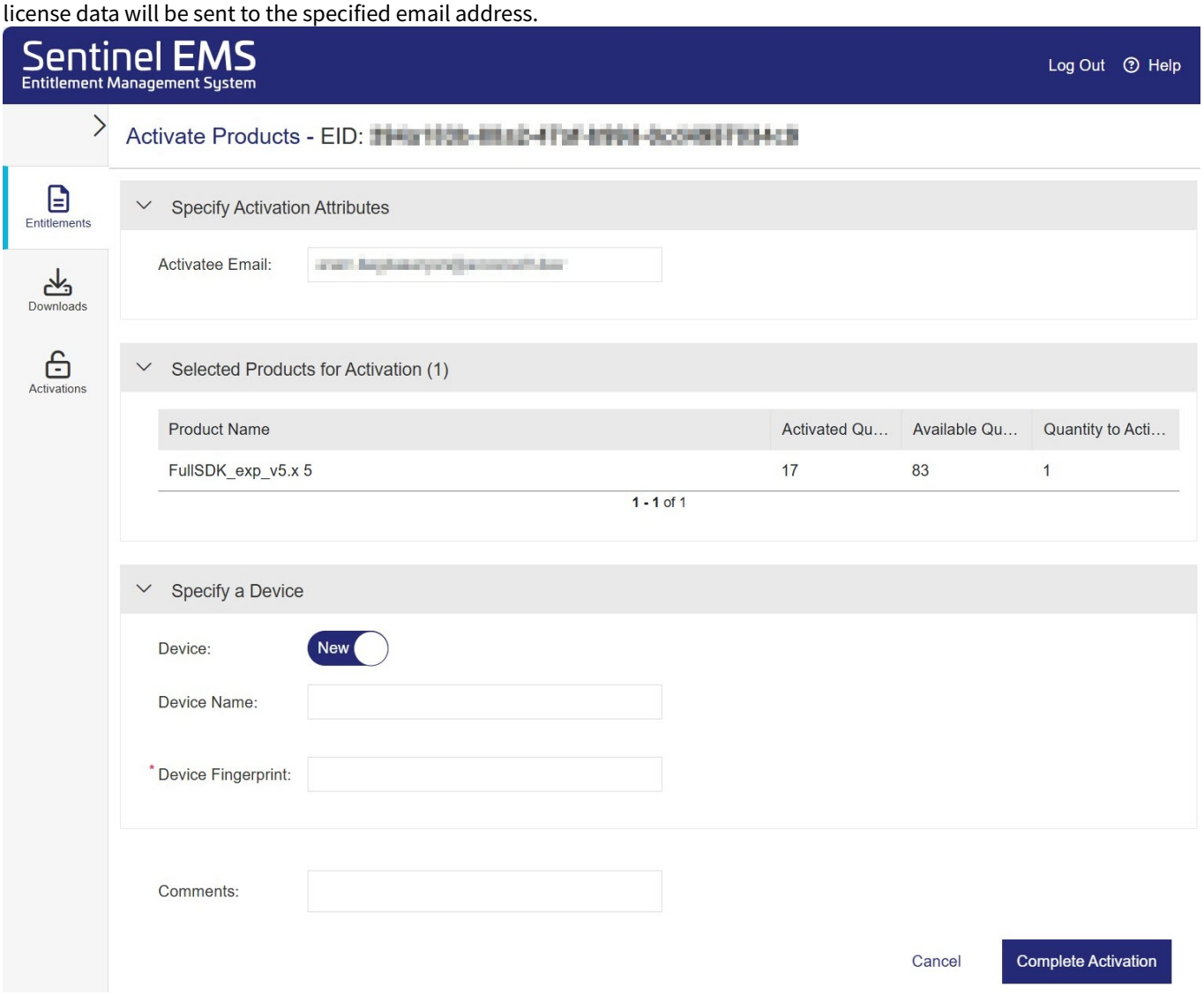


9. Click the **Save** button.

10. Click the **Activate** button to activate the license.



11. In the **Activatee Email** field, specify the email address to confirm the license activation. The **licenseFile.v2c** file with license data will be sent to the specified email address.



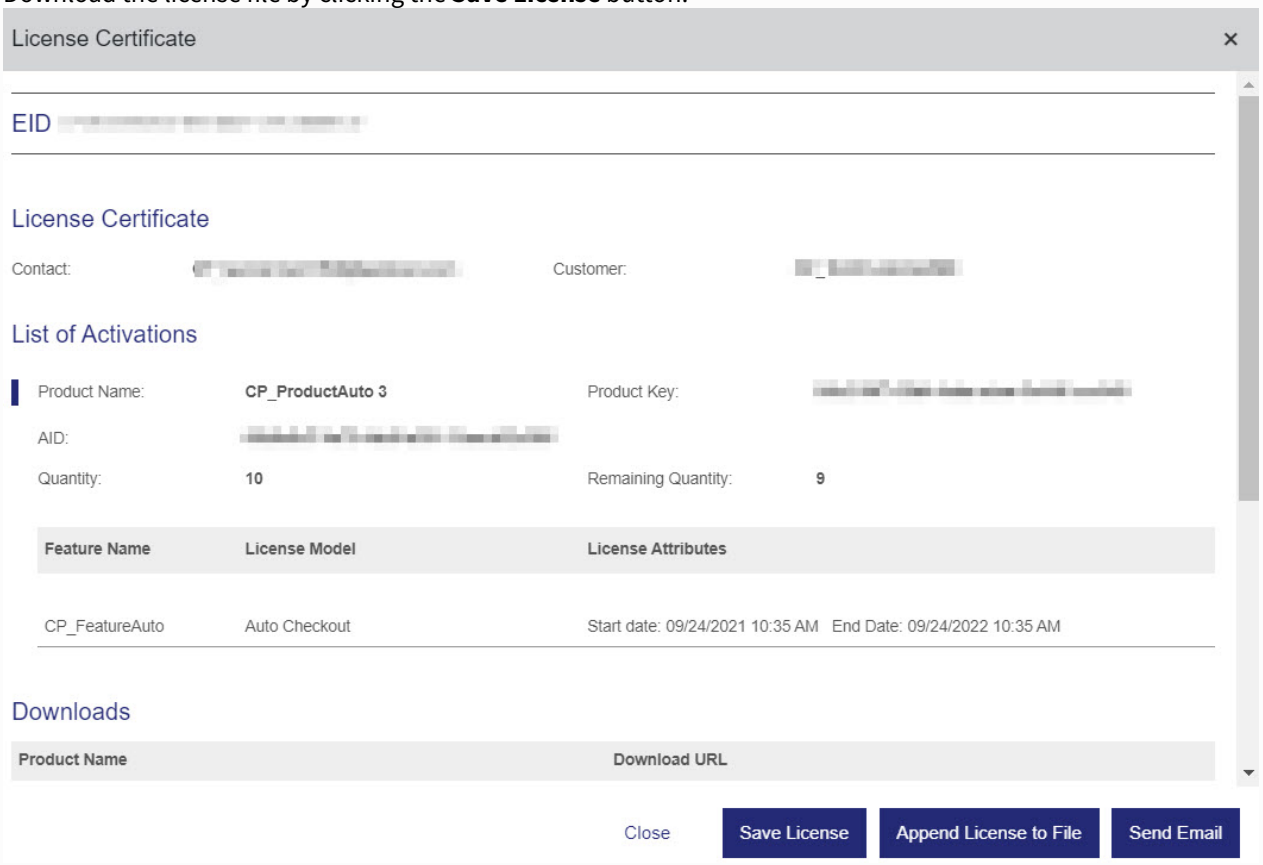
12. In the **Device FingerPrint** field, specify the **FingerPrint** data.
13. Click the **Complete Activation** button.

14. Place the downloaded **licenseFile.v2c** file on the server in the folder: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\.
15. Make sure the license is successfully activated. If the server is connected to the internet, the license will be checked automatically.

Note

If the server doesn't have an internet connection, do the following:

1. Do steps 2–5, 14 on the server where the license will be used.
2. Do steps 1, 6–13, 15 on any computer connected to the internet.
3. Click the **View License Certificate** button.
4. Download the license file by clicking the **Save License** button.



The license is activated on the server with no internet connection.

The **Equipment detector VL** license is activated.

19.4.32.8.6 Activating the license for the Equipment detector VL in Linux OS

Attention!

Starting with *Detector Pack* 3.11, a demo license has been added to the VL PPE add-on (see Installing DetectorPack add-ons(see page 321)). The demo license is valid for 30 days after installation on one server or a virtual machine.

To activate a license for the **Equipment detector VL** (see Configuring the Equipment detector VL(see page 753)), do the following:

1. Request **EID** and **ProductID** from technical support[307].

Attention!

307 https://visionlabs.ai/contacts

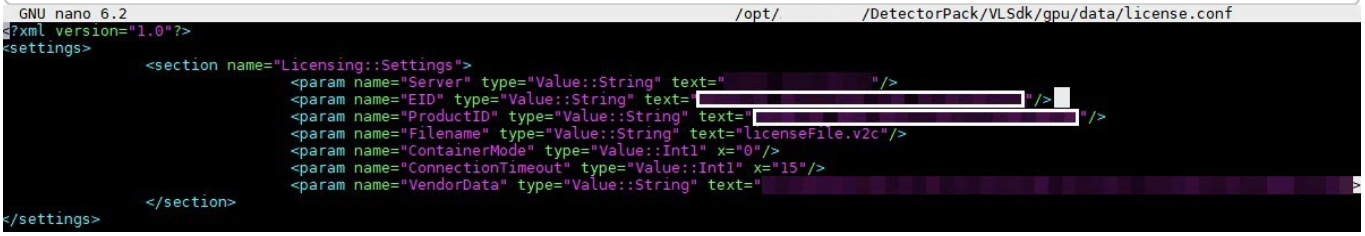
EID and **ProductID** are linked with the MAC address of the server. If the MAC address changes, you need to request **EID** and **ProductID** again.

2. Open the **license.conf** file.

```
sudo nano /opt/AxxonSoft/DetectorPack/VLSdk/gpu/data/license.conf
```

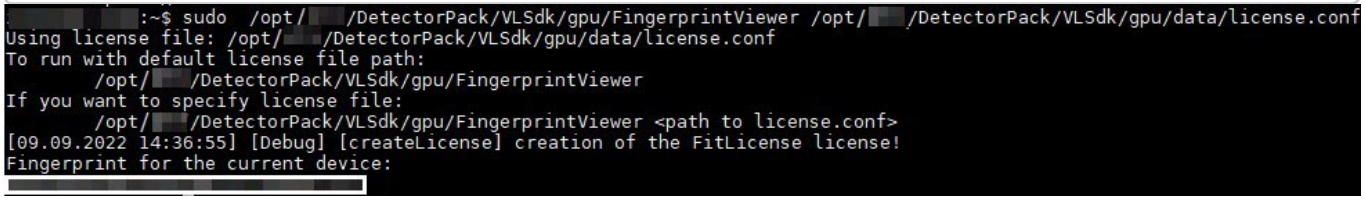
3. Enter the received **EID** and **ProductID**.

```
<param name="EID" type="Value::String" text="received EID"/>
<param name="ProductID" type="Value::String" text="received ProductID"/>
```



4. Save the file.
5. Run the **FingerprintViewer** file. You will receive the **FingerPrint** data.

```
sudo /opt/AxxonSoft/DetectorPack/VLSdk/gpu/FingerprintViewer /opt/AxxonSoft/DetectorPack/
VLSdk/gpu/data/license.conf
```



6. Go to the website[308].

Attention!

If you fail to log in to the website, contact the technical support[309].

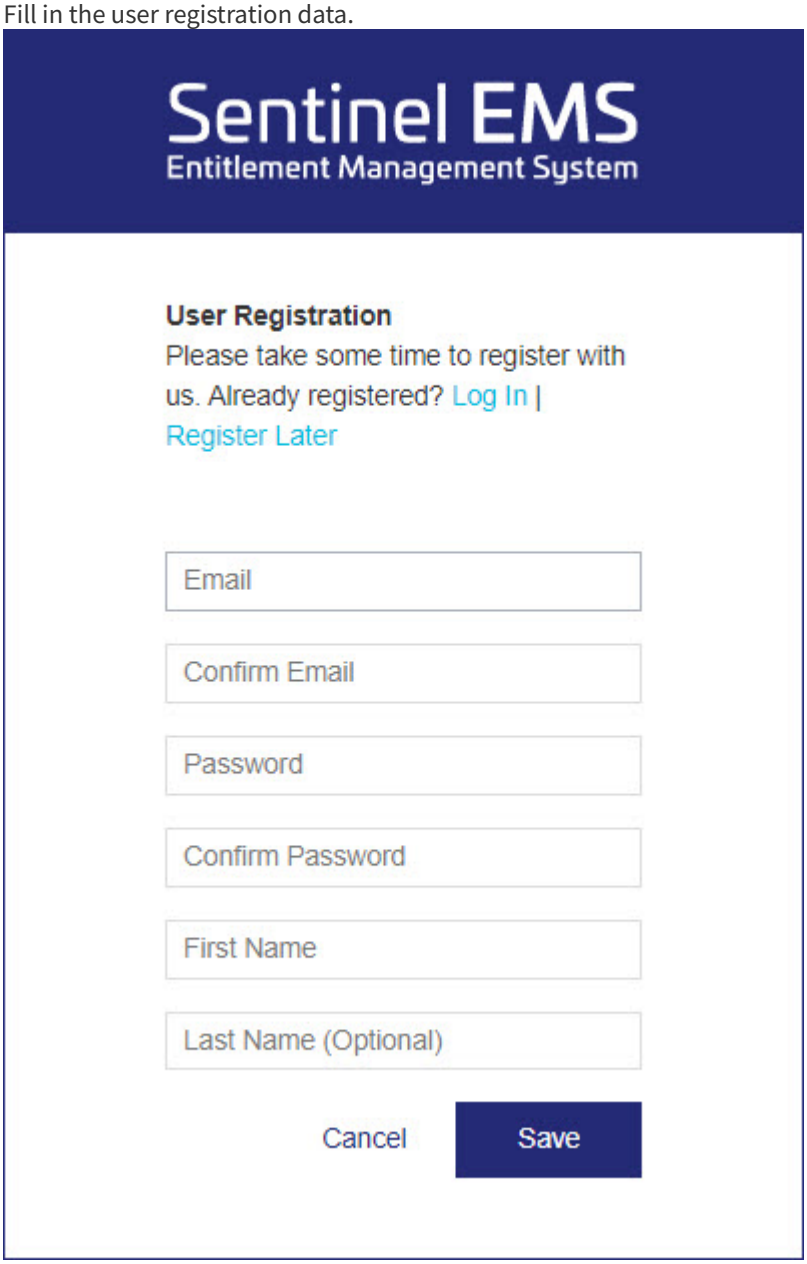
Guide to the Sentinel EMS Customer Portal[310]

308 https://license.visionlabs.ai/ems/customerLogin.html
309 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3
310 https://docs.sentinel.thalesgroup.com/softwareandservices/ems/EMSdocs/CPUG/CPhome.htm

7. Log in using the received **EID**.

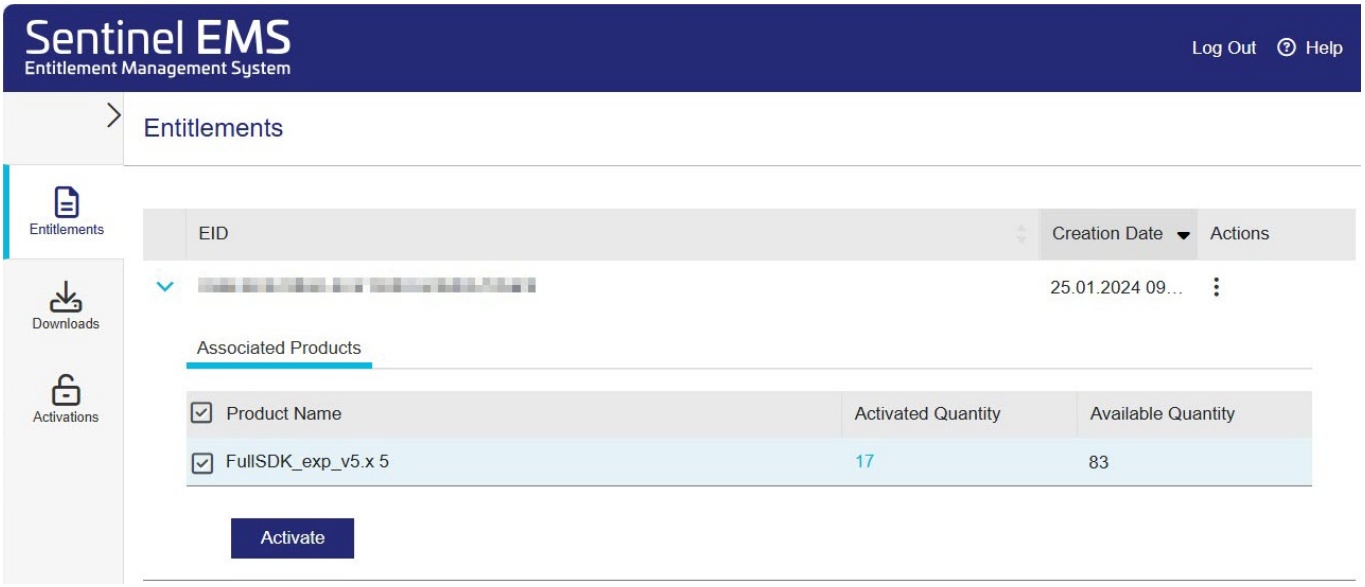


8. Fill in the user registration data.

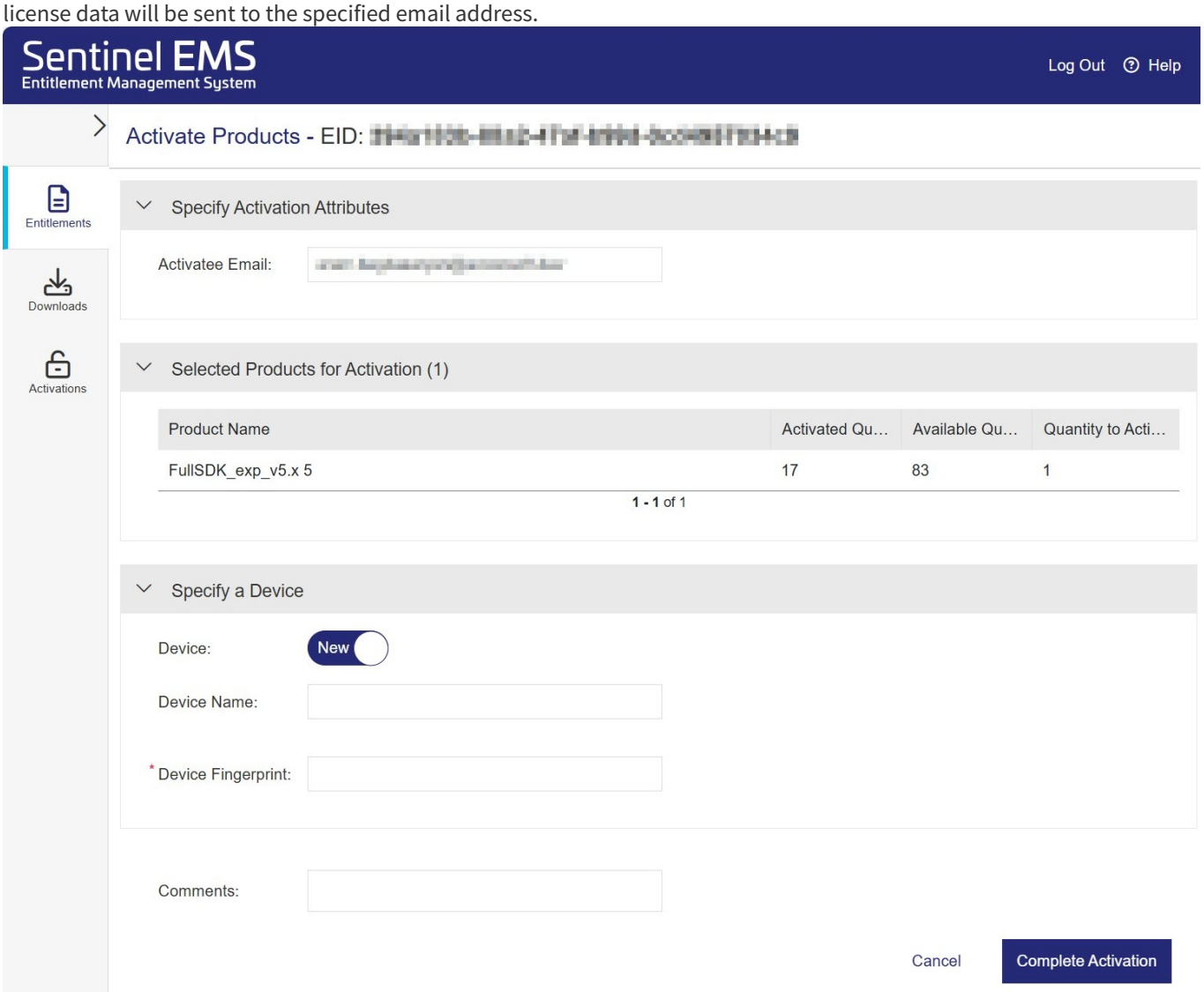


9. Click the **Save** button.

10. Click the **Activate** button to activate the license.



11. In the **Activatee Email** field, specify the email address to confirm the license activation. The **licenseFile.v2c** file with license data will be sent to the specified email address.



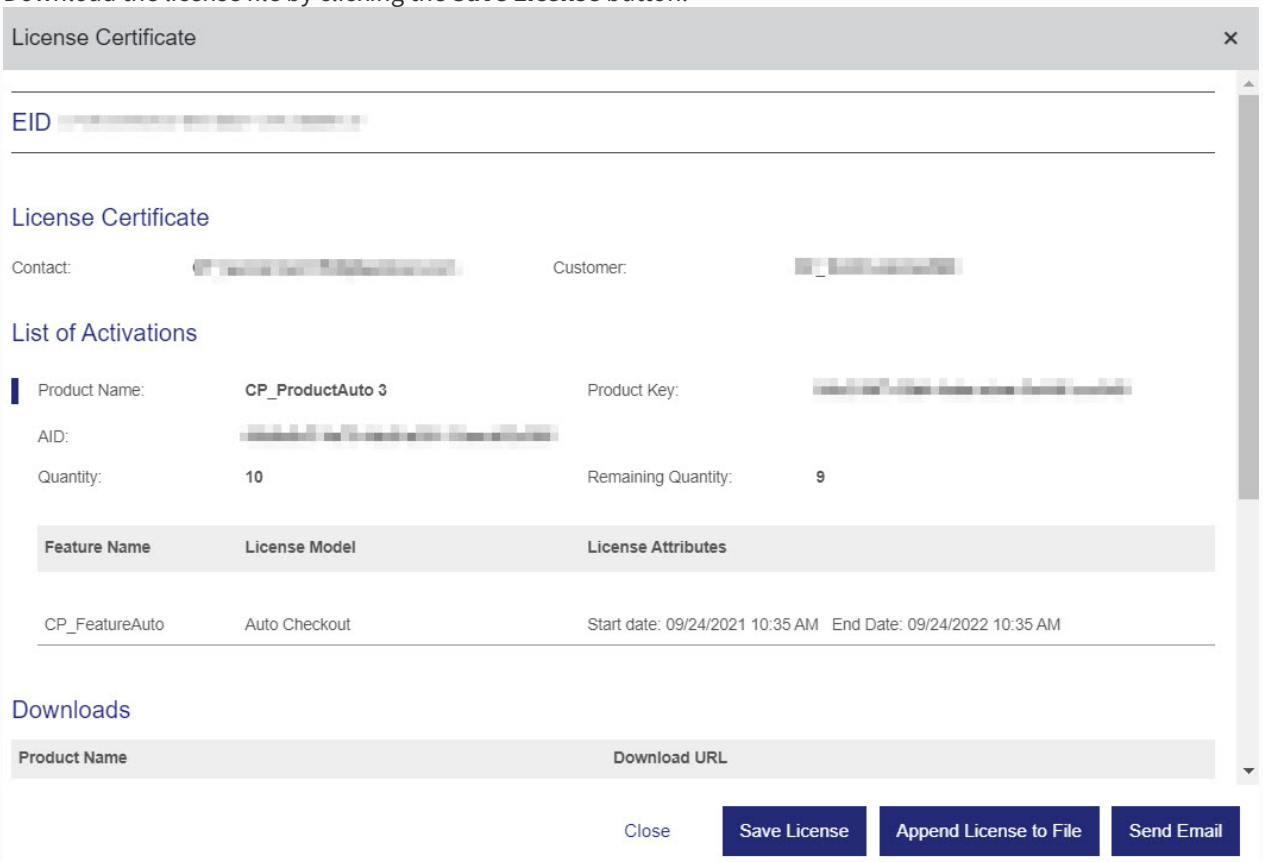
12. In the **Device FingerPrint** field, specify the **FingerPrint** data.
13. Click the **Complete Activation** button.

14. Place the **licenseFile.v2c** file in the required directory: /opt/AxxonSoft/DetectorPack/VLSdk/.
15. Make sure the license is successfully activated. If the server is connected to the internet, the license will be checked automatically.

Note

If the server doesn't have an internet connection, do the following:

1. Do steps 2–5, 14 on the server where the license will be used.
2. Do steps 1, 6–13, 15 on any computer connected to the internet.
3. Click the **View License Certificate** button.
4. Download the license file by clicking the **Save License** button.



The license is activated on the server with no internet connection.

The **Equipment detector VL** license is activated.

19.4.32.8.7 Configuring the Equipment detector VL

Video stream and scene requirements for the Equipment detector VL and its sub-detectors(see page 738)
Image requirements for the Equipment detector VL and its sub-detectors(see page 739)
Hardware requirements for neural analytics operation(see page 339)
Activating the license for the Equipment detector VL in Windows OS(see page 743)
Activating the license for the Equipment detector VL in Linux OS(see page 748)

To configure the **Equipment detector VL**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Other** → **Equipment detector VL**.

By default, the detector is enabled and set to detect people who enter or stay in the protected area without the necessary equipment and personal protective equipment (PPE).

If necessary, you can change the detector parameters. The list of parameters is given in the table:

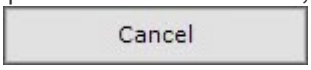
Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Equipment detector VL**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Minimum authenticity threshold	**90**	Specify the minimum level of recognition accuracy for creating a track. You must select the appropriate value empirically. The higher the value, the fewer objects will be detected, but at the same time the recognition quality will be higher. The value must be in the range [1, 100]
Mode	**CPU**	Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)). **Attention!** • If you specify other processing resource than the CPU, this device will carry the most of computing load. However, the CPU will also be used to run the detector. • It can take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	

Parameter	Value	Description
Number of frames processed per second	**1**	Specify the number of frames that the neural network will process per second. If the detector recreates the track for the same object, which leads to incorrect counting, increasing the value can help eliminate false positives. The higher the value, the more accurate the tracking, but the higher the CPU load. The value must be in the range [0.016; 100]. **Attention!** To operate the detection in a "gateway", we recommend using the standard settings of the detector: **1** FPS and **10** FPS for output (see Functions of the Equipment detector VL(see page 738)).
Number of measurements in a row to trigger detection	**10**	Specify the minimum number of frames with a violation for the detector to generate an event. The value must be in the range [2, 50]
One detection per track	**Yes** **No**	By default, the detector generates an event for each element of equipment once per track existence. If you want the detector to generate an event for each equipment violation, select the **No** value
Track lifespan (starting with *Detector Pack* 3.14)	**Yes** **No**	By default, the parameter is disabled. If you want to display the track lifespan for an object in seconds, select the **Yes** value
Type	**Equipment detector VL**	Name of the detector type (non-editable field)

By default, the entire frame is the detection area. If necessary, you can reduce the rectangular detection area in the preview window using the anchor points (see Configuring a detection area(see page 351)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide detection area, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

The **Equipment detector VL** will generate an event when a person is in the frame without the necessary equipment and personal protective equipment on the specified parts of the body or when equipment and personal protective equipment is improperly applied.

19.4.33 Category: Retail

19.4.33.1 Area occupancy detector

19.4.33.1.1 Functions of the Area occupancy detector

Description	The **Area occupancy detector** is used to: 1. Highlight the objects that are visually separable from the surrounding background within the specified surveillance area. 2. Determine the percentage of the area occupied by objects
Licensing	To operate the detector, you need to contact a manager of AxxonSoft and get a license file (see Types of licenses[311])
Add-ons	For the detector to work, you must install the Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.33.1.2 Video stream and scene requirements for the Area occupancy detector

Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Area occupancy detector** are given in the table:

Camera	• Resolution must be at least 1024x1024 pixels • The frame rate per second in the video stream from the camera is at least 8 for solving typical tasks **Attention!** • Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.
Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), we don't guarantee the stable operation of the analytics • No abrupt changes in lighting
Scene and camera angle	• Objects are visually separable from the background • The background is mostly static and doesn't change abruptly • Camera shake doesn't result in image offsets greater than 1% of the frame size

19.4.33.1.3 Configuring the Area occupancy detector

Video stream and scene requirements for the Area occupancy detector(see page 756)

To configure the **Area occupancy detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Retail** → **Area occupancy detector**.

By default, the detector is enabled.

If necessary, you can change the settings of the detector parameters given in the table:

311 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the recording of the current occupancy readings to the archive is enabled (see Displaying information from a detector (mask)(see page 1152)). To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
Other		
Enable	**Yes**	By default, the detector is enabled. To disable it, select the **No** value
	No	
Name	**Area occupancy detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**1**	Specify the number of frames for the detector to process per second. The value must be in the range [0.016, 100]
Type	**Area occupancy detector**	Name of the detector type (non-editable field)
Advanced settings		
Delayed start	**Yes**	By default, the delayed start of the detector after receiving the first frame is enabled. The delay is applied randomly, ranging from 0 to the value specified in the **Event sending period (min)** parameter. By default, the value of the **Event sending period (min)** parameter is **1** minute. It means that the detector startup after receiving the first frame is delayed for the time in the range from 0 to 60 seconds. The optimal delay value depends on the configuration and number of detectors. We recommend specifying the delay value in such a way so that the number of seconds isn't less than the number of detectors. To disable delayed start, select the **No** value
	No	
Detected objects	**Yes**	By default, detected objects are displayed. To disable the display of detected objects, select the **No** value
	No	
Frame averaging	**Yes**	By default, frame averaging is enabled. To disable it, select the **No** value
	No	

Parameter	Value	Description
Frame comparison	**Yes**	By default, the parameter is disabled. To enable frame comparison, select the **Yes** value
	No	
Minimum number of detection triggers	**5**	Specify the minimum number of detection triggers to generate an event. The value must be in the range [1, 20]
Segmentation neural network file		Select the segmentation neural network file. Standard neural networks for different types of processors are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select standard neural networks in this field, the system automatically selects the necessary one. When you use a custom neural network, you must specify the path to the file. **Attention!** • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).
Basic settings		
Event sending period (min)	**1**	Specify the time period in minutes between sending events. The default value is **1** minute. The value must be in the range [0, 1440] **Attention!** The value must not be less than the period specified by the parameter **Number of frames processed per second**.
Segmentation neural network mode	**CPU**	Select a processor for the operation of the segmentation neural network (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)) **Attention!** • It can take several minutes to launch the algorithm on Nvidia GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)). • If you specify another processing resource than the CPU, this device will carry most of the computing load. However, the CPU is also used to run the detector.
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	

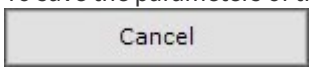
Parameter	Value	Description
Classification settings		
Classification network file		By default, the classification neural network is initialized according to the processing device selected in the **Classification neural network mode** parameter. To initialize, select the required classification neural network file. Standard neural networks for different types of processors are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. You don't need to select standard neural networks in this field, the system automatically selects the necessary one. When you use a custom neural network, you must specify the path to the file **Attention!** • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20% (see Data collection requirements for neural network training(see page 341)).
Classification neural network filter	**Yes**	By default, the parameter is disabled. To enable the classification filter, select the **Yes** value
	No	
Event reporting settings		
Current occupancy	**Yes**	By default, the parameter is disabled. If it is necessary to send an event about the current occupancy level, select the **Yes** value. Events are sent each time frames are analyzed
	No	
Max object size (%)	**100**	Specify the maximum object size as a percentage of the area. The value must be in the range [0, 100]
Min object size (%)	**0**	Specify the minimum object size as a percentage of the area. The value must be in the range [0, 100]
Occupancy threshold, %	**10**	Specify the occupancy threshold as a percentage above which events are generated. The value must be in the range [0, 100]

To generate events, you must specify a detection area. To do this, do the following:

1. Click in the preview window.
2. Select **Detection area**.
3. Specify the detection area using the anchor points  . We recommend specifying an area with a simple shape for more correct operation of the detector. You can create multiple detection areas.

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- To hide a detection area, click the  button. To cancel the action, click this button again.
- To delete a selected area, click the  button.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuring the **Area occupancy detector** is complete.

19.4.33.2 Barcode detector

19.4.33.2.1 Functions of the Barcode detector

Description	The **Barcode detector** is used to recognize and detect various types of barcodes. An event, based on which a macro can be started (see Examples of macros used for barcode detection(see page 915)), can be generated if a barcode meets the conditions specified in the detection tool settings. Supported barcode types: • Aztec • DataMatrix • PDF417 • QR code (the maximum number of characters for recognition is 1000) • Linear (UPC-A, Code 39, UPC-E, Code 93, EAN-8, Code 128, EAN-13, Codabar, DataBar, DataBar Expanded, DX Film, Edge, ITF)
Licensing	To operate the detector, you need to contact a manager of AxxonSoft and get a license file (see Types of licenses[312])
Add-ons	For the detector to work, you must install the Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.33.2.2 Video stream and scene requirements for the Barcode detector and its sub-detectors

Image requirements for the Barcode detector and its sub-detectors(see page 761)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Barcode detector** and its sub-detectors are given in the table:

Camera	• Resolution is at least 640x360 pixels • The FPS in the video stream from the camera must be at least 2 for typical tasks • Stable fixation of the camera without sudden movements or shaking **Attention!** Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods.

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Scene and camera angle	• Background is mostly static and doesn't change abruptly

19.4.33.2.3 Image requirements for the Barcode detector and its sub-detectors

Video stream and scene requirements for the Barcode detector and its sub-detectors(see page 760)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Barcode detector** and its sub-detectors are given in the table:

Barcode images	• Barcodes must be visually distinguishable from each other • Image with a high level of focus • Barcodes must be clearly visible in the image • Barcodes must appear smoothly and sequentially one after another in the frame • Barcode size must be at least 40% of the frame size • For barcode detection, the duration of barcode visibility must be at least three seconds • Image isn't noisy or distorted by compression artifacts

19.4.33.2.4 Configuring the Barcode detector

Video stream and scene requirements for the Barcode detector and its sub-detectors(see page 760)
Image requirements for the Barcode detector and its sub-detectors(see page 761)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Barcode detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Retail** → **Barcode detector**.

By default, the detector is enabled and configured for operation. Depending on the required tasks, you must select a specific type of barcode for detection.

If necessary, you can change the parameters of the detector given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Barcode detector**	Enter the detector name or leave the default name

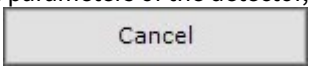
Parameter	Value	Description
Track lifespan (starting with *Detector Pack* 3.14)	**Yes**	By default, the parameter is disabled. If you want to display the track lifespan for an object in seconds, select the **Yes** value
	No	
Barcode type	**Aztec**	Select the type of barcode that will generate events from the detector when detected
	DataMatrix	
	PDF417	
	QR code	
	Linear	
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with NVIDIA NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Detector mode	**CPU**	Select a processor for the neural network operation (see Selecting Nvidia GPU when configuring detectors(see page 348)) **Attention!** • We recommend using the GPU. It may take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)). • Starting with *Detector Pack* 3.11, **Intel HDDL** and **Intel NCS** aren't supported. • Starting with *Detector Pack* 3.14, **Intel Multi-GPU** and **Intel GPU 0-3** are supported.
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
	Intel NCS (not supported)	
	Intel HDDL (not supported)	
	Intel Multi-GPU	
	Intel GPU 0	
	Intel GPU 1	
	Intel GPU 2	
	Intel GPU 3	

Parameter	Value	Description
	Huawei NPU	
Neural network file		If you use a custom neural network, select the corresponding file. **Attention!** • To train your neural network, contact AxxonSoft (see Data collection requirements for neural network training(see page 341)). • A trained neural network for a particular scene allows you to detect only the barcode of a certain type. • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20%. Standard neural networks are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK folder.
Number of frames processed per second	**10**	Specify the number of frames for the detector to process per second. The value must be in the range [0.016, 100]
Type	**Barcode detector**	Name of the detector type (non-editable field)

By default, the entire frame is a detection area. If necessary, in the preview window, set:

- one or more detection areas (see Configuring a detection area(see page 351)),
- one or more ignore areas (see Configuring the ignore area(see page 350)).

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the **Barcode detector** is complete. If necessary, you can create and configure the necessary sub-detectors on the basis of the **Barcode detector** (see Standard sub-detectors(see page 359)).



If necessary, you can search for a barcode in the archive. You can search by the text that is recognized during barcode detection (Search by barcode(see page 1243)).

19.4.33.3 Crowd estimation VA

19.4.33.3.1 Functions of the Crowd estimation VA

Description	The **Crowd estimation VA** counts crowds of people and generates an event when a certain number of people in a specified area is exceeded. **Attention!** • The **Crowd estimation VA** is used to analyze scenes with the number of people from 10 to 10,000. • To analyze scenes with less than 10 people, we recommend using **Neural counter** (see Neural counter(see page 771)). An event on the basis of which a macro can be started (see Configuring start conditions(see page 834)) can be generated if the number of objects in the frame meets the specified conditions
Licensing	To operate the detector, you need to contact a manager of AxxonSoft and get a license file (see Types of licenses[313])
Add-ons	For the detector to work, you must install the VA Crowd Estimation Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.33.3.2 Video stream and scene requirements for the Crowd estimation VA

Image requirements for the Crowd estimation VA(see page 765)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Crowd estimation VA** are given in the table:

Camera	• Resolution of 256x256 pixels or higher • Color: analytics works with both gray and color images • No camera shake
Lighting	• The best performance of the detection tool is achieved under moderate lighting. In conditions of insufficient (night) or excessive (light-striking) lighting, the algorithm performance can decrease • No abrupt changes in lighting

Scene and camera angle	• The background is mostly static and doesn't change abruptly
	• Analytics can work incorrectly:
	  • on reflective surfaces and if there are sharp shadows from moving objects
	  • if there is a repeating pattern in the scene (crosswalk)
	  • if there are objects in the scene that look like people (monuments, animals)
	  • if there are periodic movements of background objects in the camera FOV (trees, rain, and so on)

19.4.33.3.3 Image requirements for the Crowd estimation VA

Video stream and scene requirements for the Crowd estimation VA(see page 765)
Hardware requirements for neural analytics operation(see page 339)

Requirements for the operation of the **Crowd estimation VA** are given in the table:

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Object images	• Image quality: the image must be clear, without obvious defects from the compression algorithm

19.4.33.3.4 Configuring the Crowd estimation VA

Video stream and scene requirements for the Crowd estimation VA(see page 765)
Image requirements for the Crowd estimation VA(see page 765)
Hardware requirements for neural analytics operation(see page 339)

To configure the **Crowd estimation VA**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Retail** → **Crowd estimation VA**.

By default, the detector is enabled and set to count crowds of people.

If necessary, you can change the settings of the detector parameters given in the table:

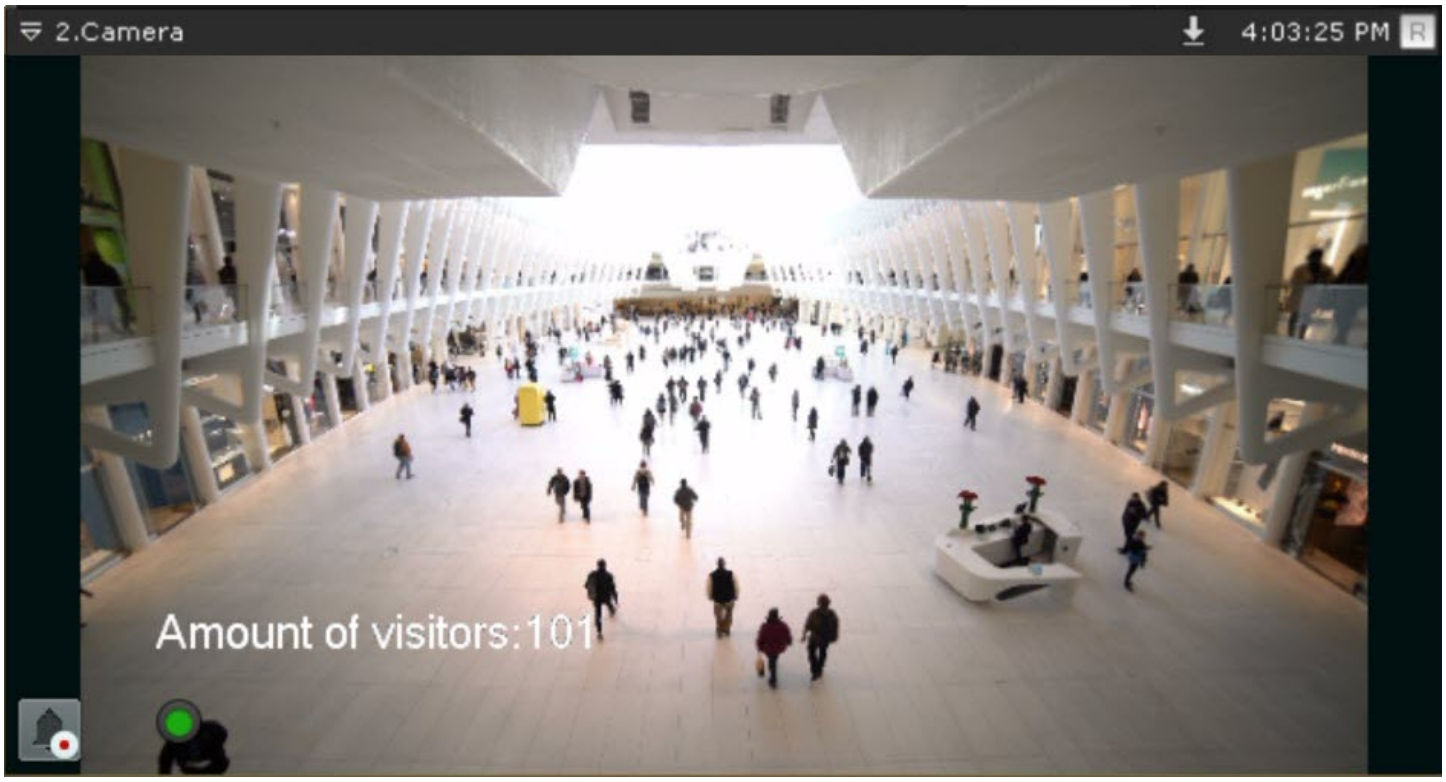
Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the recording of the mask to the archive is disabled. To record the sensitivity scale of the detector to the archive (see Displaying information from a detector (mask) (see page 1152)), select the **Yes** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Crowd estimation VA**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Delayed start (s) (starting with *Detector Pack* 3.14)	**0**	Specify the time in seconds by which the detector start will be delayed after receiving the first frame. The delay will be applied randomly within the range from **0** to the specified value. The default value is 0, meaning the detector starts without delay. The optimal delay value depends on the configuration and the number of detectors. It is recommended to specify the delay value so that the number of seconds is not less than the number of detectors. The value must be in the range [0, 3600]

Parameter	Value	Description
Detection mode	**CPU**	Select a processor for the operation (see Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	**Attention!** If you specify other processing resource than the CPU, this device will carry the most of computing load. However, the CPU will also be used to run the detector.
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
Number of alarm objects	**1**	Specify the number of objects at which an event occurs. The value must be in the range [0, 10000]
Number of frames processed per second	**0.017**	Specify the number of frames for the detector to process per second. The value must be in the range [0.016, 100]
Trigger upon count	**Greater than or equal to threshold value**	Select when you want to generate events. The **Crowd estimation VA** will generate events from the threshold value set in the **Number of alarm objects** field
	Less than or equal to threshold value	
	Change in readings	
Type	**Crowd estimation VA**	Name of the detector type (non-editable field)

By default, the entire frame is the detection area. In the preview window, you can specify the detection areas using the anchor points (see Configuring a detection area(see page 351)).

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

It is possible to display the sensor and the number of objects in the monitored area in the Surveillance window on the layout (see Displaying the number of detected objects(see page 355)).



19.4.33.4 Meta-detector

19.4.33.4.1 Functions of the Meta-detector

Description	The **Meta-detector** is used to generate events on the basis of text queries
Licensing	To operate the detector, you need to contact a manager of AxxonSoft and get a license file (see Types of licenses[314])
Add-ons	For the detector to work, you must install the Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.33.4.2 Video stream and scene requirements for the Meta-detector

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Meta-detector(see page 769)

Requirements for the operation of the **Meta-detector** are given in the table:

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Camera	• Resolution must be at least 640x360. We also don't recommend using a resolution higher than 640x360, since higher resolution doesn't increase the detection quality, but significantly increases the consumption of resources. The optimal resolution for solving typical tasks is 640x360 • The frame rate per second in the video stream from the camera is at least 2 for solving typical tasks **Attention!** • Correct operation of the detector **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods. • Correct operation of the detector **isn't** guaranteed when you use a fisheye lens.
Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • Moving objects are minimally obscured by static objects in the scene (columns, industrial products, and so on) • The analyzed scene doesn't have reflective surfaces or sharp shadows from moving objects. If present, they must be masked • Camera shake doesn't result in image offsets greater than 1% of the frame size

19.4.33.4.3 Image requirements for the Meta-detector

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Meta-detector(see page 768)

Requirements for the operation of the **Meta-detector** are given in the table:

Object images	• The detected object must be clearly distinguishable by the human eye • Width and height of objects in the image must not exceed 75% of the frame size • When you use a neural filter, the minimum width or height of an object must be at least 5% of the width/height of the frame • Image isn't noisy and isn't distorted by artifacts of the compression algorithm • The duration of the object visibility is at least 2 frames

19.4.33.4.4 Configuring the Meta-detector

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Meta-detector(see page 768)
Image requirements for the Meta-detector(see page 769)

To configure the **Meta-detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Retail** → **Meta-detector**.

The detector is enabled by default. In order for the detector to generate events, it is necessary to specify text queries in English in the **Text query** parameters. You can specify up to three text queries.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed.
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Meta-detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**1**	Specify the number of frames for the detector to process per second. The value must be in the range [0.016, 100]
Type	**Meta-detector**	Name of the detector type (non-editable field)
Advanced settings		
Number of measurements in a row to trigger detection	**15**	Set the minimum number of frames, on which the detector must detect a match between a text query and an image in order to generate an event. The value must be in the range [10, 100]
Basic settings		
Detection mode	**CPU**	Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	**Attention!** • For optimal performance, it is recommended to use the mode with a discrete GPU. • If you specify other processing resource than the CPU, this device will carry the most of computing load. However, the CPU will also be used to run the detector. • It can take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
	Intel GPU	

Parameter	Value	Description
Detection threshold	**20**	Specify the **Detection threshold** for objects in percent. If the recognition probability falls below the specified value, the data will be ignored. The higher the value, the higher the accuracy, but some events from the detector can be missed. The value must be in the range [0,05, 100]
Text query 1 **Text query 2** **Text query 3**		Enter a text query in English. For example: • **Human and dog** • **Running human** • **Fallen human** **Attention!** Optimal query structure: • Object type (human, vehicle, and so on). • Object key attribute (color, size, and so on); • Surroundings (road, building, room, and so on); • Additional scene specifications (angle, position in frame). Examples: **Woman wearing a black dress**, **White car pedestrian crossing top view**. We recommend using chatbots with artificial intelligence of the latest generation, such as ChatGPT-4o, which are able to: • Generate optimized queries relying on the syntax of the BLIP-2 model (generate text descriptions from an image). • Work with web links.

To save the parameters of the detector, click the **Apply** Apply button. To cancel the changes, click the **Cancel** Cancel button.

The **Meta-detector** is configured.

19.4.33.5 Neural counter

19.4.33.5.1 Functions of the Neural counter

Description	The **Neural counter** counts the number of objects in a specified area using neural network. A event on the basis of which a macro can be started (see Configuring start conditions(see page 834)), can be generated if the number of objects in the frame meets the specified conditions. Unlike the **Multiple Objects** detection tool (see Configuring Multiple objects(see page 383)), **Neural counter** generates events of one type—triggers. In addition, **Neural counter** consumes fewer resources than the **Multiple Objects** detection tool on the basis of **Neural tracker**
Add-ons	For the **Neural counter** to work, you must install Neuro Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.33.5.2 Video stream and scene requirements for the Neural counter operation

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Neural counter operation(see page 772)

Requirements for the operation of the **Neural counter** are given in the table:

Camera	• Resolution must be at least 640x360 pixels. We also don't recommend using a resolution higher than 1920×1080, since higher resolution doesn't increase the detection quality, but significantly increases the consumption of resources. The optimal resolution for solving typical tasks is 1280x720 (see Configuring the Neural counter(see page 773)) • The frame rate per second in the video stream from the camera is at least 8 for solving typical tasks • Both colorless (gray) and color images **Attention!** • Correct operation of the detection tool **isn't** guaranteed if you use frames that were masked **before** they got into *Axxon One* by an IP camera or similar methods. • The correct operation of the **Neural counter** isn't guaranteed if you use a fisheye lens.
Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting
Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on) • The analyzed scene doesn't have reflective surfaces and sharp shadows from moving objects. If present, they must be masked • Camera shake doesn't result in image offsets greater than 1% of the frame size

19.4.33.5.3 Image requirements for the Neural counter operation

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Neural counter operation(see page 771)

Requirements for the operation of the **Neural counter** are given in the table:

Object images

- The detected object must be clearly distinguishable by the human eye
- Width and height of objects in the image must not exceed 75% of the frame size
- The image isn't noisy and not distorted by the artifacts of the compression algorithm
- The duration of the object visibility is at least six frames
- Between two frames, an object must move in the direction of a distance not exceeding its size. This condition is necessary for the correct calculation of an object track
- The minimum value of pixel density per meter is observed:

Image resolution	Object type	Minimum pixel density per meter (ratio of the object width in pixels to the object width in meters)	Minimum object size in pixels, width x height	Ratio of the object width to the frame width as a percentage
1920x1080	Human	55	~25x105	~3%
1280x720	Human	35	~17x70	~3%
640x360	Human	17	~10x42	~3%
1920x1080	Light vehicle (2 axles)	55	~354x300	~20%
1280x720	Light vehicle (2 axles)	35	~240x205	~20%
640x360	Light vehicle (2 axles)	17	~132x112	~20%

19.4.33.5.4 Configuring the Neural counter

On the page:

- Configuring the detector(see page 774)
- Example of configuring the Neural counter detector for solving typical tasks(see page 778)

Video stream and scene requirements for the Neural counter operation(see page 771)
Image requirements for the Neural counter operation(see page 772)
Hardware requirements for neural analytics operation(see page 339)

Optimizing the operation of neural analytics on GPU in Windows OS(see page 342)
Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)

19.4.33.5.4.1 Configuring the detector

To configure the **Neural counter** detector, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Retail** → **Neural counter**.

By default, the detector is enabled and set to count the number of objects in a specified area using a neural network.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the recording of the mask to the archive is disabled. To record the sensitivity scale of the detector to the archive (see Displaying information from a detector (mask)(see page 1152)), select the **Yes** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Neural counter**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**1**	Specify the number of frames for the detector to process per second. The value must be in the range [0.016, 100] **Note** The default values (**3** output frames and **1** FPS) mean that the **Neural counter** analyzes one frame once per second. If the **Neural counter** detects the specified number of objects (or more) on **3** frames, an event from the detector is generated.
Type	**Neural counter**	Name of the detector type (non-editable field)
Advanced settings		
Detected objects	**Yes**	By default, detected objects aren't highlighted in the preview window. If you want to highlight detected objects, select the **Yes** value

Parameter	Value	Description
	No	
Neural network file		If you use a custom neural network, select the corresponding file **Attention!** • To train your neural network, contact AxxonSoft (see Data collection requirements for neural network training(see page 341)). • A trained neural network for a particular scene allows you to detect only objects of a certain type (for example, a person, a cyclist, a motorcyclist, and so on). • If you don't specify the neural network file, the default file is used that is selected automatically depending on the selected value in the **Detection neural network** parameter and the selected processor for the neural network operation in the **Decoder mode** parameter. If you use a custom neural network, enter a path to the file. The selected detection neural network is ignored when you use a custom neural network. • If you use a standard neural network (training wasn't performed in operating conditions), we guarantee the overall accuracy of 80-95% and the percentage of false positives of 5-20%. The standard neural networks are located in the C:\Program Files\Common Files\AxxonSoft\DetectorPack\NeuroSDK directory. • You cannot specify the network file in Windows OS. You must place the neural network file locally, that is, on the same server where you install *Axxon One*. • For correct neural network operation on Linux OS, place the corresponding file locally in the /opt/AxxonSoft/DetectorPack/NeuroSDK directory or in the network folder with the corresponding access rights.
Number of measurements in a row to trigger detection	**3**	Specify the minimum number of frames on which the detector must detect a violation to generate an event. The value must be in the range [1, 20]

Parameter	Value	Description
Selected object classes		If necessary, specify the class of the detected object. If you want to display tracks of several classes, specify them separated by a comma with a space. For example, **1**, **10**. The numerical values of classes for the embedded neural networks: **1**—Human/Human (top-down view), **10**—Vehicle. a. If you leave the field blank, the tracks of all available classes from the neural network are displayed (**Detection neural network**, **Neural network file**). b. If you specify a class/classes from the neural network, the tracks of the specified class/classes are displayed (**Detection neural network**, **Neural network file**). c. If you specify a class/classes from the neural network and a class/classes missing from the neural network, the tracks of a class/classes from the neural network are displayed (**Detection neural network**, **Neural network file**). d. If you specify a class/classes missing from the neural network, the tracks of all available classes from the neural network are displayed (**Detection neural network**, **Neural network file**) **Note** Starting with *Detector Pack* 3.10.2, if you specify a class/classes missing from the neural network, the tracks aren't displayed (**Detection neural network**, **Neural network file**).
Scanning window	**Yes** **No**	If detection of small objects or objects in areas far away from the camera is ineffective, you can use the scanning mode. The scanning mode doesn't provide absolute detection accuracy, but it can improve detection performance. To enable the scanning mode, select the **Yes** value (see Configuring the scanning mode(see page 353))
Scanning window height	**0**	The height and width of the scanning window are determined according to the actual size of the frame and the required number of windows. For example, the real frame size is 1920×1080 pixels. To divide the frame into four equal windows, set the width of the scanning window to **960** pixels and the height to **540** pixels
Scanning window step height	**0**	The scanning step determines the relative offset of the windows. If the step is equal to the height and width of the scanning window respectively, the segments will line up one after another. Reducing the height or width of the scanning step will increase the number of windows due to their overlapping each other with an offset. This will increase the detection accuracy, but will also increase the CPU load. **Attention!** The height and width of the scanning step must not be greater than the height and width of the scanning window—the detector won't operate with such settings.
Scanning window step width	**0**	
Scanning window width	**0**	The height and width of the scanning window are determined according to the actual size of the frame and the required number of windows. For example, the real frame size is 1920×1080 pixels. To divide the frame into four equal windows, set the width of the scanning window to **960** pixels and the height to **540** pixels
Basic settings		
Detection threshold	**30**	Specify the **Detection threshold** for objects in percent. If the recognition probability falls below the specified value, the data is ignored. The higher the value, the higher the accuracy, but some events from the detector may not be considered. The value must be in the range [0.05, 100]

<table>
<tr><th>Parameter</th><th>Value</th><th>Description</th></tr>
<tr><td rowspan="13">Mode</td><td>CPU</td><td rowspan="13">Select a processor for the neural network operation (see Hardware requirements for neural analytics operation(see page 339), Selecting Nvidia GPU when configuring detectors(see page 348)).

Attention!
If you specify another processing resource than the CPU, this device carries most of the computing load. However, the CPU is also used to run the detector.
It may take several minutes to launch the algorithm on NVIDIA GPU after you apply the settings. You can use caching to speed up future launches (see Optimizing the operation of neural analytics on GPU in Windows OS(see page 342), Optimizing the operation of neural analytics on GPU in Linux OS(see page 345)).
Starting with Detector Pack 3.11, Intel HDDL and Intel NCS aren’t supported.
Starting with Detector Pack 3.14, Intel Multi-GPU and Intel GPU 0-3 are supported.</td></tr>
<tr><td>Nvidia GPU 0</td></tr>
<tr><td>Nvidia GPU 1</td></tr>
<tr><td>Nvidia GPU 2</td></tr>
<tr><td>Nvidia GPU 3</td></tr>
<tr><td>Intel NCS (not supported)</td></tr>
<tr><td>Intel HDDL (not supported)</td></tr>
<tr><td>Intel GPU</td></tr>
<tr><td>Intel Multi-GPU</td></tr>
<tr><td>Intel GPU 0</td></tr>
<tr><td>Intel GPU 1</td></tr>
<tr><td>Intel GPU 2</td></tr>
<tr><td>Intel GPU 3</td></tr>
<tr><td>Huawei NPU</td></tr>
<tr><td>Number of alarm objects</td><td>5</td><td>Specify the number of objects at which an event occurs. The value must be in the range [0, 100]</td></tr>
<tr><td rowspan="10">Detection neural network</td><td>Person</td><td rowspan="10">Select the detection neural network from the list. Neural networks are named taking into account the objects they detect. The names can include the size of the neural network (Nano, Medium, Large), which indicates the amount of consumed resources. The larger the neural network, the higher the accuracy of object recognition</td></tr>
<tr><td>Person (top-down view)</td></tr>
<tr><td>Person (top-down view Nano)</td></tr>
<tr><td>Person (top-down view Medium)</td></tr>
<tr><td>Person (top-down view Large)</td></tr>
<tr><td>Vehicle</td></tr>
<tr><td>Person and vehicle (Nano)</td></tr>
</table>

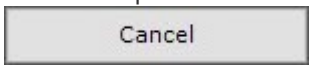
Parameter	Value	Description
	Person and vehicle (Medium)	
	Person and vehicle (Large)	
Trigger to	**Greater than or equal to threshold value**	Select when you want to generate an event. The **Neural counter** will generate events from the threshold value set in the **Number of alarm objects** field
	Less than or equal to threshold value	
	Change in readings	

By default, the entire frame is the detection area. If necessary, in the preview window, you can reduce the detection area (see Configuring a detection area(see page 351)) and/or specify one or more ignore areas (see Configuring the ignore area(see page 350)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the **Neural counter** detector is complete. It is possible to display the sensor and the number of objects in the monitored area in the surveillance window on the layout (see Displaying the number of detected objects(see page 355)).

19.4.33.5.4.2 Example of configuring the Neural counter detector for solving typical tasks

By default, the **Neural counter** is set to detect objects with a speed less than 0.3 m/s:

Parameter	Value
Other	
Number of frames processed per second	**1**
Advanced settings	
Number of measurements in a row to trigger detection	**3**
Neural network file	Path to the *.ann neural network file. You can also select the value in the **Detection neural network** parameter. In this case, this field must be left blank

Parameter	Value
Basic settings	
Detection threshold	**30**

To solve tasks in which object speed differs from 0.3 m/s, you must increase **Number of frames processed per second** or/and decrease **Number of measurements in a row to trigger detection**. You must select the values empirically depending on the task conditions.

19.4.33.6 Queue detector

19.4.33.6.1 Functions of the Queue detector

Description	The **Queue detector** generates an event when the specified number of people in the queue is exceeded

19.4.33.6.2 Video stream and scene requirements for the Queue detector

Image requirements for the Queue detector(see page 779)

Requirements for the operation of the **Queue detector** are given in the table:

Camera	• Resolution: 720x576 (CIF4), 360x288 (CIF1) is also allowed. Increasing the resolution above CIF4 doesn't improve the performance of the recognition algorithm • FPS is at least 6 • Color: analytics works with both gray and color images • No camera shake
Lighting	• The best performance of the detection tool is achieved under moderate lighting. In conditions of insufficient (night) or excessive (light-striking) lighting, the algorithm performance can decrease • Abrupt changes in lighting can lead to short-term incorrect operation of analytics
Scene and camera angle	• The best position is the camera looking down at the scene. The better this requirement is met, the more accurate the estimate is • Dimensions of the camera FOV: minimum 3x3 m (6x6 people), optimal 4x4 m (8x8 people), maximum 8x8 m (16x16 people) • The background is mostly static and doesn’t change abruptly • Analytics can work incorrectly on reflective surfaces, and if there are sharp shadows from moving objects • Analytics can work incorrectly if there are periodic movements of background objects in the camera FOV (trees, TV is on, and so on)

19.4.33.6.3 Image requirements for the Queue detector

Video stream and scene requirements for the Queue detector(see page 779)

Requirements for the operation of the **Queue detector** are given in the table:

Object images	• Image quality: image must be clear, without obvious defects from the compression algorithm • Allowable person size: the area of the rectangle around a person as a percentage of the frame area is from 0.25% to 10%

19.4.33.6.4 Configuring the Queue detector

Video stream and scene requirements for the Queue detector(see page 779)
Image requirements for the Queue detector(see page 779)

To configure the **Queue detector**, do the following:

1. Go to the **Detection Tools** tab.
2. Below the required camera, click **Create...** → **Category: Retail** → **Queue detector**.

By default, the detector is enabled and set to count the number of people in a queue.

If necessary, you can change the settings of the detector parameters given in the table:

Parameter	Value	Description
Object features		
Record mask to archive	**Yes**	By default, the recording of the mask to the archive is disabled. To record the sensitivity scale of the detector to the archive (see Displaying information from a detector (mask)(see page 1152)), select the **Yes** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Queue detector**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**1**	Specify the number of frames for the detector to process per second. The larger the value, the greater the load on the CPU. The value must be in the range [0.016; 100]
Type	**Queue detector**	Name of the detector type (non-editable field)

Parameter	Value	Description
Advanced settings		
Current queue size report interval	**0**	The default value is **0** (no events are sent). To send events to *AxxonData* (see Queue length report[315]), specify the interval of events transmission in seconds. The value must be in the range [0, 600]
Frame size change	**1920**	The analyzed frames are scaled down to a specified resolution (**1920** pixels on the longer side) by default. The following algorithm is used: 1. If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. 2. If the resulting resolution falls below the specified value, the algorithm stops and this resolution will be used further. 3. If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
Basic settings		
Person size	**10**	**Note** It is better to specify the minimum size of a person graphically, the number in the **Person size** field is a conditional value. The value must be in the range [0.25, 10] Click the  button and specify the minimum size of a person. To do this, move the anchor points of the rectangular area: 
Queue size	**5**	Specify the number of objects in a queue. When the number is exceeded, an event is generated. The value must be in the range [2, 20]

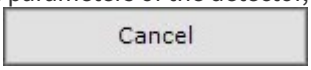
315 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172809899/Queue+length+report

Parameter	Value	Description
Sensitivity	**0.5**	Specify the sensitivity of the detector. The higher the sensitivity, the better the algorithm reacts to minor motion. If you specify the minimum sensitivity value, only significant scene changes can be analyzed by the **Queue detector**. You must specify the sensitivity value empirically based on the data from the motion mask (see Displaying information from a detector (mask)(see page 1152)) in the preview window

In the preview window, you can specify the detection area where objects are detected (see Configuring a detection area(see page 351)) and, if necessary, specify one ignore area (see Configuring the ignore area(see page 350)). You can specify the areas by moving the anchor points  .

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply**  button. To cancel the changes, click the **Cancel**  button.

Configuration of the **Queue detector** is complete. The detector will generate events of the following type:

```
Camera. Detection "Queue detector" triggered, queue (min.: 10, max.: 10)
```

where min. and max. are estimated queue lengths.

19.4.33.7 Visitors counter

19.4.33.7.1 Functions of the Visitors counter

Description	The **Visitors counter** detector counts visitors of the monitored object and generates an event when the specified number of people at the facility is exceeded

19.4.33.7.2 Video stream and scene requirements for the Visitors counter

Image requirements for the Visitors counter(see page 783)

Requirements for the operation of the **Visitors counter** are given in the table:

Camera	• Resolution: 720x576 (CIF4), 360x288 (CIF1) is also allowed. Increasing the resolution above CIF4 doesn't improve the performance of the recognition algorithm • FPS is 25 • Color: only color camera • No camera shake

Lighting	• The best performance of the detector is achieved under moderate lighting. In conditions of insufficient (night) or excessive (light-striking) lighting, the algorithm performance can decrease • Abrupt changes in lighting can lead to short-term incorrect operation of analytics
Scene and camera angle	• The best position is the camera looking down at the scene. The better this requirement is met, the more accurate the estimate is • Dimensions of the camera FOV: minimum 2x2 m, optimal 4x4 m • The background is mostly static and doesn't change abruptly • There are no moving objects in the counting area except for people • Analytics can work incorrectly on reflective surfaces, and if there are sharp shadows from moving objects • Analytics can work incorrectly if there are periodic movements of background objects in the camera FOV (trees, TV is on, and so on) • People are minimally obscured by static objects in the scene (columns, trees, and so on) • People must not move in solid stream. Groups of a few people are counted correctly

19.4.33.7.3 Image requirements for the Visitors counter

Video stream and scene requirements for the Visitors counter(see page 782)

Requirements for the operation of the **Visitors counter** are given in the table:

Object images

- Image quality: image must be clear, without obvious defects from the compression algorithm
- Allowable person size:
  Person size is an area of the rectangle around a person as a percentage of the frame area. To correctly receive an event from the detector, you must select a person size in the range from the minimum value depending on the frame width up to 75% of the frame width.

> **Note**
>
> Frame width isn't the original resolution of the video image, but the size of the frame based on the **Frame size change** parameter (see Configuring the Visitors counter(see page 785)).

The minimum size of a person, depending on the frame width, is given in the table:

Frame width, px	Minimum size of a person in %
320	**18.8**
360	**16.7**
384	**15.7**
400	**15**
426	**14.1**
512	**11.8**
640	**9.4**
800	**7.5**
832	**7.3**
854	**7.1**
960	**6.3**
1024	**5.9**
1120	**5.4**
1152	**5.2**
1280	**4.7**
1440	**4.2**
1600	**3.8**
1792	**3.4**
1856	**3.3**

Frame width, px	Minimum size of a person in %
1920	**3.2**
2048	**3.0**
2304	**2.7**
2560	**2.4**
2732	**2.2**
2800	**2.2**
3200	**1.9**
3840	**1.6**
4096	**1.5**
6400	**1**
8192	**0.8**

19.4.33.7.4 Configuring the Visitors counter

Video stream and scene requirements for the Visitors counter(see page 782)
Image requirements for the Visitors counter(see page 783)

Attention!

- The **Visitors counter** detector can have a margin of error and is suitable for counting the average number of visitors.
- We cannot guarantee the correct operation of the detector with a fisheye lens.

To configure the **Visitors counter**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Retail** → **Visitors counter**.

By default, the detector is enabled and set to count the number of people in a queue.

If necessary, you can change the settings of the detector parameters given in the table:

Parameter	Value	Description
Object features		
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		

Parameter	Value	Description
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Visitors counter**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**25**	Specify the number of frames for the detector to process per second. The larger the value, the greater the load on the CPU. The value must be in the range [0.016; 100]
Type	**Visitors counter**	Name of the detector type (non-editable field)
Advanced settings		
Frame size change	**640**	The analyzed frames are scaled down to a specified resolution (by default, **1920** pixels on the longer side) by default. The following algorithm is used: 1. If the longer side of the source image exceeds the value specified in the **Frame size change** field, it is divided by two. 2. If the resulting resolution falls below the specified value, the algorithm stops and this resolution will be used further. 3. If the resulting resolution still exceeds the specified value, it is divided by two until it is less than the specified resolution. **Note** For example, the source image resolution is 2048*1536, and the specified value is set to **1000**. In this case, the source resolution will be halved two times (512*384), as after the first division, the number of pixels on the longer side exceeds the specified value (1024 > 1000). If detection is performed on a higher resolution stream and detection errors occur, we recommend reducing the compression.
Number of people indoor	**0**	Enter the number of people indoor at the time you are configuring the detector. The value must be in the range [0, 100000]
People indoor counter	**Yes**	By default, the parameter is disabled. The detector generates events: Camera. Visitor access in the direction of "Entrance" and Camera. Visitor access in the direction of "Exit". If you also want to count visitors at the facility and generate an event when the threshold value is exceeded, select the **Yes** value
	No	
People indoor counter threshold	**10000**	Specify the threshold value of the number of people indoor. If this value is exceeded, the detector generates an event. The value must be in the range [0, 100000]
Basic settings		

Parameter	Value	Description
Person size	**20**	**Attention!** You must specify the size of a person taking into account Video stream and scene requirements for the Visitors counter(see page 782) and Image requirements for the Visitors counter(see page 783). Specify the area of the rectangle around a person as a percentage of the frame area. Note that the size is calculated based on the compressed frame size, not the original size of the video stream. The value must be in the range [1, 75]. **Note** It is better to specify the minimum size of a person graphically, the number in the **Person size** field is a conditional value. Click the min button in the preview window and specify the size of a person. To do this, move the anchor points of the rectangular area: 

In the preview window, specify the detection area. The detection area is divided into two sectors—area 1 and area 2. The transition from area 1 to area 2 is the visitor's passage in the "Exit" direction. The transition from area 2 to area 1 is the visitor's passage in the "Entrance" direction. If the **People indoor counter** parameter is enabled:

- Transition from area 1 to area 2—minus one to the visitors counter.
- Transition from area 2 to area 1—plus one to the visitors counter.

You can configure the sectors, using the anchor points or lines. To swap sectors, click inside one of them.

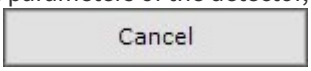


Note

For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.

Sectors are displayed by default. To hide them, click the  button. To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Visitors counter** is complete.

19.4.34 Category: Service

19.4.34.1 Audio loss detector

19.4.34.1.1 Functions of the Audio loss detector

Description	The **Audio loss detector** analyzes audio signal from the camera microphone and generates an event when the line from the microphone to the **Server** breaks (complete absence of sound) **Attention!** The **Audio loss detector** doesn't operate with cameras emitting a background signal with a non-zero volume, even if the integrated microphone is physically disabled.

19.4.34.1.2 Configuring the Audio loss detector

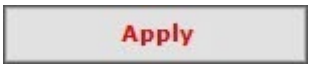
To configure the **Audio loss detector**, do the following:

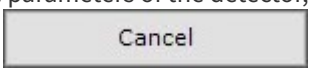
1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Service** → **Audio loss detector**.

By default, the detector is enabled and set to detect audio loss when the line from the microphone to the **Server** breaks (complete absence of sound).

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Audio loss detector**	Enter the detector name or leave the default name
Type	**Audio loss detector**	Name of the detector type (non-editable field)

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Audio loss detector** is complete.

19.4.34.2 Noise detector

19.4.34.2.1 Functions of the Noise detector

Description	The **Noise detector** analyzes audio signal from the camera microphone and generates an event when noise is detected

19.4.34.2.2 Configuring the Noise detector

To configure the **Noise detector**, do the following:

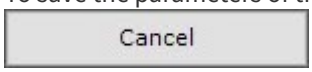
1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Service** → **Noise detector**.

By default, the detector is enabled and set to detect noise.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Noise detector**	Enter the detector name or leave the default name
Type	**Noise detector**	Name of the detector type (non-editable field)
Basic settings		
Alarm end delay	**10**	Enter the time in seconds during which the generation of an event won't stop after the noise stops. If noise is detected again within the specified time, it is considered as one event
Percentage of noise in audio stream	**2**	Specify the threshold value of noise in the audio stream as a percentage. If the value is exceeded, the detector generates an event. You must select the value empirically in the range [0, 100]

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Noise detector** is complete.

19.4.34.3 Signal detector

19.4.34.3.1 Functions of the Signal detector

Description	The **Signal detector** analyzes audio signal from the camera microphone and generates an event when an audio signal is received from an audio device

19.4.34.3.2 Configuring the Signal detector

To configure the **Signal detector**, do the following:

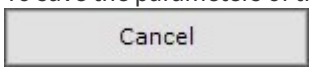
1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Service** → **Signal detector**.

By default, the detector is enabled and set to detect signals.

If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Other		
Enable	**Yes**	The detector is enabled by default. To disable the detector, select the **No** value
	No	
Name	**Signal detector**	Enter the detector name or leave the default name
Type	**Signal detector**	Name of the detector type (non-editable field)
Basic settings		
Alarm end delay	**10**	Enter the time in seconds during which the generation of an event won't stop after the noise stops. If noise is detected again within the specified time, it is considered as one event
Percentage of noise in audio stream	**2**	Specify the threshold value of noise in the audio stream as a percentage. If the value is exceeded, the detector generates an event. You must select the value empirically in the range [0, 100]

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuration of the **Signal detector** is complete.

19.4.34.4 Video clarity detector

19.4.34.4.1 Functions of the Video clarity detector

Attention!

Starting with *Detector Pack* 3.14, the **Tampering detector** has been renamed to the **Video clarity detector**.

Description	The **Video clarity detector** analyzes video image to determine the nature of its change

Type of analysis	Description
Blurred image analysis	The detector generates an event when image borders aren't clear. For example, the detector can generate an event when the image is blurred because of a dirty lens
Compression artifacts analysis	The detector generates an event when compression artifacts appear in the image
Image noise analysis	The detector generates an event when noise appears in the image. For example, the detector can generate an event when the bitrate is low or the image is rippled (snow)
Quality degradation analysis	The detector generates an event when there is a degradation in the quality of the image received from the camera. For example, the detector can generate an event when there is lens flare, severe defocusing, when camera lens closes, or when there is an abrupt decrease in image lighting
Scene change analysis	The detector generates an event when the background of the image changes, indicating a change in the position of the camera in space

19.4.34.4.2 Video stream and scene requirements for the Video clarity detector

Image requirements for the Video clarity detector(see page 791)

Requirements for the operation of the **Video clarity detector** are given in the table:

Camera	• Resolution is at least 320x240 pixels • FPS is at least 1 • Camera shake doesn't result in image offsets greater than 1% of the frame size
Lighting	• Moderate lighting. In conditions of insufficient (night) or excessive lighting (light-striking), stable operation of the analytics isn't guaranteed • No abrupt changes in lighting

Scene and camera angle	• Moving objects are visually separable from each other
	• Background is mostly static and doesn't change abruptly
	• Moving objects are minimally obscured by static objects in the scene (columns, trees, and so on)
	• Analytics can work incorrectly
	  ◦ on reflective surfaces, and if there are sharp shadows from moving objects
	  ◦ on long monochrome objects

19.4.34.4.3 Image requirements for the Video clarity detector

Video stream and scene requirements for the Video clarity detector(see page 791)

Requirements for the operation of the **Video clarity detector** are given in the table:

Object images	• Image isn't noisy and isn't distorted by the artifacts of the compression algorithm
	• The width and height of objects in the image must not:
	  • be less than 1% of the frame size (at resolutions of at least 1920x1080 pixels) or 15 pixels (at lower resolutions)
	  • exceed 75% of the frame size
	• Speed of object movement in the image must be at least one pixel per second
	• To detect an object, the duration of its visibility must be at least eight frames
	• Between two frames, an object must move in the direction of a distance not exceeding its size. This condition is necessary for the correct calculation of an object track

19.4.34.4.4 Configuring the Video clarity detector

Video stream and scene requirements for the Video clarity detector(see page 791)
Image requirements for the Video clarity detector(see page 791)

To configure the **Video clarity detector**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create...** → **Category: Service** → **Video clarity detector**.

By default, the detector is enabled and set to respond to all types of video analysis.

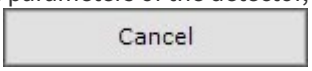
If necessary, you can change the detector parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed. Selecting a low-quality video stream reduces the load on the server
Other		
Enable	**Yes**	By default, the detector is enabled. To disable the detector, select the **No** value
	No	
Name	**Video clarity detector**	Enter the detector name or leave the default name

Parameter	Value	Description
Decode key frames	**Yes**	By default, the **Decode key frames** parameter is enabled. In this case, only key frames are decoded. To disable the parameter, select the **No** value. This parameter reduces the load on the server, but at the same time the detection quality decreases. We recommend enabling this parameter for "blind" (without video image display) servers, on which you want to perform detection. For the MJPEG codec, decoding isn't relevant, as each frame is considered a key frame. **Attention!** The **Number of frames processed per second** and **Decode key frames** parameters are interrelated. If a local client isn't connected to the server, the following rules work for remote clients: • If the key frame rate is less than the value specified in the **Number of frames processed per second** field, the detector works by key frames. • If the key frame rate is greater than the value specified in the **Number of frames processed per second** field, the detection is performed according to the set period. If a local client is connected to the server, the detector will always work according to the set period. After disconnecting the local client, the above rules are relevant again.
	No	
Decoder mode	**Auto**	Select a processing resource for video decoding. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Number of frames processed per second	**25**	Specify the number of frames for the detector to process per second. The value must be in the range [0.016; 100]
Type	**Video clarity detector**	Name of the detector type (non-editable field)
Advanced settings		
Blurred image analysis	**Yes**	Functions of the Video clarity detector(see page 790) By default, all types of analysis are applied to the video image. Select the **No** value for unnecessary types of analysis. **Attention!** If you select **Compression artifacts analysis**, **Image noise analysis**, and **Blurred image analysis**, you must specify the values for the **Event duration to trigger detection (sec)** and **Sensitivity** parameters.
	No	
Compression artifacts analysis	**Yes**	
	No	
Image noise analysis	**Yes**	
	No	
Quality degradation analysis	**Yes**	
	No	

Parameter	Value	Description
Scene change analysis	**Yes**	
	No	
Basic settings		
Event duration to trigger detection (sec)	**20**	Specify the maximum time of event duration for the response in seconds, after which the detector generates an event. The value must be in the range [5, 1200]. • If the algorithm definitely detects a defect in the frame, the response from the detector comes before the specified time. • If after the specified time, the defect hasn't been detected, you must increase the **Sensitivity** of the detector
Sensitivity	**50**	Specify the sensitivity of the detector as a percentage. The higher the sensitivity, the smaller change in the frame is detected. The value must be in the range [0, 100]

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the **Video clarity detector** is complete.

19.4.34.5 Detector of atypical changes in the scene VI

19.4.34.5.1 Functions of the Detector of atypical changes in the scene VI

Description	The **Detector of atypical changes in the scene VI** is used to detect changes not typical for the scene, such as overexposure, darkening, or defocusing
Licensing	To operate the detection tool, you need to contact an AxxonSoft manager and get a license file (see Types of licenses[316], Licensing of the software module for the Detector of atypical changes in the scene VI in Windows OS(see page 795), Licensing of the software module for the Detector of atypical changes in the scene VI in Linux OS(see page 795))
Add-ons	For the detection tool to work, you must install the VI Analytics Pack add-on (see Installing DetectorPack add-ons(see page 321))

19.4.34.5.2 Video stream and scene requirements for the Detector of atypical changes in the scene VI

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Detector of atypical changes in the scene VI(see page 795)

Requirements for the operation of the **Detector of atypical changes in the scene VI** are given in the table:

Camera	• Pitch angle of the camera optical axis relative to the horizontal plane: from 15 to 90 degrees (for the inclined method of placement) • Resolution is from 640x360 to 1920×1080 pixels

316 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Lighting	• Lighting in the scene is from 100 to 1000 lux
Scene and camera angle	• Shooting distance is from 5 to 30 meters

19.4.34.5.3 Image requirements for the Detector of atypical changes in the scene VI

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Detector of atypical changes in the scene VI(see page 794)

Requirements for the operation of the **Detector of atypical changes in the scene VI** are given in the table:

Object images	Image isn't noisy and isn't distorted by artifacts of the compression algorithm

19.4.34.5.4 Licensing of the software module for the Detector of atypical changes in the scene VI in Windows OS

Starting with *Detector Pack* 3.13, to license the detector, you must insert a Guardant USB key with a license that you got from the AxxonSoft sales department. Once you insert the key, the licensing process is complete.

If the license isn’t installed in the USB key, do the following to activate the license:

1. Contact the AxxonSoft manager to obtain the serial number for the Guardant hardware protection key.
2. Download the archive containing the **Guardant License Wizard** utility.
3. Unzip the downloaded archive.
4. Open the unzipped folder and launch the **Guardant License Wizard** utility.
5. Go to **Settings** and in the **Server address** field, enter the licensing server address:

   ```
   https://gkey.videointellect.com:9000
   ```

6. Return to the main window of the utility and click **License activation**.
7. In the **On which computer do you want to use the license?** section, select **On this**.
8. In the **Serial number** field, enter the serial number provided by the AxxonSoft manager.
9. Click **Get license**.

The license activation for the **Detector of atypical changes in the scene VI** is complete.

19.4.34.5.5 Licensing of the software module for the Detector of atypical changes in the scene VI in Linux OS

On the page:

- License activation using the Guardant dongle(see page 796)
- License activation and update for Detector Pack 3.13 and earlier(see page 796)
- Deleting the license for Detector Pack 3.13 and earlier(see page 796)

19.4.34.5.5.1 License activation using the Guardant dongle

Starting with *Detector Pack 3.14*, to operate with the license keys of the **Detector of atypical changes in the scene VI** and activate the license, do the following:

1. Connect the Guardant USB dongle to the device on which you installed *Axxon One*.
2. Install the driver:
   a. Download the archive.
   b. Unzip the content.
   c. Go to the directory with the archive contents.
   d. Run the driver installation script.

```
sudo ./install.sh
```

If you successfully install the driver, the license keys are displayed on the page http://127.0.0.1:3189/#/dongles/list.

License activation is complete.

For *Detector Pack 3.13* and earlier, use the following manual to activate and update the license:

License activation and update for Detector Pack 3.13 and earlier

19.4.34.5.5.2 License activation and update for *Detector Pack* 3.13 and earlier

To operate with the license keys of the **Detector of atypical changes in the scene VI** and activate/update the license, do the following:

1. Download the archive.
2. Unzip the content.
3. Open a terminal.
4. Go to the directory with the archive contents:

```
cd /AxxonSoft/DetectorPack/VLSdk/distrib
```

   where instead of **/AxxonSoft/DetectorPack/VLSdk**, you must specify the actual path.
5. Grant permissions to run the script for driver installation:

```
chmod 777 install.sh
```

6. Run the driver installation script.

```
sudo ./install.sh
```

7. Open a browser and go to the page http://127.0.0.1:1947/checkin.html.
8. On the page that opens, in the **Select File:** line, select the key with the v2c extension.

> **Attention!**
>
> To get the key with the v2c extension, you need to contact the AxxonSoft manager.

9. Click the **Apply File** button. If activation is successful, the key is displayed on the page http://127.0.0.1:1947/devices.html.

The license activation/update is complete. After activation, in the /SafeNet Sentinel/Sentinel LDK directory, the **installed** folder appears.

19.4.34.5.5.3 Deleting the license for *Detector Pack* 3.13 and earlier

To delete the license, do the following:

1. Delete the license file with the v2c extension from the **installed** folder in the /SafeNet Sentinel/Sentinel LDK directory.
2. Restart the OS.

Note

- When you delete the license, only the key is deleted. All license restriction counters remain in the secure storage.
- If you return the key to the root directory, it will be fully restored. Its counters will continue counting license restrictions from the moment when they stopped when the license file with the v2c. extension was deleted. The validity time of the license continues to count down even when the key is missing.

The license deletion is complete.

19.4.34.5.6 Configuring the Detector of atypical changes in the scene VI

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Detector of atypical changes in the scene VI(see page 794)
Image requirements for the Detector of atypical changes in the scene VI(see page 795)
Licensing of the software module for the Detector of atypical changes in the scene VI in Windows OS(see page 795)
Licensing of the software module for the Detector of atypical changes in the scene VI in Linux OS(see page 795)

To configure the **Detector of atypical changes in the scene VI**, do the following:

1. Go to the **Detection Tools** tab.
2. Below the required camera, click **Create…** → **Category: Service** → **Detector of atypical changes in the scene VI**.

By default, the detection tool is enabled and set to generate events when there are changes not typical for the scene, such as overexposure, darkening, or defocusing.

If necessary, you can change the detection tool parameters. The list of parameters is given in the table:

Parameter	Value	Description
Object features		
Record objects tracking	**Yes**	The metadata of the video stream is recorded to the database by default. To disable the parameter, select the **No** value
	No	
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detection tool is enabled. To disable, select the **No** value
	No	
Name	**Detector of atypical changes in the scene VI**	Enter the detection tool name or leave the default name
Background accumulation	**Yes**	By default, scene background accumulation is enabled. To disable, select the **No** value

Parameter	Value	Description
	No	
Backlight reaction time (sec)	**0**	Specify the time interval in seconds after which the detection tool signals that the scene is overexposed or darkened. The appropriate value should be determined empirically. The value must be in the range [0, 999999999]
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When you select a GPU, a stand-alone graphics card takes priority (when decoding with Nvidia NVDEC chips). If there is no appropriate GPU, the decoding will use the Intel Quick Sync Video technology. Otherwise, CPU resources will be used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Defocus reaction time (sec)	**0**	Specify the time interval in seconds after which the detection tool signals that the scene is defocused. The appropriate value should be determined empirically. The value must be in the range [0, 999999999]
Detection mode	**CPU**	Select the processor for the detection tool operation (see Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
Number of execution threads	**4**	Specify the number of execution threads. The value must be in the range [0, 100]
Number of frames processed per second	**12**	Specify the number of frames processed per second. Value should be in range [0.016, 100] **Attention!** The detector operates optimally with the default value for most use cases. Changing this value may reduce the detector's performance quality.
Saving background	**Yes**	By default, saving the scene background is enabled. To disable, select the **No** value
	No	**Attention!** Background files are automatically saved to the directory C:\ProgramData\VideoIntellect\. The size of this folder can quickly increase, potentially filling up all available space on the C drive. It is not possible to set a limit on the maximum volume of this directory, so it's important to periodically check its contents and clear it if necessary.
State saving interval	**0**	Specify the state saving interval in seconds. The value must be in the range [0, 9999]
Type	**Detector of atypical changes in the scene VI**	Name of the detection tool type (non-editable field)

In the preview window, you can specify the detection areas using the anchor points (see Configuring a detection area(see page 351)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the button (see Configuring a detection area(see page 351)). To cancel the action, click this button again.

To save the parameters of the detection tool, click the **Apply** button. To cancel the changes, click the **Cancel** button.

19.4.35 Category: Other

19.4.35.1 Fight detector VL

19.4.35.1.1 Functions of the Fight detector VL

Description	The **Fight detector VL** is used to detect fights in the scene
Licensing	To operate the detection tool, you need to contact an AxxonSoft manager and get a license file (see Types of licenses[317], Activating the license for the Fight detector VL in Windows OS(see page 800), Activating the license for the Fight detector VL in Linux OS(see page 804))
Add-ons	For the detection tool to work, you must install the VL Fight add-on and VL SDK Pack (see Installing DetectorPack add-ons(see page 321))

19.4.35.1.2 Video stream and scene requirements for the Fight detector VL

Hardware requirements for neural analytics operation(see page 339)
Image requirements for the Fight detector VL(see page 800)

Requirements for the operation of the **Fight detector VL** are given in the table:

Camera	• Resolution must be at least 640x360 pixels • The camera angle must be as horizontal as possible • FPS is at least 15 **Attention!** We don't recommend using a frame rate of more than 30 fps.
Lighting	• Lighting in the scene is at least 50 lux. In conditions of insufficient or excessive lighting (night or light-striking), we don't guarantee the stable operation of the analytics • No abrupt changes in lighting

317 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

Scene and camera angle	• Moving objects are visually separable from each other • The background is mostly static and doesn't change abruptly • Obscuring by the static objects in the scene is minimal (columns, trees, and so on) • The analyzed scene doesn't have reflective surfaces and sharp shadows from moving objects. If present, mask them • Camera shake doesn't result in image offsets greater than 1% of the frame size

19.4.35.1.3 Image requirements for the Fight detector VL

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Fight detector VL(see page 799)

Requirements for the operation of the **Fight detector VL** are given in the table:

Object images	• The height of a person must be at least 30% of the frame height or detection area
	• No objects must obscure the human body in the frame
	• The image isn't noisy and not distorted by the artifacts of the compression algorithm
	• The analytics quality is decreased by the following factors:
	  • Abrupt changes in the scene;
	  • Camera position from above at a high angle

19.4.35.1.4 Activating the license for the Fight detector VL in Windows OS

To activate a license for the **Fight detector VL** (see Configuring the Fight detector VL(see page 809)), do the following:

1. Request **EID** and **ProductID** from the technical support[318].

   Attention!

   EID and **ProductID** are linked with the MAC address of the server. If the MAC address changes, you need to request **EID** and **ProductID** again.

2. Open the following file in a text editor: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\data\license.conf.
3. Enter the received **EID** and **ProductID**.

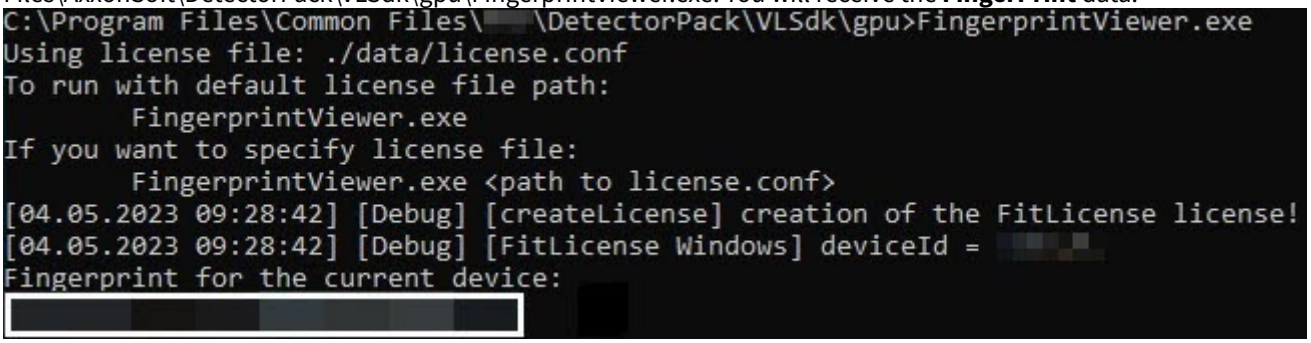
```
<param name="EID" type="Value::String" text="received EID"/>
<param name="ProductID" type="Value::String" text="received ProductID"/>
```

```
<?xml version="1.0"?>
<settings>
    <section name="Licensing::Settings">
        <param name="Server" type="Value::String" text="https://visionlabsbv.prod.sentinelcloud.com"/>
        <param name="EID" type="Value::String" text="                                    "/>
        <param name="ProductID" type="Value::String" text="                                    "/>
        <param name="Filename" type="Value::String" text="licenseFile.v2c"/>
        <param name="ContainerMode" type="Value::Int1" x="0"/>
    </section>
</settings>
```

4. Save the file: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\data\license.conf.

318 https://visionlabs.ai/contacts

5. In the command line, run the following file as administrator: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\gpu\FingerprintViewer.exe. You will receive the **FingerPrint** data.



6. Go to the website[319].

> **Attention!**
>
> If you fail to log in to the website, contact the technical support[320].

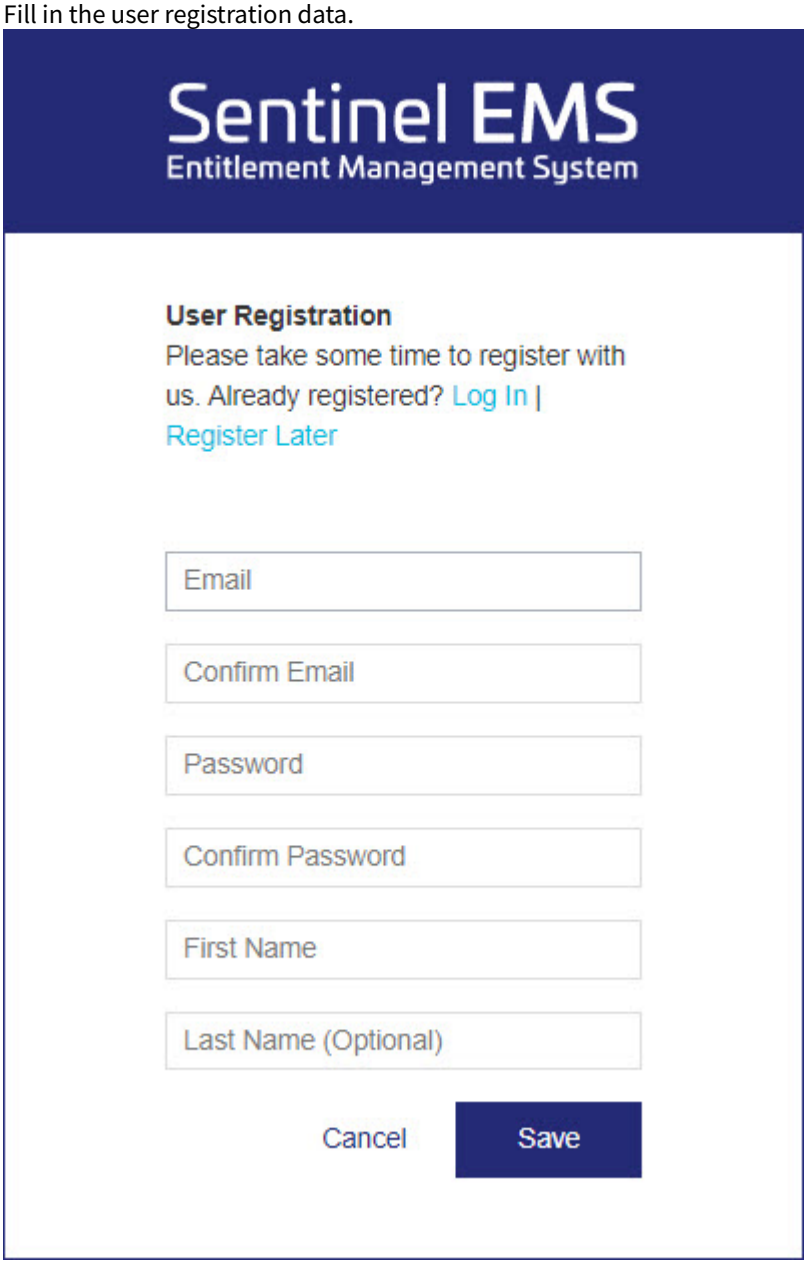
> Guide to the Sentinel EMS Customer Portal[321]

7. Log in using the received **EID**.



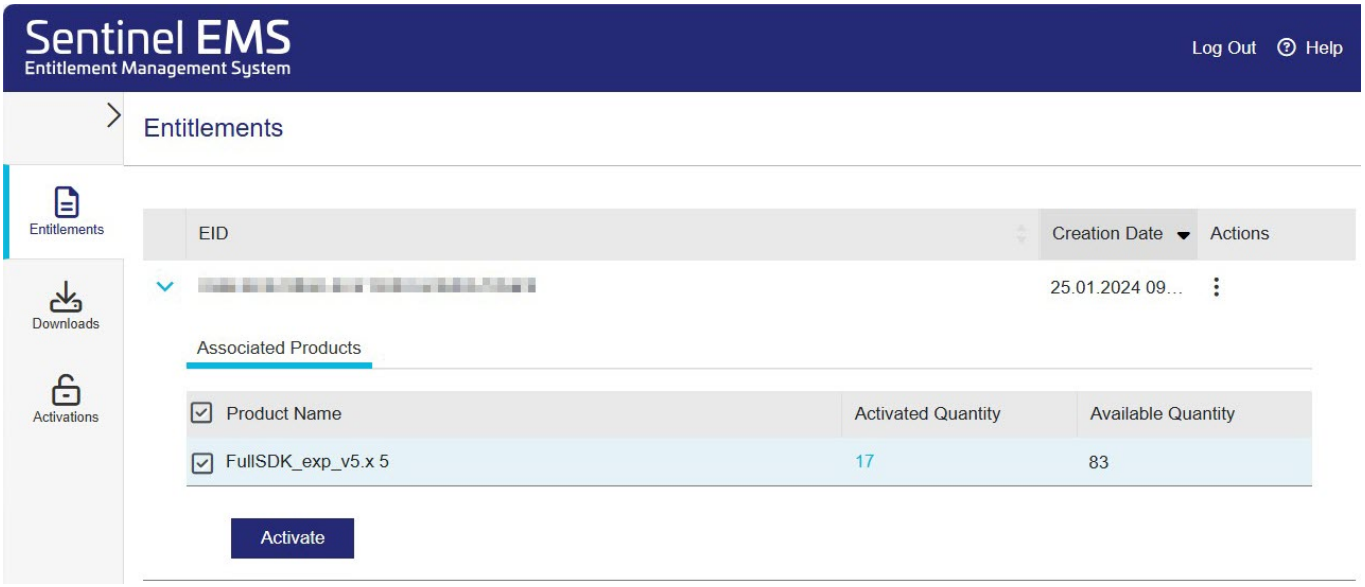
319 https://license.visionlabs.ai/ems/customerLogin.html
320 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3
321 https://docs.sentinel.thalesgroup.com/softwareandservices/ems/EMSdocs/CPUG/CPhome.htm

8. Fill in the user registration data.

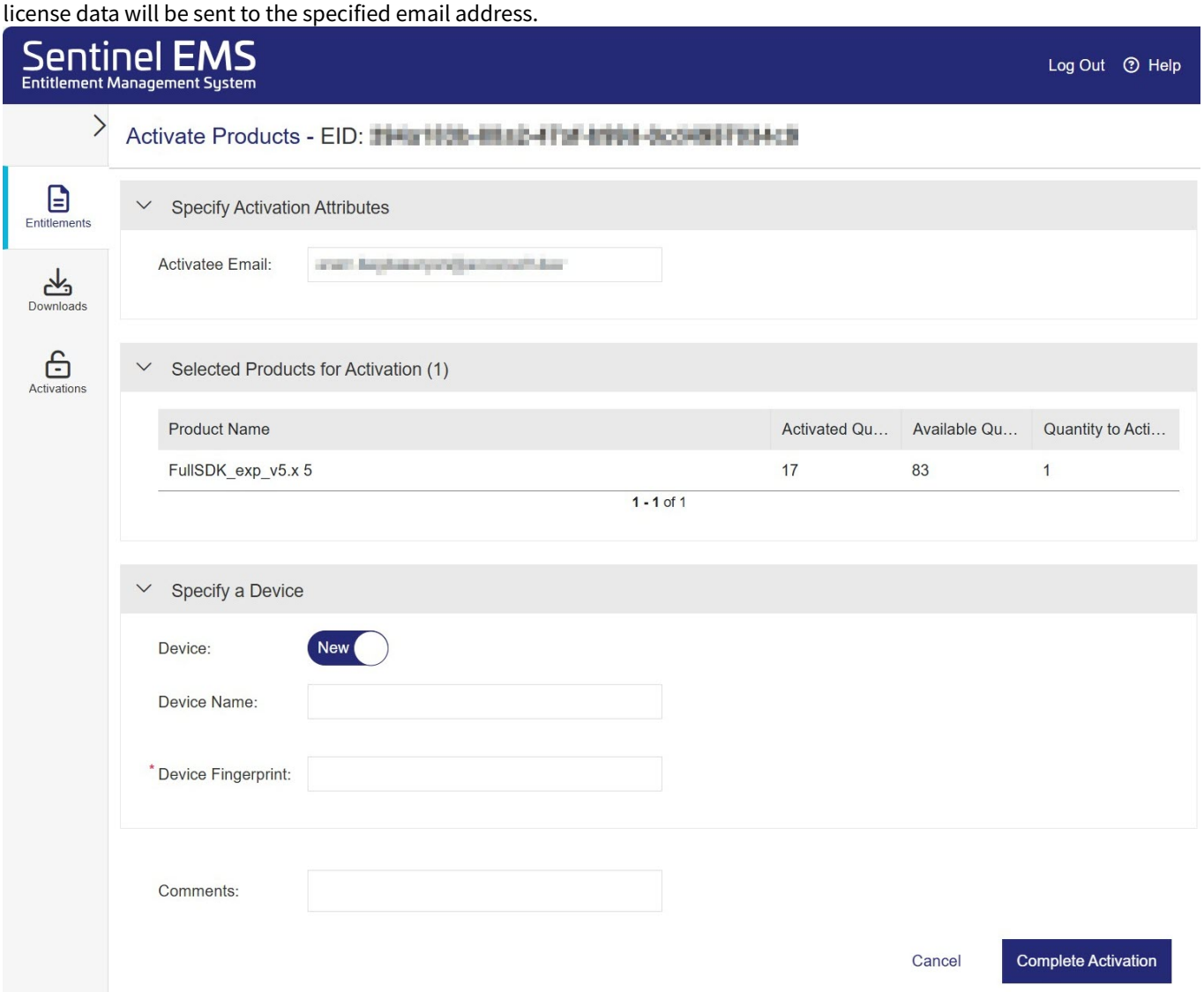


9. Click the **Save** button.

10. Click the **Activate** button to activate the license.



11. In the **Activatee Email** field, specify the email address to confirm the license activation. The **licenseFile.v2c** file with license data will be sent to the specified email address.



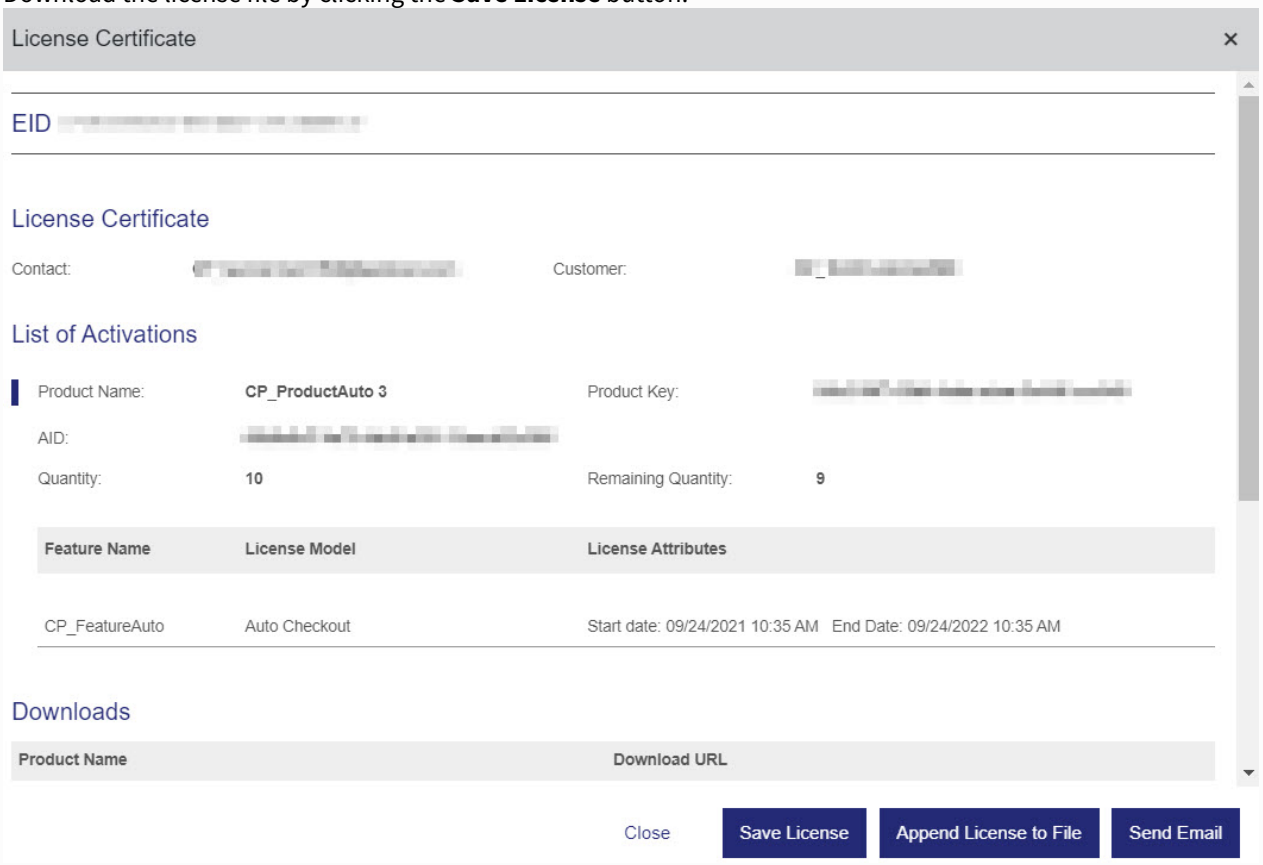
12. In the **Device FingerPrint** field, specify the **FingerPrint** data.
13. Click the **Complete Activation** button.

14. Place the downloaded **licenseFile.v2c** file on the server in the folder: C:\Program Files\Common Files\AxxonSoft\DetectorPack\VLSdk\.
15. Make sure the license is successfully activated. If the server is connected to the internet, the license will be checked automatically.

Note

If the server doesn't have internet connection, do the following:

1. Do steps 2–5, 14 on the server where the license will be used.
2. Do steps 1, 6–13, 15 on any computer connected to the internet.
3. Click the **View License Certificate** button.
4. Download the license file by clicking the **Save License** button.



The license is activated on the server with no internet connection.

The **Fight detector VL** license is activated.

19.4.35.1.5 Activating the license for the Fight detector VL in Linux OS

Attention!

A demo license has been added to the VL Fight add-on (see Installing DetectorPack add-ons(see page 321)). The demo license is valid for 30 days after installation on one server or a virtual machine.

To activate a license for the **Fight detector VL** (see Configuring the Fight detector VL(see page 809)), do the following:

1. Request **EID** and **ProductID** from technical support[322].

Attention!

322 https://visionlabs.ai/contacts

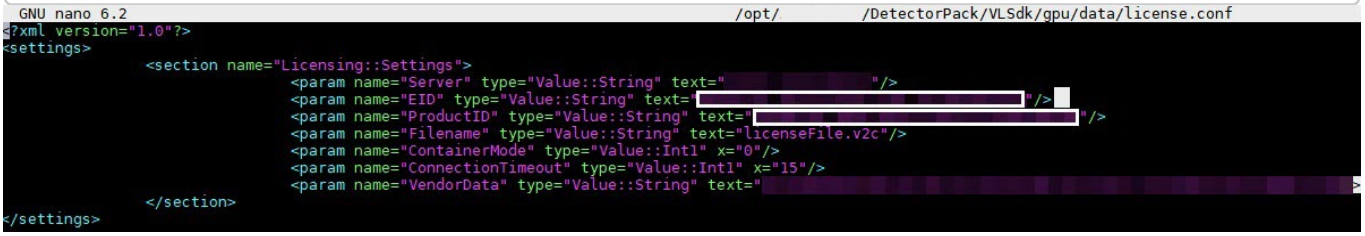
EID and **ProductID** are linked with the MAC address of the server. If the MAC address changes, you need to request **EID** and **ProductID** again.

2. Open the **license.conf** file.

```
sudo nano /opt/AxxonSoft/DetectorPack/VLSdk/gpu/data/license.conf
```

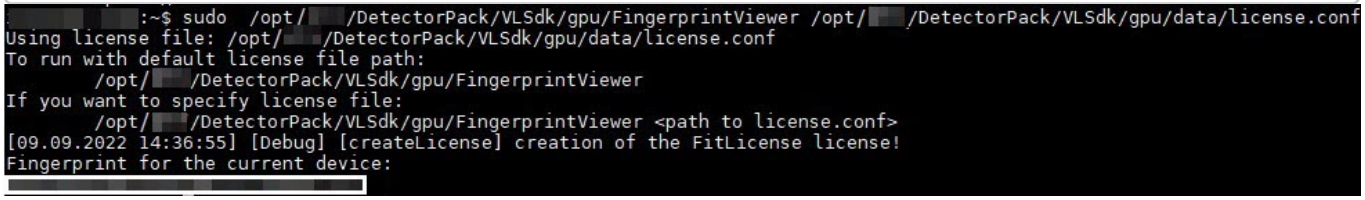
3. Enter the received **EID** and **ProductID**.

```
<param name="EID" type="Value::String" text="received EID"/>
<param name="ProductID" type="Value::String" text="received ProductID"/>
```



4. Save the file.
5. Run the **FingerprintViewer** file. You will receive the **FingerPrint** data.

```
sudo /opt/AxxonSoft/DetectorPack/VLSdk/gpu/FingerprintViewer /opt/AxxonSoft/DetectorPack/VLSdk/gpu/data/license.conf
```



6. Go to the website[323].

Attention!

If you fail to log in to the website, contact the technical support[324].

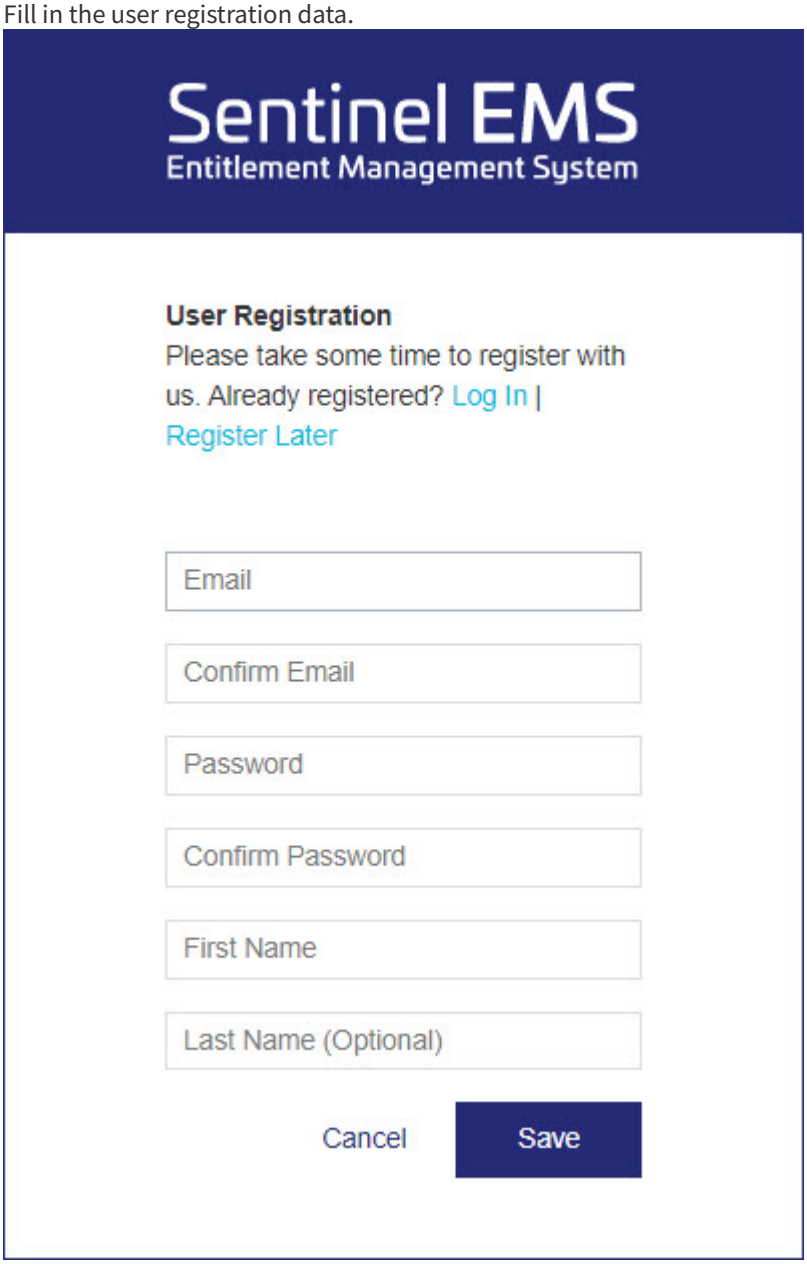
Guide to the Sentinel EMS Customer Portal[325]

323 https://license.visionlabs.ai/ems/customerLogin.html
324 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3
325 https://docs.sentinel.thalesgroup.com/softwareandservices/ems/EMSdocs/CPUG/CPhome.htm

7. Log in using the received **EID**.

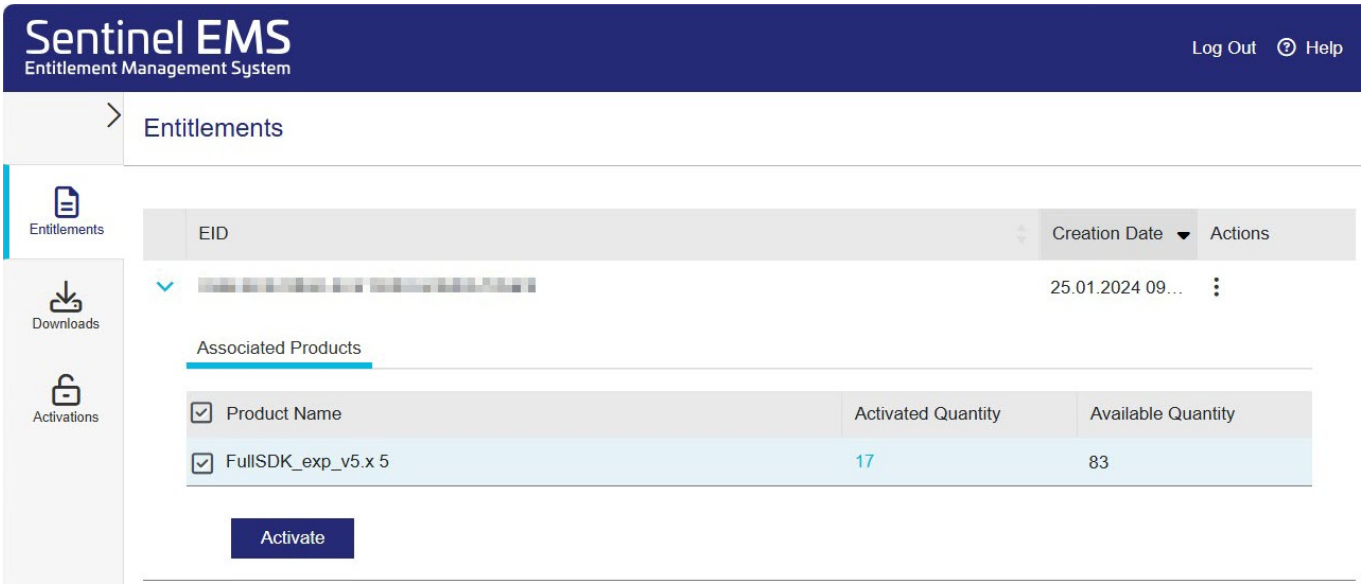


8. Fill in the user registration data.

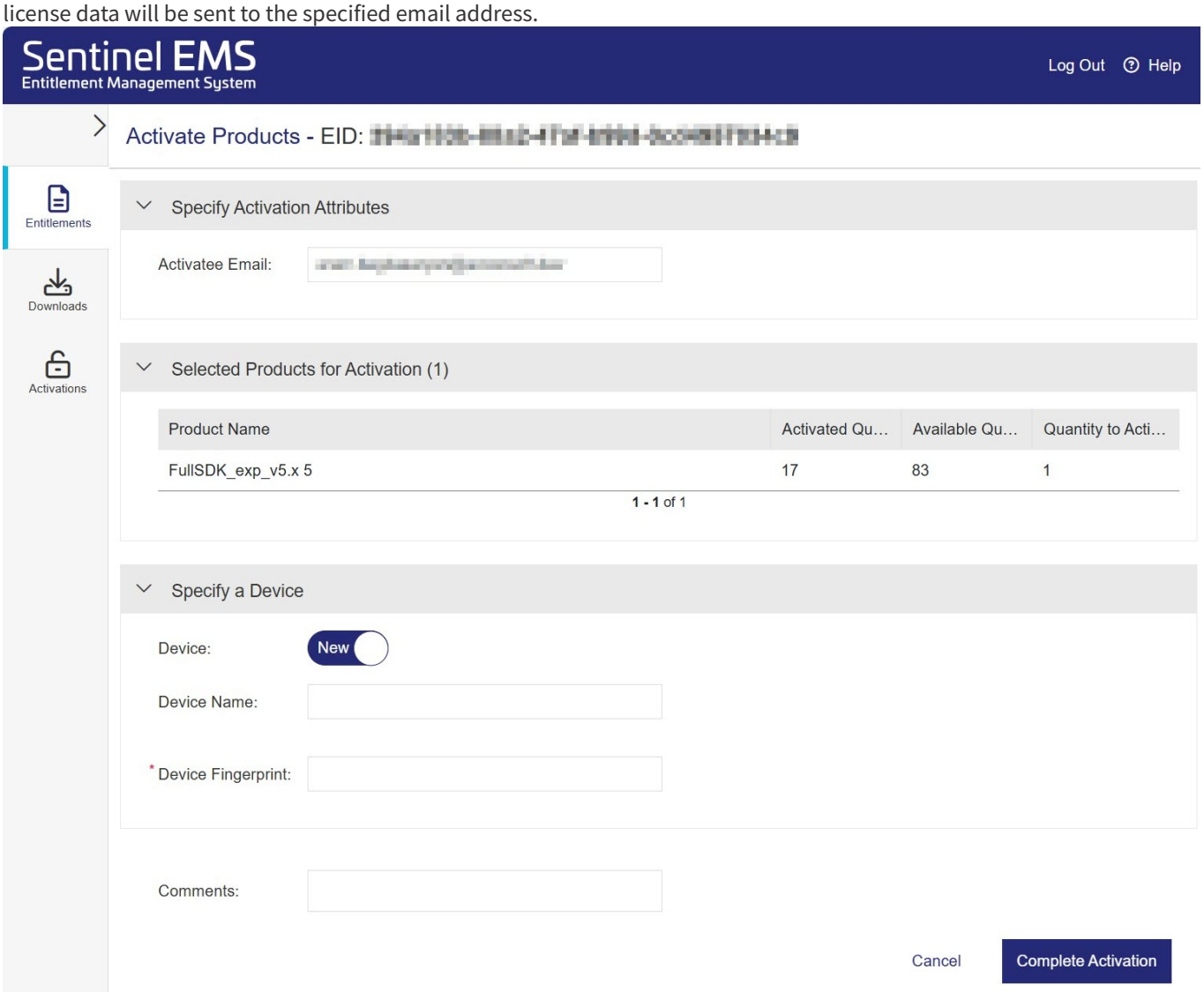


9. Click the **Save** button.

10. Click the **Activate** button to activate the license.



11. In the **Activatee Email** field, specify the email address to confirm the license activation. The **licenseFile.v2c** file with license data will be sent to the specified email address.



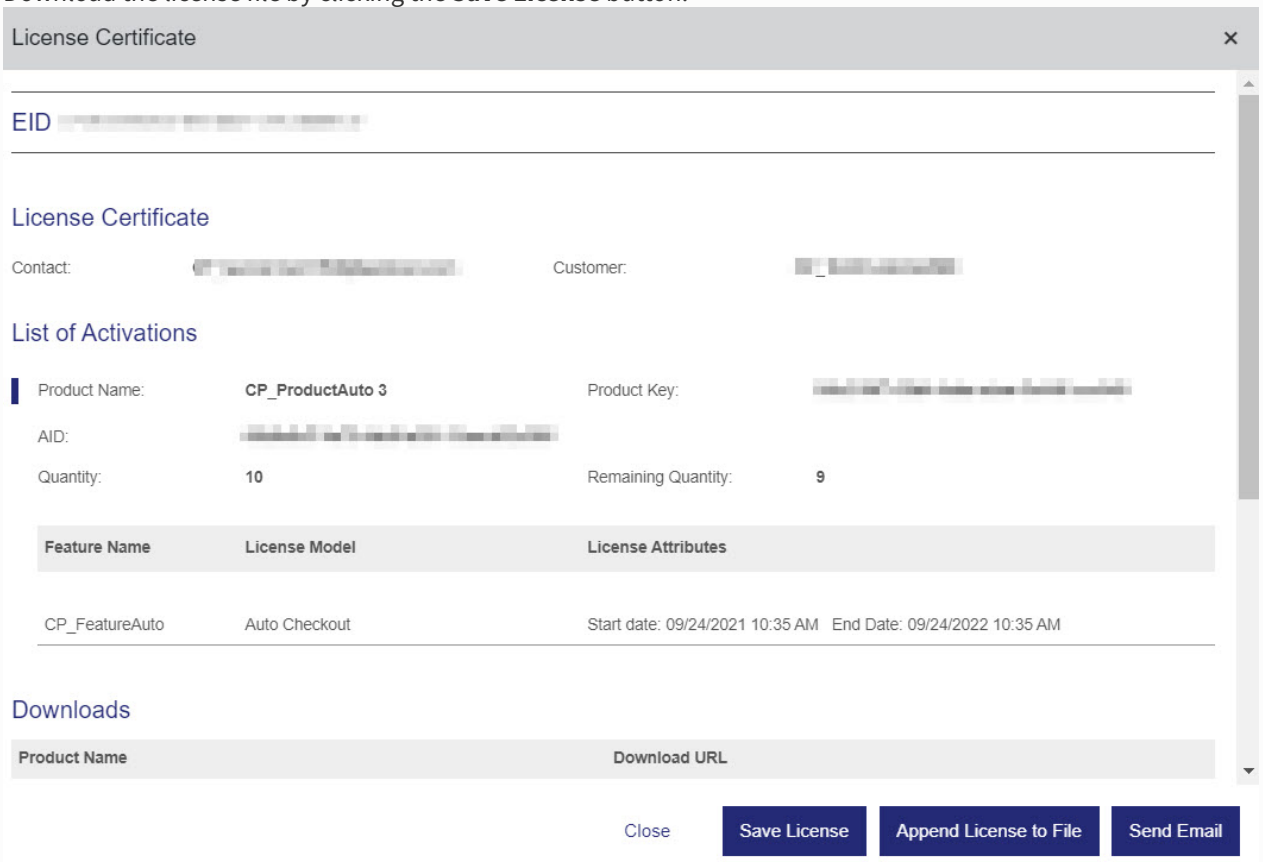
12. In the **Device FingerPrint** field, specify the **FingerPrint** data.
13. Click the **Complete Activation** button.

14. Place the **licenseFile.v2c** file in the required directory: /opt/AxxonSoft/DetectorPack/VLSdk/.
15. Make sure the license is successfully activated. If the server is connected to the internet, the license will be checked automatically.

Note

If the server doesn't have an internet connection, do the following:

1. Do steps 2–5, 14 on the server where the license will be used.
2. Do steps 1, 6–13, 15 on any computer connected to the internet.
3. Click the **View License Certificate** button.
4. Download the license file by clicking the **Save License** button.



The license is activated on the server with no internet connection.

The **Fight detector VL** license is activated.

19.4.35.1.6 Configuring the Fight detector VL

Hardware requirements for neural analytics operation(see page 339)
Video stream and scene requirements for the Fight detector VL(see page 799)
Image requirements for the Fight detector VL(see page 800)
Activating the license for the Fight detector VL in Windows OS(see page 800)
Activating the license for the Fight detector VL in Linux OS(see page 804)

To configure the **Fight detector VL**, do the following:

1. Go to the **Detectors** tab.
2. Below the required camera, click **Create…** → **Category: Other** → **Fight detector VL**.

By default, the detector is enabled and set to detect a fight in the scene.

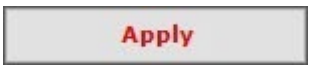
If necessary, you can change the detector parameters. The list of parameters is given in the table:

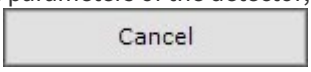
Parameter	Value	Description
Object features		
Video stream	**Main stream**	If the camera supports multistreaming, select the stream for which detection is needed
Other		
Enable	**Yes**	By default, the detector is enabled. To disable, select the **No** value
	No	
Name	**Fight detector VL**	Enter the detector name or leave the default name
Decoder mode	**Auto**	Select a processing resource for decoding video streams. When selecting a GPU, a stand-alone graphics card takes priority (decoding with Nvidia NVDEC chips). The decoding uses the Intel Quick Sync Video technology if there is no appropriate GPU. Otherwise, CPU resources are used for decoding
	CPU	
	GPU	
	HuaweiNPU	
Type	**Fight detector VL**	Name of the detector type (non-editable field)
Basic settings		
Detection mode	**CPU**	Select the processor for detector operation (see Selecting Nvidia GPU when configuring detectors(see page 348))
	Nvidia GPU 0	
	Nvidia GPU 1	
	Nvidia GPU 2	
	Nvidia GPU 3	
Detection threshold *(starting with Detector Pack 3.14)*	**50**	Specify the threshold value that recognizes behavior as a fight. The lower the value, the greater the chance of detecting weak signs of a fight. You must select the appropriate values empirically. The value must be in the range [1, 100]
Ignore time (sec)	**30**	Specify the time interval in seconds during which events aren't processed after successful detection. The parameter is necessary to reduce the total number of events since the analysis is performed continuously, and the duration of real events can be several seconds. You must select the required value empirically. The value must be in the range [0, 9999]

In the preview window, set the area for object detection. You can configure the detection area by moving the anchor points (see Configuring a detection area(see page 351)).

Note

- For convenience of configuration, you can "freeze" the frame. Click the  button. To cancel the action, click this button again.
- The detection area is displayed by default. To hide it, click the  button (see Configuring a detection area(see page 351)). To cancel the action, click this button again.

To save the parameters of the detector, click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

Configuring the Fight detector VL is complete.

19.4.36 Category: Embedded

19.4.36.1 General information about embedded detectors

Axxon One integrates embedded analytics for multiple cameras. You can find analytics in the list of supported devices[326] in the **Analytics** column.

Camera embedded analytics is the ability to process a video stream directly on the camera to identify specific events or objects. For example, this can include face recognition, motion detection, person or vehicle counting, detection of an entrance or exit area, and so on.

If *Axxon One* supports the device embedded analytics, you can create detectors from that camera (see Configuring detectors and their sub-detectors(see page 328)).

Note

- Some devices have interdependent embedded analytics that cannot work together with other detectors. For example, if an **Embedded face detector** is created for a camera in the *Axxon One* configuration, you can create the Face detector VL(see page 473) for the same camera, but it won't work.
- Some camera manufacturers restrict the use of multiple embedded detectors at the same time. If such a restriction exists, it won't be displayed in *Axxon One*. You can create multiple embedded detectors for one camera, but the functionality of these detectors can be limited by the manufacturer.

If the camera supports Motion mask, it is displayed in the preview window when you configure the embedded detector. If there is motion, but it doesn't exceed the threshold value (because of the sensitivity parameters of the detector), the mask cells are colored green. If there is motion and it generates an event, the cells are colored red.

326 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack



19.4.36.2 Embedded IVA analytics

Axxon One can receive metadata directly from some cameras. For example, you can receive metadata from the IVA system.

19.4.36.3 Embedded ONVIF analytics

Embedded ONVIF analytics are embedded detectors supported on the side of an IP device via the ONVIF[327] protocol. The list of IP devices supported via the ONVIF[328] protocol is provided in the documentation[329].

Attention!

- In *Axxon One*, embedded detectors of an IP device always have the "Embedded" prefix.
- The number of detectors that are supported via the ONVIF protocol depends on an IP device.

To configure an embedded detector, do the following:

1. Configure a detector in the web interface of an IP device.

   Attention!

   - The settings of embedded detectors are described in the official documentation of an IP device.
   - In order to receive events from an embedded detector to *Axxon One*, you must configure the schedule in the web interface of an IP device and select days and time of operation of an embedded detector.

2. Add an IP device to *Axxon One* (see Searching, adding, configuring, and removing IP devices(see page 157)).
3. Configure recording to an archive (see Configuring recording to an archive(see page 295)).
4. Create the required embedded detector (see Configuring detectors and their sub-detectors(see page 328)).
5. Configure macros to initiate (see Initiate alarm(see page 861)) and stop alarms (see Stop alarm(see page 864)).

Configuration of an embedded detector is complete. If necessary, you can change some settings of an embedded detector in the *Axxon One* interface.

Attention!

Settings of an embedded detector that are displayed in *Axxon One* depend on an IP device.

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327 https://www.onvif.org/
328 https://www.onvif.org/
329 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack

Events from an embedded detector are displayed in the events feed (see Checking events of a detector(see page 357)).

Rules is a special type of embedded detector based on advanced analytics and Profile M[330] that is used for flexible configuration of each embedded detector (see Adding the ONVIF Profile M embedded detection tools(see page 813)). You can use it to configure, for example, multiple Embedded motion detectors with different detection areas and sensitivity on the same IP device.

Attention!

- To display the embedded Rules detectors and their properties in *Axxon One*, the IP device must support the analytics service and its basic queries.
- In *DriversPack* 3.8 and earlier versions, you can configure only certain properties of the embedded Rules detectors.

19.4.36.4 Adding the ONVIF Profile M embedded detection tools

To add the ONVIF Profile M embedded detection tools, do the following:

1. Start the *Axxon One* Client.
2. Add the ONVIF device to *Axxon One* (see Searching, adding, configuring, and removing IP devices(see page 157)).
3. Configure recording to an archive (see Configuring recording to an archive(see page 295)).
4. Configure the parameters of the ONVIF device (see Camera(see page 171)).
5. On the **Detection Tools** tab, create the required embedded detection tool below the ONVIF device (see Configuring detectors and their sub-detectors(see page 328)). Names of the ONVIF Profile M detection tools start with **Rule**.

   Attention!

   - In *Axxon One*, embedded detection tools of an IP device always have the "Embedded" prefix.
   - The number of detection tools that are supported by the ONVIF protocol depends on the IP device.

Adding the ONVIF Profile M embedded detection tools is complete. Events from embedded analytics are displayed in the events feed (see Checking events of a detector(see page 357)).

19.4.36.5 Embedded license plate recognition detectors

Some camera models support embedded detectors to recognize license plates.

Note

To get the list of cameras with this feature, contact the technical support[331].

In general, when you configure embedded analytics, refer to the official documentation for the corresponding camera or the description of parameters in the *Axxon One* interface.

19.4.36.6 Embedded vehicle speed measurement radar

On this page:

- General information(see page 814)
- Configuring the Embedded vehicle speed

330 https://www.onvif.org/profiles/profile-m/
331 https://help.axxonsoft.com/jira/servicedesk/customer/portal/3

measurement radar detection tool(see page 814)
- Search the archive by vehicle speed(see page 816)

19.4.36.6.1 General information

Some cameras feature embedded analytics for license plate recognition and vehicle speed detection. IP devices that support this analytics are listed in the list of supported IP devices[332] in the **Analytics** column.

Embedded vehicle speed measurement radar is an embedded detection tool, which is used to determine the vehicle speed. Based on events received from the embedded radar, you can configure macros in *Axxon One* and search the archive by vehicle speed.

19.4.36.6.2 Configuring the Embedded vehicle speed measurement radar detection tool

In general, the **Embedded vehicle speed measurement radar** is configured as follows (as an example, the GIT-CNW25060/BUR(L) camera is used):

1. Configure the detection tool in the web interface of the IP device.

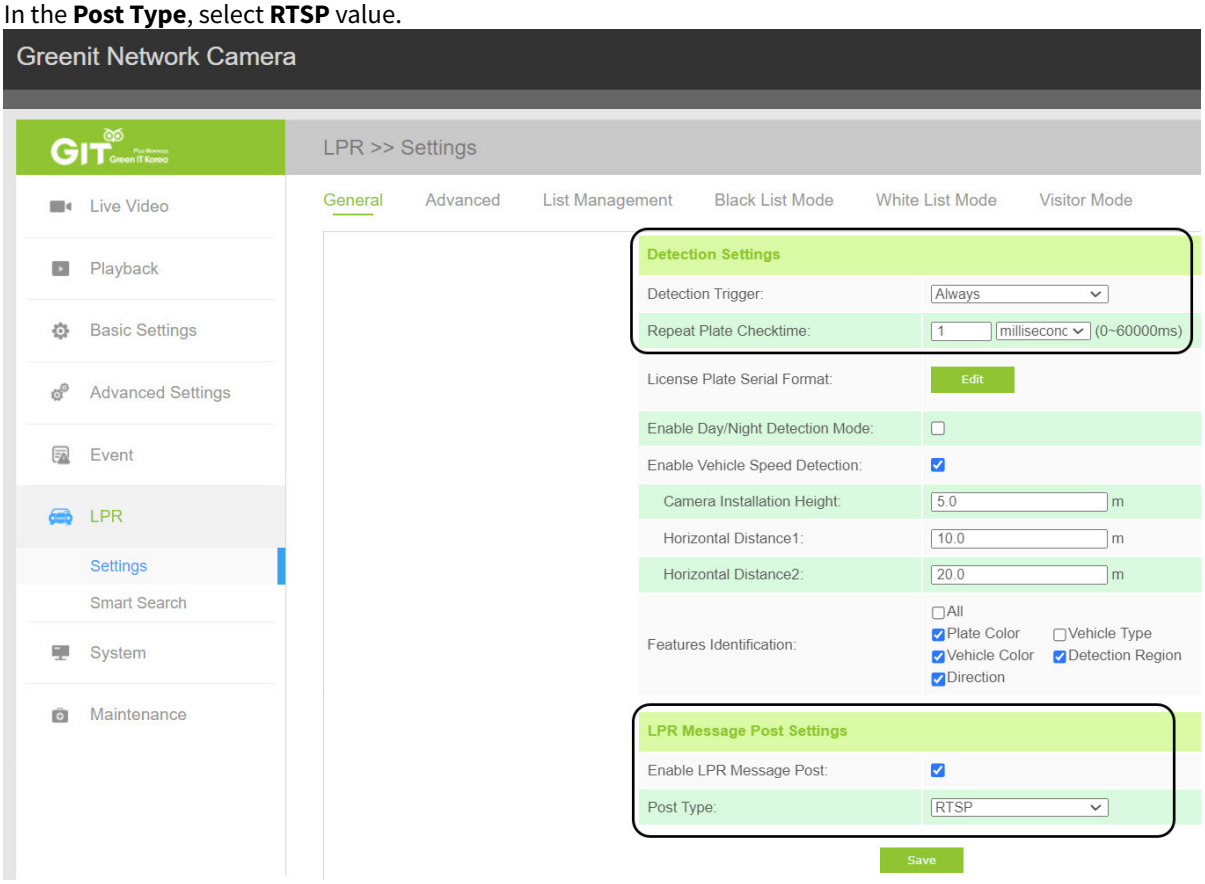
   Attention!

   - Settings for embedded detection tools are described in the official documentation of the corresponding IP devices.
   - To receive events from the embedded detection tool in *Axxon One*, set up a schedule in the web interface of the IP device:
     i. Go to the **Configuration** → **LPR** → **Settings** → **General** tab.
     ii. In the **Schedule settings** section, select the operation time of the embedded detection tool.

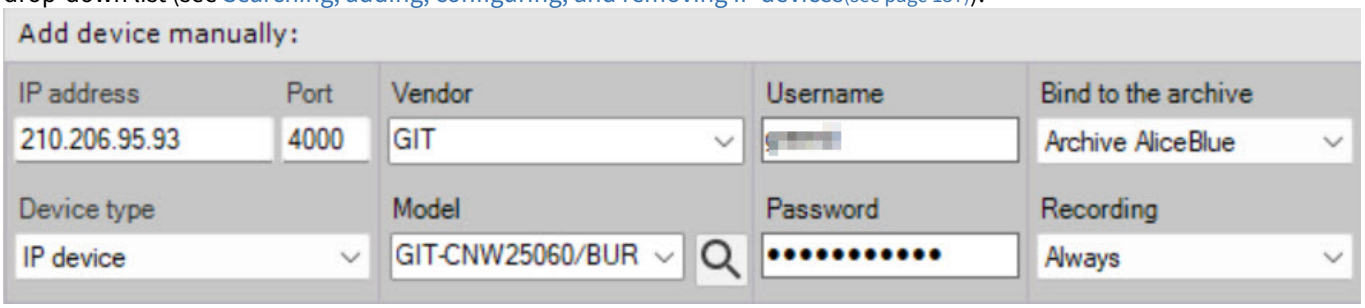
   a. In the **Detection Settings** group:
      i. In the **Detection Trigger** field, select **Always**.
      ii. In the **Repeat Plate Checktime** field, specify the value **1 millisecond**.
   b. In the **LPR Message Post Settings** group:
      i. Set the **Enable LPR Message Post** checkbox.

332 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack

ii. In the **Post Type**, select **RTSP** value.

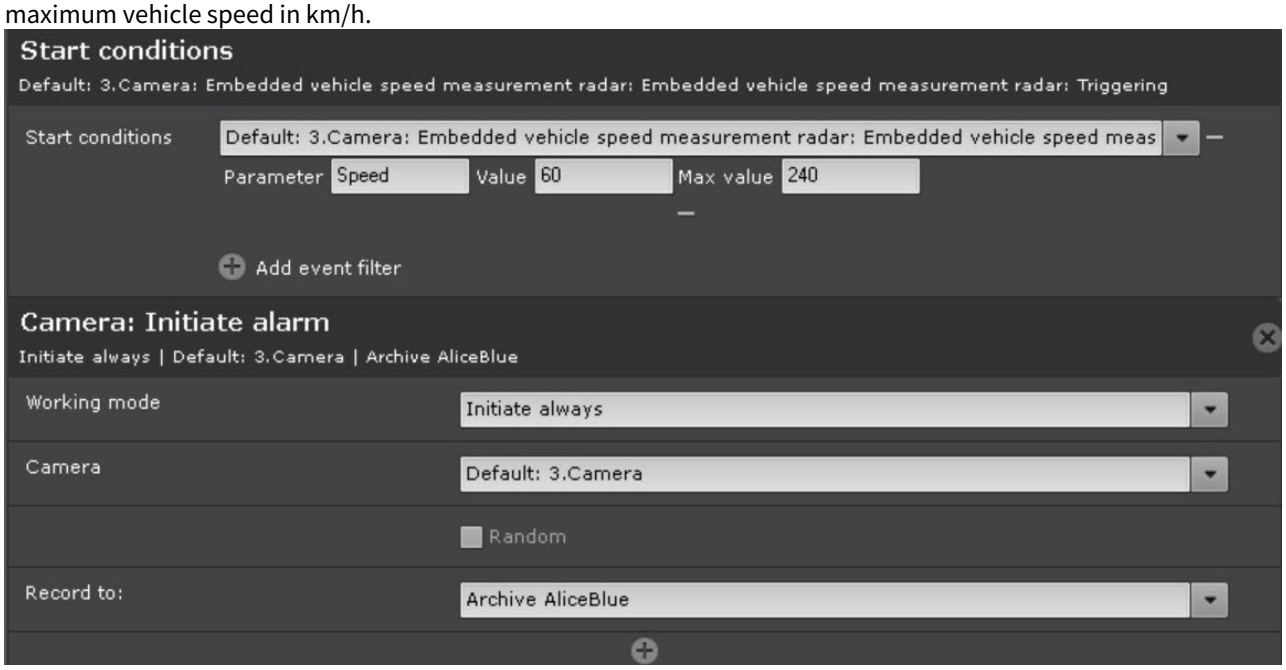


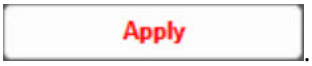
2. To save the changes, click the **Save** button.
3. Add this IP device to *Axxon One* by setting up permanent recording to the archive and selecting **Always** from the **Recording** drop-down list (see Searching, adding, configuring, and removing IP devices(see page 157)).



4. On the **Detection Tools** tab, below the required IP device, click **Create…** → **Category: Embedded** → **Embedded vehicle speed measurement radar**.
5. Configure a macro when the **Embedded vehicle speed measurement radar** detection tool generates an event (see Configuring macros(see page 830)). If necessary, you can configure a macro to initiate an alarm when the vehicle speed is exceeded (see Initiate alarm(see page 861)). To do this:
   a. Click the  button below the condition for macro.

b. In the **Parameter** field, specify the **Speed** value; in the **Value** and **Max value** fields, specify the minimum and maximum vehicle speed in km/h.



6. Click on the **Apply** button 

.

The **Embedded vehicle speed measurement radar** detection tool is configured.

When the vehicles moving at speed that exceeds the values specified in the macro are detected, an alarm is initiated and displayed on the Alert panel (see Alert panel(see page 1131), Working with an Alarm Board(see page 1278)).

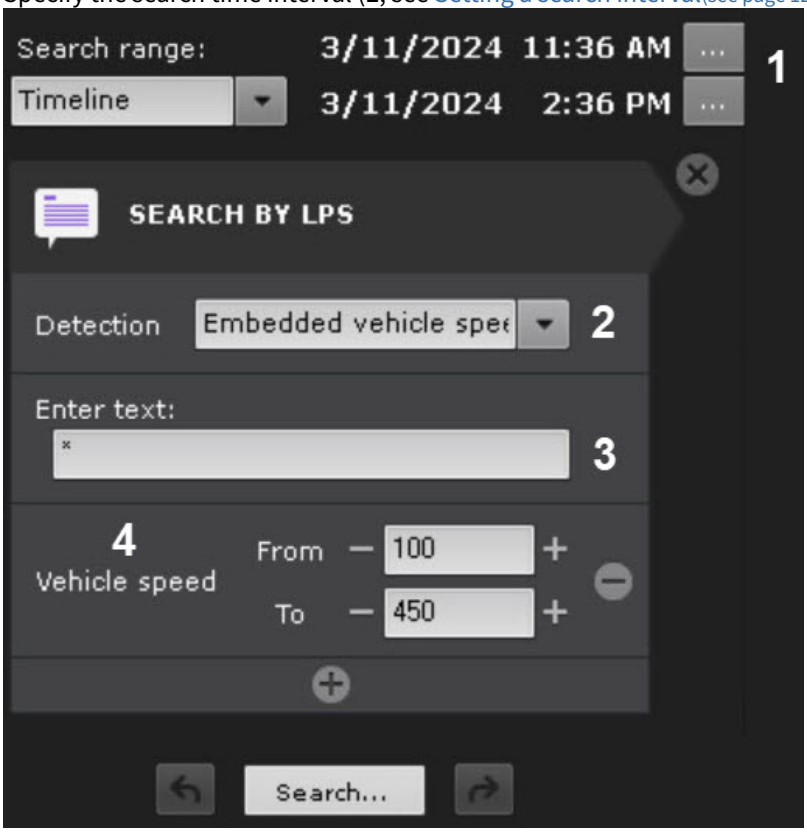


19.4.36.6.3 Search the archive by vehicle speed

You can search in the archive for events from the **Embedded vehicle speed measurement radar** detection tool based on vehicle speed. To do this:

1. Switch to the archive search mode of the camera on the basis of which the **Embedded vehicle speed measurement radar** was created (see Switching to the Archive Search mode(see page 1207)).

2. Specify the search time interval (**1**, see Setting a search interval(see page 1211)).



3. From the list of search types, select **Search by LPs** (see Search by LPs(see page 1227)).
4. From the list of detection tools, select **Embedded vehicle speed measurement radar** (**2**), the alarms from which must be used as a search source.
5. Specify the license plate number of the vehicle to search in the archive (**3**).

> **Note**
>
> To search by all recognized license plates, enter ***** (asterisk).

6. Add an additional **Vehicle speed** criterion (**4**): in the **From** and **To** fields, specify the vehicle speed range in km/h. The search results will only display events where the vehicle speed matches or is within the specified range.
7. Click the **Search** button.

This starts a search based on the selected criteria.

The search results panel displays frames with vehicles, the license plates of which contain the text from the search query and also meet the specified additional parameters.

19.4.36.7 Embedded temperature detector

For a number of thermal cameras, *Axxon One* supports an embedded temperature detector (see Documentation Drivers Pack[333], **body temperature detection**). This detector detects a person's face and its temperature in the video image.

In general, to configure the temperature detector, do the following:

1. Create a detector (see Configuring detectors and their sub-detectors(see page 328)).
2. Refer to the official documentation for the camera to configure the detector in *Axxon One*.

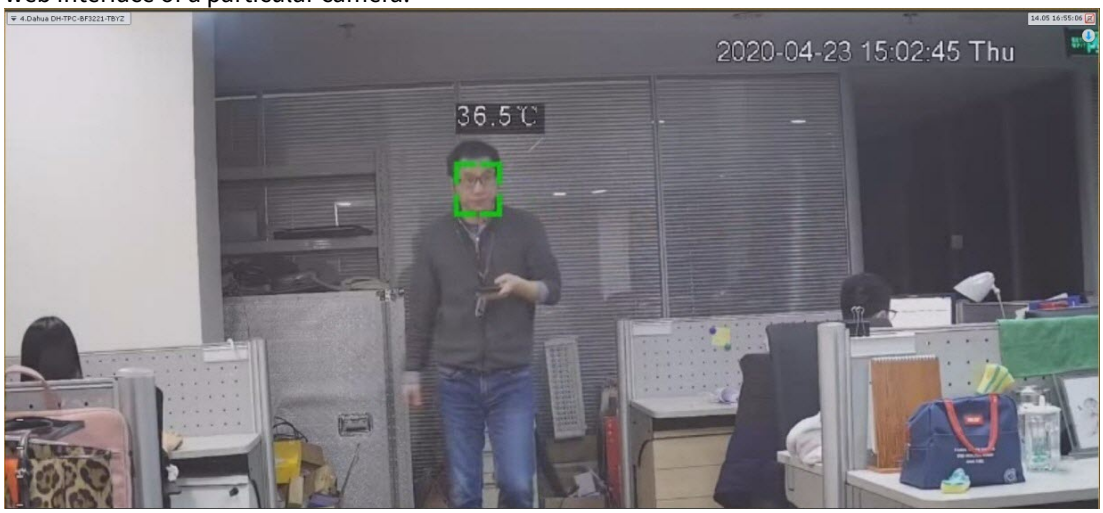
> **Attention!**

333 https://docs.axxonsoft.com/confluence/spaces/DDP/pages/97190803/Documentation+Drivers+Pack

In general, you must specify a temperature threshold for all cameras. If the threshold is exceeded, the detector generates an event.
You must also configure a black body (similar to Face detector and temperature control, see Configuring Face detector and temperature control(see page 822)).

3. If necessary, configure macros to initiate certain actions in the system when the detector generates an event (see Programming(see page 828)).

Some cameras display a bounding box of a person's face and its temperature on the video image. This feature is enabled in the web interface of a particular camera.



19.4.36.8 Face detection and temperature control with Mobotix M16 TR cameras

19.4.36.8.1 Functionality of the Face detector and temperature control

When working with Mobotix M16 TR cameras, the standard face detection algorithm (see Functions of the Face detector VA(see page 485)) is used along with an additional option of temperature measurement.

For each recognized face in the frame, the following is performed:

1. Temperature measurement.
2. Display the measurement result next to the face bounding box.
3. Recording the temperature value into the system log along with the face recognition event (see System log(see page 1318)).

You can also set the system to launch a macro if temperature readings exceed the maximum permitted value (see Parameters that specify the conditions for starting a macro when recognizing a face(see page 848)).

19.4.36.8.2 Camera requirements for Face detector and temperature control

For the **Face detector and temperature control** to work properly, the following camera requirements must be met:

1. Frame rate is at least 8 FPS.
2. Resolution is at least 1280x960 pixels.
3. Indoor installation only.
4. For maximum temperature measurement accuracy, avoid installing cameras near exits to street, in direct sunlight, and close to direct exposure to air conditioning.
5. The distance between the camera and a person in the measurement area must be within 1-2 meters.
6. For best accuracy, install the Electromagnetic Radiation Absorber (BB) in the measurement area at the same distance as a person.
7. The maximum angle of incidence must not exceed +/- 15° from the frontal angle of photos of people's faces obtained from cameras.
8. Distance between pupils on photos of people's faces obtained from cameras must be at least 32 pixels.
9. There must be minimum mutual covering of the captured faces.
10. Faces must be evenly illuminated with a diffused light of at least 200 lux. Directional side lighting isn't allowed.

11. The sharpness of the captured faces on photos obtained from cameras must at least 64 grayscale. Deficient or exceeding illumination isn't allowed.
12. There must be no back light and sharp gradients of light and shade.
13. Photos of the captured faces obtained from cameras must be clear. Image blurring caused by motion isn't allowed.

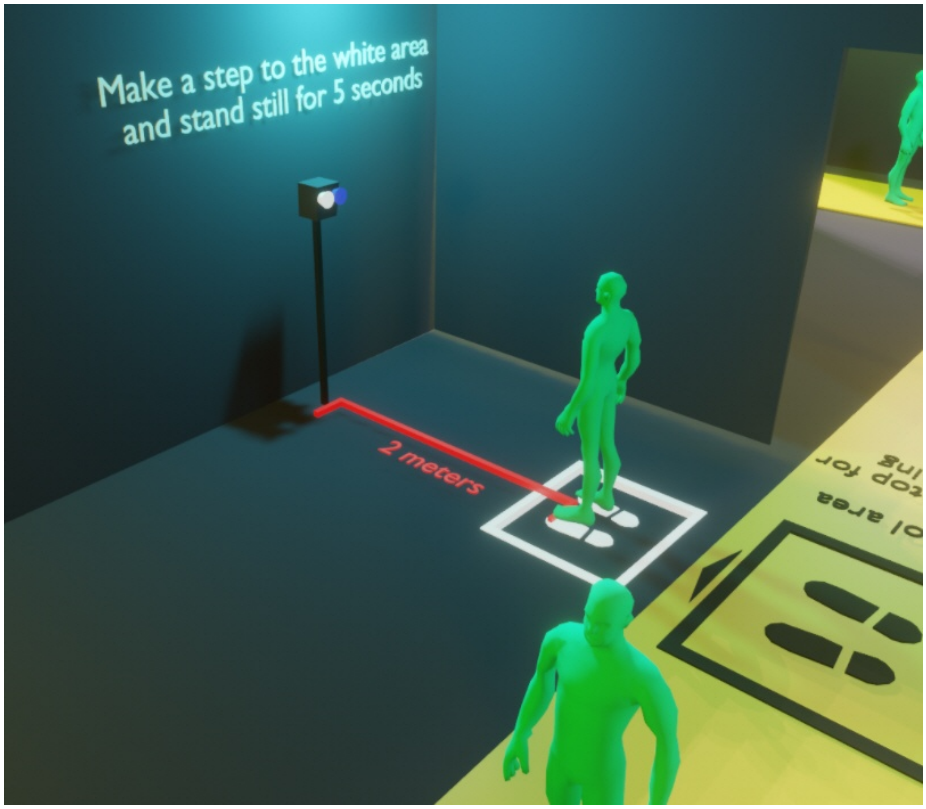
Note

You can set the required distance between the camera and the face using a lens with the required focal length.

19.4.36.8.3 Temperature screening protocol

For maximum measurement accuracy, the following conditions must be met:

1. Before checking the temperature, a person must normalize their body temperature. To do this, a person must avoid exposure to direct sunlight, incoming air flow from the street or air conditioning, and exclude any other factors that can cause momentary changes in body temperature.
2. The measurement area must contain only one person.
3. A person must be without a medical mask, glasses, or headgear in the measurement area.
4. In the measurement area, a person must stay at a distance of 1-2 metres from the camera for at least three seconds without moving, while looking into the camera lens.



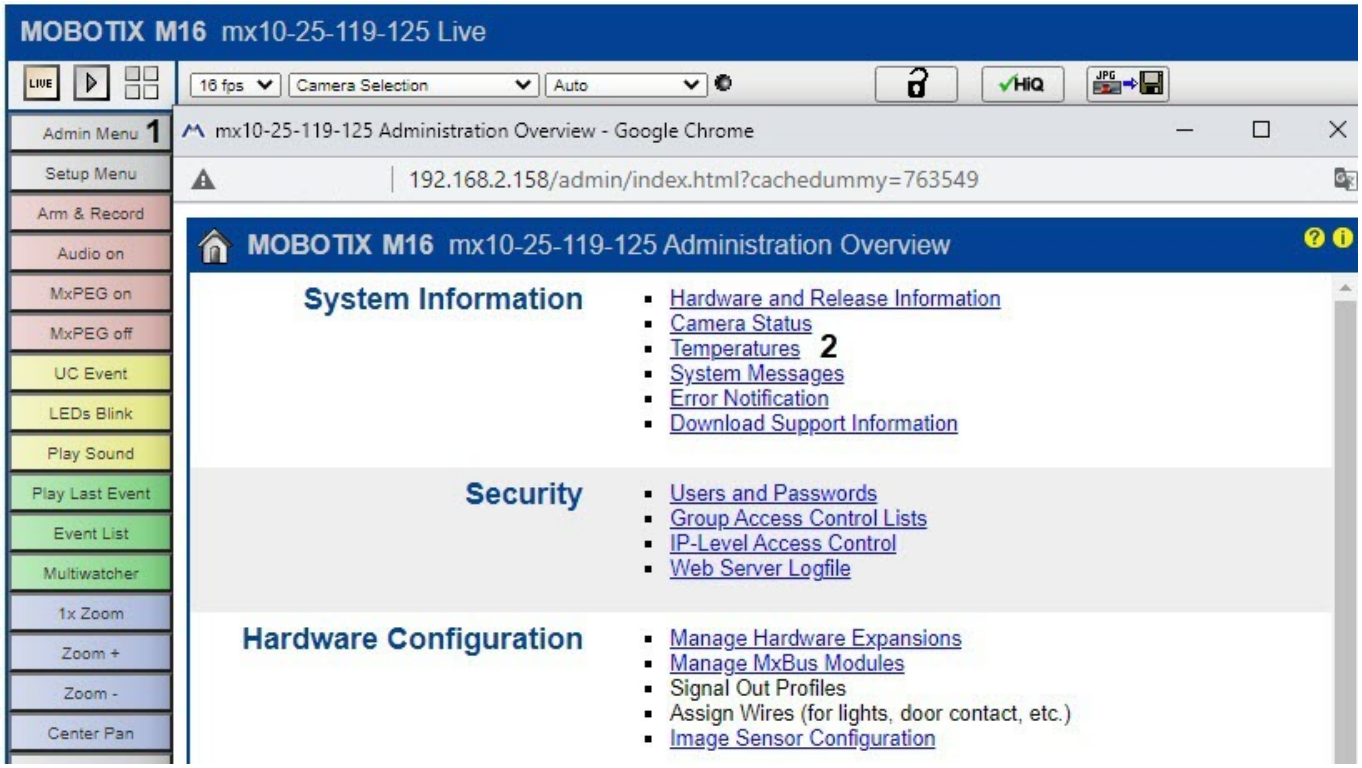
19.4.36.8.4 Pre-configuration of the Mobotix M16 TR camera

Attention!

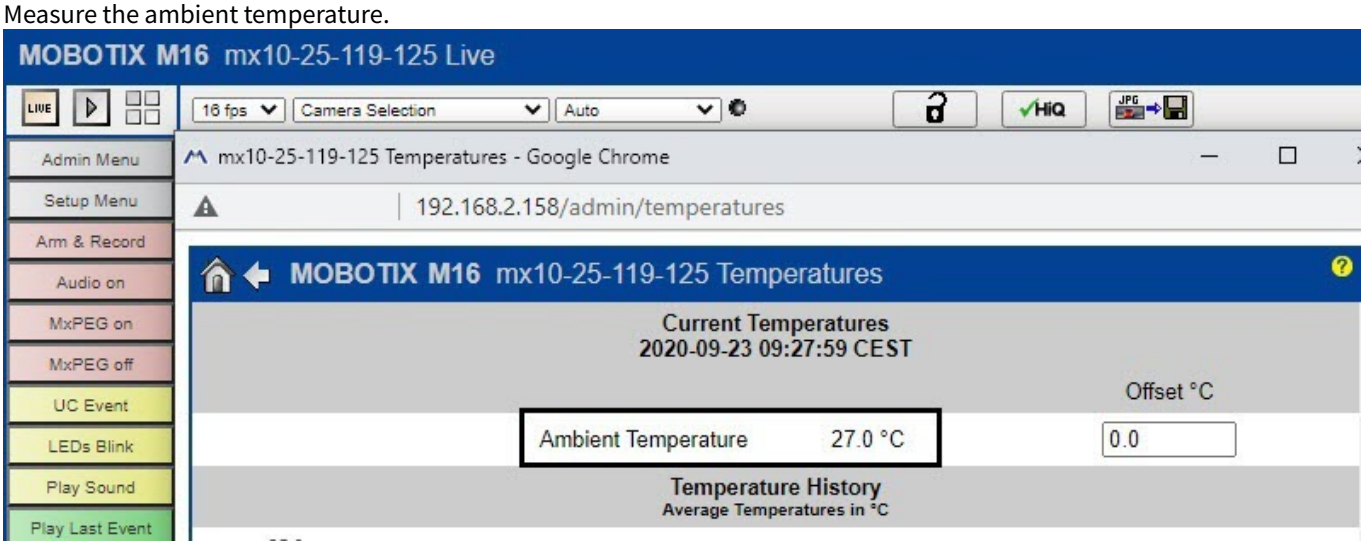
The firmware version must be MX-V5.2.6.7 (2020-06-16) or newer.
For a detailed configuration via the web interface, refer to the official Mobotix documentation.

Before working in *Axxon One*, you must configure the camera via the web interface beforehand:

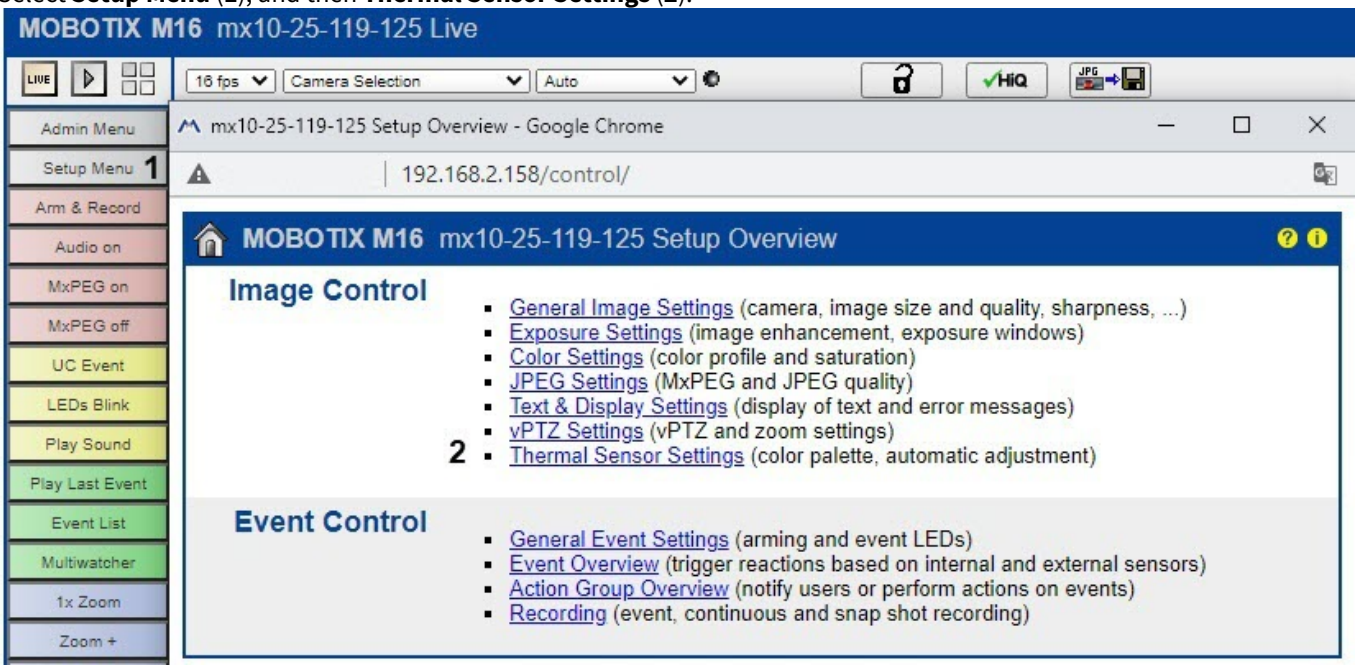
1. Go to **Admin Menu** (**1**), and select **Temperatures** (**2**).



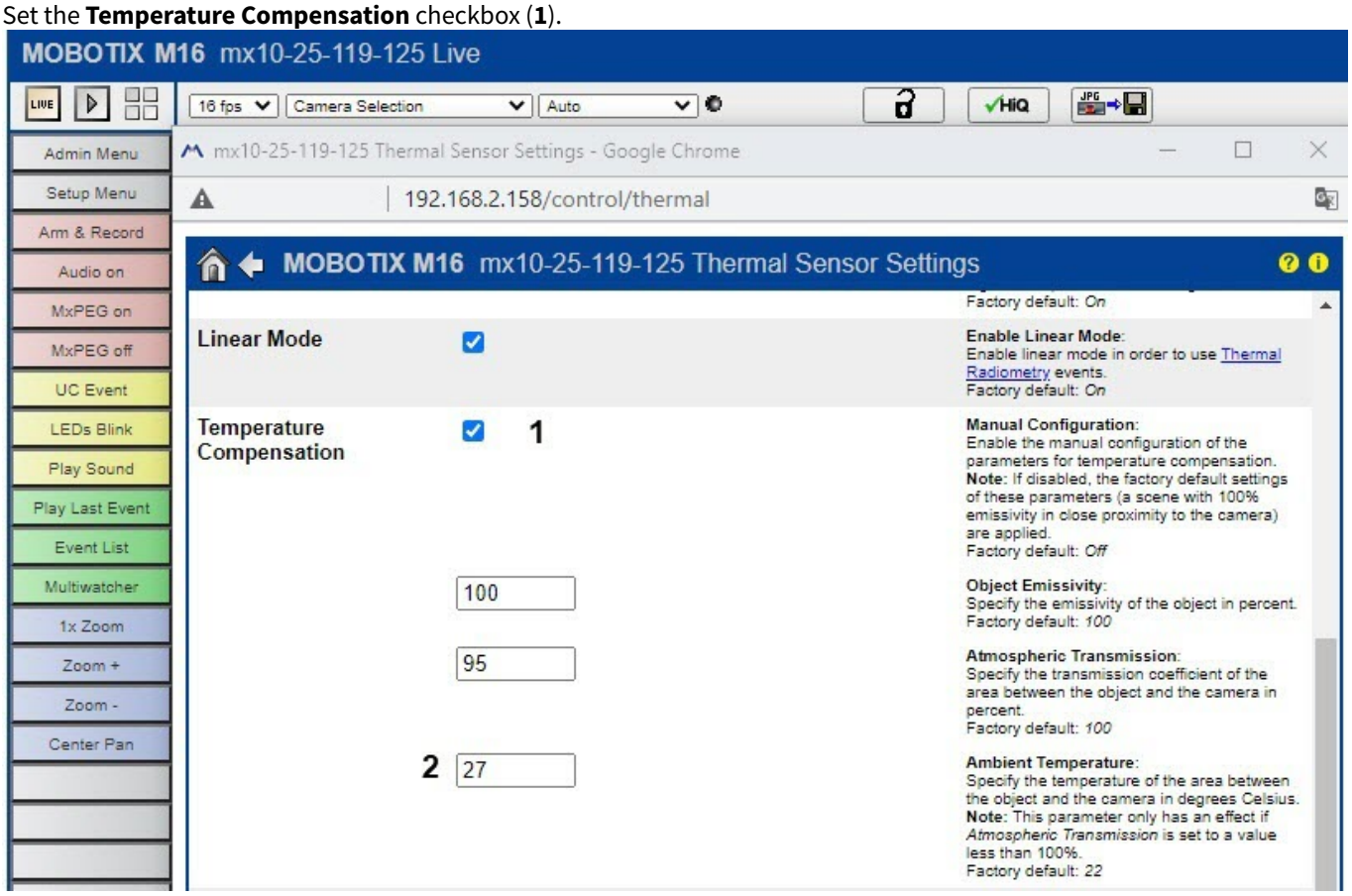
2. Measure the ambient temperature.



3. Select **Setup Menu** (**1**), and then **Thermal Sensor Settings** (**2**).

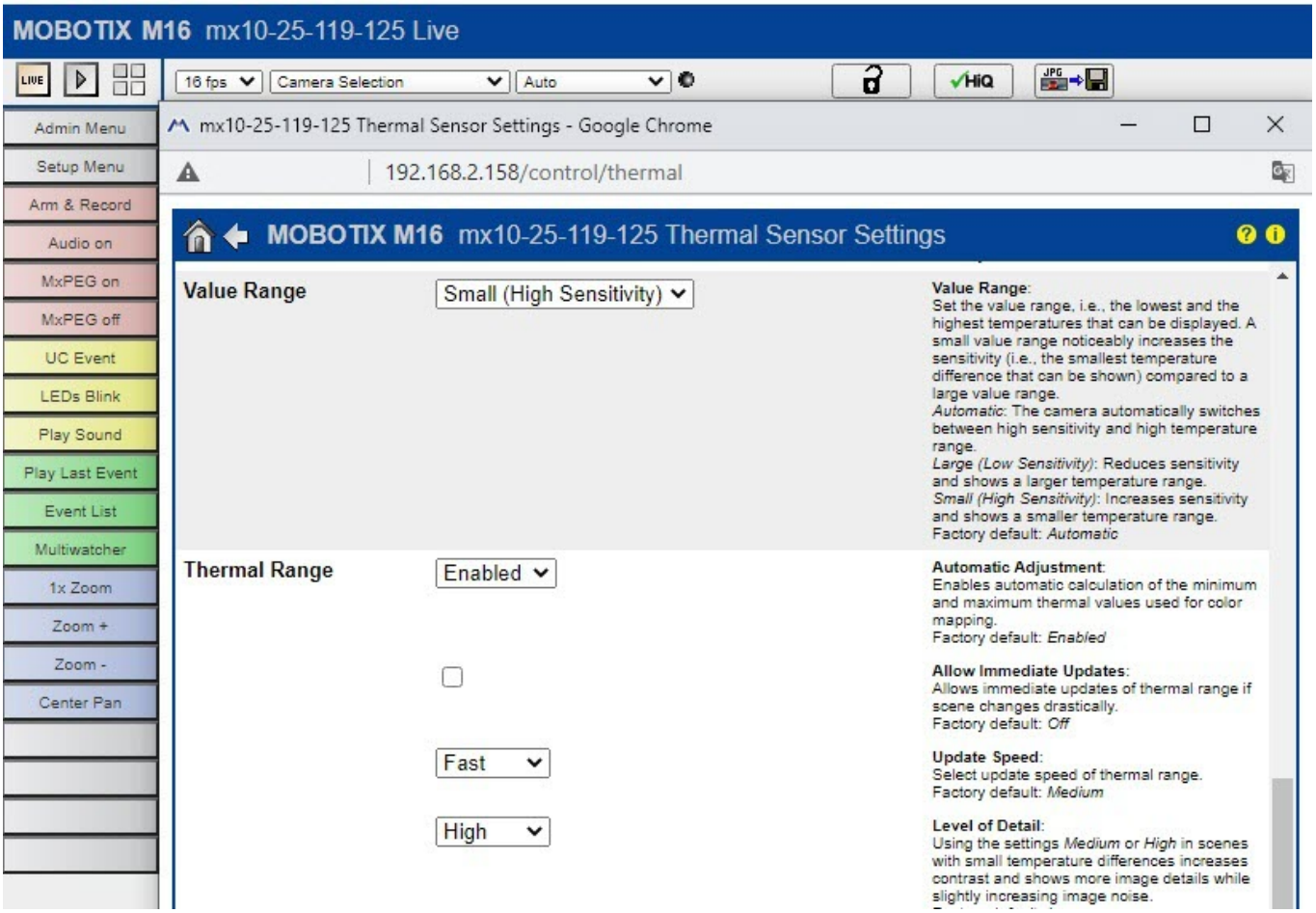


4. Set the **Temperature Compensation** checkbox (**1**).

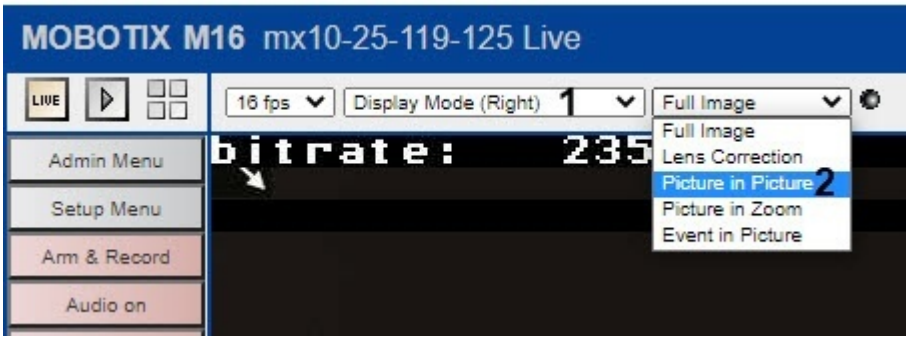


5. Enter the ambient temperature (**2**, see step 2).

6. Specify the **Value Range** and **Thermal Range** parameters as shown on the screenshot.



7. To caption video with temperature readings, select **Display Mode (Right)** (**1**), and then **Picture in Picture** (**2**).



8. Save the settings.

19.4.36.8.5 Configuring Face detector and temperature control

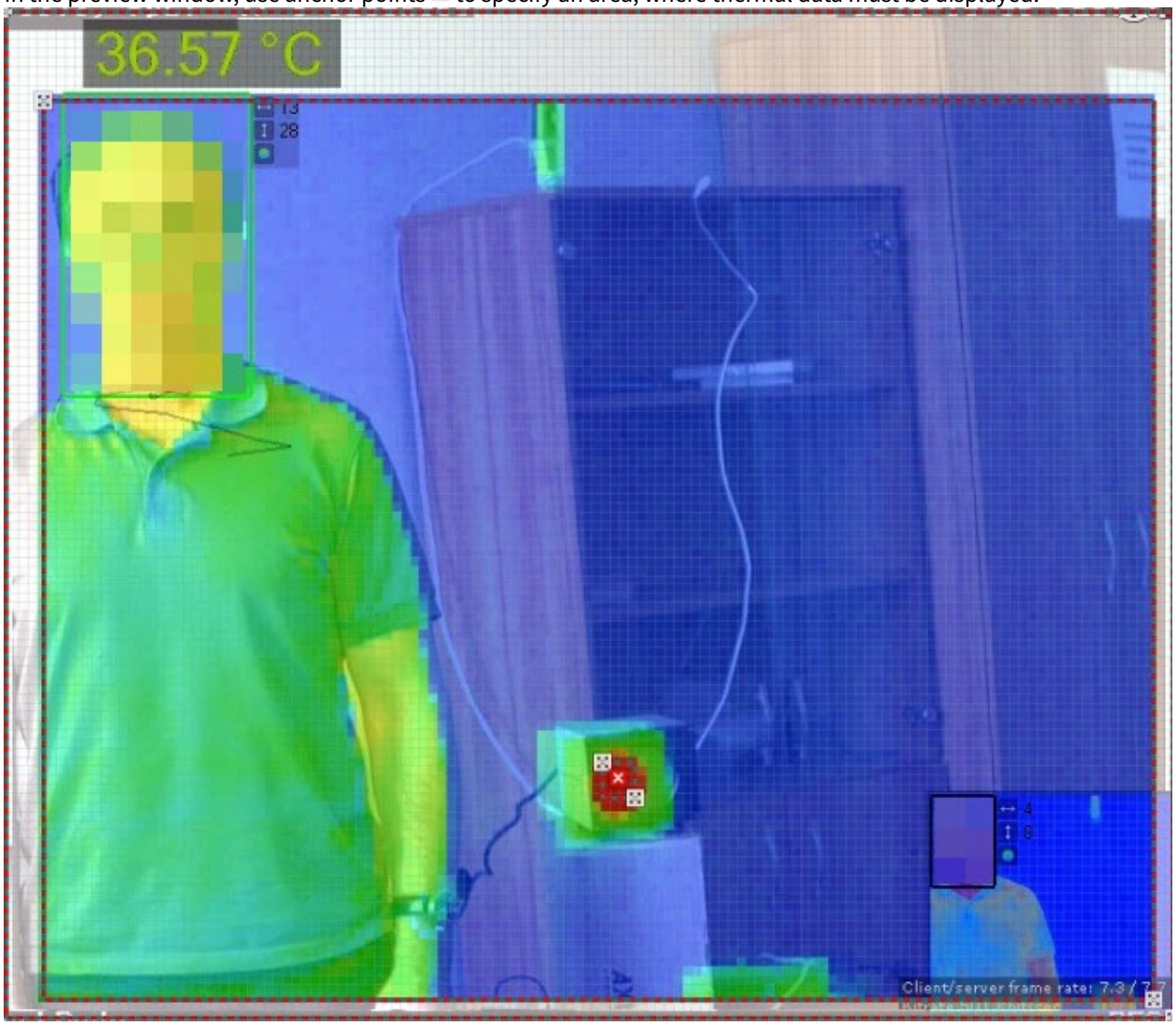
To configure face detection and temperature control, do the following:

1. Add the **Temperature Matrix Data** object to the **Embedded Detection** group.
2. Below this object, create the **Face detector and temperature control**.

3. Select temperature unit (**1**).

Face detection and temperature control	
Frame size change	1920
Maximum face height	100
Maximum face width	100
Minimum face height	2
Minimum face width	2
Minimum threshold of face authenticity	90
Mode	CPU
Period of face search	250
Send face images	No
2 Show thermal overlay	No
1 Temperature unit	Degree Celsius (°C)
Track loss time	500

4. To caption video with thermal data, do the following:
   a. Select **Yes** for the **Show thermal overlay** parameter (**2**).
   b. In the preview window, use anchor points ⁘ to specify an area, where thermal data must be displayed.



5. If you use an Electromagnetic radiation absorber (BB), do the following:

a. Specify its temperature (**3**). If temperature readings in this point are different, the temperatures at all points are corrected by the difference.

	Advanced detection settings	
3	Electromagnetic radiation absorber (BB) temperature	37.5
	Face detection algorithm	ALG1
	Maximum face deflection rate	15
	Minimum face recognition quality	50
	Minimum filtering threshold	50
4	Temperature value offset	0

b. In the preview window, double click to add anchor points at the position of the electromagnetic radiation absorber (BB).



6. If you have discovered that your readings differ from actual temperature values, add the offset value into the **Temperature value offset** field (**4**). The value can be either positive or negative.

> **Note**
>
> The rest of this detector's parameters are identical to those of the basic face detector (see Configuring the Face detector TV(see page 505)).

7. Click the **Apply** button.

Configuration of the detector is complete.

19.4.36.9 AxxonSoft Tracker in Axis devices

Attention!

Tracker isn't supported since DriverPack 3.76 (see Documentation Drivers Pack[334]).

You can use analytics from AxxonSoft (Standard sub-detectors(see page 359)) on Axis devices.

Note

This option is available for all Axis devices on the following hardware platforms:

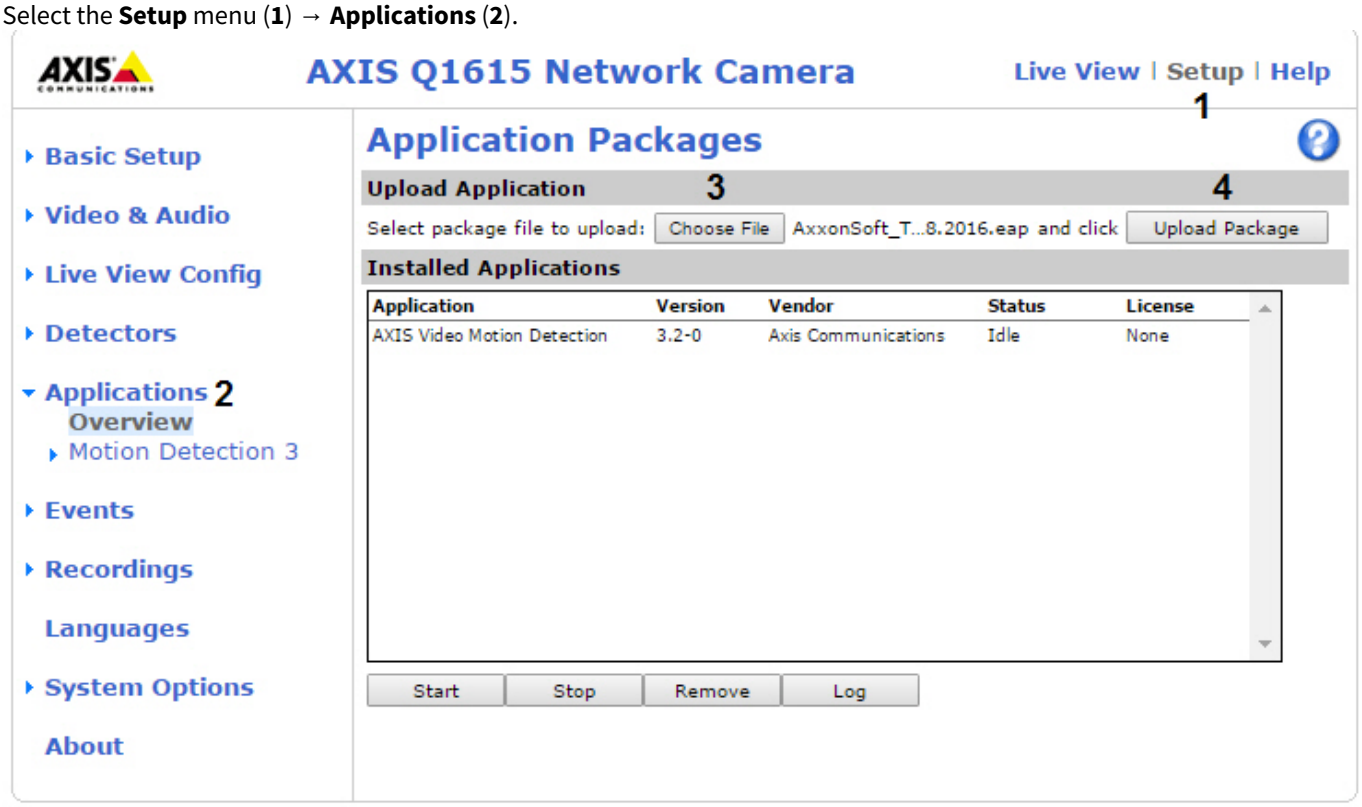
- MIPS (ARTPEC-4 and ARTPEC-5 CPUs),
- ARMv7 (ARTPEC-6 and ARTPEC-7 CPUs).

For full list of setup parameters, refer to the AxxonSoft Tracker help.

All CPU heavy analytics and metadata generation tasks are delegated to the camera in this case.

To do this:

1. Go to the device's web interface.
2. Select the **Setup** menu (**1**) → **Applications** (**2**).



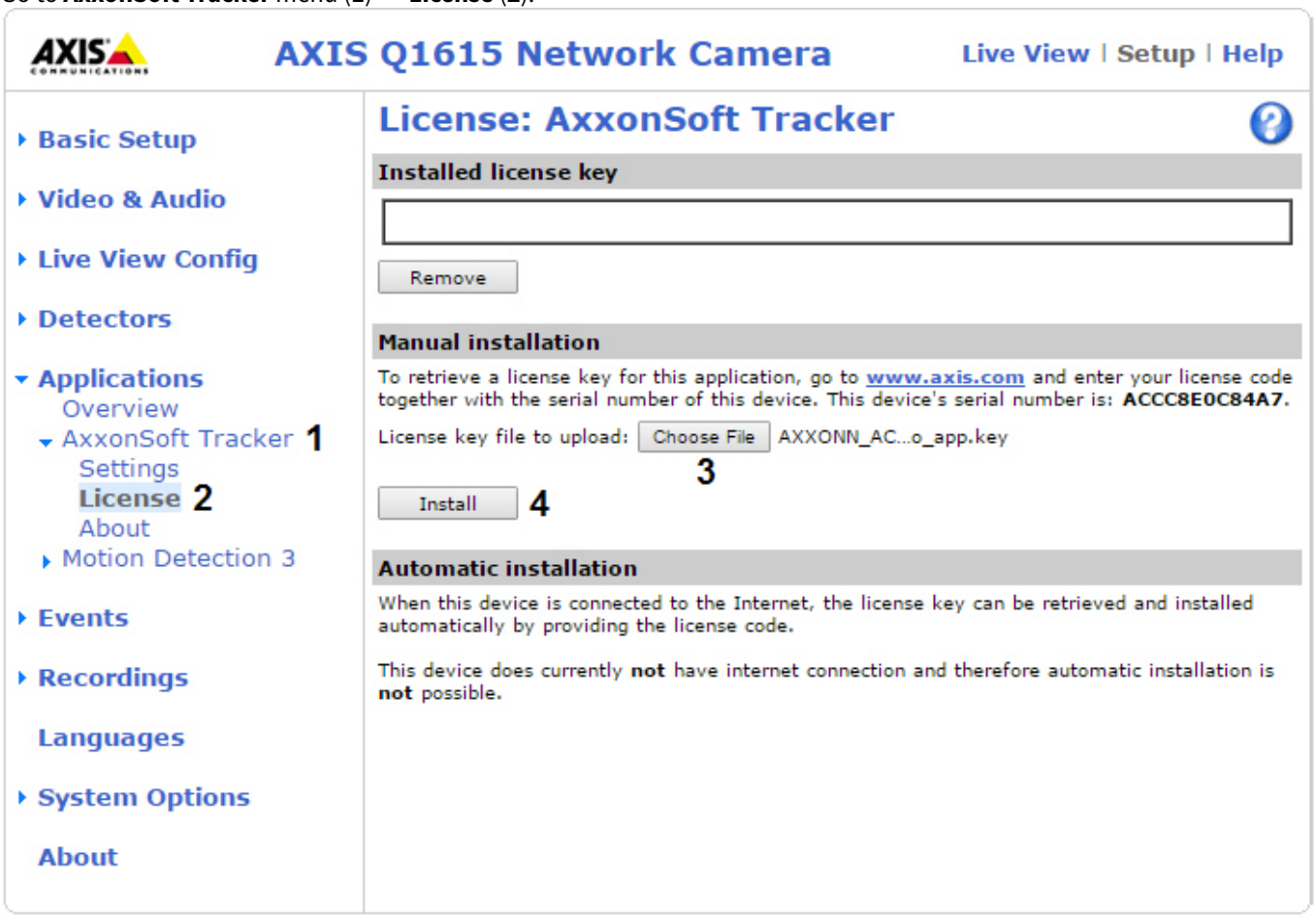
3. Select the ACAP[335] application (**3**) and click the **Upload Package** button (**4**).

Attention!

For application, contact AxxonSoft help-desk[336]. You will be given a license code that you must register along with camera's MAC address on Axis website[337] in order to get the license file.

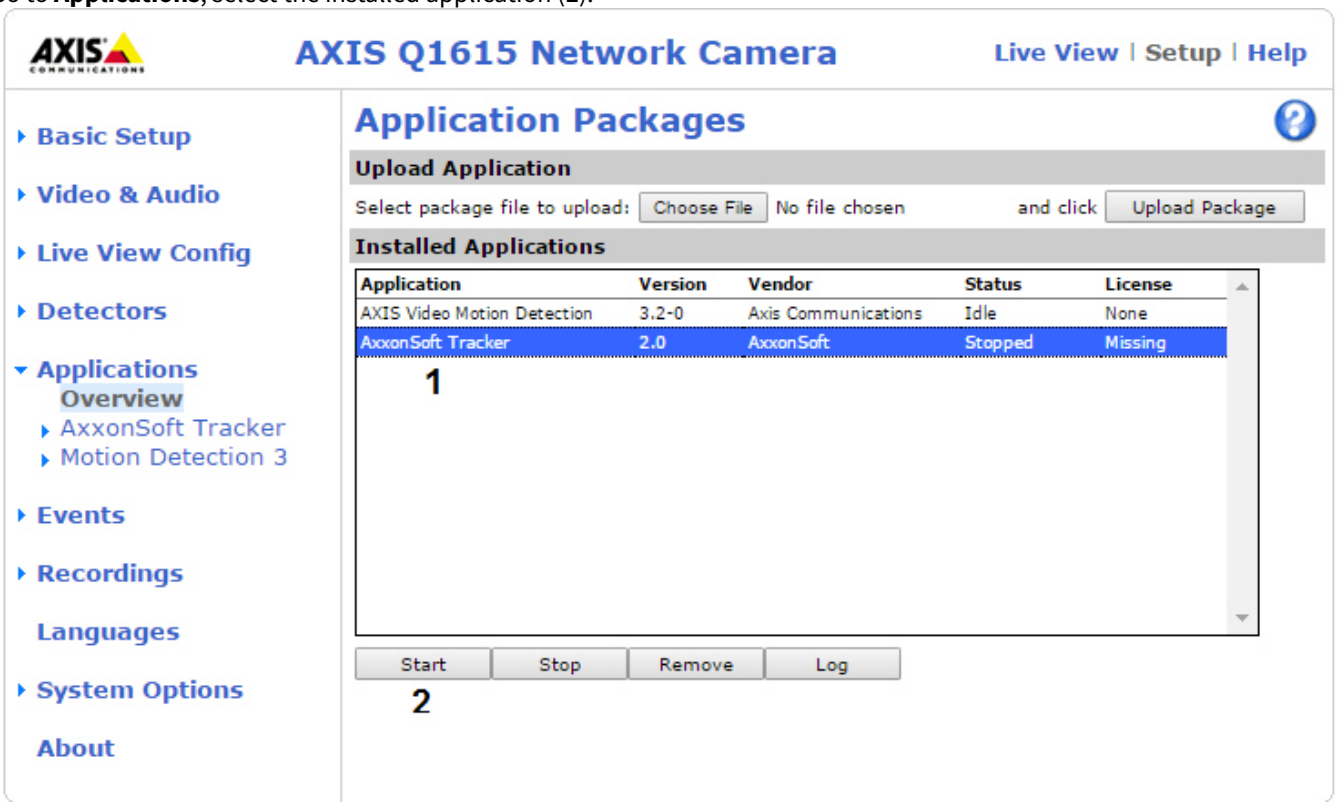
334 https://docs.axxonsoft.com/confluence/display/DDP/En
335 http://www.axis.com/us/en/support/developer-support/axis-camera-application-platform
336 https://support.axxonsoft.com
337 https://auth.axis.com/authn/authentication/html-experimental

4. Go to **AxxonSoft Tracker** menu (**1**) → **License** (**2**).

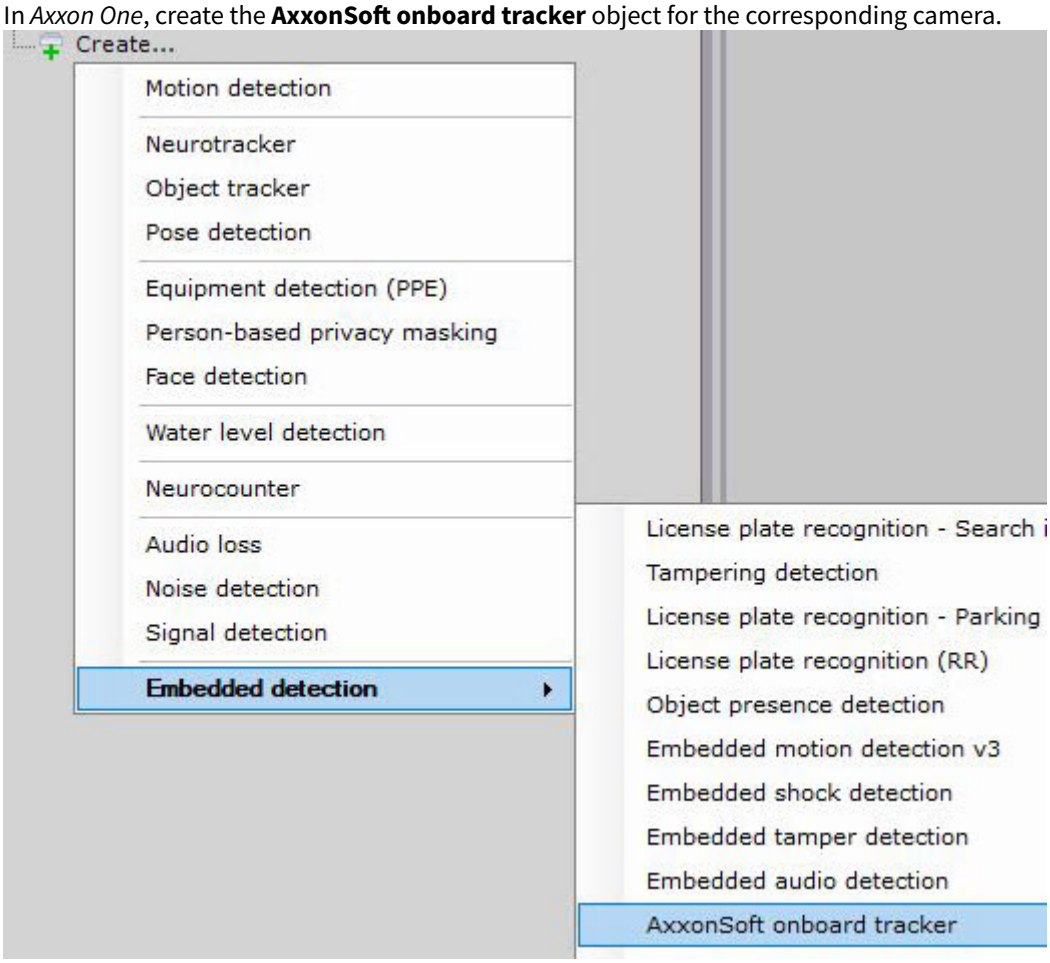


5. Select the license file (**3**).
6. Click the **Install** button (**4**).

7. Go to **Applications**, select the installed application (**1**).



8. Click the **Start** button (**2**).
9. In *Axxon One*, create the **AxxonSoft onboard tracker** object for the corresponding camera.



10. Configure the tracker and create the required detection tools.

Note

You can configure the **AxxonSoft onboard tracker** object similar to General information on the standard sub-detectors(see page 359).
You cannot configure perspective for solution based on Axis devices.

19.5 Programming

19.5.1 General information about macros

19.5.2 Configuring macros

19.5.3 Configuring start conditions

- Starting the Event rules macros based on statistical data(see page 843)
- Configuring macros when working with lists of faces(see page 845)
- Parameters that specify the conditions for starting a macro when recognizing a face(see page 848)
- Configuring macros when working with lists of license plates(see page 849)
- Parameters that specify the conditions for starting a macro when recognizing a vehicle(see page 852)

19.5.4 Examples of macros

- Wait for events(see page 856)
  - Wait for event(see page 856)
  - Wait for timeout(see page 858)
  - Wait till previous action finishes(see page 859)
  - Break execution(see page 861)
- Control alarms(see page 861)
  - Initiate alarm(see page 861)
  - Stop alarm(see page 864)
- Control archive(see page 866)
  - Start recording to archive(see page 866)
  - Start replication(see page 870)
  - Check that archive record exists(see page 871)
  - Check that protected records exist in the archive(see page 872)
  - Open results of Search in archive(see page 873)
- Control devices and outputs(see page 873)
  - Switch on/off output(see page 873)
  - Go to preset of a PTZ camera(see page 874)
  - Enable or disable component(see page 875)
- Notifications(see page 876)
  - E-mail notification(see page 876)
  - Push notification(see page 878)
  - Telegram bot notification(see page 879)
  - Voice notification from client(see page 880)
  - Stop voice notification from client(see page 881)
- Control camera(see page 882)
  - Arm or disarm a camera(see page 882)
  - View camera(see page 883)
  - Check if the camera is in armed mode(see page 885)
  - Start export(see page 885)
- Play audio(see page 887)
  - Play audio on client(see page 887)
  - Stop audio on client(see page 888)

    - Play audio on device(see page 889)
- Execute queries and actions(see page 890)
    - Run macro(see page 890)
    - Execute web query(see page 891)
    - Run external application on client(see page 893)
    - Run external application on server(see page 894)
- Control layouts(see page 896)
    - Open layout(see page 896)
    - Restore layout(see page 897)
    - Show map(see page 898)
    - Start slideshow(see page 899)
    - Stop slideshow(see page 900)
- Text templates in the action settings(see page 900)
- Examples of Cycle rules macros(see page 903)
- Examples of macros used when working with lists of faces(see page 906)
- Examples of macros used when working with lists of license plates(see page 911)
- Examples of macros used for barcode detection(see page 915)

19.5.5 General information about macros

On the page:

- General information(see page 829)
- Types of macros(see page 830)

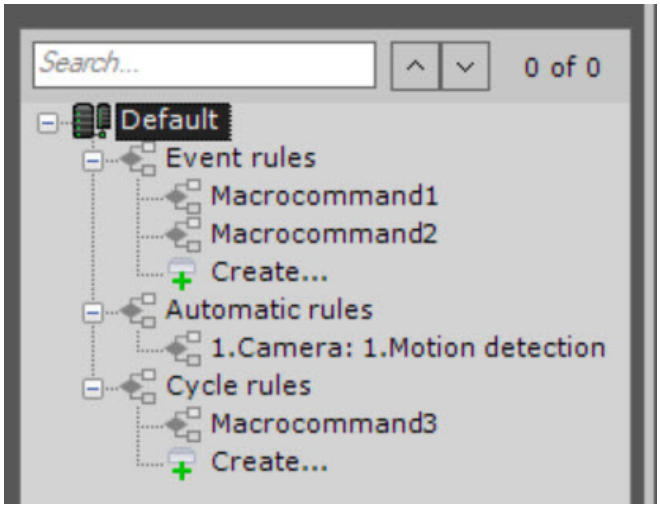
19.5.5.1 General information

Macro is a tool used to configure system responses to certain events. System response can include one or several actions. For example, when a fire is detected—to activate voice notification, when a camera is disarmed—to send an email notification and initiate an alarm, and so on.

Attention!

Macros work only within the same Axxon-domain. You cannot use objects belonging to another Axxon-domain in start conditions (see Configuring start conditions(see page 834)) and in macro actions (see The Domain object(see page 152)).

19.5.5.2 Types of macros



There are three types of macros:

Types of macros	Description
Event rules	• These macros can run automatically on receiving the specified events or initiated manually by the operator. • When an event is received, the actions in the macro are executed once
Automatic rules	• These macros run every time when a detector generates an event (see Detectors(see page 308), Automatic rules(see page 358))
Cycle rules	• These macros can run automatically after a specified period of time, or at a random time within a specified interval. • Cycle macros are run on the first server in the Axxon-domain in alphabetical order available at the time of starting the macro. • Cycle macros are executed immediately after you save them in the system, unless they have been created outside the time schedule. • After completing all actions, macro is automatically restarted. Additionally, a cycle macro can be started automatically in a specified time interval, or at a random moment within the specified time interval. In this case, all actions in the macro are executed once

19.5.6 Configuring macros

On the page:

- General information(see page 831)
- General algorithm to create and configure a macro(see page 831)

- Editing macros(see page 833)
- Copying macros(see page 833)
- Removing macros(see page 834)

19.5.6.1 General information

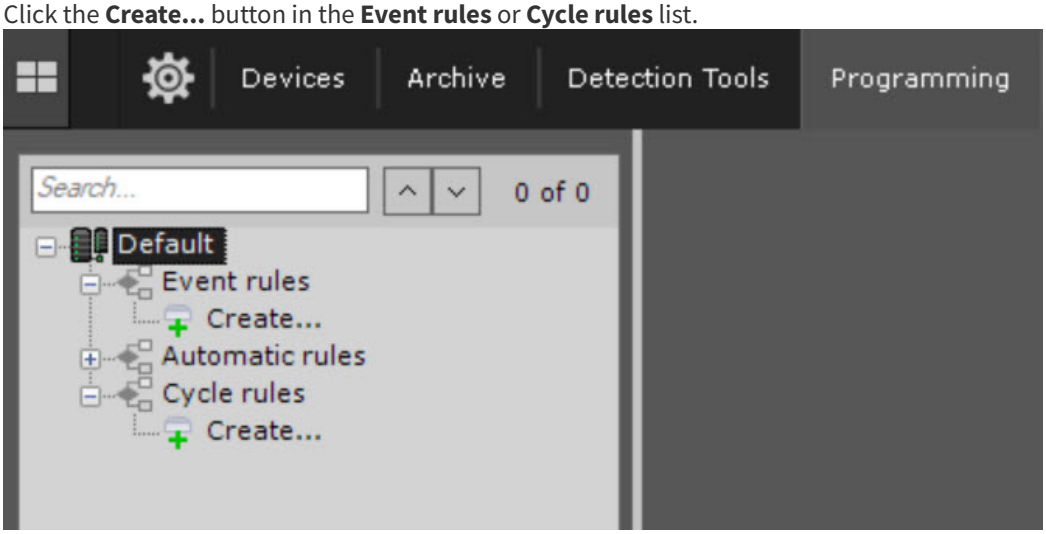
In *Axxon One*, you can create and configure macros. You can create and configure macros on the **Programming** tab.

To create and configure macros, you must have access permissions to the programming setup (see Roles(see page 920)).

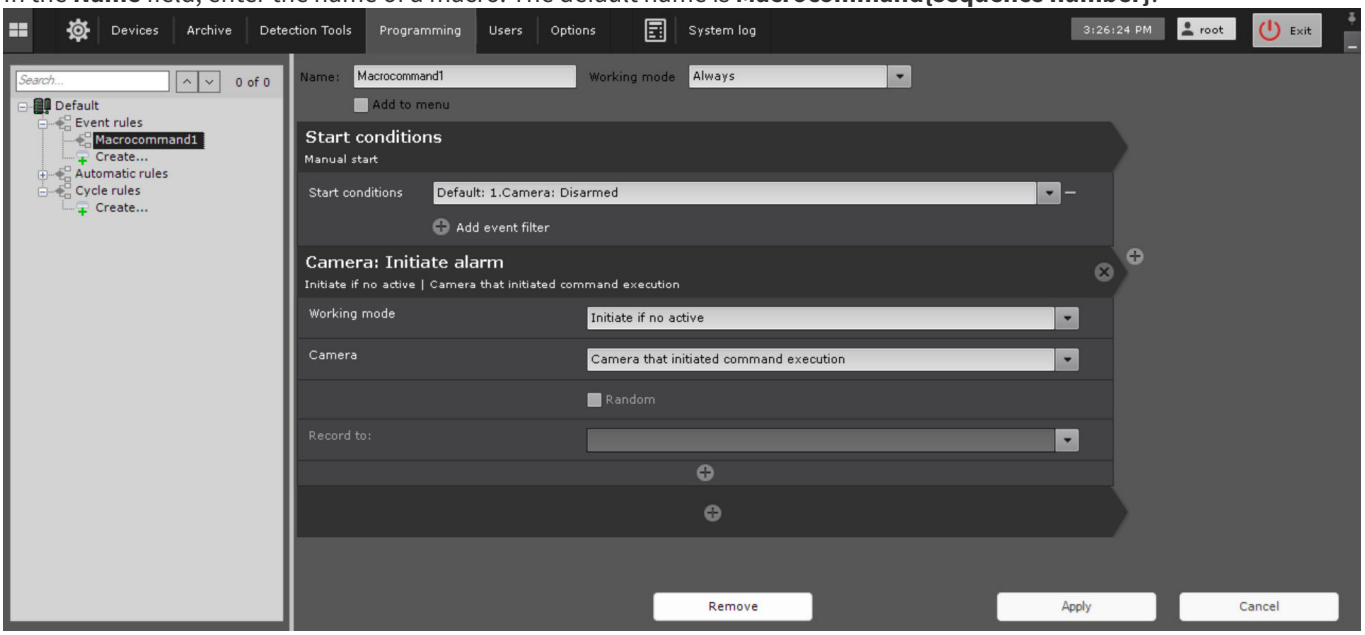
19.5.6.2 General algorithm to create and configure a macro

The **Event rules** and **Cycle rules** macros have a common algorithm of creation and configuration. To create a macro, do the following:

1. Go to the **Programming** tab.
2. Click the **Create...** button in the **Event rules** or **Cycle rules** list.



3. In the **Name** field, enter the name of a macro. The default name is **Macrocommand{sequence number}**.



4. From the **Working mode** drop-down list, select the working mode of a macro:

Working mode	Event rules	Cycle rules
Never	Can only be run manually (see Working with Dialog Board(see page 1276), Macros control(see page 1316))	Disabled, can be run manually (Macros control(see page 1316))
Always (default)	Runs always	Runs always
Time schedule	Runs within the selected time schedule (see Creating schedules(see page 1012)). Can be run manually at any time	Runs within the selected time schedule
	Attention! If a macro working mode is within a time schedule (see Creating schedules(see page 1012)), and a macro start time is outside this time schedule, a macro isn't started.	

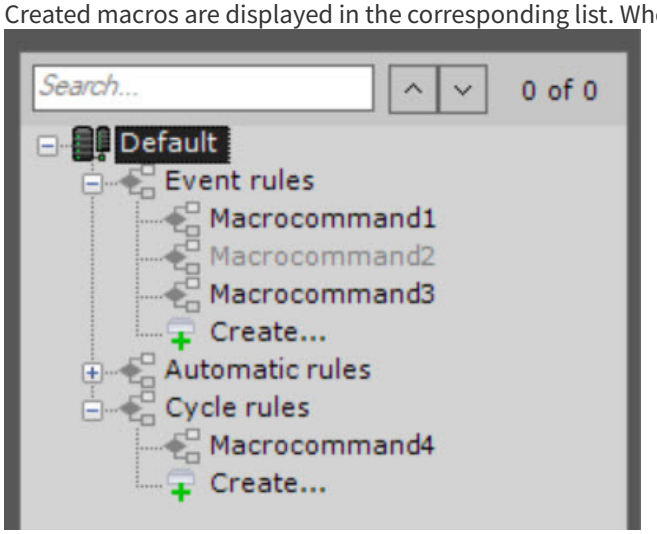
5. If you need to add a macro to the control menu on a layout (see Macros control(see page 1316)), set the **Add to menu** checkbox.
6. For the **Event rules** macros, select one or more events that initiate macro start by clicking the button in the **Start conditions** field (see Configuring start conditions(see page 834)). If you leave the event filter blank, you can start this macro only manually.

   Note

   - To delete an event from the filter, click the button.
   - You can run a macro for a group of cameras (see Creating a system of groups and subgroups(see page 268)).
   - You can collapse macro start conditions and each action by clicking the header.

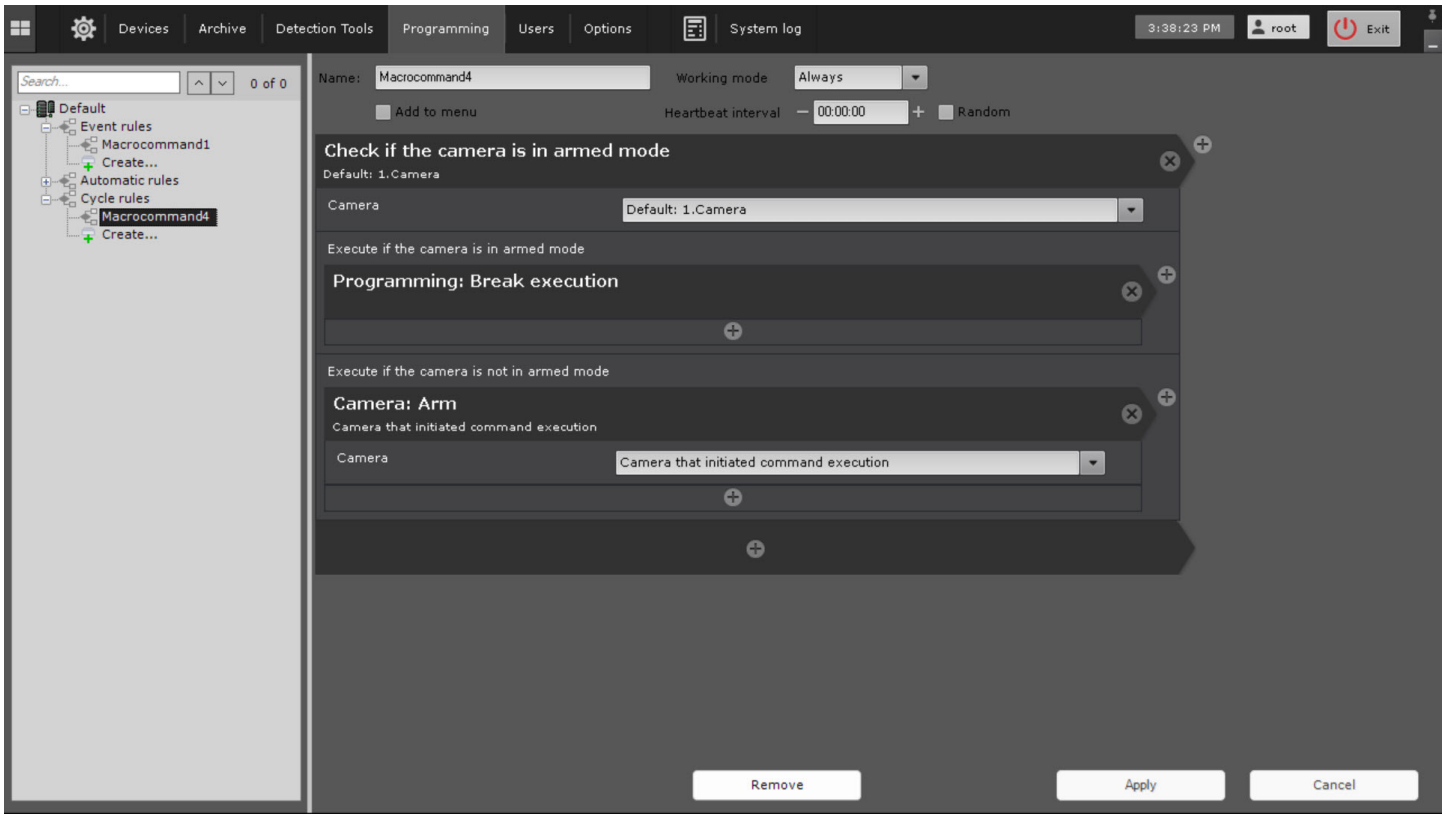
7. Add one or more actions performed by a macro (see Examples of macros(see page 856)). These are actions that the system must perform after an event occurs. To add an action, click the button. To delete an action, click the button.
8. Click the **Apply** Apply button.

Created macros are displayed in the corresponding list. When you select the **Never** working mode for a macro, it is grayed out.



19.5.6.3 Features of configuring the Cycle rules macros

The **Cycle rules** macros can be run automatically in a specified time interval, or at a random time within a specified interval. To configure this behavior, do the following:



1. In the **Heartbeat interval** field, specify the time interval in the HH:MM:SS format. For example, if you set the interval to 8 hours and leave the **Random** checkbox clear, a macro is started every 8 hours strictly. A macro is started according to cycle settings even if the actions from its previous start are not completed. In this case, several instances of the same macro are executed simultaneously.

   > **Note**
   >
   > Starting with *Axxon One* 2.0.12, the minimum allowed value of the **Heartbeat interval** field is 1 second.

2. Set the **Random** checkbox, if you need to start a macro at a random moment specified by the **Heartbeat interval** parameter. For example, if the interval is set to 8 hours, then once every 8 hours at a random moment, a macro is started.

19.5.6.4 Editing macros

To edit a macro, do the following:

1. Select the required macro from the list.
2. Change the macro settings if necessary.
3. Click the **Apply** Apply button to save the changes. Click the **Cancel** Cancel button to cancel the changes.

Editing a macro is complete.

19.5.6.5 Copying macros

To copy a macro, do the following:

1. Select the required macro from the list.
2. Click the **Create...** button.

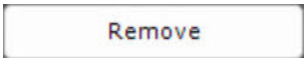
Macro is copied.

Note

To create an empty macro with no parameters specified, select any of the common macros groups, and click the **Create...** button.

19.5.6.6 Removing macros

To remove a macro, do the following:

1. Select the required macro from the list.
2. Click the **Remove** 

button.
3. Click the **Apply** 

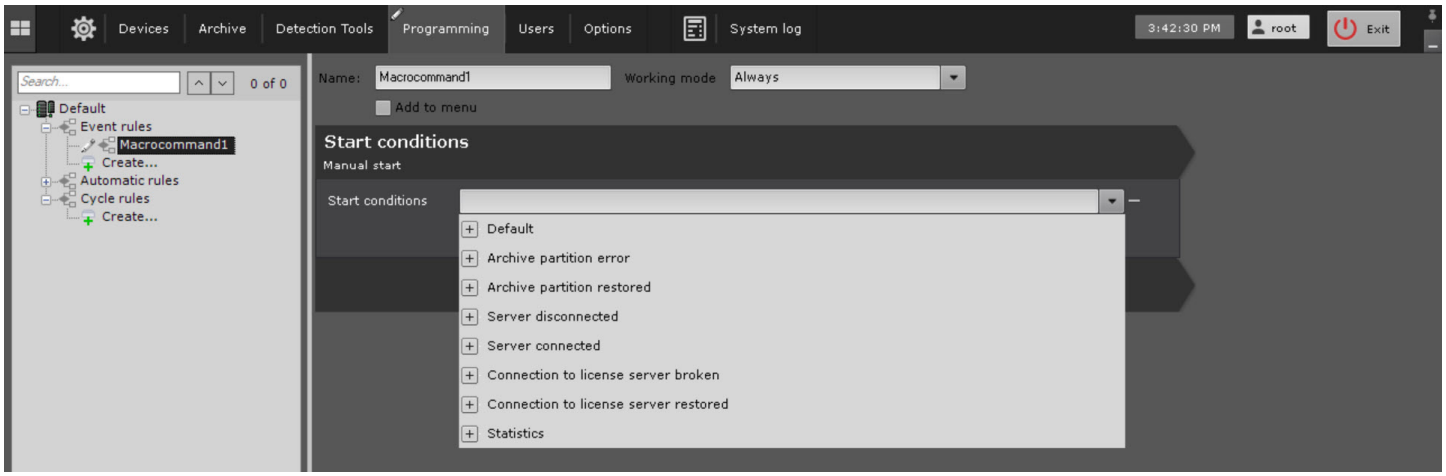
button.

Macro is removed.

19.5.7 Configuring start conditions

Start conditions are events in the system that run a macro. When you create event macros, you can select one or more start conditions.

If you specify several conditions, a macro can start when any of the specified conditions are met. In addition, macro events can start when specified statistical conditions are met (see Starting the Event rules macros based on statistical data(see page 843)).



The table shows the examples of start conditions to run a macro:

Object	Event	Description
Axxon-domain	**Recording started**	When you select an event from an Axxon-domain, a macro starts when this event is received from any object in the Axxon-domain
	Recording stopped	
	Armed	
	Armed in private mode	
	Disarmed	
	Alarm initiated	
	Alarm being processed by user	
	Alarm skipped	
	Alarm processed	
	Alarm processed—Confirmed alarm	
	Alarm processed—Suspicious situation	
	Alarm processed—False alarm	
	IP device enabled in settings	
	IP device disabled in settings	
	IP device connection lost	
	IP device connection restored	
	Authorization failed	
	No recording to archive	
Camera	**Recording started**	When you select a camera event, a macro starts when this event is received from any camera or a specific camera
	Recording stopped	
	Armed	
	Armed in private mode	
	Disarmed	
	Alarm initiated	

Object	Event	Description
	Alarm being processed by user	
	Alarm skipped	
	Alarm processed	
	Alarm processed—Confirmed alarm	
	Alarm processed—Suspicious situation	
	Alarm processed—False alarm	
	IP device enabled in settings	
	IP device disabled in settings	
	IP device connection lost	You can set a threshold for these type of events—the time in seconds (0 to 3600) between switching the **Signal lost** and the **Signal restored** states. For example, if a 10-second threshold is set for the **Signal lost** condition, then at least 10 seconds must pass between the last **Signal restored** event and the new **Signal lost** event to start the macro
	IP device connection restored	
Group of cameras	**Recording started**	When you select an event from a group of cameras, a macro starts when this event is received from any camera in the group
	Recording stopped	
	Armed	
	Armed in private mode	
	Disarmed	
	Alarm initiated	
	Alarm being processed by user	
	Alarm skipped	
	Alarm processed	
	Alarm processed—Confirmed alarm	
	Alarm processed—Suspicious situation	
	Alarm processed—False alarm	
	IP device enabled in settings	
	IP device disabled in settings	

<table>
<tr><th>Object</th><th>Event</th><th>Description</th></tr>
<tr><td></td><td>IP device connection lost</td><td></td></tr>
<tr><td></td><td>IP device connection restored</td><td></td></tr>
<tr><td></td><td>Authorization failed</td><td></td></tr>
<tr><td></td><td>No recording to archive</td><td></td></tr>
<tr><td>Detector, Input, Output and PTZ</td><td>Triggering start</td><td>Attention!
If the Triggering start event is set in the macro start conditions, then after any changes and settings saved when the detector generates an event (if there is no the Triggering end event), all actions in the macro are executed again.
The same logic is applied when you create a macro. If you are creating a macro, and the detector is generating an event, the macro is run immediately after the creation is complete.</td></tr>
<tr><td></td><td>Triggering end</td><td></td></tr>
<tr><td></td><td>Preset change</td><td>For these events, you must specify the preset number and the reason for the action:
1. Error.
2. Entered: the action occurs if you select a preset (see Creating and editing presets(see page 1168)) with the selected number while controlling a camera (see Controlling a PTZ camera(see page 1166)).
3. Manual: the action occurs if you manually change the position of a camera with a selected preset (see Control using step buttons and virtual joystick(see page 1171))</td></tr>
<tr><td>Archive</td><td>Archive partition error</td><td>When you select an event from an archive, a macro starts when this event is received from any archive or a specific archive</td></tr>
<tr><td></td><td>Archive partition restored</td><td></td></tr>
<tr><td>Time schedule</td><td>Beginning</td><td>When you select an event from a time schedule, a macro starts when this event is received from a specific time schedule</td></tr>
<tr><td></td><td>End</td><td></td></tr>
<tr><td>Server</td><td>Server disconnected</td><td>When you select an event from a server, a macro starts when this event is received from a specific server</td></tr>
<tr><td></td><td>Server connected</td><td></td></tr>
<tr><td>License server</td><td>Connection to license server broken</td><td>When you select an event from a license server, a macro starts when this event is received from a specific license server</td></tr>
<tr><td></td><td>Connection to license server restored</td><td></td></tr>
</table>

Object	Event	Description
Event source(see page 257)	**Specify event text**	You must specify a word or phrase. When it comes up in the captions, the macro starts. For example, this filter starts the macro when the word "Water" appears in the captions. If you want to start a macro when several words or values appear at once, use curly braces for logical "AND". For example, {Water} {Belgium} {River}

You can select events from detectors as start conditions for a macro. For example, you can configure a macro that starts when smoke is detected in a room by a smoke detector and initiates an alarm. If you select an event from a detector, a macro starts when this event is received. The table shows examples of detector events:

Detector	Event
Motion detector(see page 446)	**Triggering start**
	Triggering end
Neural tracker(see page 402)	**Triggering**
	Similitude search: Triggering
Abandoned object detector VI(see page 389)	**Abandoned object detected: Triggering**
Abandoned object detector VI (Street)(see page 396)	
Line crossing VI(see page 466)	**Object crossing dividing line detected: Triggering**
Movement in prohibited direction VI(see page 460)	**Object moving in area detected: Triggering**
Motion in area detector VI(see page 455)	
Detector of atypical changes in the scene VI(see page 794)	**Atypical scene changes: Triggering**
Audio loss detector(see page 788)	**Audio loss detected: Triggering start**
	Audio loss detected: Triggering end
Noise detector(see page 789)	**Noise detected: Triggering start**
	Noise detected: Triggering end
Signal detector(see page 790)	**Audio signal detected: Triggering start**
	Audio signal detected: Triggering end
Video clarity detector(see page 790)	**Tampering detected: Triggering**
Crowd estimation VA(see page 765)	**Multiple objects detected: Triggering**

Detector	Event
Face detector TV(see page 500)	**Face detected: Triggering**
	Face detected: Specified detection
	Face recognition
Face detector VA(see page 485)	**Face detected: Triggering**
	Face detected: Specified detection
	Face recognition
Face detector VL(see page 473)	**Face detected: Triggering**
	Face detected: Specified detection
	Face recognition
Face detector TV: Mask detector(see page 512)	**Face recogniton evasion detected: Triggering start**
	Face recogniton evasion detected: Triggering end
Face detector VA: Mask detector(see page 497)	**Face recogniton evasion detected: Triggering start**
	Face recogniton evasion detected: Triggering end
Face detector VL: Mask detector(see page 483)	**Face recogniton evasion detected: Triggering start**
	Face recogniton evasion detected: Triggering end
License plate recognition BRS(see page 514)	**Recognized LP: Triggering**
License plate recognition IV(see page 519)	
License plate recognition VT(see page 636)	
License plate recognition RR(see page 535)	**Recognized LP: Triggering**
	Unrecognized LP: Triggering
	License plate recognition
License plate recognition RR—Search in archive(see page 561)	**Recognized LP: Triggering**
License plate recognition RR—Parking(see page 574)	**Recognized LP: Triggering**
	Unrecognized LP: Triggering

Detector	Event
Vehicle recognition RR(see page 600)	**Recognized vehicle: Triggering**
License plate recognition XR(see page 620)	**Recognized LP: Triggering**
Audio classification IV(see page 698)	**Aggression: Triggering**
	Baby cry: Triggering
	Dog bark: Triggering
	Glass break: Triggering
	Gunshot: Triggering
	Siren: Triggering
	Smoke alarm: Triggering
Fire detector(see page 706)	**Fire detected: Triggering start**
	Fire detected: Triggering end
Glow detector(see page 736)	**Light source status changed: Triggering**
Neural classifier(see page 701)	**Object presence detected: Triggering start**
	Object presence detected: Triggering end
Smoke detector(see page 725)	**Smoke detected: Triggering start**
	Smoke detected: Triggering end
Water level detector(see page 729)	**Water level overrun detetcted: Triggering start**
	Water level overrun detetcted: Triggering end
Equipment detector(see page 711)	**PPE absence detected: Triggering**
	No body PPE: Triggering
	No feet PPE: Triggering
	No hands PPE: Triggering
	No head PPE: Triggering
	No legs PPE: Triggering

Detector	Event
	No other PPE: Triggering
Equipment detector VL(see page 738)	**PPE absence detected: Triggering**
Barcode detector(see page 760)	**Decoded barcode: Triggering**
Neural counter(see page 771)	**Multiple objects detected: Triggering**
Meta-detector(see page 768)	**Match by text query: Triggering start**
	Match by text query: Triggering end
Fight detector VL(see page 799)	**Fight detected: Triggering**
Queue detector(see page 779)	**Queue detected: Triggering**
Visitors counter(see page 782)	**Visitors counter: Triggering start**
	Visitors counter: Triggering end
	Visitor access in the direction of Entrance: Triggering
	Visitor access in the direction of Exit: Triggering
Human pose detector(see page 669)	
Sitting person detector(see page 678)	**Sitting person detected: Triggering start**
	Sitting person detected: Triggering end
Person down detector(see page 681)	**Person down detected: Triggering start**
	Person down detected: Triggering end
Hands up detector(see page 684)	**Hands up detected: Triggering start**
	Hands up detected: Triggering end
Handrail holding detector(see page 686)	**Handrail holding violation: Triggering start**
	Handrail holding violation: Triggering end
People counter(see page 688)	**Multiple objects detected: Triggering**
Close-standing people detector(see page 689)	**Close-standing people detected: Triggering start**
	Close-standing people detected: Triggering end

Detector	Event
Object tracker(see page 414)	
Line crossing(see page 362)	**Object crossing line detected: Triggering start**
	Object crossing line detected: Triggering end
Loitering in area(see page 367)	**Object loitering in area detected (specified time): Triggering**
	Group of objects loitering in area detected (specified time): Triggering start
	Group of objects loitering in area detected (specified time): Triggering end
	Object loitering in area detected (shorter than specified time): Triggering
	Group of objects loitering in area detected (shorter than specified time): Triggering start
	Group of objects loitering in area detected (shorter than specified time): Triggering end
	Object loitering in area detected (longer than specified time): Triggering start
	Object loitering in area detected (longer than specified time): Triggering end
	Group of objects loitering in area detected (longer than specified time): Triggering start
	Group of objects loitering in area detected (longer than specified time): Triggering end
Stop in area(see page 370)	**Object stopping in area detected: Triggering**
	Group of objects stopping in area detected: Triggering start
	Group of objects stopping in area detected: Triggering end
Abandoned object(see page 423)	**Abandoned object detected: Triggering**
Motion in area(see page 374)	**Object moving in area detected: Triggering start**
	Object moving in area detected: Triggering end
	Group of objects moving in area detected: Triggering start
	Group of objects moving in area detected: Triggering end
Entrance in area(see page 377)	**Object entering area detected: Triggering**

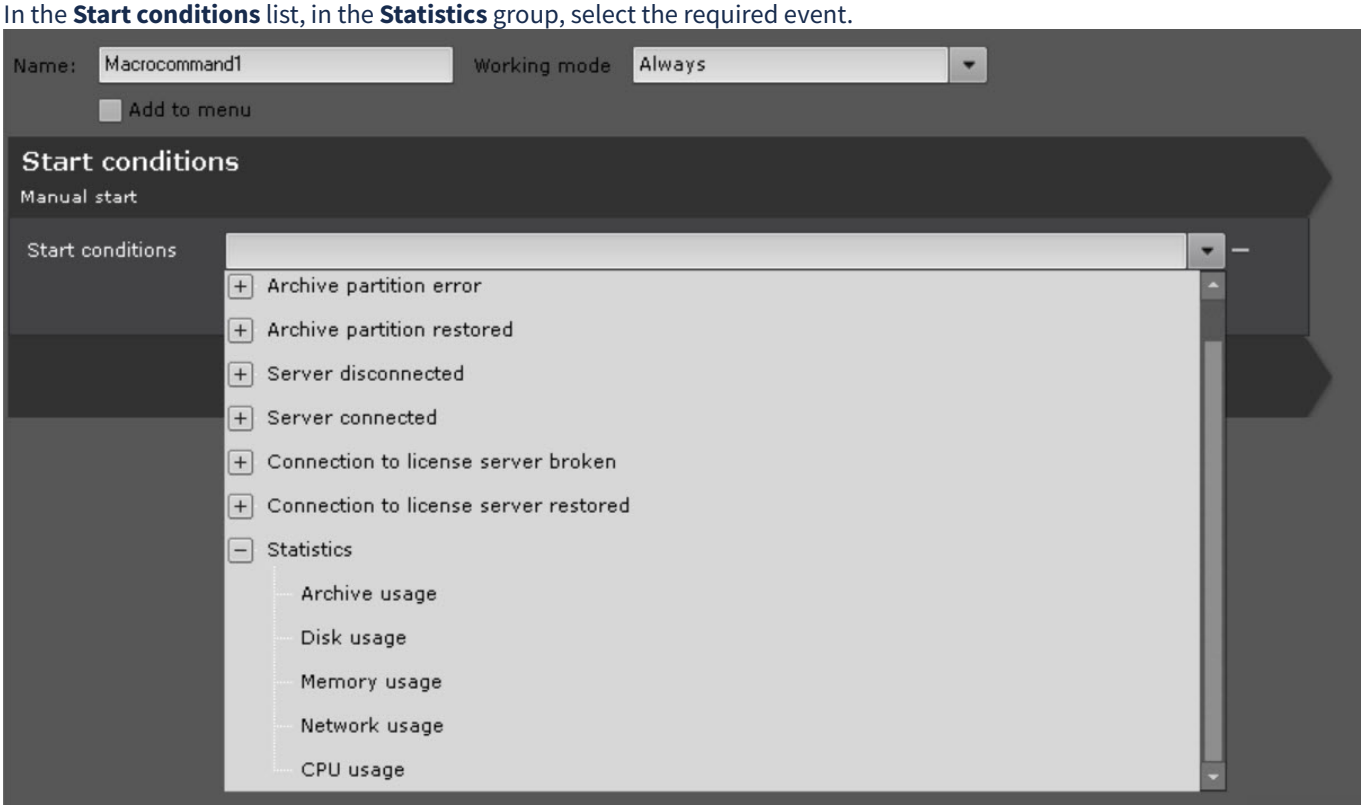
Detector	Event
	Group of objects entering area detected: Triggering start
	Group of objects entering area detected: Triggering end
Exit from area(see page 380)	**Object exiting area detected: Triggering**
	Group of objects exiting area detected: Triggering start
	Group of objects exiting area detected: Triggering end
Multiple objects(see page 383)	**Multiple objects detected: Triggering start**
	Multiple objects detected: Triggering end
Move from area to area(see page 385)	**Object moving from area to area detected: Triggering**
	Group of objects moving from area to area detected: Triggering start
	Group of objects moving from area to area detected: Triggering end

19.5.7.1 Starting the Event rules macros based on statistical data

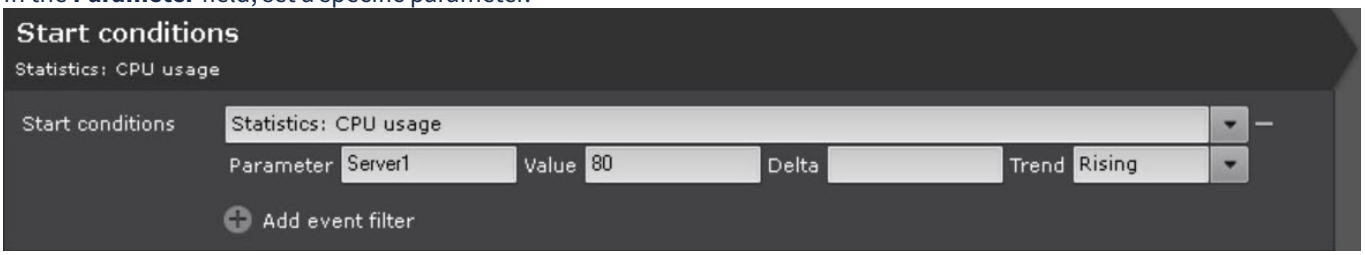
The **Event rules** macros can be initiated not only by events of a particular type (see Configuring start conditions(see page 834)), but also by statistical parameters.

To configure the start of the **Event rules** macros based on statistical data, do the following:

1. In the **Start conditions** list, in the **Statistics** group, select the required event.



2. In the **Parameter** field, set a specific parameter.

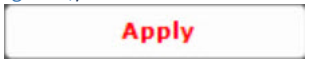


Event	Parameter
Archive usage	Archive in the following format: hosts/TEST/MultimediaStorage.AliceBlue/MultimediaStorage (see Get archive contents[338])
Disk usage	**SERVER1@C:**, where SERVER1 is the name of a server within the Axxon-domain, C:\ is the disk letter. **Attention** You cannot monitor storage capacity of a disk fully allocated for the archive (see Creating a local archive(see page 276))
Memory usage	The name of a server within the Axxon-domain
Network usage	
CPU usage	

3. In the **Value** field, enter the capacity value in percent.
4. In the **Delta** field, set the range of capacity values if you use the **Leaving** trend.
5. From the **Trend** list, select a trend to start a macro.

Trend	Macro start if capacity value
Leaving	leaves the specified range [**Value** – **Delta**; **Value**]
Rising	exceeds the **Value** value
Falling	falls behind the **Value** value

> **Attention!**
>
> Macro starts only when events that meet the start conditions occur in the future. For example, if the current CPU usage is 85%, and you specified the macro to start when the threshold of 80% is exceeded, the macro starts only when the threshold of 80% is exceeded next time.

6. If necessary, you can specify several event and/or statistical conditions to start a macro (see Configuring start conditions(see page 834)).
7. Click the **Apply**  button.

Configuration of the start of the **Event rules** macros based on statistical data is complete.

338 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246487007/Get+archive+contents

19.5.7.2 Configuring macros when working with lists of faces

On the page:

- General information(see page 845)
- Presence of the recognized face in the selected list of faces(see page 845)
- Absence of the recognized face in the selected list of faces(see page 846)
- Recognition of the presence of a specific face in the list of faces(see page 847)
- Absence of the recognized face in all created lists of faces(see page 847)

Examples of macros used when working with lists of faces(see page 906)

19.5.7.2.1 General information

When working with lists of faces, you can configure a macro to start (see General information about macros(see page 829)), when:

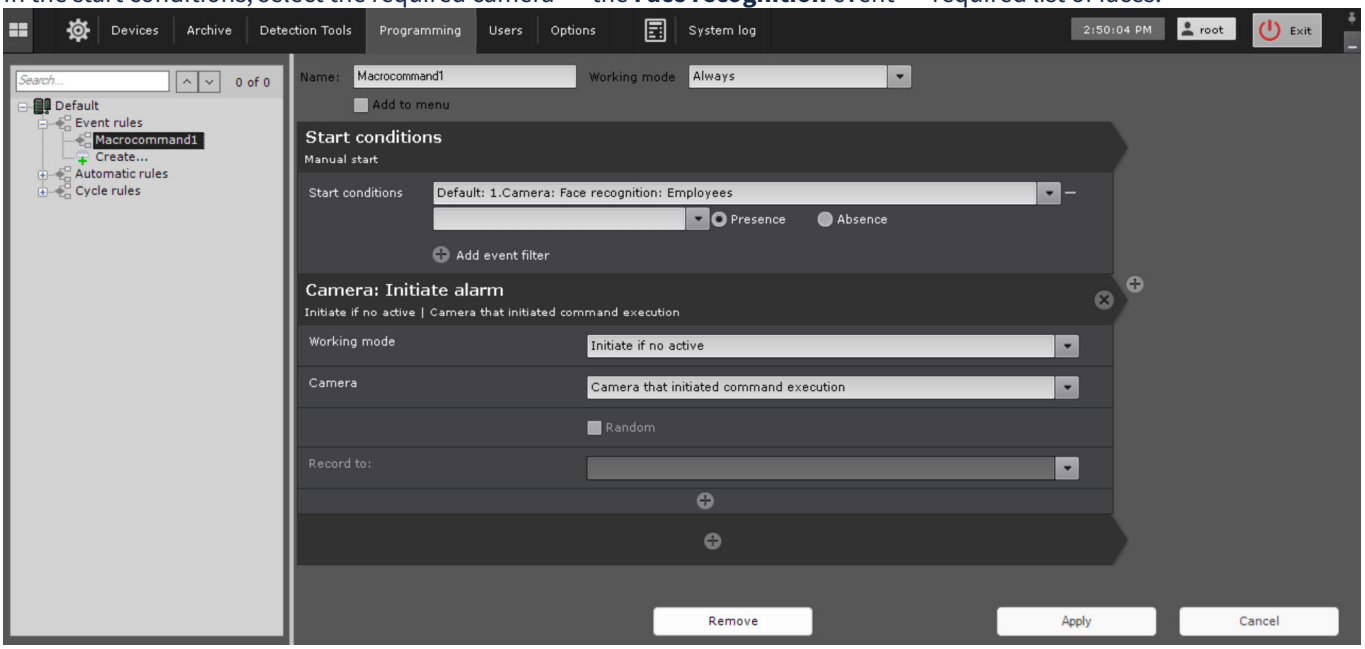
- the recognized face is present in the selected list;
- the recognized face is absent in the selected list;
- it is necessary to recognize the presence of the specific face in a list;
- the recognized face is absent in all created lists.

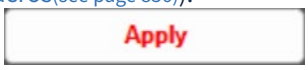
19.5.7.2.2 Presence of the recognized face in the selected list of faces

To configure a macro that starts when the recognized face is present in the selected list of faces, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...**.

3. In the start conditions, select the required camera → the **Face recognition** event → required list of faces.



4. Select the **Presence** option.
5. Click the  button and select the action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
6. Click the **Apply** 

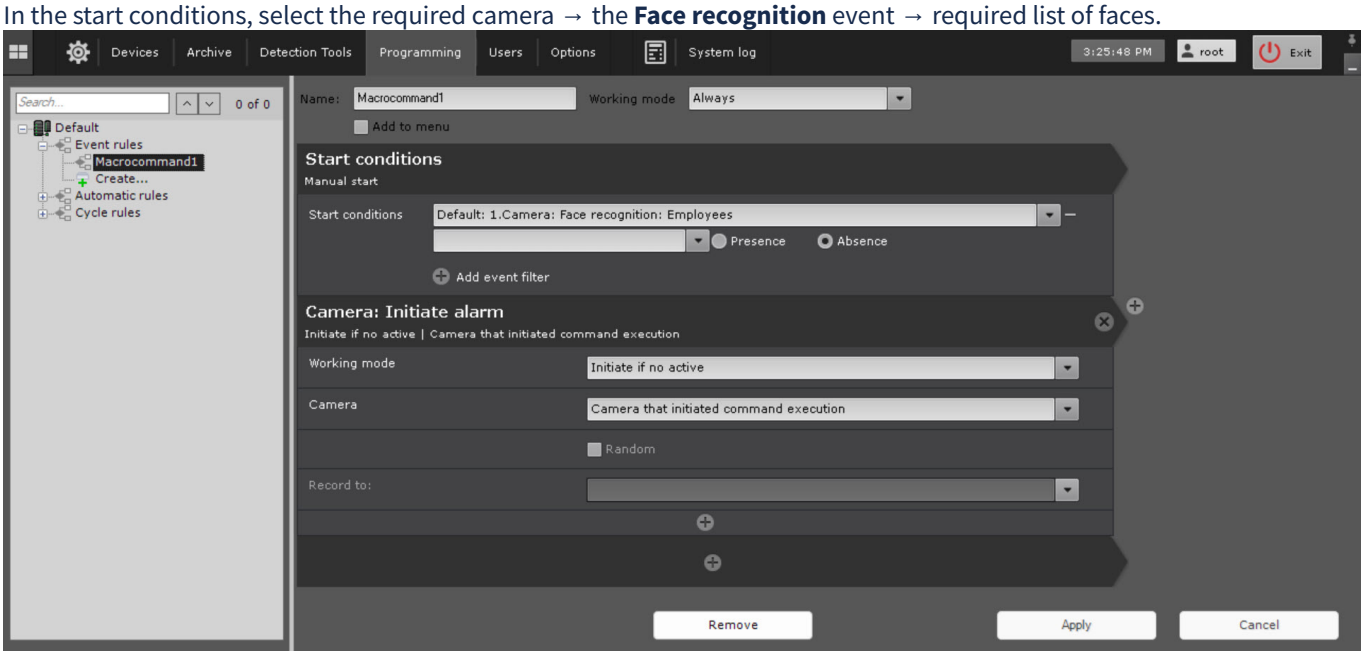
button.

Configuration of a macro that starts when the recognized face is present in the selected list of faces is complete.

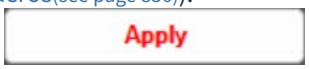
19.5.7.2.3 Absence of the recognized face in the selected list of faces

To configure a macro that starts when the recognized face is absent in the selected list of faces, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...**.
3. In the start conditions, select the required camera → the **Face recognition** event → required list of faces.



4. Select the **Absence** option.

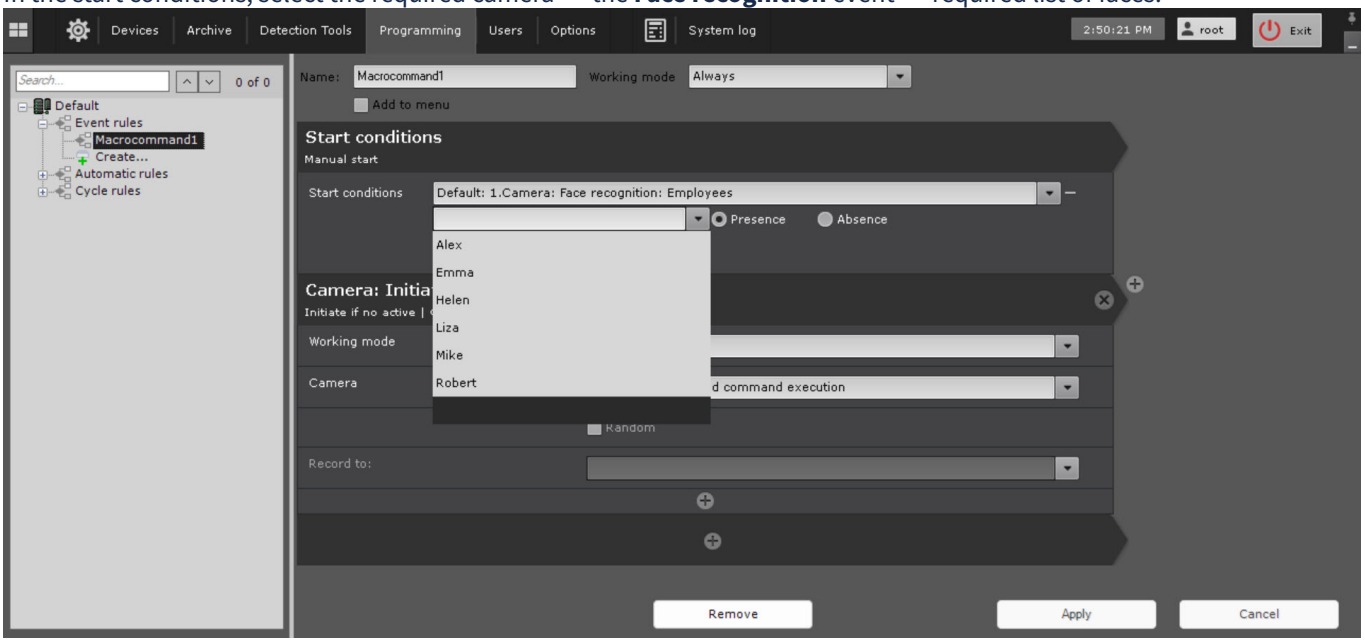
5. Click the  button and select the action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
6. Click the **Apply**  button.

Configuration of a macro that starts when the recognized face is absent in the selected list of faces is complete.

19.5.7.2.4 Recognition of the presence of a specific face in the list of faces

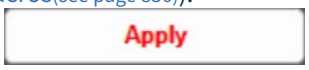
To configure a macro that starts when a specific face is present in the list of faces, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...**.
3. In the start conditions, select the required camera → the **Face recognition** event → required list of faces.



4. Select the **Presence** option.
5. Select the required person from the drop-down list.

> **Note**
>
> To select another person, clear the field and re-open the list.

6. Click the  button and select the action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
7. Click the **Apply**  button.

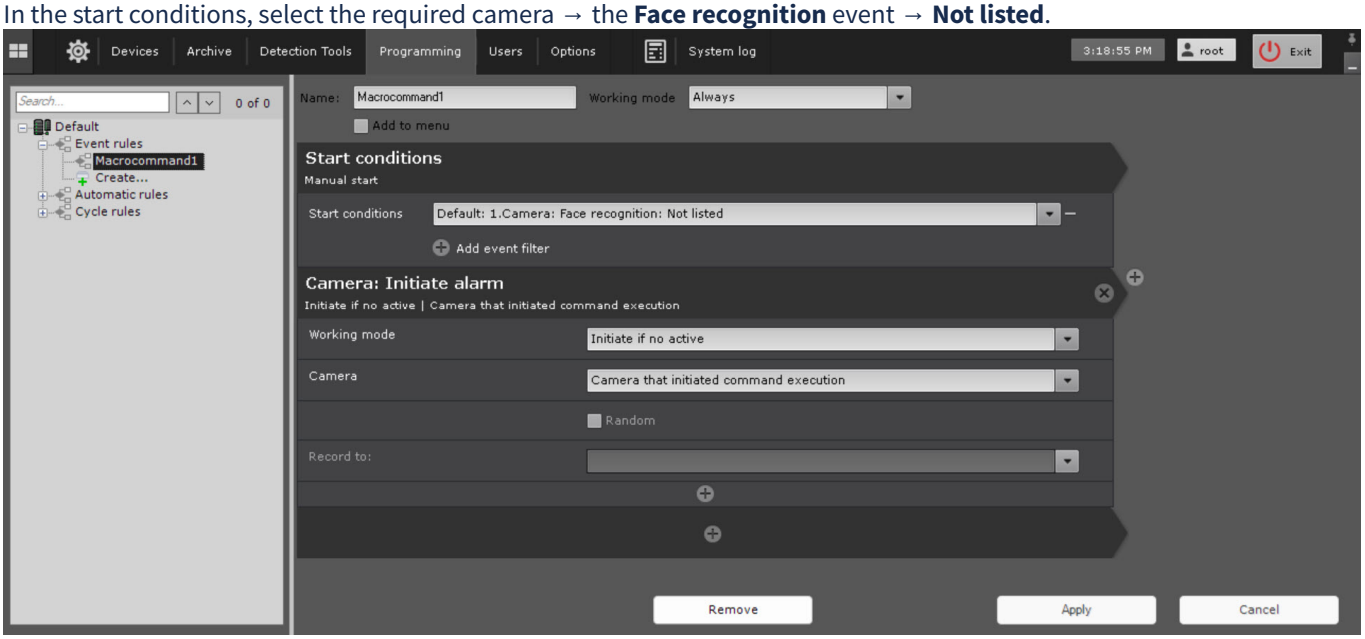
Configuration of a macro that starts when a specific face is present in the list of faces is complete.

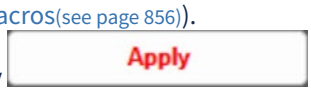
19.5.7.2.5 Absence of the recognized face in all created lists of faces

To configure a macro that starts when the recognized face is absent in all created lists of faces, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...**.

3. In the start conditions, select the required camera → the **Face recognition** event → **Not listed**.



4. Click the  button and select the action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
5. Click the **Apply**  button.

Configuration of a macro that starts when the recognized face is absent in all created lists of faces is complete.

19.5.7.3 Parameters that specify the conditions for starting a macro when recognizing a face

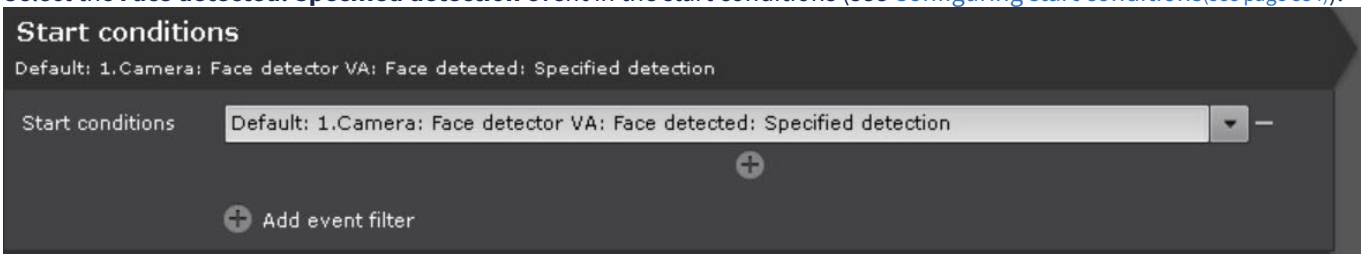
You can filter the start of macros when a face is recognized by specifying the following parameters:

> **Note**
>
> To use the **Age** and **Gender** parameters, you must enable the corresponding parameters in the settings of a detector:
> - **Age and gender** (see Configuring the Face detector VA(see page 491), Configuring the Face detector TV(see page 505)).
> - **Face attributes recognition** (see Configuring the Face detector VL(see page 478)).

1. **Age**—age of a person.
2. **Gender**—gender of a person. Values: **1**—female, **2**—male.
3. **TemperatureValue**—temperature of a person, the **Face detector and temperature control** must be configured, see Face detection and temperature control with Mobotix M16 TR cameras(see page 818).

To set the parameters that specify the conditions, do the following:

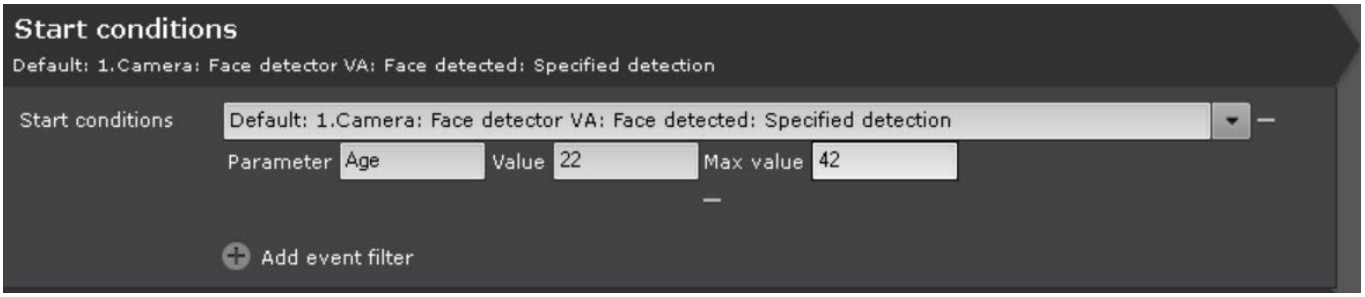
1. Select the **Face detected: Specified detection** event in the start conditions (see Configuring start conditions(see page 834)).



2. Click the  button.
3. In the **Parameter** field, specify the required parameter.

> **Attention!**

The parameter is case-sensitive.

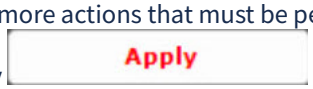


4. In the **Value** and **Max value** fields, set the range of parameter values within which the macro starts.

Note

Examples:

- If you set the **Age** parameter in the range [18; 100], the macro starts only if the detector returns the age value of 18 or more.
- If you set the **Gender** parameter in the range [1; 1], the macro starts only if the detector returns the person's gender as female.
- If you set the **Gender** parameter in the range [2; 2], the macro starts only if the detector returns the person's gender as male.
- If you set the **TemperatureValue** parameter in the range [37; 100], the macro starts only if the detector returns the temperature value of 37 degrees or more.

5. Specify one or more actions that must be performed (see Examples of macros(see page 856)).
6. Click the **Apply** 

button.

As a result, parameters that specify the conditions for starting a macro are applied.

19.5.7.4 Configuring macros when working with lists of license plates

On the page:

- General information(see page 850)
- Presence of the recognized license plate in the selected list(see page 850)
- Absence of the recognized license plate in the selected list(see page 850)
- Presence of the specific license plate in the selected list(see page 851)
- Absence of the recognized license plate in all created lists(see page 852)

Examples of macros used when working with lists of license plates(see page 911)

19.5.7.4.1 General information

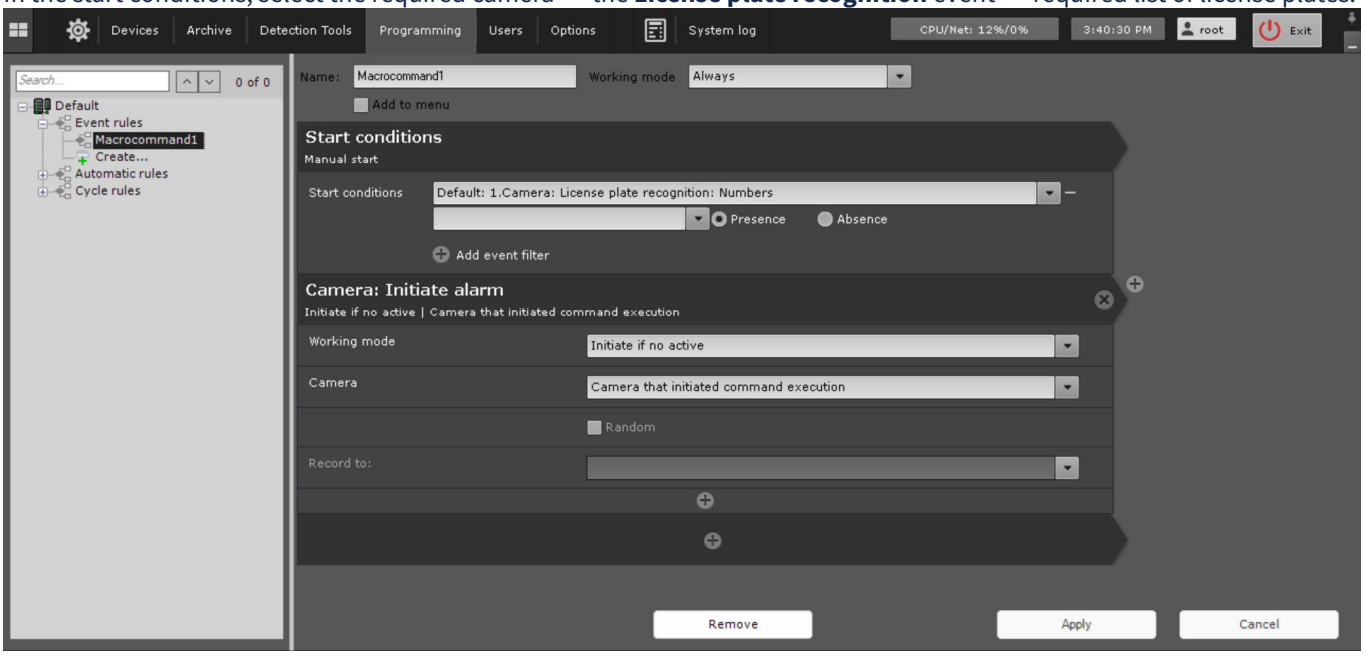
When working with lists of license plates, you can configure a macro to start (see General information about macros(see page 829)), when:

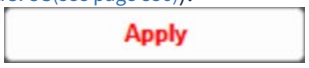
- the recognized license plate is present in the selected list;
- the recognized license plate is absent in the selected list;
- it is necessary to recognize the presence of the specific license plate in a list;
- the recognized license plate is absent in all created lists.

19.5.7.4.2 Presence of the recognized license plate in the selected list

To configure a macro that starts when the recognized license plate is present in the selected list of license plates, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...**.
3. In the start conditions, select the required camera → the **License plate recognition** event → required list of license plates.



4. Select the **Presence** option.
5. Click the  button and select the action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
6. Click the **Apply** 

button.

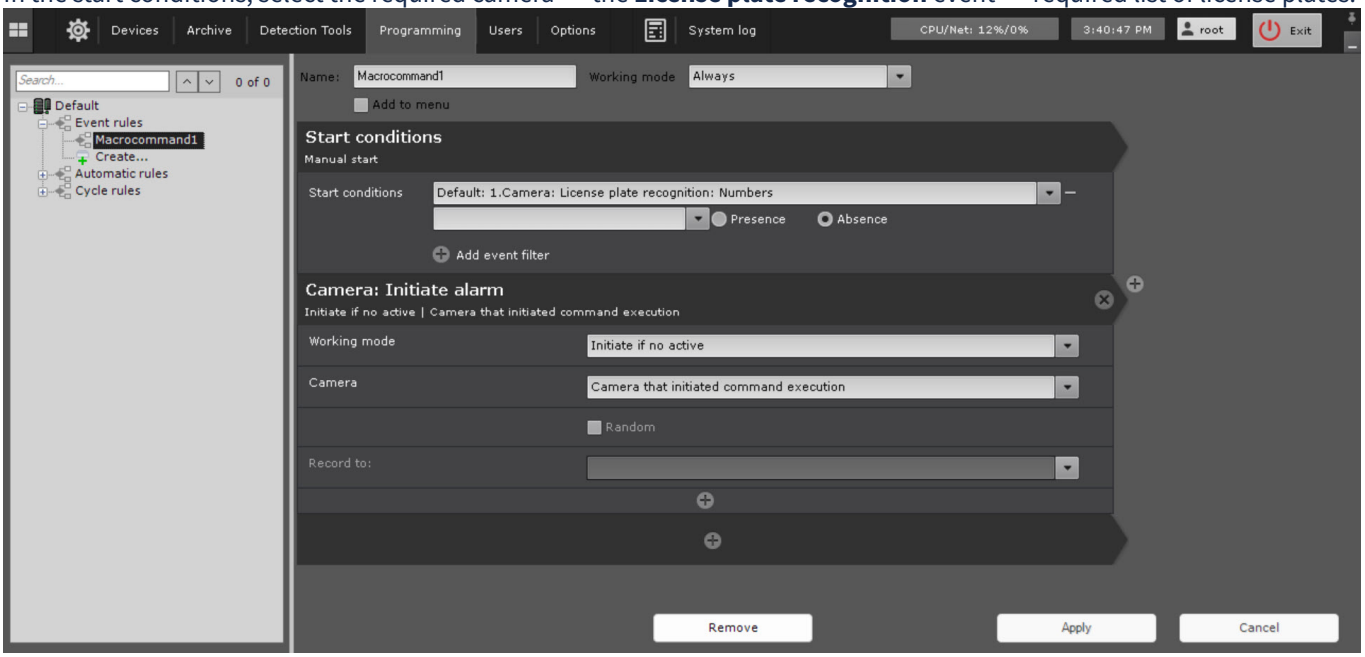
Configuration of a macro that starts when the recognized license plate is present in the selected list of license plates is complete.

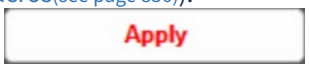
19.5.7.4.3 Absence of the recognized license plate in the selected list

To configure a macro that starts when the recognized license plate is absent in the selected list of license plates, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...**.

3. In the start conditions, select the required camera → the **License plate recognition** event → required list of license plates.



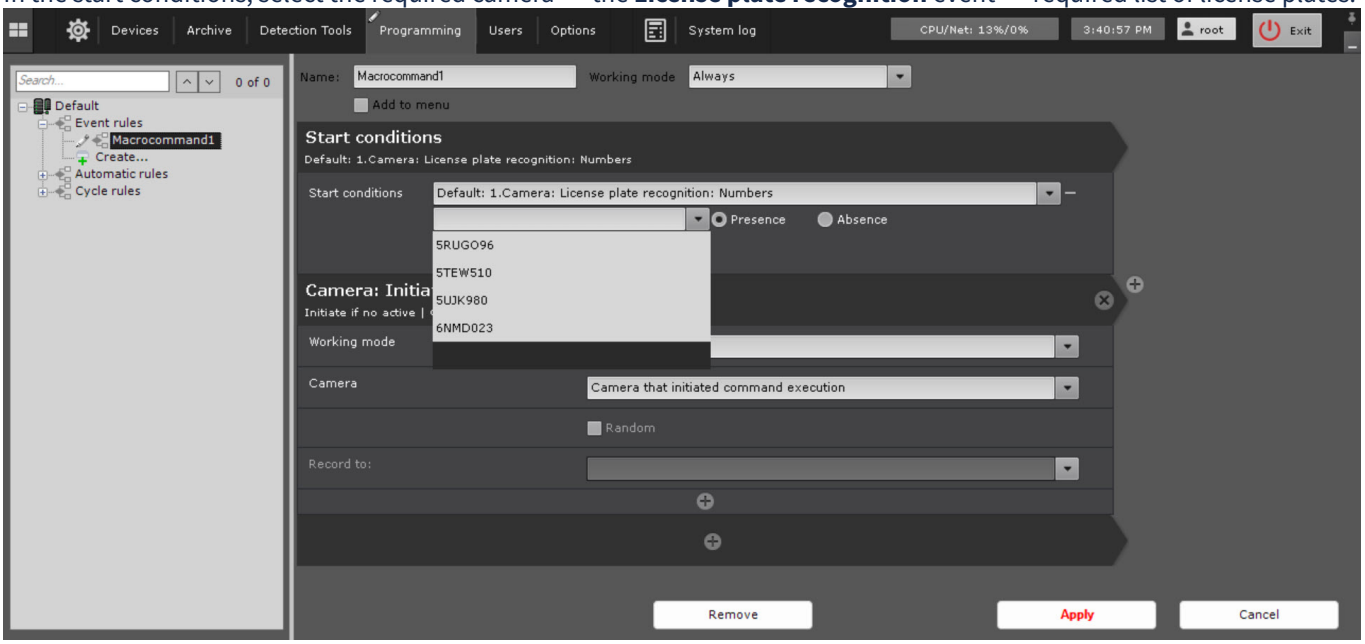
4. Select the **Absence** option.
5. Click the  button and select the action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
6. Click the **Apply**  button.

Configuration of a macro that starts when the recognized license plate is absent in the selected list of license plates is complete.

19.5.7.4.4 Presence of the specific license plate in the selected list

To configure a macro that starts when a specific license plate is present in the list of license plates, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...**.
3. In the start conditions, select the required camera → the **License plate recognition** event → required list of license plates.



4. Select the **Presence** option.

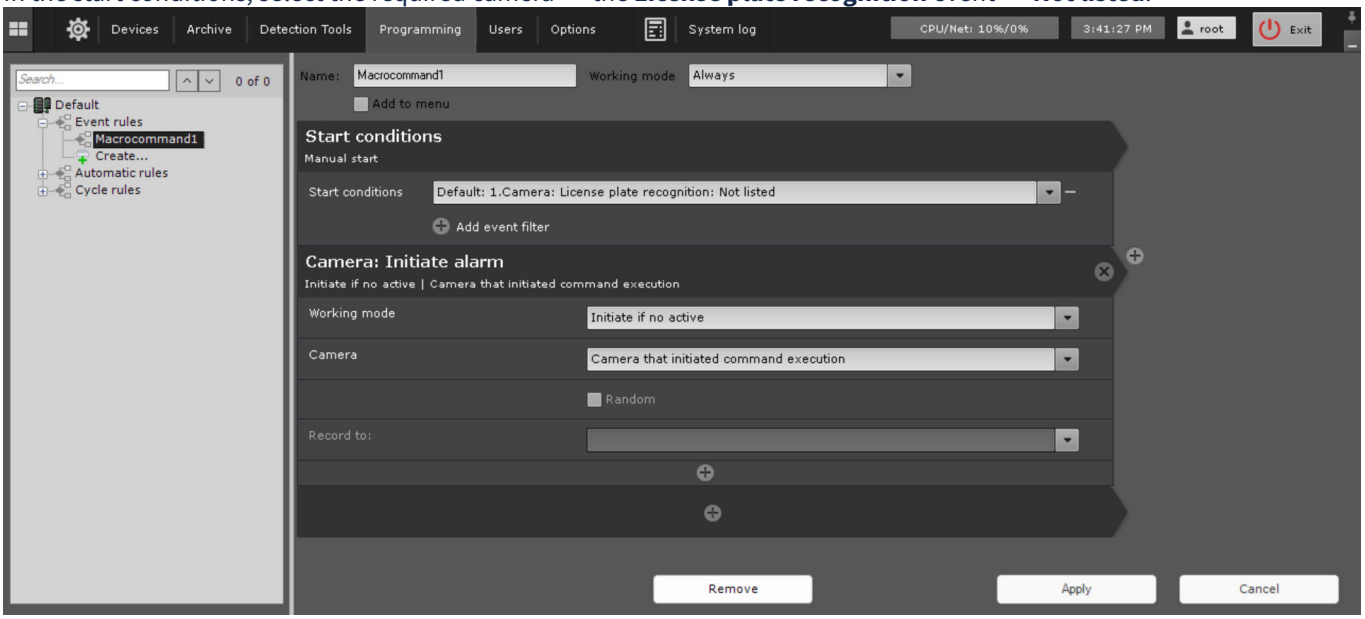
5. Select the required license plate from the drop-down list. To select another license plate, clear the field and re-open the list.
6. Click the button and select the action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
7. Click the **Apply** button.

Configuration of a macro that starts when a specific license plate is present in the list of license plates is complete.

19.5.7.4.5 Absence of the recognized license plate in all created lists

To configure a macro that starts when the recognized license plate is absent in all created lists of license plates, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...**.
3. In the start conditions, select the required camera → the **License plate recognition** event → **Not listed**.



4. Click the button and select the action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
5. Click the **Apply** button.

Configuration of a macro that starts when the recognized license plate is absent in all created lists of license plates is complete.

19.5.7.5 Parameters that specify the conditions for starting a macro when recognizing a vehicle

On this page:

- General information(see page 853)
- Algorithm for setting the clarifying parameters(see page 854)
- Example of a license plate recognition when a vehicle is approaching the camera or

moving away from it(see page 855)
- Example with speed detection(see page 855)

19.5.7.5.1 General information

You can filter the start of macros when a vehicle is recognized by specifying the following clarifying parameters:

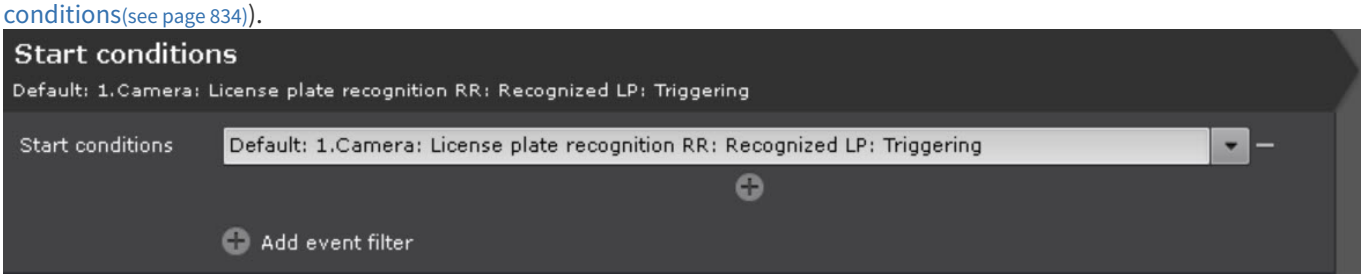
Parameter	Value	Max value	Description
Direction	**0**		Macro starts if a license plate is recognized when a vehicle is moving in an unspecified direction towards the camera
	1		Macro starts if a license plate is recognized when a vehicle is approaching the camera
	2		Macro starts if a license plate is recognized when a vehicle is moving away from the camera
SpeedKmph	Minimum speed value in km/h	Maximum speed value in km/h	Macro starts if a license plate is recognized when a vehicle is moving within the specified speed limits. The speed values must be in the range [0, 250]
SpeedMph	Minimum speed value in mph	Maximum speed value in mph	Macro starts if a license plate is recognized when a vehicle is moving within the specified speed limits. The speed values must be in the range [0, 155]
VehicleBrand	Vehicle manufacturer name (for example, **Audi**). For the full list of possible manufacturers, see Functionality of License plate recognition RR(see page 535)	—	Macro starts if a vehicle of a certain manufacturer is recognized
VehicleColor	Vehicle color (for example, **Black**)	—	Macro starts if a vehicle of a certain color is recognized
VehicleModel	Vehicle model name (for example, **A6**). For the full list of possible models, see Functionality of License plate recognition RR(see page 535)	—	Macro starts if a vehicle of a certain model is recognized

Parameter	Value	Max value	Description
VehicleClass	[0, 16], where: • **0**—Unknown (vehicles whose class could not be recognized); • **1**—Car; • **2**—Truck; • **3**—Bus; • **4**—Motorcycle; • **5**—Light commercial vehicle; • **6**—Trolleybus; • **7**—Tram; • **8**—Van; • **9**—Minivan; • **10**—SUV; • **11**—Pickup truck; • **12**—Average size vehicle; • **13**—Large vehicle; • **14**—Heavy-duty vehicle; • **15**—Special vehicle; • **16**—Dump truck	—	Macro starts if a vehicle of a certain class is recognized

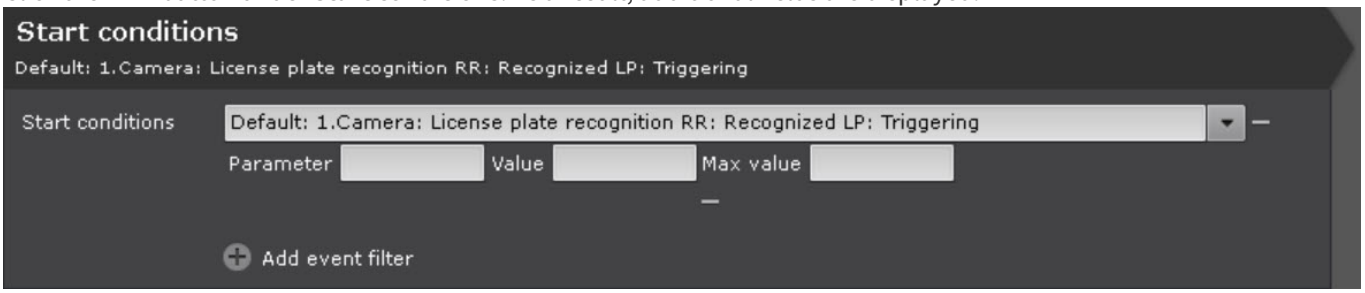
19.5.7.5.2 Algorithm for setting the clarifying parameters

To set the parameters that specify the conditions for starting macros, do the following:

1. In the **Start conditions**, select the license plate recognition or vehicle recognition event (see Configuring start conditions(see page 834)).



2. Click the  button under **Start conditions**. As a result, additional fields are displayed.



3. In the **Parameter** field, specify the required parameter.

> **Attention!**
>
> The parameter value is case-sensitive.

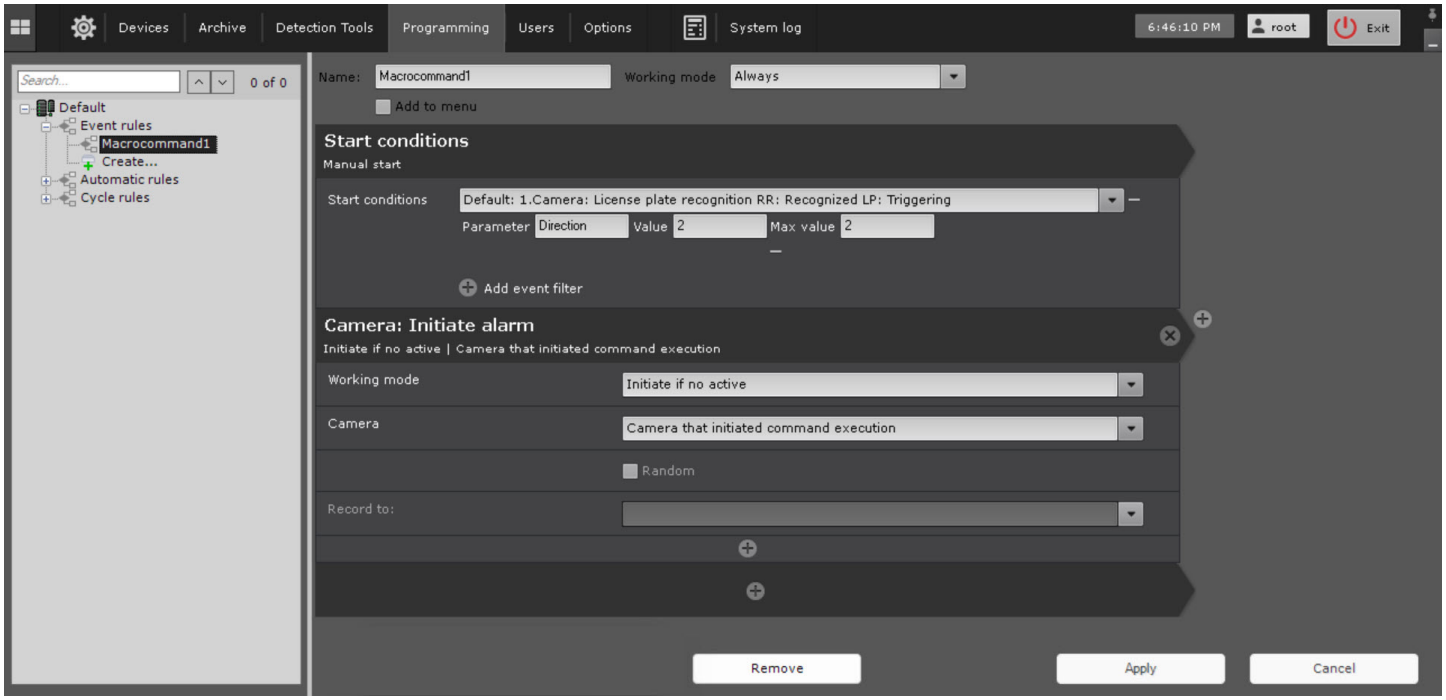
4. Depending on the parameter used, in the **Value** and **Max value** fields, set the range of values within which the macro starts.

5. Set one or more actions to be performed (see Examples of macros(see page 856)).
6. Click the **Apply** Apply button.

The clarifying parameters are set.

19.5.7.5.3 Example of a license plate recognition when a vehicle is approaching the camera or moving away from it

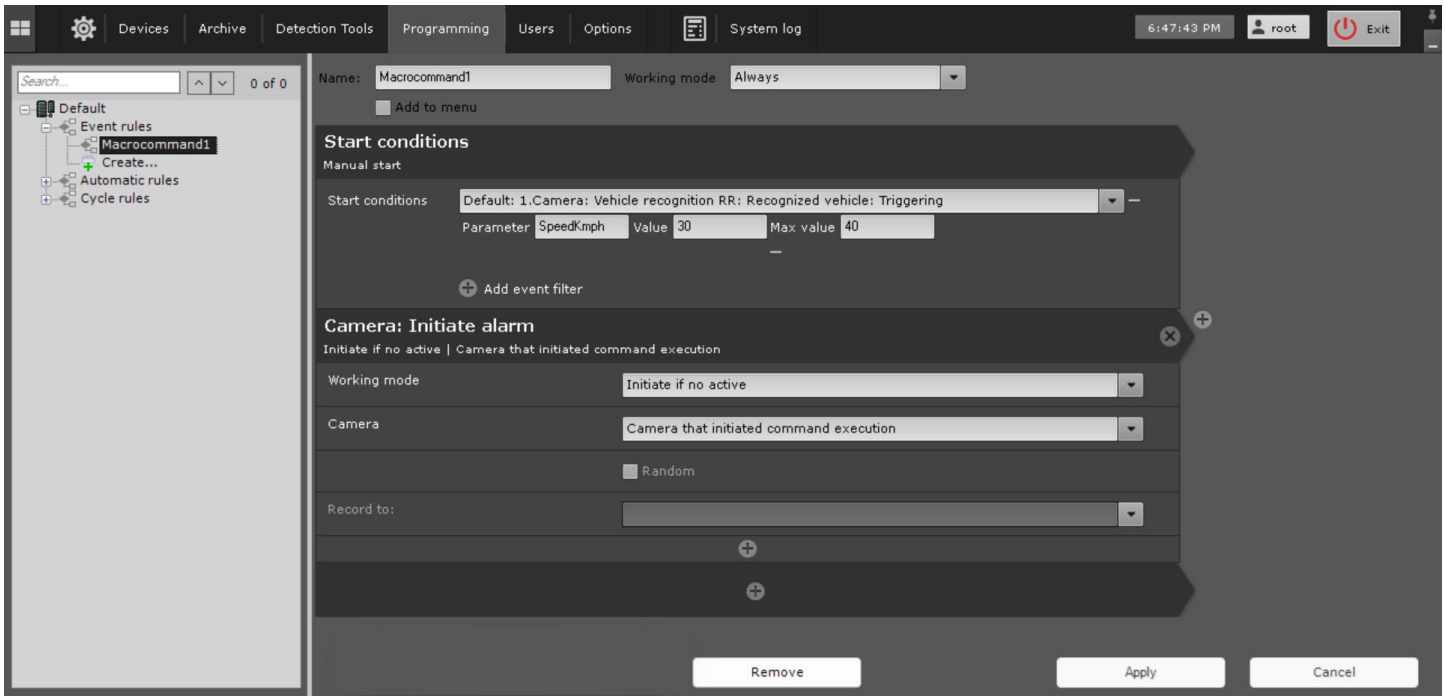
You can configure a macro to initiate an alarm if a license plate is recognized when a vehicle is approaching or moving away from the camera. To configure this macro, you must first create and configure the **License plate recognition RR** detector (see Configuring License plate recognition RR(see page 555)).



In this case, an alarm is initiated when a license plate is recognized while a vehicle is moving away from the camera.

19.5.7.5.4 Example with speed detection

You can configure a macro to initiate an alarm if a vehicle is recognized at a certain vehicle speed. To configure this macro, you must first create and configure the **Vehicle recognition RR** detector (see Configuring Vehicle recognition RR(see page 615)). You must also select the **Speed detection** value as **Kmph** in the detector settings.



In this case, an alarm is initiated when a vehicle is recognized within a speed range of 30-40 km/h.

19.5.8 Examples of macros

19.5.8.1 Wait for events

19.5.8.1.1 Wait for event

On the page:

- General information(see page 856)
- Configuring an action(see page 856)
- Example use(see page 857)

19.5.8.1.1.1 General information

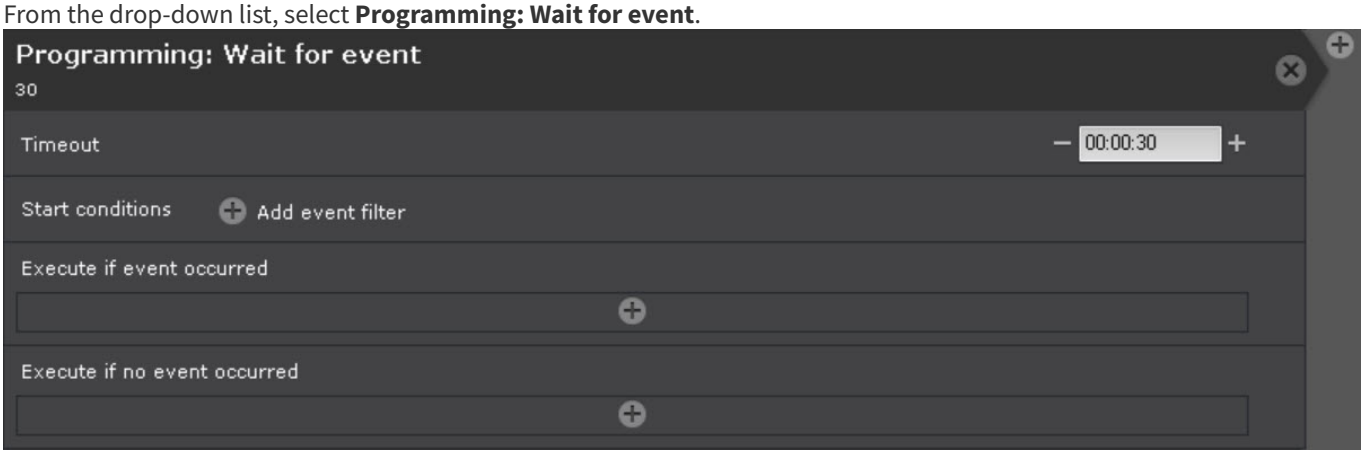
This command allows executing different actions after a certain period depending on whether an event occurs or not.

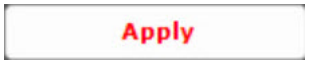
19.5.8.1.1.2 Configuring an action

To configure the occurrence of an event, do the following:

1. Go to the **Programming** tab.
2. Click the **Create...** button in the **Event rules** or **Cycle rules** list (see Configuring macros(see page 830)).
3. Select the start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below the start conditions.

5. From the drop-down list, select **Programming: Wait for event**.



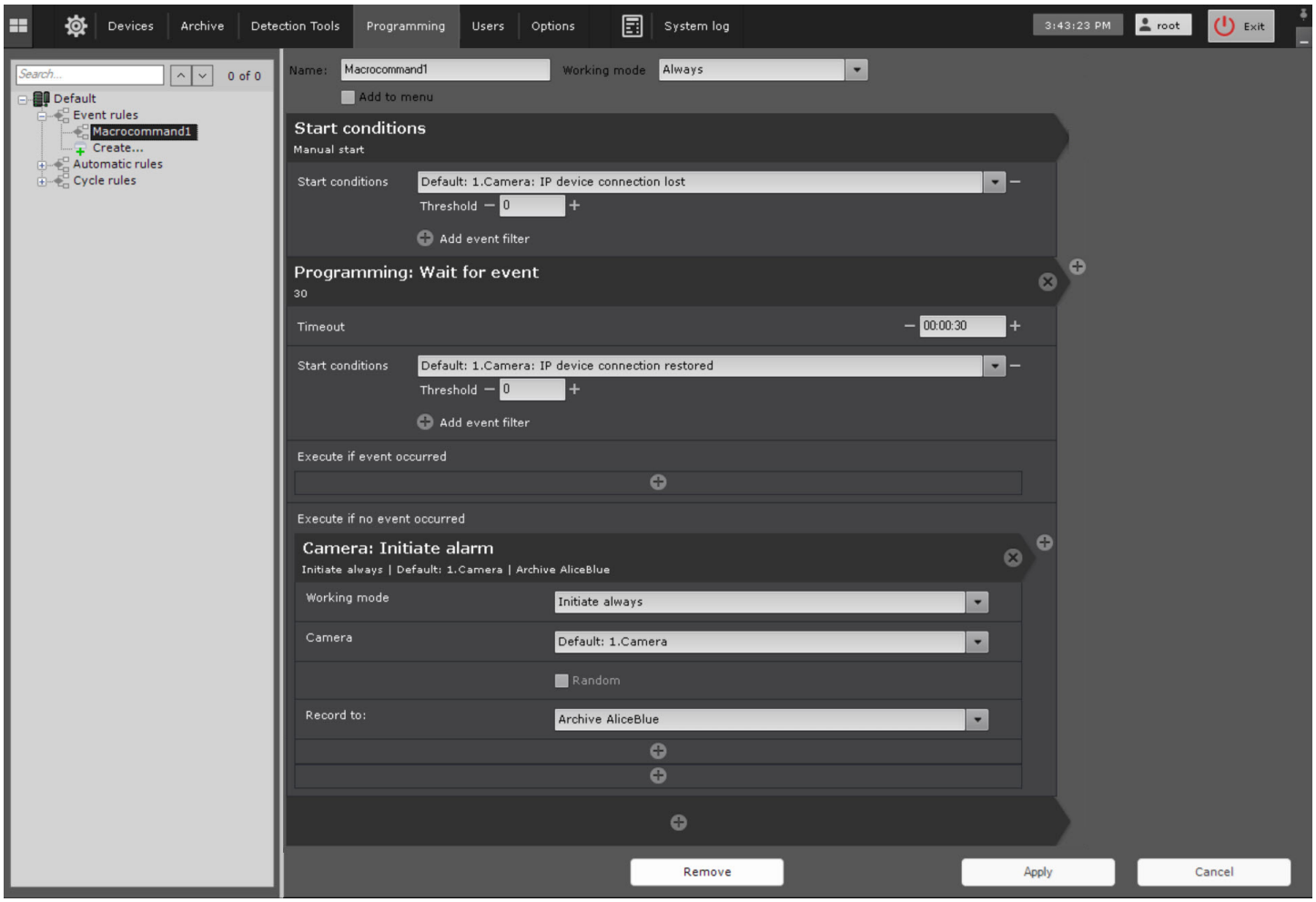
6. In the **Timeout** parameter, set the time to wait for the event to occur in **HH:MM:SS** format.
7. Click the **Add event filter** button and add the event filter if necessary. You can specify one or more events, upon receiving which the waiting stops. If you don't select events, the waiting stops only after the specified time.
8. If necessary, select and configure the action that you want to execute:
    a. When you receive an event from the filter in the **Execute if event occurred** parameter.
    b. If no event from the filter occurs during the waiting time in the **Execute if no event occurred** parameter.
9. Click the **Apply** 

button.

Configuring the **Wait for event** action is complete.

19.5.8.1.1.3 Example use

This macro checks if there is a connection with the IP device.



When a connection with the IP device is lost, the waiting time to restore the connection with a device is 30 seconds. The waiting stops as soon as a connection with the IP device is restored.

If this event doesn't occur, an alarm is initiated after this time elapses.

19.5.8.1.2 Wait for timeout

On the page:

- General information(see page 858)
- Configuring an action(see page 858)
- Example use(see page 859)

19.5.8.1.2.1 General information

This action delays the start of the next actions for a specified time.

19.5.8.1.2.2 Configuring an action

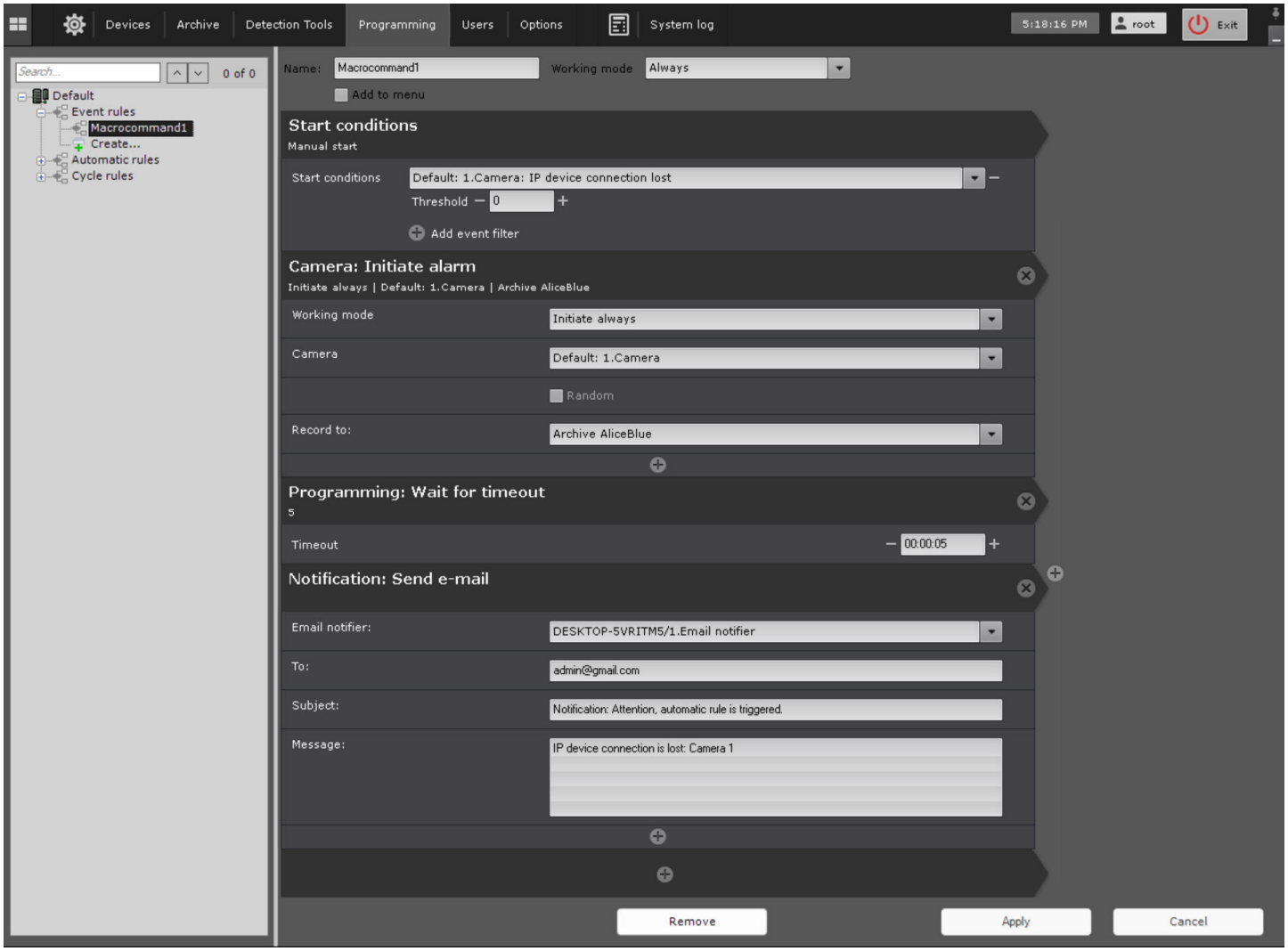
To configure this macro, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. If necessary, select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the button below start conditions.
5. From the drop-down list, select **Programming: Wait for timeout**.
6. In the **Timeout** parameter, set the delay time for the next action in **HH:MM:SS** format.
7. If necessary, add additional actions by clicking the button.
8. Click the **Apply** button.

Configuration of the **Wait for timeout** action is complete.

19.5.8.1.2.3 Example use

In this macro, the execution of actions depends on the event of connection loss with an IP device.



When this macro is executed, first an alarm is initiated in the system, and then an email message is sent after 5 seconds.

19.5.8.1.3 Wait till previous action finishes

On the page:

- General information(see page 860)
- Configuring an action(see page 860)
- Example use for a Cycle rules macro(see page 860)

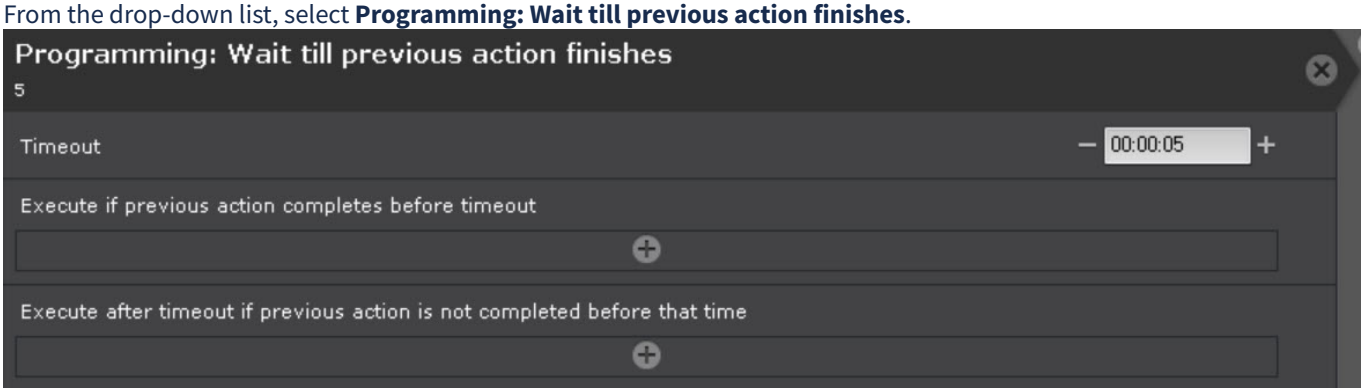
19.5.8.1.3.1 General information

This action allows executing macros depending on whether or not the previous action is finished within the specified time.

19.5.8.1.3.2 Configuring an action

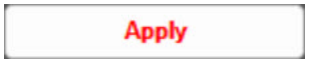
To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. If necessary, select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Programming: Wait till previous action finishes**.



6. In the **Timeout** parameter, set the time to wait for the previous action to be executed in **HH:MM:SS** format. If you set the time to **00:00:00**, the wait time is infinite.
7. Specify the action that must be executed if the previous action:
   a. Completes within the wait time specified in the **Execute if previous action completes before timeout** parameter.
   b. Doesn't complete within the wait time specified in the **Execute after timeout if previous action is not completed before that time** parameter. If the wait time is **00:00:00**, this parameter isn't relevant.

   > **Attention!**
   >
   > The **Wait till previous action finishes** macro doesn't apply to actions below (outside) this command.

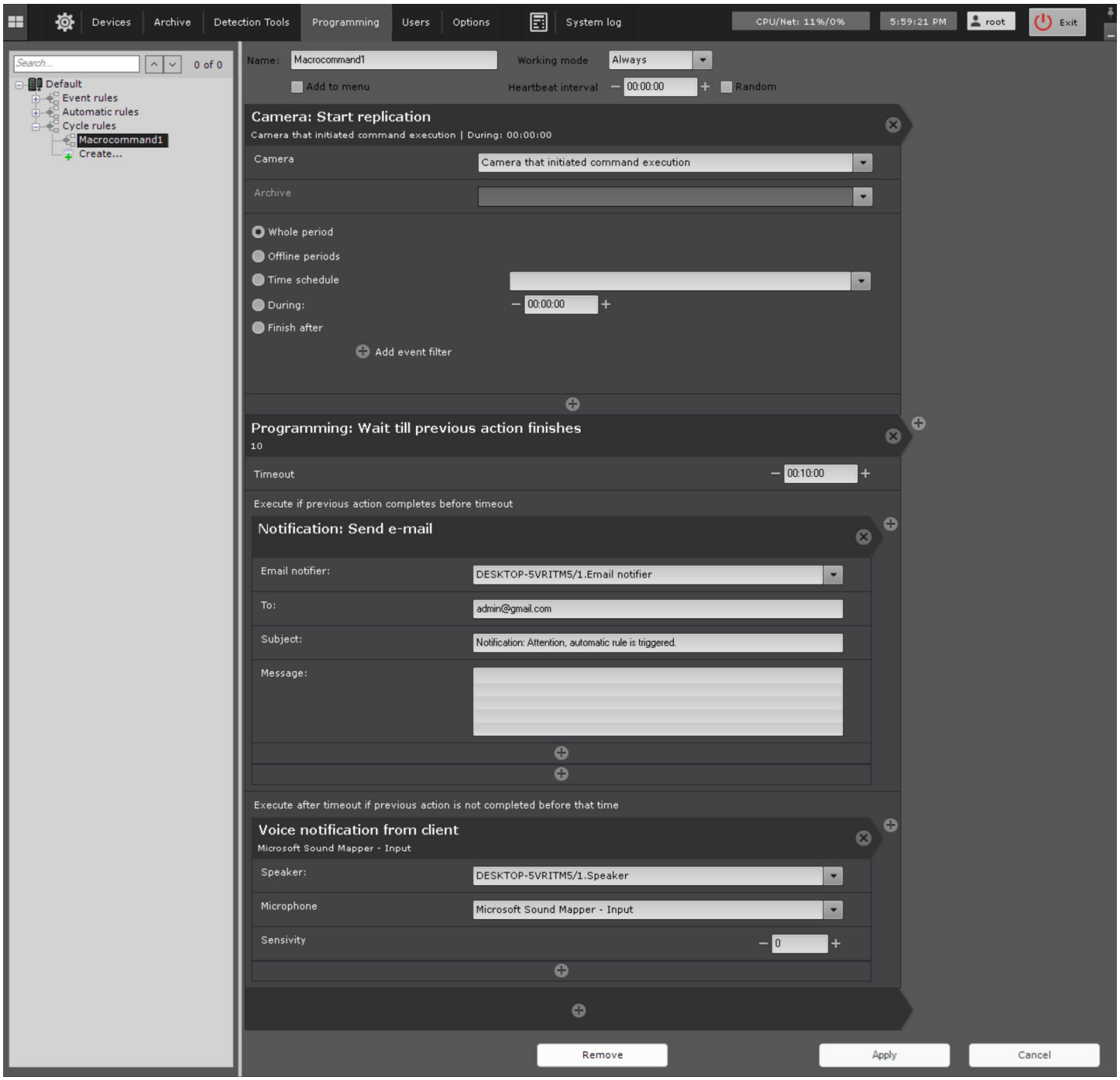
8. Click the **Apply** 

button.

Configuration of the **Wait till previous action finishes** action is complete.

19.5.8.1.3.3 Example use for a Cycle rules macro

This macro starts replication and the program on the client simultaneously. If replication completes within 10 minutes, an email notification is sent, if not, a voice notification is played.



19.5.8.1.4 Break execution

This action allows breaking the execution of a macro when a certain condition or event occurs. To configure this action, see Examples of Cycle rules macros(see page 903).

19.5.8.2 Control alarms

19.5.8.2.1 Initiate alarm

On the page:

- General information(see page 862)
- Configuring an action(see page 862)
- Example use(see page 863)

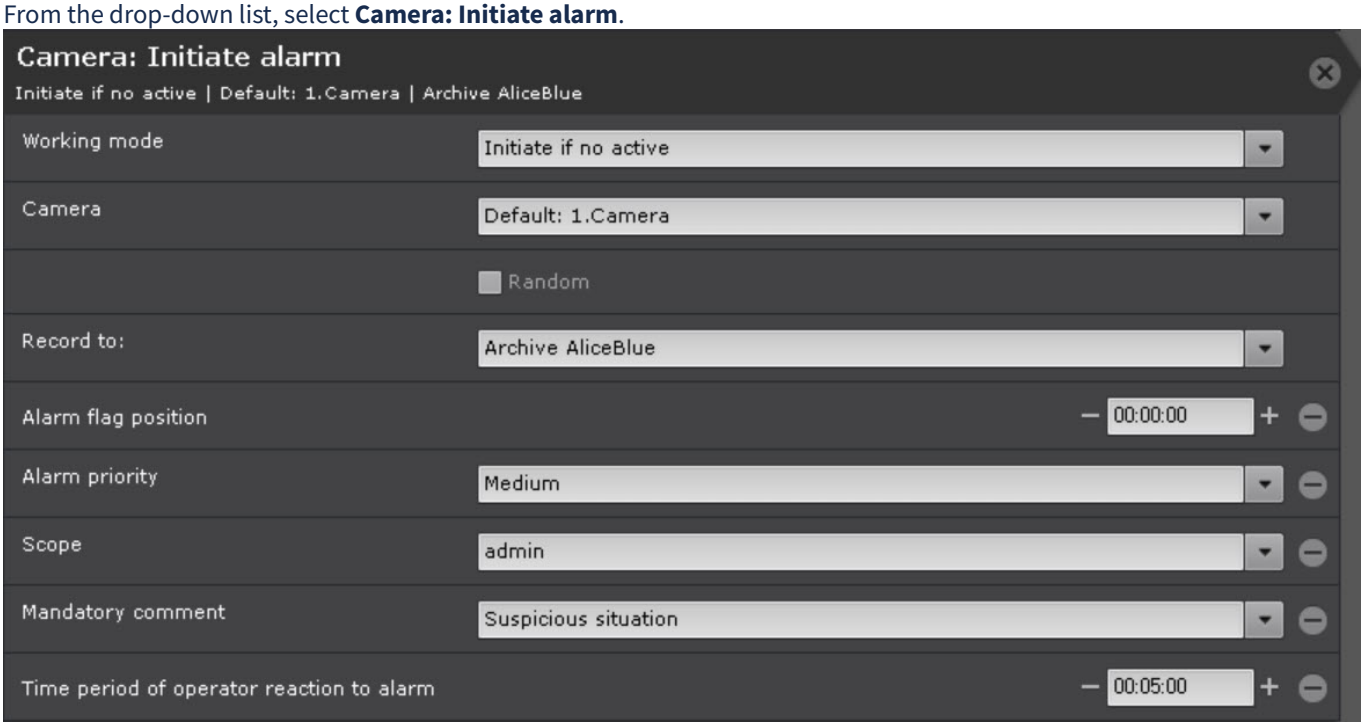
19.5.8.2.1.1 General information

This action initiates an alarm in the system and starts recording to the archive.

19.5.8.2.1.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Camera: Initiate alarm**.



6. In the **Working mode** parameter, select the alarm initiation mode:
   a. **Initiate always**,
   b. **Initiate if no active** (only if there is no active alarm on the specified camera in the system at the moment).
7. In the **Camera** parameter, select from the list a camera or group of cameras on which you want to initiate an alarm. In addition, an implicit camera selection is allowed—**Camera that initiated command execution**.

> **Attention!**
>
> If a macro is initiated by an event from an input or output (see Configuring start conditions(see page 834)) that is not connected to any camera, you need to select a specific camera for this action. If you select a group of cameras or a camera that initiated the macro, the action doesn't start.

8. Set the **Random** checkbox if you select a group of cameras or domain to initiate an alarm on a random camera from the specified group/domain.
9. In the **Record to** parameter, select an archive to record to.

10. If necessary, click the  button and add additional parameters.
11. In the **Alarm flag position** parameter, enter the time in seconds to offset the alarm flag in the past relative to the actual occurrance time of the event that triggered the macro.

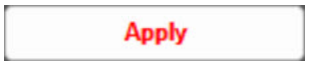
    Note

    If the alarm flag position is set, the event that was just taken into processing is played back from the moment corresponding to the flag position in the past, and not from the alarm start.

12. In the **Alarm priority** parameter, select the priority of the alarm. When an alarm is displayed on the Alert panel, the higher the alarm priority, the higher it is positioned in the alarm list.
13. In the **Scope** parameter, specify the scope of visibility for the roles, the users of which can see an alarm generated by the macro. If you don't specify any role in the scope of visibility, an alarm is displayed for all users.
14. In the **Mandatory comment** parameter, select an alarm assessment, after receiving which the operator must enter a comment.
15. In the **Time period of operator reaction to alarm** parameter, specify the time within which an alarm must be taken into processing, otherwise it will be assigned the **Skipped** status. The minimum value is **2** minutes.

    Note

    You can configure the **Mandatory comment** and **Time period of operator reaction to alarm** parameters in the system settings (see Configuring Alarm processing(see page 1011)). If you specify these parameters in the macro settings, the system settings are ignored only by the alarms initiated by this macro.

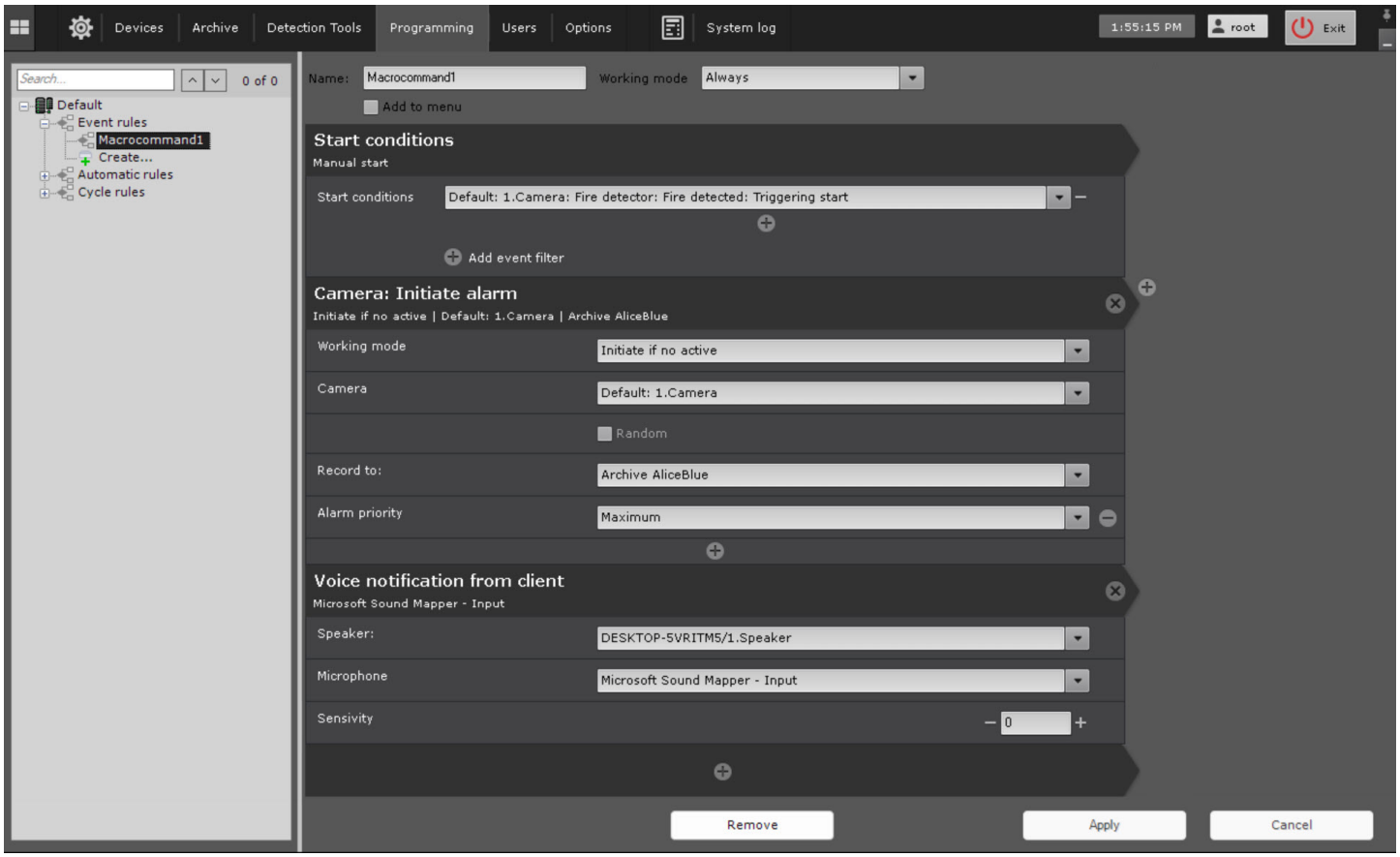
16. Click the **Apply** 

button.

Configuration of the **Initiate alarm** action is complete.

19.5.8.2.1.3 Example use

When smoke is detected, the fire detector generates an event that triggers a macro. The maximum priority alarm is initiated and an audio notification is played.



19.5.8.2.2 Stop alarm

On the page:

- General information(see page 864)
- Configuring an action(see page 864)
- Example use(see page 865)

19.5.8.2.2.1 General information

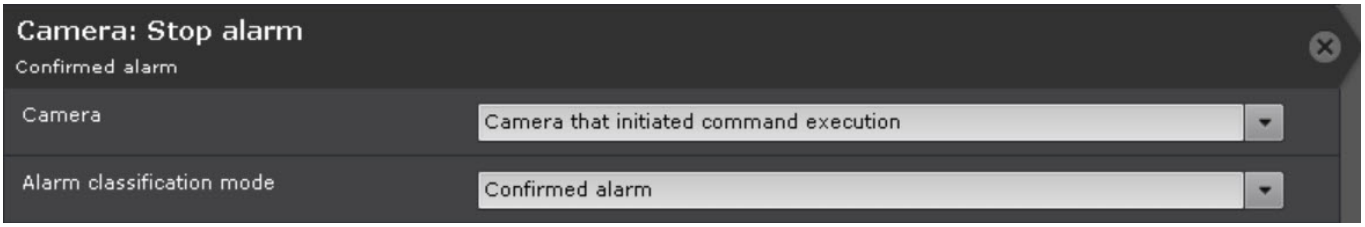
This action allows you to process and assess an alarm.

19.5.8.2.2.2 Configuring an action

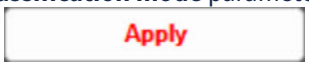
To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Camera: Stop alarm**.

6. In the **Camera** parameter, select a camera or group of cameras on which you want to stop an alarm. In addition, an implicit camera selection is allowed—**Camera that initiated command execution**.



> **Attention!**
>
> If a macro is initiated by an event from an input or output (see Configuring start conditions(see page 834)) that is not connected to any camera, you need to select a specific camera for this action. If you select a group of cameras or a camera that initiated the macro, the action doesn't start.

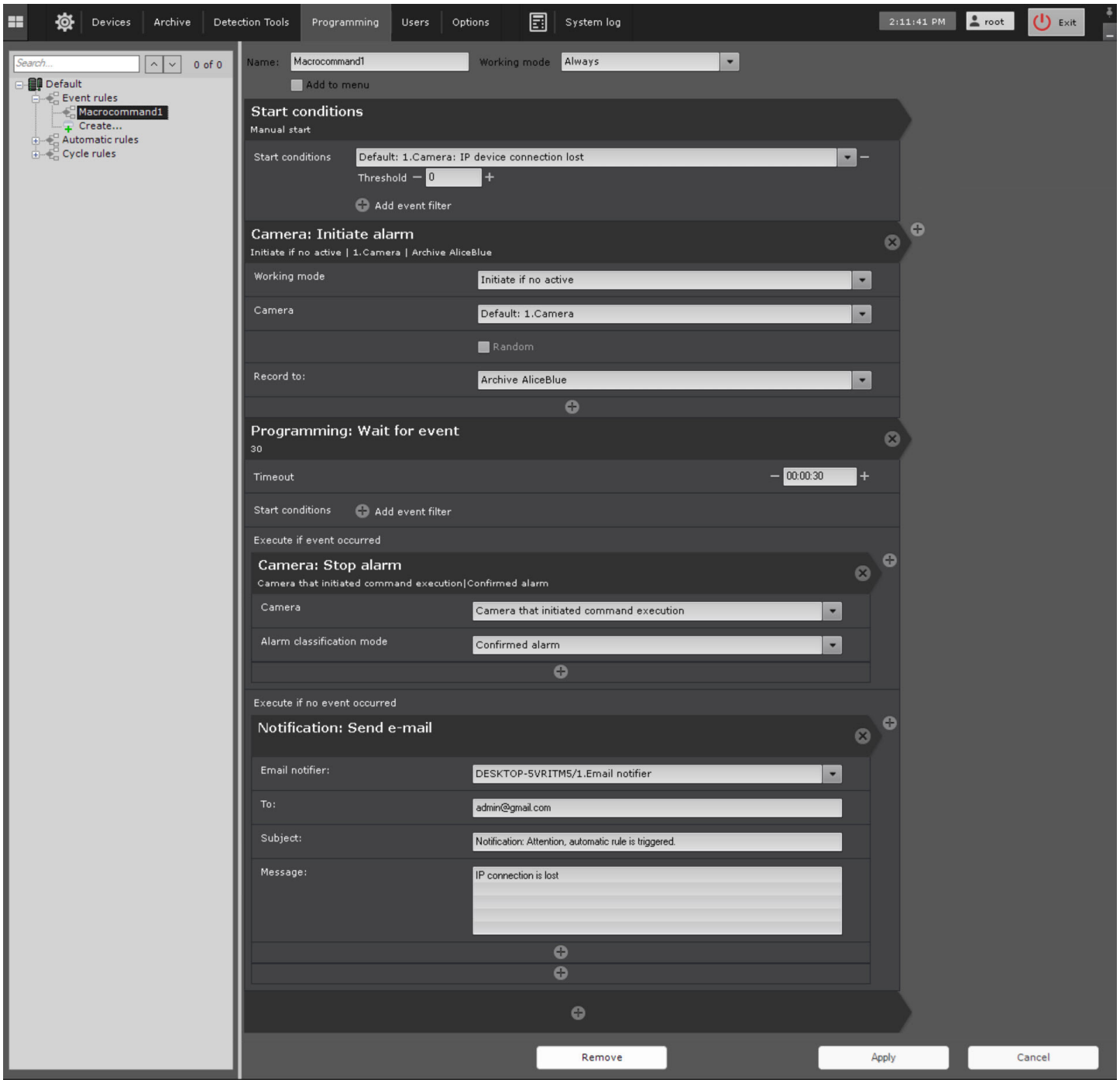
7. In the **Alarm classification mode** parameter, select the alarm status.
8. Click the **Apply** 

button.

Configuration of the **Stop alarm** action is complete.

19.5.8.2.2.3 Example use

If connection with a camera is lost, an alarm is initiated. The wait time to restore connection with a device is 30 seconds. The wait time stops as soon as connection with an IP device is restored. When connection with a camera is restored, the alarm is stopped. If this event doesn't occur, an email notification is sent to the operator after this time.



19.5.8.3 Control archive

19.5.8.3.1 Start recording to archive

On the page:

- General information(see page 867)

- Configuring an action(see page 867)
- Example use(see page 868)
  - Example 1(see page 868)
  - Example 2(see page 869)
- Axxon One operation with Windows Defender software(see page 870)

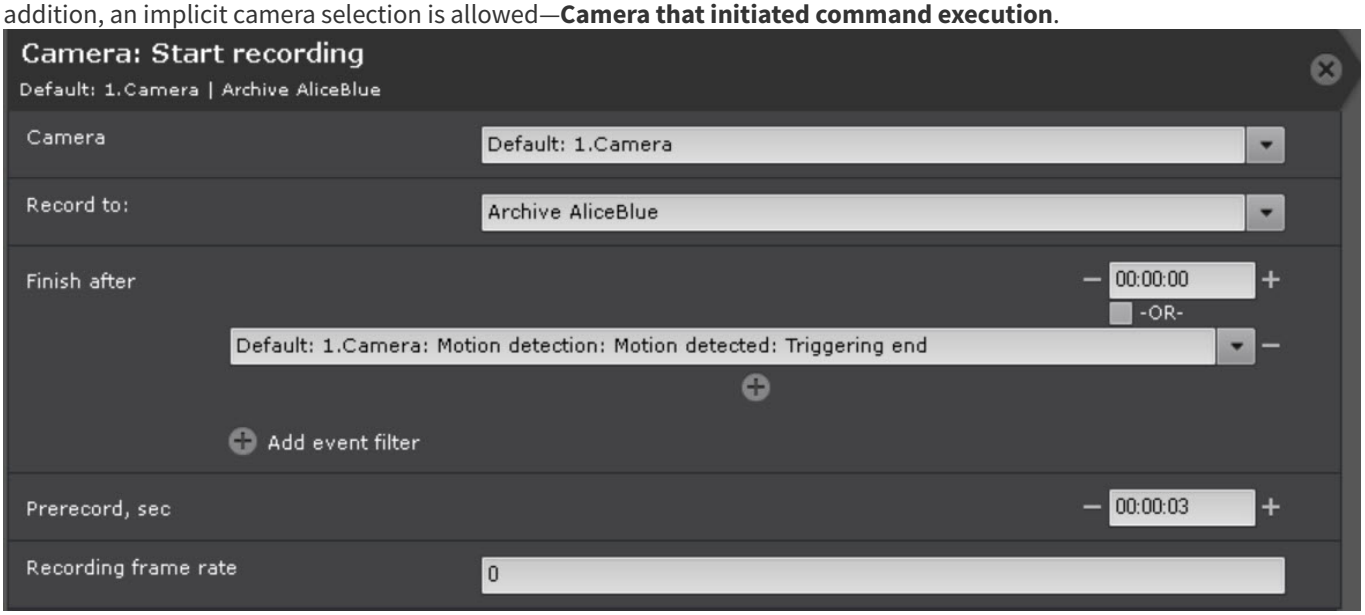
19.5.8.3.1.1 General information

This macro allows you to record events to the archive and stop recording after certain conditions are met.

19.5.8.3.1.2 Configuring an action

To configure recording to archive, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Camera: Start recording**.
6. In the **Camera** parameter, select a camera or group of cameras, video from which you want to record to the archive. In addition, an implicit camera selection is allowed—**Camera that initiated command execution**.



> **Attention!**
>
> If a macro is initiated by an event from an input or output (see Configuring start conditions(see page 834)) that is not connected to any camera, you need to select a specific camera for this action. If you select a group of cameras or a camera that initiated the macro, the action doesn't start.

7. In the **Record to** parameter, select an archive to record to.
8. In the parameters of the **Finish after** group, specify the conditions that end recording.

Condition	Description
Timer	Only a timer value is set. Recording stops after a specified time

Condition	Description
Event filter	One or several events are set, the timer is set to **00:00:00**. Recording stops when any event from the filter occurs
Timer + event filter	One or several events are set, the timer is set to non-zero. Recording stops when the set time interval expires after any event from the filter occurs
Timer + **OR** checkbox + event filter	One or several events are set, the timer is set to non-zero, the **OR** checkbox is set. In this case, the recording stops when any of the two conditions occurs first: after the time interval expires or when any event from the filter occurs

Note

- You can set the **OR** checkbox only if the timer setting is not **00:00:00**.
- An implicit selection of an event is allowed—**Last event for condition that initiated execution**. For example, if the event that initiated the execution of the command is **Triggering start** from any type of detector, then the end event is **Triggering end** from the same detector.

9. In the **Prerecord, sec** parameter, set the prerecord time in seconds. The maximum prerecord time is **30** seconds.

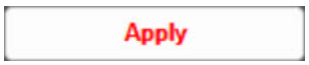
Attention!

- By default, the prerecord time interval is set to the value specified in the archive settings (see Configuring recording to an archive(see page 295)).
- The duration of the prerecord time corresponds to the longest value among the set values.
- Changing the value of the prerecord time in a specific macro does not affect the archive settings.

10. In the **Recording frame rate** parameter, enter the required frame rate value if you have cameras in continuous recording mode (see Configuring recording to an archive(see page 295)) and you want to change frame rate in some cases. After the macro completes, recording resumes at the frame rate specified in the archive settings.
You can use special values:
    - **0**—do not change the current frame rate (default).
    - **-1**—record only key frames.
    - **1000**—record at the standard FPS of the camera.

    Attention!

    - FPS for prerecord doesn't change.
    - If the macro is set to complete some time after a specified event is received, the frame rate changes for this time.
    - When decimating all video streams except MJPEG, only key frames are saved, so we recommend using special values for them **-1** and **1000**.
    - If you specify a custom frame rate, decimation is performed by key frames.
    - In MJPEG video stream all frames are key frames, so it makes sense to set an explicit frame rate value for it.

11. Click the **Apply** 

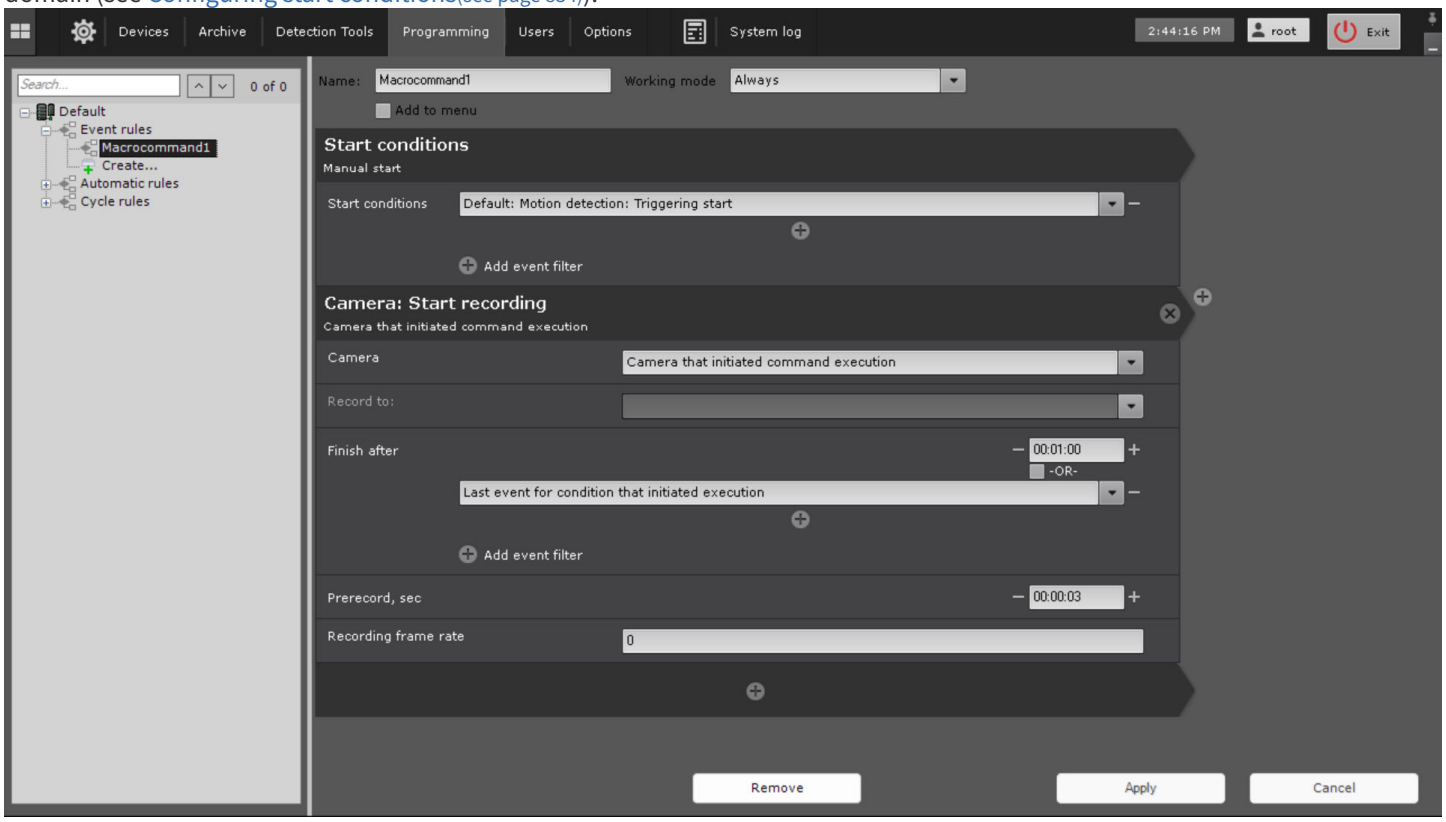
button.

Configuration of the **Start recording** action is complete.

19.5.8.3.1.3 Example use

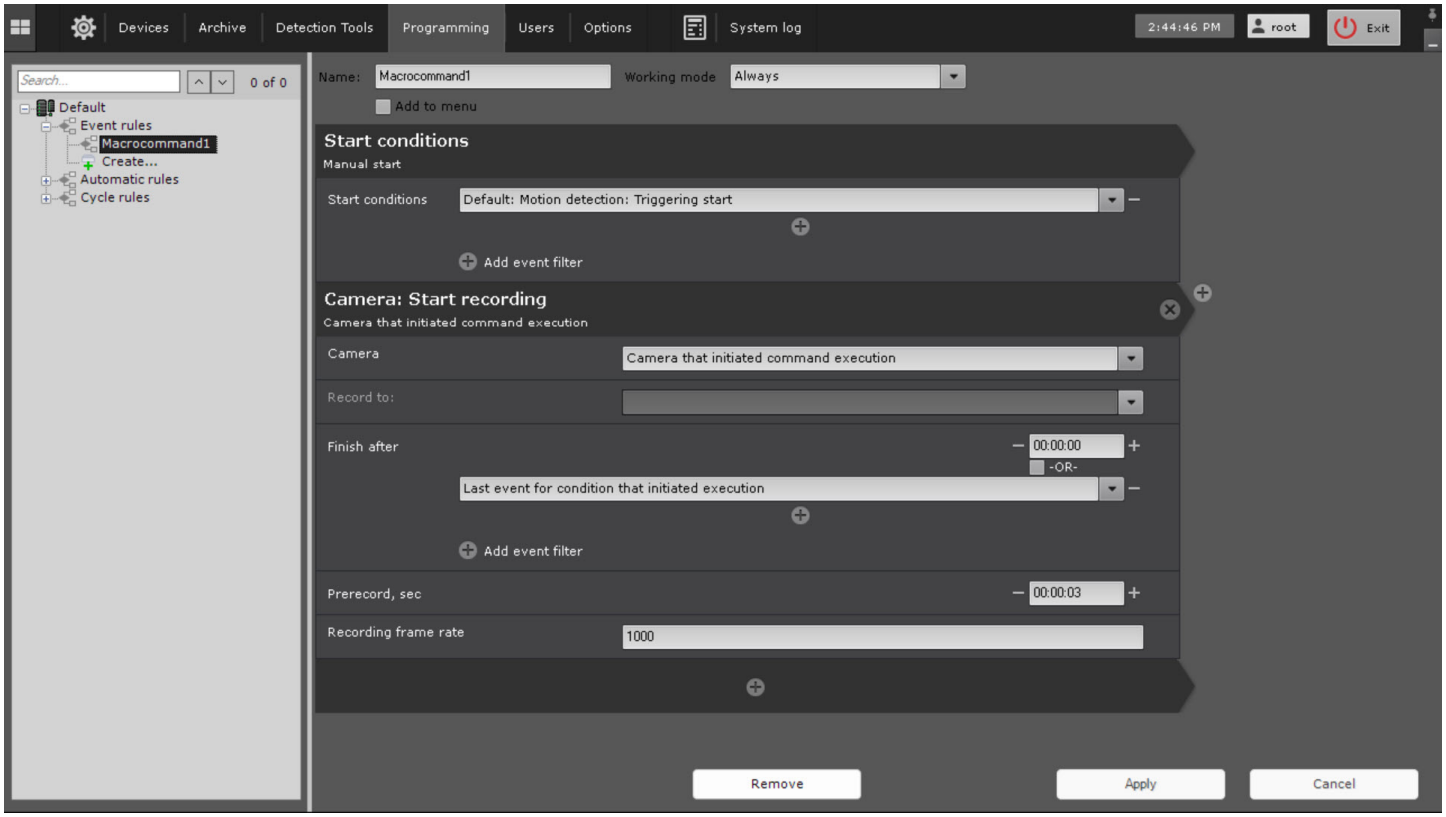
Example 1

A macro to start recording to the archive when the motion detector generates an event on any camera within the **Default** Axxon-domain (see Configuring start conditions(see page 834)).



Example 2

All cameras from the **Default** Axxon-domain are set to continuously record video with decimation to the archive (see Configuring recording to an archive(see page 295)). A macro records to the archive by events from the motion detector at full frame rate.



19.5.8.3.1.4 Axxon One operation with Windows Defender software

If you have Windows Defender software installed in your system, some problems can occur when accessing and saving data to the archive, as well as significant slowing down of Search in archive.

As a workaround, you can either disable Windows Defender or add **AppHost.exe**, **AppHostSvc.exe**, and **vfs_format.exe** files to the exceptions list.

19.5.8.3.2 Start replication

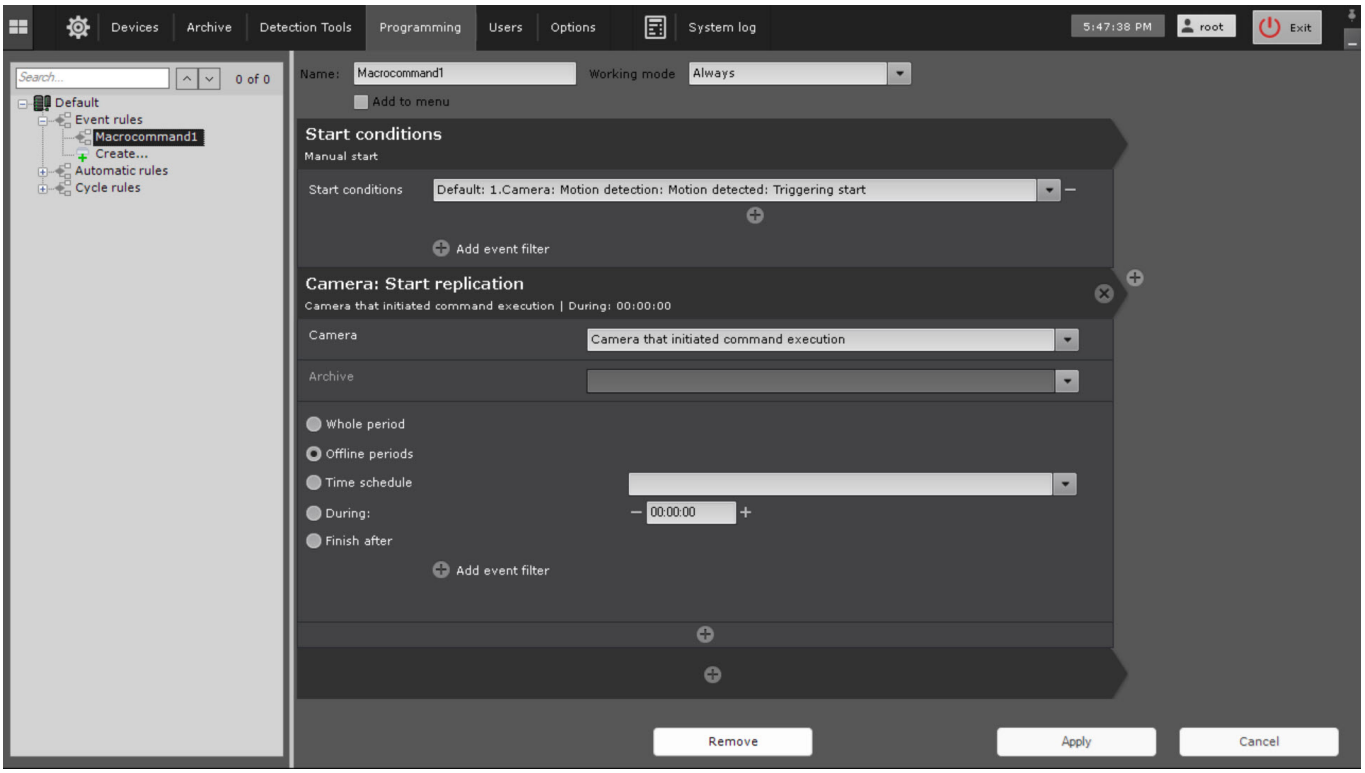
19.5.8.3.2.1 General information

This macro starts the replication process—copying blocks of information of a fixed size (video, audio, metadata) from one archive to another within the domain (see Configuring data replication(see page 298)).

19.5.8.3.2.2 Configuring an action

To configure the macro, do the following:

1. Configure on-demand replication (see Configuring data replication(see page 298)) if replication is performed from the archive. To replicate from the embedded storage of a camera, enable the corresponding object (see Embedded storage(see page 234)).
2. Go to the **Programming** tab.
3. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
4. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
5. Click the  button below start conditions.
6. From the drop-down list, select **Camera: Start replication**.
7. In the **Camera** parameter, select a camera or group of cameras for replication. In addition, an implicit camera selection is allowed—**Camera that initiated command execution**.

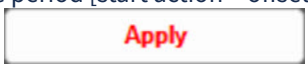


Attention!

If a macro is initiated by an event from an input or output (see Configuring start conditions(see page 834)) that is not connected to any camera, you need to select a specific camera for this action. If you select a group of cameras or a camera that initiated the macro, the action doesn't start.

8. In the **Archive** parameter, select an archive to which videos are replicated.
9. Select the replication period:

Option	Description
Whole period	All missing videos made **before** to the macro start time are copied
Offline periods	Videos recorded to the backup storage when connection with the server was lost (intervals between the **Signal lost** and **Signal restored** events) are copied. If you don't specify the **Offset** parameter, the replication covers all corresponding intervals over the last 24 hours
Time schedule	Select a time schedule (see Creating schedules(see page 1012)). All videos made according to the time schedule settings over the last 24 hours **before** the macro start time are copied
During	Set the replication duration in **HH:MM:SS**. Videos over the period [start action, start action + duration] are copied. You can specify an additional **Offset** parameter as needed
Finish after	Select one or more end events. All videos between the start point (when the action starts) and the end point (when the event is received) are copied. **Attention!** Replication doesn't start until the end event is received

10. In the **Offset** parameter, specify the offset value if you selected the **During** parameter for replication in previous step. Videos from the period [start action − offset, start action **+** duration **−** offset] are copied.
11. Click the **Apply** 

button.

Configuration of the **Start replication** action is complete.

19.5.8.3.3 Check that archive record exists

19.5.8.3.3.1 General information

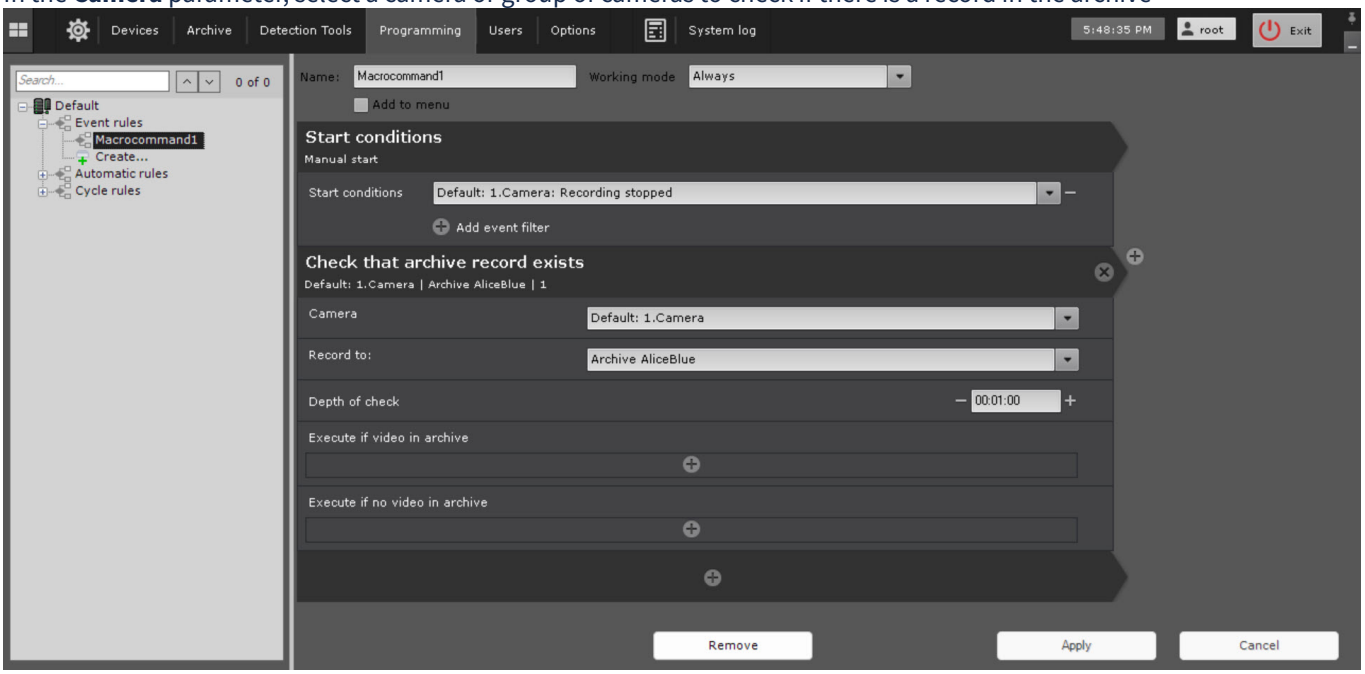
This action checks if there is at least one recording interval in the archive from a particular camera or a group of cameras for the specified period.

19.5.8.3.3.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Check that archive record exists**.

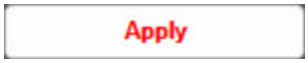
6. In the **Camera** parameter, select a camera or group of cameras to check if there is a record in the archive



> **Attention!**
>
> If a macro is initiated by an event from an input or output (see Configuring start conditions(see page 834)) that is not connected to any camera, you need to select a specific camera for this action. If you select a group of cameras or a camera that initiated the macro, the action doesn't start.

7. In the **Record to** parameter, select an archive in which you want to check that archive record exists. If you leave the field blank, the check is performed in all archives associated with this camera.
8. In the **Depth of check** parameter, specify the depth of archive check. The check covers [the time of the action start - (minus) the depth of the check; start time of the action].
9. In the **Execute if video in archive** parameter, select an action if the archive record for the specified period is found.
10. In the **Execute if no video in archive** parameter, select an action if the archive record for the specified period isn't found.

> **Note**
>
> If you select E-mail notification(see page 876) as an action, then the text of the message contains cameras (if a group of cameras is selected), for which there is no record in the archive for the specified period. You can also use two special purpose templates in the message:
>
> - {failureRecordCheck}—failed check of a record in the archive in the format Server Name|Camera Name|Archive Name.
> - {successRecordCheck}—successful check of a record in the archive in the format Server Name|Camera Name|Archive Name.
>
> **Attention!** For the correct execution of the macro, synchronize the time across all servers within the Axxon-domain.

11. Click the **Apply**  button.

Configuration of the **Check that archive record exists** action is complete.

19.5.8.3.4 Check that protected records exist in the archive

This action checks if there are protected records in the specified archive and performs the specified actions if they are present or absent, and participates in the mechanism of protecting video records from FIFO overwriting (see Protecting video recordings from FIFO overwriting(see page 303)). To configure this action, see Configuring a macro to automatically copy protected videos(see page 303).

19.5.8.3.5 Open results of Search in archive

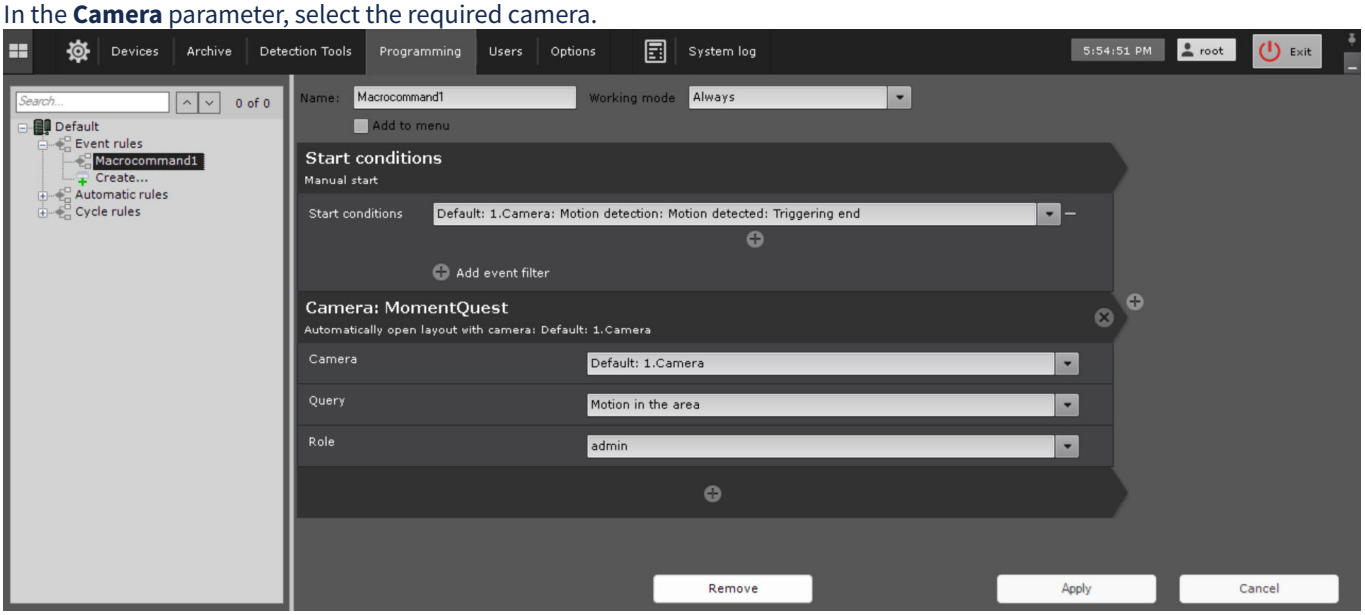
19.5.8.3.5.1 General information

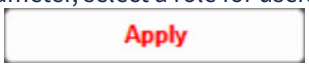
This action allows you to open the results of a previously saved Search in archive.

19.5.8.3.5.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Camera: MomentQuest**.
6. In the **Camera** parameter, select the required camera.



7. In the **Query** parameter, select a previously saved search query (see Saving search queries(see page 1245)).
8. In the **Role** parameter, select a role for users of which this action must be performed.
9. Click the **Apply**  button.

Configuration of the action is complete.

19.5.8.4 Control devices and outputs

19.5.8.4.1 Switch on/off output

19.5.8.4.1.1 General information

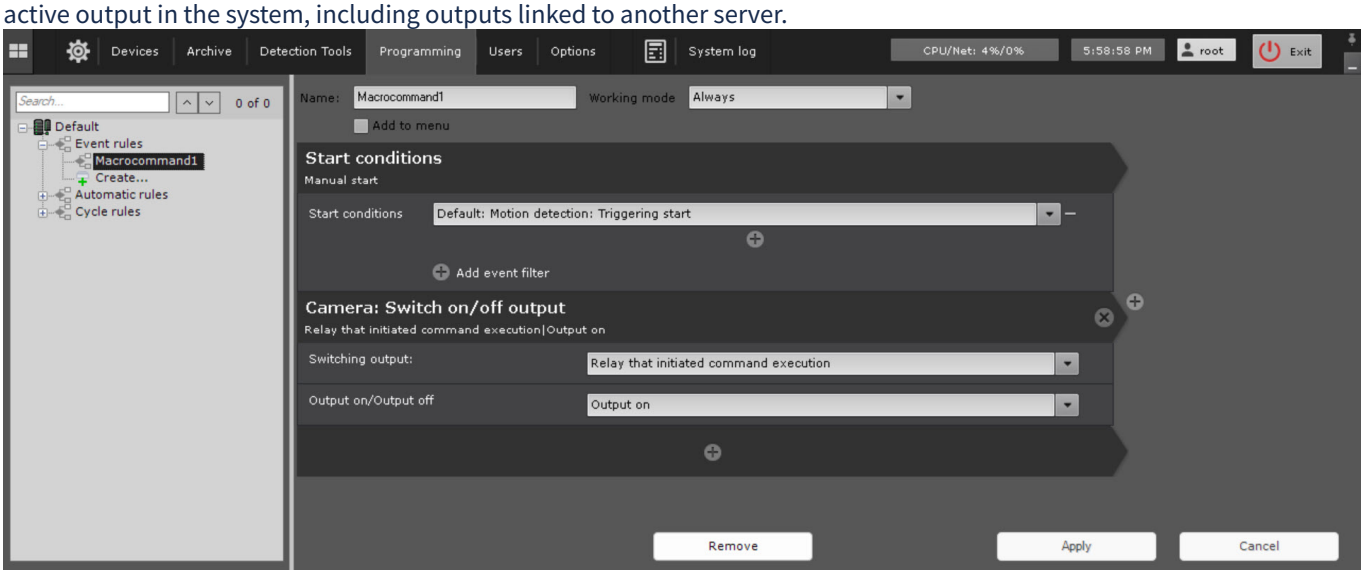
This action switches an output to the selected state.

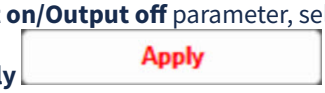
19.5.8.4.1.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. If necessary, select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button.
5. From the drop-down list, select **Camera: Switch on/off output**.

6. In the **Switching output** parameter, select an output that you want to switch when a macro triggers. You can select any active output in the system, including outputs linked to another server.



7. In the **Output on/Output off** parameter, select the required operation.
8. Click the **Apply**  button.

Configuration of the output switching action is complete.

19.5.8.4.2 Go to preset of a PTZ camera

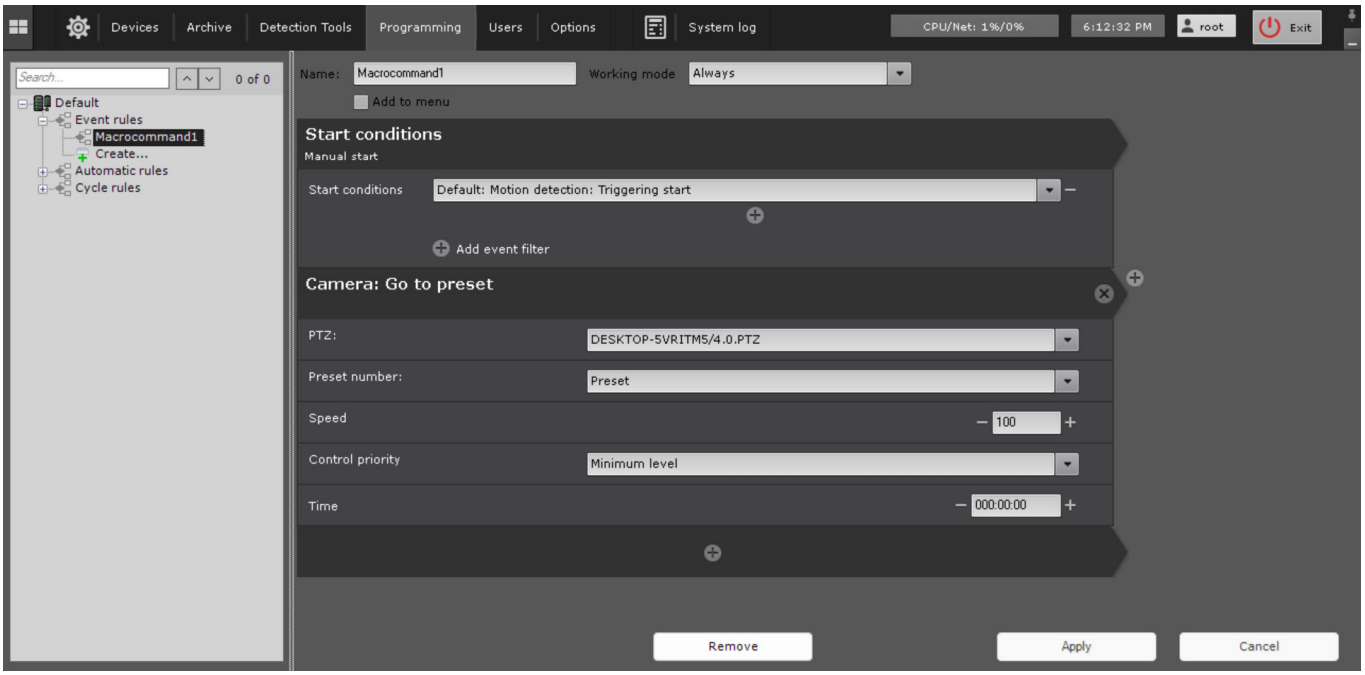
19.5.8.4.2.1 General information

This action allows you to go to a preset of a PTZ camera.

19.5.8.4.2.2 Configuring an action

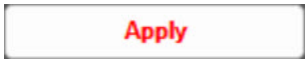
To configure the action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. If necessary, select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button.
5. From the drop-down list, select **Camera: Go to preset**.
6. From the **PTZ** drop-down list, select a PTZ device that you want to use. You can select any PTZ camera, including those bound to another server (if enabled).



7. In the **Preset number** parameter, select a preset to which you want to go when a macro triggers
8. In the **Speed** parameter, set the rotation speed of the camera. The value must be in the range [1, 100].
9. In the **Control priority** parameter, specify the camera control priority. The priority determines which user with which access level (see Roles(see page 920)) can control camera during macro execution.
10. In the **Time** parameter, set the time. If a macro is executed and the user has a lower access level than the macro, the user can control the PTZ camera only after this time has elapsed.

> **Note**
>
> In order to create a sequential switching to specified presets at selected time intervals, configure Wait till previous action finishes(see page 859) between the switching actions. You can also set Wait for timeout(see page 858). In this case, the switching between the presets takes place after the timeout time.

11. Click the **Apply** 

button.

Configuration of the **Go to preset** action is complete.

19.5.8.4.3 Enable or disable component

19.5.8.4.3.1 General information

This action enables or disables the selected camera, detector, or input.

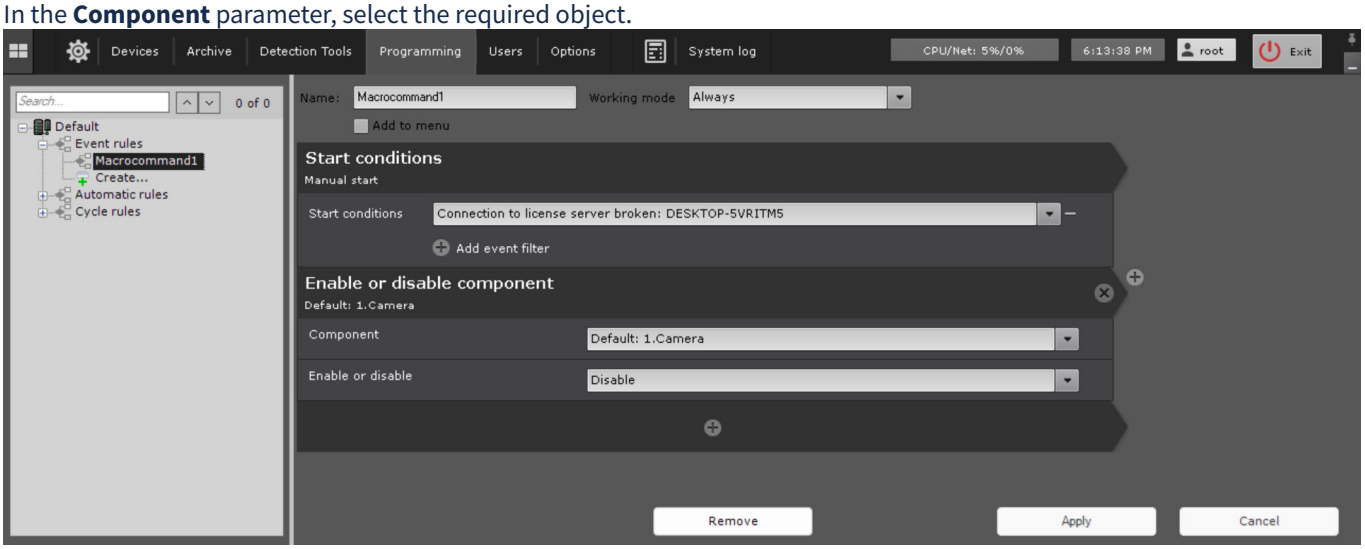
> **Note**
>
> - Changes made using this action are valid only until the *Axxon One* server service is restarted.
> - The automatic diagnostics service can restart the component automatically.

19.5.8.4.3.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.

5. From the drop-down list, select **Enable or disable component**.
6. In the **Component** parameter, select the required object.



7. In the **Enable or disable** parameter, select the required operation.
8. Click the **Apply**  button.

Configuration of the **Enable or disable a component** action is complete.

19.5.8.5 Notifications

19.5.8.5.1 E-mail notification

19.5.8.5.1.1 General information

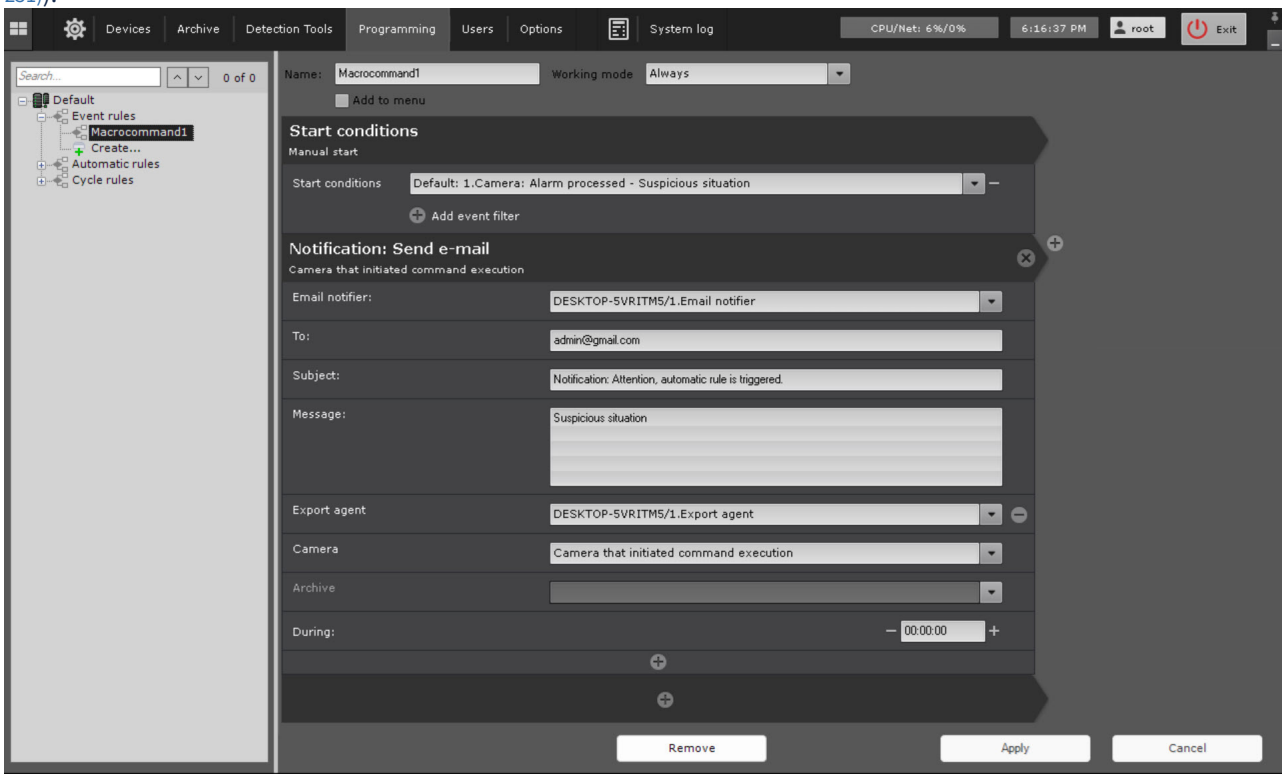
This action sends emails to specified addresses. You can attach exported videos or frames to an email.

19.5.8.5.1.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Notification: Send e-mail**.
6. Specify the following parameters:

a. **Email notifier**—select the system object for the email notification when a macro starts (see Email notifier(see page 231)).



b. **To**—enter the email address to which you want to send the message.

> **Note**
>
> - You can enter several email addresses separated by a comma or semicolon.
> - Notifications are also sent to the email addresses you specified when configuring the **Email notifier** object (see Email notifier(see page 231)).

c. **Subject**—subject of the email notification that will be sent when a macro starts.

d. **Message**—enter the text that must be sent in the email notification when a macro starts.

> **Note**
>
> You can use templates in the message (see Text templates in the action settings(see page 900)).

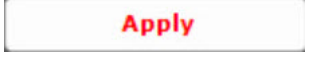
e. In the **Export agent** parameter, select an export agent.

f. In the **Camera** parameter, select a camera or group of cameras.

g. If necessary, you can attach exported video or a frame to your message. To do this, you must add and configure additional parameters (you can add them by clicking the  button). Configuration of these parameters is identical to configuration of export (see Start export(see page 885)).

> **Note**
>
> If you don't specify the **During** parameter, a frame is sent. You can specify the format of video and frame export in the settings of the Export agent (see Configuring Export agent(see page 1052)).

h. Set the **All in one email** checkbox if a macro is initiated by a group of cameras (see Configuring start conditions(see page 834)) and you want to send the frames from all cameras in the group in a single email message. If you don't set the checkbox, there is a separate email for each camera in the group.

7. Click the **Apply**  button.

Configuration of the **Notification: Send e-mail** action is complete.

19.5.8.5.2 Push notification

19.5.8.5.2.1 General information

This action sends a push notification to the device with the *AxxonNet* app installed (see AxxonSoft mobile Clients. Documentation[339]).

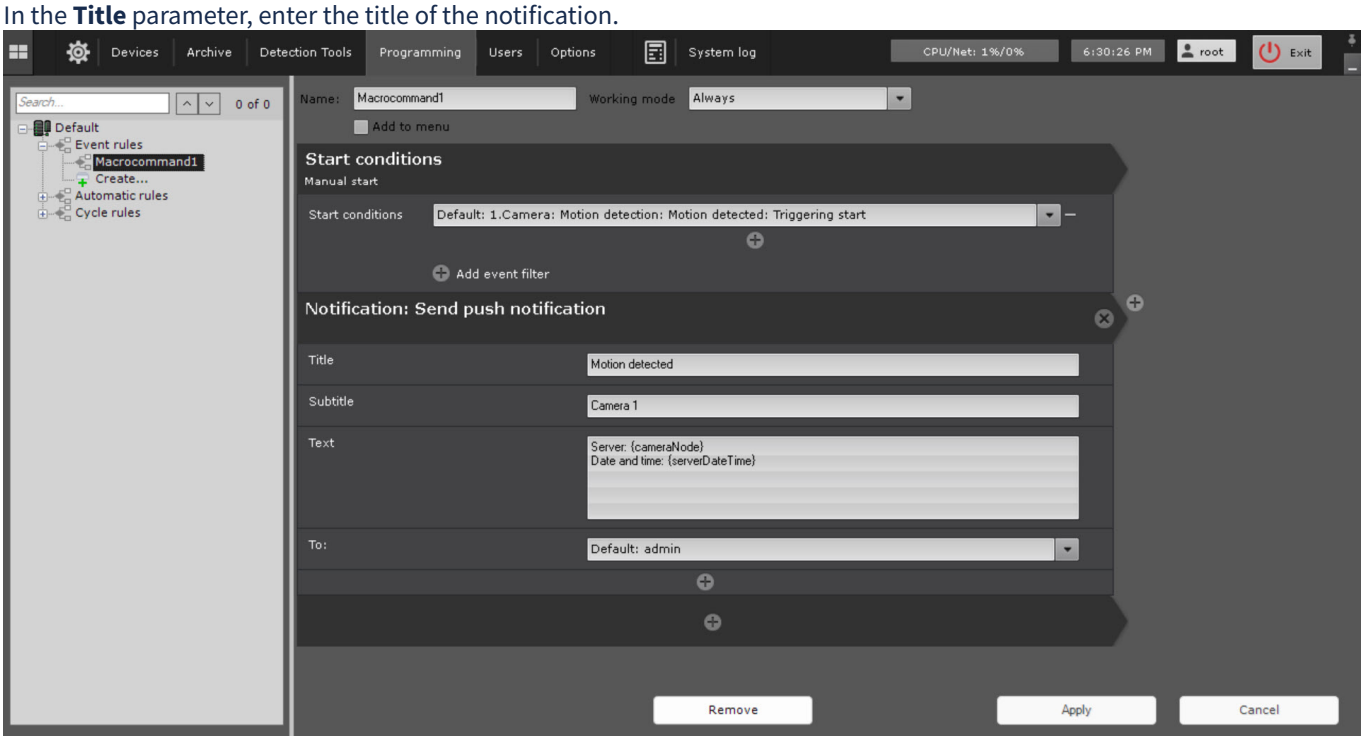
To run the action, make sure the following requirements are met:

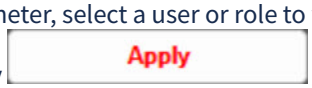
- the Axxon-domain must be connected to *AxxonNet* (see Configuring a domain in AxxonNet[340]).
- the user who receives a notification must be logged in to the app via *AxxonNet*.

19.5.8.5.2.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Notification: Send push notification**.
6. In the **Title** parameter, enter the title of the notification.



7. In the **Subtitle** parameter, enter the subtitle of the notification.
8. In the **Text** parameter, enter the main text of the notification. You can use text templates (see Text templates in the action settings(see page 900)).
9. In the **To** parameter, select a user or role to whom the notification will be sent.
10. Click the **Apply** 

button.

Configuration of the **Send push notification** action is complete.

339 https://docs.axxonsoft.com/confluence/spaces/mobile/pages/260902390/AxxonSoft+mobile+Clients.+Documentation
340 https://docs.axxonsoft.com/confluence/spaces/anet/pages/157697082/Configuring+a+domain+in+AxxonNet

19.5.8.5.3 Telegram bot notification

19.5.8.5.3.1 General information

Axxon One allows you to send text notifications to Telegram chat when any event occurs from the objects registered in the *Axxon One* object tree. Once configured, the notification sending is initiated by a macro.

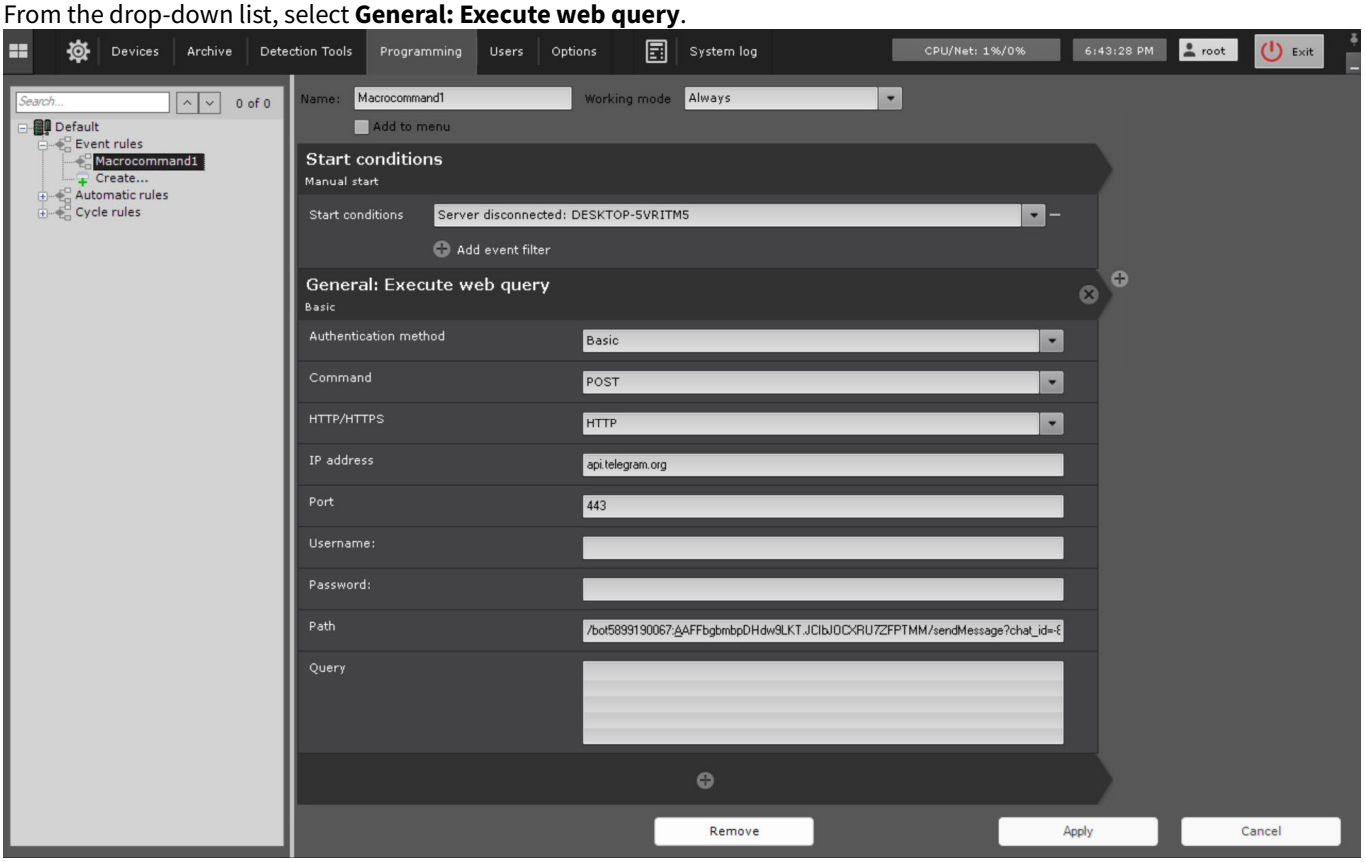
Before configuring notifications sending from *Axxon One* to Telegram, create a bot and a group chat with this bot in Telegram. For the distribution package and manuals on working with Telegram, see the developer's official website telegram.org[341].

> **Note**
>
> For the correct operation of Telegram bot and notification sending, the user who created the bot must have @username specified in Telegram.

19.5.8.5.3.2 Configuring an action

To configure notification sending via Telegram bot, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **General: Execute web query**.



6. In the **Authentication method** parameter, select the authentication method:
   a. **Basic** (default);
   b. **Digest**.
7. In the **Command** parameter, select the query type:
   a. **POST** (defaul);
   b. **GET**;

341 https://telegram.org/?setln=en

c. **PUT**;
d. **DELETE**.

8. In the **HTTP/HTTPS** parameter, select the server protocol:
   a. **HTTP**;
   b. **HTTPS**.

   > **Attention!**
   >
   > For the correct notifications sending, you must select the HTTPS protocol.

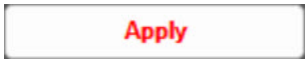
9. In the **IP address** parameter, enter the IP address of the Telegram server—api.telegram.org.
10. In the **Port** parameter, enter the port of the Telegram server—**443**.
11. In the **Path** parameter, enter the path of the query. The path of the query must look like this: /bot<BOTToken>/sendMessage?chat_id=<ChatID>&&text=<Text>, where <BOTToken> is an ID of the bot in Telegram;

    > **Note**
    >
    > The ID is provided when you create the bot

    <ChatID> is the ID of the chat;

    > **Note**
    >
    > To learn the ID of the chat, add the @RawDataBot bot to the chat. After adding, the bot will send a message to the chat that will contain the result of the execution of the getUpdates function. Find ChatId in the message. Then remove the @RawDataBot bot from the chat.

    <Text> is a notification text. You can enter the set of US-ASCII characters (Latin characters and digits) in the notification text. For the notification text to display correctly with other characters and punctuation marks, you need to encode them. The encoding is described in the RFC 3986[342] standard and called URL-encoding, URLencoded, or percent-encoding. For example, a space character is encoded as %20.

12. Click the **Apply** 

button.

Configuration of the **General: Execute web query** action is complete.

When you use the **General: Execute web query** action, all fields for sending a web query to the specified server can be filled in (see Execute web query(see page 891)). However, the **Username**, **Password** and **Query** fields are not required for sending a notification via Telegram bot.

19.5.8.5.4 Voice notification from client

19.5.8.5.4.1 General information

This action allows you to transmit audio from the client's microphone to the selected speaker.

> **Attention!**
>
> If the client is behind NAT, you must specify the external address of the switch and a port range of at least **1000** ports on the client (see Network settings utility(see page 1379)).

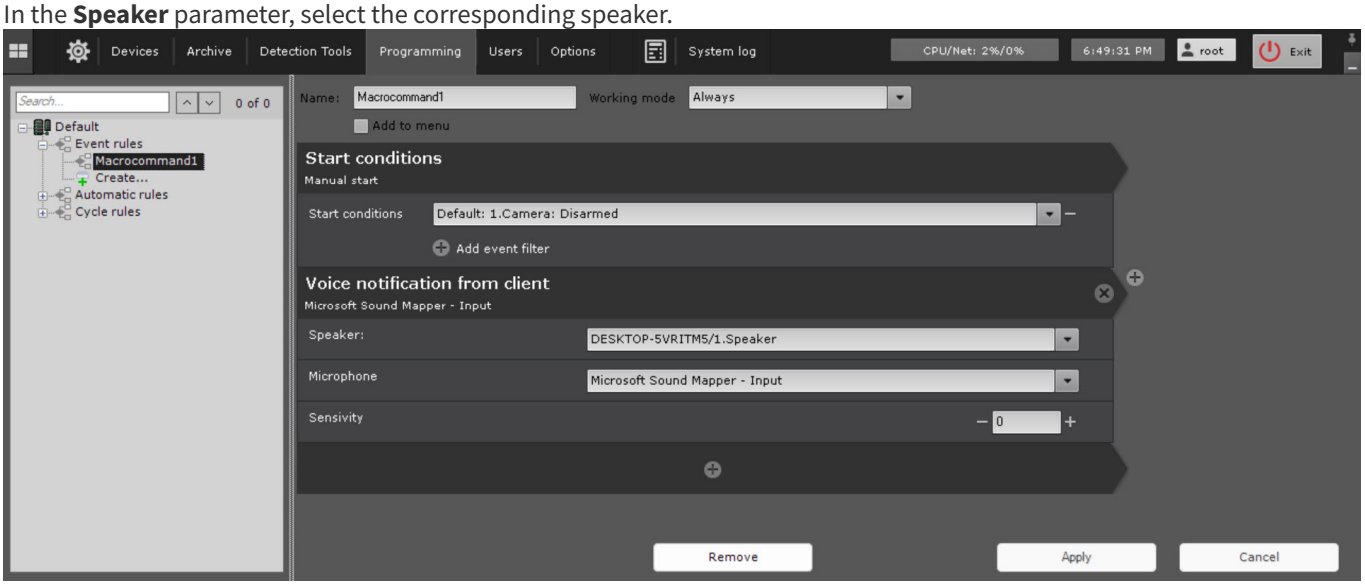
19.5.8.5.4.2 Configuring an action

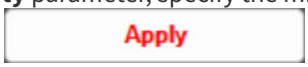
To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).

342 https://datatracker.ietf.org/doc/html/rfc3986

4. Click the  button below start conditions.
5. From the drop-down list, select **Voice notification from client**.
6. In the **Speaker** parameter, select the corresponding speaker.



7. In the **Microphone** parameter, select a microphone.
8. In the **Sensitivity** parameter, specify the microphone sensitivity for audio transmission from **0** to **100**.
9. Click the **Apply**  button.

Configuration of the **Voice notification from client** action is complete.

19.5.8.5.5 Stop voice notification from client

19.5.8.5.5.1 General information

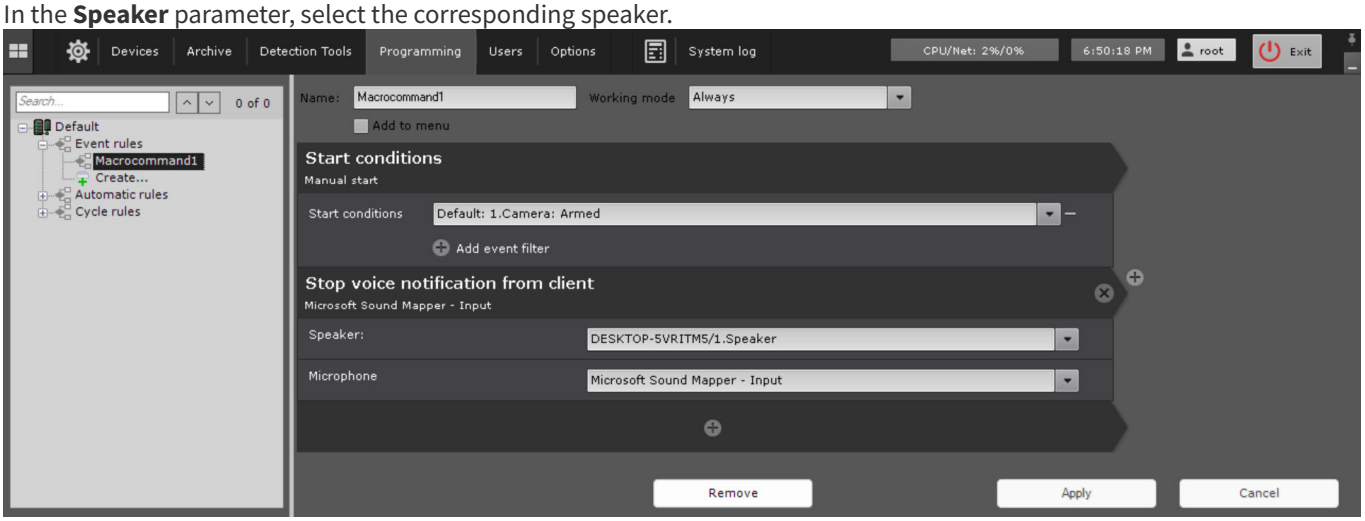
This action allows you to stop audio transmission from the client's microphone to the selected speaker.

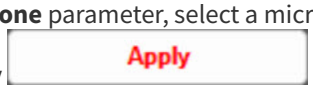
19.5.8.5.5.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Stop voice notification from client**.

6. In the **Speaker** parameter, select the corresponding speaker.



7. In the **Microphone** parameter, select a microphone.
8. Click the **Apply**  button.

Configuration of the **Stop voice notification from client** action is complete.

19.5.8.6 Control camera

19.5.8.6.1 Arm or disarm a camera

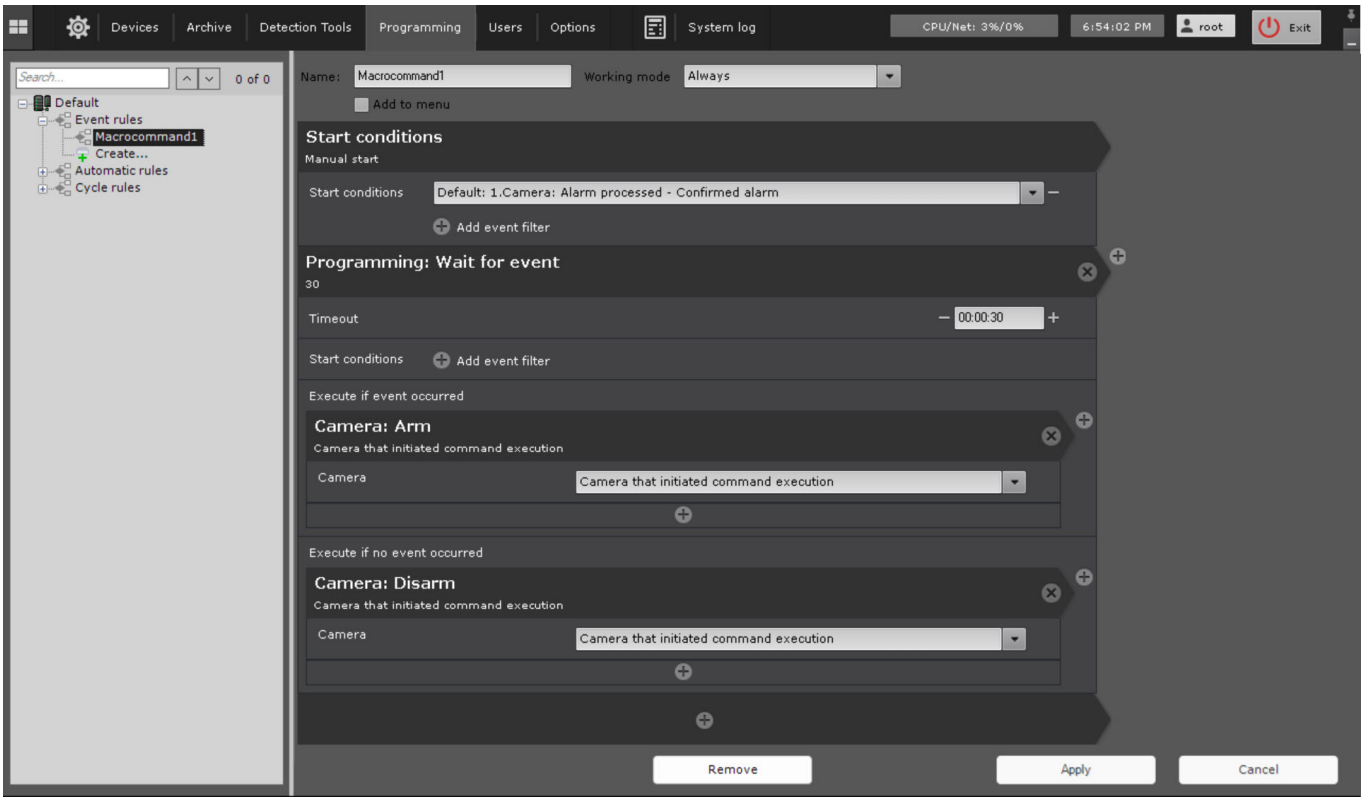
19.5.8.6.1.1 General information

To configure these actions, select a camera or group of cameras that you want to arm or disarm.

19.5.8.6.1.2 Configuring actions

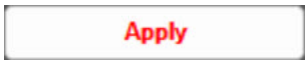
To configure these actions, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Camera: Arm** or **Camera: Disarm**.
6. In the **Camera** parameter, select a camera or group of cameras on which you want to initiate an alarm. In addition, an implicit camera selection is allowed—**Camera that initiated command execution** (see Configuring start conditions(see page 834)).



Attention!

If a macro is initiated by an event from an input or output (see Configuring start conditions(see page 834)) that is not connected to any camera, you need to select a specific camera for this action. If you select a group of cameras or a camera that initiated the macro, the action doesn't start.

7. Click the **Apply** 

button.

Configuration of the **Arm** or **Disarm** actions is complete.

19.5.8.6.2 View camera

19.5.8.6.2.1 General information

You can open a layout with the specified camera.

The **View camera** macro uses the following algorithm:

1. Searches for the layouts available to the current user that contain the selected camera.
2. Selects the layout with the minimum number of cells to display the selected camera.
3. If the required layout doesn't exist, creates a new layout with the selected camera.
4. Switches to the selected layout, or the created layout.
5. Executes the specified action.

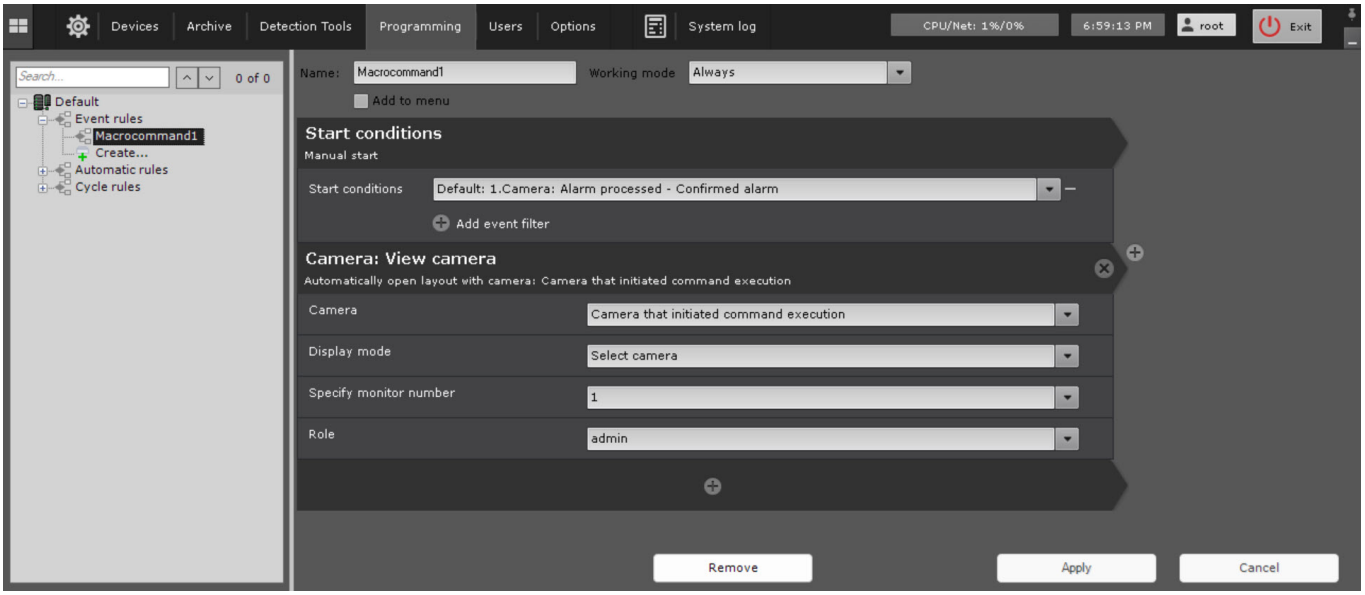
19.5.8.6.2.2 Configuring an action

To configure the **View camera** macro, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Camera: View camera**.

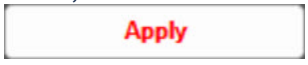
6. In the **Camera** parameter, select a camera that you want to view or a **Camera that initiated command execution** (see Configuring start conditions(see page 834)).

> **Attention!**
>
> If a macro is initiated by an event from an input or output (see Configuring start conditions(see page 834)) that is not connected to any camera, you need to select a specific camera for this action. If you select a group of cameras or a camera that initiated the macro, the action doesn't start.



7. In the **Display mode** parameter, select the display mode:

Display mode	Description of macro action
Select camera	Camera is highlighted on the layout
Zoom in camera	Camera is highlighted on the layout, Surveillance window takes up 98% of the screen
Zoom in and show map	Camera is highlighted on the layout, Surveillance window takes up 50% of the screen. The map with the selected camera is displayed
Switch to immersion mode	Immersion mode(see page 1299) is on, Surveillance window takes up 50% of the screen
Switch to archive mode	Camera is highlighted on the layout and it is in the Archive mode. If a group of cameras is specified, then a layout is created with all the cameras in the Archive mode
Mark camera	Camera is added and highlighted on the **Marked cameras** layout (see Creating special layouts(see page 973))
Unmark camera	Camera is removed from the **Marked cameras** layout (see Creating special layouts(see page 973))

8. In the **Specify monitor number** parameter, specify the number of the monitor on which the selected camera must be displayed.
9. In the **Role** parameter, select the user roles for which this macro is available.
10. Click the **Apply**  button.

Configuration of the **View camera** macro is complete.

19.5.8.6.3 Check if the camera is in armed mode

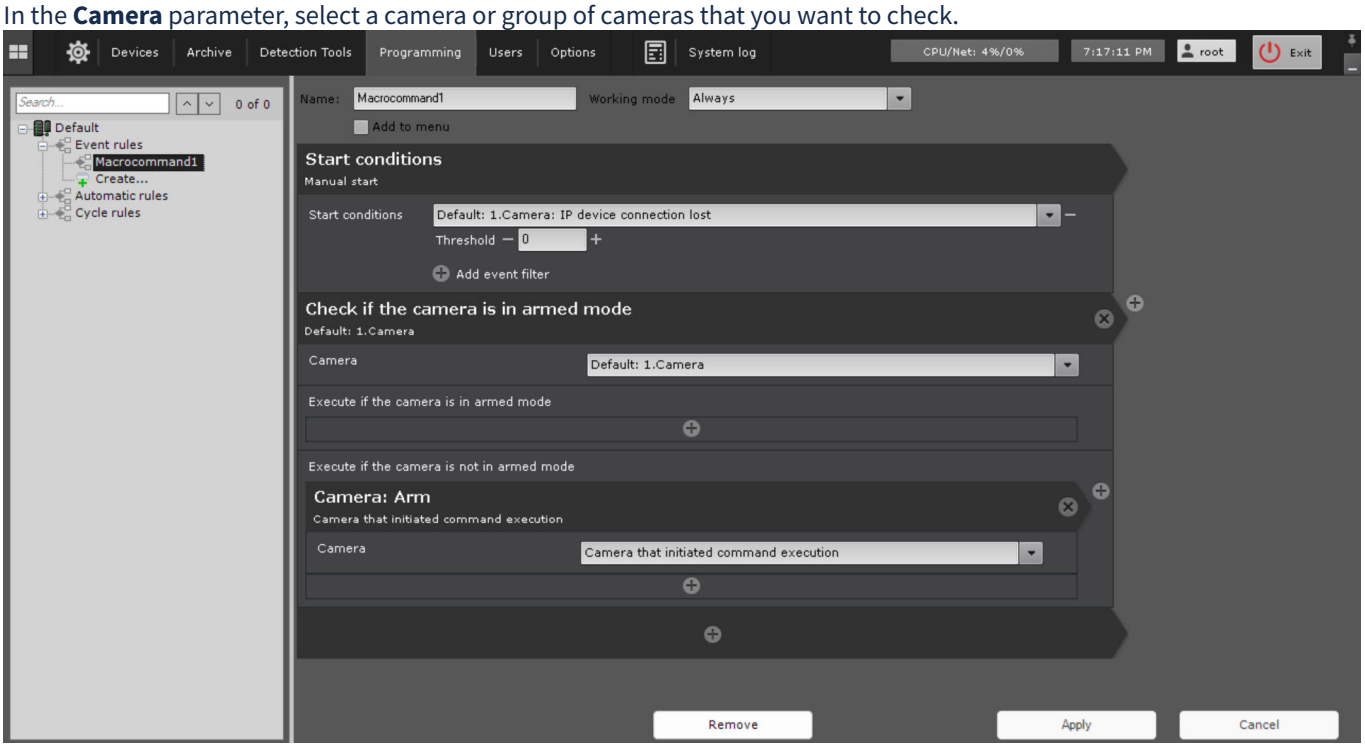
19.5.8.6.3.1 General information

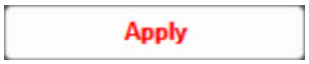
This action allows you to check if a camera or a group of cameras is armed (see Arming and disarming a camera(see page 1161)).

19.5.8.6.3.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Check if the camera is in armed mode**.
6. In the **Camera** parameter, select a camera or group of cameras that you want to check.



7. In the **Execute if the camera is in armed mode** parameter, select an action that must be executed if the checked camera is in armed mode.
8. In the **Execute if the camera is not in armed mode** parameter, select an action that must be executed if the checked camera isn't in armed mode.
9. Click the **Apply** 

button.

Configuration of the **Check if the camera is in armed mode** action is complete.

19.5.8.6.4 Start export

19.5.8.6.4.1 General information

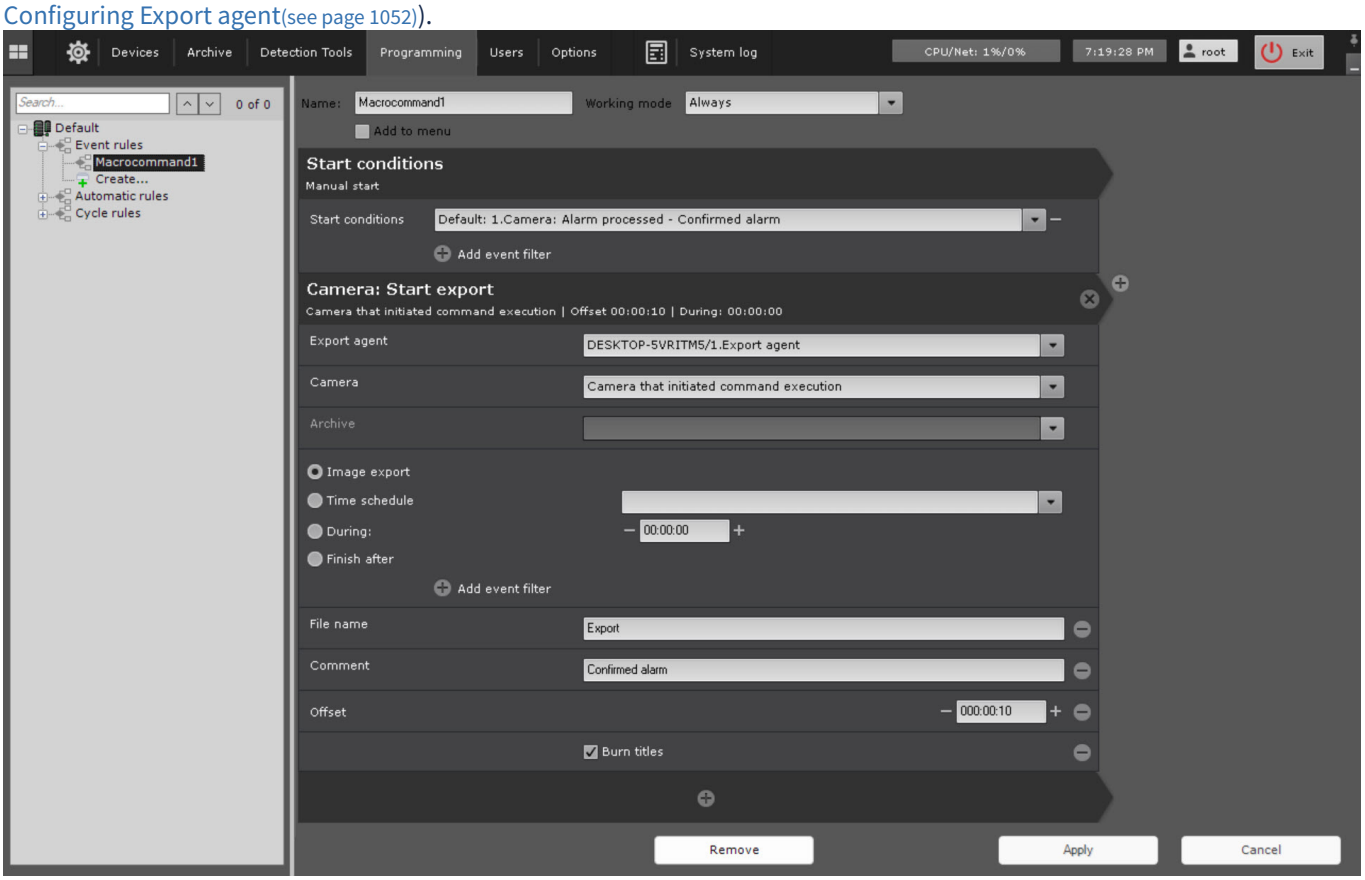
This action starts the export of a frame or video.

19.5.8.6.4.2 Configuring an action

To configure the action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).

3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the button below start conditions.
5. From the drop-down list, select **Camera: Start export**.
6. In the **Export agent** parameter, select a server (formally the **Export agent** object) to which you want to export a video (see Configuring Export agent(see page 1052)).



7. In the **Camera** parameter, select a camera, the video from which you want to export. In addition, an implicit camera selection is allowed—**Camera that initiated command execution** (see Configuring start conditions(see page 834)).

> **Attention!**
>
> If a macro is initiated by an event from an input or output (see Configuring start conditions(see page 834)) that is not connected to any camera, you need to select a specific camera for this action. If you select a group of cameras or a camera that initiated the macro, the action doesn't start.

8. In the **Archive** parameter, select an archive, the video from which you want to export.
9. In the parameter group, specify the export interval:

Option	Description
Image export	Exports a frame corresponding to the time when the action was started. **Attention!** Image cannot be exported if the camera doesn't have an archive

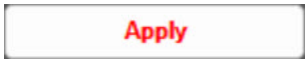
Option	Description
Time schedule	You must select a time schedule. Exports images from within the time schedule. Interval of the exported video – [beginning of the specified time schedule; end of the specified time schedule]. **Attention!** If you don't specify the offset (see step 10c), the intervals from the time schedule are taken over the last 24 hours
During	You must set the export duration in HH:MM:SS. The starting point of the exported video is the action start. End point is defined on the basis of the specified duration (interval [action start; action start + duration])
Finish after	You must select one or more events, after receiving which (any of them) export is stopped. The starting point of the exported video is the action start, the end point is the moment of receiving any of these events

10. You can click the  button to add additional parameters:
    a. **File name**—name of the exported file.

    Attention!

    You can use the following templates for file names and text comments (see Text templates in the action settings(see page 900)):
    - **%startTime%** , or **[START_TIME]**, or **{startTime}**—start time of exported interval.
    - **%finishTime%** , or **[FINISH_TIME]**, or **{finishTime}**—finish time of exported interval.

    You can use the following templates for macros started by a text message from an event source (see Configuring start conditions(see page 834)):
    - **%startEvent%**, or **[START_EVENT]**, or **{startEvent}**—event that initiated export start.
    - **%finishEvent%** , or **[FINISH_EVENT]**, or **{finishEvent}**—event that stopped the export.

    b. **Comment** that is superimposed as captions over the exported video.
    c. **Offset** is a time period used to roll back the start time of exported video. If you set this this parameter, the time interval of the exported video will be as follows: [action start – (duration + offset); action start – offset].
    If export is performed within a time schedule, this parameter is used to determine the period in the past before the action started for which the export must be performed. For example, if you set the offset to 48 hours, all videos from the given time schedule recorded within 48 hours before the action start are exported.
    d. Set the **Burn titles** checkbox to burn titles on JPEG images and AVI videos.
11. Click the **Apply** 

button.

Configuration of the **Start export** action is complete.

19.5.8.7 Play audio

19.5.8.7.1 Play audio on client

19.5.8.7.1.1 General information

This action allows you to play audio on the client's speaker.

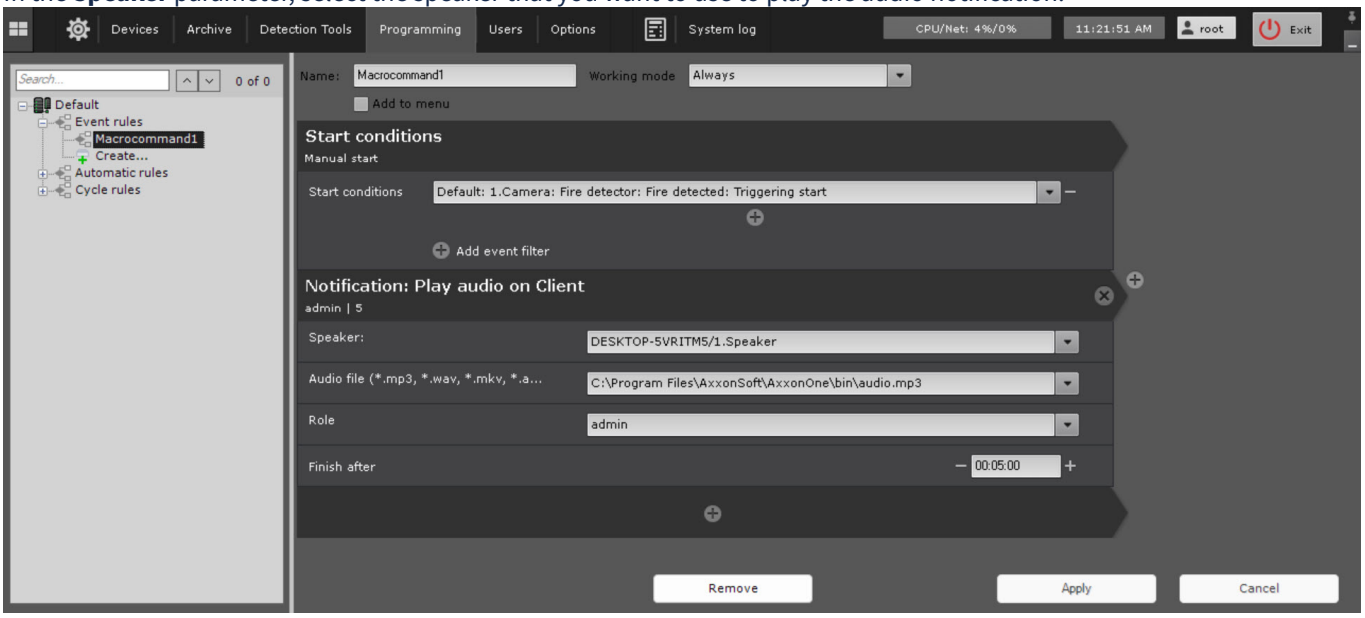
Attention!

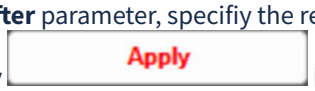
To execute the action, you must create the **Speaker** system object with the **Play on client** playback mode (see The Speaker object(see page 228)).

19.5.8.7.1.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Notification: Play audio on client**.
6. In the **Speaker** parameter, select the speaker that you want to use to play the audio notification.



7. In the **Audio file** parameter, select an audio file that you want to play as a notification.
8. In the **Roles** parameter, select the user role for whom the notification must play.
9. In the **Finish after** parameter, specifiy the required time if you want to stop notification after a certain time.
10. Click the **Apply**  button.

Configuration of the **Play audio on client** action is complete.

19.5.8.7.2 Stop audio on client

19.5.8.7.2.1 General information

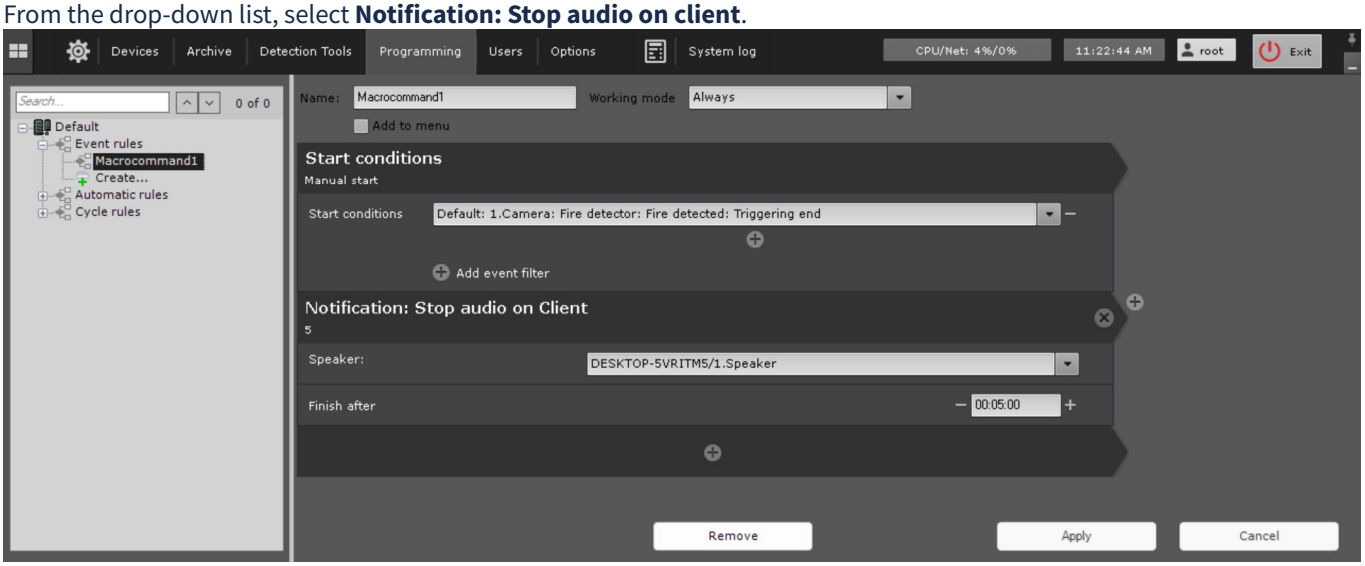
This action allows you to stop audio on the client's speaker after receiving an event.

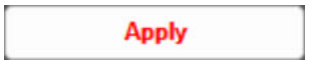
19.5.8.7.2.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.

5. From the drop-down list, select **Notification: Stop audio on client**.



6. In the **Speaker** parameter, select the speaker on which you want to stop the audio notification.
7. In the **Finish after** parameter, specifiy the required time if you want to stop notification after a certain time after receiving an event.
8. Click the **Apply**  button.

Configuration of the **Stop audio on client** action is complete.

19.5.8.7.3 Play audio on device

19.5.8.7.3.1 General information

This action allows you to play audio on a server speaker.

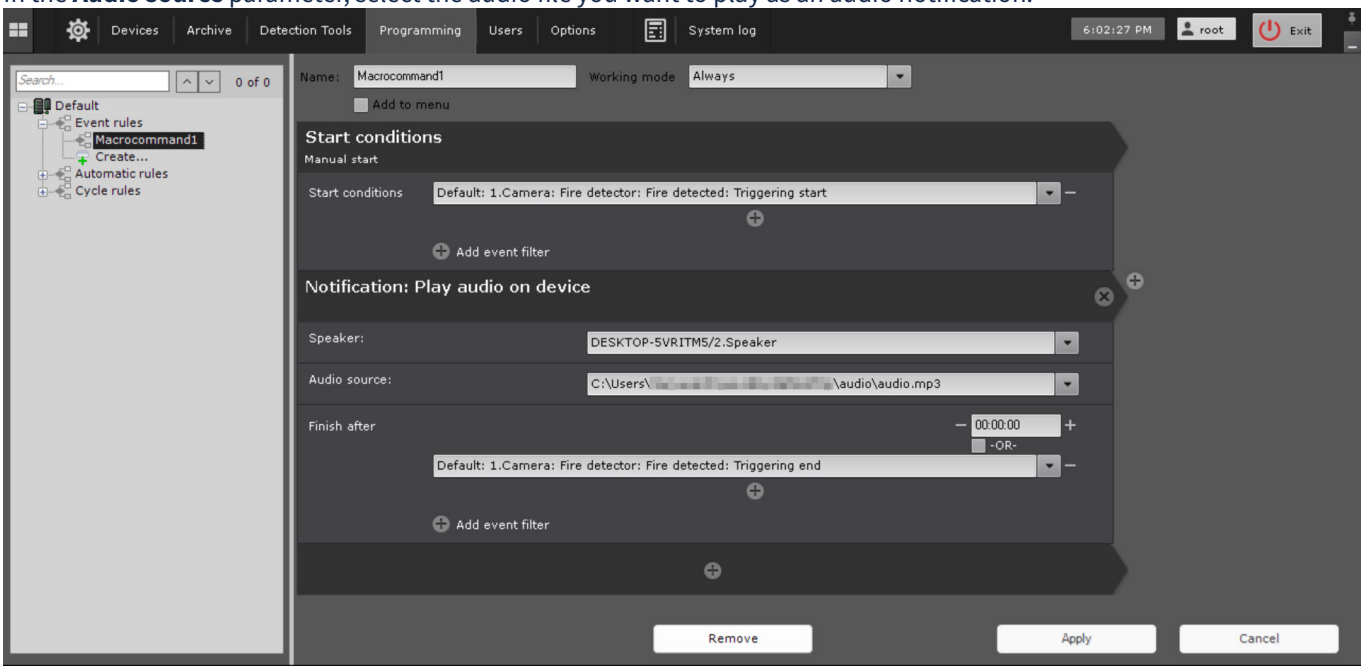
> **Attention!**
>
> To execute the action, you must create the **Speaker** system object with the **Play on client** playback mode (see The Speaker object(see page 228)).

19.5.8.7.3.2 Configuring an action

To configure the action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Notification: Play audio on device**.
6. In the **Speaker** parameter, select the required speaker.

7. In the **Audio source** parameter, select the audio file you want to play as an audio notification.

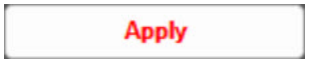


8. In the **Finish after** parameter group, specify the condition that stops the notification:

Condition	Description
Timer	Only the timer value is set. Notification stops after the set time
Event filter	One or several events are set, timer is set to 00:00:00. Notification stops when any event from the filter occurs
Timer + event filter	One or several events are set, timer is set to non-zero. Notification stops after a specified time after any event in the filter has occurred
Timer + **OR** checkbox + event filter	One or several events are set, timer is set to non-zero, the **OR** checkbox is set. In this case, notification stops when whichever condition occurs sooner: either after a specified time or when any event from the filter occurs

Note

- You can set the **OR** checkbox only if the timer setting is non-zero.
- An implicit selection of an event is allowed—**Last event for condition that initiated execution** (see Configuring start conditions(see page 834)).
- If the event that initiated the execution of the command is the **Triggering start** from any type of detector, then the end event is the **Triggering end** from the same detector.

9. Click the **Apply** 

button.

Configuration of the **Play audio on device** action is complete.

19.5.8.8 Execute queries and actions

19.5.8.8.1 Run macro

19.5.8.8.1.1 General information

This action starts the execution of another macro.

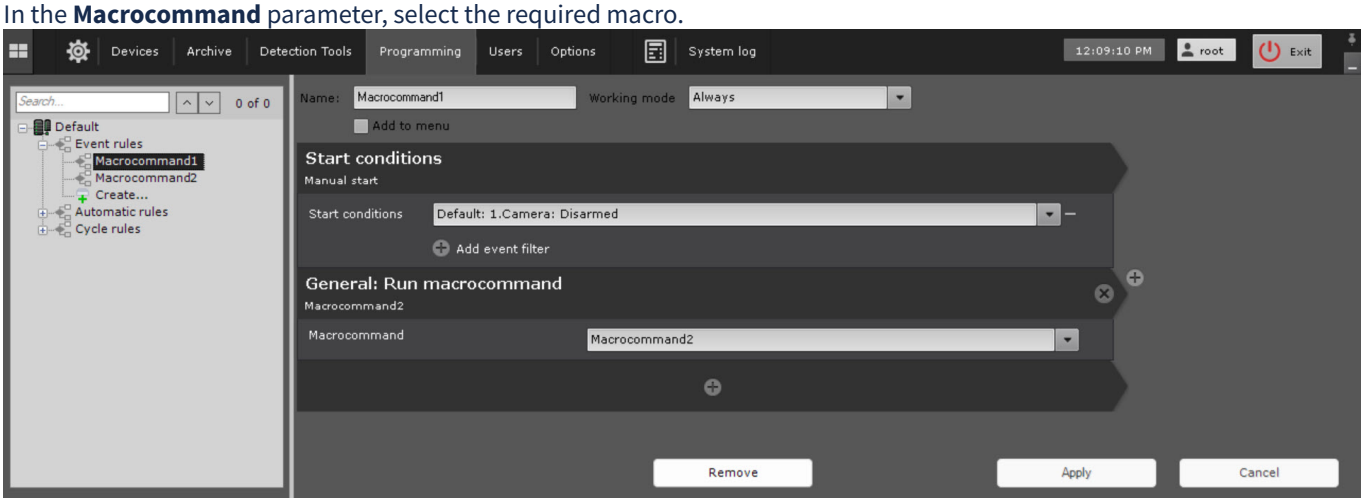
Attention!

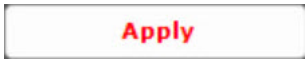
You can start only the **Event rules** macros using this action.

19.5.8.8.1.2 Configuring an action

To configure this action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **General: Run macrocommand**.
6. In the **Macrocommand** parameter, select the required macro.



7. Click the **Apply**  button.

Configuration of the **Run macrocommand** action is complete.

19.5.8.8.2 Execute web query

19.5.8.8.2.1 General information

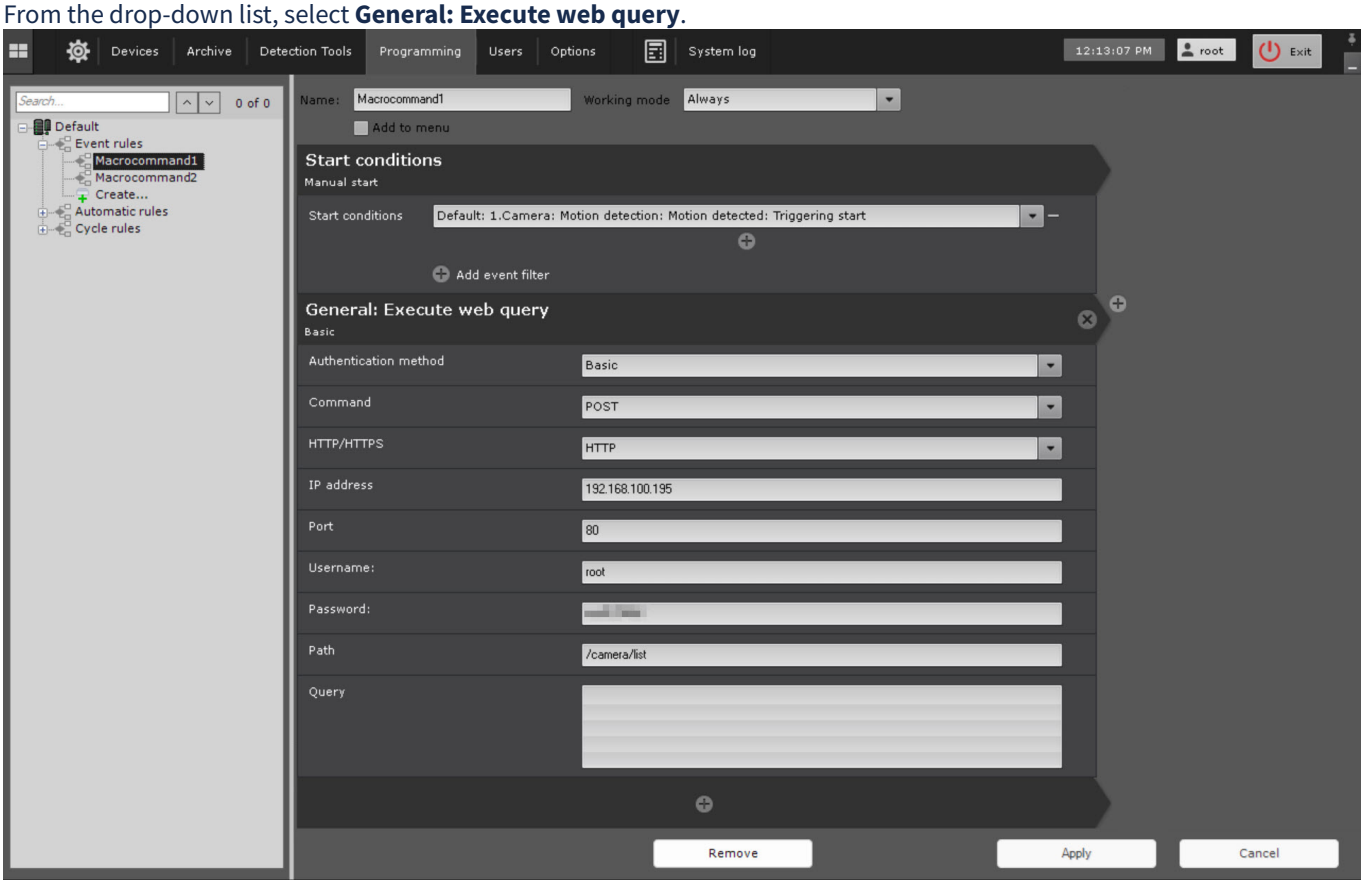
This action sends a web query to a specified server.

19.5.8.8.2.2 Configuring an action

To configure this action, do the following:

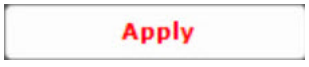
1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.

5. From the drop-down list, select **General: Execute web query**.



6. In the **Authentication method** parameter, select the authentication method:
   a. **Basic**;
   b. **Digest**.
7. In the **Command** parameter, select the query type:
   a. **POST**;
   b. **GET**;
   c. **PUT**;
   d. **DELETE**.
8. In the **HTTP/HTTPS** parameter, select the server protocol:
   a. **HTTP**;
   b. **HTTPS**.
9. In the **IP address** parameter, enter the IP address of the server.
10. In the **Port** parameter, enter the port of the server.
11. In the **Username** parameter, enter the username.
12. In the **Password** parameter, enter the user password.
13. In the **Path** parameter, enter the query path.
14. In the **Query** parameter, enter the query body if necessary.

> **Attention!**
>
> You can use templates in the query body (see Text templates in the action settings(see page 900)).

15. Click the **Apply** 

button.

Configuration of the **Execute web query** action is complete.

19.5.8.8.3 Run external application on client

19.5.8.8.3.1 General information

This action starts an external program on the computer that runs the *Axxon One* client.

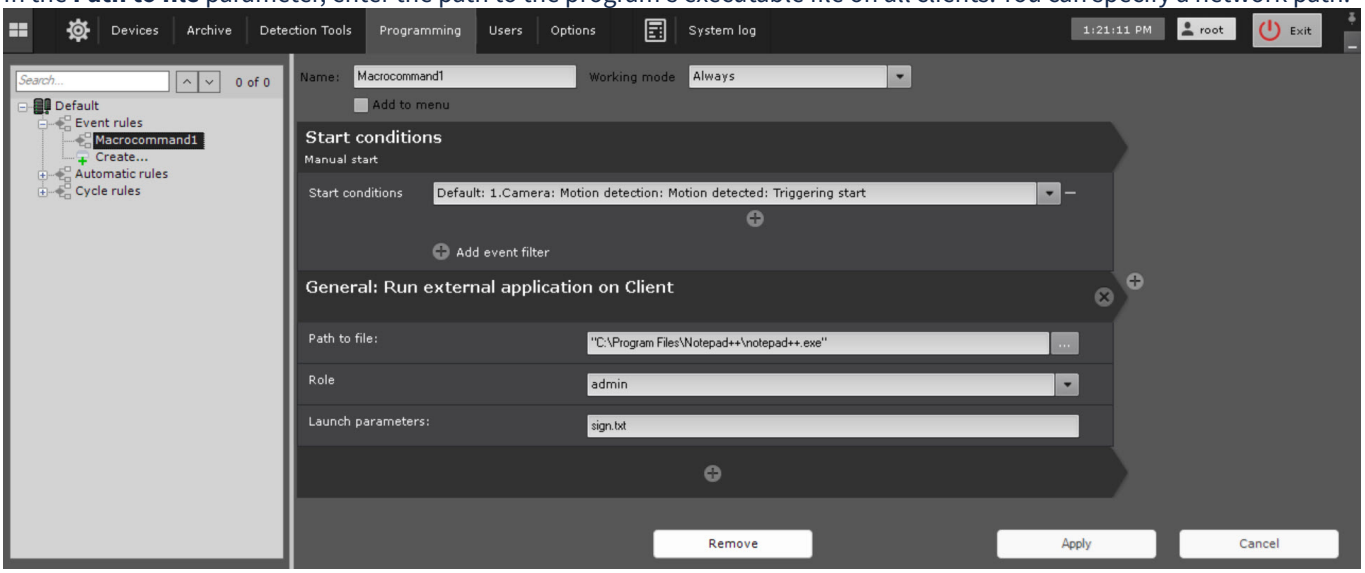
The external program starts on all clients that are connected to the domain.

> **Attention!**
>
> The external program doesn't start on the computer that is an *Axxon One* server, if the client isn't running on the computer when a macro is initiated.

19.5.8.8.3.2 Configuring an action

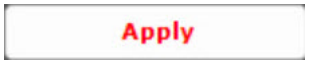
To configure the action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **General: Run external application on client**.
6. In the **Path to file** parameter, enter the path to the program's executable file on all clients. You can specify a network path.



7. In the **Role** parameter, select the role for users of which the program will be run.
8. In the **Launch parameters** parameter, specify the launch parametes if necessary. When you start an external program, its work directory coincides with the directory where the executable file is located. If there is a file in the launch parameters and it is located in the directory with the executable file of the program, you don't need to specify the path to it.

   > **Note**
   >
   > To run a program that requires Administrator privileges, you must either disable UAC (In Windows 10 OS, you must make edits to the registry[343]) or run the *Axxon One* client as Administrator.

9. Click the **Apply**  button.

Configuration of the **Run external application on client** action is complete.

343 https://winaero.com/how-to-turn-off-and-disable-uac-in-windows-10/

19.5.8.8.4 Run external application on server

On the page:

- General information(see page 894)
- Configuring an action(see page 894)
- Example use(see page 895)
  - Example 1(see page 895)
  - Example 2(see page 895)
  - Example 3(see page 896)

19.5.8.8.4.1 General information

This action starts an external program on the selected server of the Axxon-domain.

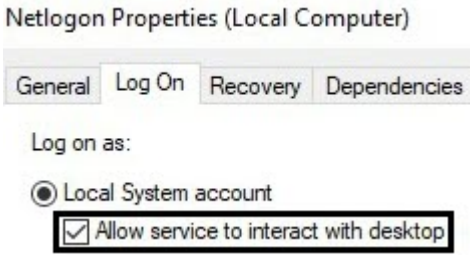
Attention!

We don't recommend running programs with GUI on the server. If you have problems with running interactive services, refer to the Windows[344] OS user manual.

19.5.8.8.4.2 Configuring an action

To configure this action, do the following:

1. Allow interaction of the server **NGP Host service** with desktop: **Start** → **Control Panel** → **Administrative Tools** → **Services** → **Netlogon** → **Properties** → **Log On**.



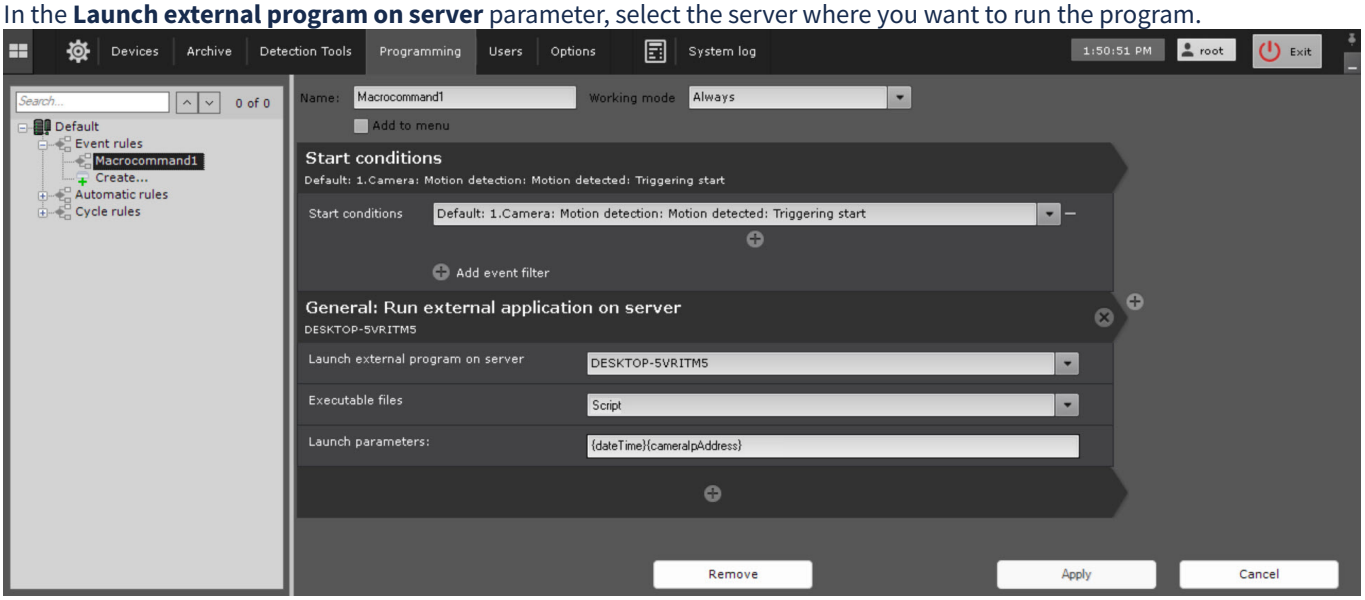
Note

For the **Failover server and client** installation type (see Installation(see page 98)), you must allow the **NGP RaFT supervisor service** to interact with desktop.

2. Add to folder **<*Axxon One* installation directory>\UserScripts** one or more .bat files with the application startup command. The command must include a path to the executable file of the program. You can specify a network path, command line parameters (see Run external application on client(see page 893)) and use templates (see Text templates in the action settings(see page 900)).
3. Go to the **Programming** tab.
4. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
5. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
6. Click the  button below start conditions.

344 https://docs.microsoft.com/en-us/windows/desktop/Services/interactive-services

7. From the drop-down list, select **General: Run external application on server**.
8. In the **Launch external program on server** parameter, select the server where you want to run the program.



9. In the **Executable files** parameter, select a .bat file with the run command.
10. In the Launch parameters parameter, enter templates, if they were set in a .bat file.

> **Attention!**
>
> If you expect a wildcard to contain spaces and/or some special shell characters (> & | <, and so on) as a result of the query, the template must be enclosed in quotation marks (""). For example, "{rectangles}". It is necessary to quote the entire template string.

11. Click the **Apply**  button.

Configuration of the **Run external application on server** action is complete.

19.5.8.8.4.3 Example use

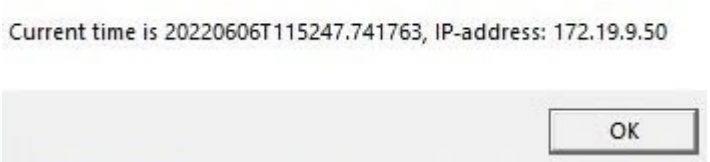
Example 1

If you use a bat file with contents:

```
SET "datatime=%1"
SET "cameraIpAddress=%2"

msg * Current time is %datatime%, IP-address: %cameraIpAddress%
```

executing the macro results in the following message:



Example 2

Export events about camera status changes (signal lost/restored) in csv format, a bat file with contents:

```
SELECT "timestamp"
```

```
    ,REGEXP_REPLACE("object_id", 'hosts/', '') as device,
    CASE
                                WHEN ("any_values"::json->>'state') = '4' THEN 'Signal Lost'
                                WHEN ("any_values"::json->>'state') = '3' THEN 'Signal
Restored'
                                ELSE ''
        END as state
FROM public."t_json_event"
WHERE type = '0' AND ("any_values"::json->>'state'='3' OR "any_values"::json->>'state'='4') AND
timestamp >= '20200211T0000'
ORDER by timestamp DESC
```

Example 3

Export of all input events in csv format, a bat file with contents:

```
SELECT "timestamp",
        REGEXP_REPLACE("object_id", 'hosts/', '') as device,
        CASE
                                WHEN ("any_values"::json->>'phase') = '1' THEN 'Closed'
                                WHEN ("any_values"::json->>'phase') = '2' THEN 'Opened'
                                ELSE ''
        END as state
FROM public."t_json_event"
WHERE type = '1' AND timestamp >= '20200209T110000' AND "object_id" LIKE '%ray%'
ORDER by timestamp DESC
```

19.5.8.9 Control layouts

19.5.8.9.1 Open layout

19.5.8.9.1.1 General information

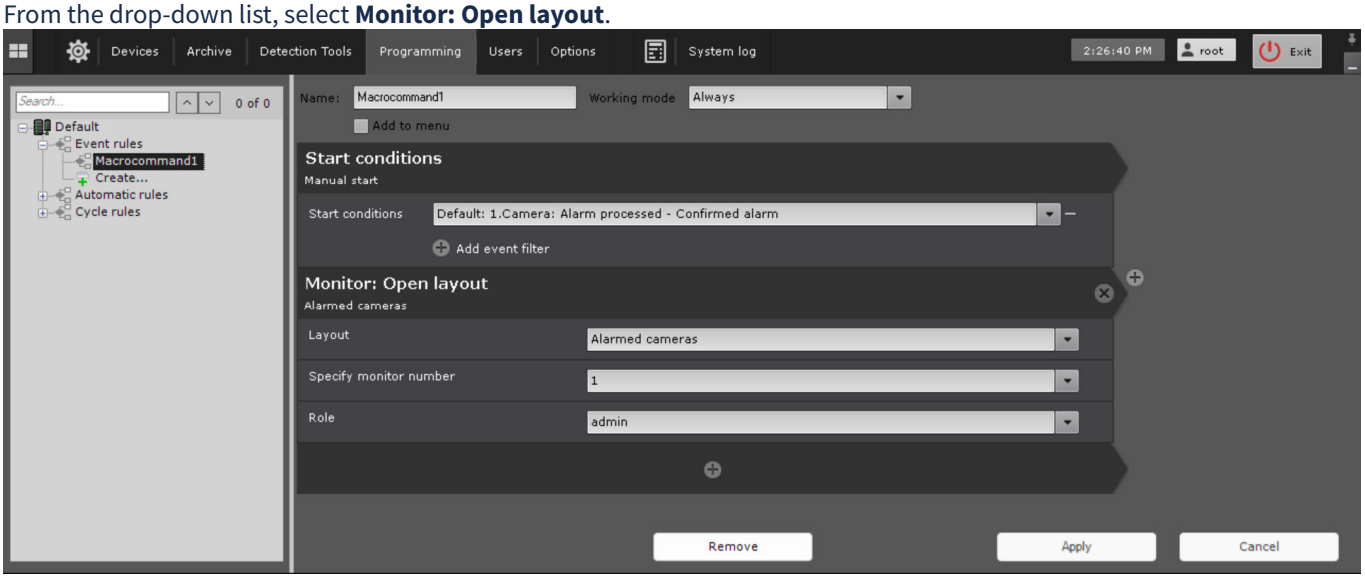
This action allows you to open any layout created in the system.

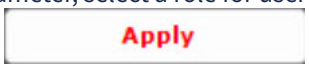
19.5.8.9.1.2 Configuring an action

To configure the action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.

5. From the drop-down list, select **Monitor: Open layout**.



6. In the **Layout** parameter, select a layout.
7. In the **Specify monitor number** parameter, select the number of the monitor on which you want to open the selected layout.
8. In the **Role** parameter, select a role for user of which this action will be executed.
9. Click the **Apply** 

button.

Configuration of the **Open layout** action is complete.

19.5.8.9.2 Restore layout

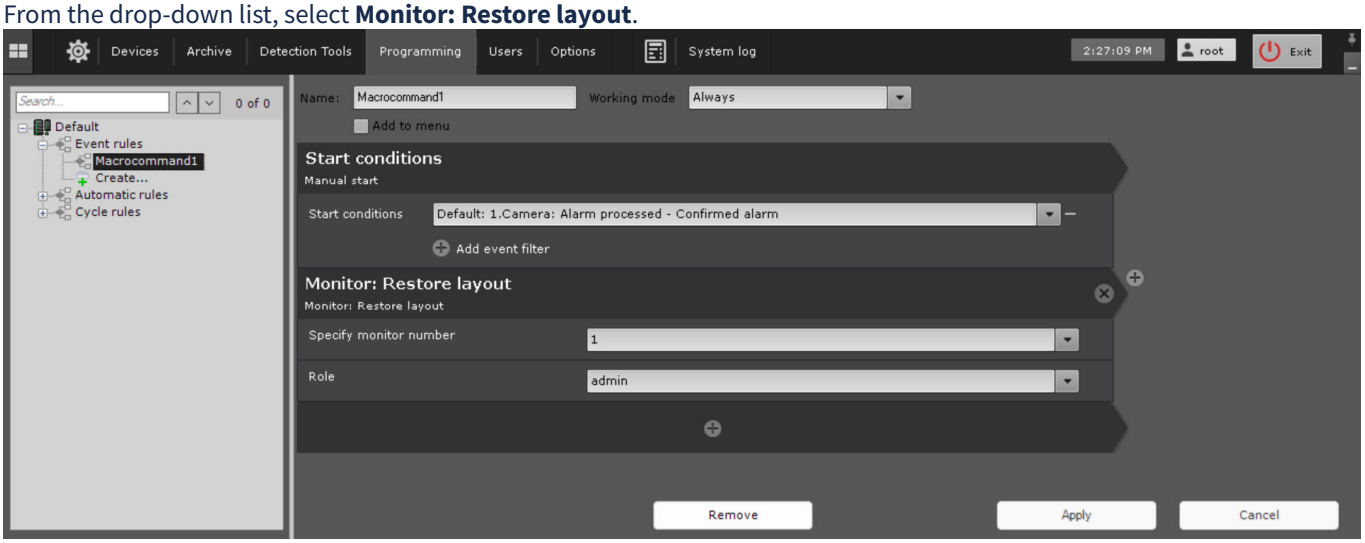
19.5.8.9.2.1 General information

This action allows you to restore a layout.

19.5.8.9.2.2 Configuring an action

To configure the action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Monitor: Restore layout**.



6. In the **Specify monitor number** parameter, select the number of the monitor on which you want to restore this layout.
7. In the **Role** parameter, select a role for users of which this action will be executed.
8. Click the **Apply** button.

Configuration of the **Restore layout** action is complete.

19.5.8.9.3 Show map

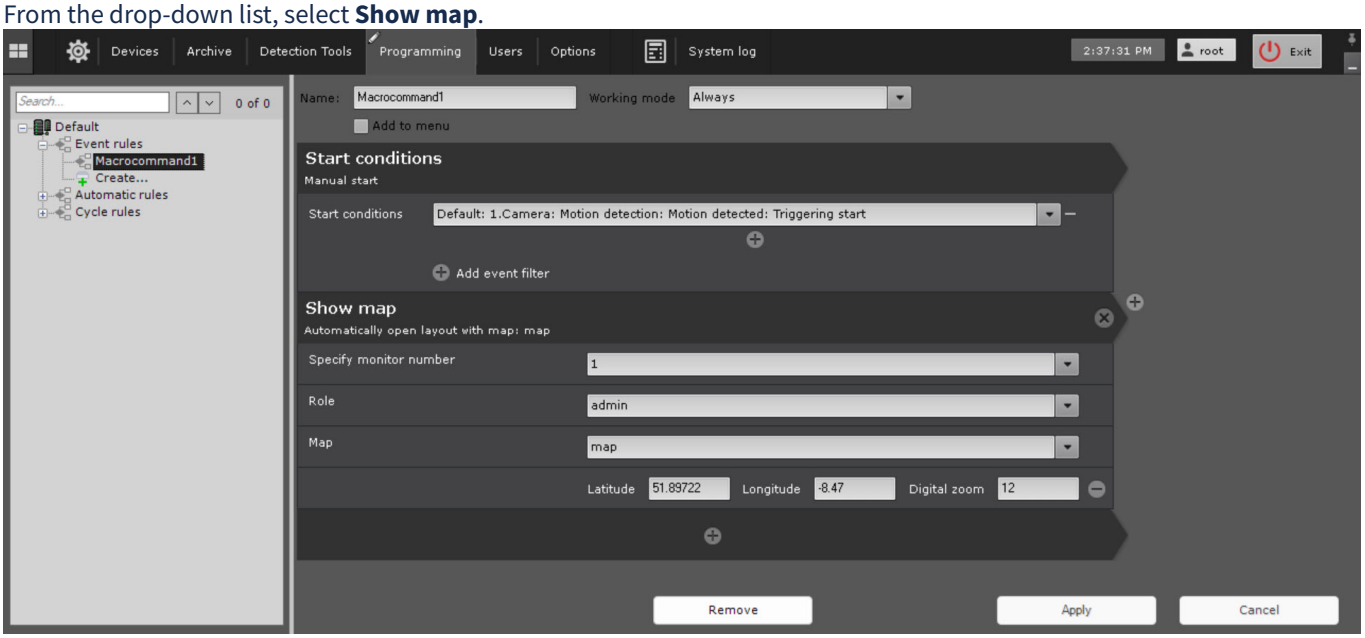
19.5.8.9.3.1 General information

This action allows you to view any map added to the system on the selected monitor (see Adding a new map(see page 983)).

19.5.8.9.3.2 Configuring an action

To configure the **Show map** macro, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the button below start conditions.
5. From the drop-down list, select **Show map**.



6. In the **Specify monitor number** parameter, select the number of the monitor on which you want to display the selected map.
7. In the **Role** parameter, select a role the users of which will have access to this macro.
8. In the **Map** parameter, select a map. When you select a geomap, it is necessary to specify the following parameters to display the required area:
   a. In the **Latitude** parameter, enter the latitude.
   b. In the **Longitude** parameter, enter the longitude.
   c. In the **Digital zoom** parameter, specify the zoom scale.
9. Click the **Apply** button.

Configuration of the **Show map** action is complete. The required map is displayed on the specified monitor.



19.5.8.9.4 Start slideshow

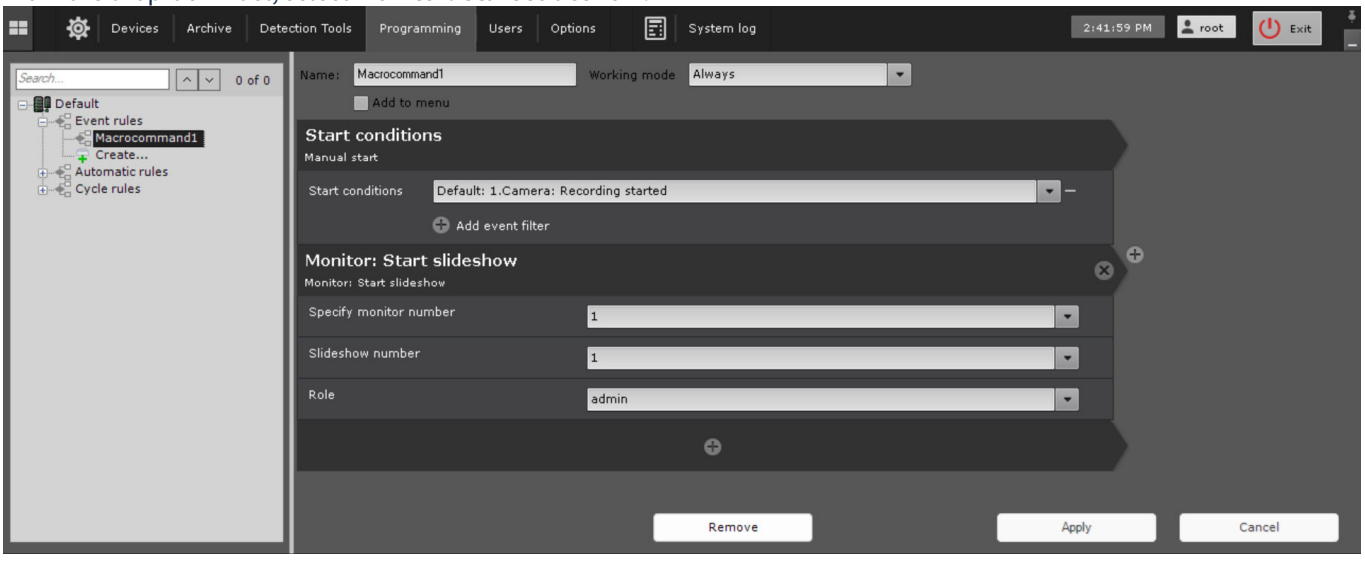
19.5.8.9.4.1 General information

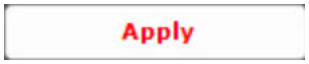
This action starts a slideshow of specific layouts (see Selection and Slideshow of Layouts(see page 1282)) on the selected operator monitor for the specified role.

19.5.8.9.4.2 Configuring an action

To configure the **Start slideshow** action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Monitor: Start slideshow**.



6. In the **Specify monitor number** parameter, select the number of the monitor on which you want to start a slideshow. If you select a dash (**–**) when selecting a monitor, a slideshow starts on the active monitor.
7. In the **Slideshow number** parameter, select the number of a slideshow. The list starts with a zero. For example, **Slideshow #1** in the **Layouts** interface has the number **0**.
8. In the **Role** parameter, select a role for which the macro will be executed. If you leave the **Role** field blank, the macro is executed for all roles that have access to this rule.
9. Click the **Apply** 

button.

Configuration of the **Start slideshow** action is complete.

19.5.8.9.5 Stop slideshow

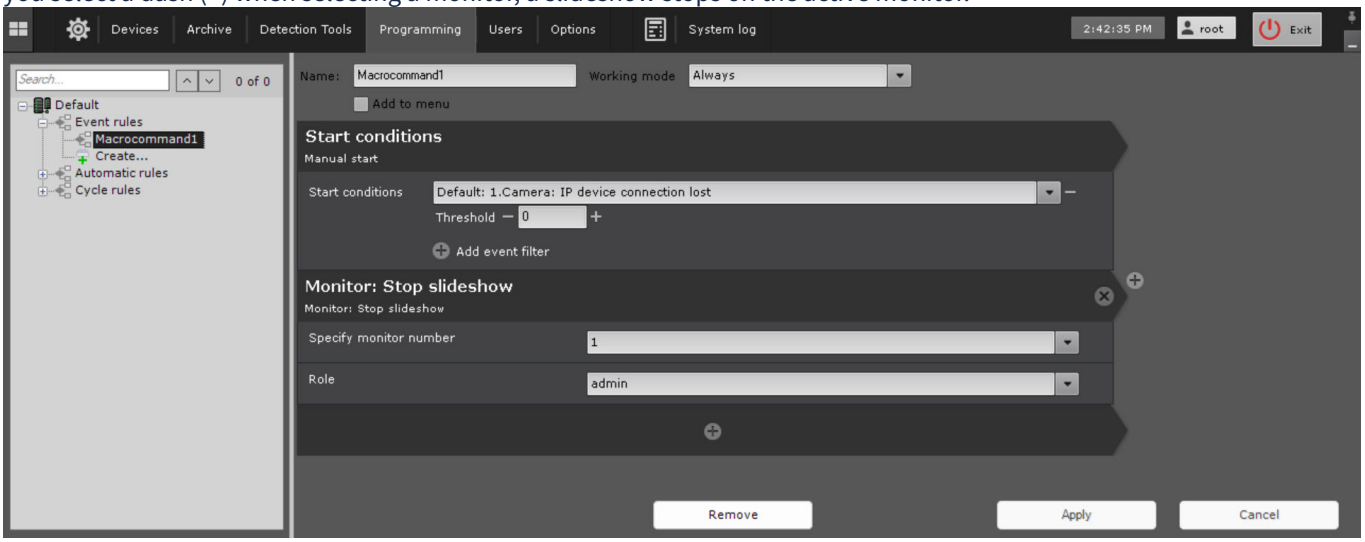
19.5.8.9.5.1 General information

This action stops a slideshow of specific layouts (see Selection and Slideshow of Layouts(see page 1282)) on the selected operator monitor for the specified role.

19.5.8.9.5.2 Configuring an action

To configure the **Stop slideshow** action, do the following:

1. Go to the **Programming** tab.
2. In the **Event rules** or **Cycle rules** list, click **Create...** (see Configuring macros(see page 830)).
3. Select a start condition that triggers a macro (see Configuring start conditions(see page 834)).
4. Click the  button below start conditions.
5. From the drop-down list, select **Monitor: Stop slideshow**.
6. In the **Specify monitor number** parameter, select the number of the monitor on which you want to stop a slideshow. If you select a dash (**–**) when selecting a monitor, a slideshow stops on the active monitor.



7. In the **Role** parameter, select a role for which the macro will be executed. If you leave the **Role** field blank, the macro is executed for all roles that have access to this rule.
8. Click the **Apply** 

button.

Configuration of the **Stop slideshow** action is complete. To stop a slideshow, you can also left-click any Surveillance window. After you restart the client, a slideshow resumes.

19.5.8.10 Text templates in the action settings

You can use text templates in actions that involve sending notifications (see E-mail notification(see page 876), Push notification(see page 878), Execute web query(see page 891)):

Template	Description
{cameraNode}	Server name (used if a macro start condition is connected to a camera)
{eventNode}	Server name (used if a macro start condition isn't connected to a camera)
{cameraName}	Name and a short name of the camera that initiated a macro
{cameraLabel}	Just the camera name
{cameraIpAddress}	Camera IP address
{cameraId}	Camera ID
{cameraRef}	The VIDEOSOURCEID identifier (see Get list of cameras and information about them[345])
{dateTime}	Time of a macro start in ISO format in the UTC time zone
{serverDateTime}	Time of a macro start in ISO format in the server time zone
{plate}	Recognized vehicle license plate
{plateDirection}	Direction of movement of a vehicle in the frame. Possible values: • **1**—from top to bottom; • **2**—from bottom to top
{name}	Name of the recognized person from a list of faces (see Faces[346])
{list}	Name of a list of faces or a list of LPs (see Faces[347], LPs[348])

Attention!

You can use the **{age}** and **{gender}** templates (see Parameters that specify the conditions for starting a macro when recognizing a face(see page 848)) when the following conditions are met:

1. The **Age and gender** parameter (see Configuring the Face detector VA(see page 491), Configuring the Face detector TV(see page 505)) or the **Face attributes recognition** parameter (see Configuring the Face detector VL(see page 478)) is enabled in the settings of a face detector.
2. The **Face detected: Specified detection** event is selected as a start condition for this macro (see Configuring start conditions(see page 834)).

{age}	Age of a recognized person
{gender}	Gender of a recognized person
{appearedTime}	Time of object detection in the UTC time zone

345 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486987/Get+list+of+cameras+and+information+about+them
346 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
347 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
348 https://docs.axxonsoft.com/confluence/spaces/anet/pages/184380358/LPs

Template	Description
{serverAppearedTime}	Time of object detection in the server time zone
{rectangles}	Coordinates and size of an object that generated an event from a detector
{comment}	User comment

Attention!

Statistical templates (used only when a macro is started when a corresponding statistical condition is met (see Starting the Event rules macros based on statistical data(see page 843))).

{cpuUsage}	Server CPU usage
{netUsage}	Server network usage
{memoryUsage}	Server memory usage
{diskUsage}	Disk usage
{archiveUsage}	Archive usage

Note

- In addition to curly braces **{}**, you can also use **%%** or **[]** in templates. For example, **%cameraId%**.
- The date/time templates (such as **{dateTime}**, **{serverDateTime}**, **{appearedTime}**, **{serverAppearedTime}**) offer an extended input option, which allows you to specify the date and time in arbitrary format. A format description parameter must be contained within a pair of **@** characters. For example, **{dateTime@%Y-%m-%d %H:%M:%S@}**. In this case, the actual format is presented as **2020-10-04 18:43:23**.
  Available parameters:

Click here to expand

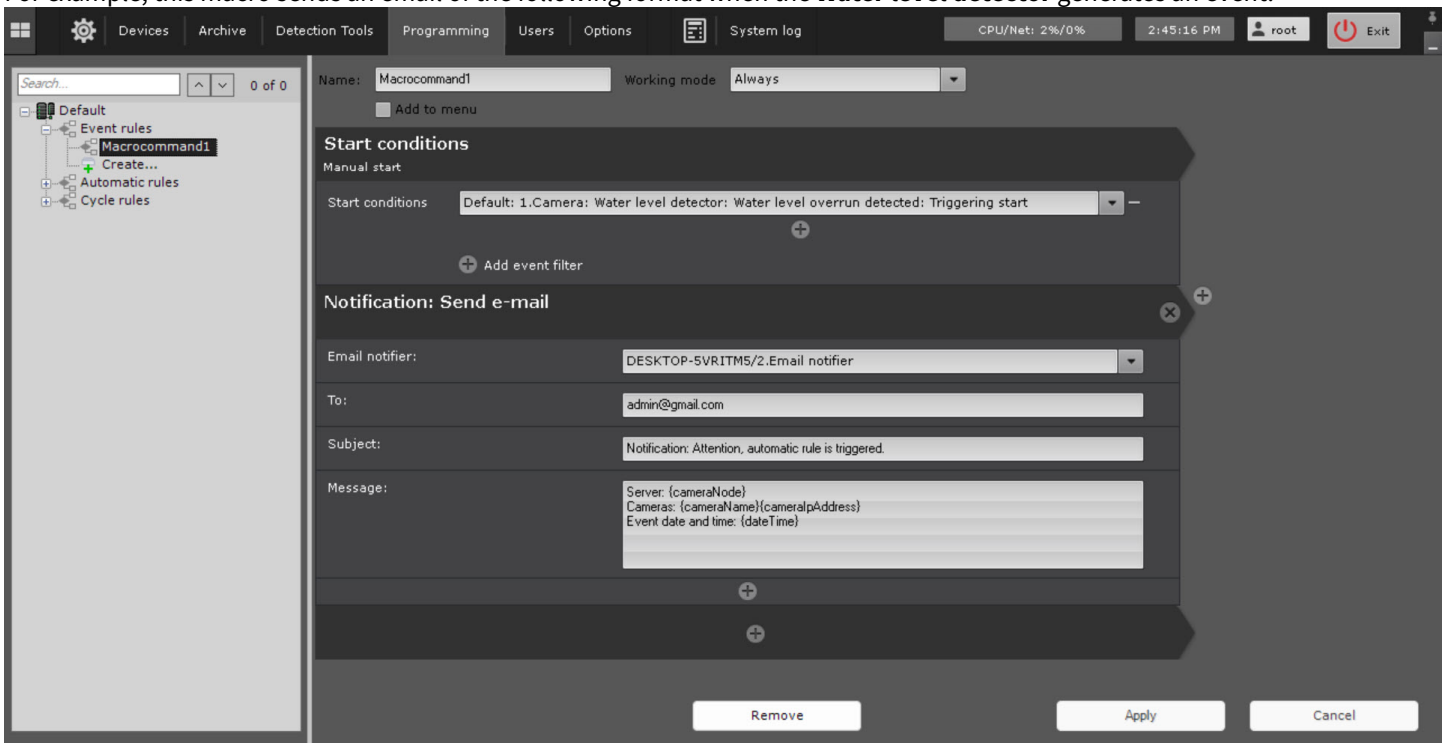
Parameter	Description
%a	Abbreviation for the day of the week
%A	Full name of the day of the week
%b	Abbreviation for the month
%B	Full name of the month
%y	Last two digits of the year
%Y	Year in full
%m	Month of the year
%d	Day of the month
%H	Hour in 24h format
%M	Minute as a decimal number

Parameter	Description
%S	Second as a decimal number
%F	Fractions of a second

Combined parameters:

Parameter	Description
%D	Equivalent to %m/%d/%y
%T	Equivalent to %H:%M:%S

For example, this macro sends an email of the following format when the **Water level detector** generates an event:




```
Subject: Notification: Attention, water level detector is triggered
Server: Server1
Camera: 10.0.11.36 34.Camera
Time: 20190812T085517.926430
```

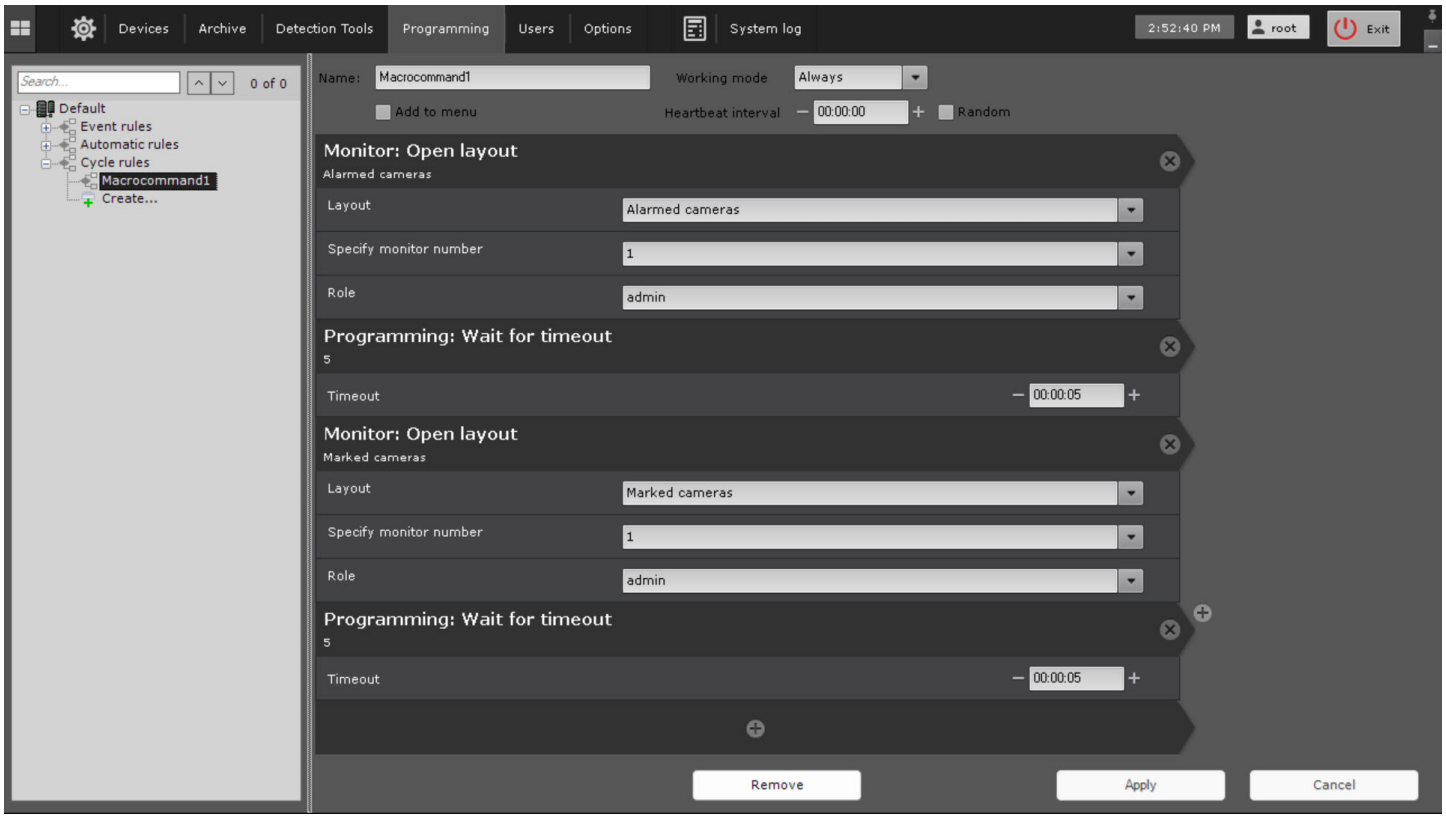
19.5.8.11 Examples of Cycle rules macros

General information about macros(see page 829)
Configuring macros(see page 830)

Attention!

If you don't have the **Wait** command in a **Cycle rules** macro, there is a delay of one second between cycles.

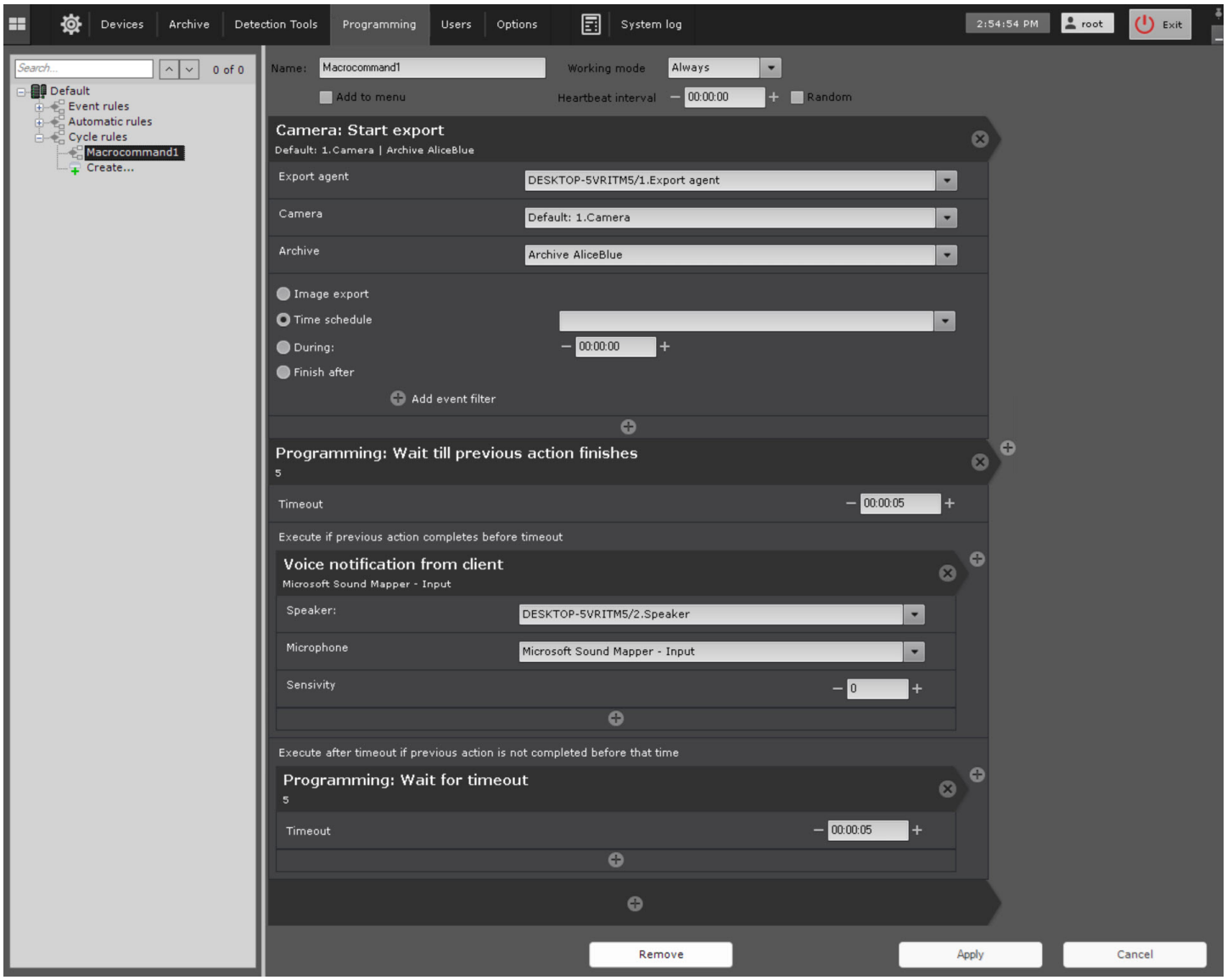
Example 1. This macro runs continuously, starting from the moment that you saved it.



Cycle consists of alternating layouts with alarmed cameras and layouts with marked cameras. interval is five seconds.

Open layout(see page 896)
Wait for timeout(see page 858)

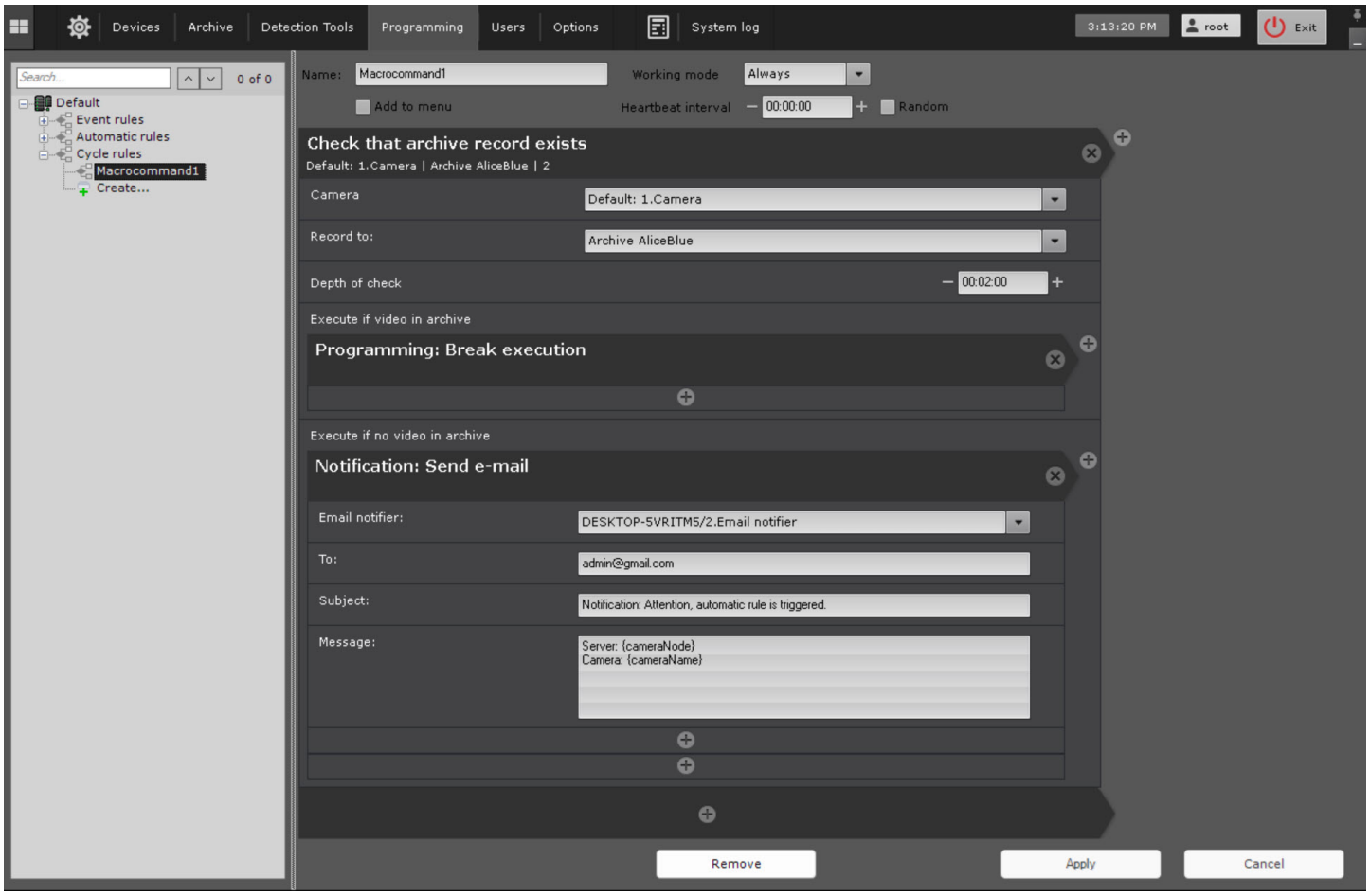
Example 2. This macro runs continuously within a time schedule.



Every hour video from camera 1 is exported. After export is completed, a voice notification is played.

Start export(see page 885)
Wait till previous action finishes(see page 859)
Voice notification from client(see page 880)
Wait for timeout(see page 858)

Example 3. This macro checks if there are recording intervals in the archive from a camera for the last two minutes.



If there are archive records in the camera, the macro stops its execution. If there are no archive records in the camera for the last two minutes, an email notification with the server and camera specified is sent.

Check that archive record exists(see page 871)
Break execution(see page 861)
E-mail notification(see page 876)

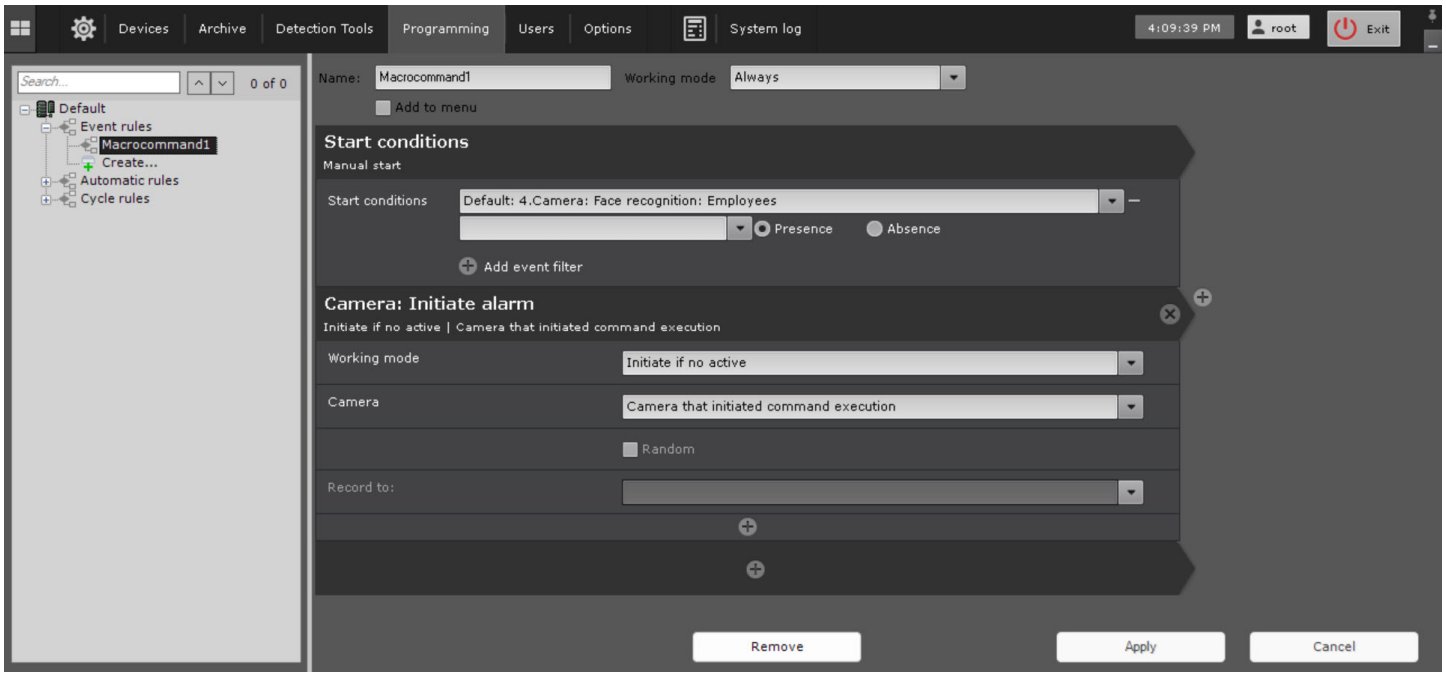
19.5.8.12 Examples of macros used when working with lists of faces

On this page:

- Alarm initiation(see page 907)
- Switching on the output for the authorized persons(see page 909)
- Sending an email(see page 910)
- Starting export(see page 911)

Configuring macros when working with lists of faces(see page 845)

19.5.8.12.1 Alarm initiation



You can use this macro together with a **Dialog Board** (see Configuring a Dialog Board(see page 966)). To configure a **Dialog Board** to display an alarm, do the following:

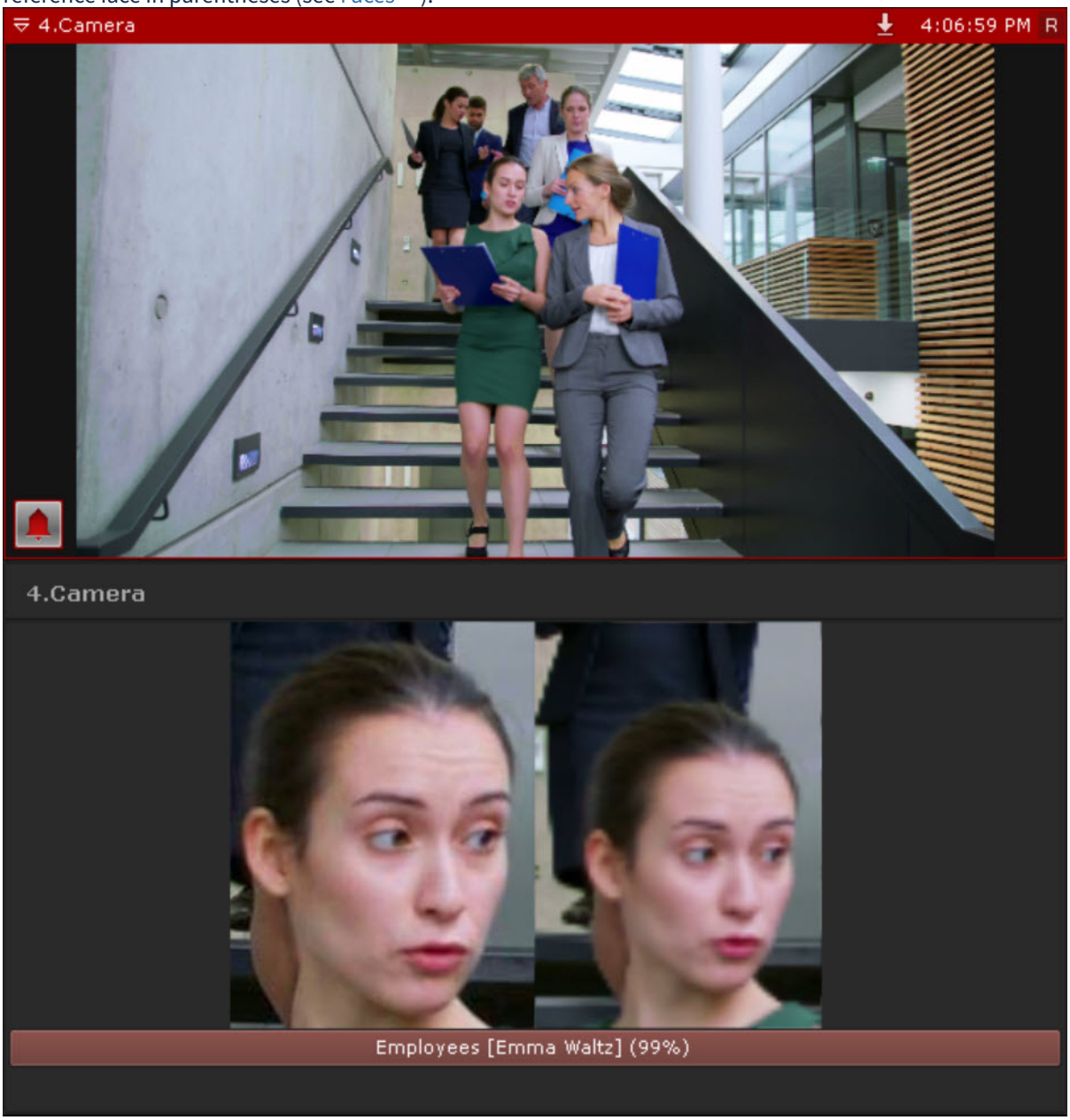
1. Add a **Dialog Board** to a layout (see Configuring a Dialog Board(see page 966)).
2. Link the **Dialog Board** to a Surveillance window (see Linking cells(see page 952)).
3. On the **Dialog Board**, select from the list the event type **Camera: Alarm initiated by macro** that you want to be displayed on the **Dialog Board**.
4. Click the **Add** button.
5. On the **Dialog Board**, click the  button and select the **Alarm** element.
6. Click the **Save** 

button.

As a result, when a face from the list is recognized, the following information is displayed on the **Dialog Board**:

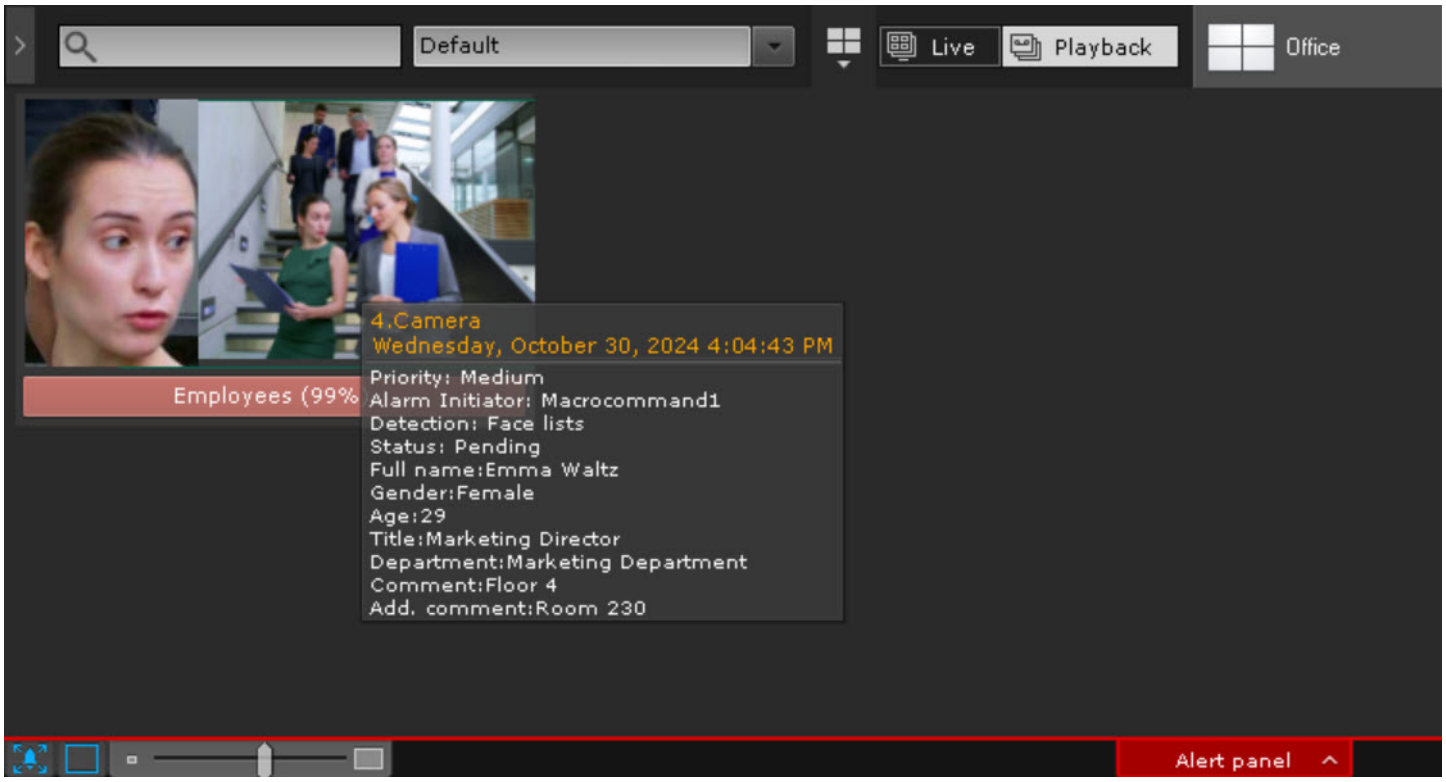
- reference photo from a face list;
- an enlarged image of the recognized face in the frame;

- the name of the face list, full name of the recognized person in square brackets, and the percentage of similarity with the reference face in parentheses (see Faces[349]).



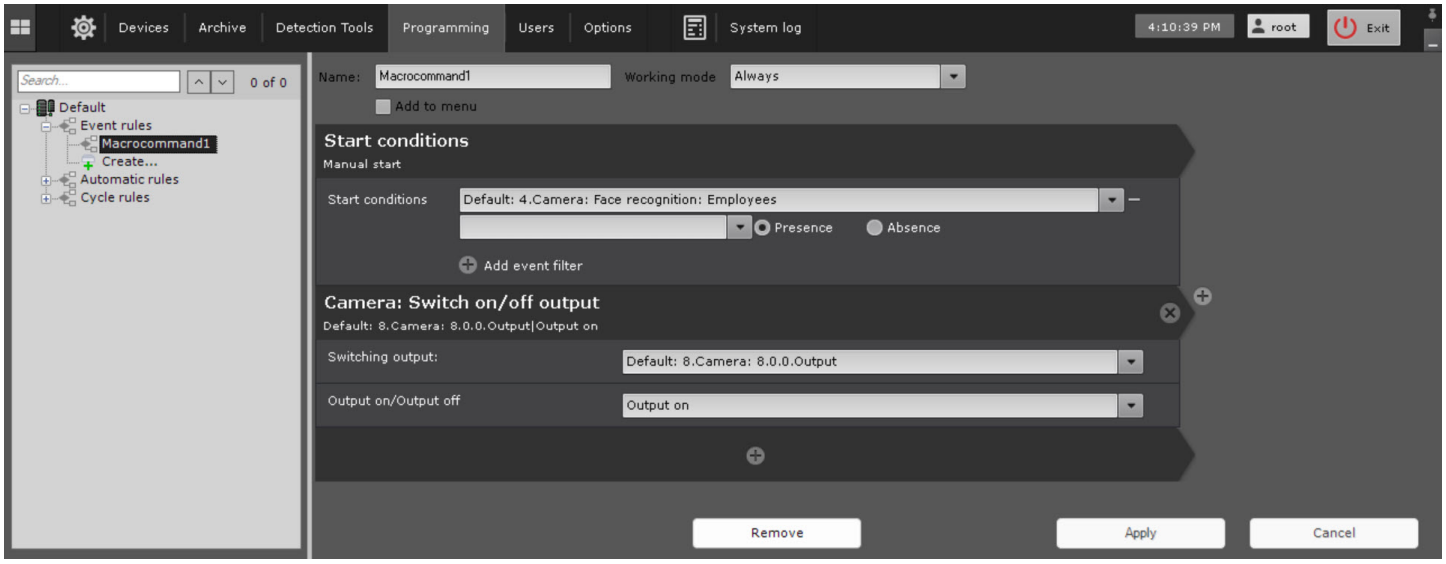
When an alarm is initiated by this macro, you can view additional information about a recognized face on the **Alert panel** (see Alert panel(see page 1131)) when you hover the mouse cursor over the video.

349 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces



You can specify additional information about faces in *AxxonNet* (see Configuring a list of faces[350]).

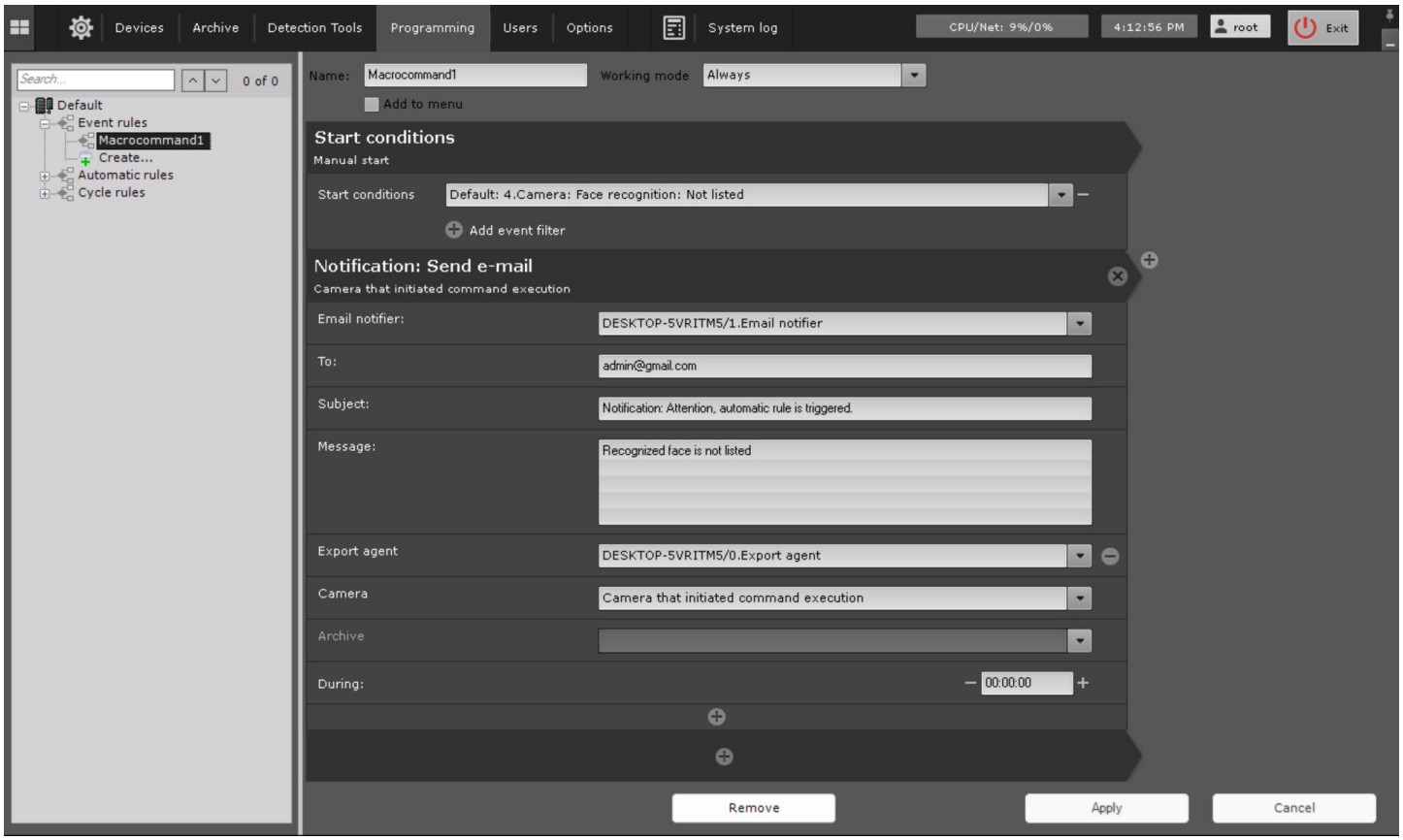
19.5.8.12.2 Switching on the output for the authorized persons



If only an authorized list of persons has access to the room, the system initiates an automatic reaction if the recognized face is in the authorized list.

350 https://docs.axxonsoft.com/confluence/spaces/anet/pages/224297983/Configuring+a+list+of+faces

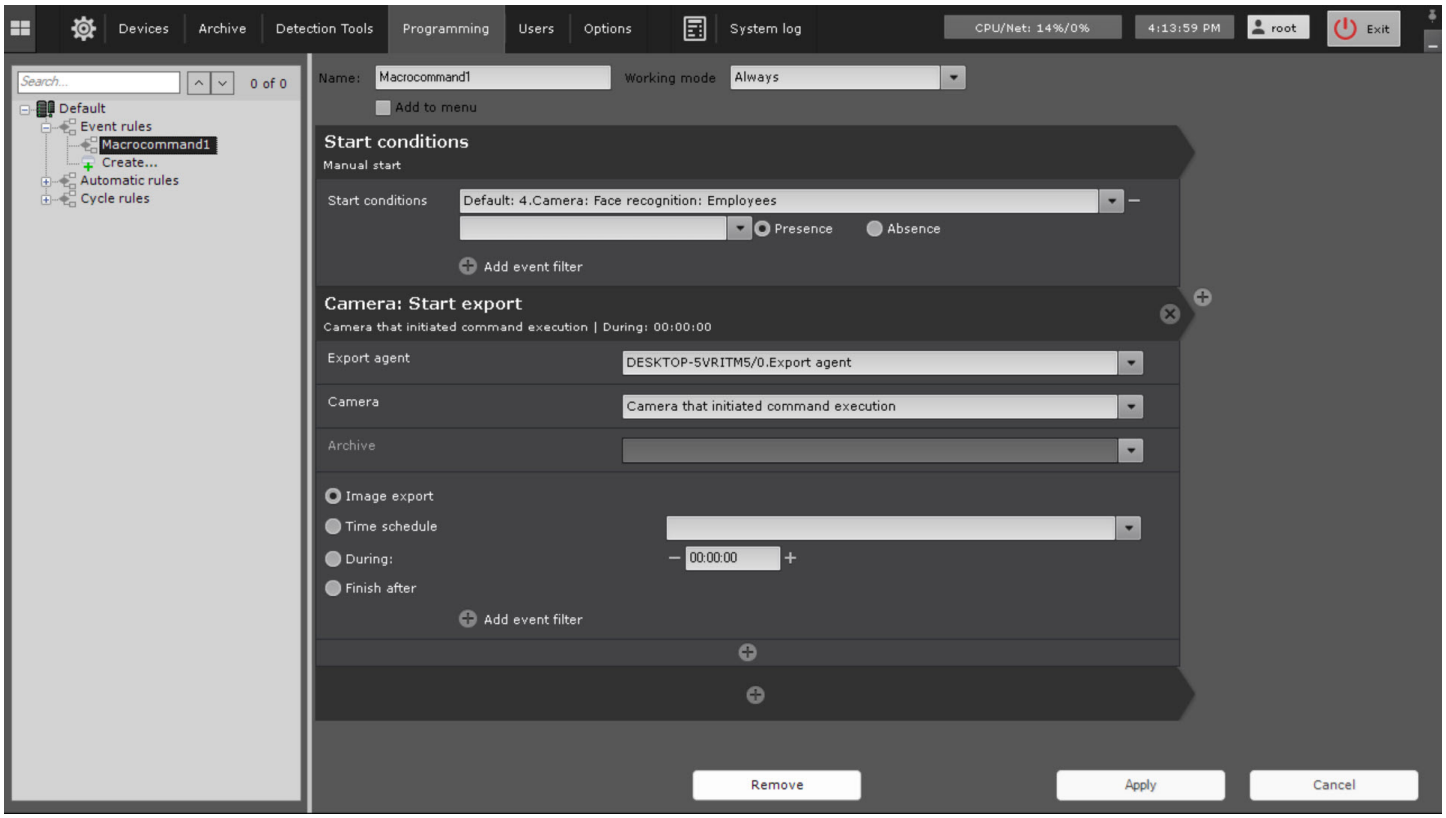
19.5.8.12.3 Sending an email



If an email is sent via the SMTP Server (see Email notifier(see page 231)), then two files are attached to the message:

- full frame at the moment of face recognition;
- an enlarged image of the recognized face in the frame.

19.5.8.12.4 Starting export



As with the email message, three files are exported when exporting an image upon face recognition event:

- full frame at the moment of face recognition;
- reference photo from the face list;
- an enlarged image of the recognized face in the frame.

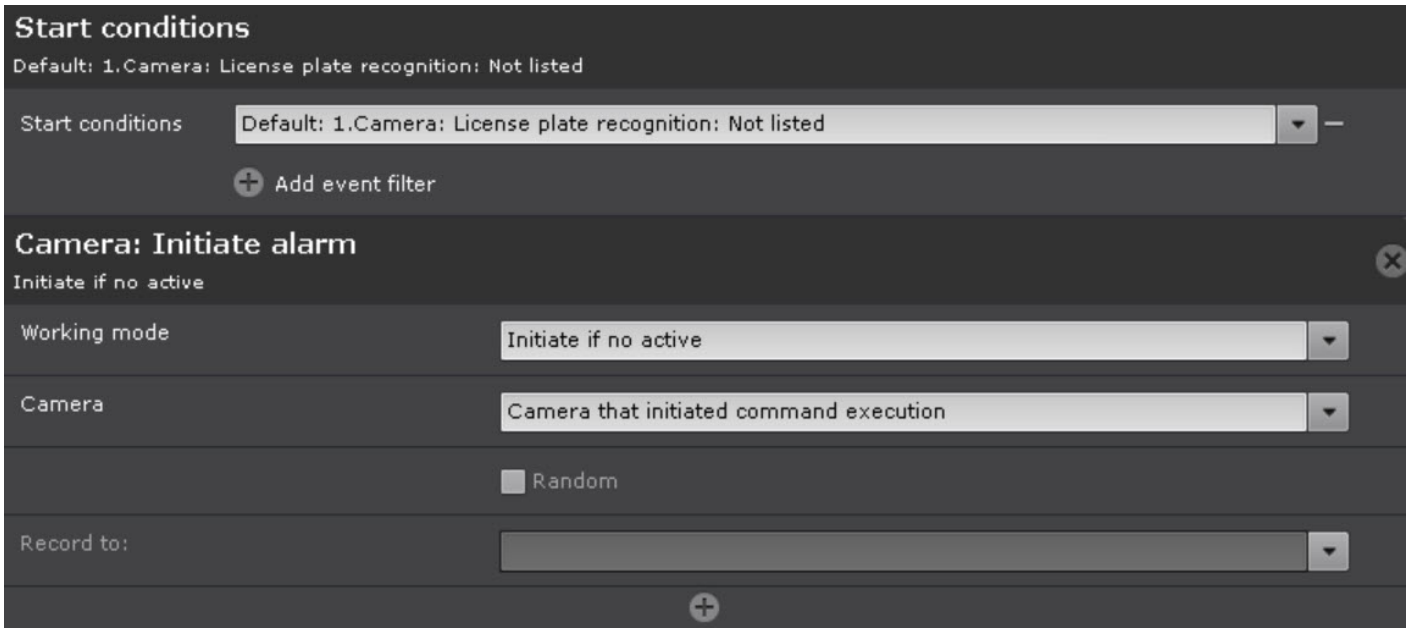
19.5.8.13 Examples of macros used when working with lists of license plates

On this page:

- Alarm initiation(see page 912)
- Switching on the output for the authorized license plates(see page 914)
- Sending an email(see page 914)
- Starting export(see page 915)

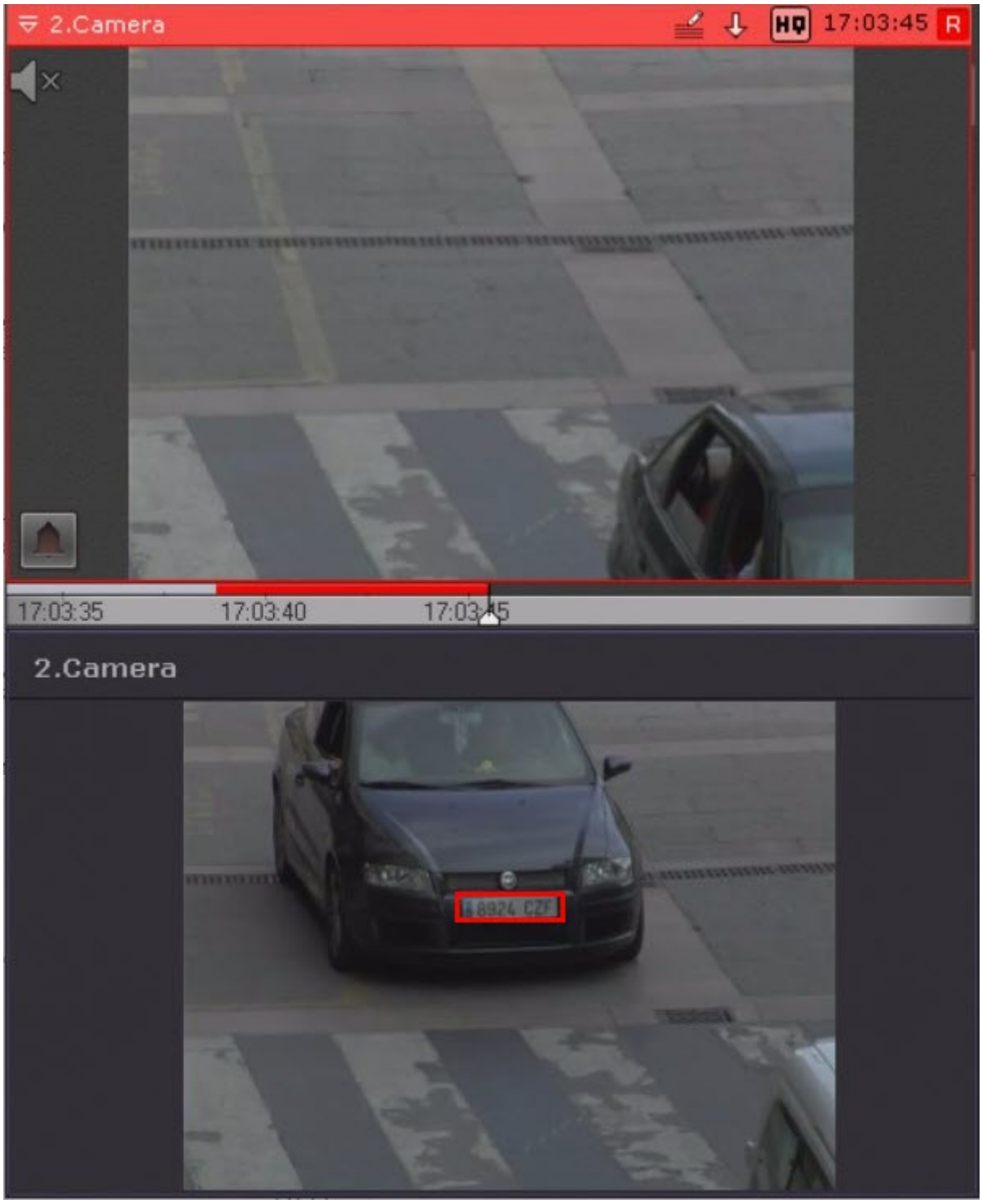
Configuring macros when working with lists of license plates(see page 849)

19.5.8.13.1 Alarm initiation

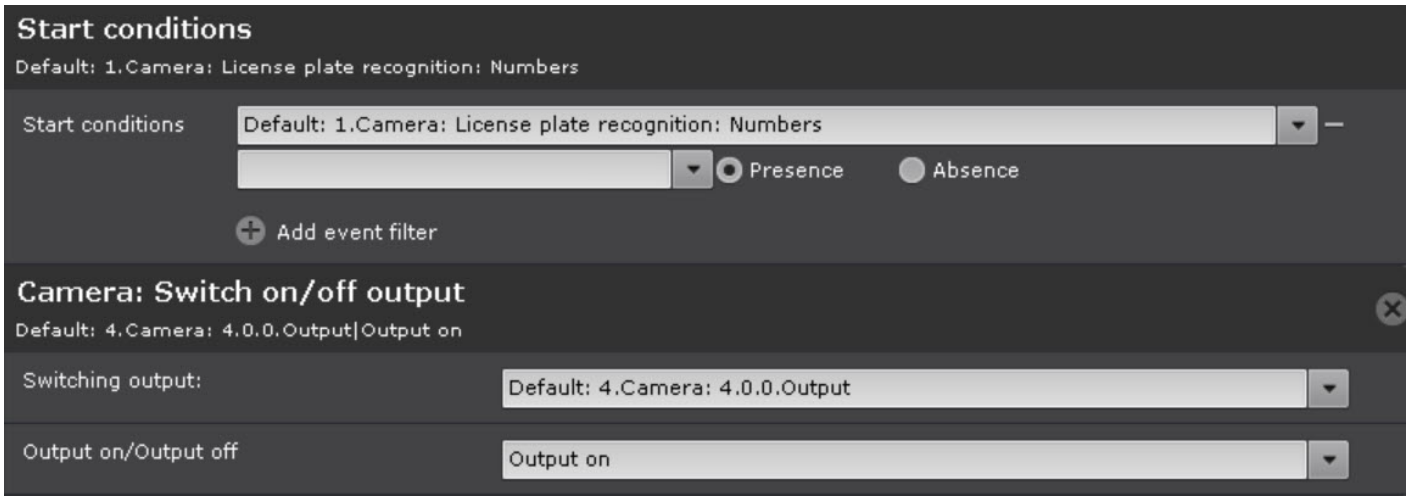


This macro can be used together with a **Dialog Board** (see Configuring a Dialog Board(see page 966)).

If the **Dialog Board** is configured to display an alarm and linked with a camera (see Linking cells(see page 952)), then when a not listed license plate is recognized, the board displays the recognized license plate outlined with a red border.

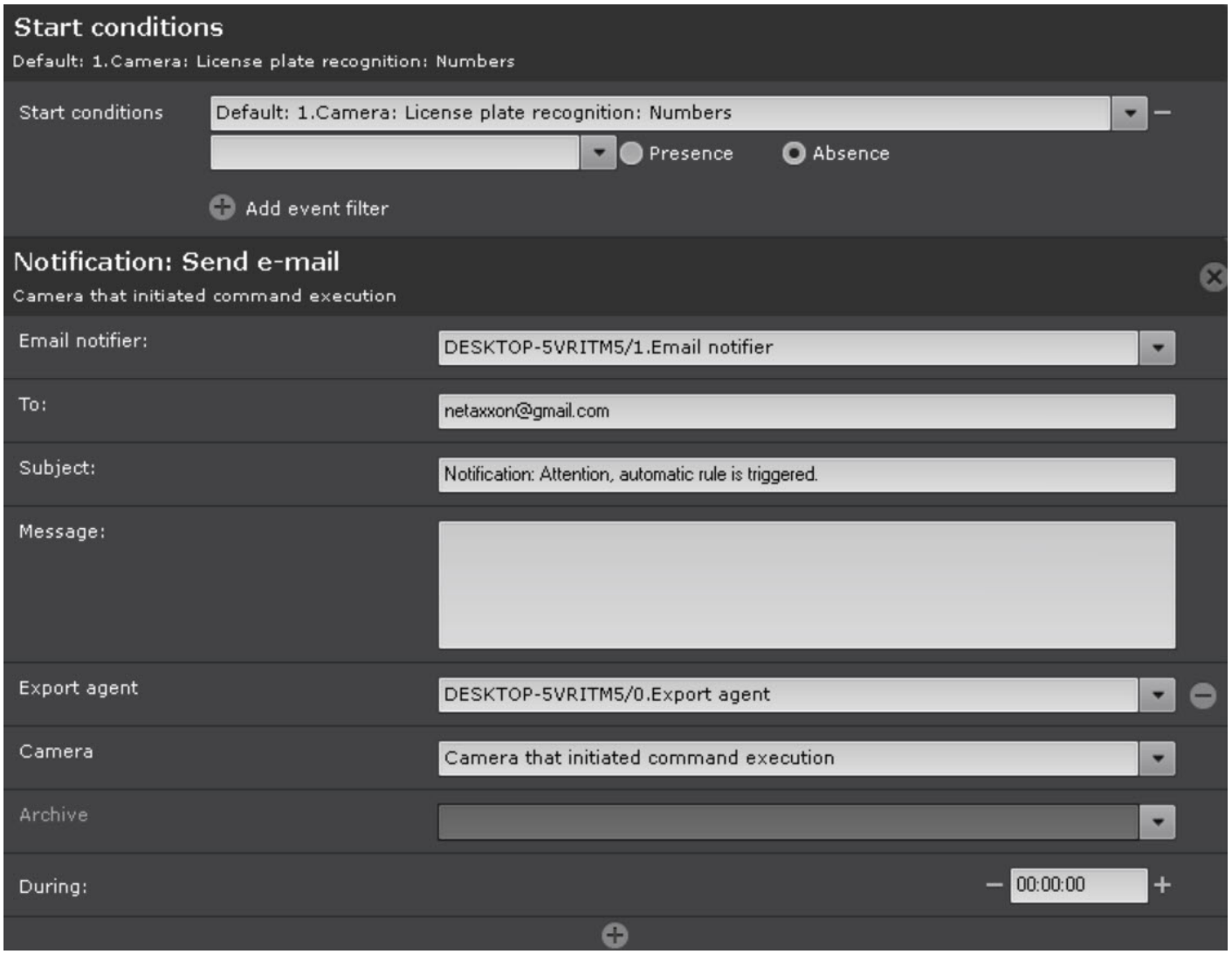

2.Camera
HQ
17:03:45
R
17:03:35
17:03:40
17:03:45
2.Camera
8924 CZF

19.5.8.13.2 Switching on the output for the authorized license plates



If only an authorized list of license plates has access to the facility, the system generates an automatic reaction if the recognized license plate is in the authorized list.

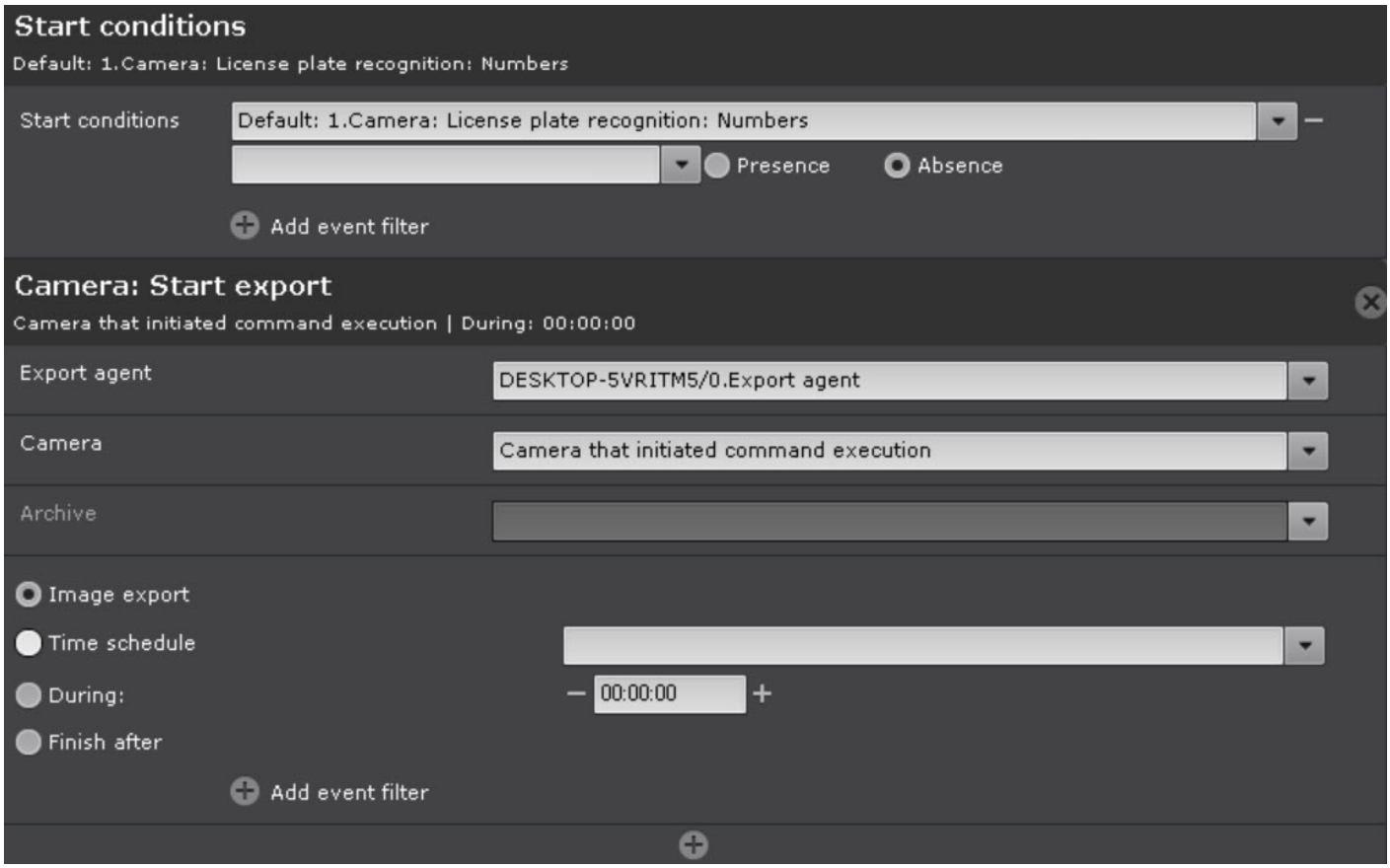
19.5.8.13.3 Sending an email



If an email is sent via the SMTP Server (see Email notifier(see page 231)), then two files are attached to the message:

- full frame at the moment of license plate recognition;
- an enlarged image of the recognized license plate.

19.5.8.13.4 Starting export



As with an email message, two files are exported when exporting an image upon license plate recognition event:

- full frame at the moment of license plate recognition;
- an enlarged image of the recognized license plate.

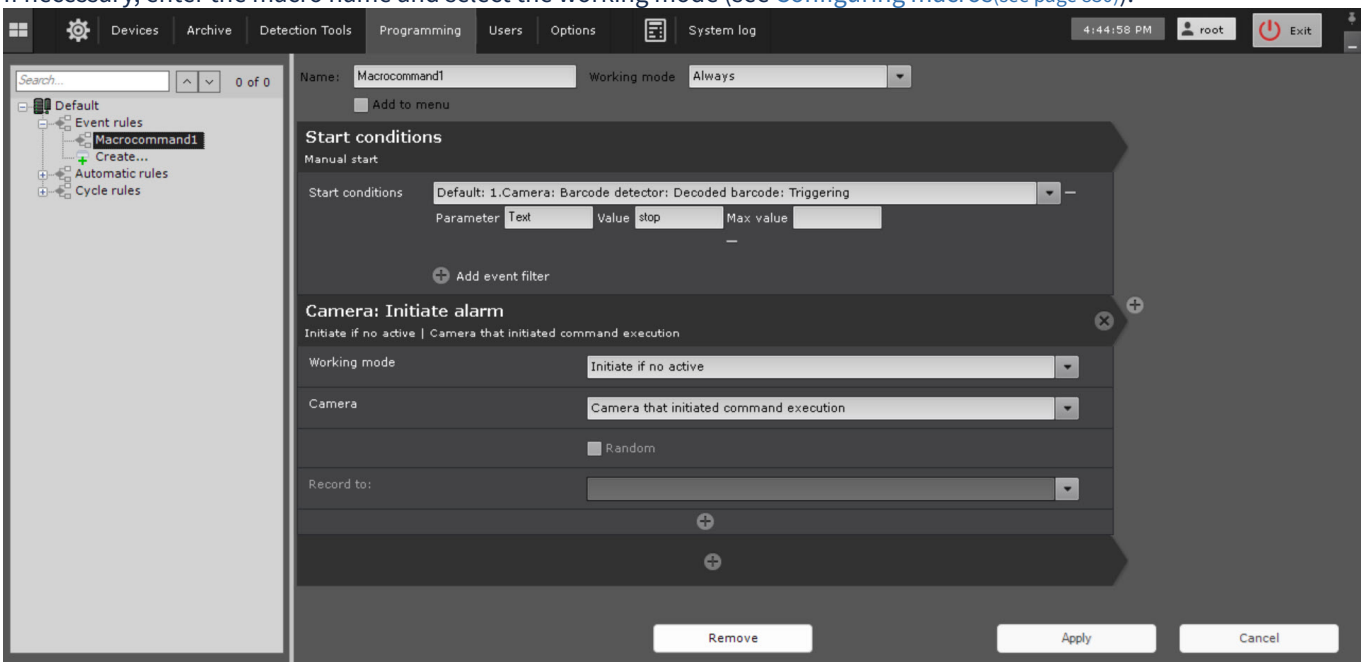
19.5.8.14 Examples of macros used for barcode detection

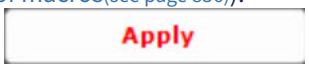
You can configure macros for the barcode detector that will perform specific actions when a barcode is detected (see Examples of macros(see page 856)).

For example, you can configure a macro to initiate an alarm if a certain text is detected in a barcode. To configure such a macro, do the following:

1. Create and configure the **Barcode detector** beforehand (see Barcode detector(see page 760)).
2. Go to the **Programming** tab → **Event rules** → **Create...**.

3. If necessary, enter the macro name and select the working mode (see Configuring macros(see page 830)).



4. Click the  button below start conditions.
5. In the **Parameter** field, enter **Text**.
6. In the **Value** field, enter the required text that will initiate an alarm when recognized.
7. Click the  button and select the required action that will be performed when an event from the start conditions occurs (see Examples of macros(see page 856)).
8. Click the **Apply**  button.

Configuration of a macro that initiates an alarm when a specific text is detected in a barcode is complete.

19.6 Users

19.6.1 General information about users

19.6.2 Types of permissions to access hardware, archives and macros

19.6.3 Roles

19.6.4 LDAP catalogs

19.6.5 Configuring local users

19.6.6 Configuring LDAP users

19.6.7 Security policy

19.6.8 Changing user password

19.6.9 General information about users

Types of permissions to access hardware, archives and macros(see page 919)

In *Axxon One*, every user has permissions based on their role. There are two types of users: local (stored in the Server database) and LDAP[351].

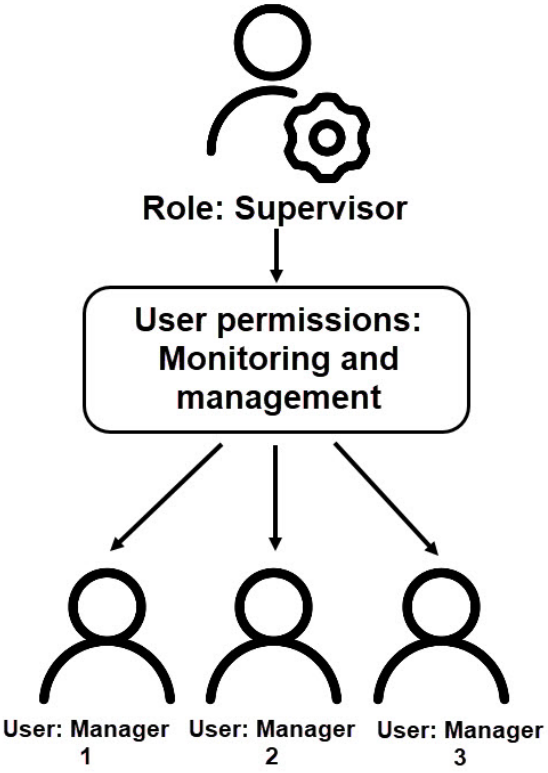
Attention!

To enable LDAP users, you must configure access to LDAP catalogs (see LDAP catalogs(see page 930)).

Term	Description
Roles	Determine a set of permissions for users in *Axxon One*. Several users can have the same role in *Axxon One*
Users	An account in *Axxon One*. Each user can be assigned to one or more roles. In this case, user's permissions are summed up from all the roles that the user has, that is, the permissions with the widest access to configuring the components of *Axxon One* are selected from all user roles. The user logs into the system using a unique username and password. The actions of all system users are registered in the system log (see System log(see page 1318))
Permissions	Determine what actions the user can perform in the system. These actions can include administering, managing and monitoring the components of a video surveillance system. Permissions are configured along with roles and are granted to users assigned to the corresponding roles

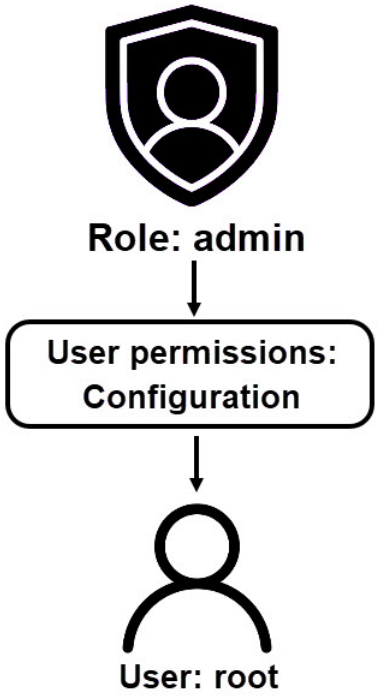
For example, three **Manager** users are assigned the **Supervisor** role. Users have permissions to monitor and manage video surveillance system components. User permissions are configured when creating a role.

351 https://en.wikipedia.org/wiki/Lightweight_Directory_Access_Protocol



By default, there is one role—**admin** and one user—**root**. The **root** user belongs to the **admin** role and has permissions to configure all components of the video surveillance system.

> **Note**
>
> Only **admin** users can create other **admin** role users.



Common algorithm for configuring users:

1. Create a new role on the **Users** tab and configure permissions for the new role (see Roles(see page 920)).
2. Register new users for the role and enter additional information about users (see Configuring local users(see page 933), Configuring LDAP users(see page 937)).

19.6.10 Types of permissions to access hardware, archives and macros

General information about users(see page 917)

In *Axxon One*, you can set user permissions both for a specific device (object) and for a group of devices. Specifics of object and group permission types are described in the table below.

User permission type	Usage	Priority
Object	Configuring access to a specific device, archive or macro in the system	Highest
Group	Configuring access to all cameras added to a group (see Creating a Group object(see page 266))	Priority below Object permissions **Note** • If the camera belongs to several groups with different access levels assigned to them, the user permissions with the highest access level are used. • If the camera belongs to a child group, then the permissions defined for the child group have a priority when determining access to the camera.

User permission type	Usage	Priority
Default	Configuring access to all devices, archives or macros that will be created in the system. If Group or Object permissions are not assigned to the device after its creation, then the default permissions are applied	Priority below Group permissions

19.6.11 Roles

On the page:

- General information(see page 920)
- Creating a role(see page 920)
- Copying a role(see page 930)
- Removing a role(see page 930)

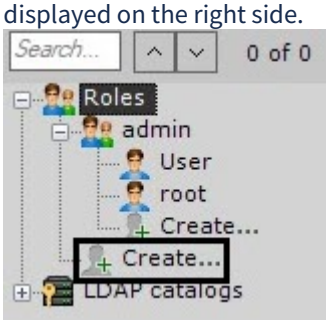
19.6.11.1 General information

A role is intended for assigning a group of users individual rights and permissions for administration, management and/or monitoring of individual components of *Axxon One*.

19.6.11.2 Creating a role

To create a new role, do the following:

1. At the end of the list of system roles, click the **Create** link. The new role is added to the system, with its properties displayed on the right side.



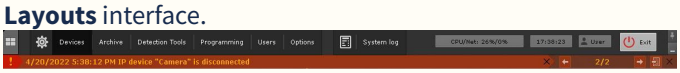
2. Configure the access permissions:

Parameters	Access level	Description
Basic		
Name	–	Enter a name for the role
Map control		Select the access level to the maps for users with this role

Parameters	Access level	Description
Map management	**No access**	Users cannot view maps
	View only	Users can only view maps
	View/move/ scale	Users can views, move, and scale maps
	Full access	All operations with map are available
Other		
Archive depth viewing restriction	–	If you need to limit the access of users of this role to all system archives, you can specify the archive depth limit in hours. If no limit is set, users can view all videos
Access to Functions		Set access permissions to *Axxon One* functions
Access to confidential comments	**Yes**	Add and view confidential comments
	No	
Access to Search in archive mode	**Yes**	Archive search (see Video surveillance in the Archive Search mode(see page 1210))
	No	
Adding camera to layout in monitoring mode	**Yes**	Add a camera to a layout in the Live mode (see Adding cameras to cells(see page 950))
	No	
Adding/ editing presets	**Yes**	Add and edit presets for PTZ cameras (see Selecting a preset(see page 1169))
	No	
Alarms processing	–	Alarms management (see Video surveillance in the Alarm management mode(see page 1181))
	No access	Users have no access to alarm events
	View only	Users can view alarm events, but they can't assess them
	Full access	Users can view alarm events and assess them
Allow comments in archive	–	Create comments in the archive (see Operator comments(see page 1153)) and protected records (see Protecting video recordings from FIFO overwriting(see page 303))
	No access	No comments allowed
	Create	Users can add comments to the archive

Parameters	Access level	Description
	Create/Protect	Users can add comments to the archive, create protected records
	Create/Protect/ Edit and delete	Users can add comments to the archive, create and edit protected records
Allow to delete records	**Yes**	Remove videos from the archive (see Deleting a part of archive(see page 1195))
	No	
Allow unprotected export	**Yes**	Export frames and videos without password protection (see Frame export(see page 1307), Standard video recordings export(see page 1308)). Set **No** to require setting a password when exporting (see Exporting frames and video recordings(see page 1306))
	No	
Export	**Yes**	Export frames and videos (see Exporting frames and video recordings(see page 1306))
	No	
Layouts editing	**Yes**	Edit layouts (see Editing layouts(see page 944))
	No	
Minimize to taskbar	**Yes**	Minimize the client to the tray (see Interface of Axxon One(see page 93))
	No	
Operating domain	**Yes**	Manage Axxon domain (see Operations with domains(see page 152))
	No	
Permissions to access via WebUI	**Yes**	Access to the Web-Server (see Working with Axxon One through the Web-Client(see page 1325))
	No	
Show captions	**Yes**	Display captions (see Viewing titles from POS terminals(see page 1157))
	No	
Show faces	**Yes**	Showing faces (see Masking faces(see page 1000))
	No	
System log	**Yes**	View the system log (see System log(see page 1318))
	No	
Unlock camera menu button	**Yes**	Context menu of a camera (see Context Menu of the Surveillance window(see page 1112))

Parameters	Access level	Description
	No	
View masked video	**Yes**	View masked video (see Configuring privacy masking in archive(see page 1001), People masking(see page 693))
	No	
Access to Interfaces		Configure the access permissions to the interfaces
Group panels	**Yes**	Configure the access permissions to camera groups on the **Hardware** tab and to the camera groups on the **Layouts** interface
	No	
Layouts tab	**Yes**	Configure the access permissions to the **Layouts** tab. This parameter applies to both the client and the Web-Client (see Web-Client GUI(see page 1329))
	No	
Objects panel and Camera search panel	**Yes**	Configure the access permissions to the Objects panel (see Object panel(see page 1133)) and the Camera search panel (see Camera Search Panel(see page 1130))
	No	
Access to Settings		

<table>
<tr><th>Parameters</th><th>Access level</th><th>Description</th></tr>
<tr><td rowspan="11">Archive settings
Detection settings
Device settings
Options settings
Programming setup
Show error messages
User Permission settings</td><td>Yes</td><td rowspan="11">• Configure the access permissions to the Settings tabs
Attention!
• If you select the Device access rights only value in the User Permission settings parameter, all users of the given role will have the permissions to change only the access permissions to the connected devices.
• If the Programming setup is not available for the user role, the user will not be able to use the created macros until the appropriate permissions are granted.
• Configure the access permissions to the system error messages
Attention!
• System error messages are displayed in real-time in the Layouts interface.
 
• Critical error messages in the system are displayed regardless of the Show error messages parameter.
• Critical errors include:
• geomap connection error;
• export error;
• domain disconnection error;
• insufficient network bandwidth error that is disabled by default. If necessary, you can enable it by adding the SHOW_INSUFFICIENT_BANDWIDTH_WARNING system variable with the TRUE value (see Creating system variable(see page 126)).</td></tr>
<tr><td>No</td></tr>
<tr><td>Yes</td></tr>
<tr><td>No</td></tr>
<tr><td>Yes</td></tr>
<tr><td>No</td></tr>
<tr><td>Yes</td></tr>
<tr><td>No</td></tr>
<tr><td>Yes</td></tr>
<tr><td>No</td></tr>
<tr><td>Yes</td></tr>
<tr><td>Device access rights only</td></tr>
<tr><td>No</td></tr>
<tr><td colspan="3">Additional</td></tr>
<tr><td>Comment</td><td>–</td><td>Specify additional information about the user, if necessary</td></tr>
<tr><td colspan="3">Supervisor confirmation</td></tr>
</table>

<table>
<tr><th>Parameters</th><th>Access level</th><th>Description</th></tr>
<tr><td>Supervisor for acccess to export</td><td>–</td><td rowspan="2">

If the administrator has to confirm the launch of export for users of this role (see Exporting frames and video recordings(see page 1306)), select the corresponding role in the list
If the administrator has to confirm the login of users of this role (see Starting the client(see page 138)), select the corresponding role in the list

Attention!

If a user belongs to several roles and each of these roles has its own supervisor, the user can receive confirmation to access export or authorization from a single administrator.
Note
For example, a user can belong to several roles at the same time: Operator 1, Operator 2, Operator 3.
Each of these roles has its own supervisor:

For Operator 1, the supervisor is Admin 1.
For Operator 2, the supervisor is Admin 2.
For Operator 3, the supervisor is Admin 3.

The user needs to receive confirmation from only one of the three administrators.
If a user belongs to a regular role (such as Operator) and an administrator role at the same time, supervisor confirmation isn't required, provided that the administrator role can be used as supervisor.
Note
For example, a user belongs to the Operator 1 and Admin 1 roles at the same time. If Admin 1 is selected as supervisor in the Supervisor confirmation settings, the user doesn't need to receive confirmation to access export or authorization.

</td></tr>
<tr><td>Supervisor for authorization in client</td><td>–</td></tr>
<tr><td colspan="3">Time schedule management</td></tr>
<tr><td>Time schedule</td><td>–</td><td>If you need to grant the users in this role permissions only for a certain period of time, select a time schedule from the list. These users will not be able to use their permissions outside of the selected time schedule</td></tr>
<tr><td colspan="3">Video walls management</td></tr>
<tr><td rowspan="2">Server</td><td>Yes</td><td rowspan="2">Configure the permissions to manage the connected clients' monitors by setting permissions for each server on Axxon domain. A user who has management permissions for the monitors of a particular server can manage monitors of any client connected to that server</td></tr>
<tr><td>No</td></tr>
</table>

2. On the **Groups** tab, configure the **Default permissions** (see Types of permissions to access hardware, archives and macros(see page 919)).

Note

When you create a new role, you cannot go to another tab until the role is saved. If you change any access permissions on any tab, you cannot go to another tab until the settings are saved.

Device	Access level	Description
Default permissions		Configure the default permissions to devices
Camera access	**No access**	No access to the device
	Archive only	User can view only the archive
	Live in Armed mode	User can view video from the camera only when the camera is armed
	Live	User can view live video from the camera. Other functions and device configuration are not available
	Live/Archive	User can view live and recorded video from the camera. User cannot arm/disarm/configure the camera
	Live/Archive/Control	All functions available. User cannot configure the device
	Live/Archive/Control/ Configure	All functions and device configuration available
Microphone access	**No access**	User cannot listen to live audio: • from the camera; • in the archive. Audio recording to an exported file is not available
	Live Audio	User can listen to live audio from the camera (the microphone must be turned on). User cannot listen to audio in the archive
	Live Audio and Archive	All functions are available
PTZ priority	**No access**	User cannot control the PTZ device
	Minimum level	User can control the PTZ device with the corresponding priority (see Controlling a PTZ camera(see page 1166))
	Low level	
	Medium level	
	High level	
	Maximum level	

3. On the **Groups** tab, configure the **Group permissions** if there are camera groups (see Configuring video camera groups(see page 265)).

Device	Access level	Description
Group permissions		Configure group access permissions to cameras (see Types of permissions to access hardware, archives and macros(see page 919))

Device	Access level	Description
Camera group	**Inherited**	Access permissions are inherited from the **Default permissions** tab → **Camera access**
	No access	No access to the device
	Archive only	User can view only the archive
	Live in Armed mode	User can view video from the camera only when the camera is armed
	Live	User can view live video from the camera. Other functions and device configuration are not available
	Live/Archive	User can view live and recorded video from the camera. User cannot arm/disarm/configure the camera
	Live/Archive/Control	All functions available. User cannot configure the device
	Live/Archive/Control/ Configure	All functions and device configuration available

4. If necessary, configure the access permissions to a specific device on the **Devices** tab.
To do this, select the access level for a specific device (see Types of permissions to access hardware, archives and macros(see page 919)).

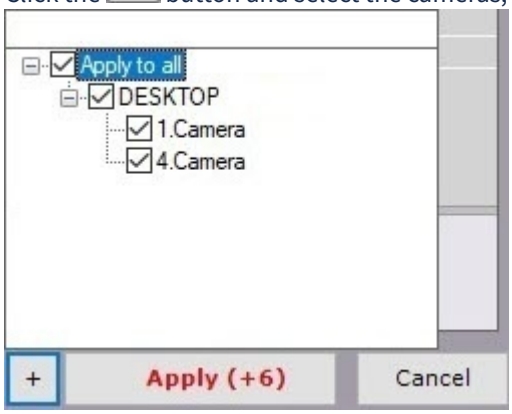
Access level	Device	Access level to device
Inherited	**Camera**	Access levels are inherited from the **Default permissions** tab → **Groups** or from the group permissions
	Microphone	Access levels are inherited from the **Default permissions** tab → **Groups**
	PTZ	
Archive only	**Camera**	Archive only
	Microphone	Live audio and archive
	PTZ	Medium level
Live in Armed mode	**Camera**	View in armed mode
	Microphone	Live audio
	PTZ	Medium level
Live	**Camera**	View live video
	Microphone	Live audio
	PTZ	Medium level

Access level	Device	Access level to device
Live/Archive	**Camera**	View live video and archive
	Microphone	Live audio and archive
	PTZ	Medium level
Live/Archive/Control	**Camera**	All functions, configuration isn't available
	Microphone	Live audio and archive
	PTZ	Medium level
Live/Archive/Control/Configure	**Camera**	All functions, configuration is available
	Microphone	Live audio and archive
	PTZ	Maximum level

You can specify the access level to a specific camera and extend it to other cameras. To do this, do the following:

a. Select the access level to a camera from a drop-down list on the **Devices** tab.

b. Click the + button and select the cameras, to which you want to specify the same access level.



c. Click the **Apply** button.

As a result, the specified access level is extended to the selected cameras.
To quickly select multiple cameras, press down the **Shift** key, select the first and last camera, to which you want to specify the same access level. The checkboxes set for all selected cameras when you select any of them.

> **Note**
>
> Similarly, you can extend the access levels to microphones, PTZ devices and archives.

5. Configure the **Default permissions** to domain archives or **Archive permissions** to a specific archive in the **Archives** section.

Device	Access level	Description
Default permissions		Configure the default access permissions to the archive (see Types of permissions to access hardware, archives and macros(see page 919))

Device	Access level	Description
Archive access	**No access**	No access to this archive
	Full access	Full access to the archive
Archive permissions		Configure the permissions to a specific archive (see Types of permissions to access hardware, archives and macros(see page 919))
Archive	**Inherited**	Access level is inherited from the **Default permissions** tab
	No access	No access to this archive
	Full access	Full access to the archive

6. Configure the **Default permissions** to macros or **Macro permissions** to a specific macro in the **Macros** section.

> **Attention!**
>
> Users outside the **admin** role can create macros, if they have the permissions to create them. They cannot use them until they have the permissions to use them.

Macro type	Access level	Description
Default permissions		Configure the default permissions to macros (see Types of permissions to access hardware, archives and macros(see page 919))
Macro access	**No access**	No access to macros
	Full access	Full access to macros
Macro permissions		Configure the access permissions to a specific macro (see Types of permissions to access hardware, archives and macros(see page 919))
Automatic rules	**Inherited**	Access level is inherited from the **Default permissions** tab
	No access	No access to macros
	Full access	Full access to macros
Event rules	**Inherited**	Access level is inherited from the **Default permissions** tab
	No access	No access to macros
	Full access	Full access to macros

Macro type	Access level	Description
Cycle rules	**Inherited**	Access level is inherited from the **Default permissions** tab
	No access	No access to macros
	Full access	Full access to macros

7. Click the **Apply**  button to save the changes.

A new role is created.

19.6.11.3 Copying a role

You can copy a role. To do this, do the following:

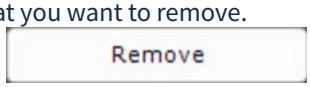
1. Click the name of the role that you want to copy.
2. Click the **Create** button.

A new role is created with the same parameters as the selected role.

> **Note**
>
> To create an empty user role with no parameters specified, select the **Roles** common group, and click the **Create** button.

19.6.11.4 Removing a role

To remove a role, do the following:

1. Select the role that you want to remove.
2. Click the **Remove**  button.

> **Note**
>
> You cannot delete a role if the user who is logged in belongs to that role.

3. Click the **Apply**  button.

The role is removed. All users who belong to this role are also removed.

19.6.12 LDAP catalogs

On the page:

- General information(see page 931)
- Configuring LDAP(see page 931)
- Copying the LDAP catalog(see page 932)

- Removing the LDAP catalog(see page 933)

19.6.12.1 General information

LDAP catalogs allow you to centralize the user management. *Axxon One* supports three operation scripts with LDAP:

- Manual registration of LDAP users: allows granting selectively the access to the LDAP catalog. The administrator manually creates the *Axxon One* user and links it with the LDAP account.
- Synchronization of LDAP users: allows adding users in bulk. The system loads users from the selected LDAP branch and automatically adds them to the selected *Axxon One* role.
- Automatic registration of LDAP users: allows any LDAP user to log in to *Axxon One* under one or multiple predetermined roles. After the system successfully checks the password, the user is automatically added to the configuration and gets the role specified in the **Role for automatic registration of user** field.

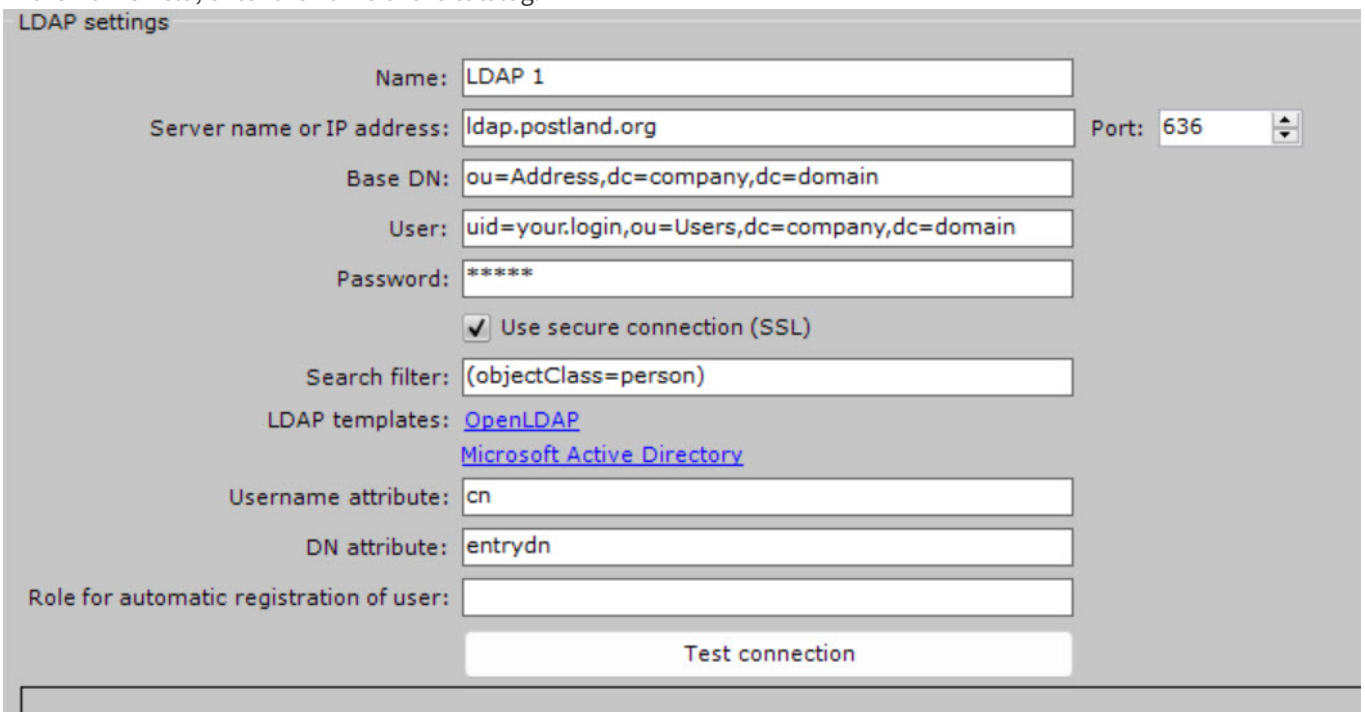
19.6.12.2 Configuring LDAP

To configure the LDAP catalog, do the following:

1. In the **LDAP catalogs** group, click the **Create...** button.



   The **LDAP 1** object is added in the system. On the right, the panel with connection settings to the **LDAP 1** catalog is displayed.
2. In the **Name** field, enter the name of the catalog.



3. In the **Server name or IP address** field, enter the address of the LDAP catalog server.
4. In the **Port** field, enter the connection port of the LDAP catalog server.
5. In the **Base DN** field, enter the Distinguished Name of the branch from which the data search starts.

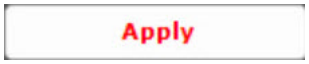
Attention!

- If LDAP users are located in multiple directories with the hierarchical structure, you cannot synchronize all users at the same time.
- To synchronize each user group in the DN branch, you must specify the path to the corresponding directory.
  For example, LDAP contains the **Employees** directory and the **Managers**, **Cashiers** and **Salesmen** subdirectories:
  - DN branches for synchronizing users within the **Managers** directory: ou=Managers,ou=Employees,dc=example,dc=com.
  - DN branches for synchronizing users within the **Cashiers** directory: ou=Cashiers,ou=Employees,dc=example,dc=com.
  - DN branches for synchronizing users within the **Salesmen** directory: ou=Salesmen,ou=Employees,dc=example,dc=com.

6. In the **User** field, enter the name of the user who has the read access from the base DN, in LDAP (RDN + DN) format.
7. In the **Password** field, enter the user password.
8. Set the **Use secure connection (SSL)** checkbox if you want to use a secure connection (SSL) when you connect to the LDAP catalog.
9. In the **Search filter** field, enter the filtering string of entries in the catalog.

Attention!

To upload users by groups, not by catalogs, you must use the **memberof** attribute in the filter. For example: (&(objectClass=user)(memberof=CN=YourGroup,OU=Users,DC=YourDomain,DC=com))

10. In the **Username attribute** field, enter the attribute from which the username is obtained. To search for users via the **sAMAccountName** attribute, you must enter the attribute in lowercase letters—**samaccountname**.
11. In the **DN attribute** field, enter the attribute from which the user's DN is obtained. You can use Microsoft Active Directory and OpenLDAP LDAP templates in the **LDAP templates** parameter to specify the username and DN attribute.
12. In the **Role for automatic registration of user** field, enter the role to which new users of the LDAP catalog are automatically added when they log in to *Axxon One*. If you don't specify a role, the automatic user creation for this catalog is disabled.
13. Click the **Apply** 

button.

As a result, the LDAP catalog is added to the system.

To test the connection, click the **Test connection** button. If the connection is successful, the form below is filled by the data of catalog users.

cn	entrydn
name1 surname1	cn=name1 surname1,ou=load,ou=Groups,dc=example,dc=com
name2 surname2	cn=name2 surname2,ou=load,ou=Groups,dc=example,dc=com
name3 surname3	cn=name3 surname3,ou=load,ou=Groups,dc=example,dc=com

Otherwise, an error message appears.

19.6.12.3 Copying the LDAP catalog

To copy a catalog with all settings, do the following:

1. Click the name of the catalog that you want to copy.
2. Click the **Create...** button.

As a result, the new catalog with identical settings is created. The default name of the new catalog is **LDAP 1**, **LDAP 2**, and so on, depending on the number of previously created catalogs.

19.6.12.4 Removing the LDAP catalog

To remove a catalog, do the following:

1. Click the name of the catalog that you want to remove.
2. Click the **Remove** Remove button.

As a result, the selected catalog is removed.

19.6.13 Configuring local users

On the page:

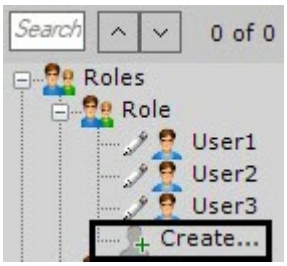
- Registering local users(see page 933)
- Adding local users to a role(see page 935)
- Locking a local user(see page 937)
- Removing a local user(see page 937)

General information about users(see page 917)
Roles(see page 920)

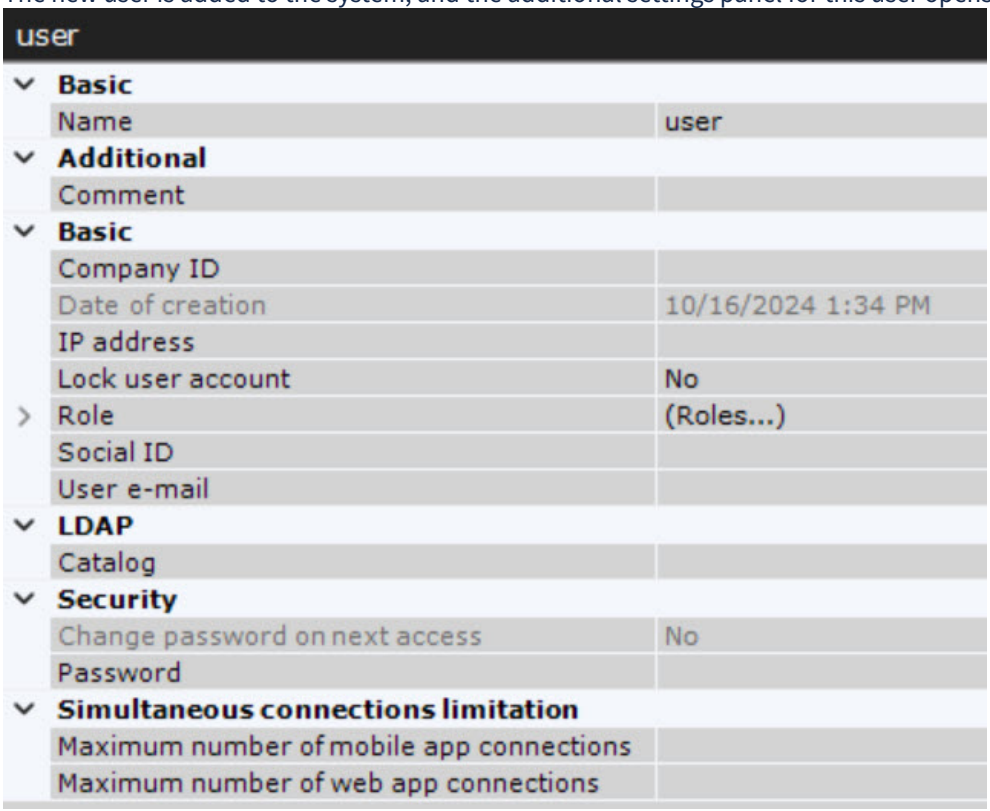
19.6.13.1 Registering local users

To register a local user, do the following:

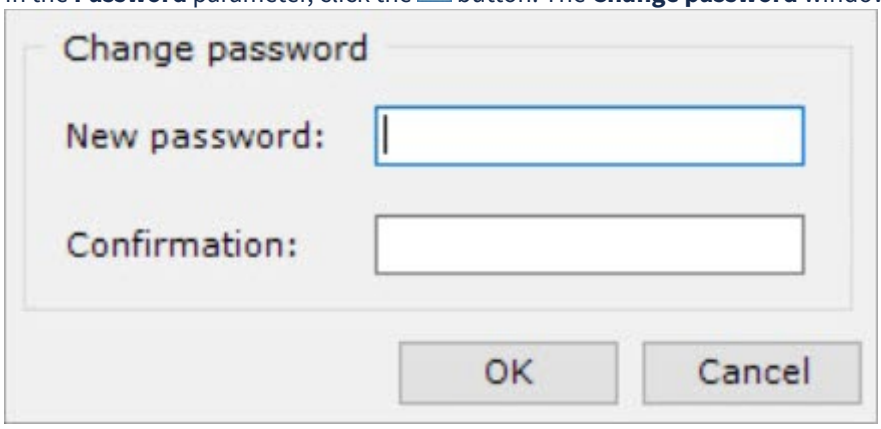
1. Click the **Create** link at the end of the list of a role, to which you want to add a user.



The new user is added to the system, and the additional settings panel for this user opens on the right.



2. In the **Name** parameter, enter a user name.
3. In the **Security** settings group, enter a password:
   a. In the **Password** parameter, click the button. The **Change password** window opens.

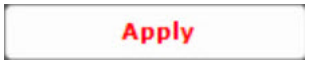


   b. In the **New password** field, enter a user password (see Security policy(see page 939)).
   c. In the **Confirmation** field, reenter the password.
   d. Click the **OK** button to save the settings.
4. In the **Change password on next access** parameter, select the **Yes** value if you want to change the specified password upon the next connection to the Client.
5. In the **Maximum number of mobile app connections** parameter, specify the maximum number of connections if you want to limit the number of connections for a user via the mobile Client (see AxxonSoft mobile Clients. Documentation[352]).
6. In the **Maximum number of web app connections** parameter, specify the maximum number of connections if you want to limit the number of connections for a user via the Web-Client (see Starting and logging in to the Web-Client(see page 1326)). The parameter also sets a maximum number of RTSP stream requests for this user.

Attention!

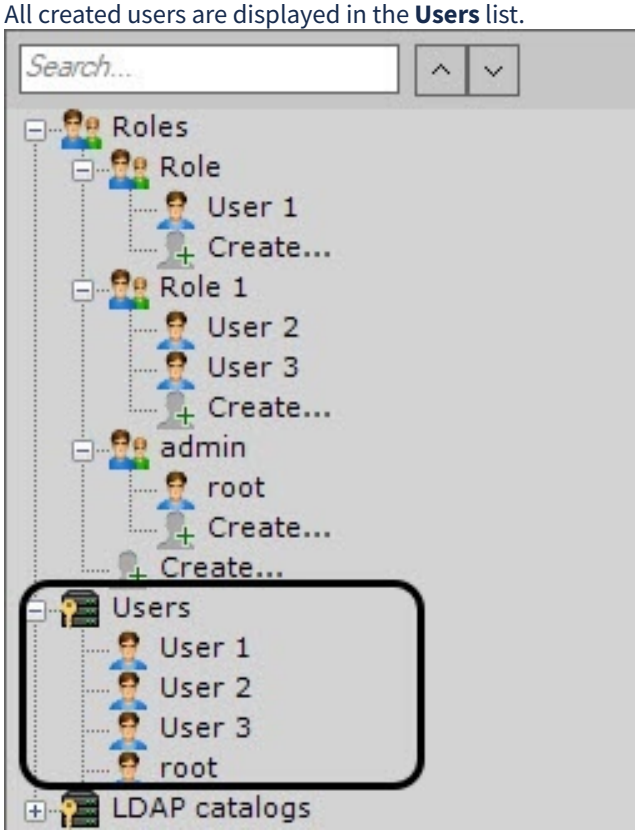
352 https://docs.axxonsoft.com/confluence/spaces/mobile/pages/260902390/AxxonSoft+mobile+Clients.+Documentation

Limiting the number of connections for the **Maximum number of mobile app connections** and **Maximum number of web app connections** parameters takes effect after you restart the Server (see Starting and stopping Axxon One software(see page 137)).

7. If necessary, enter additional information about the user in the corresponding fields: **User e-mail**, **IP address**, **Company ID**, **Social ID**.
8. Click the **Apply** 

button.

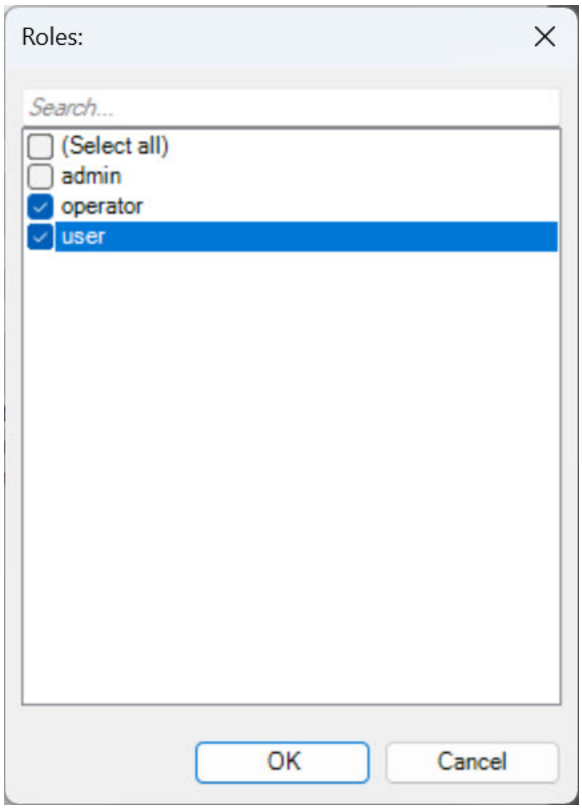
A local user has been registered and added to a role.
All created users are displayed in the **Users** list.



19.6.13.2 Adding local users to a role

You can add a local user to a role or several roles:

1. Using the **Roles** parameter:
   a. In the **Users** list, select a user, who you want to add to a different role.
   b. In the **Roles** parameter, in the user settings, click the ... button.
   c. In the window that opens, set the checkboxes next to the roles, to which you want to add the user. You can select one or several roles.



d. Click the **OK** button.

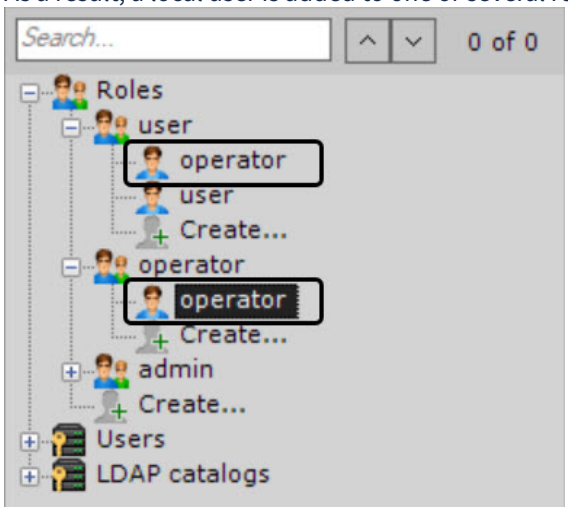
e. Click the **Apply** Apply button.

2. By dragging and dropping[353]:
   a. In the **Users** list, select a user, who you want to add to a different role.
   b. Move the user to the required role.

> **Note**
>
> To copy the user to another role, press the **Ctrl** key and move the user to the required role.

   c. Click the **Apply** Apply button.

As a result, a local user is added to one or several roles.

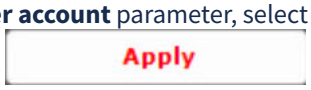


353 https://en.wikipedia.org/wiki/Drag_and_drop

User access permissions are summarized from all roles, to which the user belongs, that is, the permissions with the highest access to the configuration of *Axxon One* components are selected from all roles.

19.6.13.3 Locking a local user

To lock an account of a local user, do the following:

1. Select a user from the **Users** list or select a user of a specific role.
2. In the **Lock user account** parameter, select the **Yes** value.
3. Click the **Apply** 

button.

As a result, the selected user is locked. Locked users cannot log in. To unlock the user, in the **Lock user account** parameter, select the **No** value (see Registering local users(see page 933)).

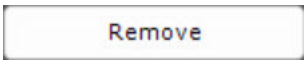
19.6.13.4 Removing a local user

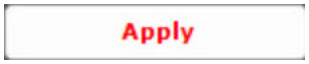
To remove a local user from the tree, do the following:

1. Select the user that you want to remove.

   Attention!

   You cannot remove a user you are logged in as.

2. Click the **Remove** 

button.
3. Click the **Apply** 

button.

As a result, a local user is removed.

19.6.14 Configuring LDAP users

On the page:

- Registering an LDAP user(see page 937)
- Synchronizing LDAP users(see page 938)
- Locking an LDAP user(see page 939)
- Removing an LDAP user(see page 939)

General information about users(see page 917)
Roles(see page 920)
LDAP catalogs(see page 930)

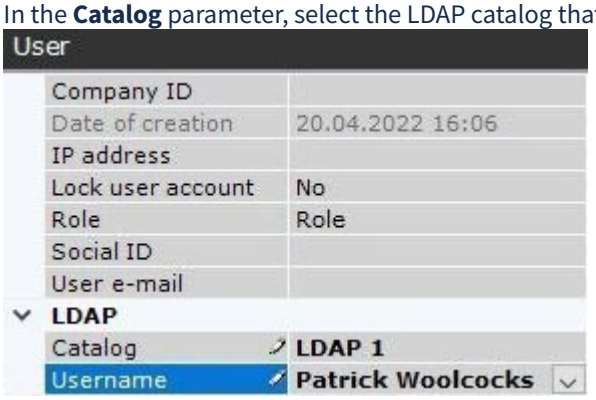
19.6.14.1 Registering an LDAP user

Note

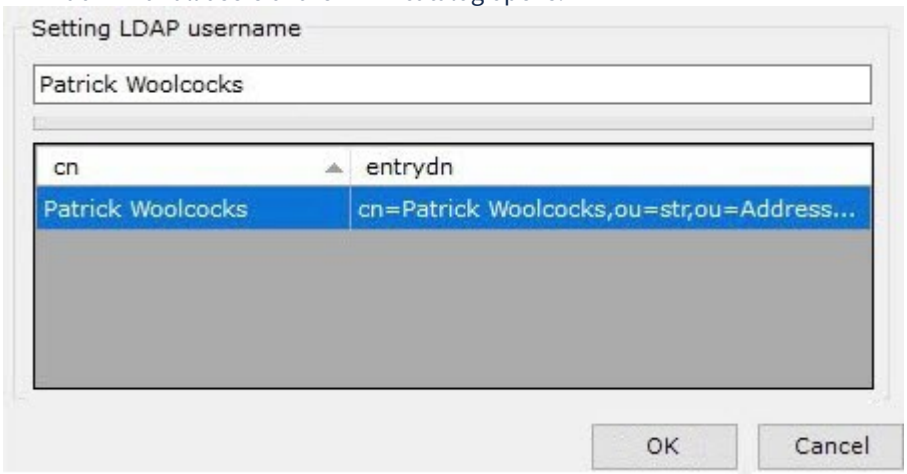
When you register an LDAP user, you must select the username from the specified LDAP catalog. You don't need to specify the password.

To register an LDAP user, do the following:

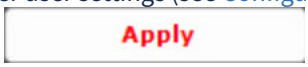
1. Add a user to the system (see Configuring local users(see page 933)).
2. In the **Catalog** parameter, select the LDAP catalog that contains the user (see LDAP catalogs(see page 930)).



3. In the **Username** field, click the button.
   A window with all users of the LDAP catalog opens.



4. Use the search at the top of the window to find a user or select a user from the list manually.
5. Click the **OK** button.
6. Specify the other user settings (see Configuring local users(see page 933)).
7. Click the **Apply** button.

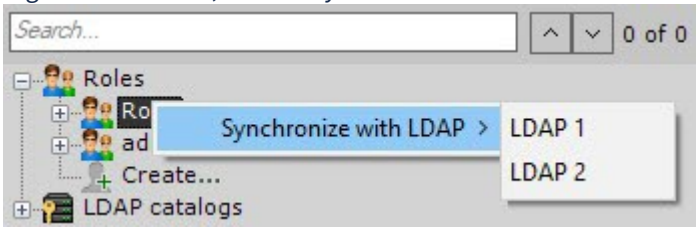


As a result, the user is registered and added to a specific role. When an LDAP user connects, the username specified in the *Axxon One* settings and the password from the LDAP catalog are used.

19.6.14.2 Synchronizing LDAP users

To add users from an LDAP catalog to a specific role, do the following:

1. Right-click the role, to which you want to add users.



2. Select **Synchronize with LDAP**.
3. Select the required LDAP catalog (see LDAP catalogs(see page 930)).

All users in the selected catalog are added to the selected role. By default, the username matches the login in the LDAP catalog.

19.6.14.3 Locking an LDAP user

To lock an account of an LDAP user, do the following:

1. Select a user from the **Users** list or select a user of a specific role.
2. In the **Lock user account** parameter, select the **Yes** value.
3. Click the **Apply** button.

As a result, the selected user is locked. Locked users cannot log in. To unlock the user, in the **Lock user account** parameter, select the **No** value (see Registering an LDAP user(see page 937)).

19.6.14.4 Removing an LDAP user

To remove an LDAP user, do the following:

1. Select the user that you want to remove.

   Attention!

   You cannot remove a user you are logged in as.

2. Click the **Remove** button.
3. Click the **Apply** button.

As a result, an LDAP user is removed.

Attention!

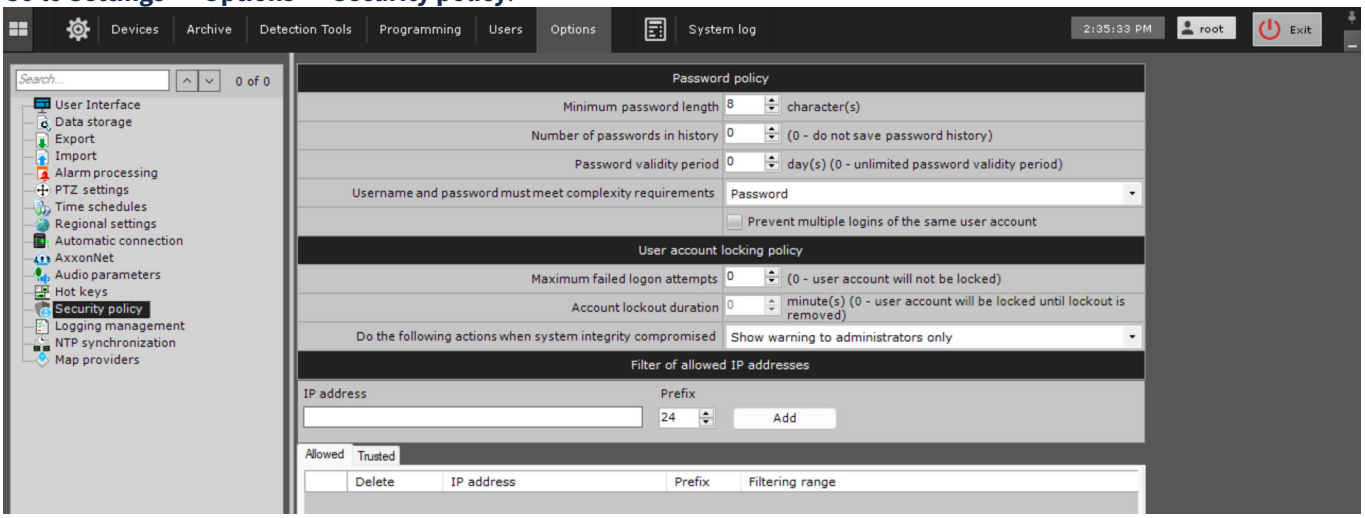
When you remove a user on the LDAP Server, the user is also removed in *Axxon One*.

19.6.15 Security policy

Configuring automatic response when Axxon One integrity check fails(see page 1008)
IP address filtering configuration(see page 1046)

To configure the user security policy, do as follows:

1. Go to **Settings** → **Options** → **Security policy**.



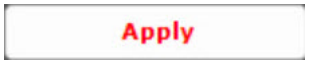
2. In the **Minimum password length** field, set the minimum password length.
3. In the **Number of passwords in history** field, set the number of the most recent passwords for each user to be stored in history. **0**—do not store password history. If this value is different from **0**, the passwords that are stored in history cannot be used when setting a new password.
4. In the **Password validity period** field, set the password validity period in days. After the validity period expires, the user is prompted to set a new password. **0**—the password validity period never expires.
5. In the **Username and password must meet complexity requirements** field, select the positions to meet complexity requirements:
   a. **Nothing**.
   b. **Password only**.
   c. **Username and password**.

   Attention!

   ### The requirements:

   - **Username**:
     - must contain at least six characters and at least two digits;
     - must not include common role names, such as: user, admin, administrator, administrator1, root, super, superuser, supervisor.
   - **Password** must contain at least eight characters that must meet at least three requirements for passwords containing less than 10 characters and at least two requirements for passwords containing 10 or more characters:
     - At least one uppercase letter;
     - At least two lowercase letters;
     - At least three digits;
     - At least four special characters: **. , : ; ! ? \ | / ( ) [ ] { } + − = < > " @ ' # * $ ` % ^ & _ ~**.
6. If you need to limit the number of sessions per user to one, set the **Prevent multiple logins of the same user account** checkbox. This requirement also applies to Web-Clients and mobile Clients.
7. In the **Maximum failed logon attempts** field, set the number of failed logon attempts to lock the user's account. **0**—no account locking on incorrect passwords. If this value is different from **0**, when a new user is created, they are given the name **User** with a random number from 10000 to 99999. The name can be changed in the user settings.

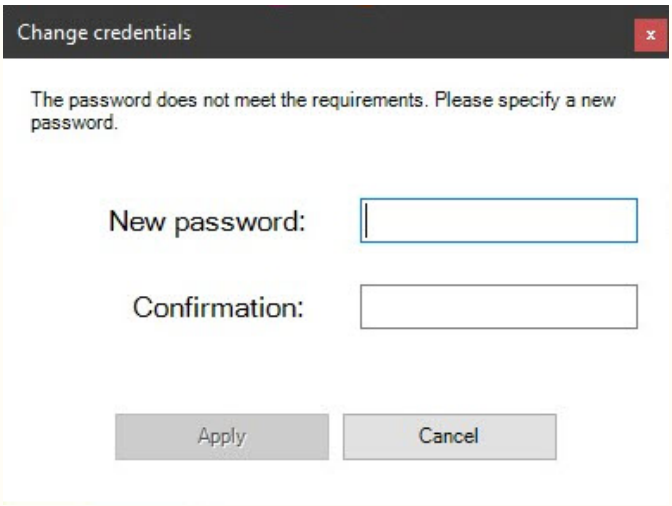
   Attention!

   When unlocked, the user is offered only one authentication attempt. A successful authentication resets the failed attempts counter to zero, otherwise the user account is locked again.
8. In the **Account lockout duration** field, set the duration of user account lockout on failed login attempts in minutes. **0**—the account can be unlocked by the administrator only (see Configuring local users(see page 933), Configuring LDAP users(see page 937)).
9. Click the **Apply**  button.

Configuring the user security policy is complete.

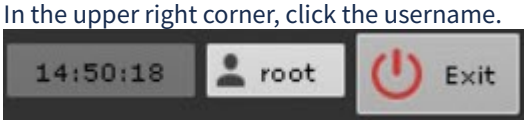
Attention!

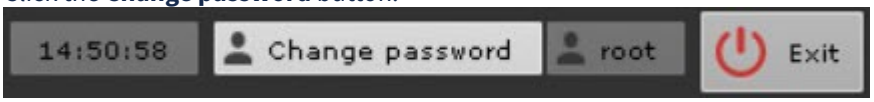
If any user accounts created in your system before you applied changes in security policy are incompatible with the new requirements, the users are prompted to change their credentials upon their next login.

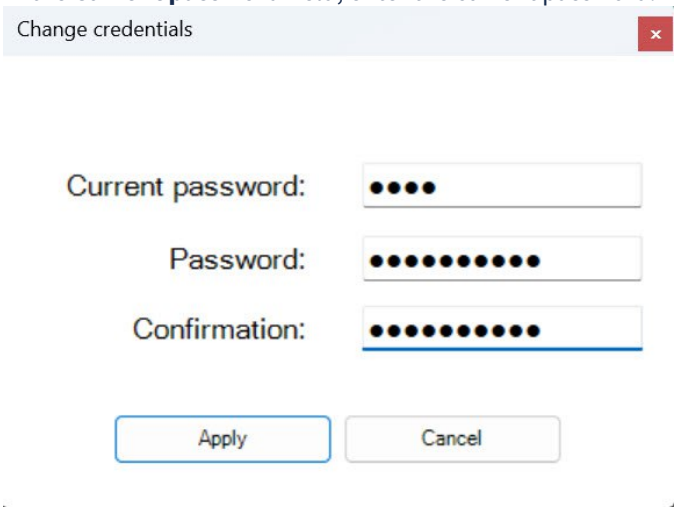


19.6.16 Changing user password

You can change user passwords in *Axxon One* with a few clicks. To change a password, do the following:

1. Go to the **Settings** interface by clicking the  button.
2. In the upper right corner, click the username.


3. Click the **Change password** button.


4. In the **Current password** field, enter the current password.


5. In the **Password** field, enter a new password (see Security policy(see page 939)).
6. In the **Confirmation** field, enter a new password again.
7. Click the **Apply** button.

As a result, the password of the current user is changed. Next time the user logs in, they must use a new password.

19.7 Configuring layouts

Axxon One allows users to configure custom layouts.

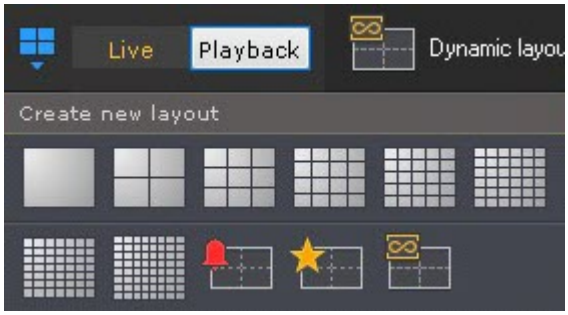
Separate layouts are configured for each user of the system. To configure layouts, log into any Server of Axxon-domain under the appropriate user name and configure the layouts for that user. Layouts created for the user will be available when you connect from any Client to any Server in the Axxon-domain. The layout is selected for display and editing only for a specific user – other users of the system will not see any changes on their screen.

> **Note**
>
> Creation, editing, copying, and deletion of layouts are available to users that belong to roles with the **Changing custom layouts** component activated (see General information about users(see page 917)).

After you configure user's layouts, you may limit user's privileges.

19.7.1 Creating and deleting layouts

Layouts are created based on standard layout types. To create a new layout, click the  button in the context menu and select one of the standard layouts.



This takes you to layout editing mode (see Switching to layout editing mode(see page 945)).

> **Note**
>
> A new layout is also created when you select a video camera that is not displayed in any previously created layout (see Object panel(see page 1133), Camera Search Panel(see page 1130)).
> If you do this, layout editing mode does not start and the layout will not be saved.

The newly created layout will be named automatically. You can rename it later.

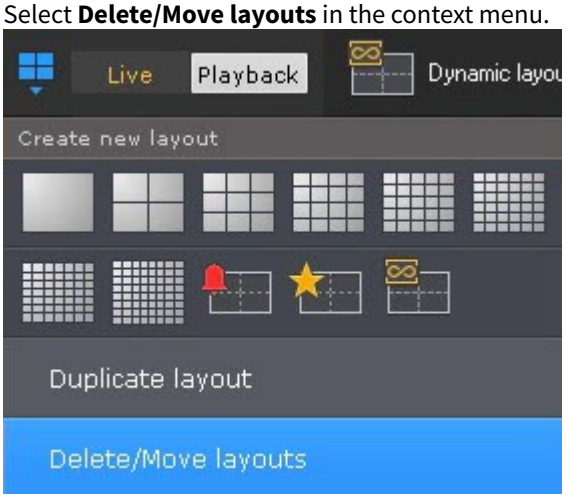
To save the layout, exit layout editing mode and save changes (see Exiting Layout Editing mode(see page 972)).

The layout will then be placed at the beginning of the list in the layout panel.

If you do not save changes and exit, the layout will not be saved.

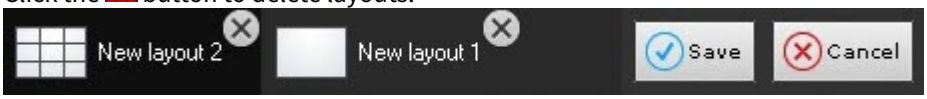
To delete layouts:

1. Select **Delete/Move layouts** in the context menu.



> **Note**
>
> You can not access it in the Layout Editing mode though.

2. Click the button to delete layouts.



3. Click **Save**.

You will exit Manage Layouts mode and save changes.

The layouts have now been deleted.

19.7.2 Rename Layouts

To rename a layout, double left-click and enter a new name.



You can rename layouts in Manage Layouts mode either.

19.7.3 Layouts grouping

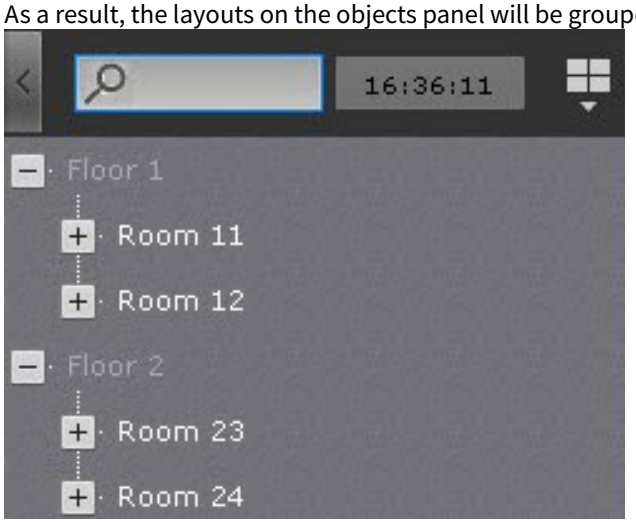
> Rename Layouts(see page 943)

In *AxxonOne* you can group layouts on the objects panel (see Object panel(see page 1133)). To group layouts:

1. Double-click on the layout name.
2. Use the "\" symbol in the layout name.



As a result, the layouts on the objects panel will be grouped.



19.7.4 Reorder Layouts

To reorder layouts in the ribbon:

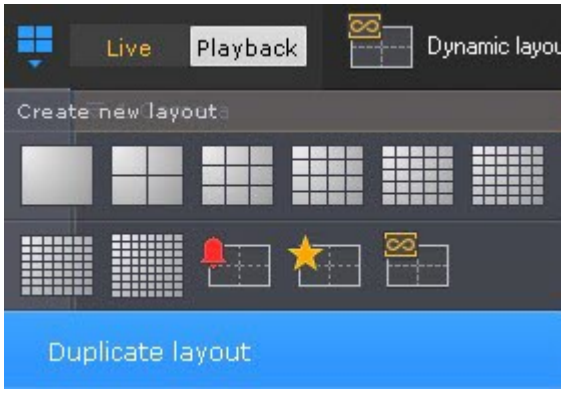
1. Go to Manage Layouts mode (see Creating and deleting layouts(see page 942)).
2. Drag & drop layouts.
3. Click **Save**.

You have now reordered layouts.

19.7.5 Layout copying

You can copy existing layouts.

Select the layout that you want to copy. Click the  button to open the context menu and select **Duplicate layout**.



An identical layout is then created.

> **Note**
>
> Layouts cannot be copied while in editing mode.

19.7.6 Editing layouts

Every layout consists of cells that are windows in which either video cameras or information boards can be placed.

In *Axxon One*, there are 7 types of information boards that can be added to the layout:

1. Alarms Board.
2. Events Board.
3. Status Board of the Servers and cameras.
4. Statistics Board.
5. Dialog Board.
6. Web Board.
7. Devices Board.

Information boards are available on the layouts panel in the editing mode.

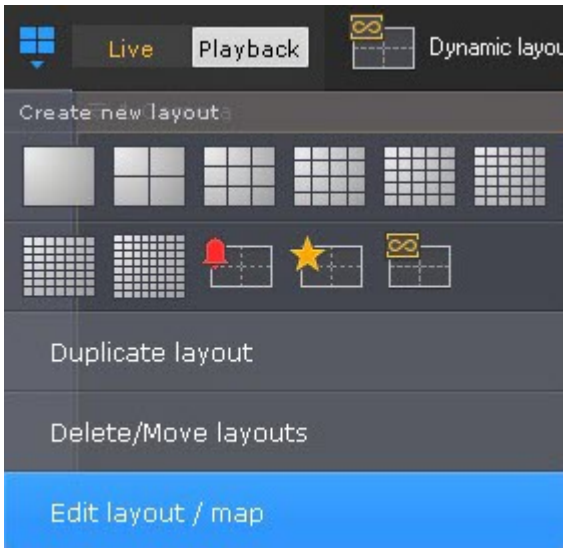


When a camera is added to a cell, a surveillance window appears.

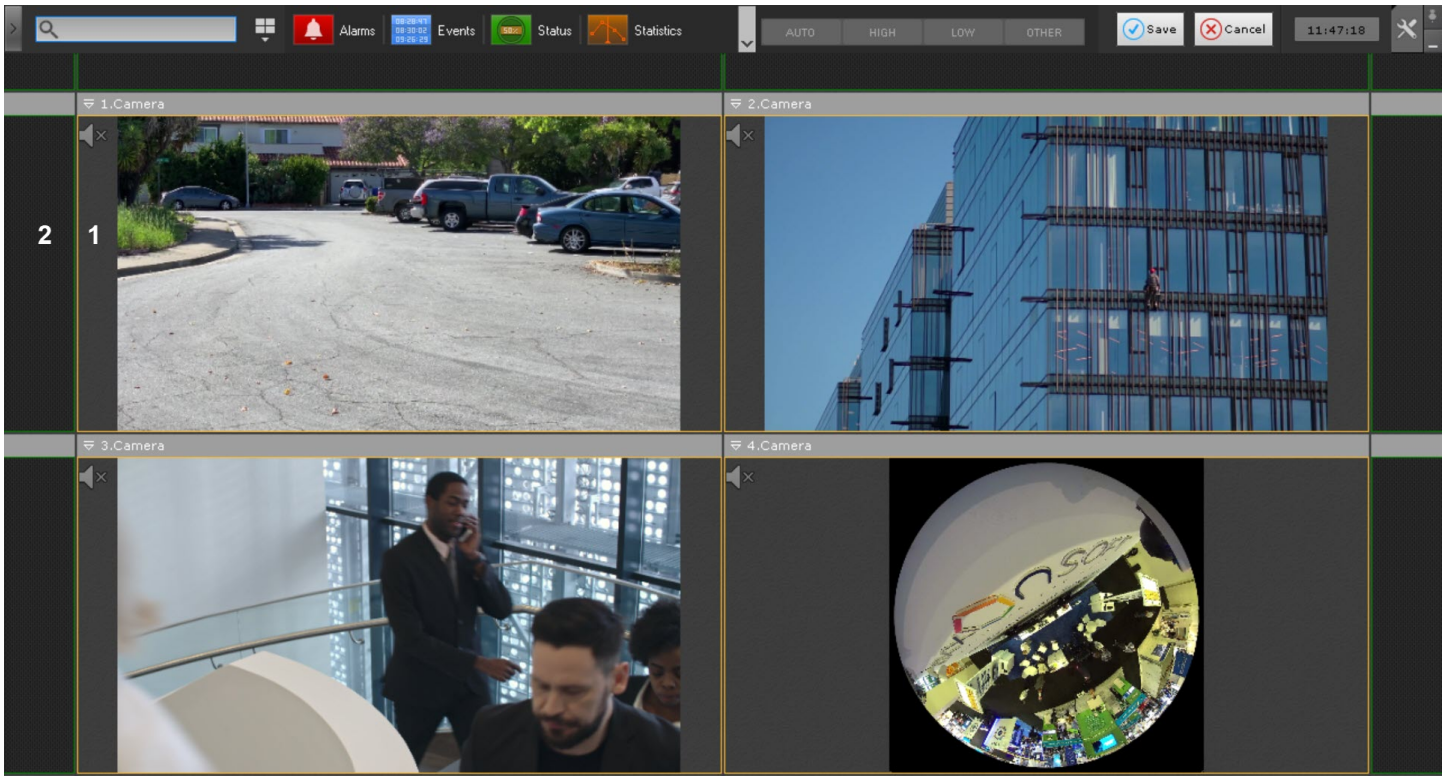
19.7.6.1 Switching to layout editing mode

You can switch to the layout editing mode either automatically when creating a new layout (see Creating and deleting layouts(see page 942)), or manually using the **Edit layout/map** item of the context menu of the layouts panel. The context menu is opened when you click the  button.

> **Note**
>
> To use the layout editing mode, you must have the required permissions (see General information about users(see page 917)).



In the layout editing mode, the space is divided by a grid into cells of the surveillance windows (**1**).



On the edge of the layout there are fragments of cells (**2**), which are parts of the ordinary empty cells and allow adding new cells to the layout (see Adding new cells to a layout(see page 946)).

19.7.6.2 Selecting a layout for editing

To edit a layout, do as follows:

1. Go to the layout you want to change (see The Layouts panel(see page 1129)).
2. Switch to the Layout Editing mode (see Switching to layout editing mode(see page 945)).

As a result, an interface for editing the selected layout will be displayed.

19.7.6.3 Configuring layout cells

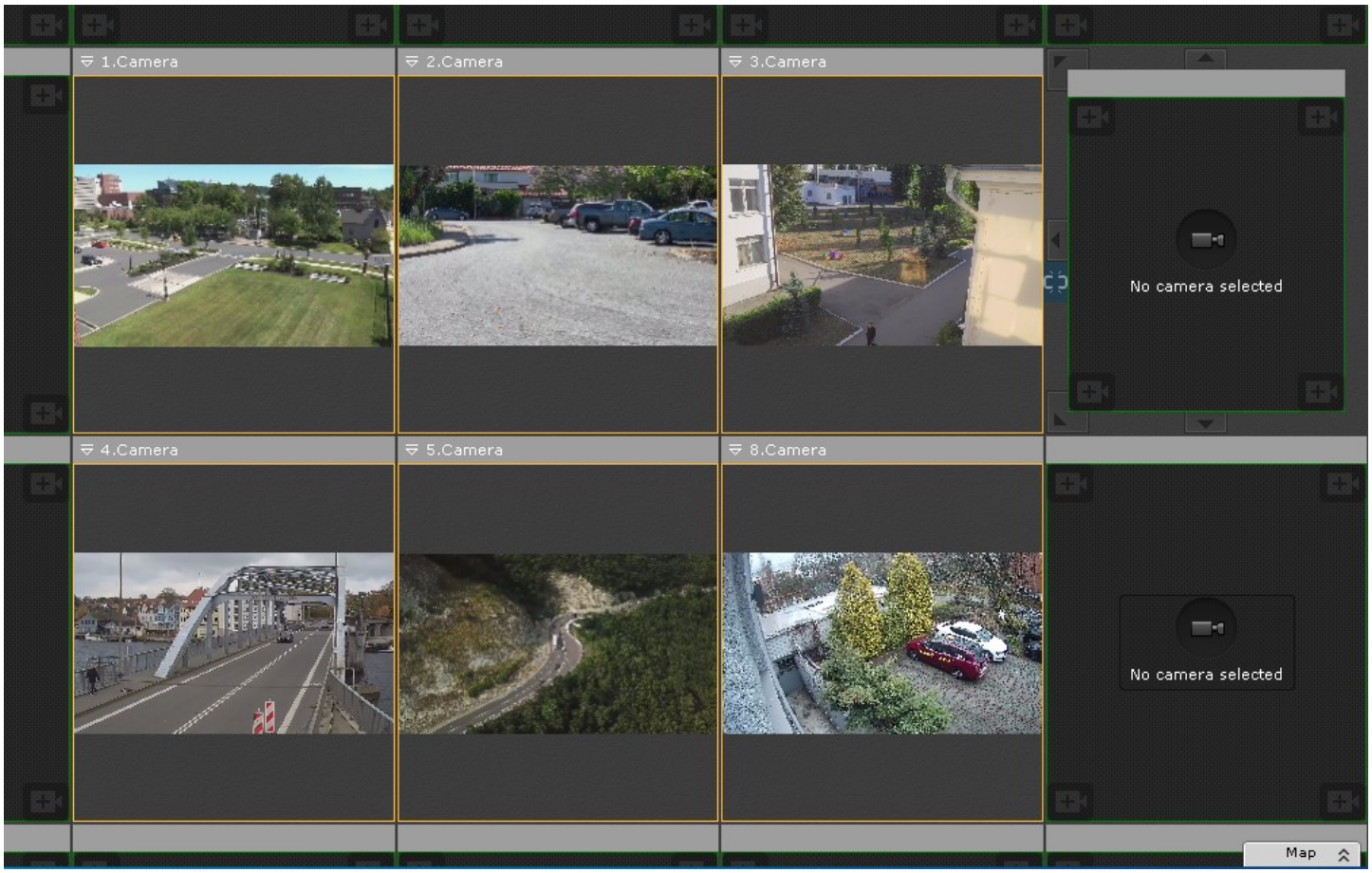
19.7.6.3.1 Adding new cells to a layout

Switching to layout editing mode(see page 945)

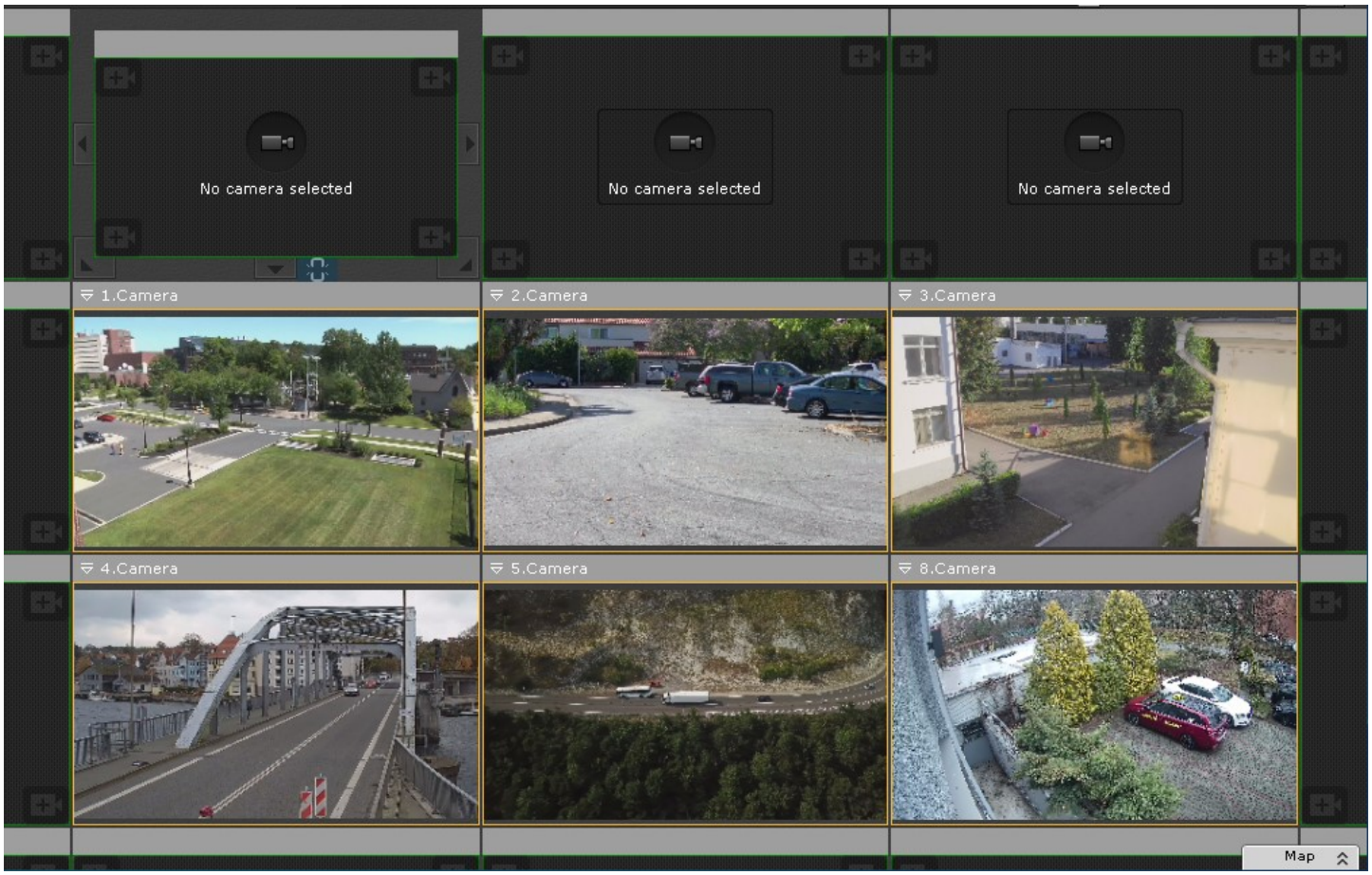
You can add new cells to a layout in one of three ways:

1. Drag a non-empty cell onto a grid square fragment (see Moving cells(see page 950)).
2. Left-click a grid square fragment and resize it (see Resizing cells(see page 949)).
3. Left-click a grid square fragment and select a video camera or information board in it (see Adding cameras to cells(see page 950)).

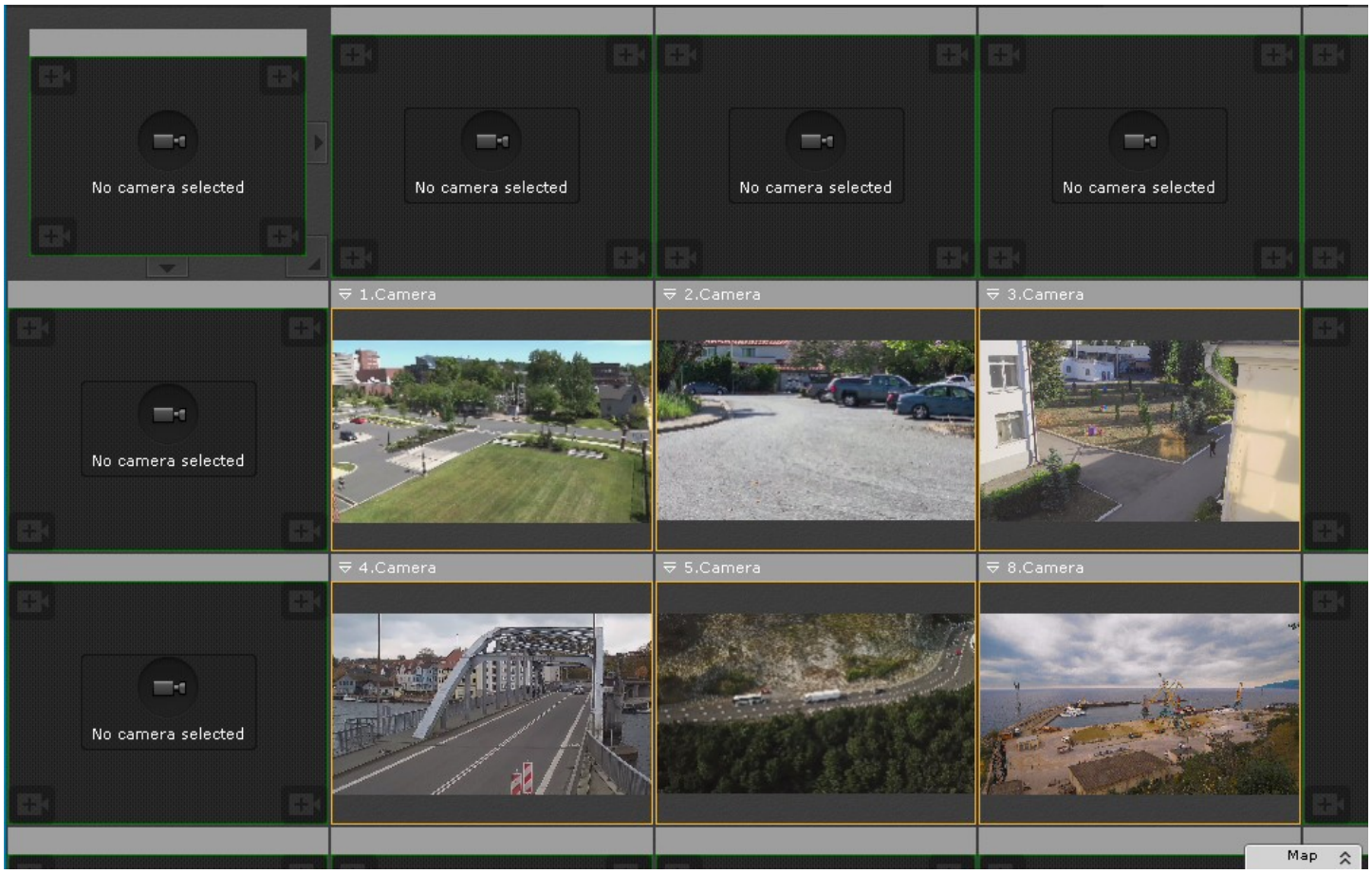
Cells are added in rows. For example, when editing a six-square (3*2) layout, a column of two grid squares is added when a fragment is chosen on the left or right side of the screen.



A row of three squares is added when you select a fragment from the upper or lower part of the screen.



When you select a corner fragment, both a row and column are added.



19.7.6.3.2 Resizing cells

Switching to layout editing mode(see page 945)

To resize a cell, use the buttons on its edges.

Button	Action	Button	Action
	Increases the cell by a column to the left and row above		Increases the cell by a column to the right and row below
	Increases the cell by a column to the left		Increases the cell by a column to the right
	Increases the cell by a column to the left and row below		Increases the cell by a column to the right and row above
	Increases the cell by a row below		Increases the cell by a row above

When you point the cursor at any button, a darkened area that shows the size of the cell after resizing is displayed.



You can also select and resize any tile. To resize, click the button on the cell border and expand/contract the cell as you wish. You can resize the cell only in one direction. You cannot resize the cell in two directions with the corner buttons.

If you expand a tile, the neighboring tiles contract and vice versa.

Note

If the cell is in the outermost top/bottom row or left/right column, you cannot resize it by clicking and dragging the borders. You should add an extra cell to the current row or column first.

Attention!

If you expand the cell over the next one or several cells, they are deleted.

19.7.6.3.3 Moving cells

Switching to layout editing mode(see page 945)

To move a cell, left-click the frame of the grid square fragment and drag it to the necessary position.

The cells are then switched: the contents of the previously occupied cell are moved to the location of the cell being moved.

If a cell is moved to a grid square fragment, new cells are added to the layout (see Adding new cells to a layout(see page 946)).

19.7.6.3.4 Adding cameras to cells

Switching to layout editing mode(see page 945)

You can add a camera to a cell in one of three ways:

1. Using the **Objects Panel**.
2. Using the **Camera Search Panel**.
3. Using an interactive map.

You can add a camera to an empty cell or to a cell containing an information panel or another camera.

Note

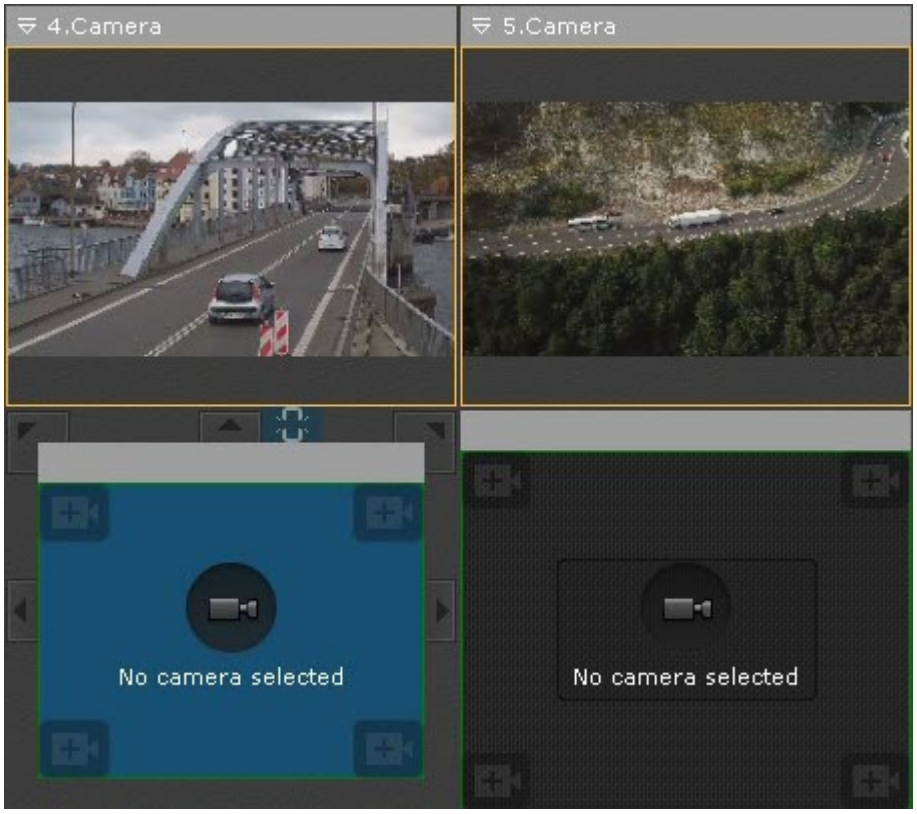
You can add cameras from any domain to the layout (see Camera Search Panel(see page 1130)).
You can add the same camera to several cells of the same layout.

Adding a camera using the Objects Panel

To add a camera using the **Objects Panel**, do the following:

1. Click the mouse button to switch the cell to the active mode.
2. Click a camera in the **Objects Panel** (see Object panel(see page 1133)).

You can also drag a camera to a cell. An empty cell with a cursor in it is highlighted when you drag the camera.



To add multiple cameras to a layout, do the following:

1. In the **Objects panel**, use the **Ctrl** or **Shift** key to select several cameras.
2. Drag the cameras to the layout.

You can use the **Objects Panel** for adding all cameras within a group or a domain to the layout. To do it, do the following:

1. Left-click the group/domain on the panel.
2. Drag the group/domain to the layout.

> **Note**
>
> Cameras that are currently disabled won't be added to the layout.

Adding a camera using the Camera Search Panel

To add a camera to a cell, do the following:

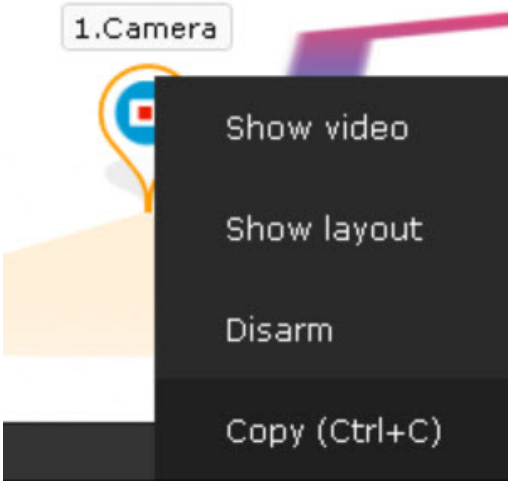
1. Click the mouse button to switch the cell to the active mode and select a camera from the list in the **Camera Search Panel** (see Camera Search Panel(see page 1130)).
2. Select a camera from the list in the **Camera Search Panel** and drag it to the layout.

Adding a camera using an interactive map

You can add a camera to a cell in one of the following ways:

1. Select a camera icon on the map and drag it to a cell (see Adding video cameras(see page 985)).

2. In live mode, right-click the camera icon and click the **Copy** button.



Then click an empty cell or a cell containing an information panel or another camera.

> **Note**
>
> Changes aren't saved and the original layout will be available when you switch layouts or the next time you start the Client.

19.7.6.3.5 Adding information boards to cells

> Switching to layout editing mode(see page 945)

You can add information boards to cells in two ways:

1. Activate the cell (by clicking it) and select the information board that you want to add to the cell.
2. Click an information board to select it. Drag the information board to the layout cell and then release the mouse.

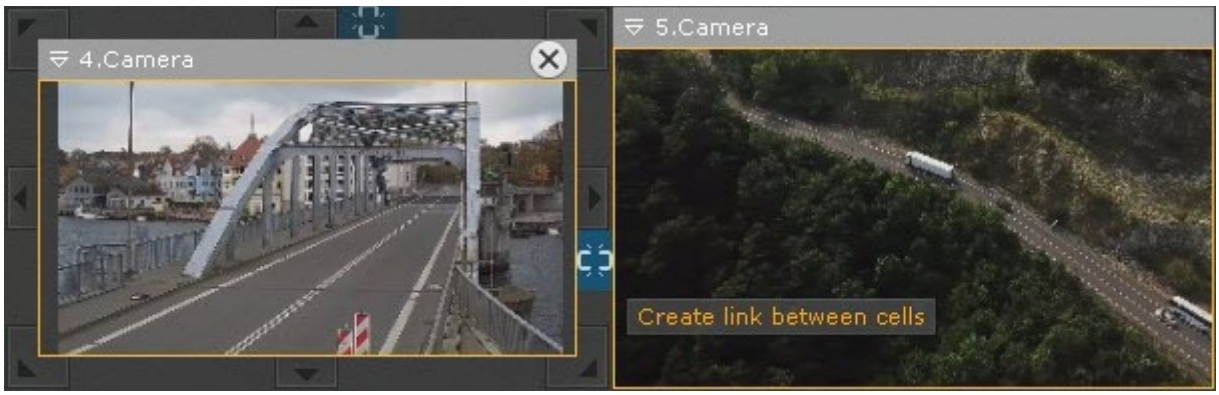
You can add an information board to an empty cell or to a cell that contains a camera or other information board.

> **Note**
>
> After you add an information board to the cell, you should configure it (see Configuring information boards(see page 961)).

19.7.6.3.6 Linking cells

> Switching to layout editing mode(see page 945)

You can link cells. To create a link, select cells and click the button on the border. To delete the link, click .



You can create the following links:

1. A Surveillance window to a Surveillance window. You can link cells from the same row only.
   This way you can hide cell borders in live view and have a virtually merged FOV from several cameras.


2. An information board to a Surveillance window. This way you can link adjacent cells, up/down and across. A single information board can be linked with multiple cameras. If a Surveillance window is linked to an **Event Board**, you can click an event and switch to the Archive mode (see Switching a camera linked to an Event Board to the archives(see page 1267)).
3. You can also link two information panels or empty cells to panels (see Configuring Alarmed cameras layout(see page 975)).

All linked cells have a different scaling logic (see Scaling the Surveillance window(see page 1140)).

19.7.6.3.7 Merging videos from adjacent cameras (FrameMerge)

Switching to layout editing mode(see page 945)

FrameMerge stitches video feeds from neighboring cameras into a single panoramic view.

The resulting video is available:

- as live video feeds,
- as recorded footage,
- as exported video files.

> **Attention!**
>
> The maximum horizontal resolution of exported video is 8184 pixels.

To use this option, cameras and their video feeds must match the following conditions:

1. Install cameras as close to each other as possible.
2. No more than 3 cameras' feeds can be merged horizontally.
3. The cameras must have:
   a. pixel resolution of no less than 640 * 480;
   b. identical aspect ratio for the high and low bitrate streams;
   c. identical parameters of lenses.
4. You have to synchronize time on all cameras (for example, via NTP protocol).
5. Camera jitter must not result in more than 1% image shift in both directions.
6. The recommended image overlap across adjacent cameras is 20–25 percent of image width.
7. Camera images must be aligned vertically.

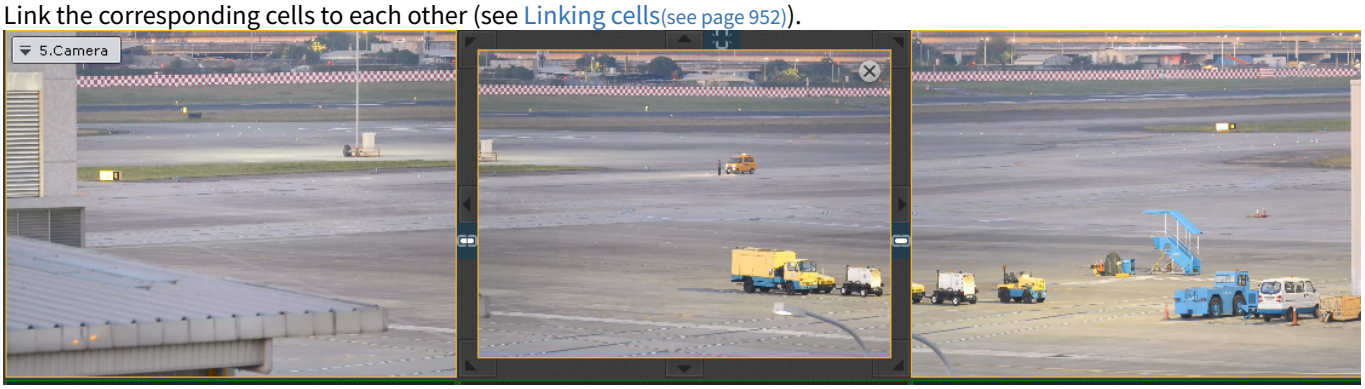
For best results in merging, ensure the following:

1. Daylight illumination.
2. Sufficient light to capture small details.
3. No over-exposed areas within the scene.
4. Minimum video noise and compression artifacts.
5. Moving objects must be visually separated within the FOV.
6. Same set of objects in overlapping areas.

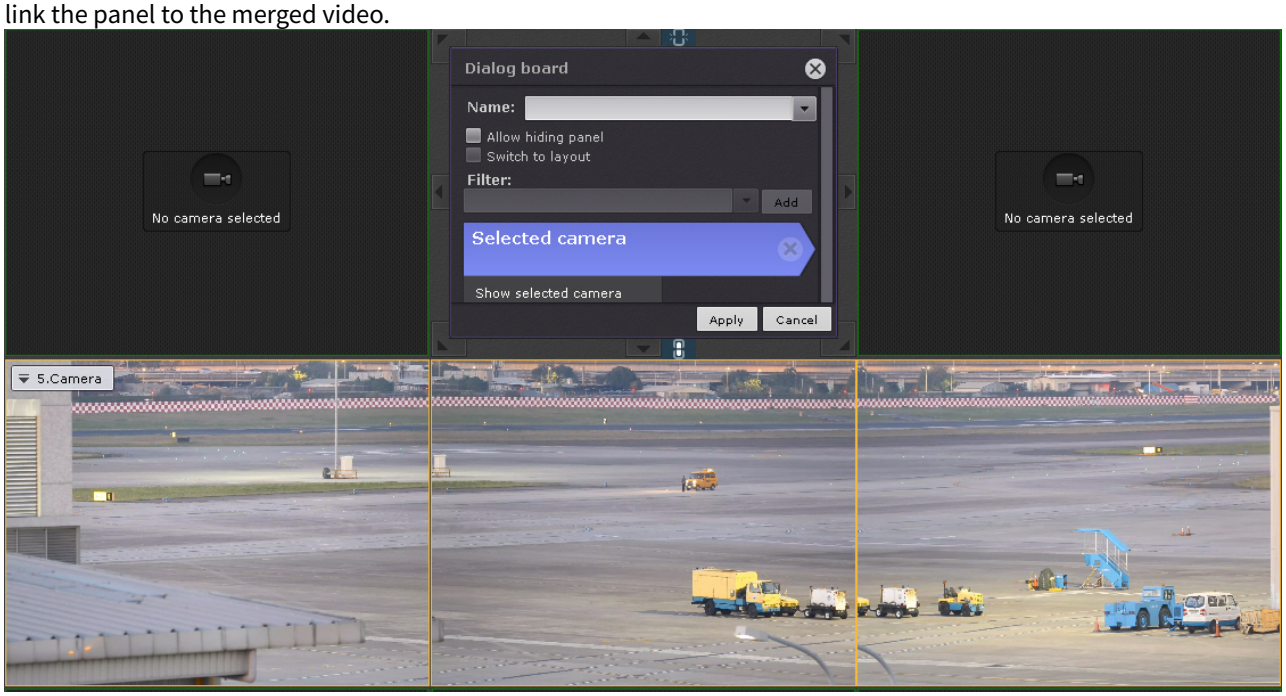
> **Attention!**
>
> If overlapping areas are plain monochrome (e.g. the sky), no merging is possible.

To configure video merging, do the following:

1. Place the cameras horizontally within the layout.
2. Link the corresponding cells to each other (see Linking cells(see page 952)).



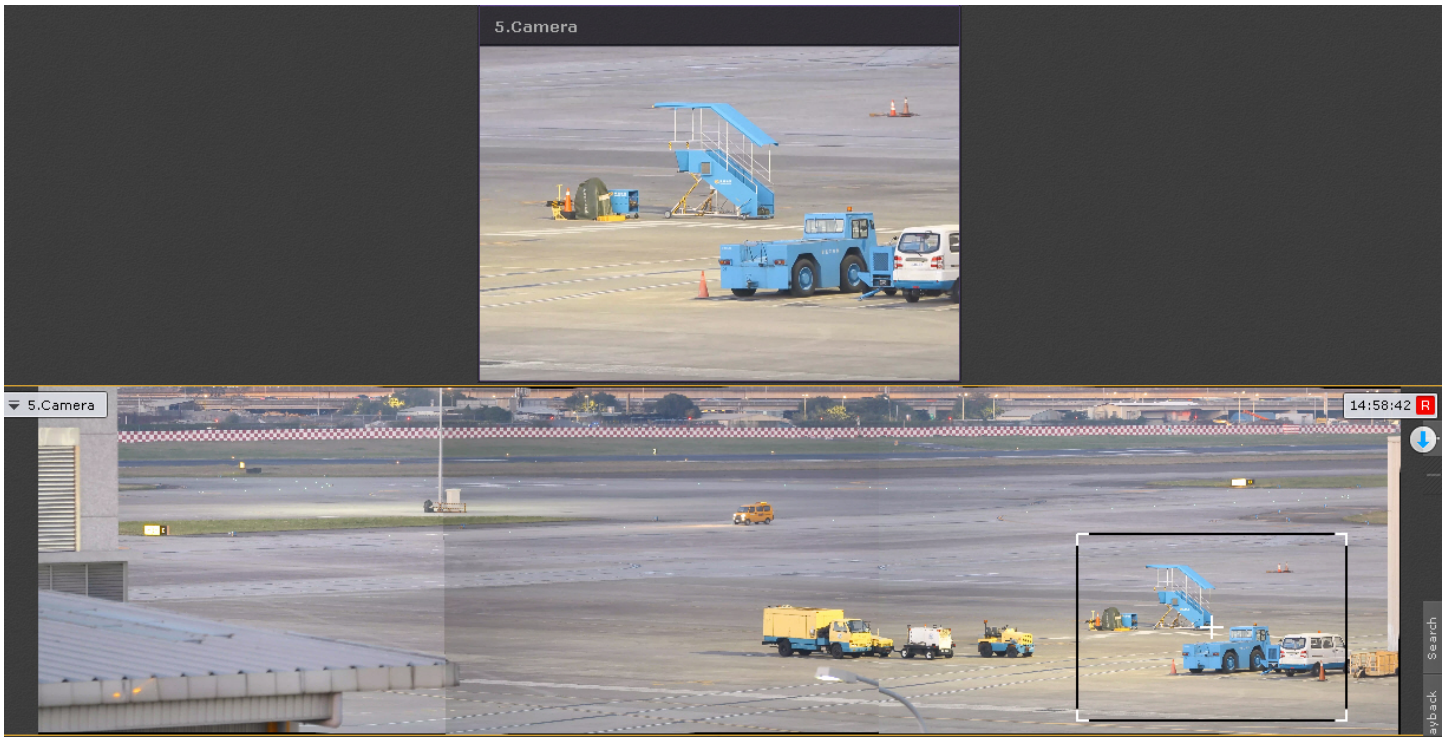
3. If you need to display a sub-area of the merged video in a separate window, do the following:
   a. add a dialog board to the layout (see Configuring a Dialog Board(see page 966));
   b. configure the panel to display the selected camera;
   c. link the panel to the merged video.



4. Save the layout.

While merging video feeds, the system automatically scans images from adjacent cameras for appropriate stitching points.

The resulting image will be displayed in a single viewing window. If you select a rectangular area within the video image (as for Area zoom function, see Control using Areazoom(see page 1174)), the cropped image appears in the dialog board.



Attention!

Do not move or reposition cameras after merging their video feeds. If any of the cameras change its position, you have to reconfigure the merging.

19.7.6.3.8 Clearing cells

Switching to layout editing mode(see page 945)

To remove an information board or camera from a cell, in the upper-right corner, click the button.

If clearing cells in a row or column removes content from all of these cells, the entire row and/or column is removed from the layout.

19.7.6.4 Configuring Surveillance windows

19.7.6.4.1 Selecting default functions for Surveillance windows

Switching to layout editing mode(see page 945)

Default values for video stream quality, object tracking, autozoom, and video display (contrast, focus, deinterlacing and flip) functions can be set for Surveillance windows.

After the user switches to a layout, these functions are activated automatically.

To set a function as a default one, activate it during Layout Editing mode (see Selecting video stream quality in a viewing tile(see page 1161), Object tracking(see page 1148), Autozoom(see page 1164), Video image processing(see page 1143), Selecting viewing mode for videos from a fisheye camera(see page 1254)) and save changes before exiting the mode.

19.7.6.4.2 Selecting the default video stream for all cameras on the layout

Switching to layout editing mode(see page 945)

You can select the defaut video stream (see Camera(see page 171)) for all video cameras on the layout on the top panel:



When you switch to the layout editing mode, buttons for selecting the quality of the video stream will be displayed on the top panel. The number of cameras with the selected video stream quality is displayed above each button.

When you click the buttons, all multi-stream cameras switch to the selected video stream quality, except the **Other** quality (see Selecting video stream quality in a Surveillance window (GreenStream)(see page 1161)).

Also in the editing mode, the selected quality of the video stream is displayed in the upper right corner of the Surveillance window.



Note

Information about the quality of the video stream in the Surveillance window is displayed only for multi-stream cameras.

19.7.6.4.3 Selecting the default video mode for a camera

Switching to layout editing mode(see page 945)

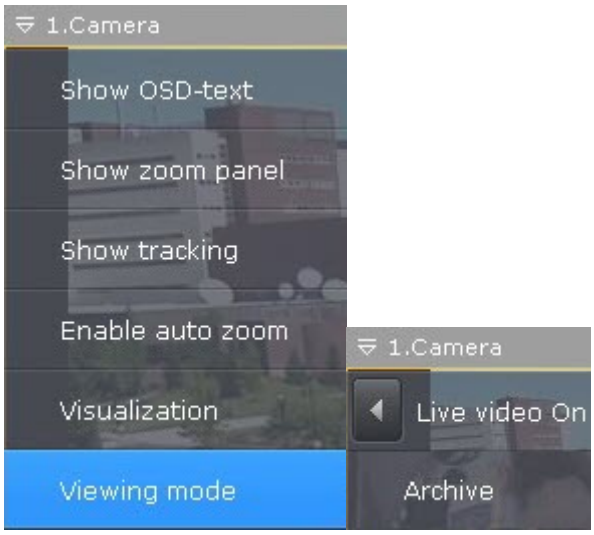
By default, when you switch to a layout, all video cameras are in Real-time/Live viewing mode.

You can select a default video mode for each camera: Live mode or Archive mode.

Note

This function is not available if the camera is not attached to an archive.

To select a default video mode, in the context menu of the Surveillance window, select **Viewing mode** and select the necessary mode.



If Archive mode is selected, when you switch to the layout, the camera is immediately in Archive mode.

19.7.6.4.4 Moving input and output icons in the Surveillance window

Switching to layout editing mode(see page 945)

You can move input and output icons in the Surveillance window.

To do so, left-click the input or output icon and drag it to the place in the Surveillance window where you want to put the icon.

19.7.6.4.5 Configuring default digital zoom (the Fit screen function)

Switching to layout editing mode(see page 945)

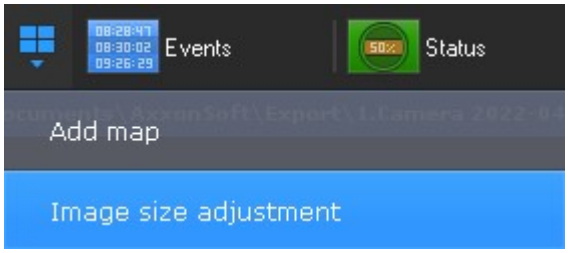
The Fit screen function allows displaying a Surveillance window by default so that it occupies all the available space on the screen (full screen). The default zoom step for full screen display is calculated automatically as a minimum zoom value that allows filling the available screen space with the Surveillance windows.

To enable the Fit screen function for a specific Surveillance window, display the digital zoom controller (see Digital video zoom(see page 1141)), click the  button on it, and save changes when exiting editing mode.

Note

To disable the Fit screen function, click the  button again.

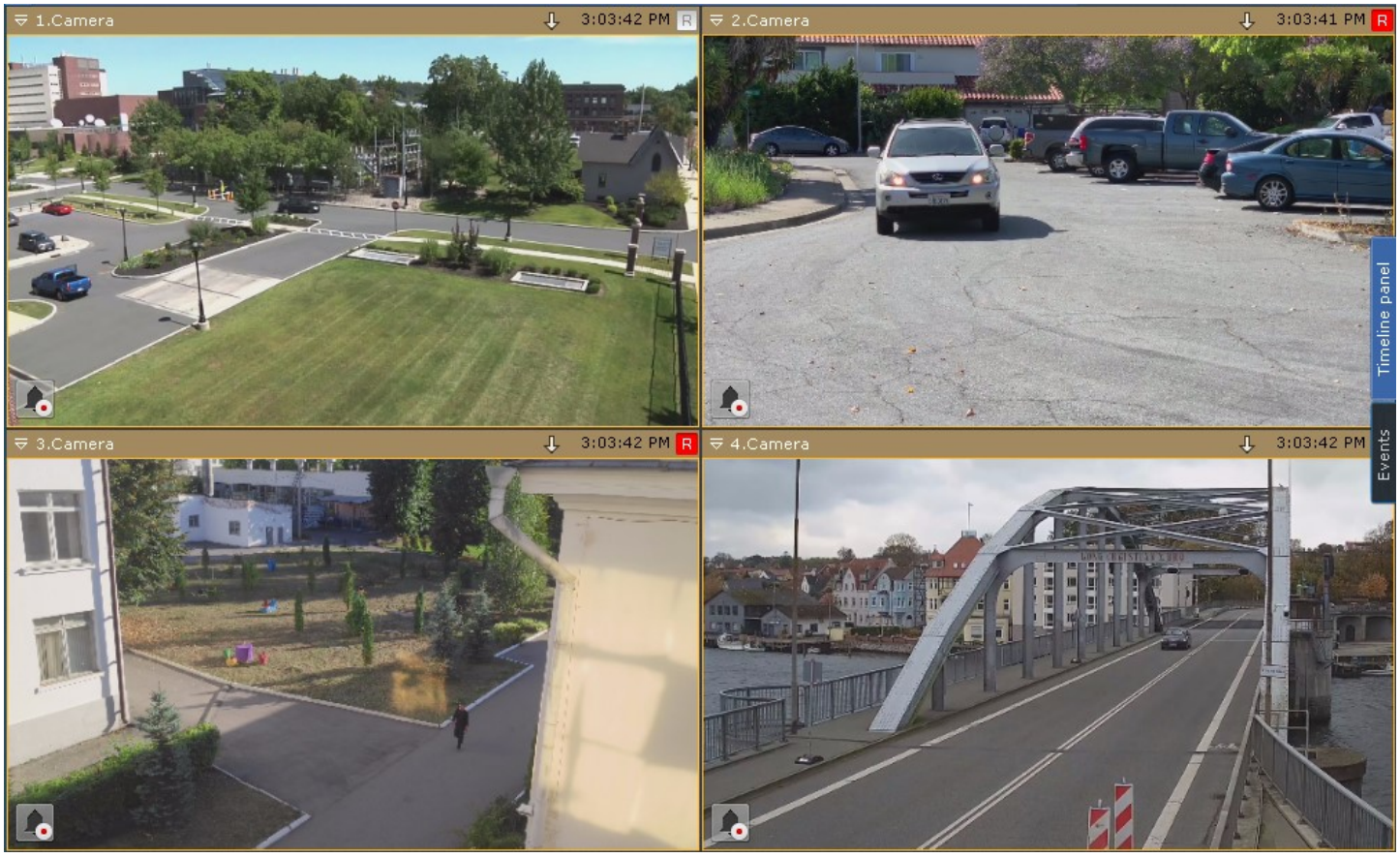
To enable the Fit screen function for all Surveillance windows on the layout, open the context menu and select **Image size adjustment**.



Note

To disable Fit screen across all layouts, reselect **Image size adjustment**.

Now when a user switches to this layout, the video in the Surveillance window is displayed at the calculated minimum necessary step of digital zoom and the Surveillance window occupies all available space.



19.7.6.4.6 Configuring pan/tilt angle for cameras with Immervision lenses in 180 degrees Panorama display format

Switching to layout editing mode(see page 945)

You can set the pan/tilt angle for fisheye cameras in 180° Panorama display format when switching to a layout.

This is useful when needing to display the entire viewable area in the layout (two areas of 180° each). In this case, the video camera is added twice, but with different viewing angles.



To set the viewing angle, click and hold the button (see 180 degree Panorama(see page 1257)).

19.7.6.4.7 Configuring display of water level sensor

Switching to layout editing mode(see page 945)

If you have created a water level detector for a camera (see Configuring the Water level detector(see page 730)), you can see the water level sensor in the Surveillance window.

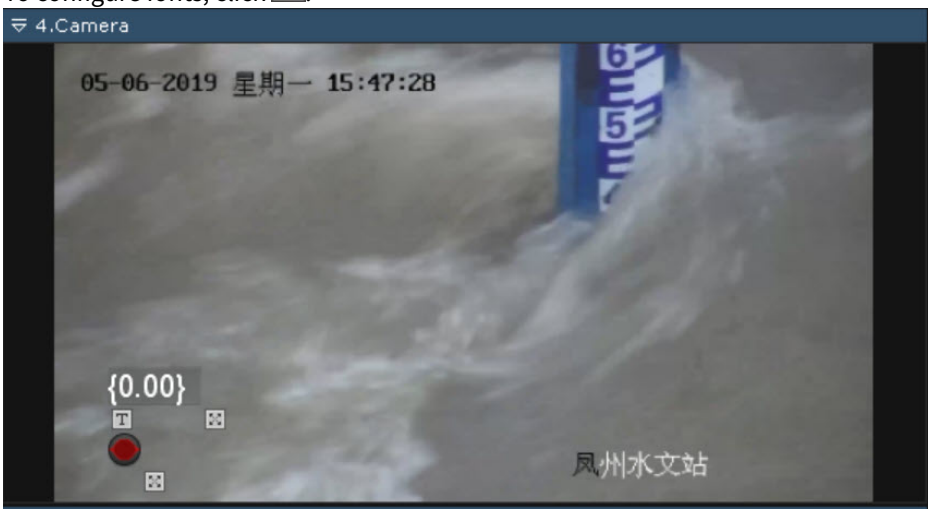
You can also display the numerical value of current water levels for the sensor. To do it, follow the steps below:

1. In the text field, enter "{0.00}" and additional text if necessary. For example, "Water level: {0.00}".

Note

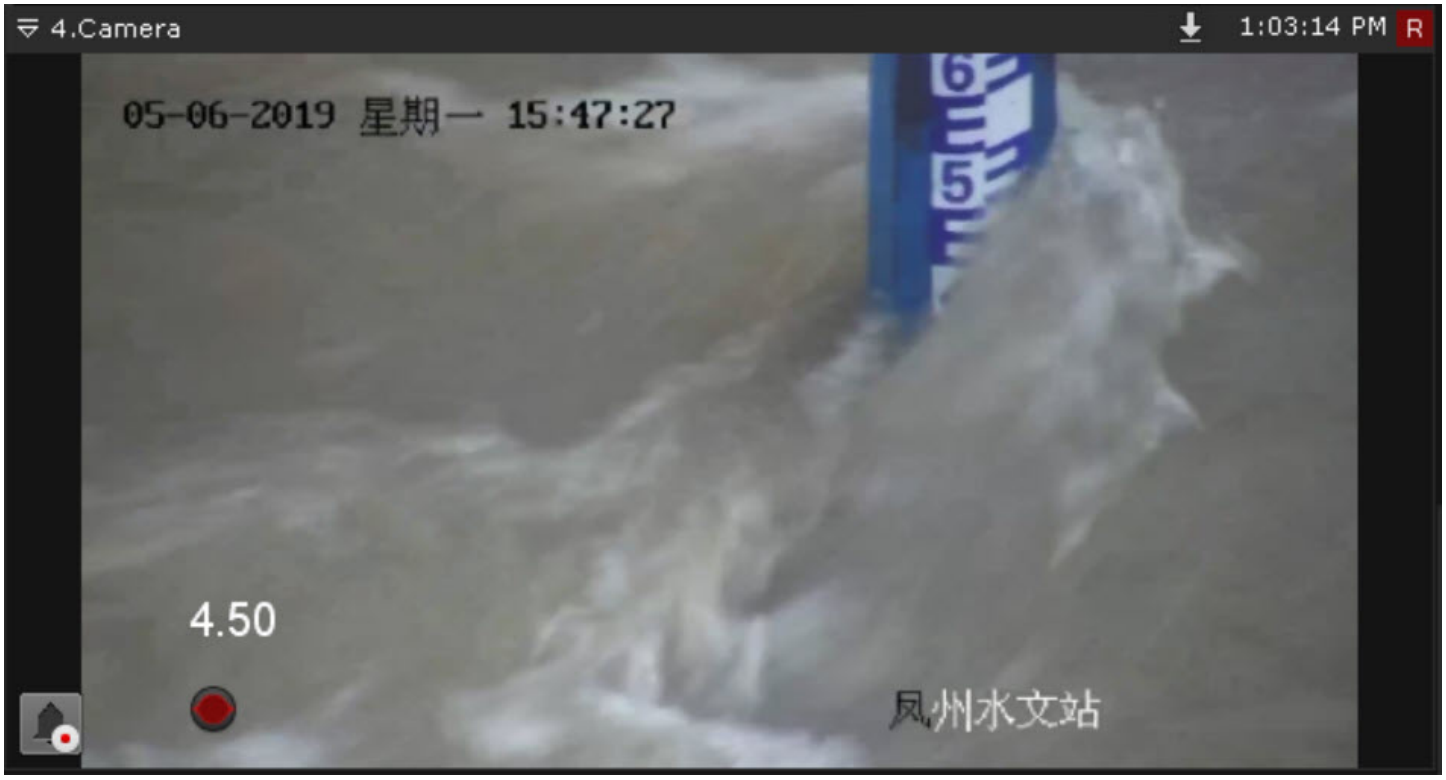
If you enter "{0.00}", then a fractional number with 2 digits after the point will be displayed (see Displaying the number of detected objects(see page 355)).

2. To configure fonts, click T.



3. Use ⤢ buttons to scale up/down the text and the sensor icon.
4. You can move the sensor just as any other object (see Moving input and output icons in the Surveillance window(see page 957)).

When the layout is saved, you see the information displayed in the Surveillance window.



19.7.6.4.8 Adding links to other cameras to the Surveillance window

Switching to layout editing mode(see page 945)

You can add links to other cameras to the Surveillance window. If you click such a link, you go to the corresponding camera (see Switching to other camera via a link in the Camera Window(see page 1159)).

To add a link, do the following:

1. While holding the Ctrl button on your keyboard, left-click the camera icon on the **Objects Panel** (see Object panel(see page 1133)), and drag it into the Surveillance window.

A link will be added to a window as an icon  .

2. To rotate the icon, click . Each click rotates the icon by 45°.

> **Note**
>
> If you add a text note to the link (see 3), the icon disappears after you rotate it by 360°, and you will have just the text to switch to another camera.
> To bring back the icon, click .

> **Note**
>
> To remove the link, click the button.

3. If required, you can add a text comment to a link via the appropriate text field. To set font attributes, click the button.
4. Use buttons to scale up/down the text and the icon.
5. You can move the link just as any other object (see Moving input and output icons in a viewing tile[354]).

When the layout is saved, you see the newly created link in the Surveillance window.



19.7.6.5 Configuring information boards

19.7.6.5.1 Configuring information board templates

Switching to layout editing mode(see page 945)

To save information board parameters as a template, specify a name when configuring an information board.



If a name is not specified for the information board (it is not necessary to specify one), no template with the information board parameters is saved or made available when creating new information boards.

When configuring a new information board, you can use previous templates for the type of information board in question by selecting one from the **Name** list.

354 https://docs.axxonsoft.com/confluence/spaces/one1en/pages/226952372/Moving+input+and+output+icons+in+a+viewing+tile



If you save the new information board with the same name, the template parameters are updated and all information boards based on the template are updated as well.

To delete a template, in the **Name** list, click the − button across from the template. The parameters of information boards based on the deleted template are saved, but their names are discarded.

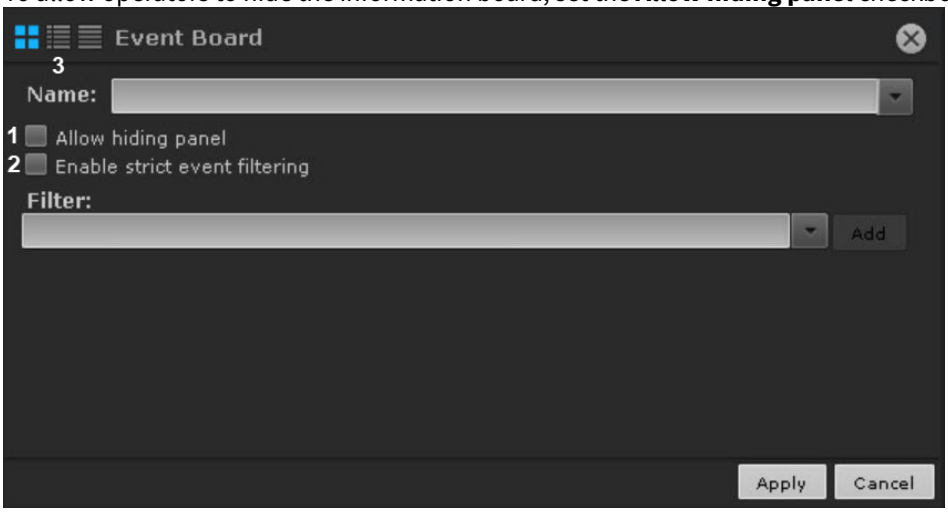
19.7.6.5.2 Configuring an Event Board

Switching to layout editing mode(see page 945)

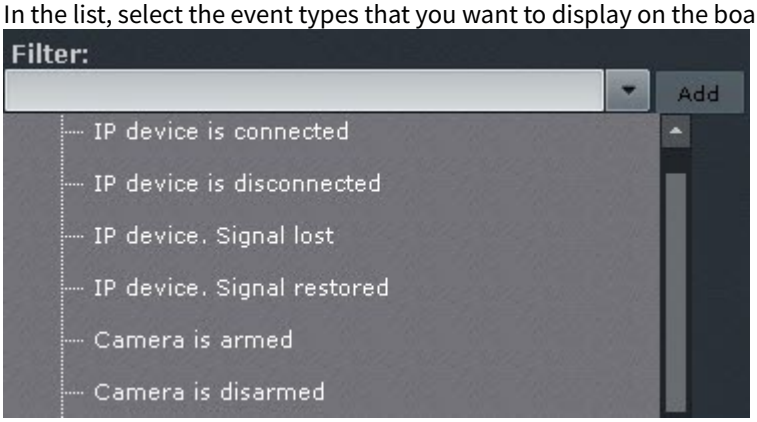
Event Boards display some or all system events.

To configure an **Event Board**:

1. Add an information board to the layout (see Adding information boards to cells(see page 952)).
2. In the upper right corner, click the button.
3. To allow operators to hide the information board, set the **Allow hiding panel** checkbox (**1**).



4. By default, some events on the **Event Board** come with audit events. If display of audit events isn't required, set the **Enable strict event filtering** checkbox (**2**).
5. In the list, select the event types that you want to display on the board and click **Add**.



To add events of the same type from different devices, enter the name of the event in the **Filter** field. This will list only the events of the chosen type. To list all events, clear the **Filter** field.

> **Note**
>
> To remove an added event type, click the button.

If no event type is selected, all system events are displayed on the information board.

> **Note**
>
> - You can also add any text to the filter. For example, if you add the **Signal lost** filter, **Event Board** will display event data from all devices in the system.
> - To display events from the Face Detection, we recommend that you select two events: **Triggered detection "Face appeared"** and **Triggered specified detection "Face appeared"**.

6. Select the default view for information on the **Event Board** (see Options for displaying information on the Event Board(see page 1266)): the first frame of the event and time, first frame and text, or text only (**3**).
7. Click the **Apply** button to save the changes.

Configuration of the **Event Board** is complete.

19.7.6.5.3 Configuring a Health Board

Switching to layout editing mode(see page 945)

System Health Boards display the status of selected system servers and connected cameras.

To configure a Health Board:

1. Add an information board to the layout (see Adding information boards to cells(see page 952)).
2. In the upper-right corner, click the button.
3. To allow operators to hide the information board, select the **Allow hiding panel** check box (**1**).



4. Select the Servers you want to monitor. To do so, select one server (**3**) or all servers from the Axxon domain (click **All selected servers**) and click the **Add** button (**2**).

> **Note**
>
> To remove the selected server, click the button.

5. To display the status of only distressed servers out of those selected, select **Distressed servers only** (**3**).
   A server is classified as distressed if any of the following are true:
   a. Any components (CPU, hard disk, or network connection) are in critical condition.
   b. There is no connection to the Server.
   c. Any video cameras of the Server are in critical condition.

> **Note**
>
> Information about the status of Servers and cameras is given in the section Working with System Health Boards(see page 1268).

6. Select the default view for display of information on the Health Board (see Working with System Health Boards(see page 1268)): diagram, diagram with text, or table (**4**).
7. Click the **Apply** button to save changes.

Configuration of the Health Board is complete.

19.7.6.5.4 Configuring a Statistics Board

> Switching to layout editing mode(see page 945)

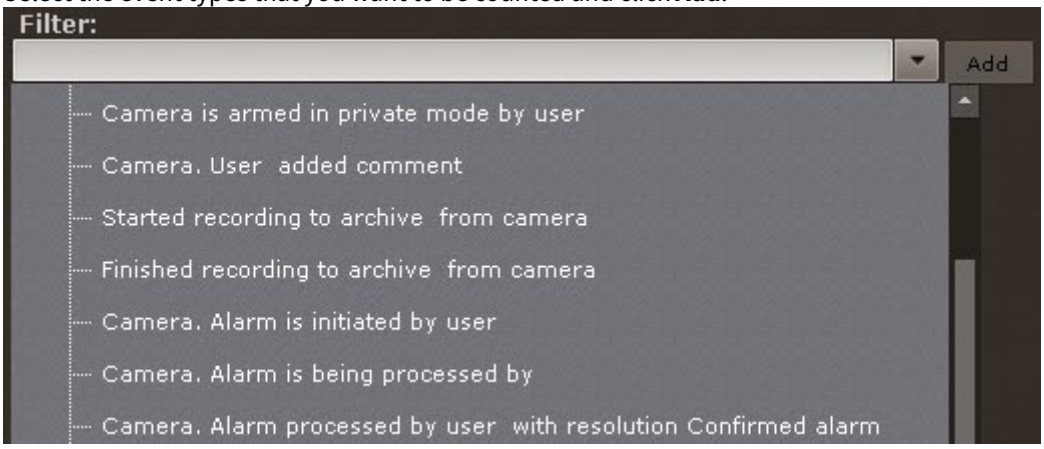
Statistics Boards display information on the number of events of the selected type or types, as a number and graph.

To configure a Statistics Board:

1. Add an information board to the layout (see Adding information boards to cells(see page 952)).
2. In the upper-right corner, click the button.
3. To allow operators to hide the information board from a layout, select the **Allow hiding panel** check box (**1**).



4. Select the event types that you want to be counted and click **Add**.



To add events of the same type from different devices, enter the name of the event in the **Filter** field. This will list only the events of the chosen type. To list all events, clear the **Filter** field.

> **Note**
>
> To remove an added event type, click the button.

If no event type is selected, all system events are counted.

5. Select the time period for display of statistics on the graph (**2**).
6. Click **Apply** to save the changes.

Configuration of the Statistics Board is complete.

19.7.6.5.5 Configuring a Web Board

Switching to layout editing mode(see page 945)

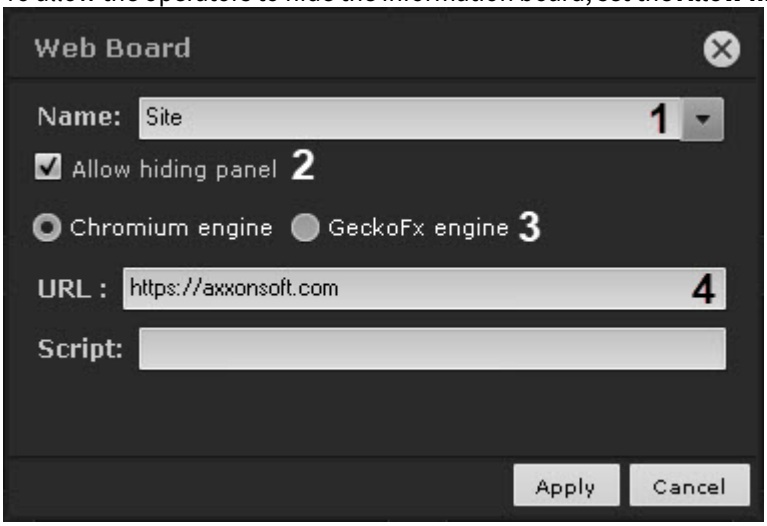
The **Web Board** allows you to view a specific web page on the layout.

Note

Starting with *Axxon One* 2.0, web pages in the *Axxon One* interface are displayed via Chromium or Gecko browser. When upgrading from previous versions that support the Internet Explorer engine, the engine will be automatically replaced with Chromium, which you can manually replace with Gecko.

To configure the **Web Board**:

1. Add an information board to the layout (see Adding information boards to cells(see page 952)).
2. In the upper-right corner, click the  button.
3. Enter the name of the **Web Board** or select it from the list (**1**).
4. To allow the operators to hide the information board, set the **Allow hiding panel** check box (**2**).



5. Select the web page output: Chromium or Gecko (**3**).
6. Enter the address in the **URL** field (**4**).

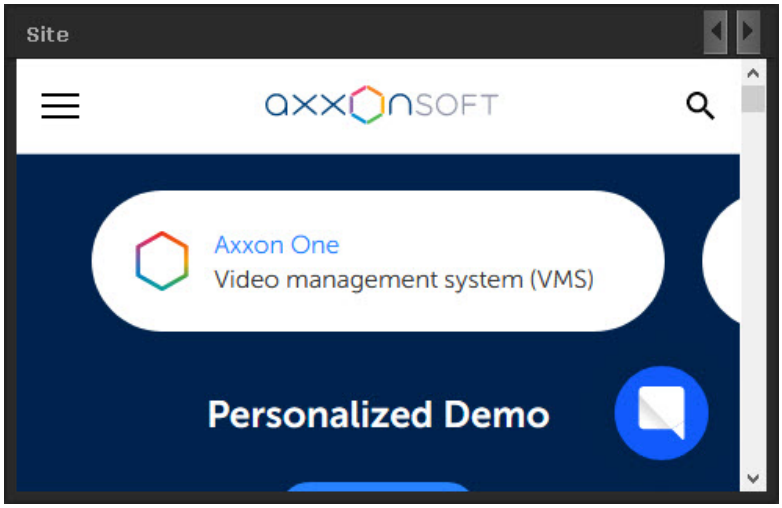
Note

The **URL** field supports addresses in the following formats:

- http://www.site.com
- http://site.com
- https://www.site.com
- https://site.com
- www.site.com
- site.com
- [IP-address]
- [IP-address]:[Port]
- http://[IP-address]
- http://[IP-address]:[Port]

7. To save the changes, click the **Apply** button. To discard the changes, click the **Cancel** button.

Configuration of the **Web Board** is complete. The specified page will be displayed on the **Web Board**.



19.7.6.5.6 Configuring a Dialog Board

Switching to layout editing mode(see page 945)

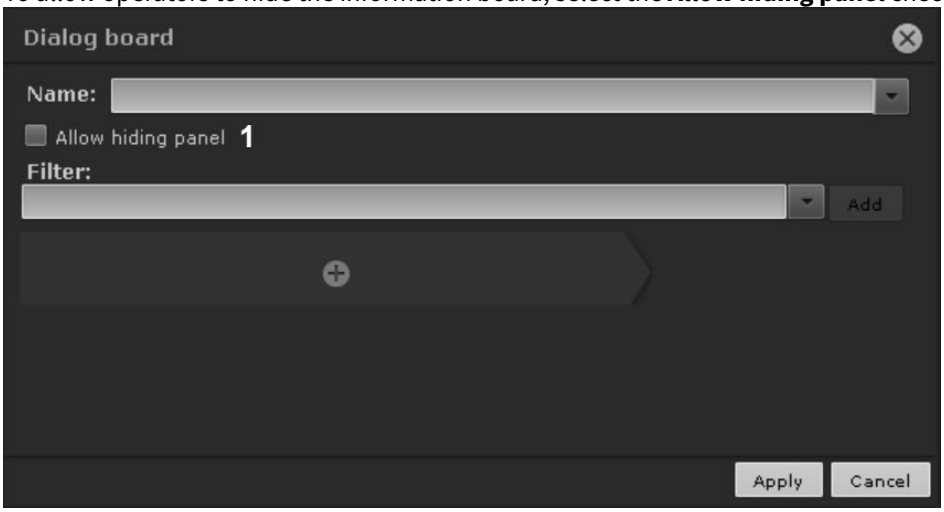
Dialog board allows users to view info about alerts/detection events and quickly start macros to respond.

In addition, the panel can display:

- video from the selected camera on the layout;
- video from the Related camera for the selected camera on the layout;
- video from the Related camera for the camera linked to the panel;
- alarm event from the selected or linked camera;
- still image.

You can configure Dialog board as follows:

1. Add an information board to the layout (see Adding information boards to cells(see page 952)).
2. In the upper-right corner, click the  button.
3. To allow operators to hide the information board, select the **Allow hiding panel** check box (**1**).



4. Select the event types that you want to display on the board and click **Add**.



To add events of the same type from different devices, enter the name of the event in the **Filter** field. This will list only the events of the chosen type. To list all events, clear the filter field.

> **Note**
>
> To remove an added event type, click the button.

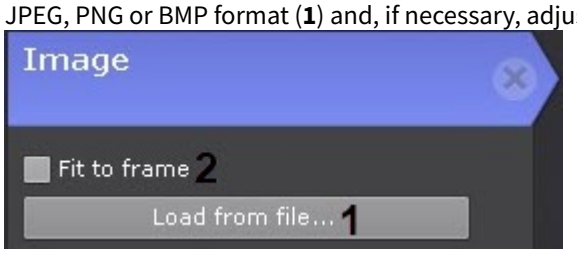
> **Note**
>
> If the board has video, the event filter is not required.

If no event type is selected, all system events are displayed on the information board.

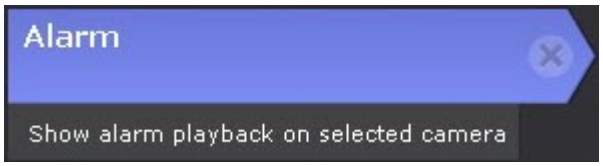
5. Configure the information board:
   a. If you want video on the board, then click the button and select the item in the menu. You cannot add other elements if you have video here.
      i. **Selected camera** – if you want to display video from the selected camera (**1**).



      ii. **Related camera of selected camera** – if you want to display video from the related (alternative, see Camera(see page 171)) camera of the selected camera (**2**).
      iii. **Related camera of linked camera** – if you want to display video from the related (alternative, see Camera(see page 171)) camera of the linked camera (**3**). In this case, the panel must be connected to some camera window.
   b. If you want to display a still image on the panel, select the **Image** element. To do this, select a desired image in JPEG, PNG or BMP format (**1**) and, if necessary, adjust it to panel size (**2**).



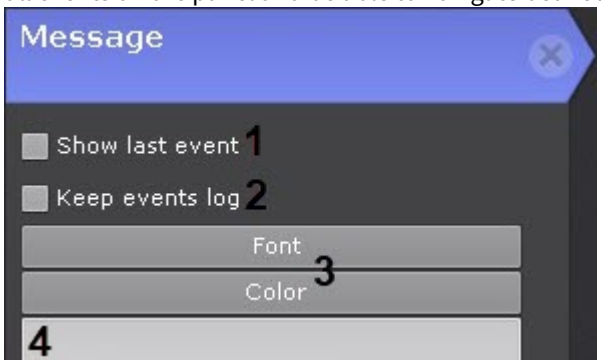
   c. If you want to display an alarm event in the panel from the selected or linked camera, select **Alarm**. If the panel is linked to any camera window, then alarms from this camera will be displayed. If the panel is not linked to any tile, then alarms from any selected camera will be displayed.



When you add the **Alarm** item to the message panel, you can also add pre-programmed buttons to evaluate the alarm event. It is color-coded as follows: green – **False alarm**, yellow – **Non-critical alarm**, red – **Critical alarm**.



d. If necessary, add a message that will be displayed on the panel in case of event (**4**). You can select the font and color (**3**) of the message. If it is necessary to display the event text, set the **Show last event** checkbox (**1**). To keep all events on the panel and be able to navigate between them, set the **Keep events log** checkbox (**2**).

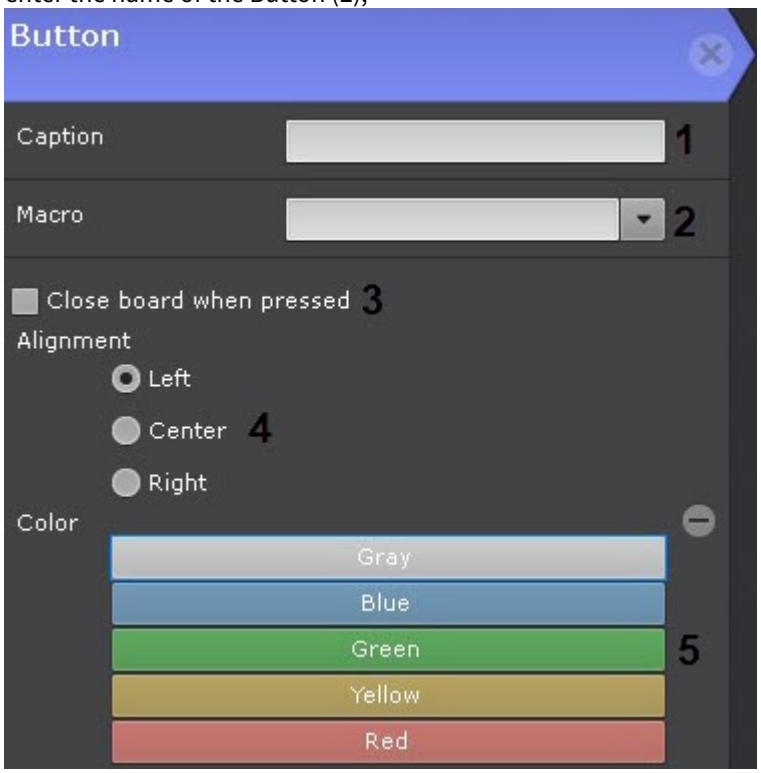


e. If necessary, add the comments field. Select the appropriate check box to make comments mandatory.



f. Add one or more Response Buttons.
To configure Response Buttons, you should set the mandatory and optional parameters (by clicking):

- enter the name of the Button (**1**);



- select a macro that will start when you click the Button (**2**);
- if you want to hide the board after pressing the Response Button, select the checkbox (**3**);
- select location for the Button: on the left, in the center, on the right (**4**);
- select a color (**5**).

6. Click **Apply** to save the changes

Configuration of the Dialog board is complete.

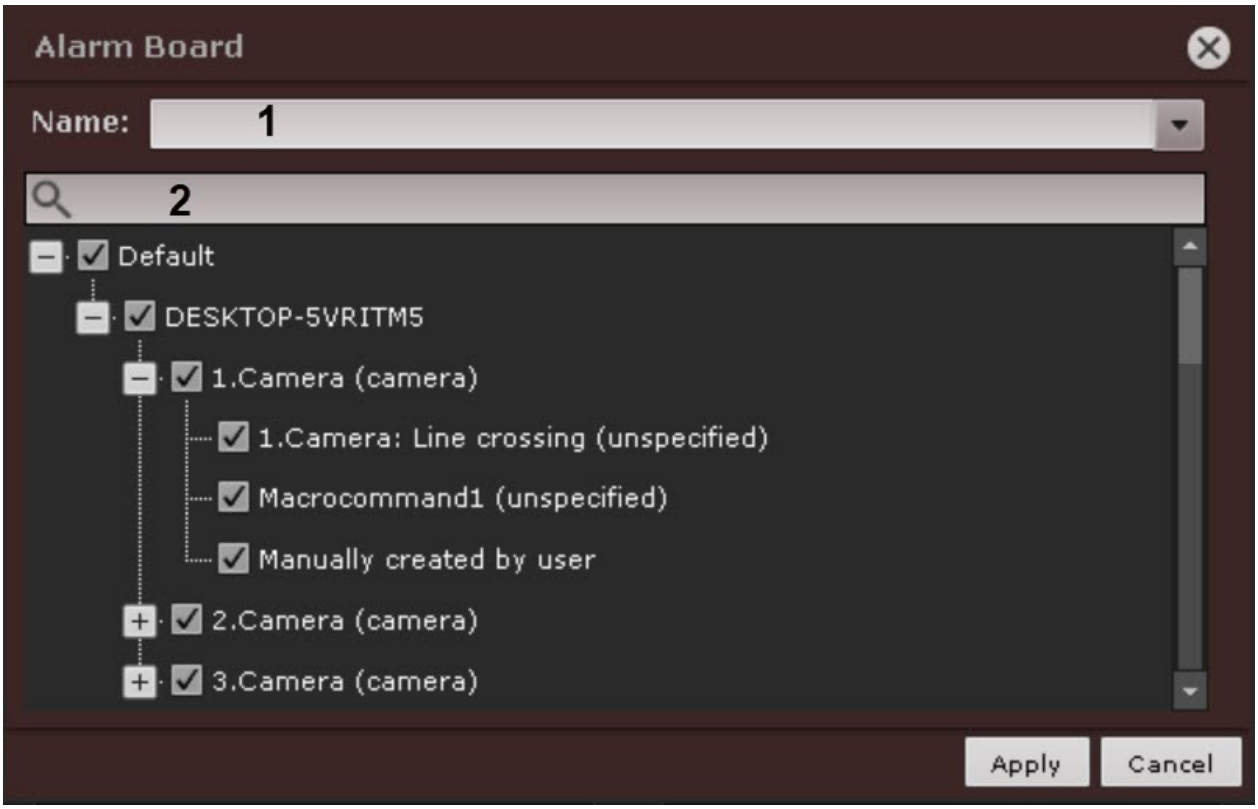
19.7.6.5.7 Configuring an Alarm Board

Switching to layout editing mode(see page 945)

Alarm Board is used to display alarm events and work with them. The board displays videos of all alarm events of the system.

To configure an **Alarm Board**, do the following:

1. Add the board to the layout (see Adding information boards to cells(see page 952)).
2. In the upper right corner of the board, click the  button.
3. Enter or select the name of the Alarm Board from the list (**1**).
4. Set the checkboxes next to the devices and types of commands that can initiate an alarm and must be displayed on the board (**2**).



5. To save the changes, click the **Apply** button. To cancel the changes, click the **Cancel** button.

Configuring an **Alarm Board** is complete.

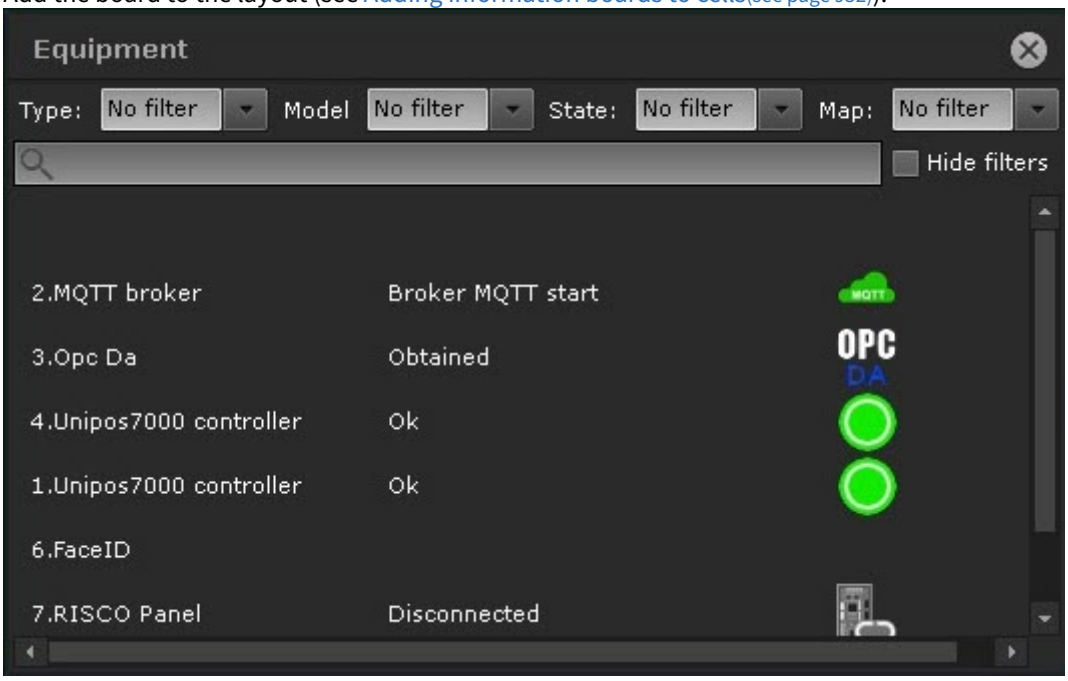
19.7.6.5.8 Configuring an Equipment Board

Switching to layout editing mode(see page 945)

The **Equipment Board** is used to display information about *ACFA* integration modules.

To configure the **Equipment Board**, do the following:

1. Add the board to the layout (see Adding information boards to cells(see page 952)).



2. If necessary, configure the filters that you want to display on the board by setting the ☑ checkbox next to the required option in the drop-down list. Types of filters, options and their description are presented in the table:

Type of filter	Option	Description
Type	• No filter • ACFA • Controller • Loop • Reader • Sensor • Relay • Lock • Area • Group area • Fence	Equipment type
Model	• No filter • Lock • Fence • Sensor • Reader • *ACFA* integration module	Equipment model
State	• No filter • start • stop • Tamper • Obtained • Locked • Closed • AUX trouble • Arm • Ok • Unknown • Cracked • Opened • Normal • Unlocked • Disarm • Disconnected • Connected • Alarm	Equipment state
Map	• No filter • Any • Not on map • Map	Display equipment on the map

Note

If you don't specify any filters, the board will display all available information about *ACFA* integration modules.

3. If you want to hide filters on the layout, set the ☑ **Hide filters** checkbox.
4. Click the **Save** button to save the changes (see Creating and deleting layouts(see page 942)).

19.7.6.6 Configuring Alarms Panel on a layout

You can configure the size of Alarms Panel (see Alert panel(see page 1131)) with included videos for each layout separately.

To do it, follow the steps below:

1. Go to the desired layout.
2. Open the Alarms Panel and set desired sizes of videos, and of the panel itself (see Alert panel(see page 1131)).
3. Switch to the Layout Editing mode (see Switching to layout editing mode(see page 945)).
4. Exit the Layout Editing mode and save changes (see Exiting Layout Editing mode(see page 972)).

The Alarms Panel will always open as you have specified it for this layout.

19.7.6.7 Exiting Layout Editing mode

To exit Layout Editing mode and save changes, click **Save** in the upper panel.



To exit Editing mode without saving changes, click **Cancel**.

19.7.7 Share layouts

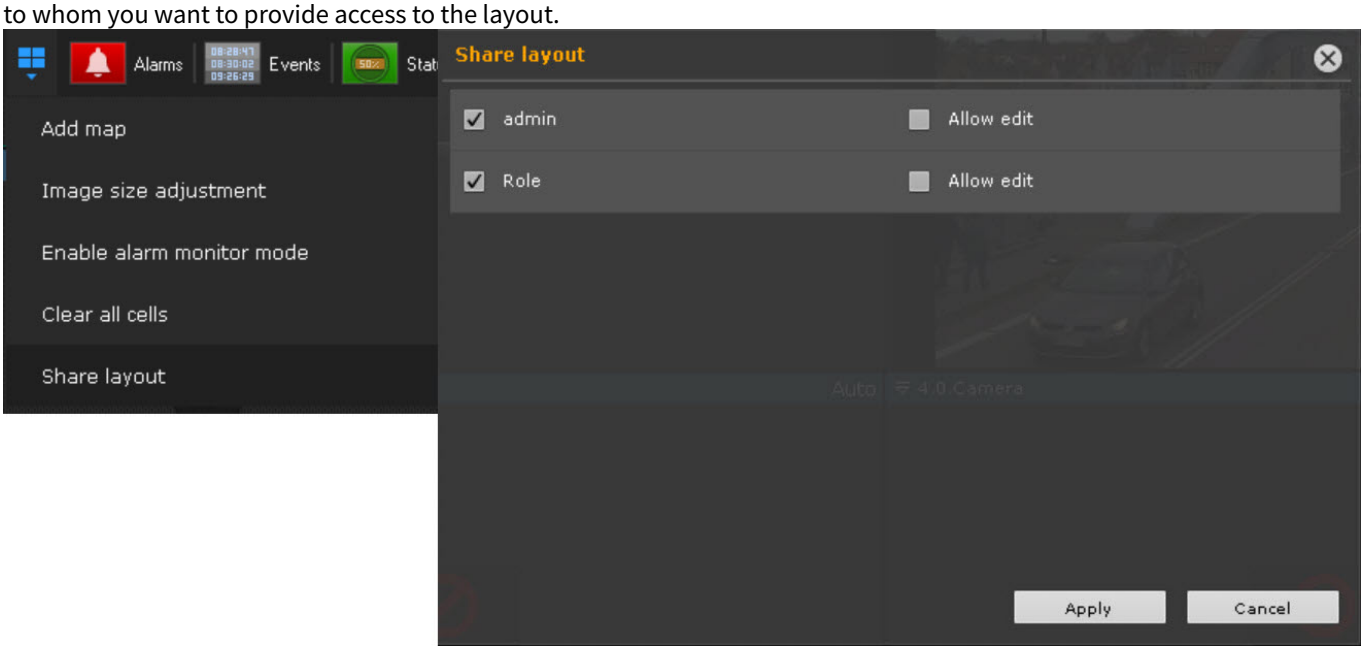
19.7.7.1 Sharing layouts

You can share the created layouts between the system users. The user can provide access to the layout that they created.

> **Note**
>
> This feature is especially relevant when only the system administrator creates and edits layouts. After all layouts are configured, the administrator shares layouts between the groups of operators.

To provide access to the layout for other users, do the following:

1. Select a layout (see Selecting a layout for editing(see page 946)) and go to the layout editing mode (see Switching to layout editing mode(see page 945)).
2. Open the context menu by clicking the  button, and in the **Share layout** item, select one or several roles of the users to whom you want to provide access to the layout.



> **Note**
>
> You can select the roles of the selected domain. To switch the domain, use the camera search panel (see Camera Search Panel(see page 1130)).

3. If you want to grant rights for the layout editing, set the **Allow edit** checkbox next to the role.
4. Click the **Apply** button.
5. Exit the editing mode (see Exiting Layout Editing mode(see page 972)).

Providing access to the layout for other users is complete.

These users cannot edit and share this layout with other users, but they can do the following:

1. Work with layout (see The Layouts panel(see page 1129)).
2. Delete it from their list (see Creating and deleting layouts(see page 942)).

> **Note**
>
> Only the user who creates the given layout can completely delete it from the system. After the user deletes a layout, it becomes unavailable for other users. If the given layout is opened on the monitor of any user, then after it is deleted, the system switches to another layout.

3. Copy the layout (see Layout copying(see page 944)). The user becomes the owner of the copied layout and can edit it.

The shared layout has the following icon:



19.7.7.2 Switching between domains on the layout

When you use the Cross-System client (see Cross-System client(see page 143)), you can switch between the available domains on the current layout by using the drop-down list that is located in the upper left corner next to the camera search field (see Camera Search Panel(see page 1130)).

When you use the Cross-System client, the system supports creating and saving the layouts that contain cameras from different domains. To configure it, do the following:

1. Switch to the required domain.
2. Create the new layout and add cameras of the current domain on it.
3. Switch to another domain and add the required cameras to the same layout.
4. Save the layout.

The layout is saved on the domain that is selected at the moment of its creation regardless of whether there are cameras of this domain on the layout or not. When you connect to this domain for the next time without accessing other domains, the saved layout is displayed empty.

> **Note**
>
> The Cross-System client is used to connect devices that are in one network. When you connect via the *Axxon Datacenter*, you can use the technic domain. When you use the cloud connection, there are no network limitations.

19.7.8 Configuring special layouts

19.7.8.1 Creating special layouts

There are three special layouts available in *Axxon One*:

1. Marked cameras layout displays all marked cameras  .

2. Alarmed cameras layout displays all cameras with alarms  .
3. Dynamic layout displays the cameras added from the **Object Panel** in Live video mode  .

To create a special layout, do the following:

1. Click the  button to open the **Layouts** context menu.
2. Select the required layout.

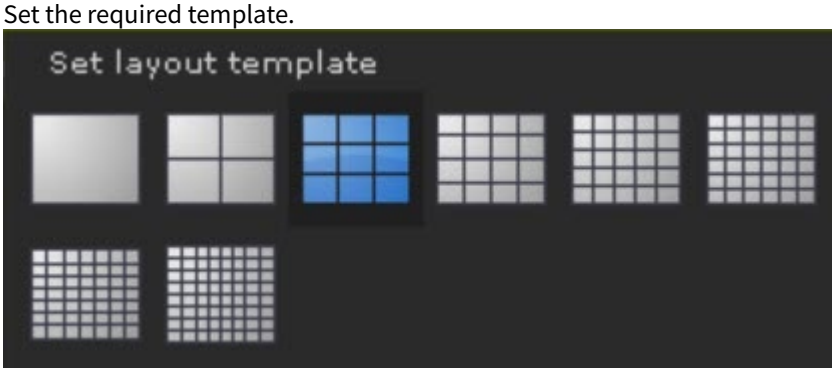


The layout is created and added to the panel.

By default, the **Marked cameras** layout and the **Alarmed cameras** layout are 3*3. The **Dynamic** layout is created empty.

The number of cameras on the **Marked cameras** layout and the **Alarmed cameras** layout can be limited by the layout template—1, 4, 9, 16, 25, 36, 49, 64. To set the layout template, do the following:

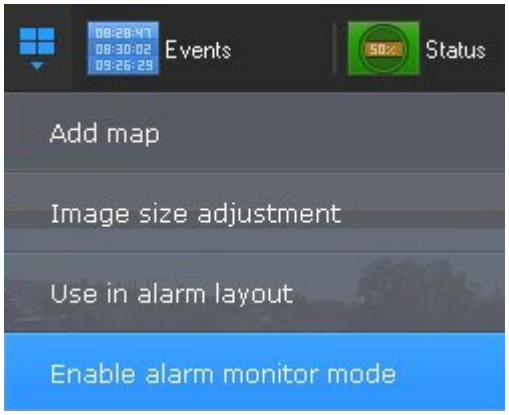
1. Click the  button to open the context menu of the layouts.
2. Set the required template.



Note

To return to automatic change of the **Alarmed cameras** layout, click the format that you selected again.

You can change any standard layout to an **Alarmed cameras** layout. To do this, in the layout editing mode, open the menu and select **Enable alarm monitor mode**.



In this mode, only alarmed cameras will be displayed.

If the alarm monitor mode is enabled, the layout will be marked with the following sign 

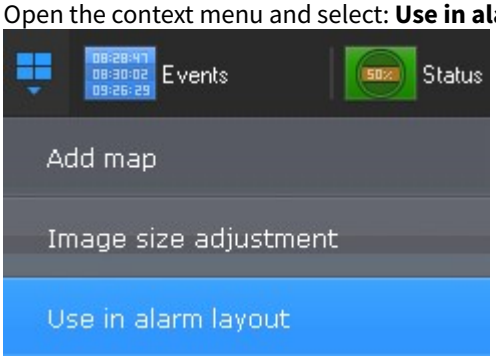
.

19.7.8.2 Configuring Alarmed cameras layout

By default, special layout display alerts from all cameras. You can limit this: alerts only from the selected layouts.

To do this:

1. Select the layout (see Selecting a layout for editing(see page 946)).
2. Open the context menu and select: **Use in alarm layout**.

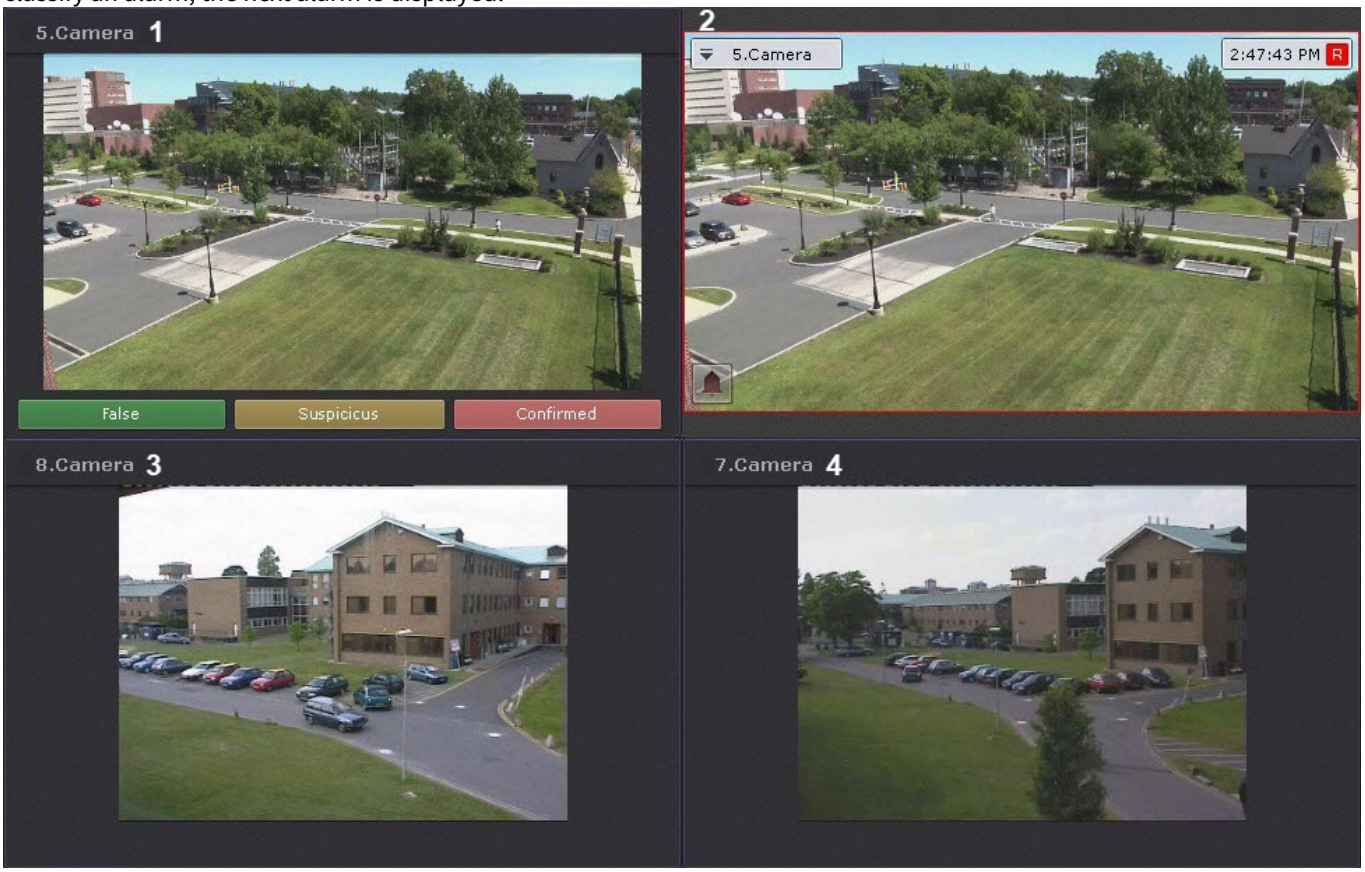


3. Save changes (see Exiting Layout Editing mode(see page 972)).

> **Note**
>
> To undo, select: **Disable use in alarm layout.**

Also, you can customize the layout with active alarms to show:

1. An alarm and the Alarm Management option (**1**). If there are several alarms, the longest-standing alarm is displayed. If you classify an alarm, the next alarm is displayed.

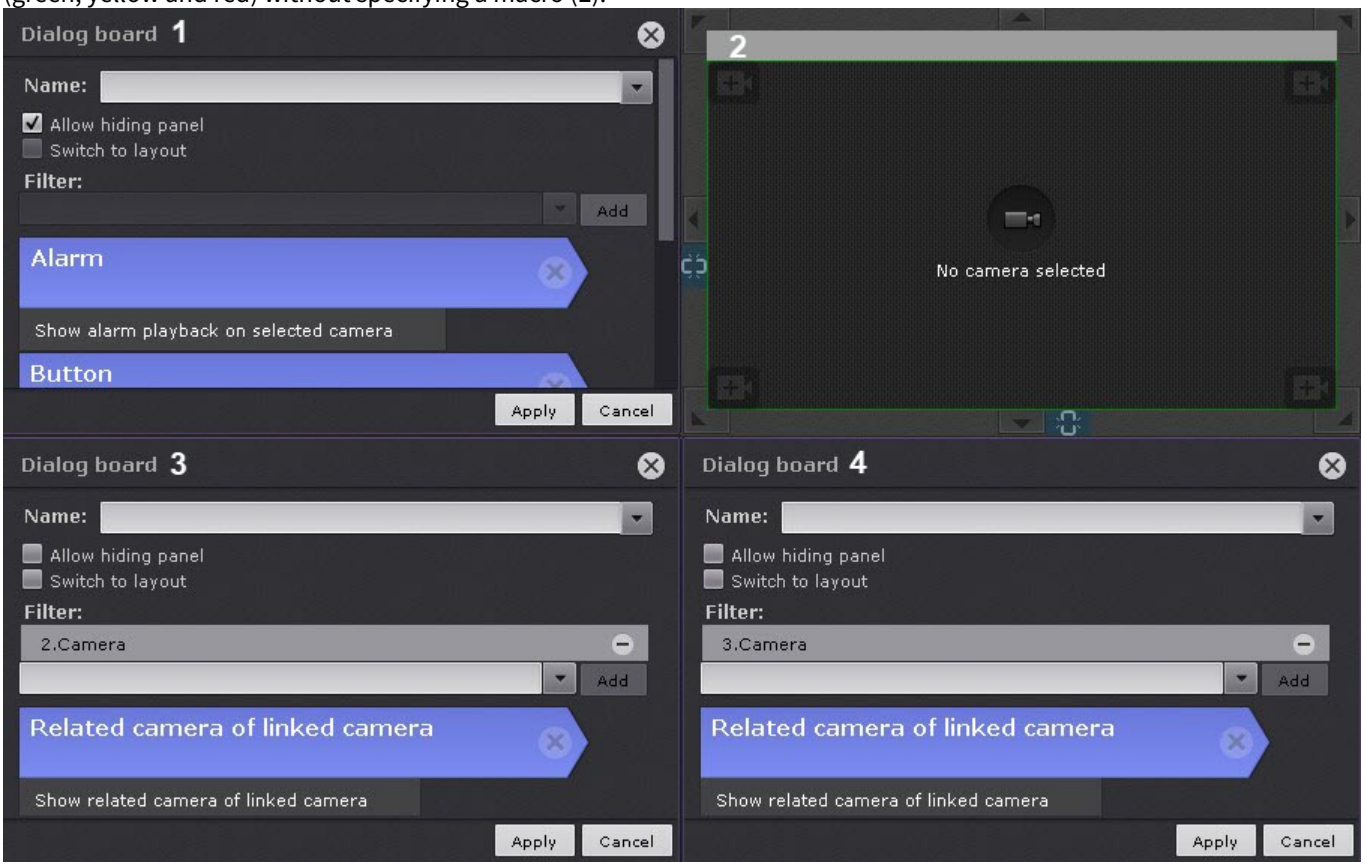


2. An alerted camera in Live Video mode (**2**).

3. 2 additional cameras (**3**, **4**) in Live Video mode (for example, the 2 nearest ones to the alarmed one).

Do the following:

1. Switch to the Layout Editing mode (see Switching to layout editing mode(see page 945)).
2. In the first cell, add a Dialog board (see Configuring a Dialog Board(see page 966)) with the **Alarm** element and 3 buttons (green, yellow and red) without specifying a macro (**1**).



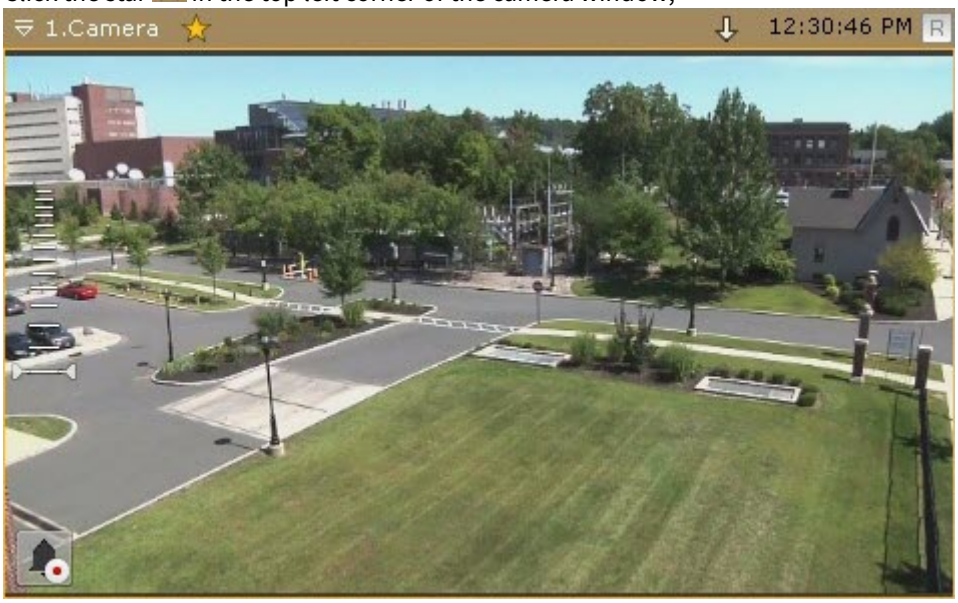
3. Leave the second cell empty (**2**).
4. In the third and fourth cells, add a message panel with **Related camera of linked camera** (**3**, **4**).
5. Link cells as follows: 1 with 2, 2 with 4, 3 with 4 (see Linking cells(see page 952)).
6. Save the layout.
7. For each camera, select 2 stand-by cameras (for example, those closest to it, see Camera(see page 171)).

> **Note**
>
> In cell **4**, the first stand-by camera will be displayed, in cell **3** – the second.

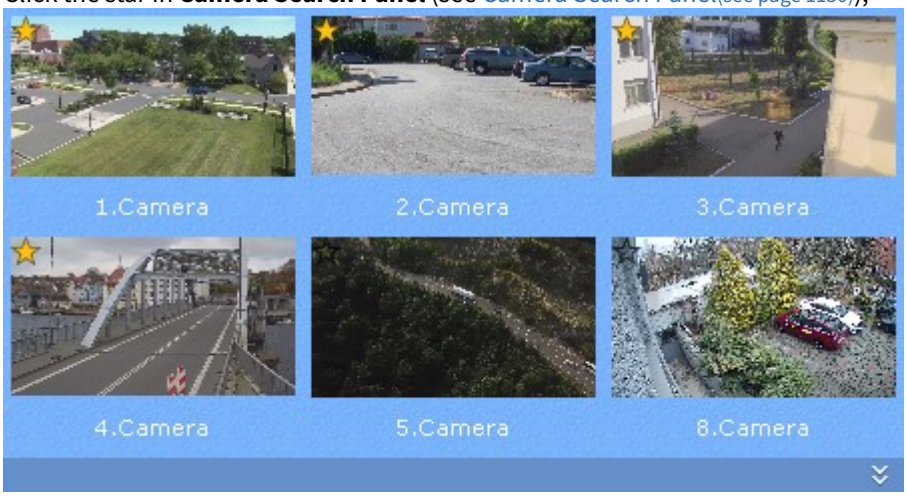
19.7.8.3 Configuring Marked cameras layout

To add a tag to a video camera, do one of the following actions:

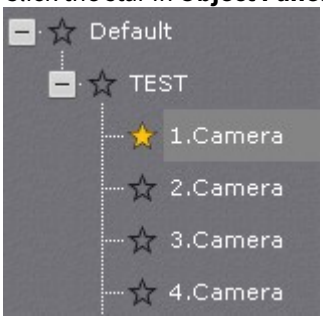
- Click the star in the top left corner of the camera window;



- Click the star in **Camera Search Panel** (see Camera Search Panel(see page 1130));



- Click the star in **Object Panel** (see Object panel(see page 1133));



Attention!

You can add tags to cameras on any video wall (see Managing monitors on a local Client(see page 1285)).

If you exceed the maximum number of cameras allowed, only the cameras most recently selected remain on the layout.

Note

To remove the tag, click the star again .

You can move cameras around on layouts by drag-and-drop.

Attention!

Camera windows are not saved on the layout. After restarting the Client or Server, you should add them again.

Note

You can use Duplicate layout(see page 944) to create a copy of the current special layout.

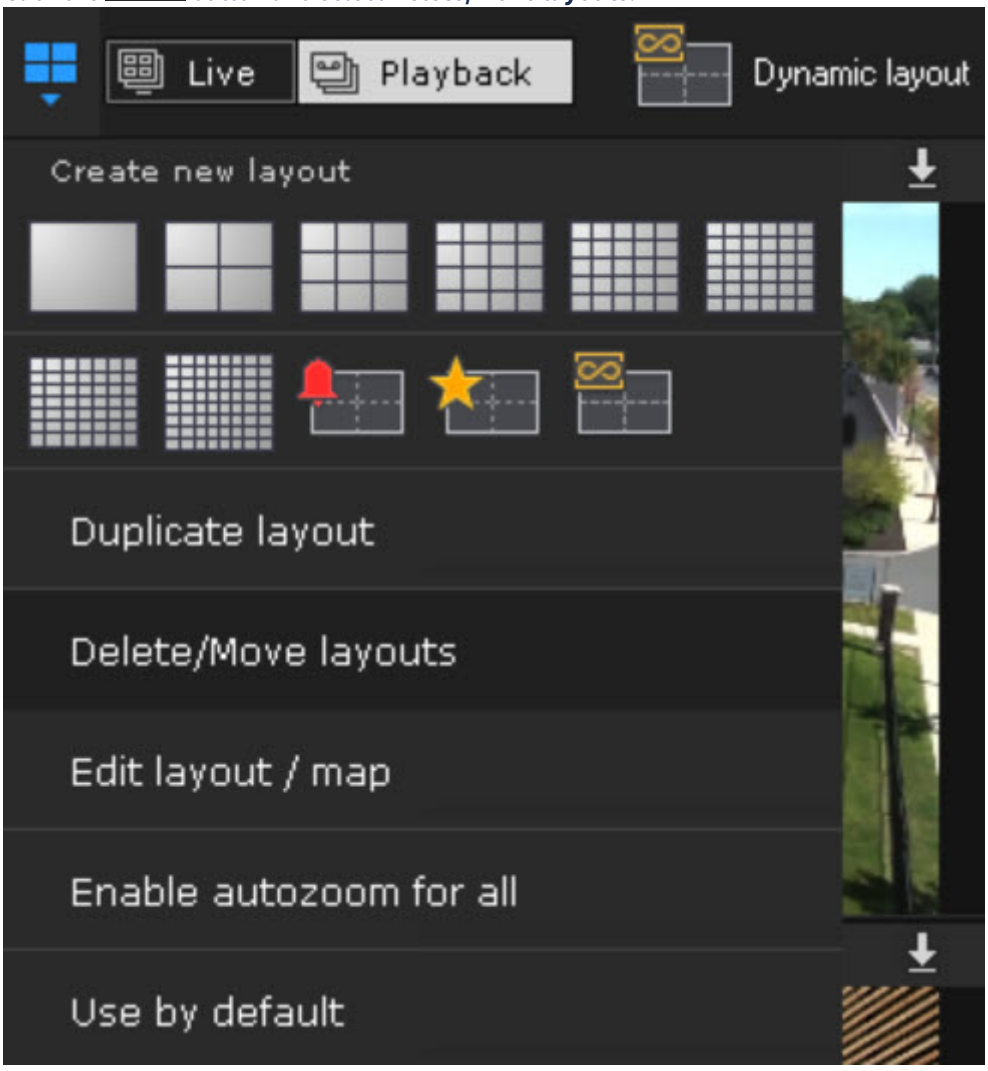
19.7.9 Configuring custom slideshows

Slideshow is a set of layouts displayed on the operator's screen in a specified order for a specified period (see Configuring the slideshow parameters(see page 1027)).

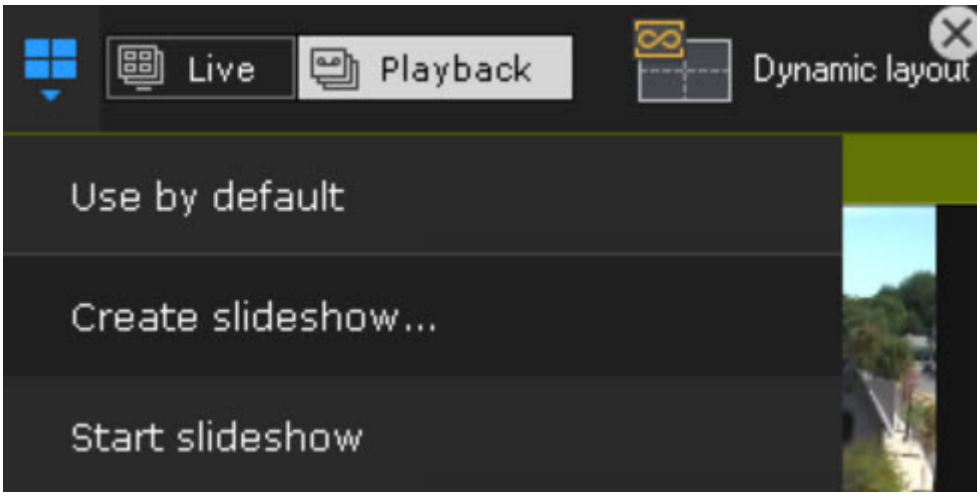
By default, the system has only one slideshow that includes all available layouts.

To create a custom slideshow, do the following:

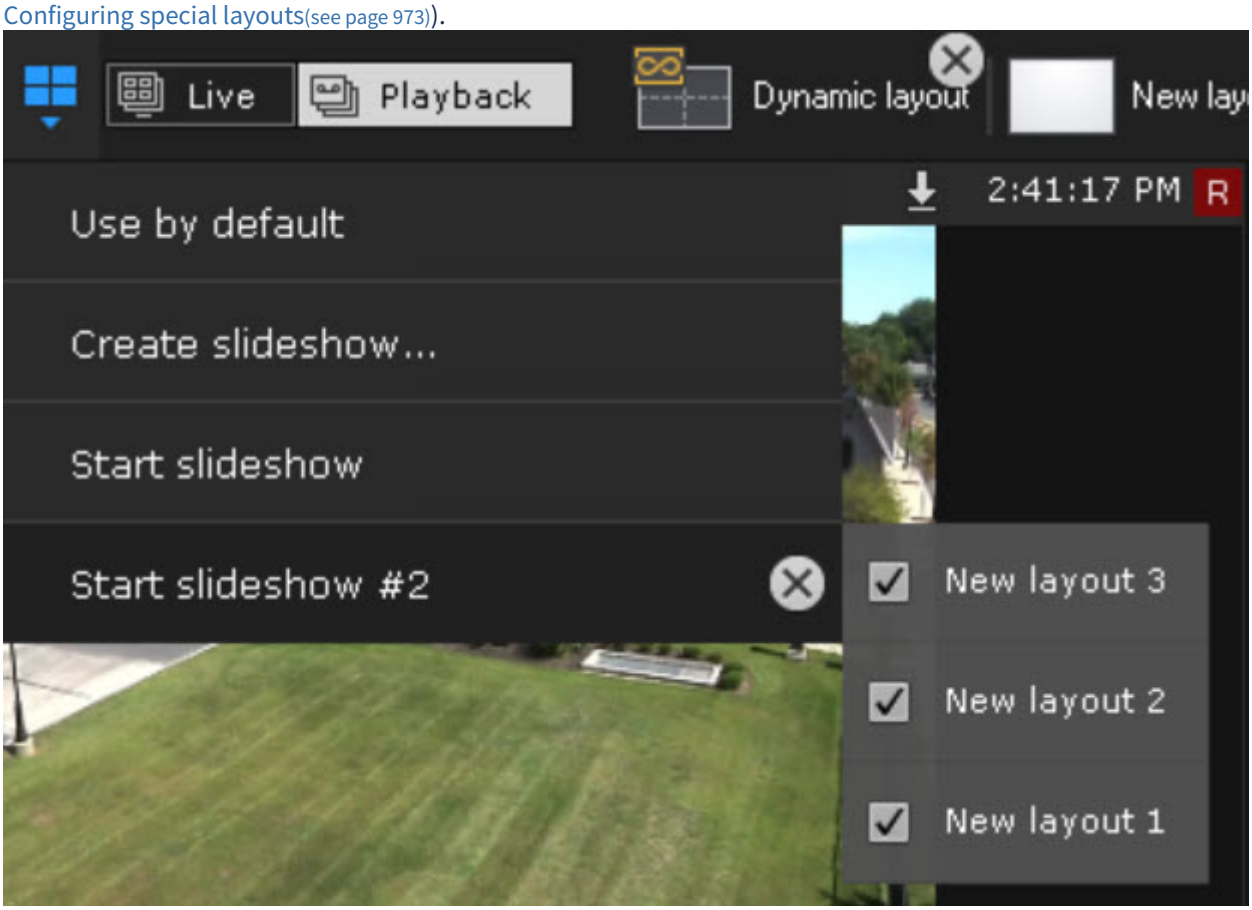
1. Go to the layout control mode (see Creating and deleting layouts(see page 942)).
2. Click the  button and select **Delete/Move layouts**.



3. Click the  button and select **Create slideshow...** .



4. Select the layouts that you want to include in the slideshow. You cannot include special layouts in the slideshow (see Configuring special layouts(see page 973)).



5. Click the **Save**  button in the upper right corner.

To remove a custom slideshow, click the  button.

19.7.10 Setting the default layout

You can set a default layout to be displayed after you launch the Web Client.

To set the default layout, do the following:

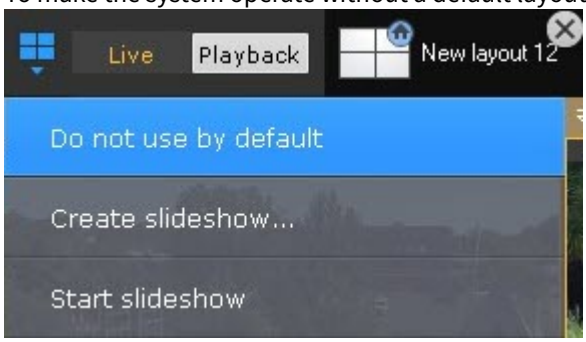
1. Go to Manage Layouts mode (see Creating and deleting layouts(see page 942)).
2. Go to the desired layout.
3. Click  and select **Use by default**.



Now, the current layout is assigned as default.

To assign another layout as default, repeat the steps above.

To make the system operate without a default layout, click  and select **Do not use by default**.



19.7.11 Setting a layout ID

You can set an ID for a layout. This may appear useful for calling layouts with hotkeys (see Notes regarding hot key actions(see page 1056)).

To specify an ID, do the following:

1. Double click on a layout thumbnail.



2. Enter an ID.



3. Click anywhere in the Client UI.

Now, the ID is added and displayed before the layout name.



Note

When you hover the mouse cursor over a layout, the name and ID (if specified) of the layout are displayed separately.



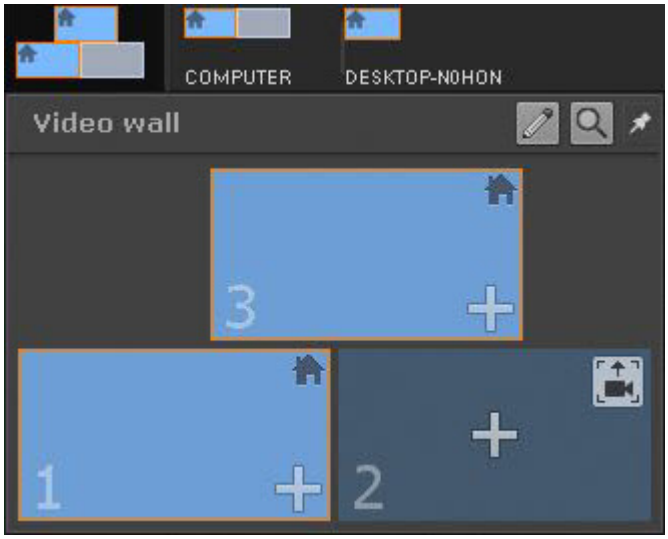
19.8 Configuring Video wall

A video wall is a set of monitors that are physically and logically connected into a single screen.

A video wall can include any monitors of all Clients of the domain. Except for cases when the user doesn't have permissions to the Servers to which some monitors in the video wall are connected (see Roles(see page 920)). In such cases, the user won't see the monitors to which they don't have access.

By default, the video wall is displayed with the initial configuration from the monitors of a local Client. However, after you make changes and save the configuration of the video wall, these changes are applied to all users in the domain.

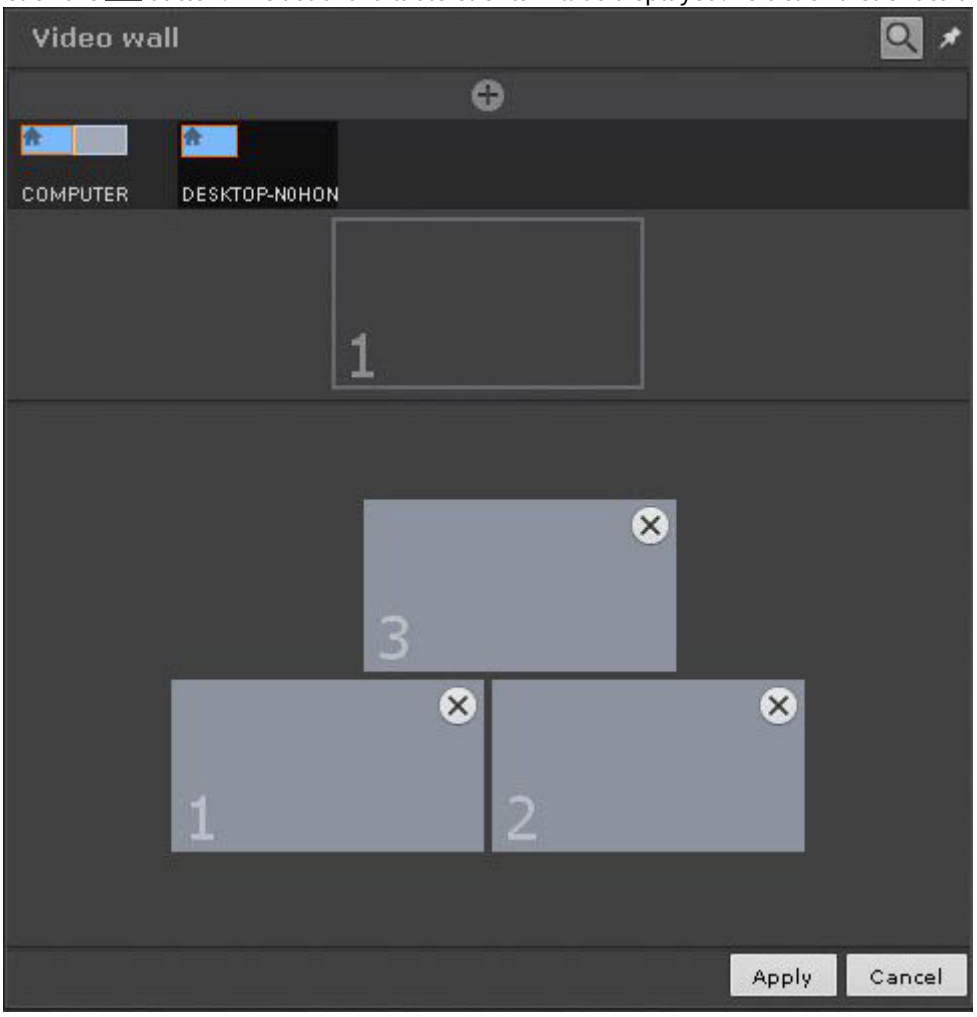
You can configure a video wall on the corresponding panel (see Video wall panel(see page 1127)).



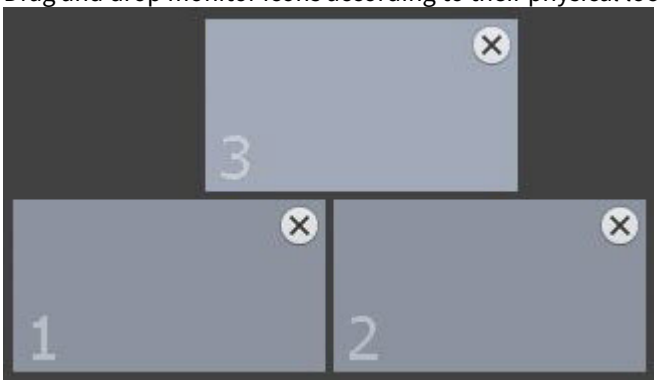
To configure a video wall, do the following:

1. Click the  button.

2. Click the button. The list of available Clients will be displayed. Left-click a Client to display its active monitors.



3. Drag and drop monitor icons according to their physical locations on the video wall.



> **Note**
>
> An ID number is assigned to each monitor added to the video wall. To display the ID number of a monitor, click the button.

4. Click the **Apply** button.

The video wall is configured.

> **Note**

You can manage the monitors of the video wall similarly to the Client monitors (see Managing monitors on a local Client(see page 1285), Managing monitors on remote Clients within the Axxon-domain(see page 1287)).

19.9 Configuring the interactive map

Configuration of the interactive map is performed in layout editing mode (see the sections Interactive map(see page 1129), Switching to layout editing mode(see page 945)).

Note

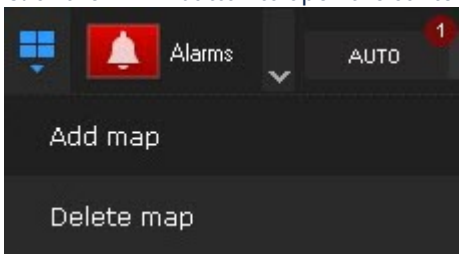
Creation, editing, and deletion of interactive maps are available to users with roles for which the **Change maps** component is activated (see the section General information about users(see page 917)).

19.9.1 Adding a new map

Vector maps in Axxon One(see page 1016)

To add a new map, do the following:

1. Do one of the following four actions:
   a. In the lower-left part of the screen, click the button.
   b. Click the button to open the context menu of the layouts panel and select the **Add map** item.

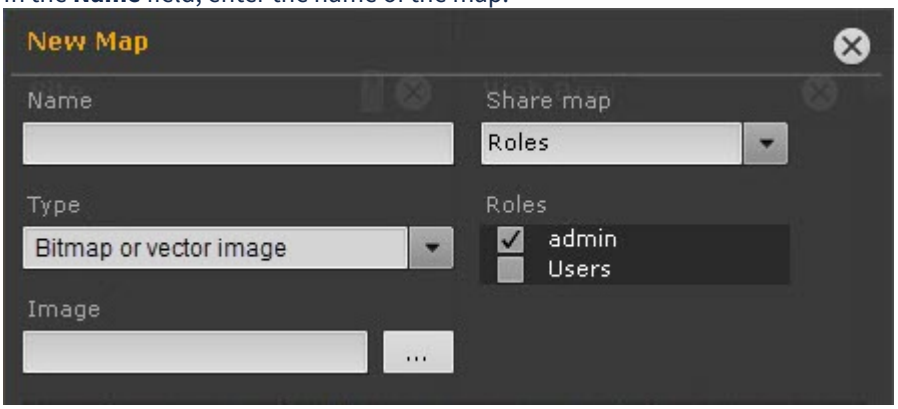


   c. Right-click the empty background of the map, and from the map context menu, select the **Add new map** item.



   d. Select a camera from the list on the cameras panel with a mouse cursor and, while holding down the mouse button, move the cursor to the empty map background and then release the mouse button. The action is available if no maps have been created in the system.

2. In the **Name** field, enter the name of the map.



3. In the **Type** field, select what will be used as a map (see Vector maps in Axxon One(see page 1016)):
   a. **Bitmap or vector image**.
   b. **Google**:
      i. **Google Hybrid**;
      ii. **Google Map**;
      iii. **Google Satellite**.
   c. **OpenStreetMap.**
4. If you select the **Bitmap or vector image** type of the map, click the ... button next to the **Image** field, and select a file that will be used as a graphic plan of the protected territory.
   Supported formats:
   a. Bitmap: PNG, JPG, JPEG, JPE, GIF, BMP.
   b. Vector image: SVG.

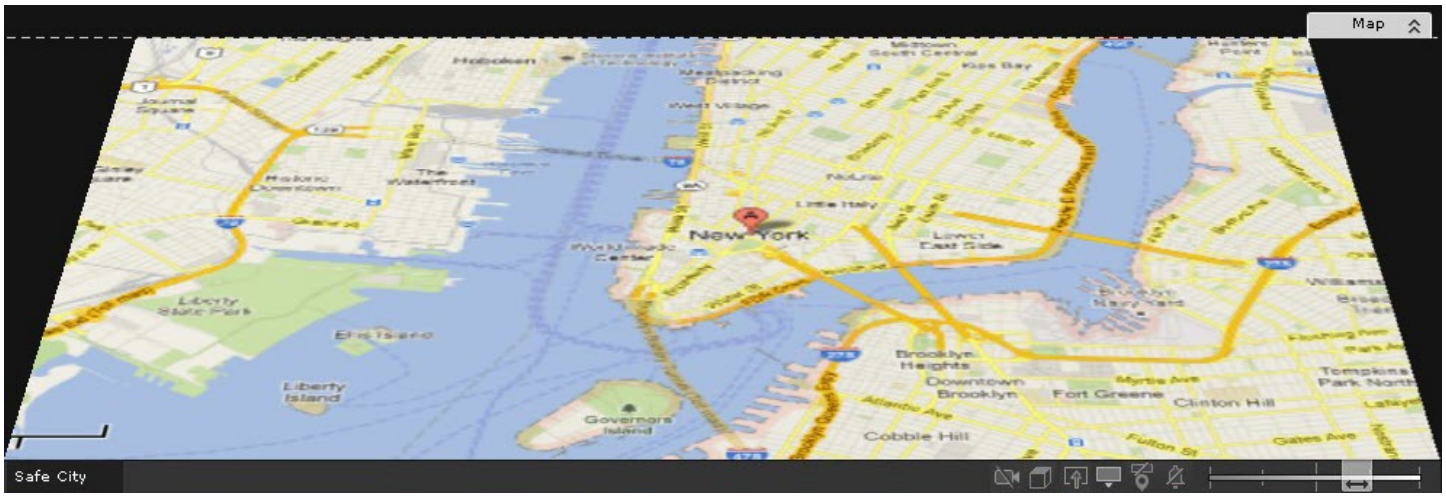
   > **Note**
   >
   > - The maximum image size is four million pixels (the number of pixels at 2000x2000 resolution). If you select a larger image, a map won't be created.
   > - If you don't select an image, a map with a white background will be created.
   > - The file size must not exceed 4 MB.

5. If you use a geomap, in the **Address** field, enter the address, zip code, or geographical coordinates of the required territory on the **Google** map or **OpenStreetMap** and click the ... button. You can scale the map with the scale slider or the mouse wheel. You can move on the map in the common way.



6. From the **Share map** drop-down list, select the users for whom the map will be available:
   a. **Any user**.
   b. **Not shared**—only for the current user.
   c. **Roles**—for the users of the selected roles.
7. Click the Apply button. To cancel adding a map, click the Cancel button.

Adding a map is complete.



19.9.2 Adding system objects to the map

You can add these types of objects to your map:

- video cameras,
- outputs (relays),
- inputs (sensors),
- macros,
- counters,
- switches to another map.

19.9.2.1 Adding video cameras

On this page:

- General information(see page 985)
- Adding a video camera using the drag-and-drop method(see page 986)
- Adding a video camera through the menu(see page 986)
  - Changing the size of video camera icons(see page 987)

19.9.2.1.1 General information

You can add a video camera to the map via:

- drag-and-drop[355] method;
- camera menu or object panel.

355 https://en.wikipedia.org/wiki/Drag_and_drop

19.9.2.1.2 Adding a video camera using the drag-and-drop method

You can add a video camera to the map using the drag-and-drop[356] method:

- from the Camera Search Panel (see Camera Search Panel(see page 1130));
- from the Object Panel (see Object panel(see page 1133)).

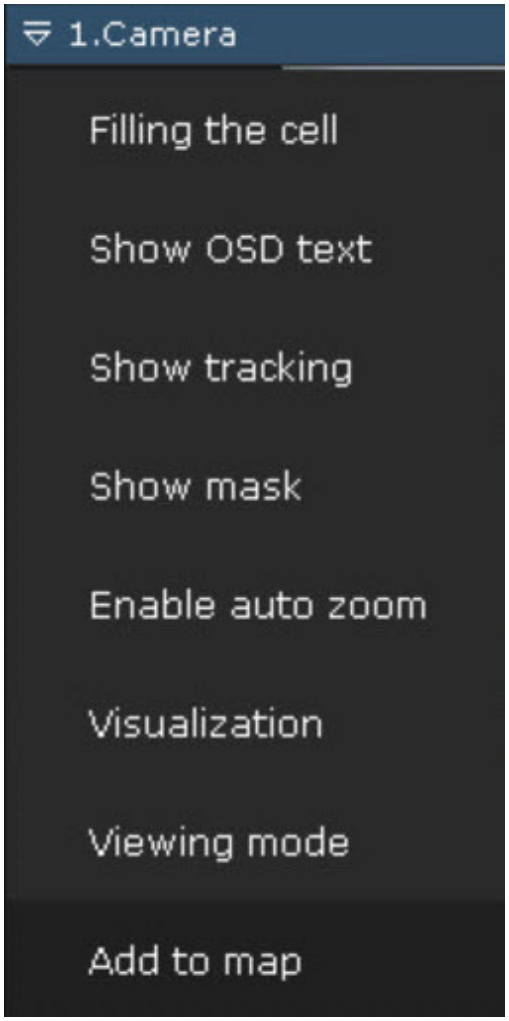
When using this method:

- if you add a group of video cameras, all video cameras in this group will be added to the map (see Configuring video camera groups(see page 265));
- the position of the video camera is pinned at the current location on the map. When you move existing video cameras on the map, their position is also pinned.

19.9.2.1.3 Adding a video camera through the menu

You can add a video camera to the map through the menu:

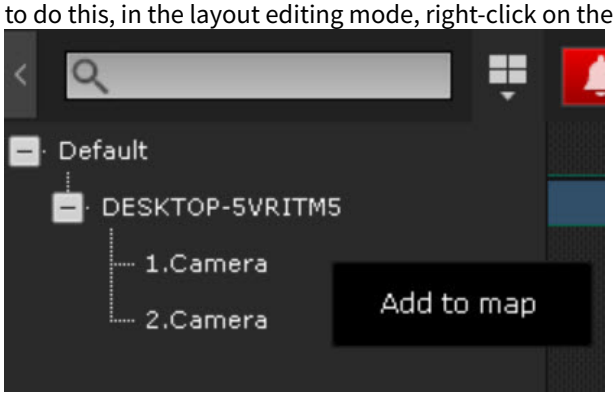
- of the video camera:
  - to do this, in the layout editing mode (see Switching to layout editing mode(see page 945)), left-click on the short name of the video camera and select the **Add to map** menu item.



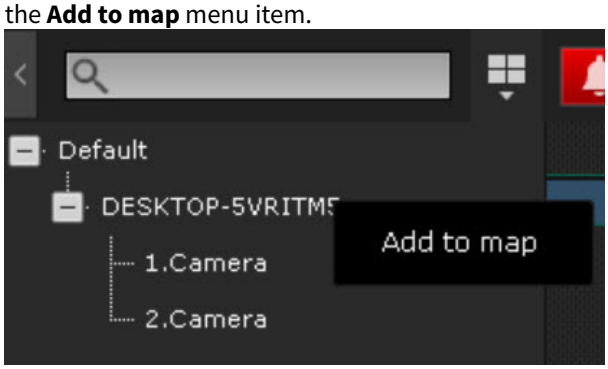
- of the object panel:

356 https://en.wikipedia.org/wiki/Drag_and_drop

- to do this, in the layout editing mode, right-click on the camera and select the **Add to map** menu item.



- if it is necessary to add all cameras of a group or Server, right-click on the name of the group or Server and select the **Add to map** menu item.



If the **Geo location latitude**, **Geo location longitude** and **Geo location azimuth** are specified for the camera (see Camera(see page 171)), then the video camera icon will be automatically positioned on the map in accordance with the specified coordinates.

If coordinates are not specified, the video camera icon will automatically be positioned at the center of the visible map area.

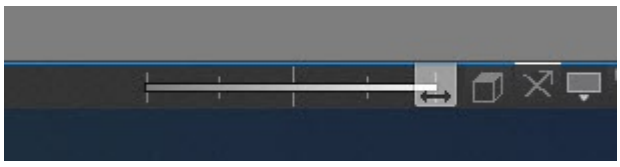
Attention!

- If the video camera's longitude and latitude values are **0**, the azimuth value will not be taken into account when adding the video camera to the map.
- **Geo location azimuth** is measured in degrees from north clockwise, where:
  - **0** degrees indicates that the camera field of view is north (up);
  - 90 degrees—east (right).
- If a video camera has a built-in GPS tracker, its location on the geomap changes automatically according to the received data (see Configuring cameras with a built-in GPS tracker(see page 991)).

If the camera coordinate settings are changed, it is necessary to remove the camera from the map and add it again to apply the new coordinate values.

19.9.2.1.3.1 Changing the size of video camera icons

To change the size of the video camera icons, you must use the Change icon size slider in the lower right corner of the screen in the layout editing mode.



19.9.2.2 Adding inputs and outputs

Only Input and Output objects that have been activated can be added to the map.

To add inputs/outputs to the Map, do the following:

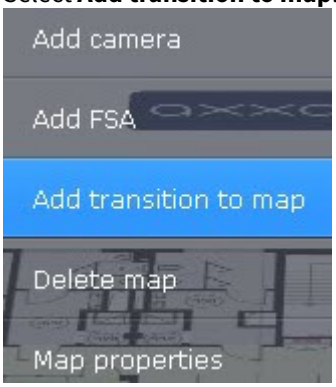
1. Open **Objects Panel** (see Object panel(see page 1133)).
2. Drag and drop the inputs/outputs to the map.

19.9.2.3 Adding switches to another map

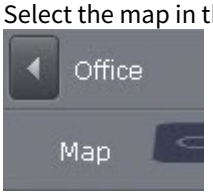
You can add a "switch" to another map in one of two ways:

1. Select the tab of the map to which you want the switch to point and, without releasing the mouse button, drag it to the map and release the mouse button.
2. By using the map context menu.

1. Select **Add transition to map**.



2. Select the map in the system to which the new switch will point.



Addition of the switch is now complete.

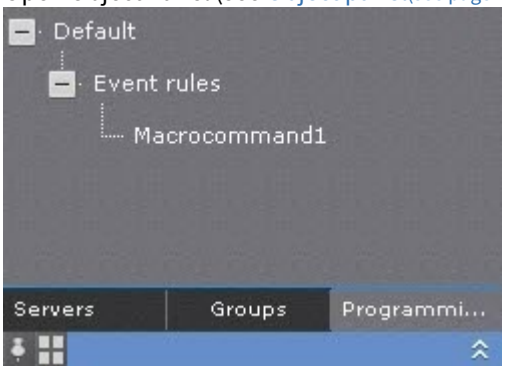


Then drag the switch icon to the necessary place on the map.

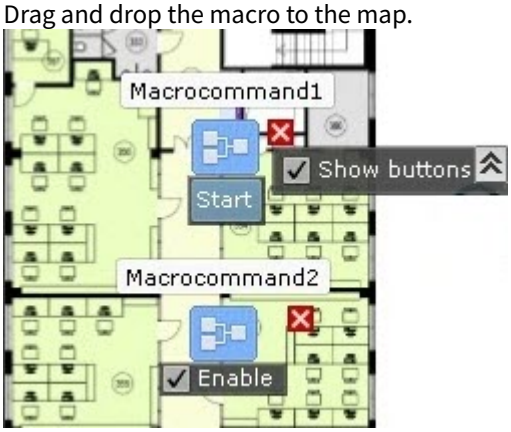
19.9.2.4 Adding macros

To add macros (see General information about macros(see page 829)) to the map, do as follows:

1. Open Object Panel (see Object panel(see page 1133)) and go to the **Programming** tab.



2. Drag and drop the macro to the map.



3. By default, for event-driven macros you will see the Start button, and the on/off checkbox for cyclic macros. To hide them, deselect the **Show buttons** checkbox. In this case, you can manage the macros only through the context menu.

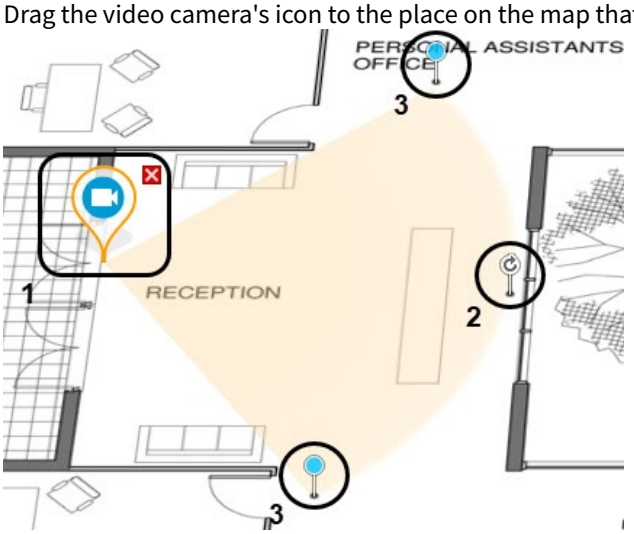
> **Note**
>
> To remove a macro from the map, click ✖.

19.9.3 Configuring cameras on the map

19.9.3.1 Configuring a camera in standard map viewing mode

After you add a camera to the map (see Adding video cameras(see page 985)), perform the following actions:

1. Drag the video camera's icon to the place on the map that represents the camera's actual location at the site (**1**).



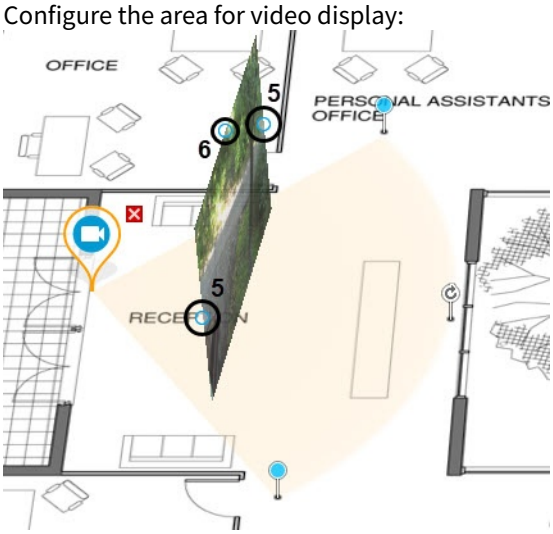
2. Set the video camera's field of view in the same direction as at the real site (**2**).
3. On the map, use the nodal points to adjust the video camera's field of view to match the actual situation at the site (**3**).
4. To display the video image, right-click on the area of the video camera's field of view and select the **Show video** item from the context menu (**4**).



> **Note**

This option (**Show video** or **Hide video**) can be configured separately from the layout editing mode. In this case, the parameter setting will be saved until the client is restarted.

5. Configure the area for video display:



Important!

To display the video image when using ceiling-mounted fish-eye cameras (see Configuring fisheye cameras(see page 183)), it is necessary to set the area of the camera's field of view (**3**) in the form of a circle (360° field of view). In this case, the video image from the video camera will be displayed directly in the specified area:



To enable this feature on cameras with Immervision lenses, it is necessary to select the **PTZ** display mode (see Configuring fisheye cameras(see page 183)).
If the camera's fish-eye field of view is different from the ceiling position, the video image display area is not available.

a. Using dots (**5**), adjust the size of the video image area – left-click the dot, hold and drag the cursor.
b. Using a dot (**6**), change the tilt angle of the area.

Note

You can switch map display to "flat" while working with the Map (see Customizing an interactive map(see page 1297)).

c. Using the slider in the lower right corner of the screen, adjust the transparency of the video image display area.



Configuration of the camera in standard map viewing mode is complete.

19.9.3.2 Configuring cameras with an embedded GPS tracker

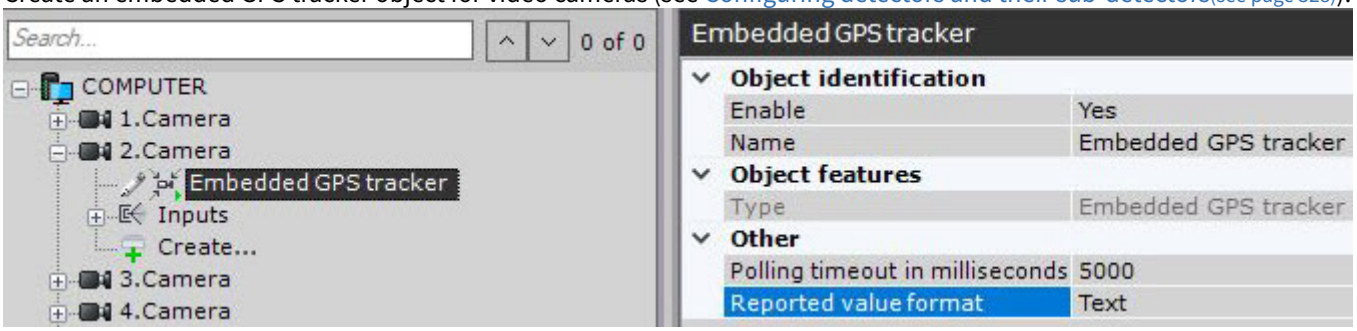
Some devices contain an embedded GPS tracker that transmits the current coordinates of the device to *Axxon One* VMS.

Location of these devices/cameras and their feeds are automatically geotagged when displayed on a geo map.

> **Note**
>
> This feature is widely used when cameras are installed, for example, in ambulances or public transport.

To enable this feature, do as follows:

1. Create an embedded GPS tracker object for video cameras (see Configuring detectors and their sub-detectors(see page 328)).



2. Create a geomap (see Adding a new map(see page 983)).
3. Add video cameras to the geomap (see Adding video cameras(see page 985)).

19.9.3.3 Configuring cameras in immersion mode

You can link video to the objects shown on a map. This allows making video surveillance more visual and informative.

The feature is available through immersion mode (see Immersion mode(see page 1299)).

To link video to a map, use the four attachment points. Objects in the video need to be linked to their depiction on the site map.

To link objects with symbols on the map:

1. Click an object in the video. A point is added.

   > **Important!**
   >
   > When specifying points on an image, follow the rules:
   > 1. All 4 points should belong to the same horizontal plane. Place points on the floor or on the ground.
   > 2. Do not place 3 points on one line.
   > 3. Points should show the perspective of the plane.

2. Click on the depiction of the object on the map. A second point is added, connected by a line to the first point.

> **Important!**
>
> When a fourth link is made, it is possible that the second point cannot be placed in some areas. This occurs when the system cannot find a valid angle for displaying the video and map for the given links. Most likely, the links have been set incorrectly.



After a fourth link is added, an angle is chosen so that the surveillance objects in the video and on the map coincide.

To remove a link, place the cursor above the first point in the link and click the button. After all links are added, it is possible to change the location of previously set points by dragging them while holding the left mouse button.

To save links between video and the map, exit layout editing mode and save changes. The links you make are discarded if any of the following occur before you exit and save changes:

- The position of the video camera icon on the map is changed.
- The angle of display of the video display area for the camera on the map is changed.
- The field of view of the camera on the map is changed in any way.

19.9.4 Attaching a map to a layout

You can attach a map to a layout. This means that when you switch to the layout, the attached map opens automatically.

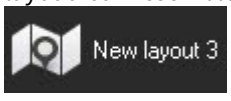
To attach a map to a layout:

1. Select the layout with which you want to associate the map in the layouts ribbon or create a new layout (see Creating and deleting layouts(see page 942) and Selecting a layout for editing(see page 946)).
2. Go to map editing mode (see the section Opening and closing the map(see page 1291))
3. Go to an existing map with which you want to associate the layout or create a new map (see the sections Switching between maps(see page 1298) and Adding a new map(see page 983)).
4. Save changes and exit layout editing mode (see Exiting Layout Editing mode(see page 972)).

After you save the layout, its icon resembles than shown in picture below.



If a map is open in 2D mode when you save a layout, when you switch to that layout, the map will always open in 2D mode. The layout icon resembles that shown in picture below.



The map is now attached to the layout.

19.9.5 Configuring the floors

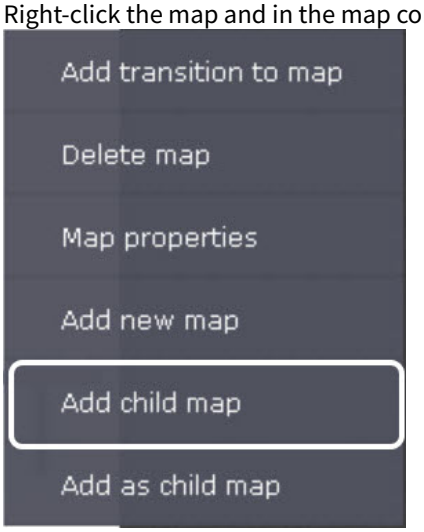
19.9.5.1 Creating a new floor

You can create a new floor in two ways: by adding child map or by adding a map as a child.

19.9.5.1.1 Adding child map

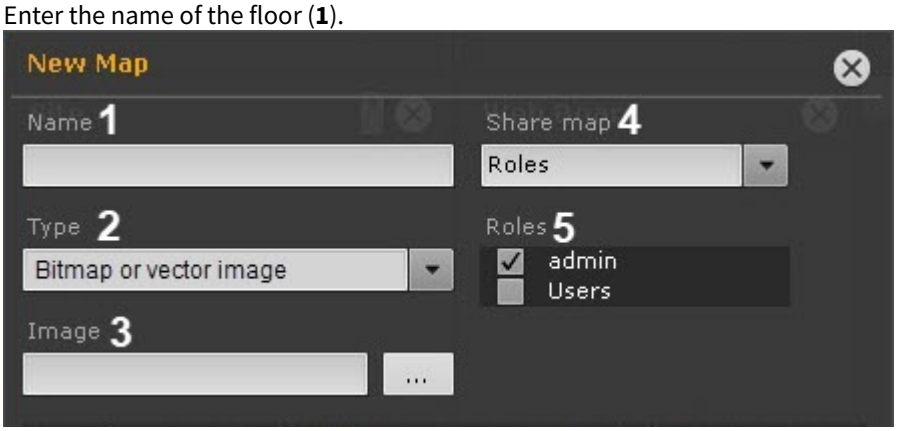
To add child map, do the following:

1. Right-click the map and in the map context menu, select the **Add child map** item.



> **Note**
>
> You can add a floor to an existing map (see Adding a new map(see page 983)).

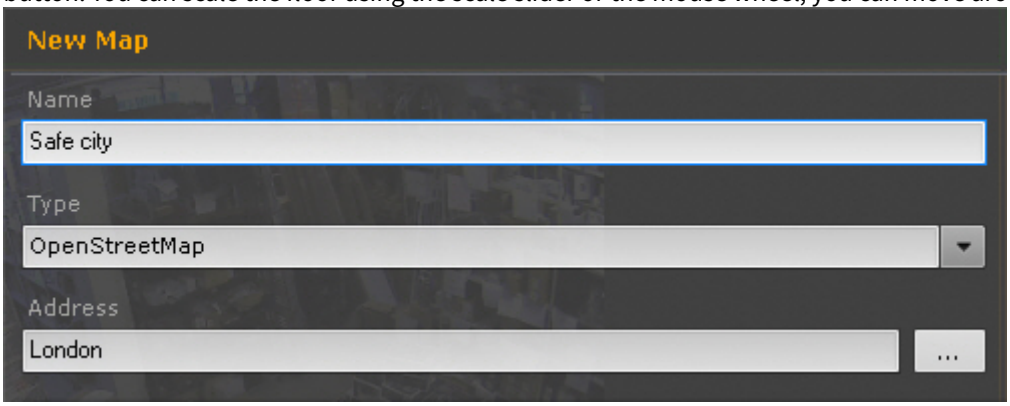
2. Enter the name of the floor (**1**).



3. Select the item that will be used as a floor map (**2**, see Vector maps in Axxon One(see page 1016)).
4. Click the ... button and select the image (**3**), which will be used as a graphic plan of the protected area (if the **Bitmap or vector image** type is selected). The supported formats: png, jpg, jpeg, jpe, gif and bmp. If no image is selected, a floor with a white background will be created.

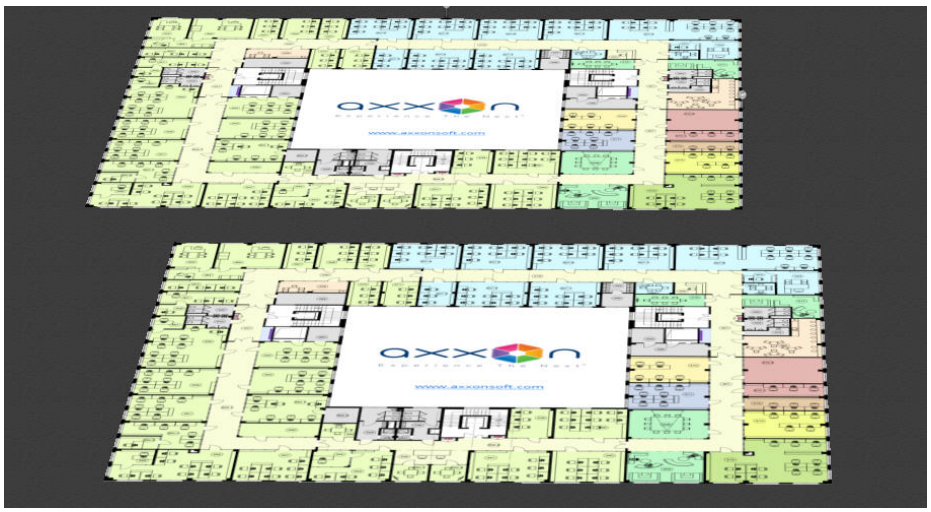
> **Note**
>
> The maximum image size is 4 million pixels (the number of pixels in the resolution 2000x2000). If you select a larger image, the floor will not be created.

5. If a geo map is used, in the **Address** field, enter either the address, or the zip code, or the geographical coordinates of the required area on the **OpenStreetMap** map (for details, see the provider's website[357]) or **Google** map and click the ... button. You can scale the floor using the scale slider or the mouse wheel, you can move around the floor in a standard way.



6. Select the users for whom the floor will be available (**4**): for everyone, only for the current user (**Nobody** option), for users of the selected roles (**5**).
7. Click the **Apply** button.
8. If necessary, repeat steps 1–7, adding a new floor to the last created floor.

The floor is created.



19.9.5.1.2 Adding as child map

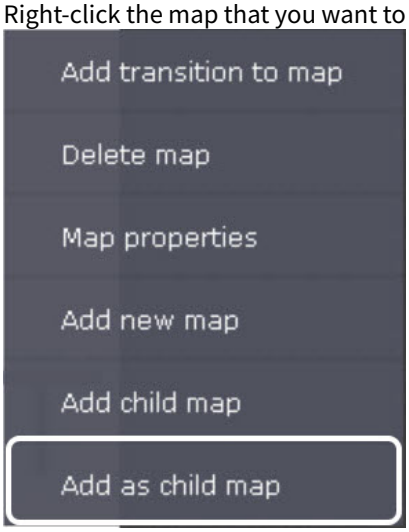
Attention!

- You can only add a map as child if it does not have lower floors. At the same time, the parent map should not have upper floors.
- If a map, which is added as a child, and a parent map both are a part of map hierarchies, then these map hierarchies must be independent.
- If one of the conditions described above is not met, the **Add as child map** item will not be displayed.
- Geomaps cannot be added as top or bottom floors in a map hierarchy

To add a map as a child map, do the following:

357 https://wiki.openstreetmap.org/wiki/Browsing

1. Right-click the map that you want to add as a child and in the map context menu, select the **Add as child map** item.

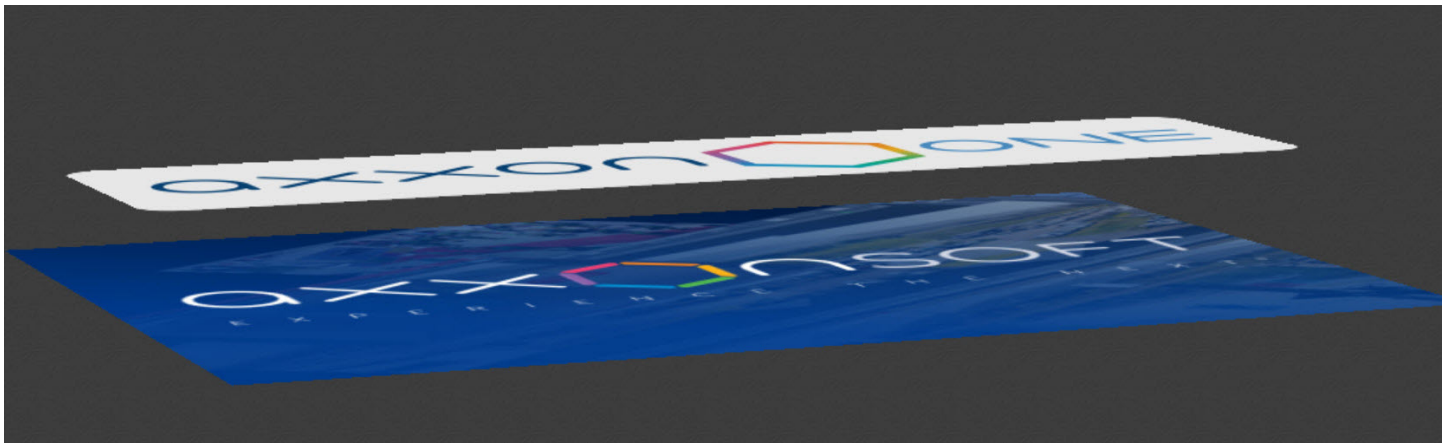


2. Select the map to which you want to add a map as a child map.



3. Click the **Apply** button.

Creating a map as a child map is complete.

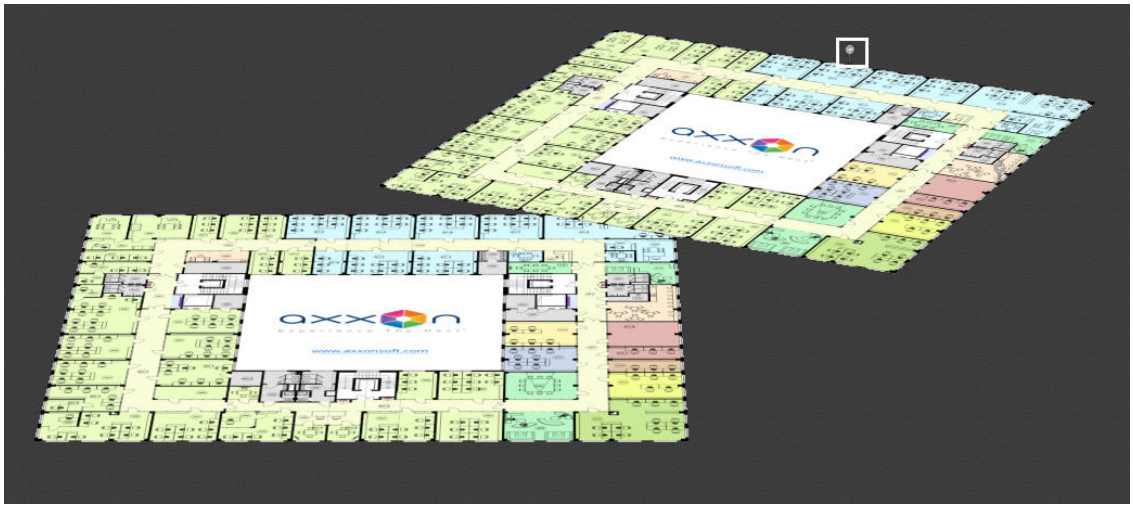


19.9.5.2 Configuring floor location on the map

To shift a floor in an arbitrary direction, click on the floor image and, while holding down the left mouse button, move the image to the required location.

> **Note**
>
> Both the selected floor and the floors created on its basis will move.

To rotate or resize the floor image, click and hold the  button, and rotate or enlarge the floor image.



19.9.5.3 Editing a floor

When you create a floor, each new floor is created as a separate map. To edit a floor, go to the tab with its map:



The same functions are available for editing a floor as for a map:

1. Adding objects to the floor — see Adding system objects to the map(see page 985).
2. Configuring the display of added video cameras — see Configuring cameras on the map(see page 989).
3. Removing objects from a floor — see Removing objects from the map(see page 997).

4. Changing the type and display — see Changing map type and display(see page 998).
5. Changing the name of the floor — see Renaming the map(see page 998).

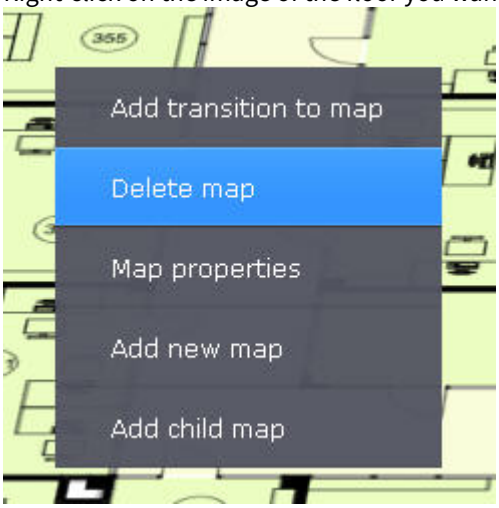
19.9.5.4 Removing a floor

You can delete a floor in two ways:

1. In the lower left corner of the screen, click the button on the tab corresponding to the floor you want to delete:



2. Right-click on the image of the floor you want to delete and select the **Delete map** item from the context menu:



19.9.6 Removing objects from the map

To remove an object from the map, click the button that is next to the object icon, or in the context menu, select **Remove from map**.



> **Note**
>
> To delete a map switch, you must click the button.

19.9.7 Setting keywords for geomap search

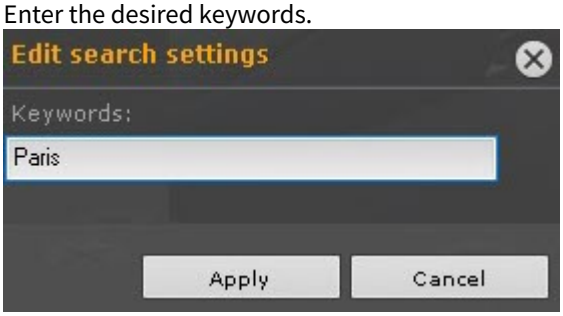
The keywords are needed to locate a site or a street on OpenStreetMap.

For example, if you are searching for a site or a street in a particular city/town, the name of the town has to be entered as a keyword.

The default keyword is the address set during the map creation process (see Adding a new map(see page 983)).

To set new keywords, you need to:

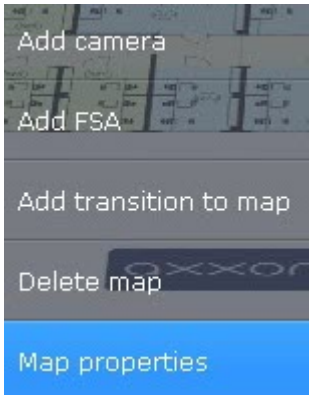
1. Click in the lower panel.
2. Enter the desired keywords.



3. Click **Apply**.

19.9.8 Changing map type and display

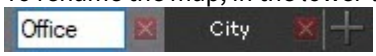
You can change the type and display of a map that has been created previously. To do so, open the map context menu and select **Map properties**.



A map properties configuration window opens, which is similar to the map creation window (see Adding a new map(see page 983)).

19.9.9 Renaming the map

To rename the map, in the lower-left corner of the screen, left-click a tab and specify a new name.



19.9.10 Sorting of map lists

You can change the order of tabs for previously created maps. By default, tabs with maps are ordered by creation date.

To change the order, drag and drop tabs as necessary. Left-click a tab and drag it to the desired location.



19.9.11 Deleting a map

To delete a map, in the lower-left corner of the screen, select the button on the corresponding tab. Alternatively, in the context menu, you can select **Delete map**.





19.10 System preferences

19.10.1 Server settings

19.10.1.1 Configuring Search in archive

On the page:

- Enabling the recording of video stream metadata(see page 999)
- Configuring user permissions for Search in archive(see page 1000)

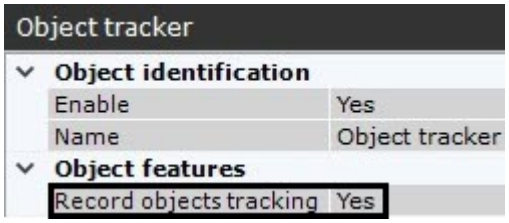
To perform Search in archive of a camera, the following conditions must be met:

1. Video meets the requirements (see Requirements to video parameters for Search in archive(see page 1000)).
2. There are recordings of a video stream from the required camera in the archive (see Configuring recording to an archive(see page 295)).
3. There are recordings of metadata from at least one source in the database of object tracks. Metadata can be generated by *Axxon One* (see Metadata database(see page 333)) or received from a camera (see General information about embedded detectors(see page 811)).
4. The user has the appropriate permissions (see Roles(see page 920)).

This section contains information on how to configure *Axxon One* to meet these conditions.

19.10.1.1.1 Enabling the recording of video stream metadata

To enable metadata recording to the database, select **Yes** in the **Record objects tracking** list for the corresponding detection tool (object tracker, face recognition, embedded detection). The metadata recording is enabled by default.



In the settings of the **Motion detection**, you must enable the **Object tracking** parameter (see Motion detector(see page 446)).

Note

For the information on configuring the storage of metadata, see Configuring storage of the archive, system log, and metadata(see page 1009).

19.10.1.1.2 Configuring user permissions for Search in archive

You need **Live/Archive**, **Live/Archive/Control** or **Live/Archive/Control/Configure** permissions for a camera to perform a Search in archive (see Roles(see page 920)).



19.10.1.1.3 Requirements to video parameters for Search in archive

When you use Search in archive, the video parameters must meet the same requirements as for detection tools.

In addition, there is a dependence of the minimum and maximum allowable speed of object movement in the video image on the camera frame rate:

1. The maximum speed depends on the size of an object. The following table shows the dependence of the maximum allowable speed on the frame rate for typical objects—human and car:

Frame rate	Maximum allowable speed of a human	Maximum allowable speed of a car
6 FPS	5 km/hr	40 km/hr
12 FPS	10 km/hr	85 km/hr
25 FPS	20 km/hr	170 km/hr

   So if it is necessary, for example, to detect people moving at a speed of up to 10 km/hr, it is sufficient to record at 12 FPS.
2. The minimum speed of object movement must be such that the object image shifts by at least 1 pixel per frame.

19.10.1.2 Setting up privacy masking

19.10.1.2.1 Masking faces

You can mask recognized faces of a designated users' group (role).

The face(s) will be masked:

- during Live or Video Footage viewing;
- during Video Footage search.

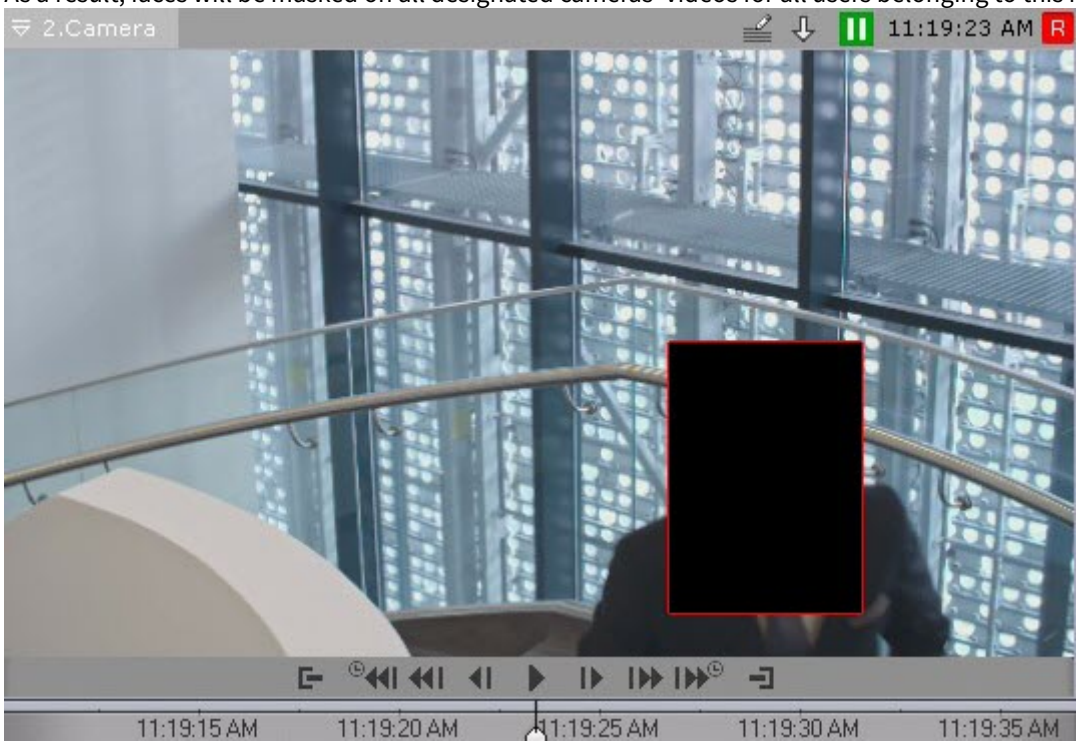
Attention!

Privacy masks are displayed in the standalone Client software only. You cannot use masks with both Web and Mobile Clients.

To do it, follow the steps below:

1. Create and configure Face Detection Tools for cameras where face masking is necessary (see Category: Face(see page 473)).
2. Set **No** for the **Show faces** parameter in the Role Settings panel (see Roles(see page 920)).

As a result, faces will be masked on all designated cameras' videos for all users belonging to this role.



19.10.1.2.2 Configuring privacy masking in archive

You can mask any objects on the video image in the archive for certain users.

The objects are masked:

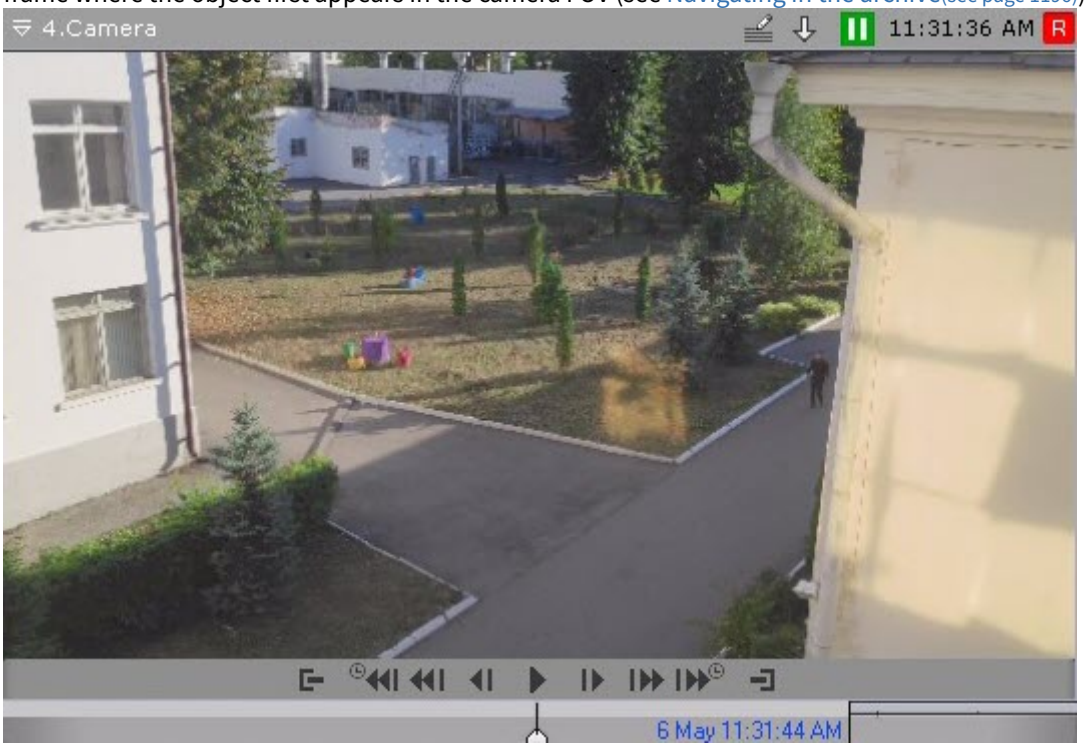
- when viewing the archive,
- when searching in the archive,
- when exporting from the archive.

To do this, set the **No** value for the **View masked video** parameter in the role settings (see Roles(see page 920)). The objects are masked for all users belonging to this role.

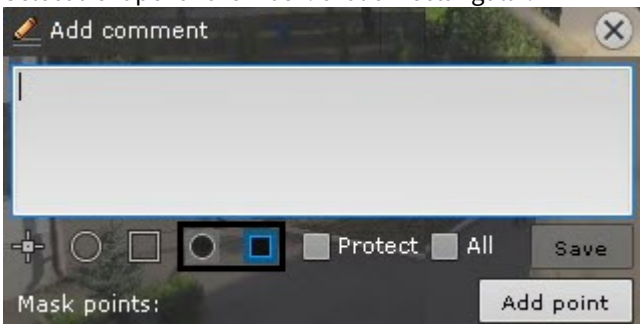
> **Attention!**
>
> Privacy masks are displayed in the Client only. You cannot use masks in the Web-Client and mobile Client.

To mask an object in the archive, do the following:

1. Go to Archive mode and find the object you want to mask (see Switching to the Archive mode(see page 1187)). Go to the frame where the object first appears in the camera FOV (see Navigating in the archive(see page 1196)).

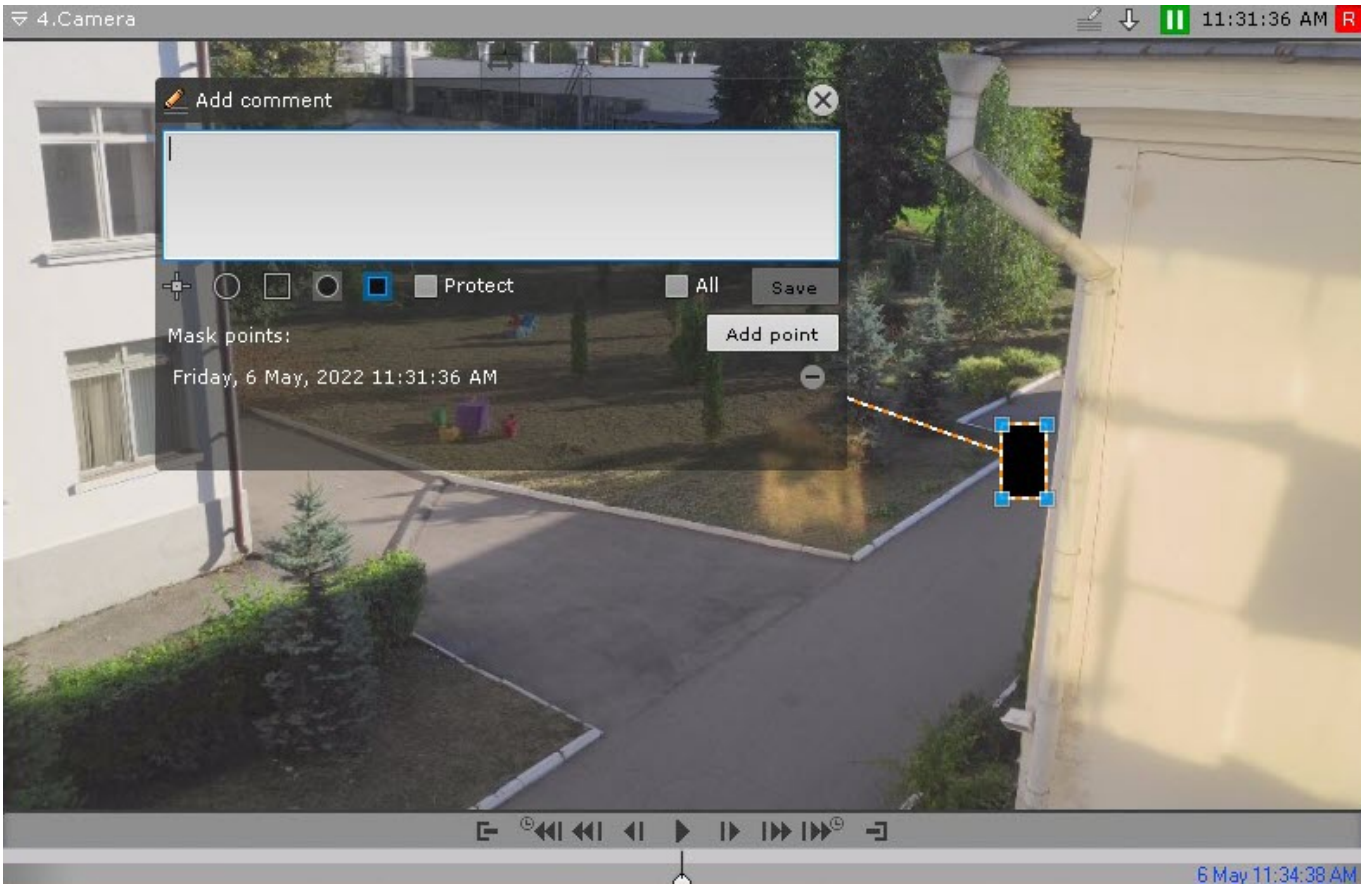


2. Click the  button.
3. Select a shape for the mask: oval or rectangular.

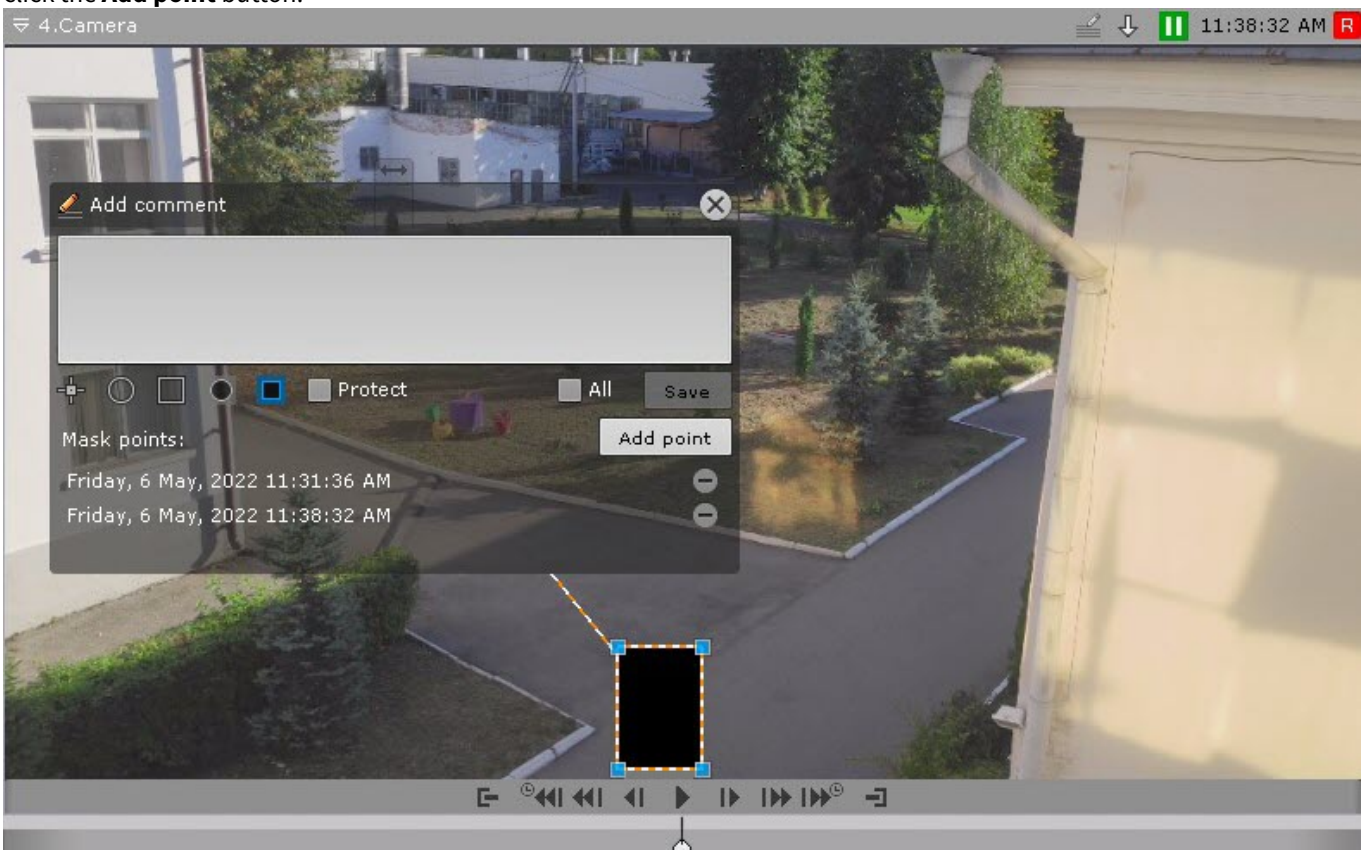


4. Apply the mask over the object.

> **Note**
>
> Configuring a masked area similar to adding a comment (see Adding a comment(see page 1154)).

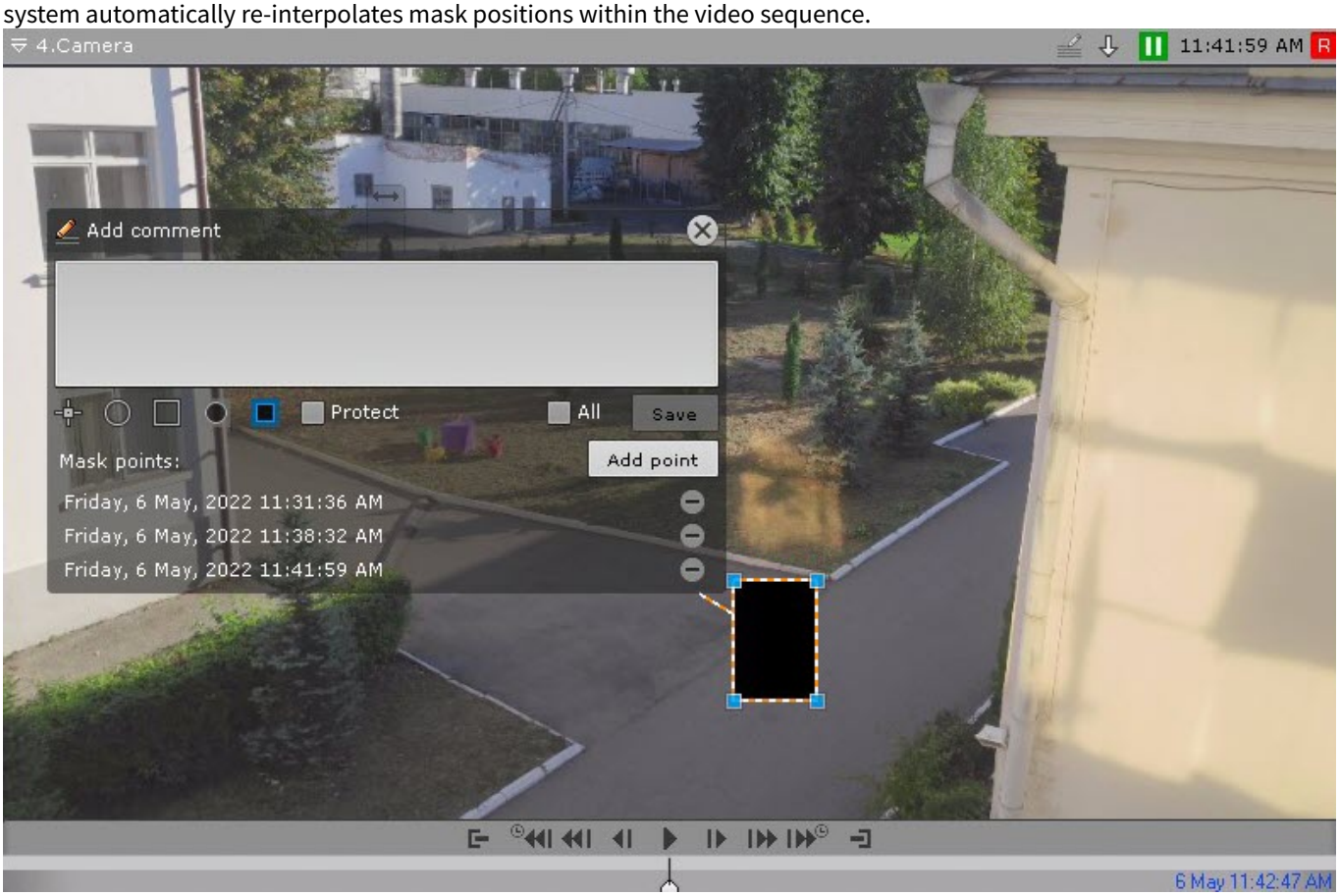


5. Locate the last frame before the object disappears from the camera FOV and place the mask over it. To save mask position, click the **Add point** button.



6. The system automatically interpolates the mask position on intermediate frames, assuming that the object is moving straight and rectilinear.

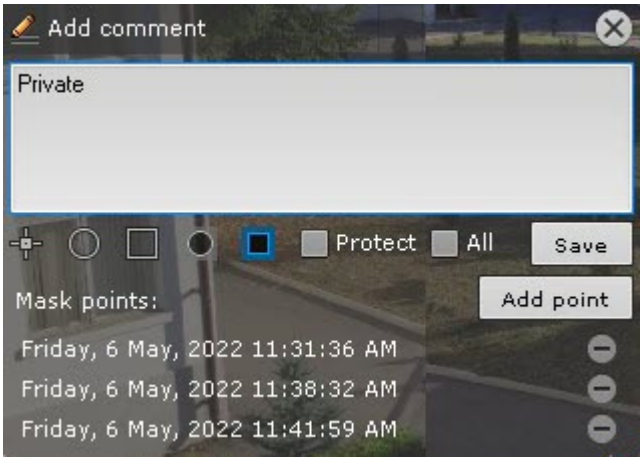
7. View the video. If necessary, you can specify additional mask positions on intermediate frames for better masking. The system automatically re-interpolates mask positions within the video sequence.



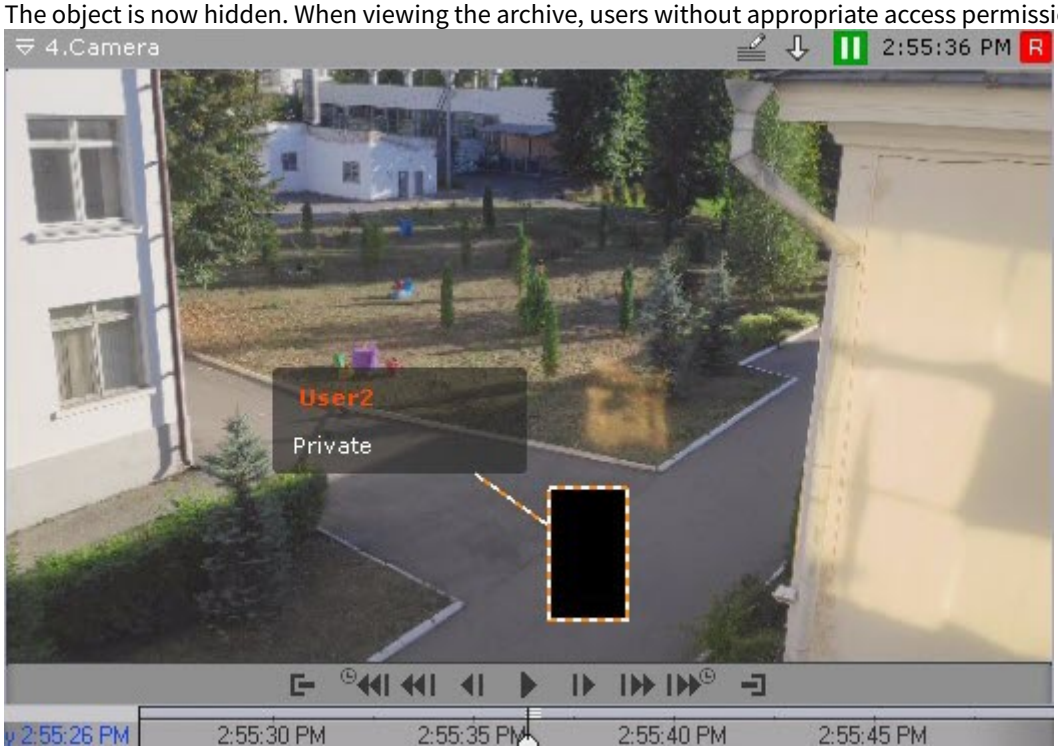
> **Note**
>
> To remove a mask position, click the button.

8. After setting all necessary mask positions, enter your comment and click the **Save** button.

> **Attention!**
>
> After the mask is saved, you cannot delete it. Only the users who have the **Yes** value selected for the **View masked video** parameter can hide the mask when viewing the archive and exporting (see Roles(see page 920)).



The object is now hidden. When viewing the archive, users without appropriate access permissions see the object masked.



19.10.1.3 Configuring hardware video decoding for display on the Client

In the *Axxon One* Client, there are two ways for hardware video decoding:

1. Using the Intel Quick Sync Video technology (see Hardware-based decoding with Intel Quick Sync Video(see page 1005)).
2. Using the NVDEC chip on NVIDIA graphics cards (see Hardware-based decoding with NVIDIA NVDEC chips(see page 1007)).

In addition, decoding with both Intel QSV and NVDEC is possible (see Simultaneous decoding with Intel Quick Sync Video and NVIDIA NVDEC chips(see page 1008)).

Attention!

Hardware decoding is not supported for the videos that were created using the YUV422 format. If hardware decoding is enabled, such video will be decoded by the software on the CPU.

19.10.1.3.1 Hardware-based decoding with Intel Quick Sync Video

Intel Quick Sync Video is a technology available on some Intel processors, that provides hardware acceleration for video encoding and decoding. This technology provides faster and more energy efficient processing of video content.

Attention!

Axxon One applies Intel Quick Sync Video for decoding:

1. Video in the formats: H.264, H.265 and H.265+.
2. Live mode, Archive mode (forward playback only) and TimeCompressor(see page 1191) mode.

Attention!

If the Client shares the same computer with the Server, which applies a detection tool to a video stream, Intel Quick Sync Video will not be used for displaying this stream.

Note

Maximum pixel resolution depends on your particular version of the Intel Quick Sync. For details, refer to https://www.intel.com/content/www/us/en/homepage.html.

To use Intel Quick Sync Video, make sure your system meets the following requirements:

1. The CPU has an integrated graphics core with Intel Quick Sync Video support.

   Note

   You can check if the CPU supports Intel Quick Sync Video here[358].

   Attention!

   For H.265 and H.265+ video formats, Intel Quick Sync Video technology is supported only on Intel processors with microarchitecture: Braswell (only decoding), Cherry Trail (only decoding), Skylake, Apollo Lake, Kaby Lake, Gemini, Coffee Lake and newer microarchitecture.

2. The mainboard supports the GPU core (includes Flexible Display Interface[359]).
3. The graphics driver supports Intel Quick Sync Video. We recommend using the latest version of the Intel HD Graphics Driver[360].

   Note

   You can also update the driver automatically using the Intel Driver Update Utility[361].

To enable Intel Quick Sync Video in *Axxon One*, do the following:

1. Enable using the integrated graphics core in the BIOS settings.

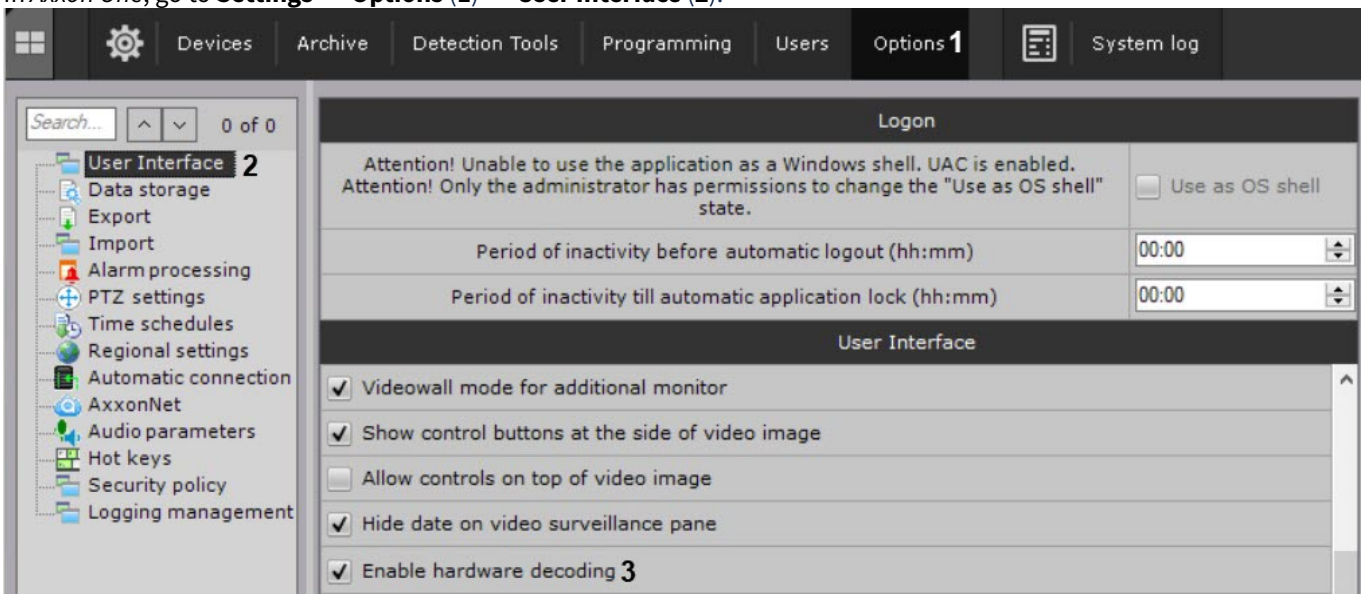
   Note

   Depending on the BIOS version, the option may be named differently (**iGPU**, **Internal Graphics**, **Integrated Graphics Adapter** – **PEG**).

2. It is not allowed to use an integrated graphics core and an external graphics card at the same time. In this case, to use Intel Quick Sync Video, do the following:
   a. Enable **Multi-Monitor** in the BIOS settings.
   b. In Windows OS connect a virtual monitor to the integrated graphics core and extend the desktop to it.

358 http://ark.intel.com/
359 https://en.wikipedia.org/wiki/Flexible_Display_Interface
360 https://downloadcenter.intel.com/search?keyword=Intel%C2%AE+HD+Graphics+Driver
361 http://www.intel.com/content/www/us/en/support/detect.html?iid=dc_iduu

3. In *Axxon One*, go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



4. Set the **Enable hardware decoding** checkbox (**3**).
5. Click the **Apply** button.

Intel Quick Sync Video in *Axxon One* is enabled.

19.10.1.3.2 Hardware-based decoding with NVIDIA NVDEC chips

NVDEC chips on NVIDIA GPUs provide accelerated hardware-based video decoding. This helps to reduce the load on the CPU and/or increase the number of the video cameras displayed on the Client.

Attention!

In *Axxon One*, the NVDEC chips are used to decode:
1. Video in the H.264, H.265 and MPEG-2 formats.
2. Live mode, Archive mode (forward playback only) and TimeCompressor(see page 1191) mode.

Attention!

Before you start, make sure to install the latest driver for your NVIDIA GPU.

Note

A list of the devices that support decoding with NVDEC chips, see on the NVIDIA official website[362].

Note

When decoding with NVIDIA NVDEC chips on portable computers due to the specifics of the devices interaction, the resources of the built-in graphics card will also be used.

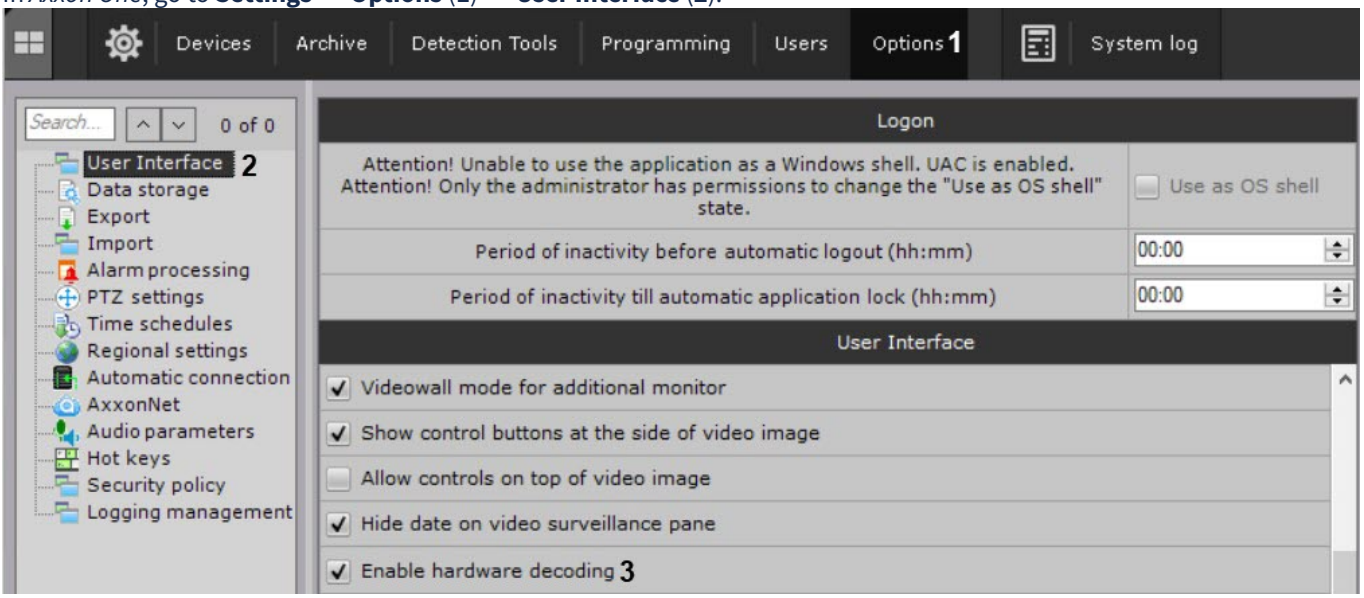
When decoding with NVDEC chips, the following limitations apply:

1. Maximum video resolution for the H.264 format is 4096x4096.
2. Maximum video resolution for the H.265 format is 8192x8192.
3. The maximum total frame rate per second for the H.264 format is 648 FPS.

To enable decoding with NVDEC chips, do the following:

362 https://developer.nvidia.com/video-encode-decode-gpu-support-matrix

1. In *Axxon One*, go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Set the **Enable hardware decoding** checkbox (**3**).
3. Click the **Apply** button.

Decoding with NVDEC chips is enabled.

19.10.1.3.3 Simultaneous decoding with Intel Quick Sync Video and NVIDIA NVDEC chips

Axxon One allows simultaneous decoding with Intel Quick Sync Video and NVIDIA NVDEC chips.

In this case, NVIDIA devices will be used first for decoding. When their resources end, Intel Quick Sync Video technology will be used.

For the simultaneous decoding, it is necessary to configure the decoding with Intel Quick Sync Video (see Hardware-based decoding with Intel Quick Sync Video(see page 1005)) and with NVIDIA NVDEC chips (see Hardware-based decoding with NVIDIA NVDEC chips(see page 1007)).

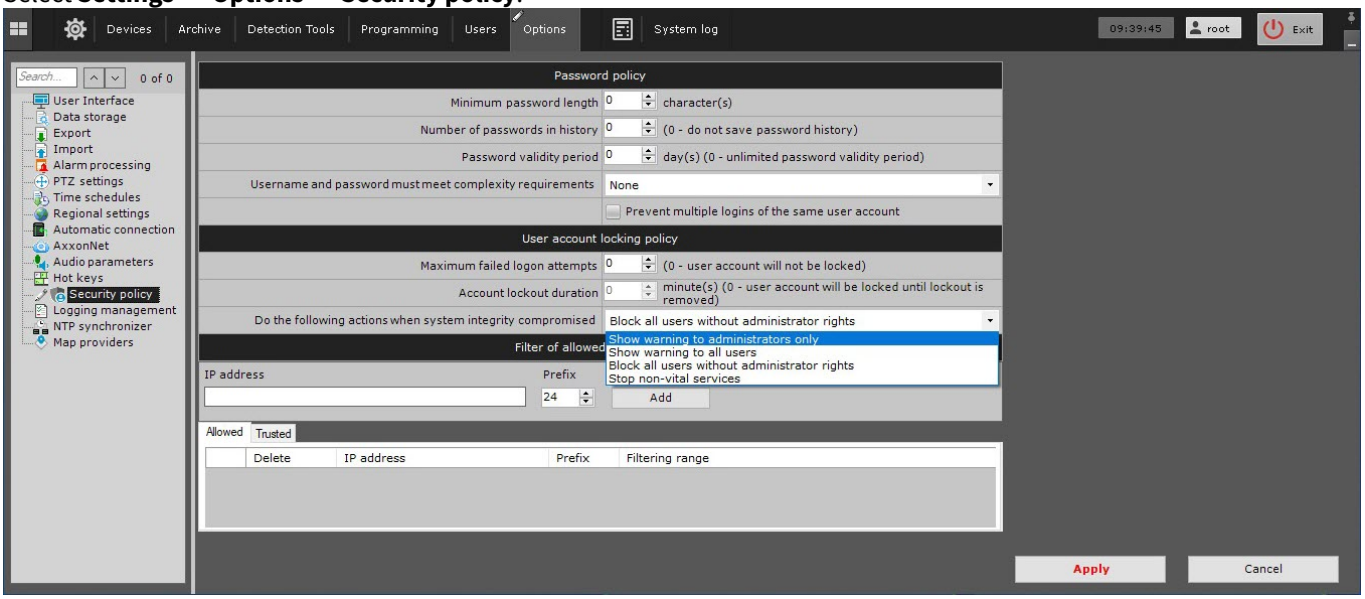
19.10.1.4 Configuring automatic response when Axxon One integrity check fails

When you start each Servers and Clients, *Axxon One* automatically checks the digital signature for all executable files (exe, dll, so).

If all files are in place and match their signatures, the **System integrity check passed successfully** record appears in the system log (see System log(see page 1318)).

If the integrity of system files and directories is compromised, altered by malware, or someone has attempted to hack into the system, *Axxon One* will automatically perform one of the pre-configured actions. To select the system response when integrity is compromised, do the following:

1. Select **Settings → Options → Security policy**.



2. From the **Do the following actions when system integrity compromised** drop-down list, select the necessary response:

Response	Description
Show warning to administrators only	Users of the **admin** role will see a warning when the Client starts. To continue launching the Client, click **Continue**. To quit, click **No**. To open a text file containing the list of compromised files, click **Details**. 
Show warning to all users	All users will see a warning
Block all users without administrator rights	The Client will shut down and the warning will be displayed for all users, except for the users of the **admin** role. They also won't be able to connect to the Server
Stop non-vital services	Operation of all objects that are subject to licensing (cameras, detection tool, and so on) will be stopped. A warning will be displayed for all users when starting the Client

3. Click the **Apply** button.

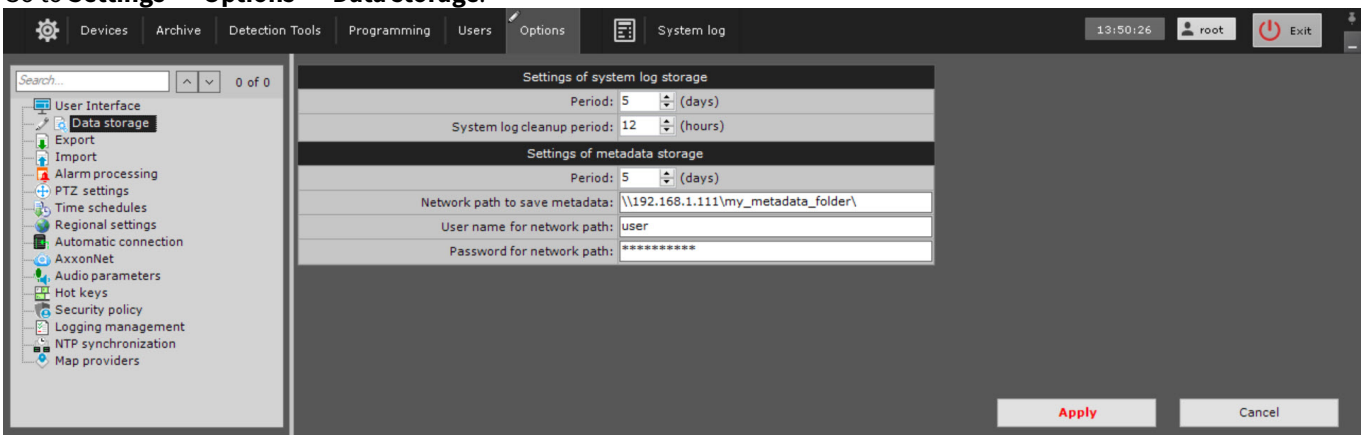
19.10.1.5 Data storage

System log(see page 1318) is stored in the local database for each server by default. You can set access to the system log for a user group in the **Users** tab of the **Settings** tab (see Roles(see page 920)).

Metadata (see page 333)files are stored in the metadata storage in the local directory of the server. The metadata storage path is set during the *Axxon One* installation (see Installation(see page 98)). If necessary, you can place metadata in the network storage.

To configure the data storage, do the following:

1. Go to **Settings** → **Options** → **Data storage**.



2. In the **Settings of system log storage** section:
   a. In the **Period** field, enter the storage period of the system log in the server database. The maximum allowable value is 1000 days.

      > **Attention!**
      >
      > If you enter the **0** value, the system log events are stored for 0 days.

   b. In the **System log cleanup period** field, enter the system log cleanup period for irrelevant events in hours. The events are considered irrelevant if their storage period in the system log exceeds the set one on the previous step.
3. In the **Settings of metadata storage** section:
   a. In the **Period** field, enter the metadata storage period in the metadata storage in days. The maximum allowable value is 1000 days.

      > **Attention!**
      >
      > - If you enter the **0** value, there is no limit to the depth of the metadata in the database.
      > - If the free space on the disc becomes less than 15 GB, the metadata storage is overwritten, that is, the new data is recorded over the oldest one (see General information about the self-diagnostics service(see page 1097)).
      > - The cleanup of the metadata storage from videos, the storage period of which exceeds the set one, is performed:
      >   - Each 12 hours after *Axxon One* starts.
      >   - Each time when you start searching in the archive (see Search in archive[363]).
      > - If there is no recording by a camera to the archive during the metadata storage cleanup, the data of this camera is stored in the database regardless of the date.

   b. If necessaty, you can the database in the network storage (by default, the metadata storage is placed locally, the path is set during the installation, see Installation(see page 98)).
      i. In the **Network path to save metadata** field, specify the path to the network storage where the database must be placed.

         > **Attention!**
         >
         > - At the end of the network path, you must specify the character of the closing slash (\). Otherwise, the network path is considered incorrect, and the metadata recording isn't performed. The example of the correct network path: \ \192.168.1.111\my_metadata_folder\
         > - If you clear the path to the network storage used to store the metadata, the metadata is recorded to the local database.

363 https://docs.axxonsoft.com/confluence/spaces/Psim2en/pages/314508919/Search+in+archive

ii. In the **User name for network path** field, enter the name of the user that has the access to the specified network storage.
iii. In the **Password for network path** field, enter the password of the user that has the access to the specified network storage.

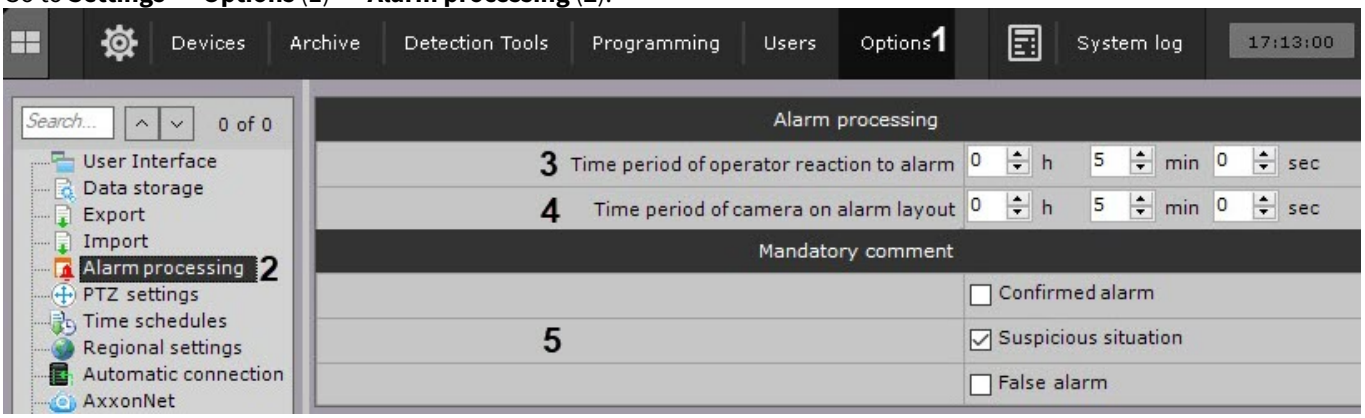
4. Clcik the **Apply** Apply button.

Configuring the database storage is complete.

19.10.1.6 Configuring Alarm processing

To configure alarm processing in the system, do the following:

1. Go to **Settings** → **Options** (**1**) → **Alarm processing** (**2**).



2. In the **Time period of operator reaction to alarm** field (**3**), enter the time during which the alarm must be taken into processing, otherwise is assigned the **Skipped** status. The minimum value is 2 minutes.

> **Note**
>
> To take an alarm into processing, you must switch to the Alarm management mode.
> After an alarm is taken into processing, the time for handling it is unlimited.

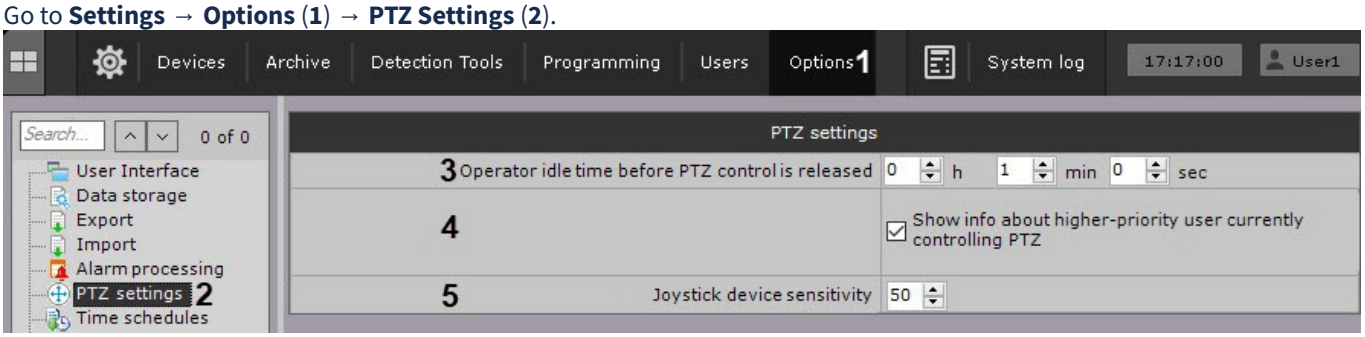
3. Set the maximum time for an alarm to stay on a special layout (**4**, see Working with Special layouts(see page 1283)). After the specified time has elapsed, the alarm is removed from the layout and its place is taken by the next alarm, which has not yet been displayed on the layout.
4. Select the alarm assessment, after accepting which, the operator is required to enter a comment (**5**).
5. Click the **Apply** button.

Configuration of alarm processing is now complete.

19.10.1.7 Configuring PTZ control

To configure PTZ control, do as follows:

1. Go to **Settings** → **Options** (**1**) → **PTZ Settings** (**2**).



2. Set the operator idle time in hours, minutes and seconds (**3**). When the time runs out, the PTZ control is unlocked automatically if the operator did not perform any actions.

3. By default, if the higher priority user controls the PTZ camera, then the PTZ control panel displays the name of the user. To disable the display of this information, clear the corresponding checkbox (**4**).
4. Set the **Joystick device sensitivity** (**5**, see Joystick Configuration(see page 1058)). The sensitivity range depends on the value specified in the device model repository for a particular device.

   Note

   For example, the following is specified in the Axis T8311 device model repository:

   ```
   <property id="deviceSensitivity" xsi:type="PropertyIntRangeType">
   <value>
   <min>5</min>
   <max>100</max>
   <default>50</default>
   </value>
   </property>
   ```

   This means that the sensitivity for this device can be set in the range from 5 to 100.
5. Click the **Apply** button.

PTZ control is now configured.

Controlling a PTZ camera(see page 1166)
Roles(see page 920)

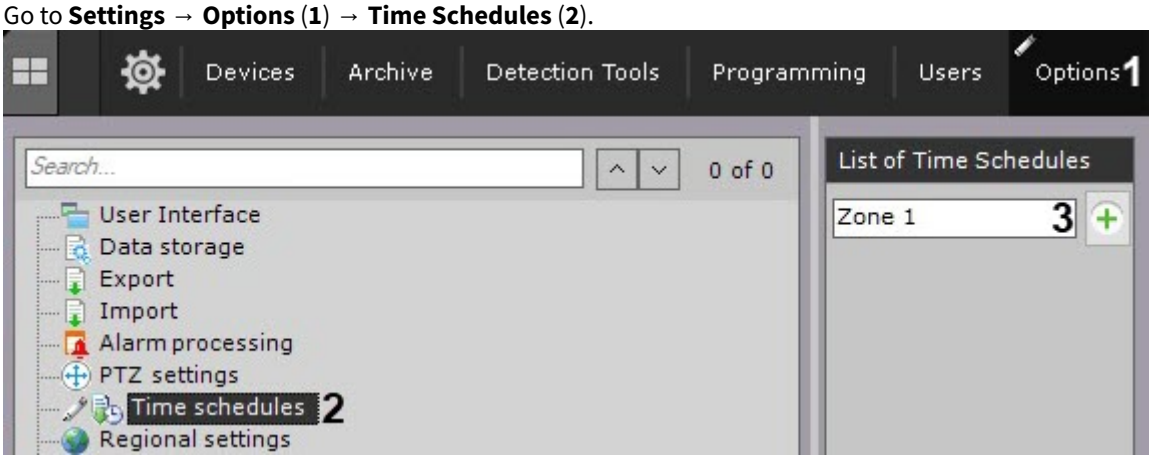
19.10.1.8 Configuring schedules

A schedule consists of all the time intervals for which video streams from video cameras will be recorded to archive.

19.10.1.8.1 Creating schedules

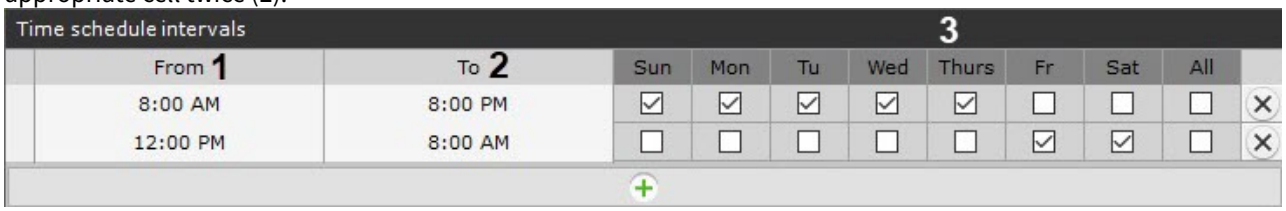
To create a schedule, complete the following steps:

1. Go to **Settings** → **Options** (**1**) → **Time Schedules** (**2**).



2. In the **List of Time Schedules**, enter the name of the required schedule (**3**) and click .
3. Set the time intervals for the schedule:

a. Enter the interval's start time in the **From** column with the help of the buttons accessible by left-clicking the appropriate cell twice (**1**).

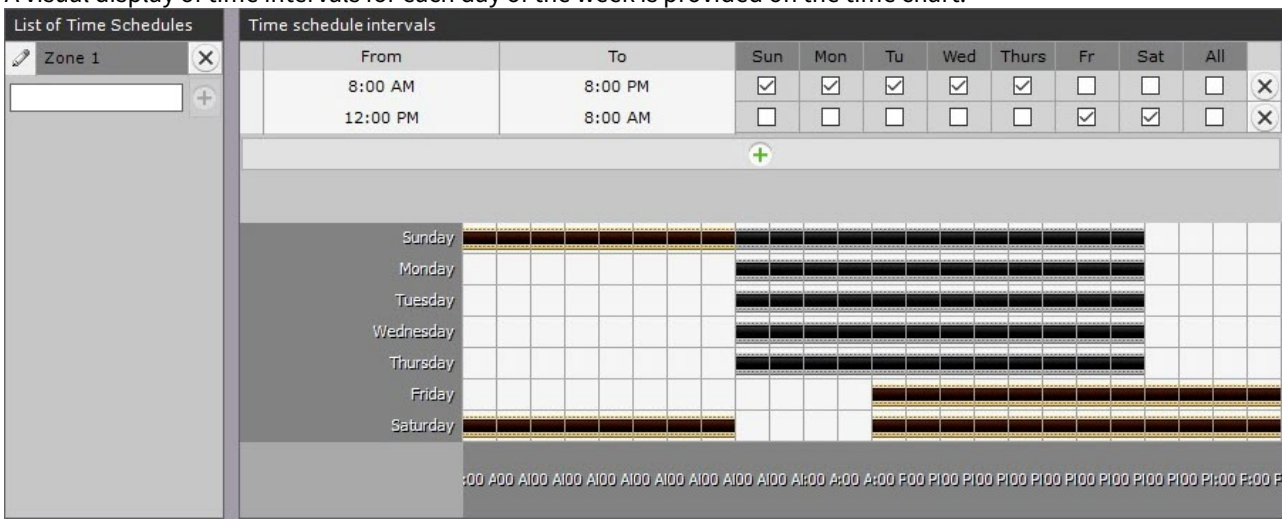


Button	Action
	Shift the interval start back by 1 hour
	Shift the interval start back by 5 minutes
	Shift the interval start ahead by 5 minutes
	Shift the interval start ahead by 1 hour

b. Enter the interval's end time in the **To** column with the help of the buttons accessible by left-clicking the appropriate cell twice (**2**).
c. Select the days of the week to be included in the interval by selecting the appropriate check boxes (**3**).
d. Create the necessary number of intervals to be included in the schedule.

> **Note**
>
> To delete a time interval, click in the corresponding row.

A visual display of time intervals for each day of the week is provided on the time chart.



4. Click the **Apply** button.

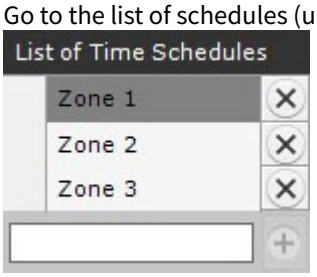
Creation of a schedule is now complete.

Configuring recording to an archive(see page 295)
Configuring macros(see page 830)

19.10.1.8.2 Deleting a schedule

To delete a schedule, complete the following steps:

1. Go to the list of schedules (under **Settings** → **Options** → **Time Schedules**).



2. Click  beside the schedule that you want to delete.
3. Click the **Apply** button.

Deletion of a schedule is now complete.

19.10.1.9 Configuring the Server ports

On this page:

- Changing the gRPC API port(see page 1014)
- Changing the port range of the Server(see page 1014)

After *Axxon One* is installed, you can change the port range for Servers, the gRPC API port number (see Ports used by Axxon One(see page 95)).

19.10.1.9.1 Changing the gRPC API port

To change the gRPC API port number, create an NGP_NATIVE_BL_PORT system variable, and set its value to the required port number (see Creating system variable(see page 126)).

19.10.1.9.2 Changing the port range of the Server

To change the port range for a Server, use the Network settings utility (see Network settings utility(see page 1379)).

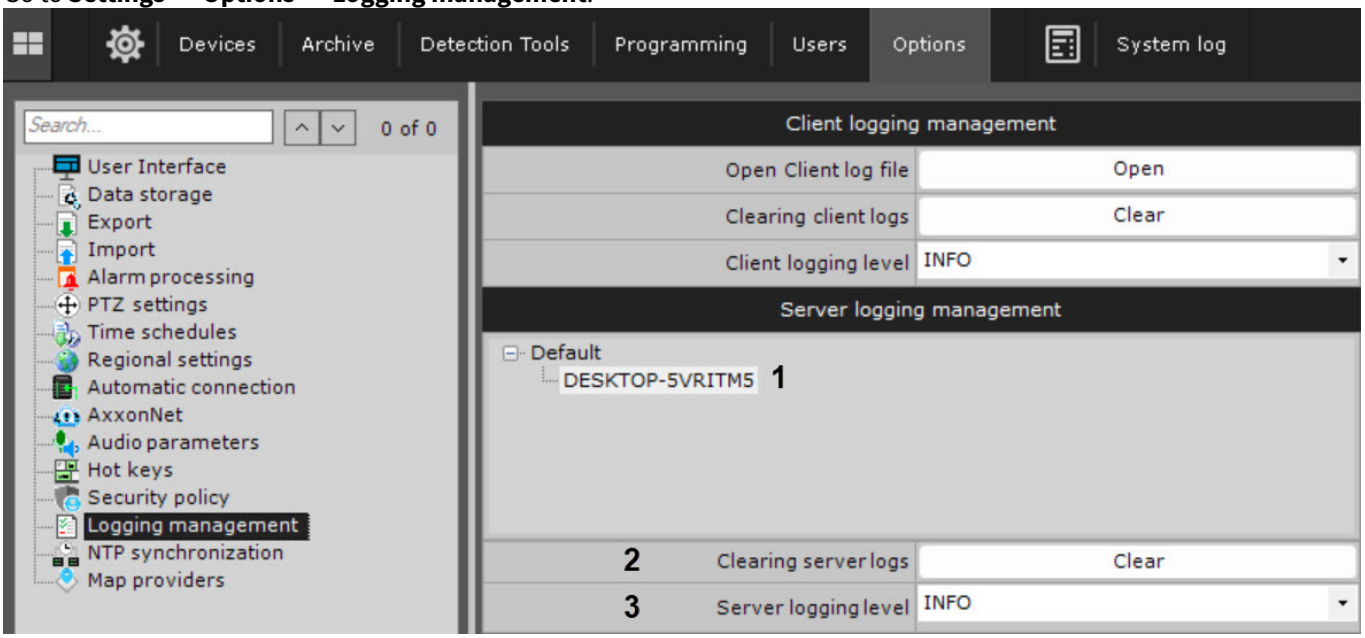
19.10.1.10 Configuring the Server logging level

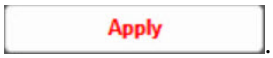
By default, the Server logging level is determined by the settings specified in a special utility (see Log management utility(see page 1414)). But you can temporarily change the Server logging level for operational analysis of current logs.

Changes made to the logging level will remain in effect until the Server is turned off. The next time you start the Server, the logging level will correspond to the one specified in the Log management utility.

To temporarily change the Server logging level, do as follows:

1. Go to **Settings** → **Options** → **Logging management**.



2. Select the Server of Axxon-domain for which you want to change the logging level (**1**).
3. Select the required level from the **Server logging level** list (**3**). Levels are described in Log management utility(see page 1414).
4. Click the **Apply** button 

.

The Server logging level is temporarily changed.

You can also delete all Server logs. To do this:

1. Next to the **Clearing server logs** area (**2**), click the **Clear** button.
2. Click **Apply**.

All Server logs are deleted.

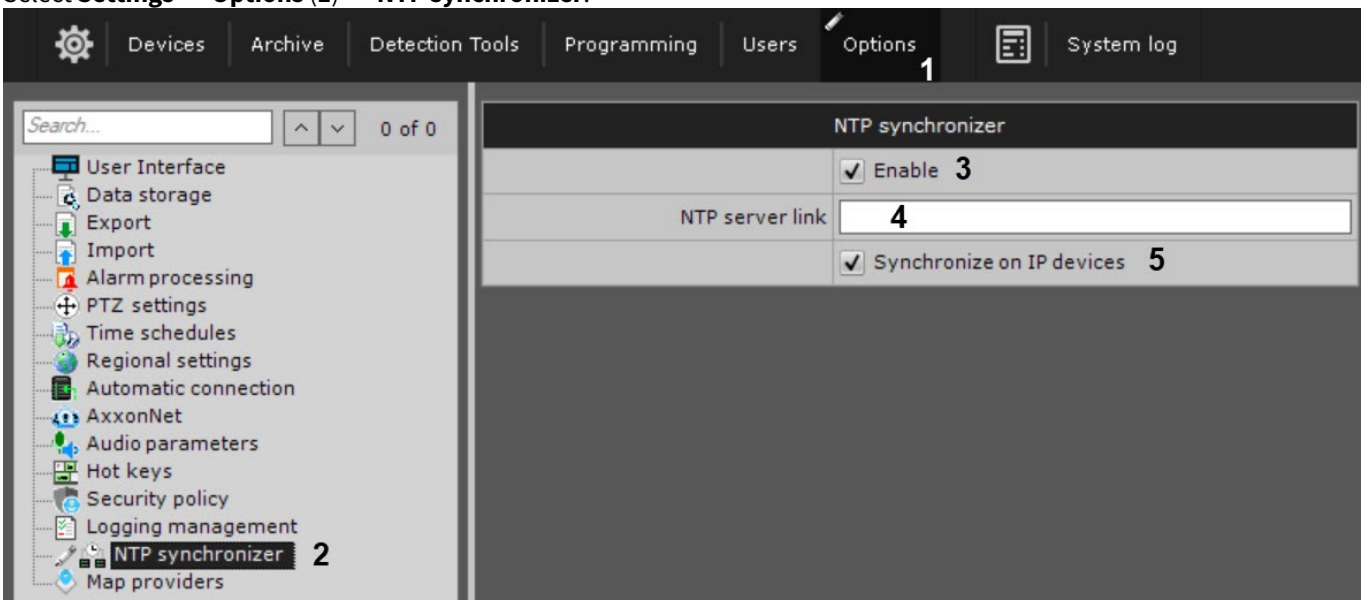
19.10.1.11 Configuring NTP synchronization

By default, the server time is synchronized with the OS time. You can synchronize the server time with the NTP Server. For this, the following conditions must be met:

1. *Axxon One* is installed in Windows OS.
2. In Windows OS, the **Set time zone automatically** option is enabled. To enable it, in Windows 10, go to **Settings** → **Time & Language**.

To configure NTP synchronization, do the following:

1. Select **Settings** → **Options** (**1**) → **NTP synchronizer**.



2. Set the **Enable** checkbox (**3**) to enable NTP synchronizer.
3. In the **NTP server link** field (**4**), specify the address of the required NTP Server.
4. Set the **Synchronize on IP devices** checkbox (**5**) to enable time synchronization for the IP devices connected to the Server.

> **Note**
>
> NTP time synchronization on IP devices works only for devices connected via ONVIF protocol.

5. Click the **Apply** button.

NTP synchronization is performed automatically once every 24 hours, and when the settings are changed.

19.10.1.12 Vector maps in Axxon One

On the page:

- Adding vector maps(see page 1016)
- Bitmap or vector image(see page 1017)
- Google(see page 1018)
- OpenStreetMap(see page 1023)

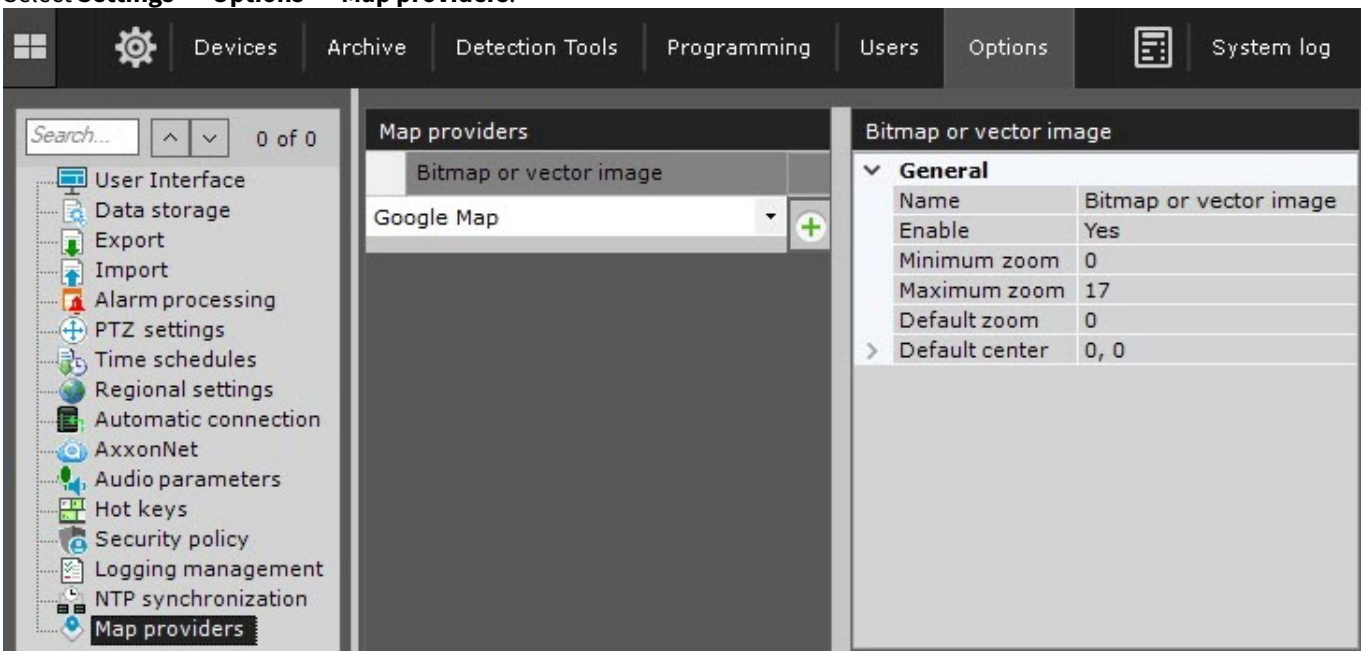
You can use vector maps in *Axxon One*: Bitmap or vector image, Google Map, and OpenStreetMap.

19.10.1.12.1 Adding vector maps

In *Axxon One*, a **Bitmap or vector image** map is added by default. You cannot delete it.

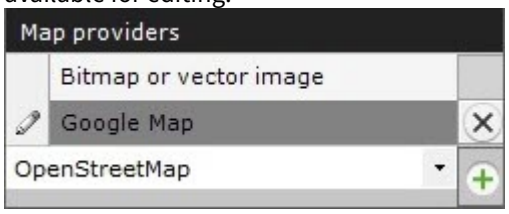
To add vector maps as an interactive map to *Axxon One*, do the following:

1. Select **Settings** → **Options** → **Map providers**.



2. In the **Map providers** table, click the button. From the list, select the necessary map provider and click the button.

Adding a vector map to *Axxon One* is complete. The map of the selected provider will be displayed in the table and will be available for editing.



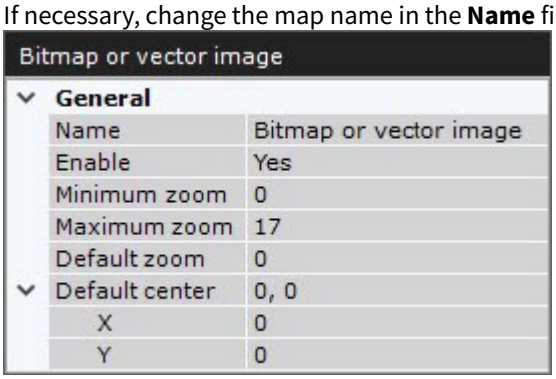
To cancel adding a vector map or to delete a map, click the button.

19.10.1.12.2 Bitmap or vector image

Bitmap or vector image is an image that will be used as a graphic plan of the protected territory.

To configure the map display as a bitmap or vector image in *Axxon One*, do the following:

1. If necessary, change the map name in the **Name** field or leave the default name.



2. In the **Enable** field, select the **Yes** value to enable **Bitmap or vector image**.
3. Set the **Minimum zoom** and **Maximum zoom** of the map. The values must be in the range [0; 19].
4. In the **Default zoom** filed, set the scale of the map that will be displayed by default. The value must be in the range [0; 19].
5. In the **Default center** field, set the coordinates of the map center that will be displayed by default:
   a. **X**—latitude;
   b. **Y**—longitude.

6. Click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.
7. Restart the *Axxon One* Client (see Stop the client(see page 145), Starting the client(see page 138)).
8. Configure the map display (see Adding a new map(see page 983)).

Configuring the display of the **Bitmap or vector image** map in *Axxon One* is complete.

19.10.1.12.3 Google

You can use **Google Map** in *Axxon One*. To use **Google Map** as an interactive map in *Axxon One*, do the following:

1. Sign up with Google Maps and purchase a license:
   a. Sign up with Google Cloud. To do this you need to contact one of Google Cloud partners: https://cloud.withgoogle.com/partners/, which will give you access to the Google Cloud console (user account) after signing up.

      Note

      Individuals can sign up with Google Cloud on their own. In this case, the Credit Card will be used for payment.

   b. Subscribe and, in the account, find a link to Api Key that you will need to use for each *Axxon One* Client. Charging will be done by subscription, the company will receive invoices for payment. You can see the prices here: https://developers.google.com/maps/billing-and-pricing/pricing?hl=en.
   c. Configure Google Maps using 2D Tiles[364].
2. Configure **Google Map** display in *Axxon One:*
   a. In the **General** section:

364 https://developers.google.com/maps/documentation/tile?hl=en

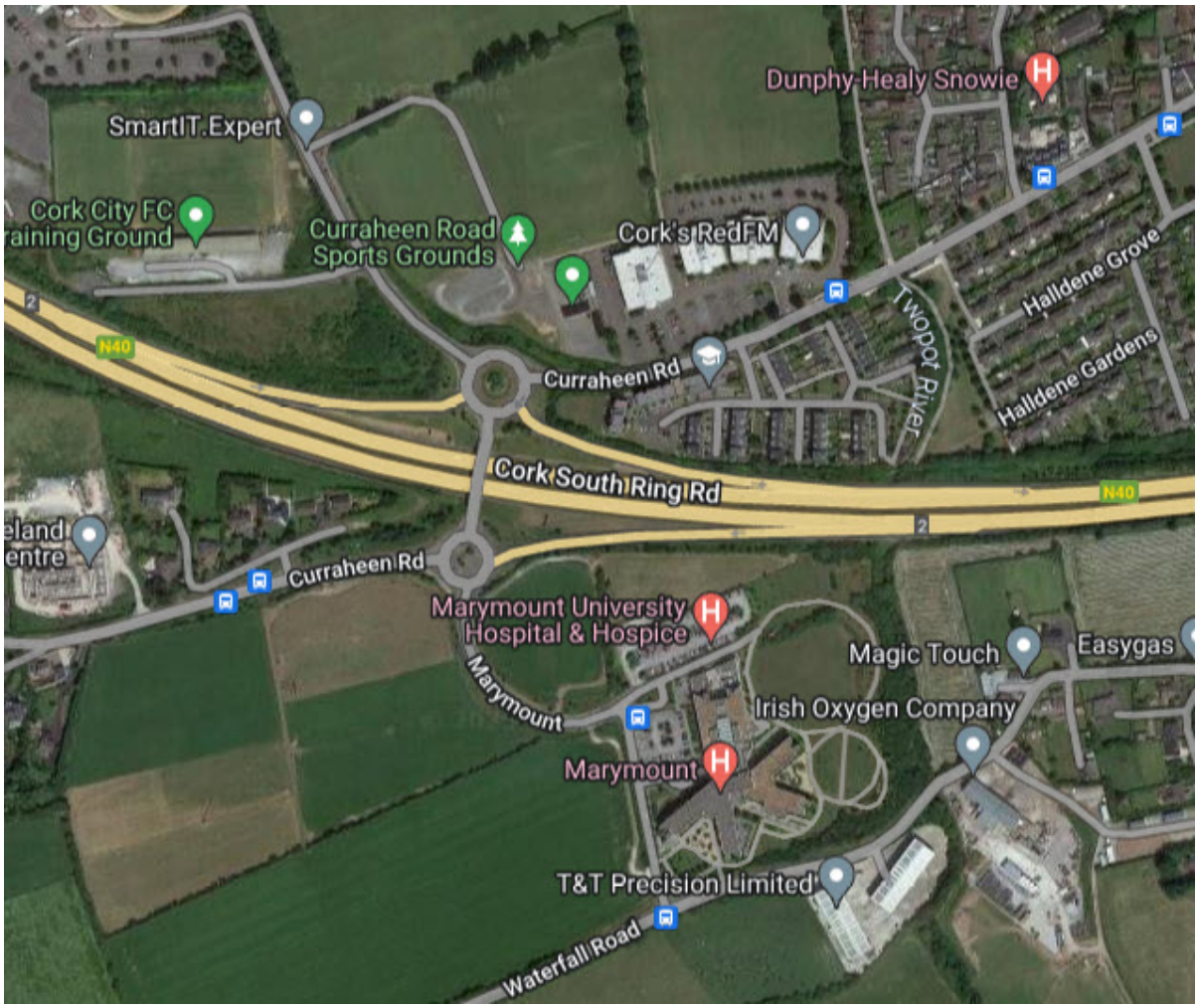
i. If necessary, change the provider name in the **Name** field or leave the default name.

Google Map	
General	
Name	Google Map
Api key	
Google Map	
Name	Google Map
Enable	Yes
Minimum zoom	3
Maximum zoom	19
Default zoom	9
Default center	0, 0
X	0
Y	0
Google Hybrid	
Name	Google Hybrid
Enable	No
Minimum zoom	3
Maximum zoom	17
Default zoom	9
Default center	0, 0
X	0
Y	0
Google Satellite	
Name	Google Satellite
Enable	No
Minimum zoom	3
Maximum zoom	17
Default zoom	9
Default center	0, 0
X	0
Y	0

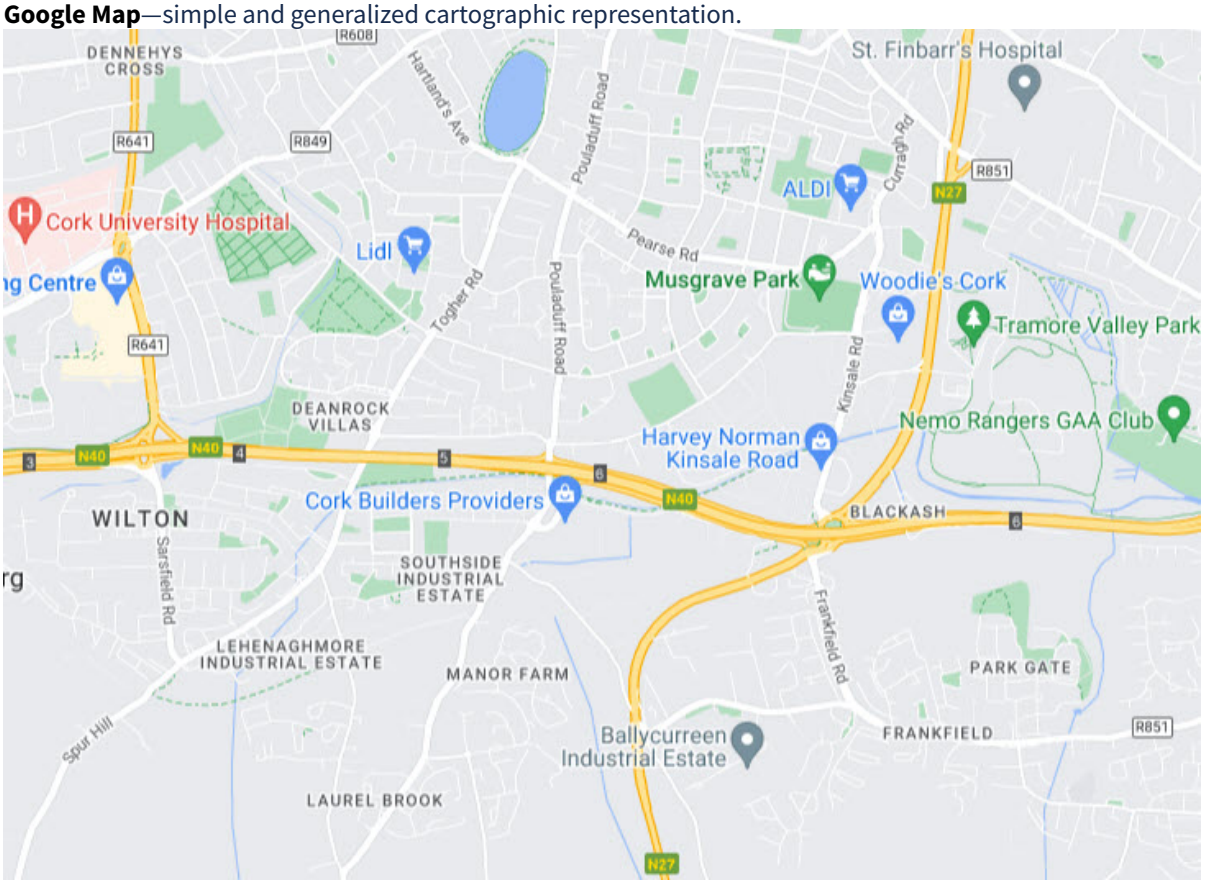
ii. Enter the received **ApiKey**.

b. Select the type of the map display:

i. **Google Hybrid**—satellite cartographic representation combined with a simple and generalized cartographic representation.


Dunphy Healy Snowie
SmartIT.Expert
Cork City FC
raining Ground
Curraheen Road
Sports Grounds
Cork's RedFM
Halldene Grove
Halldene Gardens
Lwopot River
N40
Curraheen Rd
Cork South Ring Rd
N40
2
eland
entre
Curraheen Rd
Marymount University
Hospital & Hospice
Magic Touch
Easygas
Marymount
Irish Oxygen Company
Marymount
T&T Precision Limited
Waterfall Road

ii. **Google Map**—simple and generalized cartographic representation.



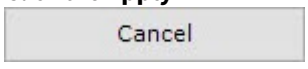
iii. **Google Satellite**—satellite cartographic representation.



> **Note**
>
> In *Axxon One*, you can use all three types of **Google** maps to display on the layout (see Adding a new map(see page 983)).

c. Configure the settings of the selected type of the map display:
   i. If necessary, change the map name in the **Name** field or leave the default name.
   ii. In the **Enable** field, select the **Yes** value to enable **Google Hybrid**/**Google Map**/**Google Satellite**
   iii. Set the **Minimum zoom** and **Maximum zoom** of the map. The values must be in the range [0; 19].
   iv. In the **Default zoom** filed, set the scale of the map that will be displayed by default. The value must be in the range [0; 19].
   v. In the **Default center** field, set the coordinates of the map center that will be displayed by default:
      1. **X**—latitude (**8**);
      2. **Y**—longitude (**9**).

d. Click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.

e. Restart the *Axxon One* Client (see Stop the client(see page 145), Starting the client(see page 138)).

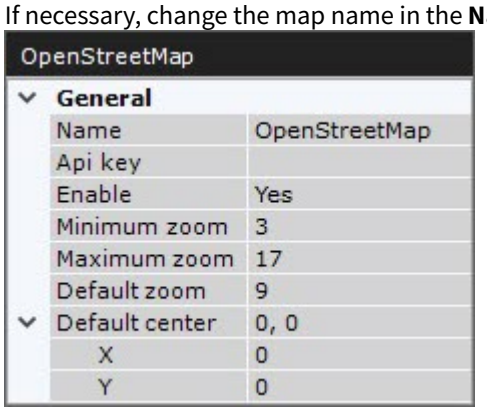
f. Configure the map display (see Adding a new map(see page 983)).

Configuring the display of **Google Map** in *Axxon One* is complete.

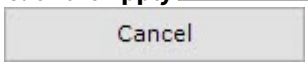
19.10.1.12.4 OpenStreetMap

Axxon One uses geodata from the **OpenStreetMap** provider via the Mapbox service. To use **OpenStreetMap** as an interactive map in *Axxon One*, do the following:

1. Purchase a license for Tilequery API from the Mapbox provider: https://www.mapbox.com/pricing/#gltile and get an **ApiKey**.
2. Configure the display of **OpenStreetMap** in *Axxon One*:
   a. If necessary, change the map name in the **Name** field or leave the default name.



   b. Enter the received **ApiKey**.
   c. In the **Enable** field, select the **Yes** value to enable **OpenStreetMap**.
   d. Set the **Minimum zoom** and **Maximum zoom** of the map. The values must be in the range [0; 19].
   e. In the **Default zoom** filed, set the scale of the map that will be displayed by default. The value must be in the range [0; 19].
   f. In the **Default center** field, set the coordinates of the map center that will be displayed by default:
      i. **X**—latitude;
      ii. **Y**—longitude.
   g. Click the **Apply** 

button. To cancel the changes, click the **Cancel** 

button.
3. Restart the *Axxon One* Client (see Stop the client(see page 145), Starting the client(see page 138)).
4. Configure the map display (see Adding a new map(see page 983)).

Configuring the display of **OpenStreetMap** in *Axxon One* is complete.

19.10.1.13 Connecting the Axxon One domain to AxxonNet

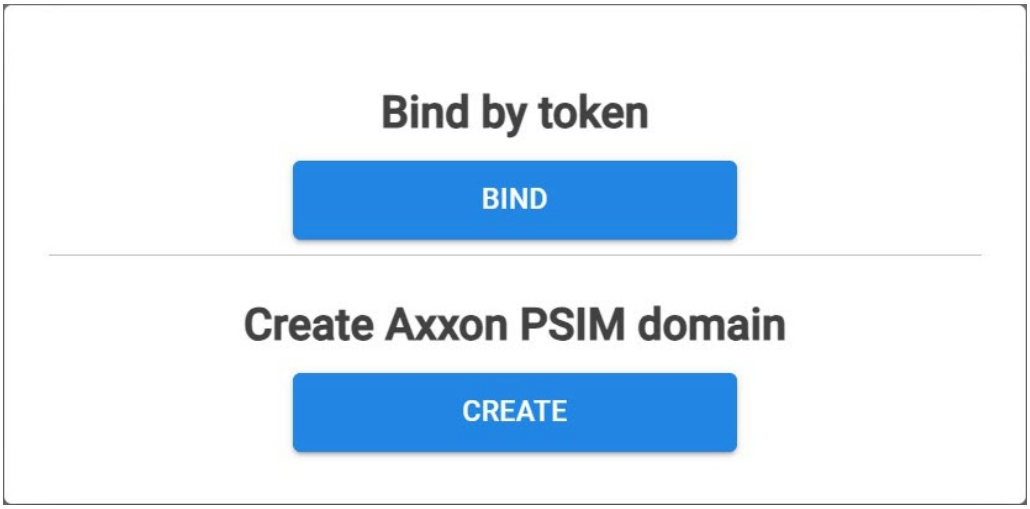
AxxonNet documentation[365]
Configuring domains(see page 151)

To connect the *Axxon One* domain to *AxxonNet*, you must:

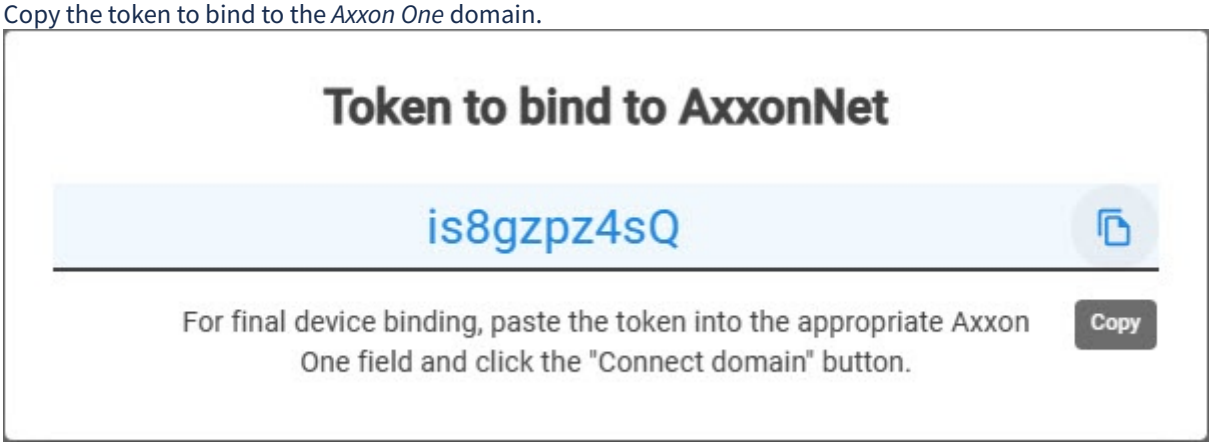
1. Have access to the internet.
2. Open ports 80 and 443.
3. Allow access of incoming and outgoing traffic to the https://axxonnet.com/ website if the Server has limited internet access.
4. Log in to *AxxonNet* https://axxonnet.com/ (see Registration, authorization, password recovery and change in AxxonNet[366]).
5. Click the  button in the upper right corner on the **Domains** tab.

365 https://docs.axxonsoft.com/confluence/spaces/anet/pages/157696830/AxxonNet
366 https://docs.axxonsoft.com/confluence/spaces/anet/pages/224297962/Registration+authorization+password+recovery+and+change+in+AxxonNet

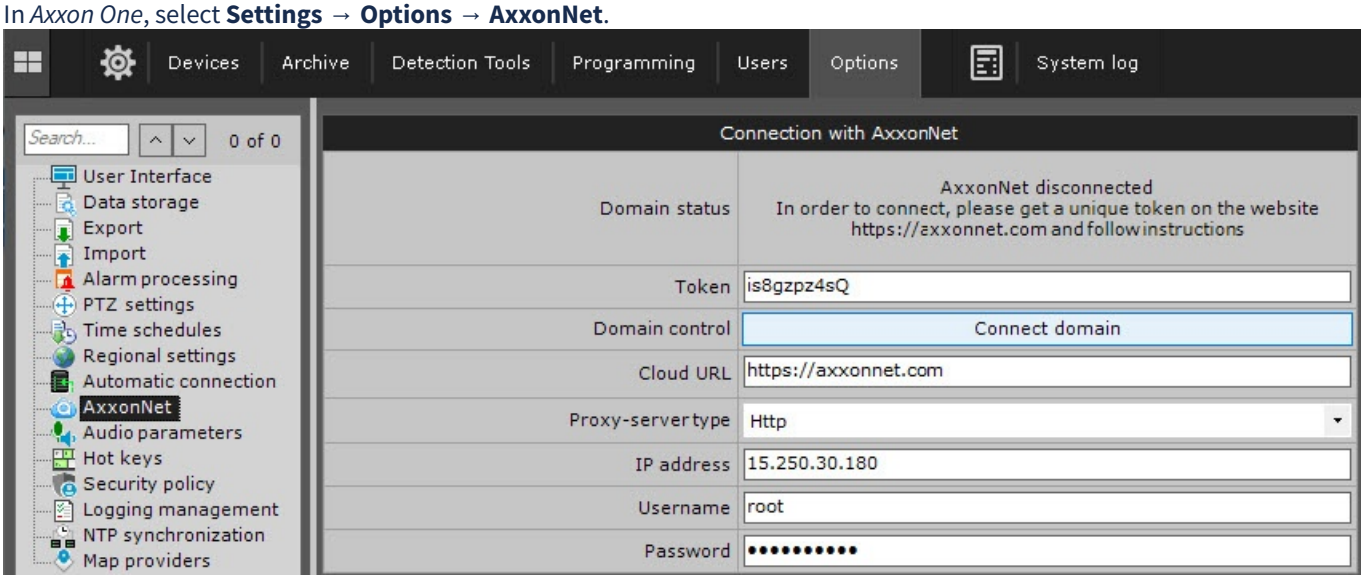
6. Click the **BIND** button.



7. Copy the token to bind to the *Axxon One* domain.



8. In *Axxon One*, select **Settings** → **Options** → **AxxonNet**.

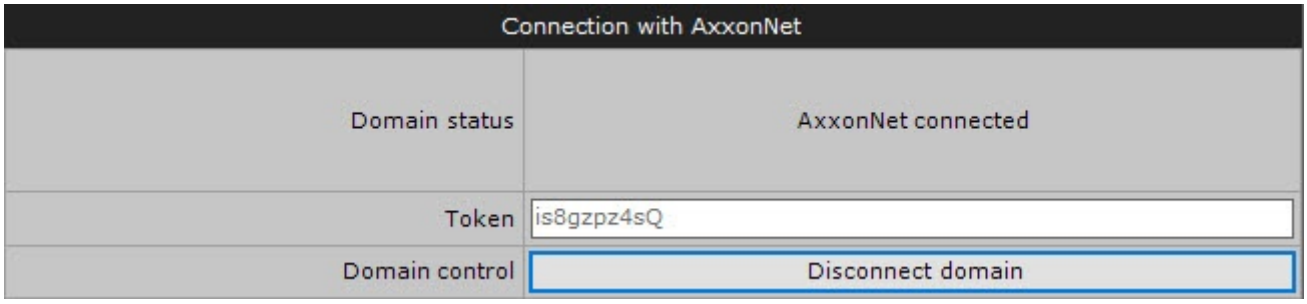


9. In the **Token** field, paste the copied token to bind to *AxxonNet.*
10. In the **Cloud URL** field, enter https://axxonnet.com/.
11. If you connect through a proxy-server:
    a. From the drop-down list, select the **Proxy-server type**:
        i. **None**
        ii. **Http**
        iii. **Https**
        iv. **Socks5**
    b. Enter the **IP address** of the cloud service to which you want to connect.

c. Enter the **Username** and **Password** to connect to the proxy-server.

12. Click the **Connect domain** button.

If the connection is successful, the status in *Axxon One* changes to **AxxonNet connected**. To disconnect the domain from *AxxonNet*, click the **Disconnect domain** button.



If several domains with identical names are connected to *AxxonNet*, a sequential number is added to each of the names listed on the **Domains** tab. If there is no connection with the Server, the domain is highlighted in red color.



19.10.2 Client settings

19.10.2.1 Configuring the user interface

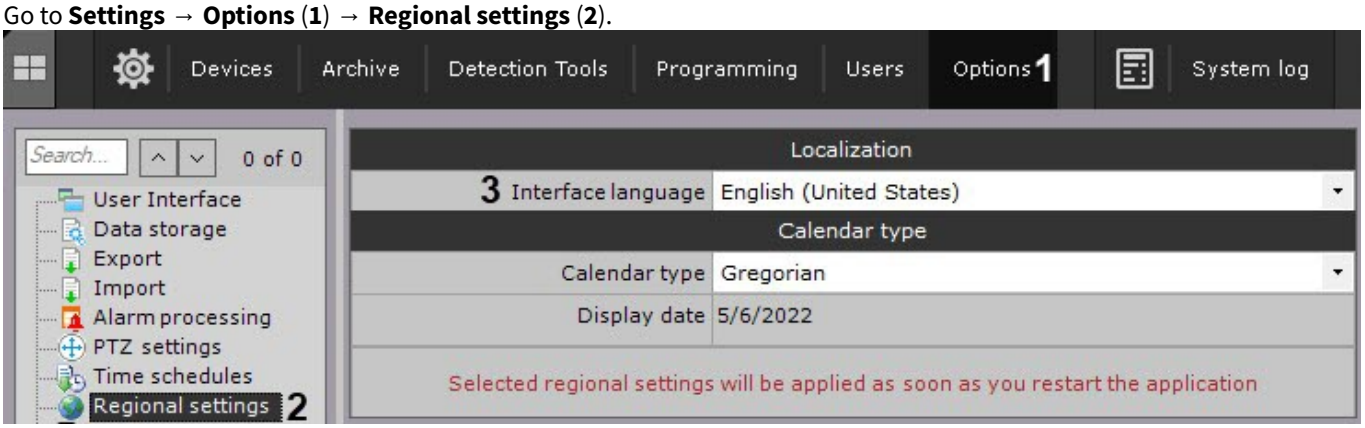
19.10.2.1.1 Selecting the interface language

When working with *Axxon One*, the user can choose the Client interface language.

> **Attention!**
>
> The language of the events in the system log is determined by the settings of the OS on the Server.

To select the Client interface language, do the following:

1. Go to **Settings** → **Options** (**1**) → **Regional settings** (**2**).



2. Select *Axxon One* interface language from the **Interface language** drop-down list (**3**).
3. Click the **Apply** button to save the changes.
4. Restart *Axxon One* (see Stop the client(see page 145), Starting the client(see page 138)).

When *Axxon One* is restarted, the selected interface language will be applied.

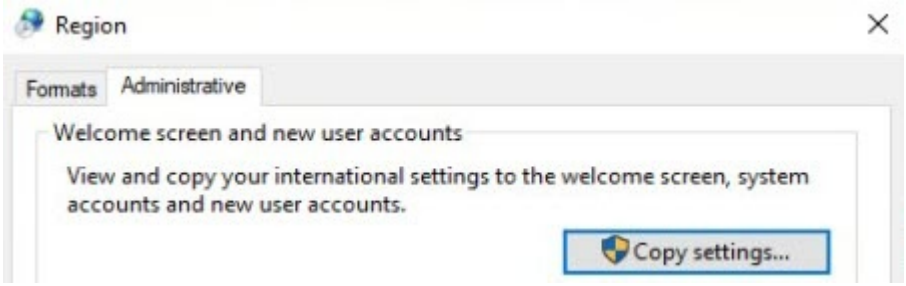
To change the language of the events in the system log, do the following:

1. On the Server, go to **Control Panel** → **Region**.

> **Note**
>
> The configuration is given for Windows 10 OS.



2. From the **Format** drop-down list, select the required language.
3. Go to the **Administrative** tab.



4. Click the **Copy settings** button.
5. Set the **Welcome screen and system accounts** checkbox.



6. Click the **OK** button in both windows.

7. Restart the Server (see Stop the server(see page 146), Starting the server(see page 137)).

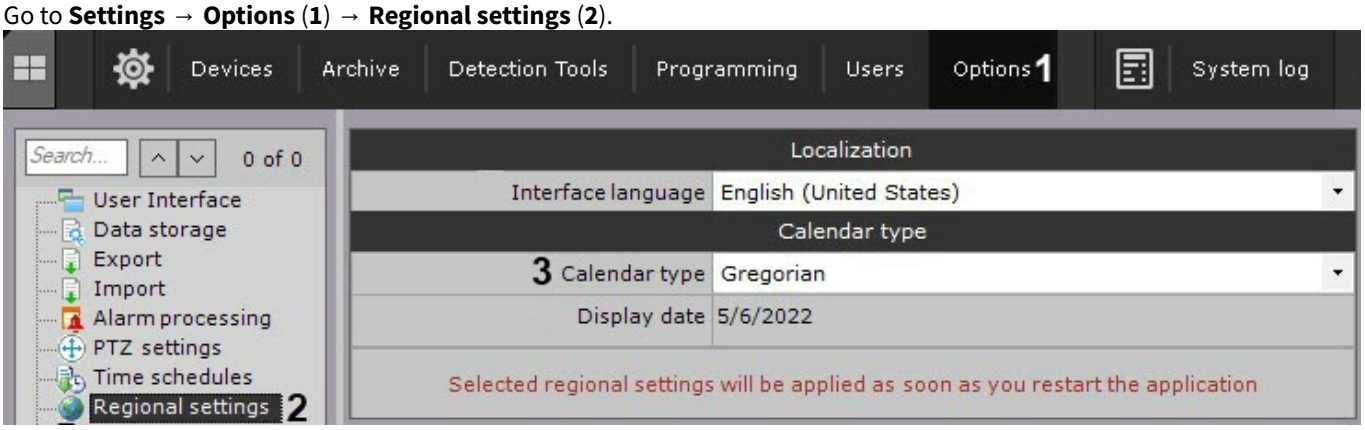
The language of the events in the system log is changed.

19.10.2.1.2 Selecting the calendar type

When working with *Axxon One*, the user can choose the calendar type (Gregorian or Persian).

To select the calendar type, do the following:

1. Go to **Settings** → **Options** (**1**) → **Regional settings** (**2**).



2. Select the calendar type that is used in *Axxon One* from the **Calendar type** drop-down list (**3**).
3. Click the **Apply** button to save the changes.
4. Restart *Axxon One* (see Stop the client(see page 145), Starting the client(see page 138)).

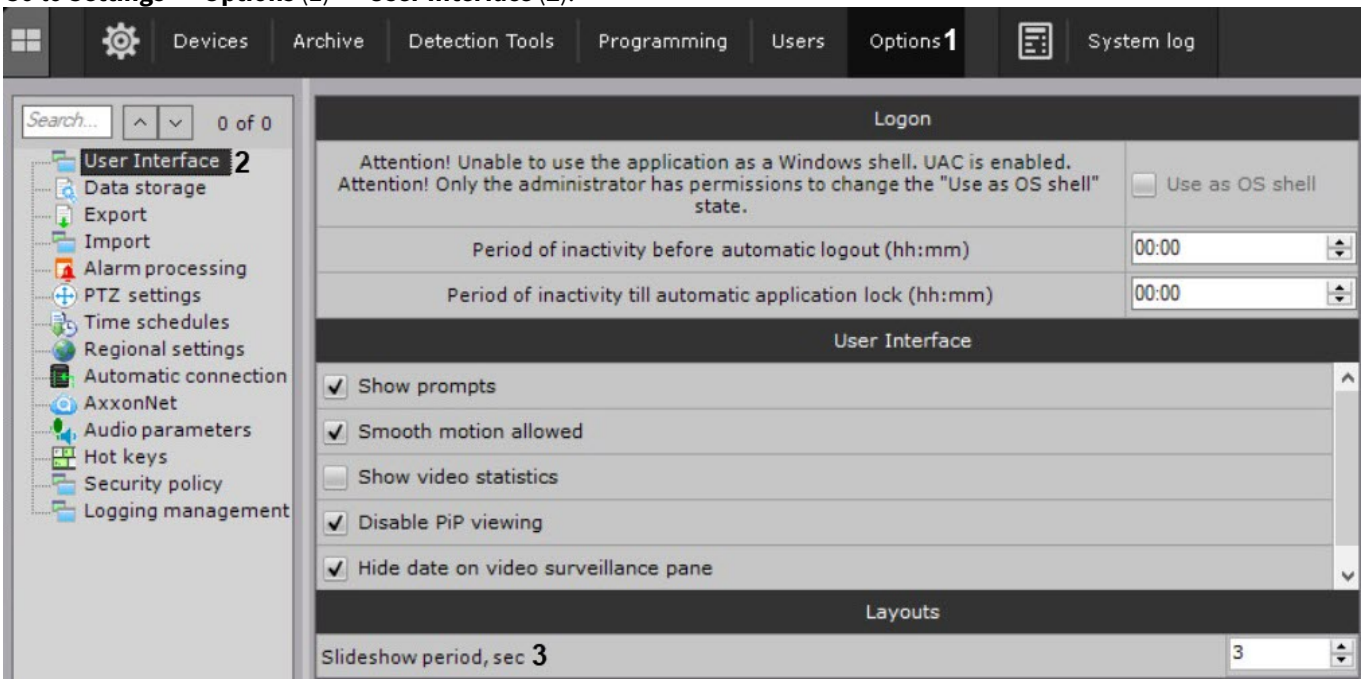
When *Axxon One* is restarted, the selected calendar type will be applied.

19.10.2.1.3 Configuring the slideshow parameters

The slideshow mode is a cyclic switching of the layouts within the specified period. The slideshow is launched using the context menu of the layouts panel.

To configure the slideshow period, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Set the slideshow period in seconds (**3**).
3. Click the **Apply** button.

The slideshow period is configured. The layouts will be switched within the specified period.

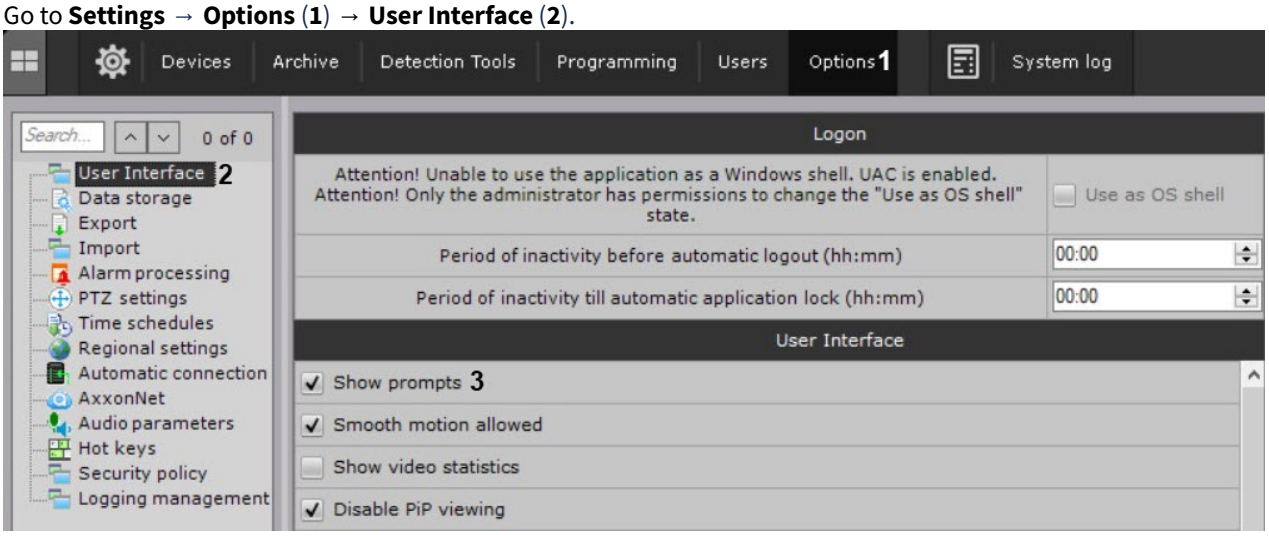
> **Note**
>
> Only the users with the **Layout editing** permission can switch the modes (see Roles(see page 920)).

19.10.2.1.4 Hiding prompts

In *Axxon One*, prompts are displayed when the cursor is hovered over a control element. By default, the prompts are enabled.

To disable the prompts, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Clear the **Show prompts** checkbox (**3**).
3. Click the **Apply** button.

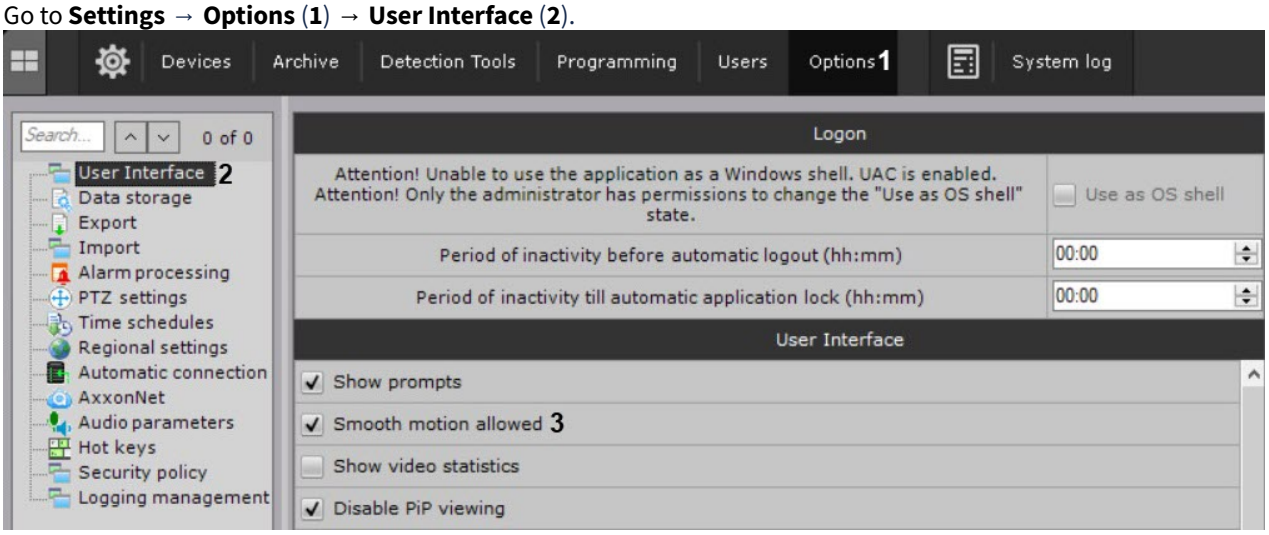
Prompts are now disabled. You can re-enabled prompts by setting the **Show prompts** checkbox.

19.10.2.1.5 Configuring smooth motion

Smooth motion allows smoothly changing the position of the surveillance windows, as well as smoothly switching between the tabs. By default, smooth motion is enabled.

To disable smooth motion, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Clear the **Smooth motion allowed** checkbox (**3**).
3. Click the **Apply** button.

Smooth motion of the surveillance windows is disabled.

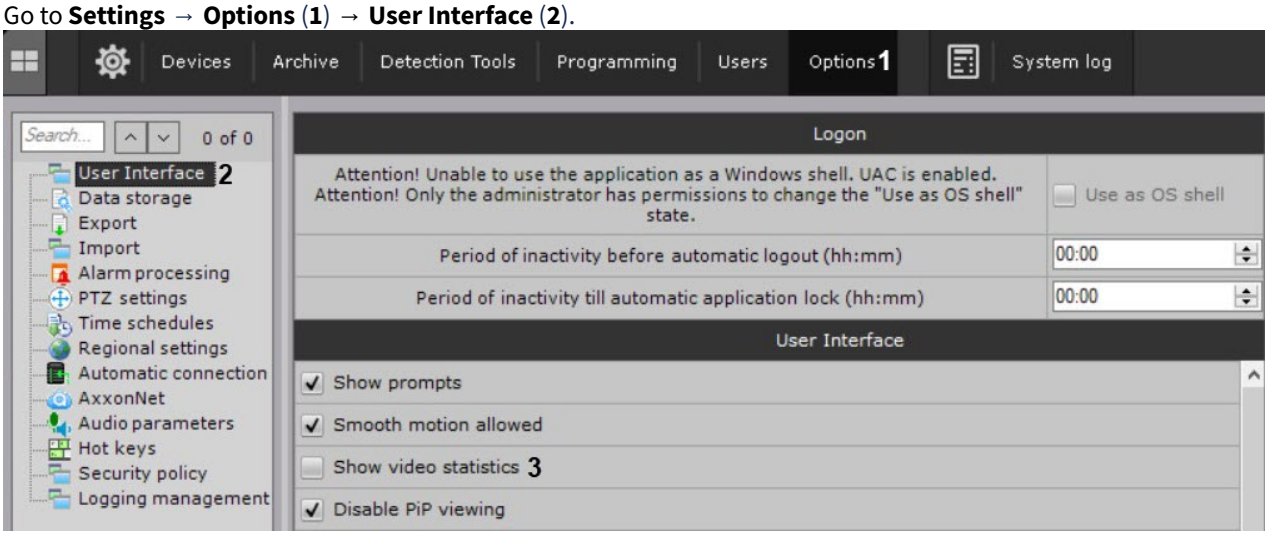
19.10.2.1.6 Configuring display of video statistics

You can display the following video statistics in the surveillance window:

1. Frame rate of the displayed video stream.
2. Frame rate of the video stream received from a video camera or an archive.
3. Bitrate of a compressed video stream.
4. Resolution of the displayed video stream.

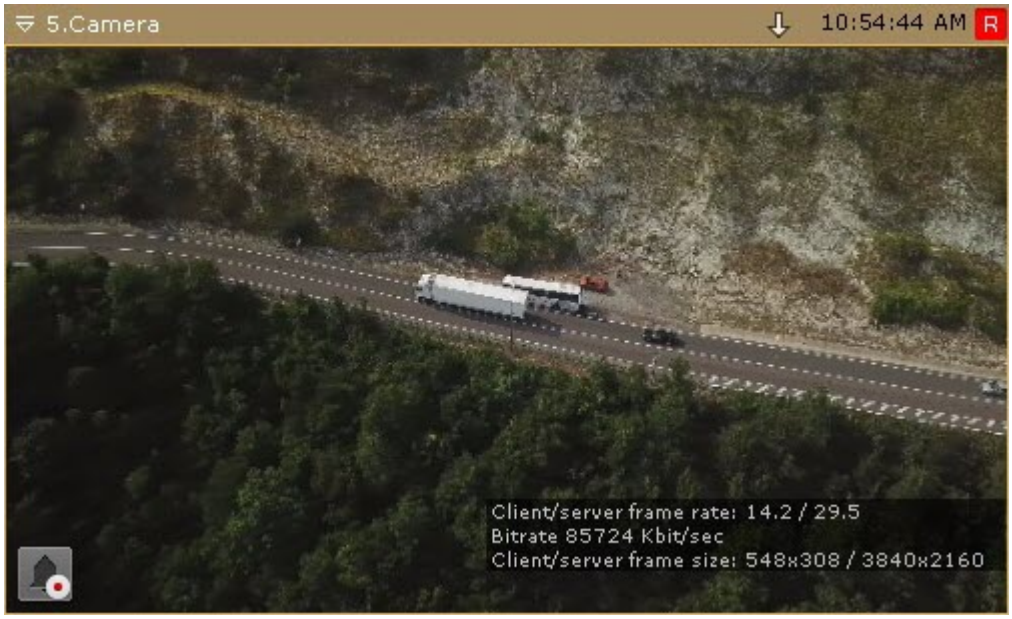
To display video statistics, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Set the **Show video statistics** checkbox (**3**).
3. Click the **Apply** button.

The video statistics will now be displayed in the surveillance window for the following modes: Live Video, Archive, Alarm, and Archive Search.

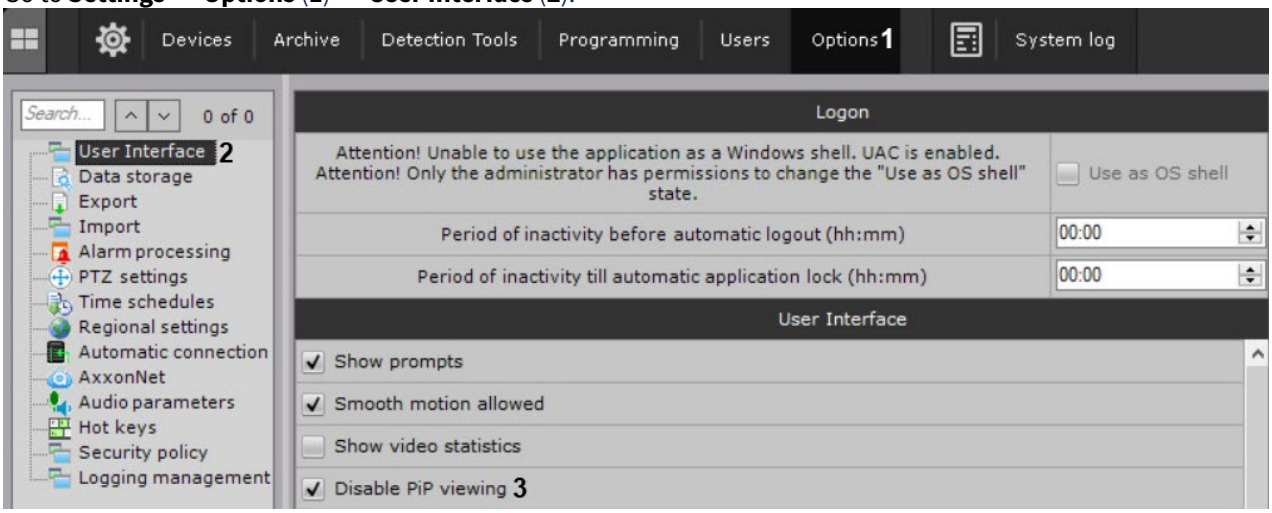


19.10.2.1.7 Configuring preview of alarm events

You can disable the preview of alarm events in the surveillance window.

To do this, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Set the **Disable PiP viewing** checkbox (**3**).
3. Click the **Apply** button.

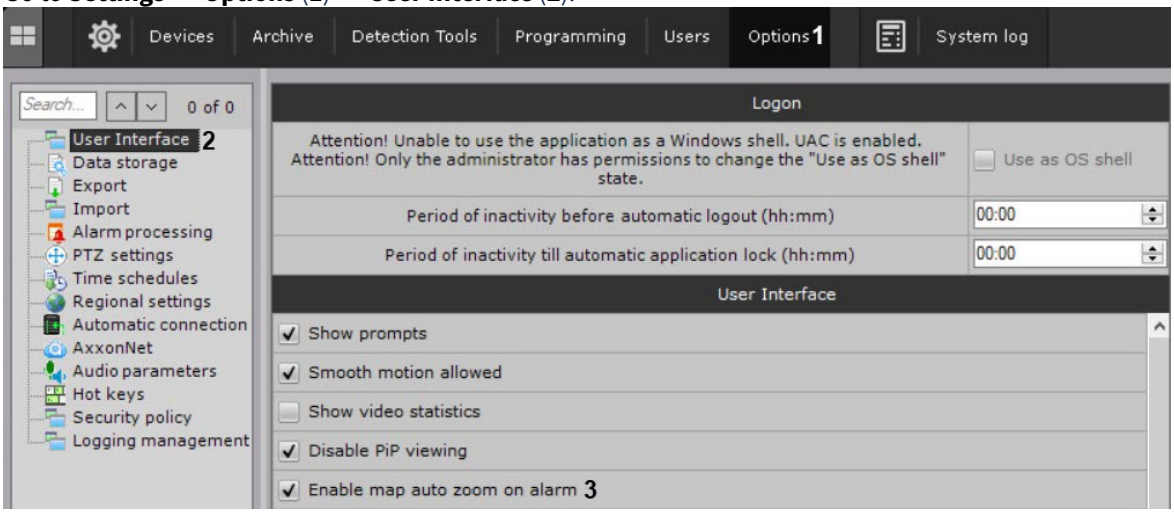
Preview of alarm events is disabled.

19.10.2.1.8 Configuring map auto zoom

It is possible to zoom the map automatically and place the icon of the alarm camera at the center of the map.

To do this, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Set the **Enable map auto zoom on alarm** (**3**) checkbox.
3. Click the **Apply** button.

Map auto zoom on alarm is configured. When an alarm occurs, the icon of the alarm camera will be placed at the center of the zoomed map.

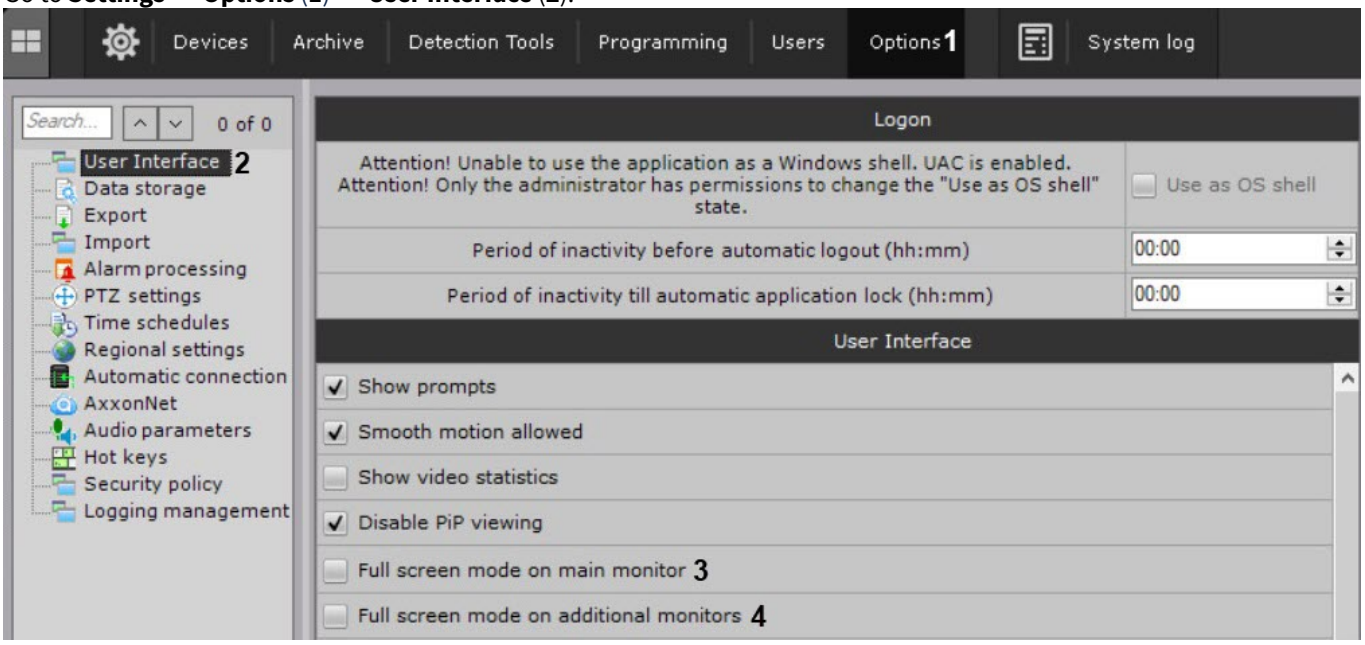
19.10.2.1.9 Configuring the Client screen mode (full screen or window)

By default, the Client (main monitor and all additional monitors) is displayed in full screen mode.

It is possible to use window mode both on the main monitor and on the additional monitors.

To do this, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. To use window mode on the main monitor, clear the **Full screen on main monitor** checkbox (**3**).
3. To use window mode on the additional monitors, clear the **Full screen on additional monitors** checkbox (**4**).
4. Click the **Apply** button.
5. Restart *Axxon One* (see Stop the client(see page 145), Starting the client(see page 138)).

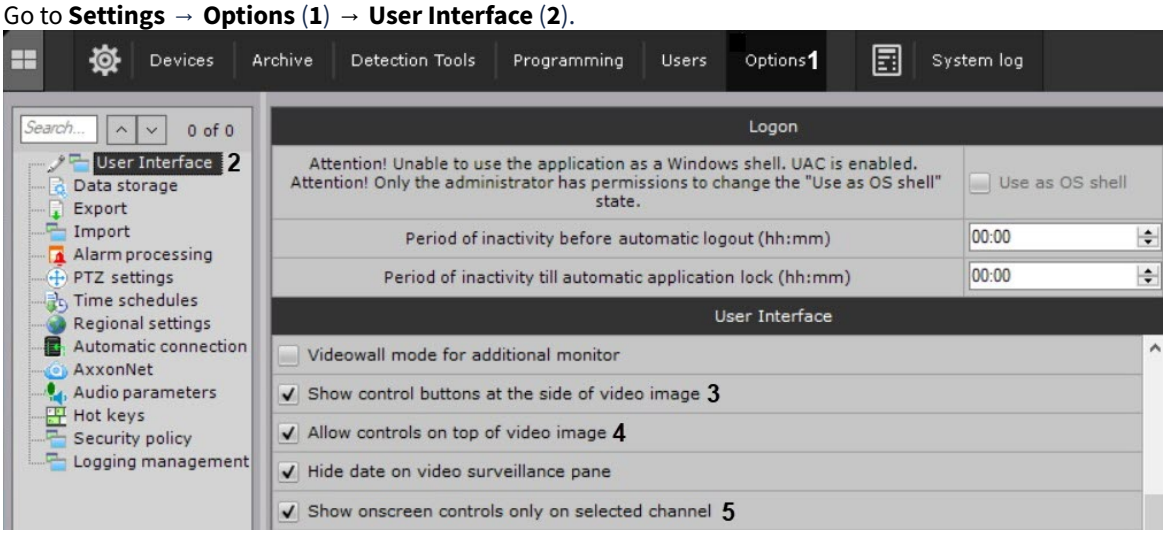
The window mode is configured. The *Axxon One* Client will be displayed in window mode on new start.

19.10.2.1.10 Configuring the display of the surveillance window

Surveillance window(see page 1109)

To configuring the display of the surveillance window, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. By default, the surveillance mode selection buttons are located at the side of the surveillance window. To move the buttons inside of the surveillance window, clear the **Show control buttons at the side of video image** checkbox (**3**).

Attention!

With this display of the surveillance window, the following won't be available: the zoom function (in real-time and archive modes, see Scaling the Surveillance window(see page 1140)) and the immersive mode button (see Immersive mode(see page 1299)).

3. By default, the surveillance window elements (context menus, export buttons, PTZ mode selection buttons, etc.) are displayed outside of the video image. To move the control buttons on the video image, clear the **Allow controls on top of video image** checkbox (**4**).
4. If it is necessary to display the surveillance window elements only for the active window on the layout, set the **Show onscreen controls only on selected channel** checkbox (**5**). This parameter is valid only if the **Allow controls on top of video image** checkbox is set (**4**).
5. Click the **Apply** button.
6. Reopen the layout or create a new one (see The Layouts panel(see page 1129)).

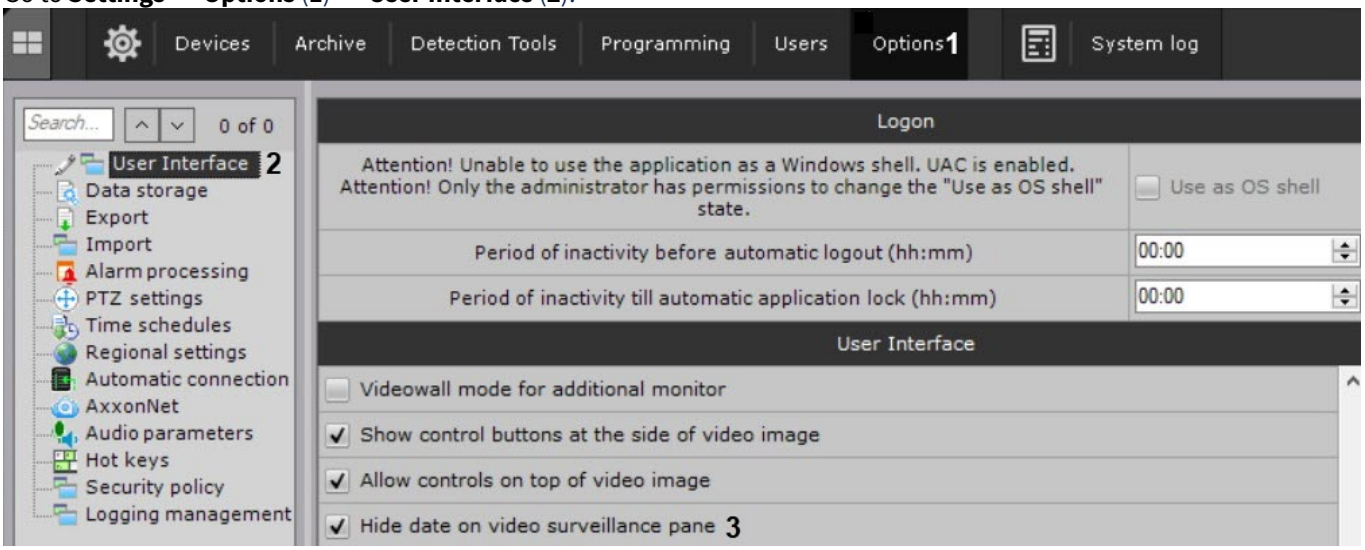
Configuring the display of the surveillance window is complete.

19.10.2.1.11 Configuring time display

By default, the time indicator (see Time display(see page 1113)) in the surveillance window does not display the date.

To display the date, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Clear the **Hide date on video surveillance pane** checkbox (**3**).
3. Click the **Apply** button.
4. Reopen the layout or create a new one (see Layouts management(see page 1281)).

The time indicator is configured. The date will be displayed to the left of the time.



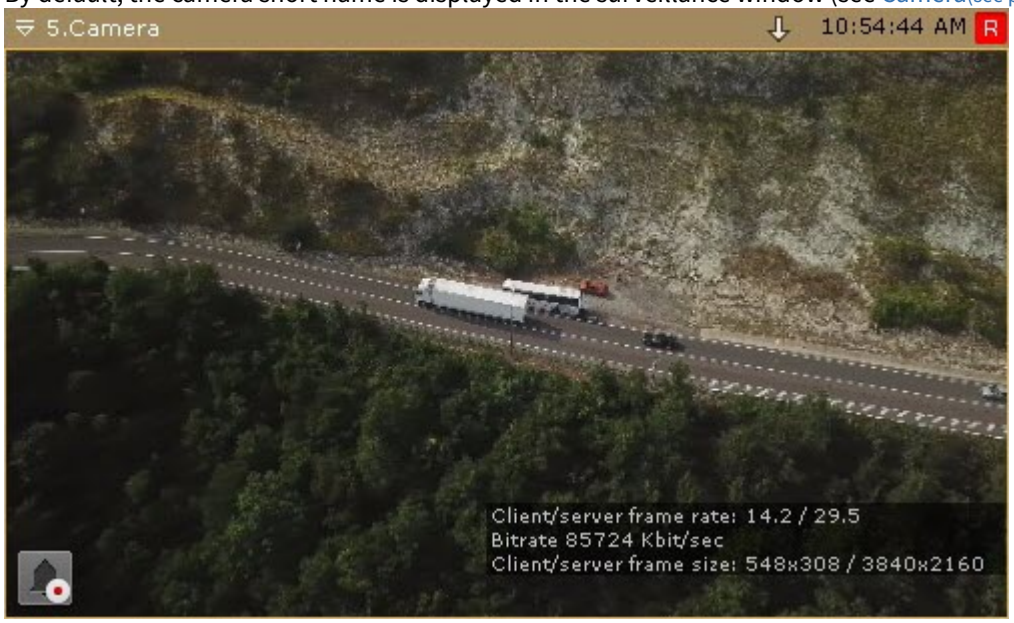
You can also hide the time indicator in the surveillance window. To do it, do the following:

1. Go to the role settings (see Roles(see page 920)).
2. In the **Access to Functions** group, set **No** for the **Unlock camera menu button** parameter.
3. Set the camera access level — **Live**.

As a result, the time indicator of the specified cameras will be disabled for all users of this role.

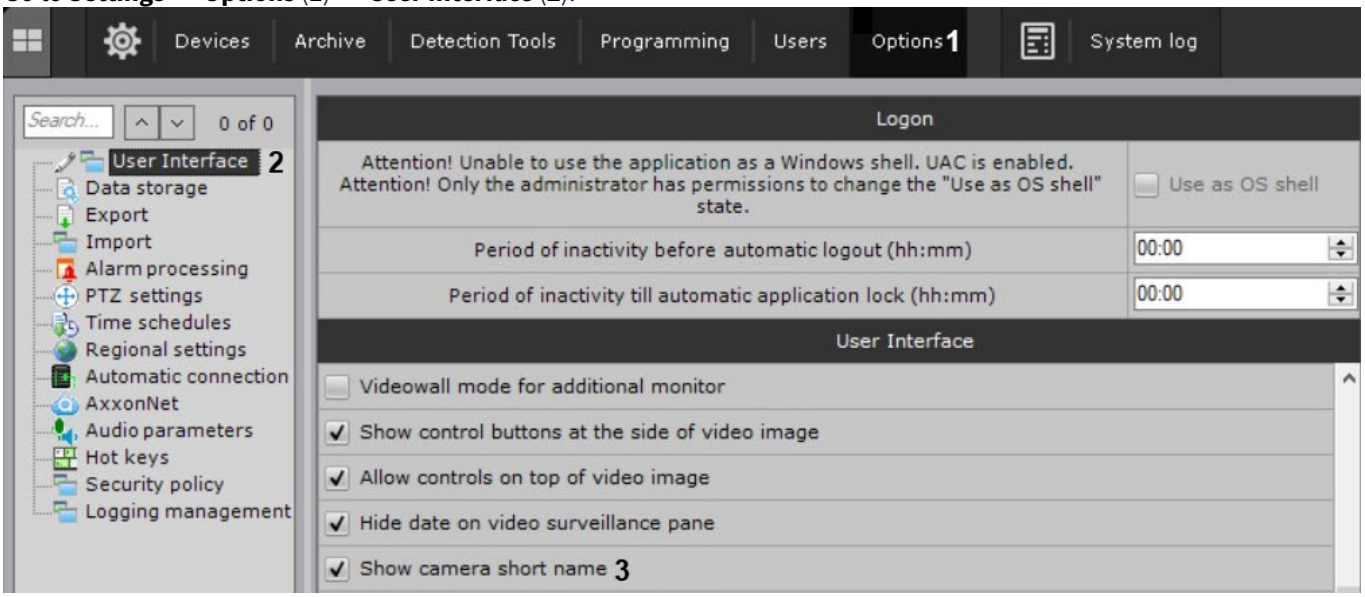
19.10.2.1.12 Configuring the display of the camera short name

By default, the camera short name is displayed in the surveillance window (see Camera(see page 171)).



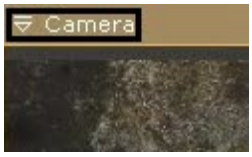
To disable displaying the short name, do as follows:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Clear the **Show camera short name** checkbox (**3**).
3. Click the **Apply** button.
4. Reopen the layout (see Layouts management(see page 1281)).

The camera short name display is disabled.



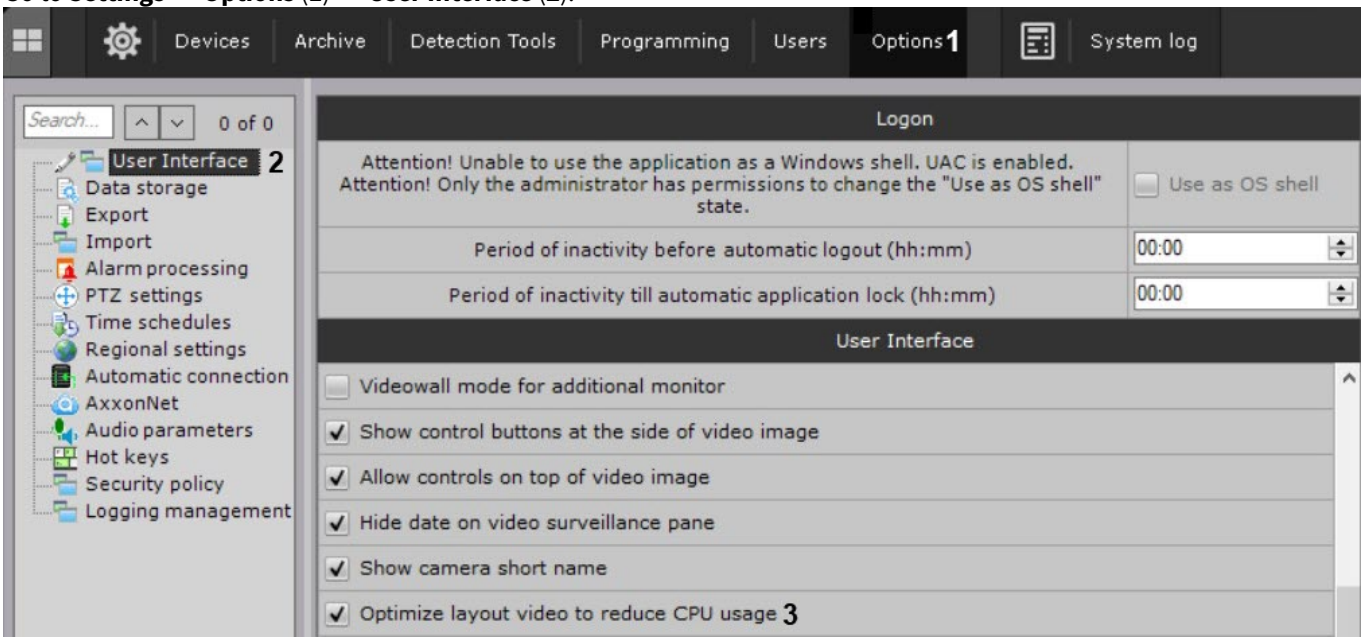
19.10.2.1.13 Optimizing video image on the layout

It is possible to automatically reduce the number of the displayed pixels in the layout if the screen resolution is lower than the stream resolution from the video camera. This allows reducing the CPU load.

Video image optimization is enabled by default. To disable it, do the following:

> **Note**
>
> If video image optimization is enabled, the definition of the image in the layout may decrease.

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).

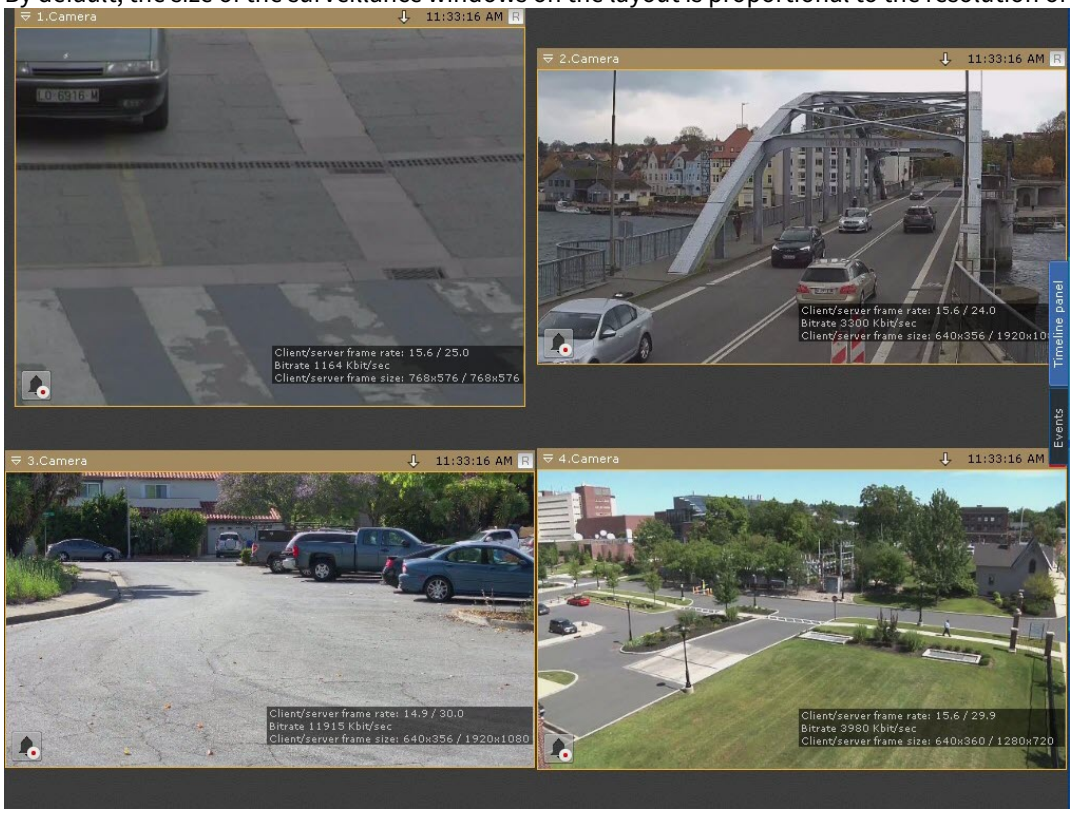


2. Clear the **Optimize layout video to reduce CPU usage** checkbox (**3**).
3. Click the **Apply** button.

Video image optimization is disabled.

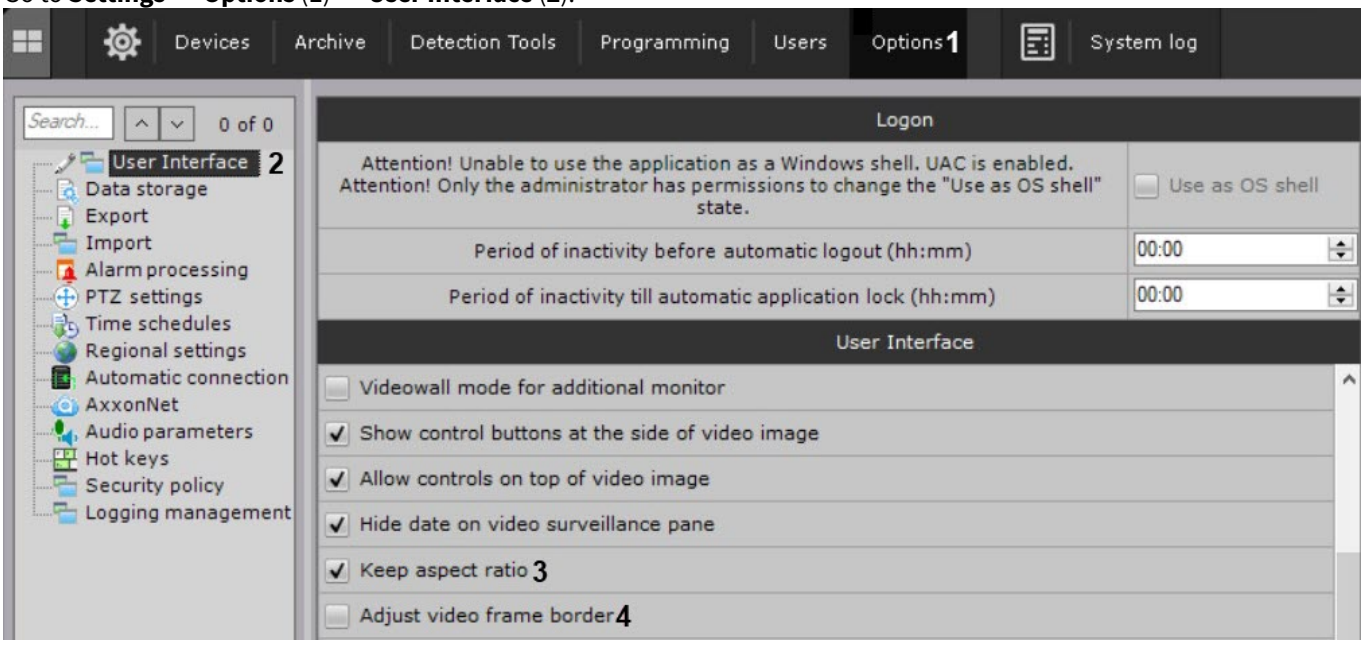
19.10.2.1.14 Configuring video display on the layout

By default, the size of the surveillance windows on the layout is proportional to the resolution of the video image.



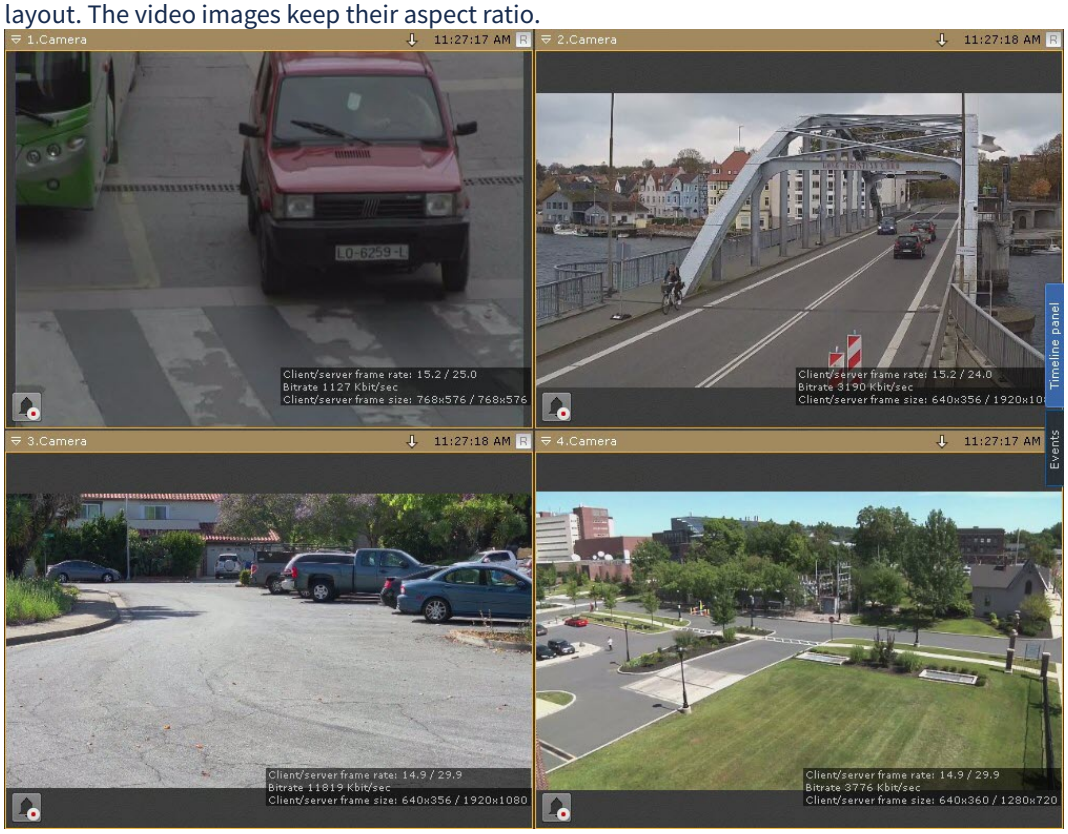
For the surveillance windows to be of a fixed size and occupy the entire area of the layout, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Clear the **Adjust video frame border** checkbox (**4**).
3. Click the **Apply** button.
4. Reopen the layout (see Layouts management(see page 1281)).

Configuring the surveillance windows is complete. The surveillance windows are of a fixed size and occupy the entire area of the layout. The video images keep their aspect ratio.



To expand the video image to the entire surveillance window, do the following:

1. Clear the **Keep aspect ratio** checkbox (**3**).
2. Click the **Apply** button.
3. Reopen the layout (see Layouts management(see page 1281)).

Configuring the surveillance windows is complete. The video image is expanded to the entire surveillance window.



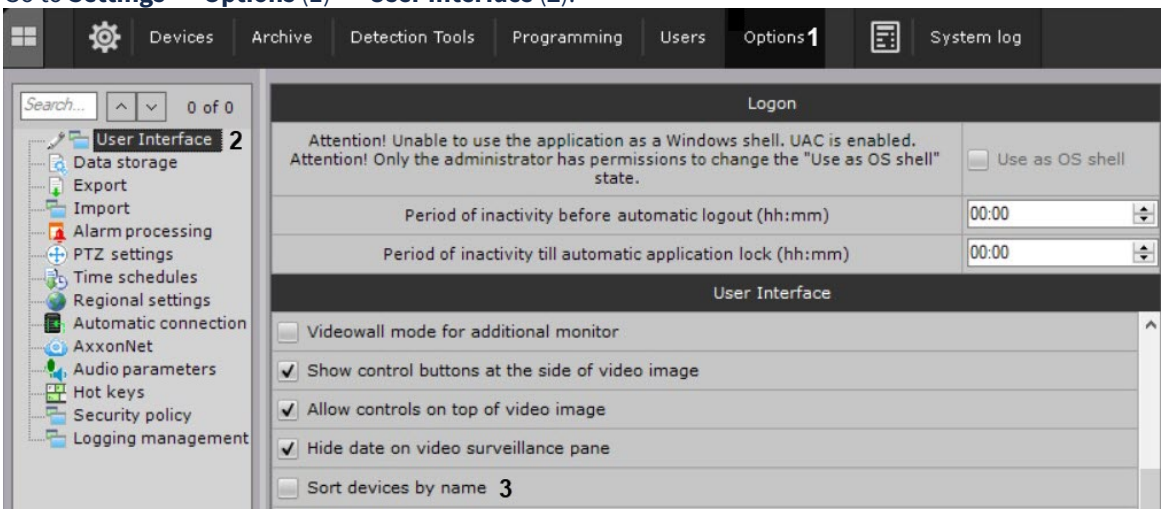
Configuring layouts(see page 942)
Configuring Surveillance windows(see page 955)

19.10.2.1.15 Configuring camera sorting on Objects Panel

By default, the cameras on the Objects Panel (see Object panel(see page 1133)) are sorted by the short name (see Camera(see page 171)).

To enable the sorting by the name, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Set the **Sort devices by name** checkbox (**3**).
3. Click the **Apply** button.

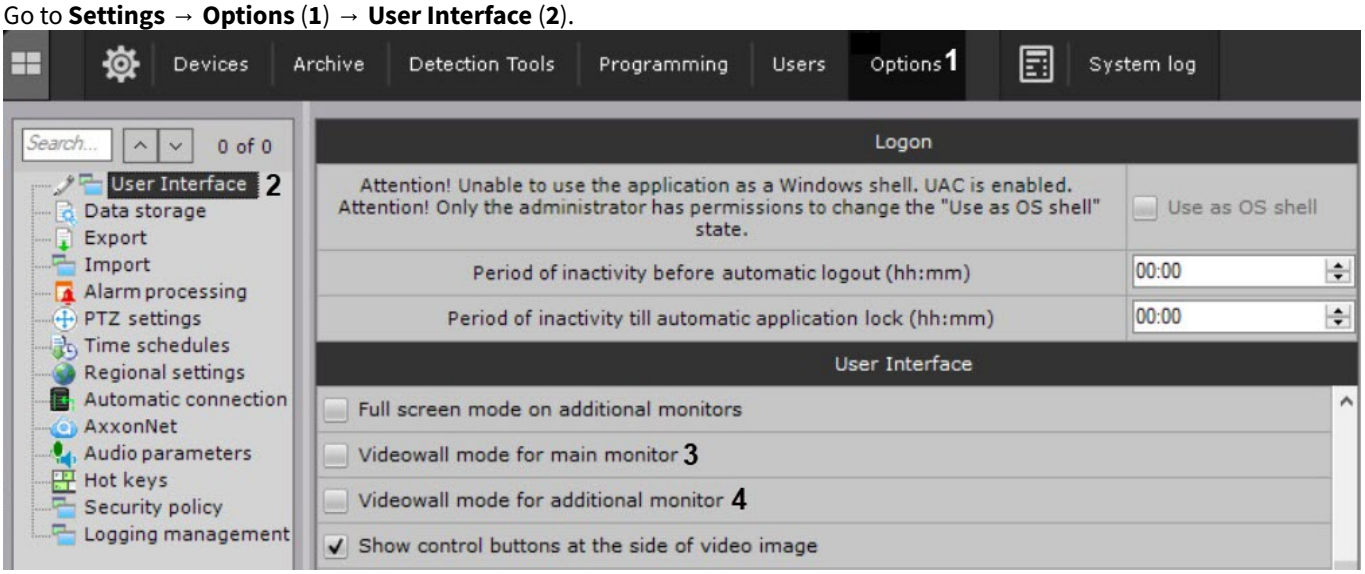
Sorting the cameras by the name on the Objects Panel is enabled.

19.10.2.1.16 Configuring the videowall mode

Configuring Video wall(see page 981)

To configure the videowall mode, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. To use the videowall mode on the main monitor, set the **Videowall mode for main monitor** checkbox (**3**).
3. To use the videowall mode on the additional monitor, set the **Videowall mode for additional monitor** checkbox (**4**).
4. Click the **Apply** button.
5. Restart *Axxon One* (see Stop the client(see page 145), Starting the client(see page 138)).

The videowall mode is configured.

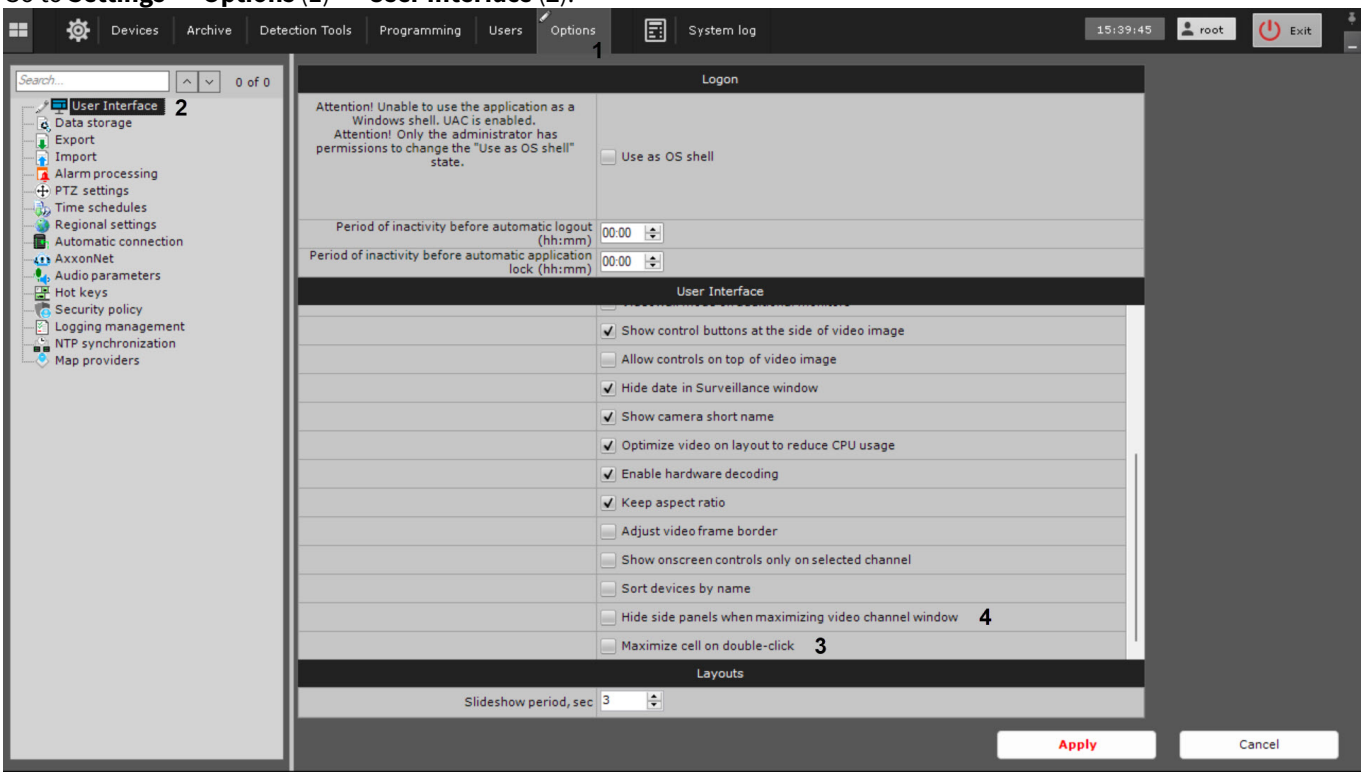
At a new start of the *Axxon One* Client:

1. On the main monitor, the panel pin button won't be active (see Interface of Axxon One(see page 93)). The Archive navigation panel and the Event Board (see The Archive Navigation Panel(see page 1118)), the Layouts panel (see The Layouts panel(see page 1129)), messages about system errors that occurred (see Control in Live Video mode(see page 1317)), the Alert panel (see Alert panel(see page 1131)) won't be displayed.
2. The additional monitor won't display the Objects panel (see Object panel(see page 1133)), the Archive navigation panel and the Event Board (see The Archive Navigation Panel(see page 1118)), the Alert panel (see Alert panel(see page 1131)).
3. The map (see Working with the interactive map(see page 1291)) will be available on the main monitor and on the additional monitor.

19.10.2.1.17 Configuring cell maximization on double click

To maximize the cell on double click, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. Set the **Maximize cell on double-click** checkbox (**3**).
3. Click the **Apply** button.

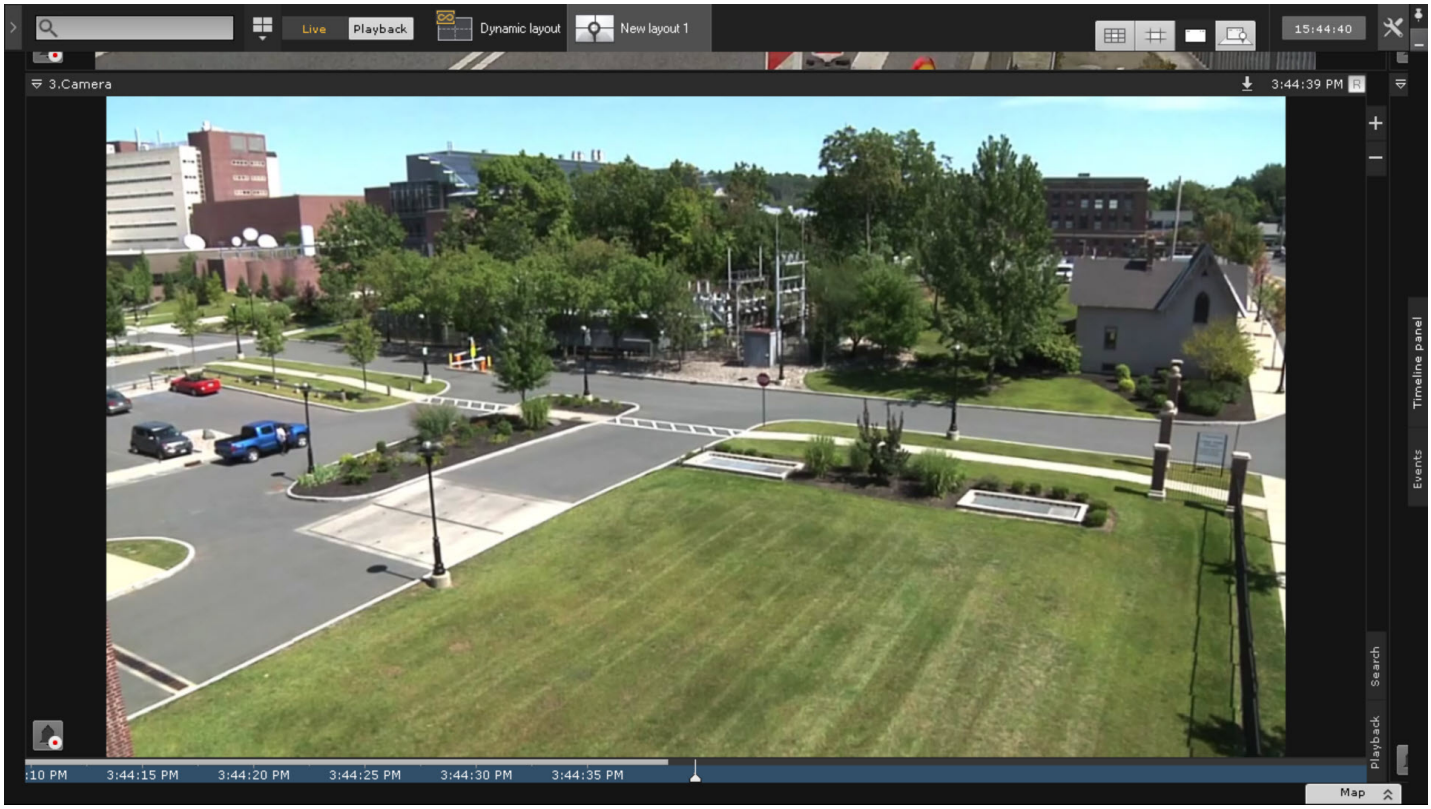
Configuring the cell maximization on double click is complete.

When you double-click on the video window, the top panel will be hidden on the main and additional monitors. The side panels and map will not be hidden; the side panel buttons will always be visible.

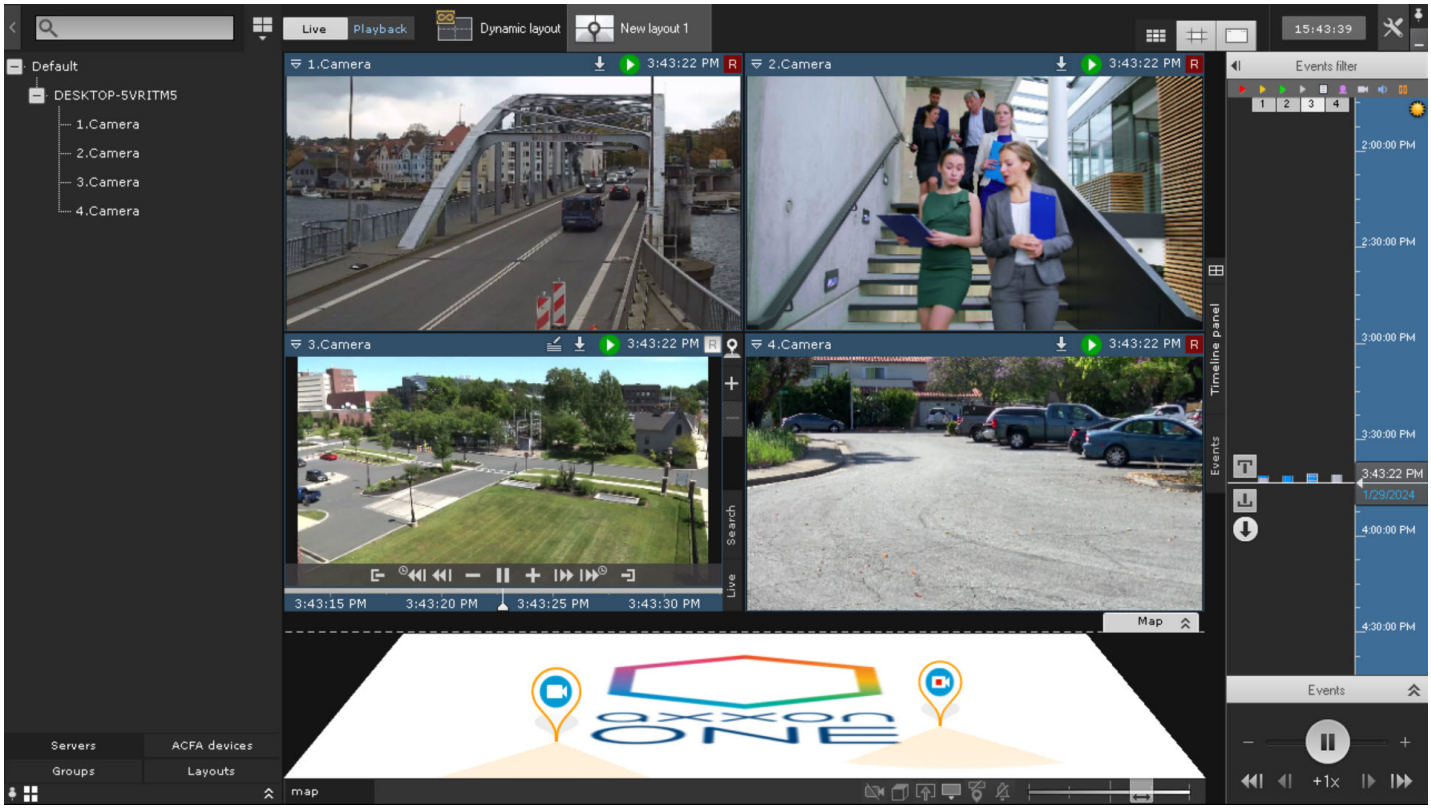


To hide the side panels and the map when the video window is maximized, set the **Hide side panels when maximizing video channel window** checkbox (**4**).

In this case, when you double-click on the video window, the top panel will be visible, but the side panels and the map will be hidden on the main and additional monitors. The side panel buttons will always be visible.



You can exit the full-screen mode in the same way. The top and side panels, as well as the map, will be displayed again.



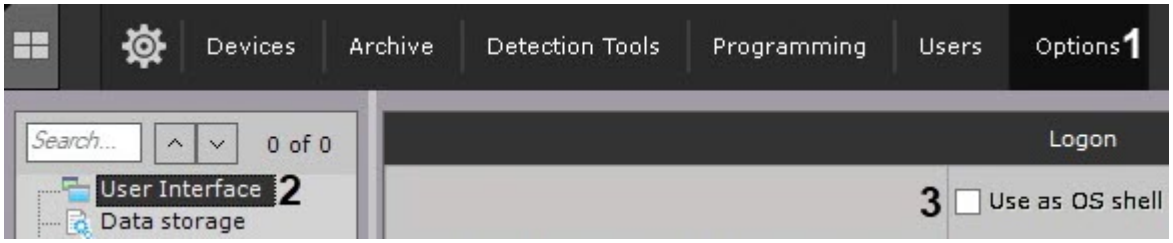
19.10.2.2 Configuring how Axxon One starts

19.10.2.2.1 Configuring Axxon One startup instead of the standard Windows OS shell

Autorun of *Axxon One*, instead of the standard Windows OS shell, is used in cases where you need to restrict access to computers running the digital video surveillance system, including preventing the launch of various applications, file copying and deletion, various Windows operations, and other non-standard use of the computers.

If you configure *Axxon One* to autorun instead of the standard Windows shell, *Axxon One* will launch instead of Windows Explorer immediately after Windows loads. This makes it impossible for the user to launch certain applications installed on the computer or to work with certain program dialog boxes.

To activate autorun of the *Axxon One* software package instead of the standard Windows shell, select the **Use as OS shell** (**3**) check box in **Settings** → **Options** → **User Interface** (**1-2)** and click **Apply**.



Axxon One will now launch instead of the standard Windows shell the next time you start Windows.

Note

If User Accounts Control is enabled in the Windows OS, *Axxon One* VMS cannot automatically start in place of OS shell (the appropriate check box is grayed out). Disable UAC.
In Windows 10 OS, you also need to make changes to the registry[367] and reboot your PC.

19.10.2.2.2 Automatic connection

On the page:

- General information about configuring Automatic connection(see page 1042)
- Configuring the automatic connection(see page 1042)
- Configuring the automatic connection of the client to servers belonging to different domains(see page 1043)
- Configuring the automatic connection of the client to the nodes of the failover system(see page 1044)
- Configuring the automatic connection with the backup server(see page 1044)

367 http://winaero.com/blog/how-to-turn-off-and-disable-uac-in-windows-10/

- Changing the server port(see page 1044)
- Exporting and importing the automatic connection configuration(see page 1045)

19.10.2.2.1 General information about configuring Automatic connection

This setting is used to automatically connect:

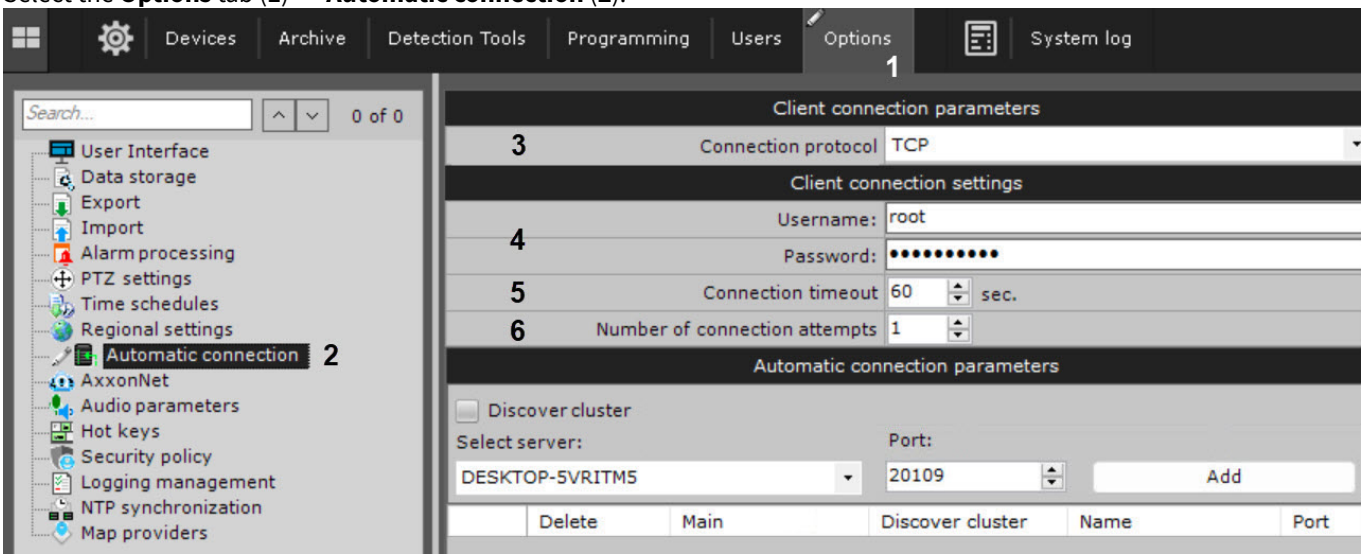
- the client to the server without re-entering the server name, username and password when starting the app;
- the client to servers belonging to different domains (see Cross-System client(see page 143));
- the client to the nodes of the failover system (see Configuring Failover VMS(see page 1064)).

If you connect automatically, the servers specified in the **Automatic connection parameters** group will be used first. If these servers are unavailable, the system will try to connect to the servers from the **Preferred servers parameters** group following the set order (see Selecting Preferred Servers(see page 1047)).

19.10.2.2.2 Configuring the automatic connection

To configure the automatic connection, do the following:

1. Select the **Options** tab (**1**) → **Automatic connection** (**2**).



2. From the drop-down list (**3**), select the connection protocol to the server.
   Description of the protocol and recommendations for selection are given in the table.

Protocol	Description
TCP	This protocol is more reliable but has a busy connection. We recommend selecting it for servers with a small number of cameras
UDP unicast	UDP protocol has a higher data transmission speed, but it is less reliable. The unicast scheme is used to transmit data to one recipient. You must select this protocol for a server with a large number of cameras that has several clients working with it
UDP multicast	The multicast scheme is used to transmit data to a group of recipients. This protocol is best suited for a server with a large number of cameras that has many clients working with it. **Attention!** To operate with this protocol, all network elements, including switches must support it

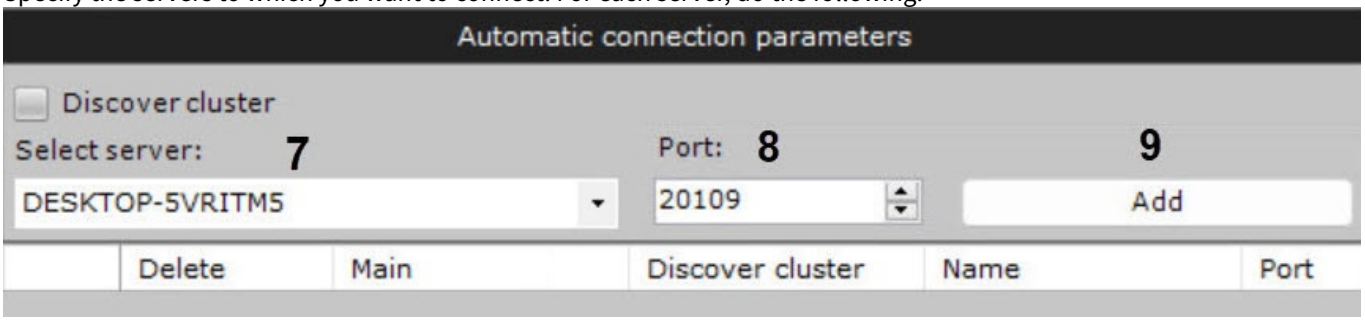
The choice of either favoring connection reliability or data transmission speed depends on the clients' connection protocol to the server. You can select the connection protocol for each server of the domain. All clients connected to the server will receive video streams via this protocol.

3. For automatic authorization when connecting to servers, enter the username and password (**4**). If you leave these fields blank, authorization will be performed manually when you start the client.

   Attention!

   Cross-System client connects to all servers using a single username-password pair that must be created in each domain (see Cross-System client(see page 143)).

4. In the **Connection timeout** field (**5**), specify the waiting period for a successful connection before considering the attempt unsuccessful. The default value is 60 seconds, the maximum value is 300 seconds (5 minutes). If you use this setting, an automatic connection attempt will occur immediately. If the connection fails, the server will wait for the time period (timeout) specified by the user and repeat the connection attempt.
5. Specify the maximum number of automatic connection attempts after the specified timeout (**6**).
6. Specify the servers to which you want to connect. For each server, do the following:



   a. Select a server from the list or enter the server IP address (**7**).
   b. Specify the port for connecting to the server (**8**).

      Note

      If you leave the **Port** field blank, the standard port **20109** will be used for connection.

   c. Click the **Add** button (**9**).

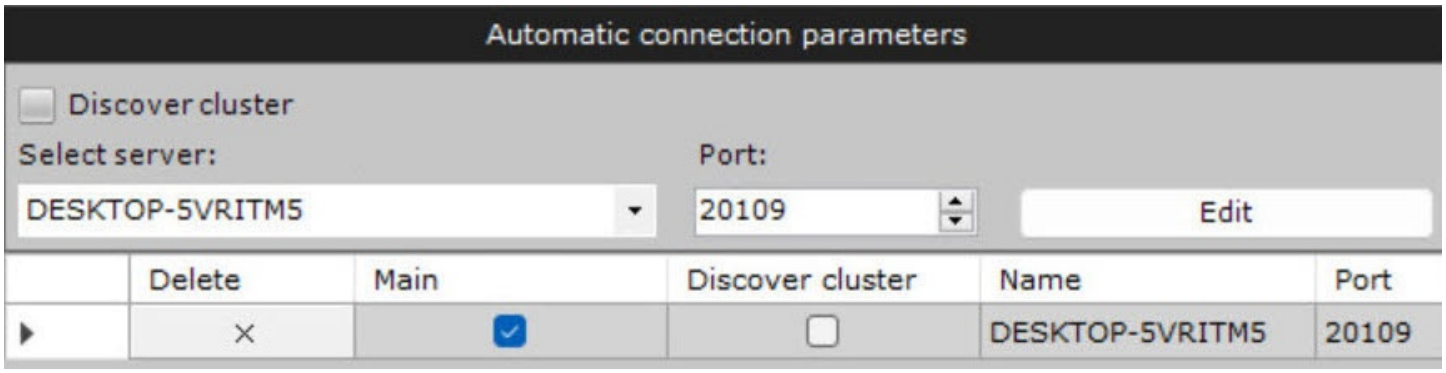
      Note

      - If you use the Cross-System client, you can connect to only one server of each domain (see Cross-System client(see page 143)). Therefore, when you add a server to the list, all other servers of this domain become unavailable for selection.
      - To remove a server from the list, click the ✕ button.

Configuring the automatic connection of the client to servers is complete. The next time you start *Axxon One*, the system will connect to the selected servers.

19.10.2.2.3 Configuring the automatic connection of the client to servers belonging to different domains

When you use the Cross-System client, select the main domain after adding all servers to the list. To select the main domain, set the **Main** checkbox in the corresponding column of the server that belongs to this domain.

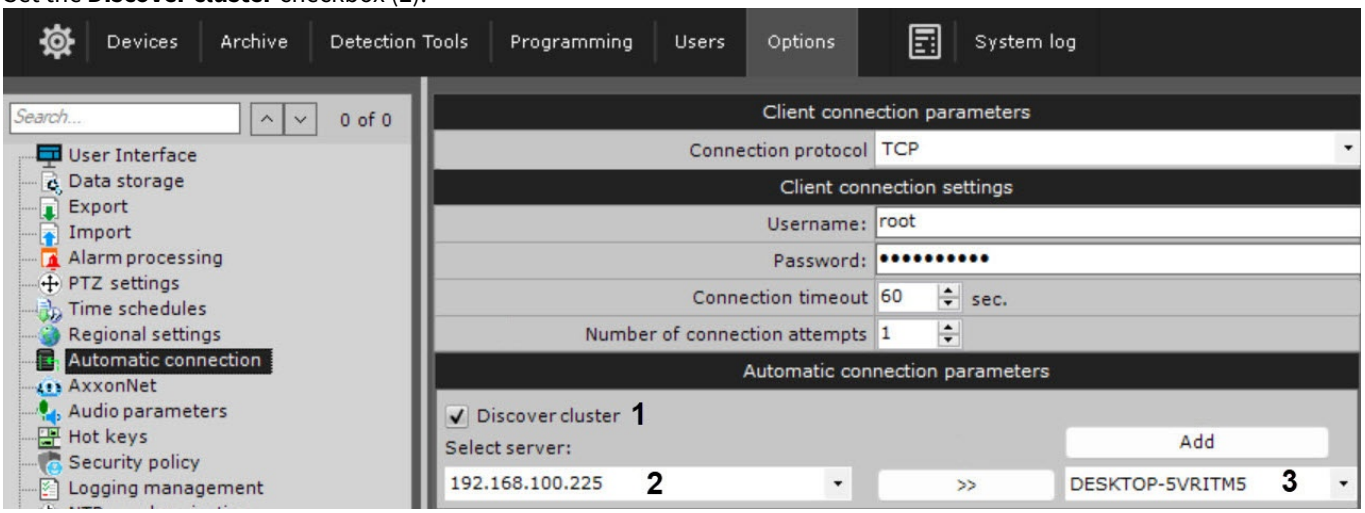


When you connect, the client will use the parameters (maps, layouts, user permissions) of the main domain.

19.10.2.2.2.4 Configuring the automatic connection of the client to the nodes of the failover system

If you want to configure the automatic connection to a node of the failover system, do the following:

1. Set the **Discover cluster** checkbox (**1**).



2. Enter the IP address of any server of the cluster (**2**) and click the >> button.
3. From the drop-down list (**3**), select a node that you want to add to autoloading.
4. Click the **Add** button.
5. Click the **Apply** Apply button.

Configuring the automatic connection of the client to the node of the failover system is complete.

19.10.2.2.2.5 Configuring the automatic connection with the backup server

To automatically connect to the backup server if the main one is unavailable in the N+1 cluster configuration, do the following:

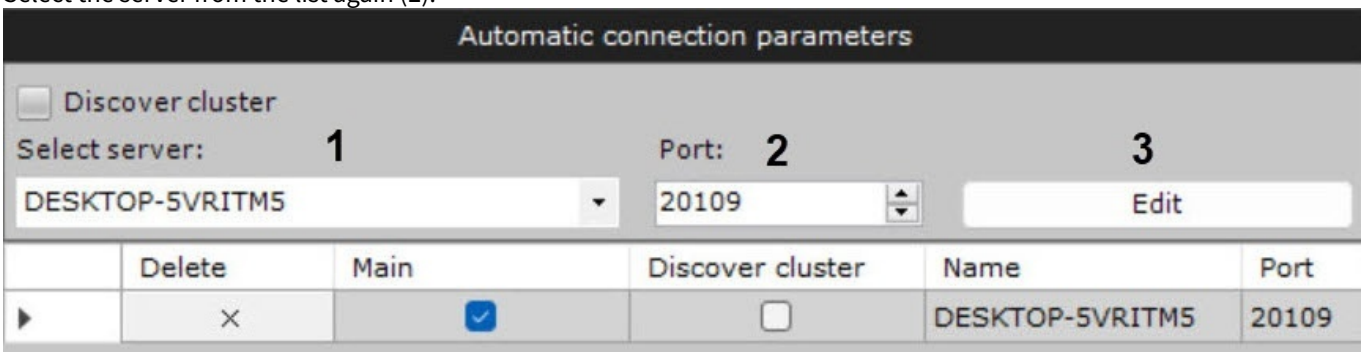
1. In the **Automatic connection parameters** group, enter the IP address and port of the main server, as well as the name of the node.
2. Click the **Add** Add button.
3. Set the checkboxes in the **Main** and **Discover cluster** columns.
4. In the **Preferred servers parameters** group, select a backup server from the list or enter its IP address and node name.
5. If necessary, change the default port for the backup server in the **Port** field.
6. Click the **Add** Add button.
7. Click the **Apply** Apply button.

Configuring the automatic connection with the backup server is complete.

19.10.2.2.2.6 Changing the server port

To change the port of the already added server, do the following:

1. Select the server from the list again (**1**).

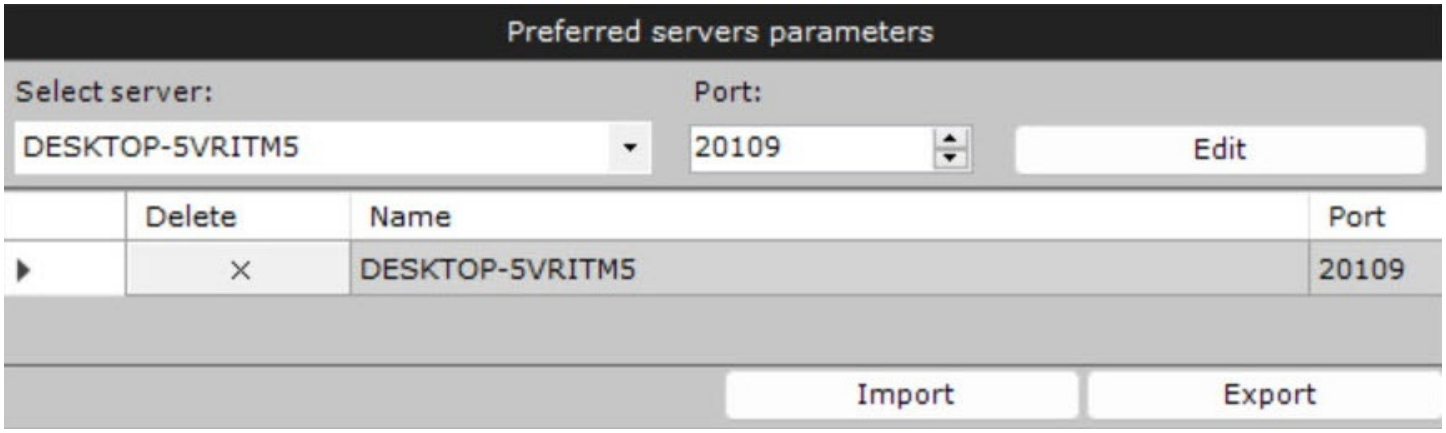


2. In the **Port** field (**2**), specify a new number.
3. Click the **Edit** button (**3**).

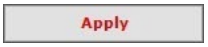
Changing the port of the added server is complete.

19.10.2.2.7 Exporting and importing the automatic connection configuration

To save the configuration of the automatic connection to servers and preferred servers (see Selecting Preferred Servers(see page 1047)) to a JSON file, click the **Export** button.



To load the configuration on the clients, do the following:

1. Click the **Import** button.
2. Click the **Apply** 

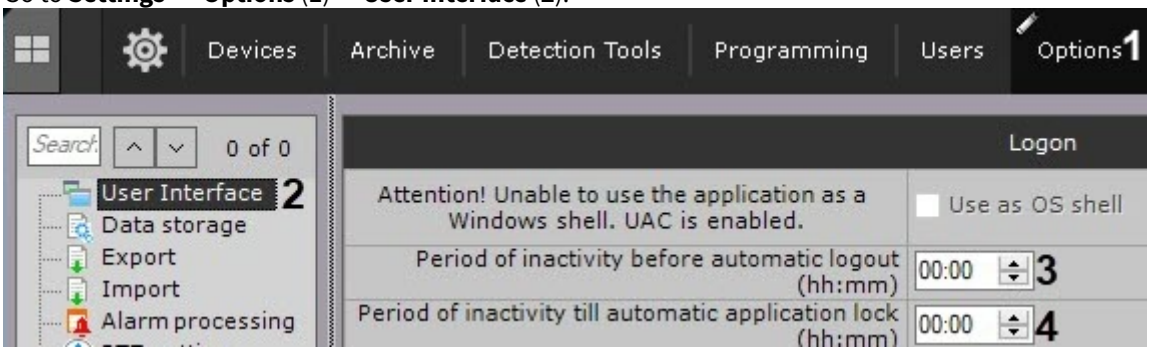
button.

19.10.2.2.3 Configuring automatic logging out and locking of the Client

You can set the system to automatically log out of the Client and/or lock the Client if the user is inactive for a certain period of time, that is, there are no signals from input devices (keyboard, mouse, joystick).

To do this, do the following:

1. Go to **Settings** → **Options** (**1**) → **User Interface** (**2**).



2. In the **Period of inactivity before automatic logout (hh:mm)** field, enter the time of user inactivity after which the Client is logged out (**3**).
   If the field is blank or the value is set to 00:00, the Client isn't logged out.
3. In the **Period of inactivity till automatic application lock (hh:mm)** field, enter the time of user inactivity after which the Client is locked (**4**). You need to go through the authentication procedure again for further work.
   If the field is left blank or the value is set to 00:00, the Client isn't locked.

   Note

   - Automatic lock isn't performed if a layout with cameras is open.
   - You can lock the Client manually at any time using keyboard shortcuts (see Assigning hot keys(see page 1055), Appendix 3. Hotkeys in Axxon One(see page 1430)).

4. Click the **Apply** button.

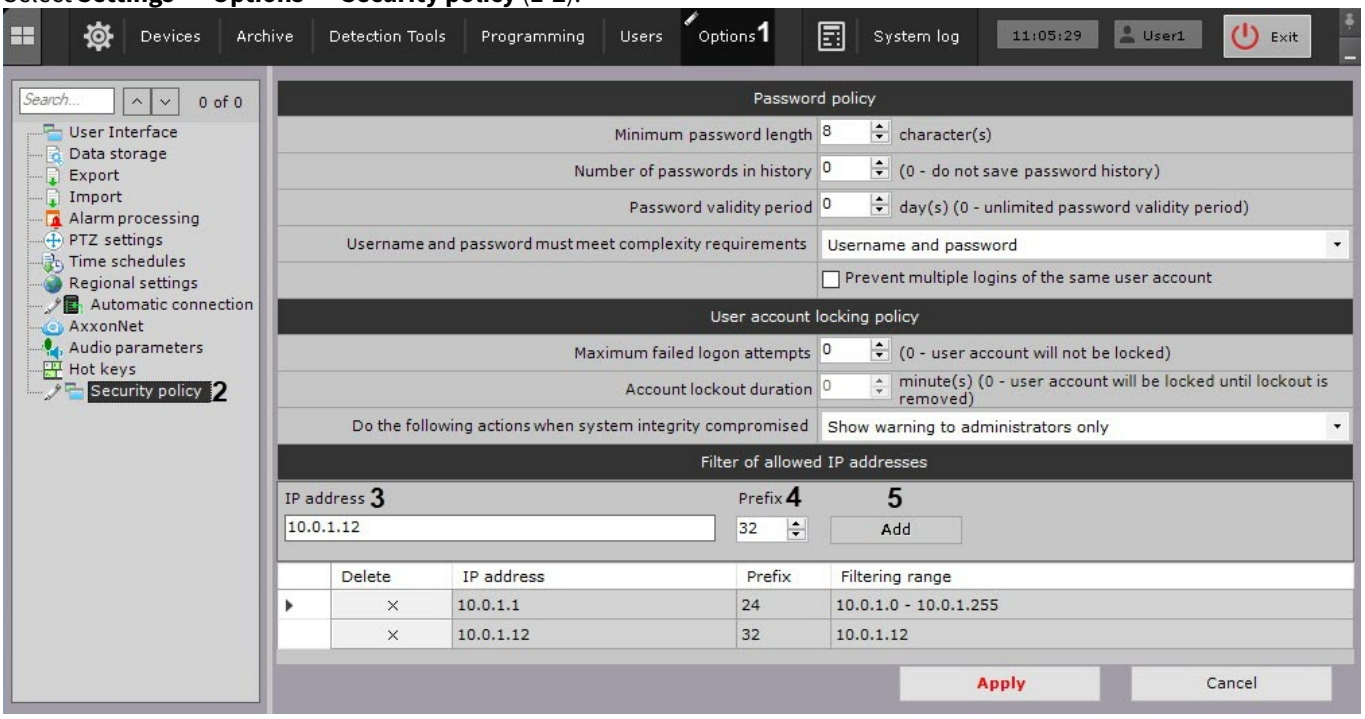
Configuration of automatic logging out and locking of the Client is now complete.

19.10.2.2.4 IP address filtering configuration

You can restrict remote clients' access to the server to a range of IP addresses.

To do this:

1. Select **Settings** → **Options** → **Security policy** (**1**-**2**).



2. In the **Filter of allowed IP addresses** group, enter the IP address (**3**) and subnet mask[368] (**4**) to set the range of addresses from which a connection will be permitted.
3. Click the **Add** button (**5**).
4. Click **Apply**.

The range is now added to the list. No connection will be possible from addresses not in the list.

To remove an address or a range from the list, do the following:

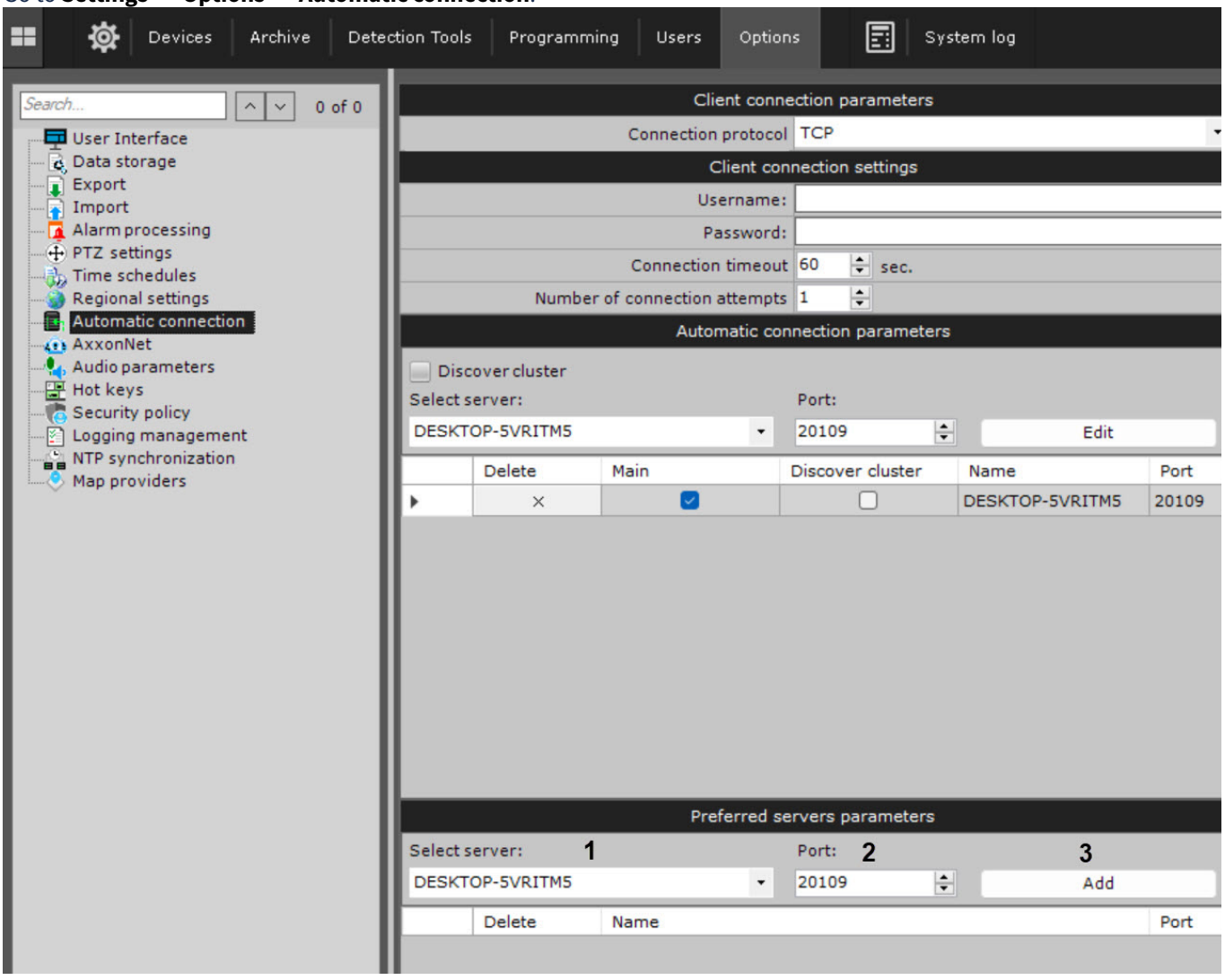
1. Click the ✕ button.
2. Click **Apply**.

19.10.2.2.5 Selecting Preferred Servers

You can set Preferred Servers, which will be displayed at the top of the list when you launch Client (see Starting the client(see page 138)). Also, preferred Servers are used for automatic connection: it primarily uses the Servers specified in the **Automatic connection parameters** group (see Automatic connection(see page 1041)), and if these Servers are unavailable, then the system will try to connect to Servers from the **Preferred servers parameters** group in the set order.

To set Preferred Servers, follow the steps below:

1. Go to **Settings** → **Options** → **Automatic connection**.



2. In the **Preferred servers parameters** group, select the Server from the list (**1**).
3. Change the default port if necessary (**2**).
4. Click **Add** (**3**).

368 https://en.wikipedia.org/wiki/Subnetwork

5. Repeat the steps for all required Servers.
6. Click **Apply** 

.

Note

You can save the Preferred Servers list to a JSON file and load it to another Client (see Automatic connection(see page 1041)).

19.10.2.3 Configuring export

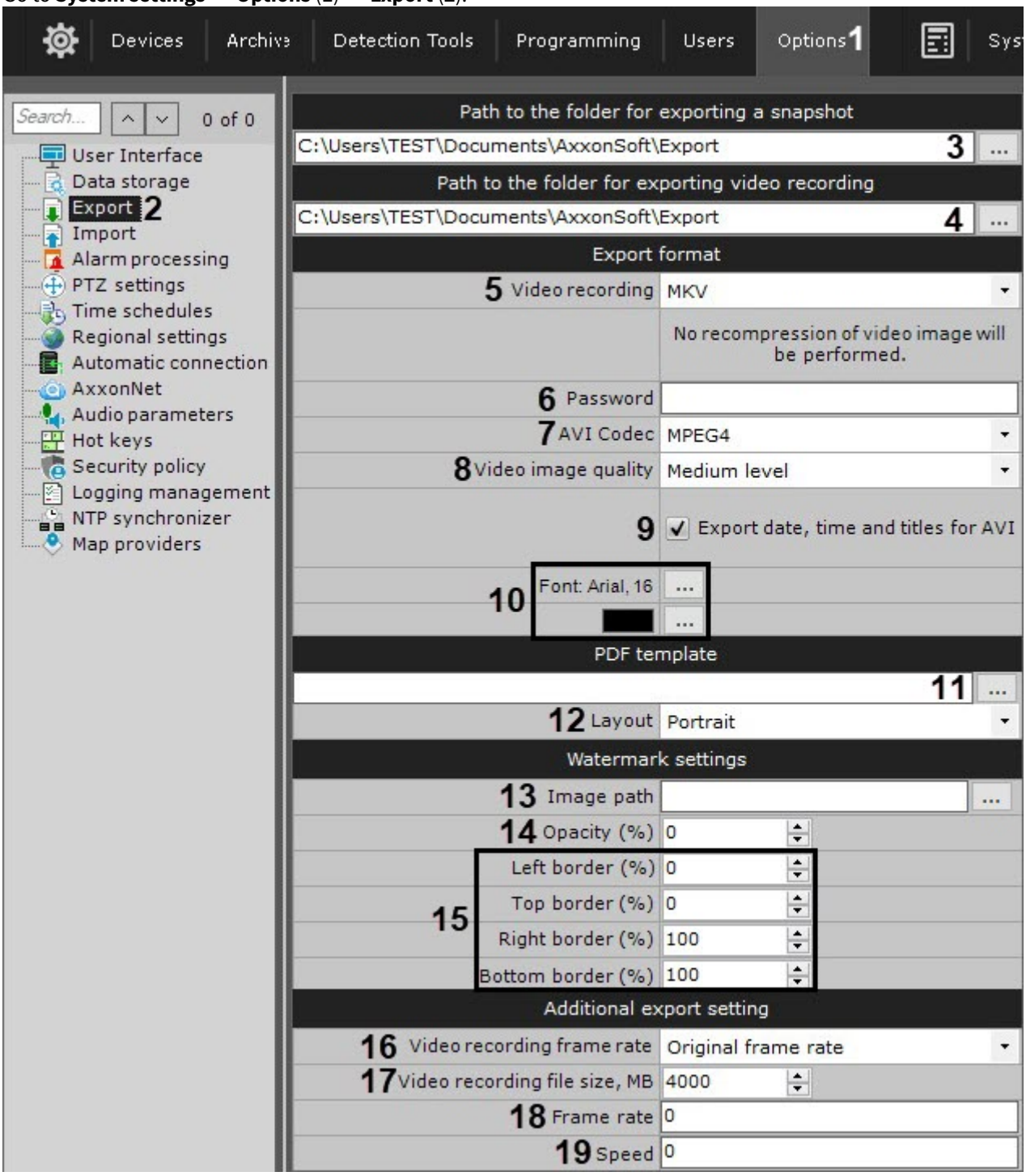
19.10.2.3.1 Configuring export options

Configuring export includes:

- setting the default destination folders for exported files,
- setting the default formats for the export of video and snapshots,
- configuring export of video in AVI format,
- configuring the template for the export of snapshots in PDF format,
- other export settings.

Configure export as follows:

1. Go to **System settings** → **Options** (**1**) → **Export** (**2**).



2. In the **Path to the folder for exporting a snapshot** (**3**) and **Path to the folder for exporting video recording** (**4**), enter the full path to the folders in which the exported files should be saved. To do this, click the ... button.

Attention!

During export you can specify any path. These fields also allow you to specify the name template for the exported files, as follows:



- {0}—camera short name;
- {1}—camera name;
- {2}—date;
- {3}—time;
- {4}—recording duration (for video export only).

3. Select the default formats for export of video and snapshots (**5**). You can select any available format during export. Snapshots can be exported in two formats: JPG and PDF. Videos can be exported into the following four formats: MP4, MKV, EXE and AVI.

   Note

   - Video is exported to MKV format without recompression.
   - Video is exported to AVI format with recompression in the selected codec (**7**).
   - When video is exported to EXE format, a self-contained executable file is generated, containing video, playback tools, and necessary codecs.

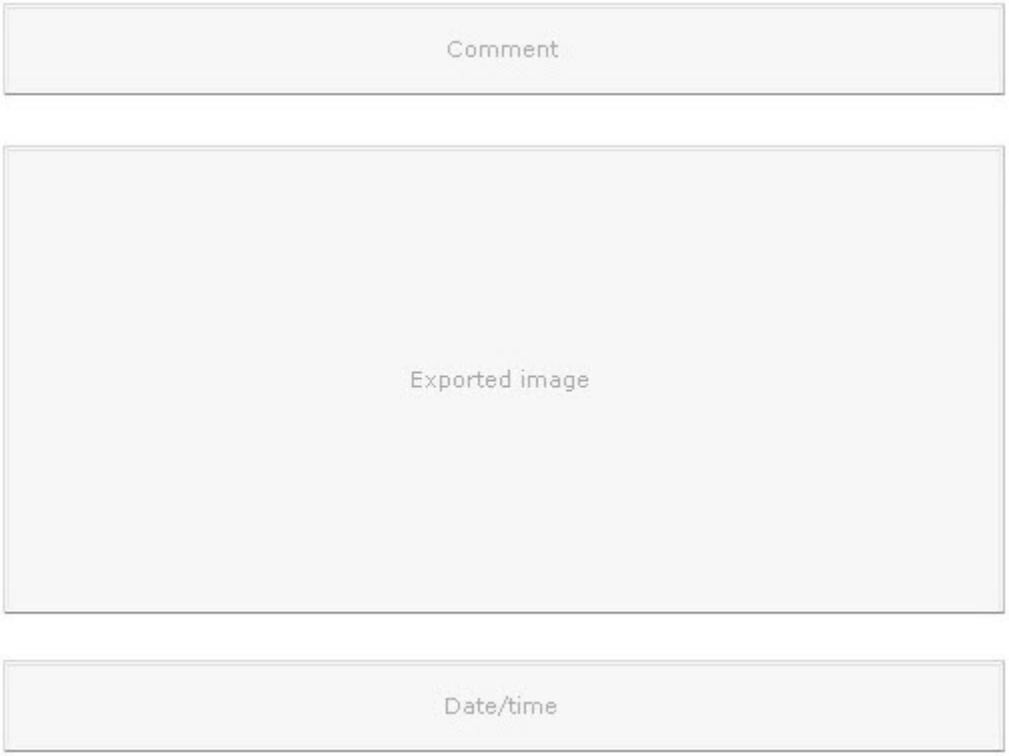
4. If you want to export to an encrypted ZIP archive, set an archive password (**6**). If you export to EXE format, you will need to enter a password when you open the file.
5. Specify settings for video export to AVI format:
   a. Select a codec (**7**):
      i. MPEG4,
      ii. MGPEG,
      iii. h264.
   b. Select video image quality (**8**):
      i. Minimum level,
      ii. Low level,
      iii. Medium/Low,
      iv. Medium level,
      v. Medium/High,
      vi. High level,
      vii. Maximum level.
6. If you want to superimpose captions in the exported video, set the **Export date, time and titles for AVI** checkbox (**9**). When exporting to MKV format, captions are always added, you can disable them when playing back.
7. Configure the template to export snapshots to PDF format:
   When exporting, a PDF document consists of three sections: a comment specified during export; exported image; date and time of the snapshot.
   a. Select the font and set its color (**10**).
   b. If necessary, select a PNG image that will be used as a background of the PDF document (**11**).

      Note

      The size of the image must not exceed 1 MB.

   c. Select document layout (**12**):
      i. Portrait,
      ii. Landscape.

d. Configure the size of the sections and their position on the page.



> **Note**
>
> You can change the size and position of a section in the same way as working with windows in Windows OS[369].

8. You can watermark the exported files as follows:

> **Attention!**
>
> The watermark settings are applied to the entire Axxon-domain.

   a. Select a file with a watermark (**13**). PNG, JPEG, BMP images are allowed.
   b. Set the opacity of the watermark: 100%—opaque, 0%—transparent (**14**).
   c. Set the location of the watermark (**15**). To do this, specify the border of the watermarked area on each side of the frame as percentage of the frame size. The top left corner should be taken as the origin point.
   For example, with the default values (Left **0**, Top **0**, Right **100**, Bottom **100**), the specified area will take the entire frame, and the watermark will be located in the center of the image. To place the watermark in a corner, specify the following values:
      i. for the top-left corner—Left **0**, Top **0**, Right **watermark width as percentage of the frame width**, Bottom **watermark height as percentage of the frame height**;
      ii. for the bottom-left corner—Left **0**, Top **100 minus watermark height as percentage of the frame height**, Right **watermark width as percentage of the frame width**, Bottom **100**;
      iii. for the top-right corner—Left **100 minus watermark width as percentage of the frame width**, Top **0**, Right **100,** Bottom **watermark height as percentage of the frame height**;
      iv. for the bottom-right corner—Left **100 minus watermark width as percentage of the frame width**, Top **100 minus watermark height as percentage of the frame height**, Right **100**, Bottom **100**.

9. Select a frame rate for the exported video on one of the following ways:
   a. From the **Video recording frame rate** drop-down list (**16**), select the value:
      i. Original frame rate,
      ii. **1/2**—the frame rate in the exported video recording will be two times lower than the original frame rate,
      iii. **1/4**—the frame rate in the exported video recording will be four times lower than the original frame rate,

369 https://support.microsoft.com/en-US/windows

iv. **1/8**—the frame rate in the exported video recording will be eight times lower than the original frame rate.

b. Set the frame rate per second manually (**18**). The value must be in the range [1; 300].

> **Note**
>
> The minimum frame rate in the exported video is 1 FPS.

10. Set the maximum size of the exported video recording in MB (**17**). When the specified size is reached, a new file will be created.

> **Attention!**
>
> - If you set the **0** value, the export will always be to a single file.
> - The minimum value is 5 MB.
> - Due to Windows OS limitations, you cannot export files of more than 4 Gb to EXE format.

11. If it is necessary to change the speed of the exported video recording, in the **Speed** field (**19**), set the speed-up factor from 0 to 128. You can enter fractional values. For example, if you set 10 for the original 10-minute video recording, it will be exported to a 1-minute recording.
12. Click the **Apply** button.

Export configuration is now complete.

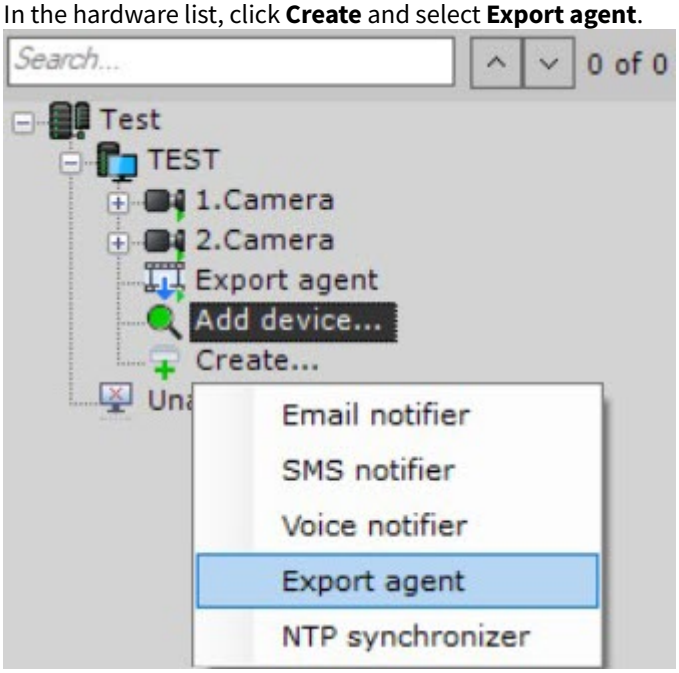
19.10.2.3.2 Configuring Export agent

Export agent is a service that allows automatically exporting frames and video recordings to a particular Server when an event occurs in the system.

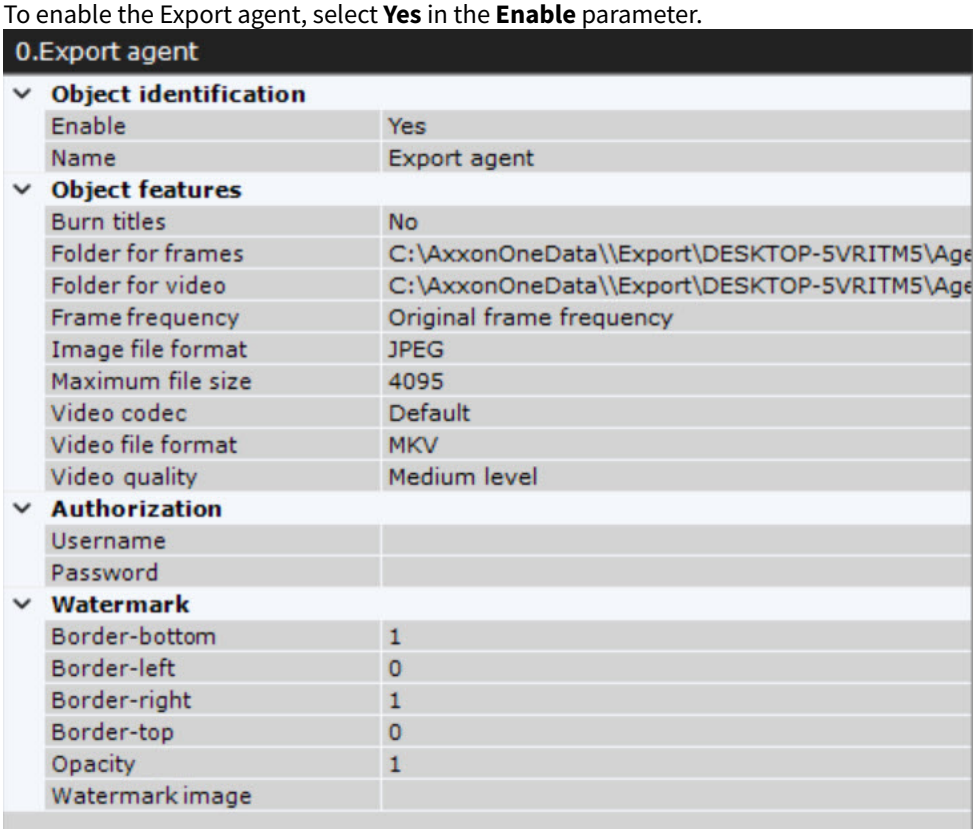
To start automatic export of frames and video recordings, you need to create a macro in the Cycle rules (see Programming(see page 828)).

To create and configure the Export agent, do the following:

1. In the hardware list, click **Create** and select **Export agent**.



2. To enable the Export agent, select **Yes** in the **Enable** parameter.



3. If necessary, you can specify a new name for the Export agent in the **Name** parameter.
4. By default, the **Burn titles** parameter is disabled. To burn titles on JPEG images and AVI video, select **Yes**.
5. In the **Folder for frames** and **Folder for video** parameters, specify full paths to folders for storing exported frames and videos. If you specify network folders, you must also specify the **Username** and **Password** of the user who has access to this network storage.
6. In the **Frame frequency** parameter, select the frame rate of the final video stream:
    a. **Original frame frequency** (default);
    b. **1/2**—frame rate of the exported video is two times lower than the original frame rate;
    c. **1/4**—frame rate of the exported video is four times lower than the original frame rate;
    d. **1/8**—frame rate of the exported video is eight times lower than the original frame rate;
7. In the **Image file format** parameter, select the frame format for export:
    a. **JPEG** (default);
    b. **PDF**.
8. In the **Maximum file size** parameter, specify the maximum file size of the exported video in megabytes. When the specified size is reached, a new file is created. The default value is **4095**.
9. In the **Video codec** parameter, select the codec of the final video stream:
    a. **MPEG4**;
    b. **MGPEG**;
    c. **H.264**;
    d. **Default**.
10. In the **Video file format** parameter, select the video format for export:
    a. **MKV** (default);
    b. **AVI**;
    c. **EXE**;
    d. **MP4**.
11. In the **Video quality** parameter, select the quality of the final video stream:
    a. **Minimum level**;
    b. **Low level**;
    c. **Medium/Low level**;
    d. **Medium level** (default);
    e. **Medium/High level**;
    f. **High level**;

g. **Maximum level**.

12. Specify the location of the watermark. To do this, specify the border of the watermarked area on each side of the frame as a fraction of the frame size in the **Border-bottom**, **Border-left**, **Border-right**, **Border-top** parameters. The values must be in the range [0, 1]. The top left corner must be taken as the coordinate origin point.
    For example, with the default values (Left **0**, Top **0**, Right **1**, Bottom **1**), the specified area takes the entire frame, and the watermark is located in the center of the image. To place the watermark in a corner, specify the following values:
    a. for the top-left corner—Left **0**, Top **0**, Right **watermark width as a fraction of the frame width**, Bottom **watermark height as a fraction of the frame height**;
    b. for the bottom-left corner—Left **0**, Top **1 minus watermark height as a fraction of the frame height**, Right **watermark width as a fraction of the frame width**, Bottom **1**;
    c. for the top-right corner—Left **1 minus watermark width as a fraction of the frame width**, Top **0**, Right **1**, Bottom **watermark height as a fraction of the frame height**;
    d. for the bottom-right corner—Left **1 minus watermark width as a fraction of the frame width**, Top **1 minus watermark height as a fraction of the frame height**, Right **1**, Bottom **1**.
13. In the **Opacity** parameter, specify the watermark opacity: 1—opaque, 0—fully transparent. The value must be in the range [0, 1].
14. In the **Watermark image** parameter, select a watermark file. Only images in PNG format are allowed.
15. Click the **Apply** button.

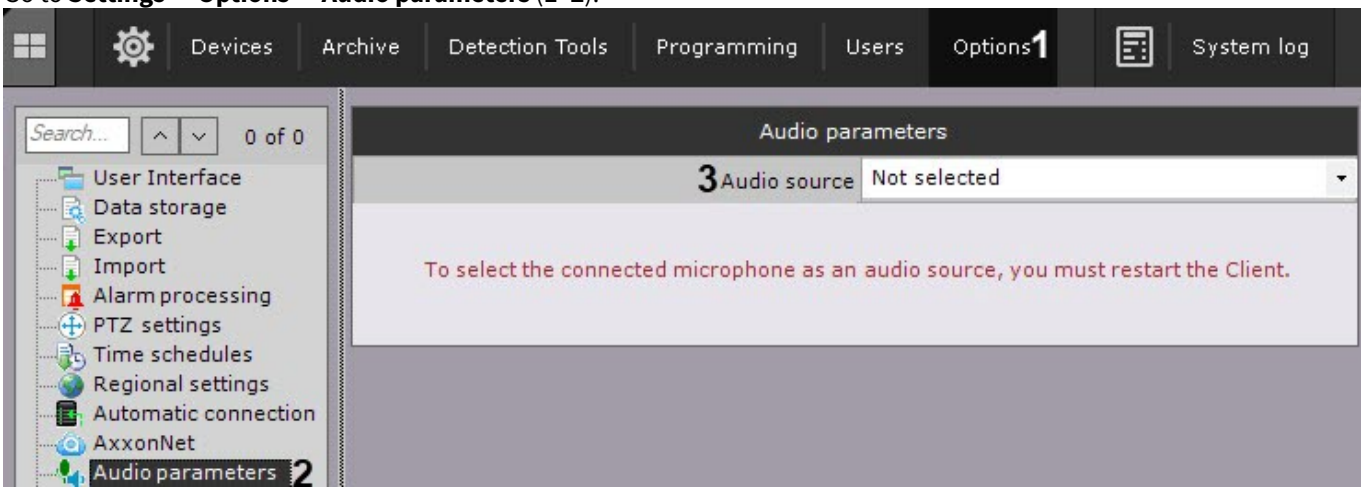
Creating and configuring the Export agent is now complete.

19.10.2.4 Configuring audio on the Client

To broadcast audio from the Client microphone on a camera speaker, you must configure audio on the Client.

Do the following:

1. Go to **Settings** -> **Options** -> **Audio parameters** (**1**–**2**).



2. In the **Audio source** field, select the system device that will be used as the audio source for playback on the camera speaker (**3**).

> **Note**
>
> The default device is shown in the list in bold.

3. Click the **Apply** button.

Configuration of audio on the Client is now complete.

19.10.2.5 Configuring hot keys

19.10.2.5.1 Introduction to hot keys in Axxon One

In *Axxon One*, hot keys for standard keyboards and joysticks can be set to perform certain actions.

The operator's work with hotkeys is divided into 6 modes:

1. Global mode, in which a hot key is always available.
2. Live Video mode.
3. Archive viewing and search in archive mode.
4. Time Compressor mode.
5. Alarm Processing mode.
6. Programming – running macros.

When setting hot keys, keep the following rules in mind:

- the same shortcut can be used for different actions in different modes;
- a shortcut in any particular mode can be associated with only one action;
- shortcuts set in Global mode cannot be redefined in other modes;
- hot keys are available only when the Client is active;
- on standard keyboards, alphanumeric keys must be preceded by modifier keys (CTRL, ALT, SHIFT);
- during system configuration (when the Settings tab is open), only one action with hot keys is available: go to layouts (the Activate panel of configuration command).

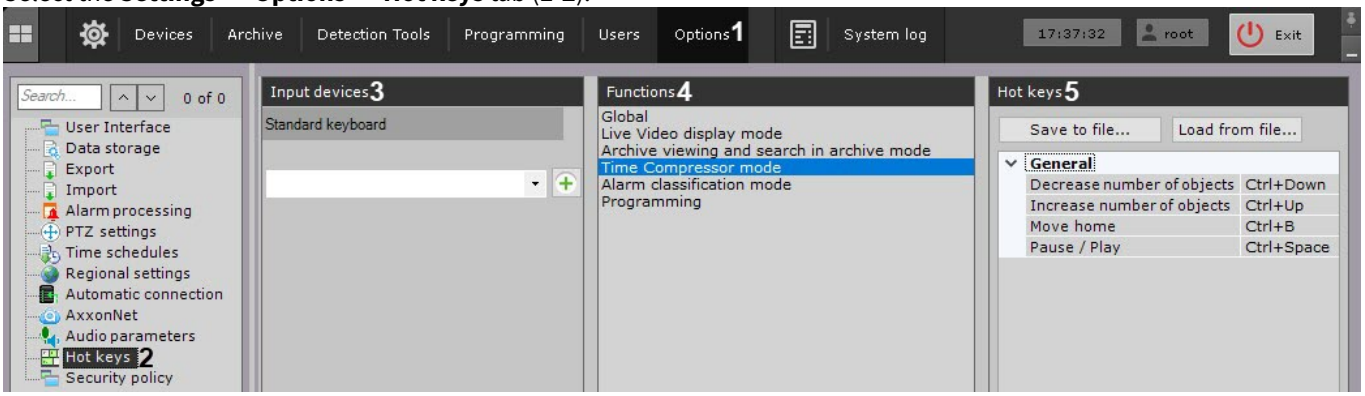
Note

Please refer to the list of hotkeys in Appendix 6(see page 1430) to this guide.

19.10.2.5.2 Assigning hot keys

To assign hot keys:

1. Select the **Settings** → **Options** → **Hot keys** tab (**1**-**2**).



2. In the list, select the device for which you want to configure hot keys (**3**).
3. Select the mode for which you want to configure hot keys (**4**, see Introduction to hot keys in Axxon One(see page 1054)).
4. To assign a shortcut to a specific action:
   a. Double-click the current shortcut assigned to the action (**5**). The field is now cleared.

   Note

   For some actions in Global mode, you cannot change the default hot keys.

   b. Press the key/key combination/joystick button to assign to the action.

   Note

   If the field is left empty, no hot key will be assigned to the action.
5. Assign hot keys for all actions of interest.
6. Click the **Apply** button.

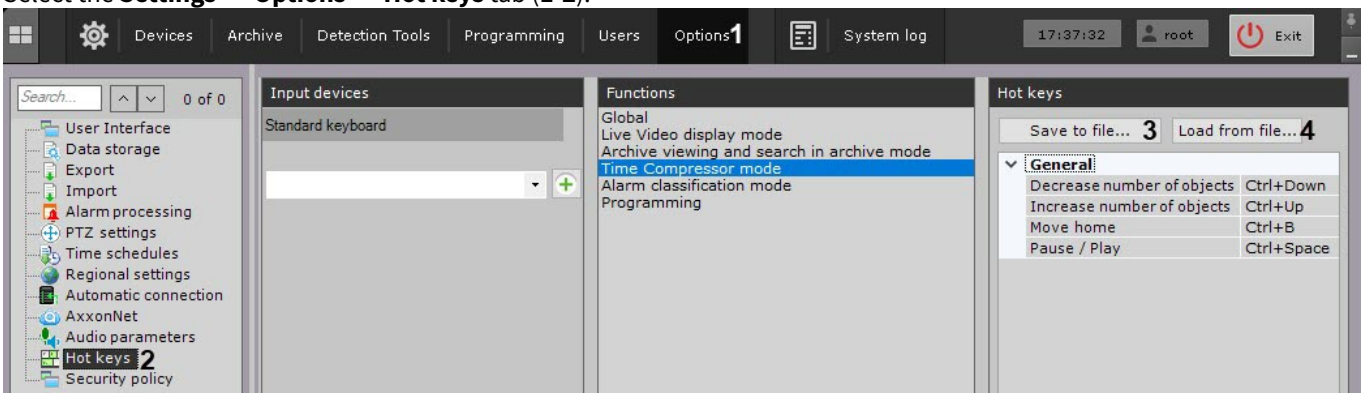
Assignment of hot keys is now complete.

19.10.2.5.3 Exporting and importing hot keys

You can export and import hot key configuration files from and to the Client. Export and import of hot keys is performed via files in XML format.

To export hot keys:

1. Select the **Settings** → **Options** → **Hot keys** tab (**1**-**2**).



2. Click the **Save to file...** button (**3**).
3. Select where to save the file and give it a name.

Export of hot keys is now complete.

To import hot keys:

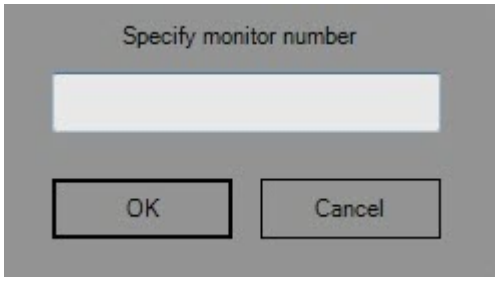
1. Select the **Settings** → **Options** → **Hot keys** tab (**1**-**2**).
2. Click the **Load from file...** button (**4**).
3. Select a file that contains a hot key configuration. Click the **Open** button.
   The hot key combinations are imported into the Client, so long as a valid file is selected.
4. Click the **Apply** button.

Import of hot keys is now complete.

19.10.2.5.4 Notes regarding hot key actions

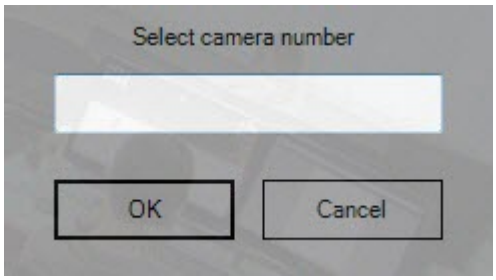
To select an active monitor in a multi-monitor configuration (see Managing monitors on a local Client(see page 1285)), click **Select Monitor by number** (Global mode).

When you click the button or press the hotkeys, a window opens, where you can enter the monitor ID.



Enter the monitor ID and click **OK**. This monitor becomes active.

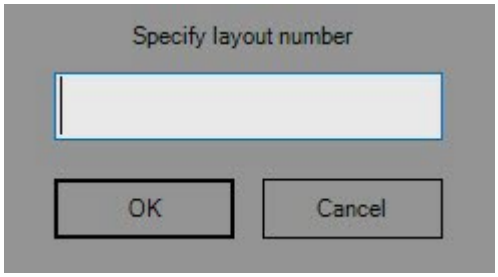
When a key or key combination assigned to the **Camera selection in current layout** action (Global mode) is pressed, the go to camera by number window opens.



Enter the destination camera's user- friendly short name (number) (see Camera(see page 171)), then click **OK**.

If the current layout contains a camera with the specified number (short name), the relevant viewing tile becomes active. If the current layout does not contain a camera with the specified number (short name), a minimum layout containing the camera is opened.

If you press hotkeys for **Select layout by number** (Global mode), a window opens requesting you to enter the layout number. The layouts are sorted left to right, starting from 1.



Enter the number of a desired layout, then click **OK**.

If you press hotkeys for **Select layout by ID** (Global mode), a window opens requesting you to enter the layout ID (see Setting a layout ID(see page 980)).

In all other cases, no system actions occur.

Descriptions of other non-trivial actions performed via hot keys are given in the table.

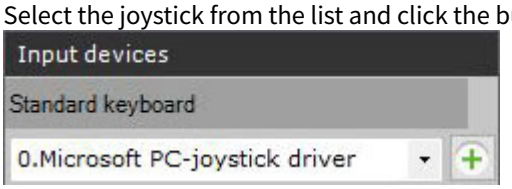
Mode	Action	Description
Global (general)	Navigation (up, left, down, right)	Navigate or move within the selected interface element. These keys are active only when a navigable menu or panel/ ribbon is open.
	Activate layout ribbon	When this key is pressed, the layout ribbon expands, allowing to navigate between and select layouts. When the ribbon is minimized or a layout is selected, the relevant viewing tile becomes active.
	Activate panel of video walls	When this key is pressed, the panel of video walls expands, allowing to navigate between available monitors. When the panel is minimized, the viewing tile becomes active.
	Activate camera panel	When this key is pressed, the camera panel expands, allowing to navigate between and select cameras. When the panel is minimized or a camera is selected, a viewing tile becomes active.
	Activate panel of configuration	Pressing this key a second time opens the tools panel, on the **Layouts** ribbon.
	Open alarm panel	Pressing this key again minimizes the panel.
	Open panel with hardware list (left)	Pressing this key again minimizes the panel.

Global (map)	Switch to 3D mode	If the map is in 2D mode, clicking this button switches to 3D mode. If the map is in 3D mode, clicking this button hides the map.
Live Video mode	Open the menu of the selected camera and select a menu item.	Pressing this key again closes the menu.
	Switch to Archive mode	If a viewing tile in a layout is active, the archive is opened only for that particular camera. Pressing this key again switches to Live Video mode. If there are no active viewing tiles in the layout, the archive is opened for all cameras in the layout.
Archive viewing and search in Archive mode	Go to Search in Archive mode.	Pressing this key again switches to Archive mode.
	Go to the next/ previous frame	Holding this key moves forward/backward frame by frame until the key is released.
	Go to the next/ previous video clip	Holding this key moves forward/backward between video clips until the key is released.
	Go to TimeCompressor mode	Pressing this key again switches to standard Archive mode.
	Open list of timeline events	Pressing this key again closes the list.
	Move to next hour Move to next month Move to next timestamp Move to previous hour Move to previous month Move to previous timestamp	Listed are the actions available while operating the Calendar (see Navigating using the Timeline(see page 1196)).

19.10.2.5.5 Joystick Configuration

To configure the joystick, do as follows:

1. Connect the joystick to a computer.
2. Calibrate the joystick.
3. Select the joystick from the list and click the button .



4. Set keyboard shortcuts, and click **Apply**.
5. Configure the sensitivity for PTZ controls:
   a. Start a text processor (i.e. Notepad) and open the file <Joystick_Name>.xml, which is located in C:\Users\<User_Name>\AppData\Local\AxxonSoft\Axxon One\HotKeysXmlConfigurationFiles.

b. Set the sensitivity for commands in **<Sensitivity>0.2</Sensitivity>**.

```
<HotKeysSchemaDeviceCommands>
<CommandName>DiscreteZoomOut</CommandName>
<HotKey>A2-</HotKey>
<Sensitivity>0.2</Sensitivity>
</HotKeysSchemaDeviceCommands>
```

The sensitivity values range from 0.0 (low sensitivity) to 1.0 (high sensitivity). Please see the commands that have sensitivity settings in the table.

Command	Command description
DiscreteMoveXAxisRight	Pan right (Move right)
DiscreteMoveXAxisLeft	Pan left (Move left)
DiscreteMoveYAxisUp	Tilt up (Move up)
DiscreteMoveYAxisDown	Tilt down (Move down)
DiscreteZoomIn	Zoom in
DiscreteZoomOut	Zoom out
DiscreteFocusNear	Reduce the focal length
DiscreteFocusFar	Increase the focal length
DiscreteIrisOpen	Open the iris
DiscreteIrisClose	Close the iris

Attention!

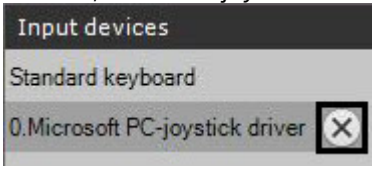
Do not set values outside the range and edit other parameters in the file.

c. Save the changes to the file.

Joystick configuration is now complete.

If the joystick is already configured and the specified file does not have the **Sensitivity** parameter, do as follows:

1. Remove/Delete the joystick from the *Axxon One VMS*.



2. Click the **Apply** button.
3. Add and configure the joystick again.

19.10.2.6 Configuring video capturing on operator monitor

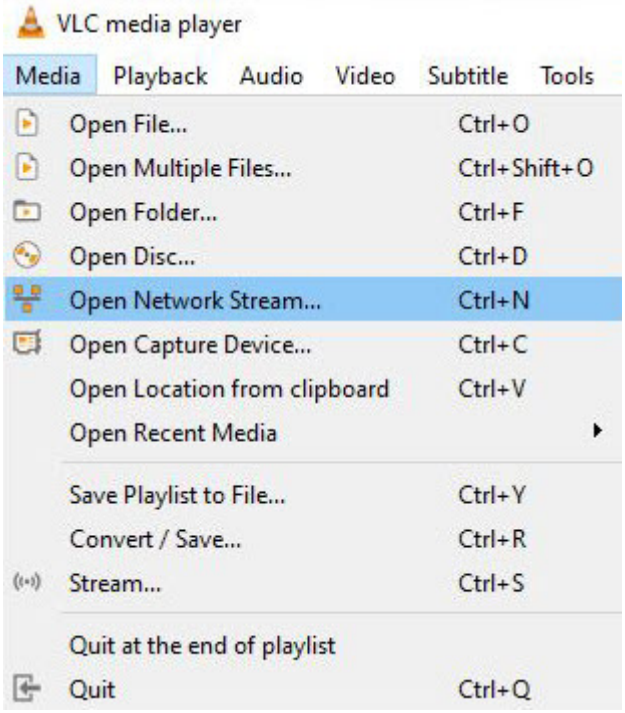
Video recording from the computer monitor is used to control the operator's actions. You can broadcast video from the computer monitor to *Axxon One* via the common protocols using the third-party software, for example:

1. Via the RTSP protocol using the VLC Media Player.
2. Via the ONVIF protocol using the ScreenOnvif software, which can be purchased on the website http://screenonvif.com/en.

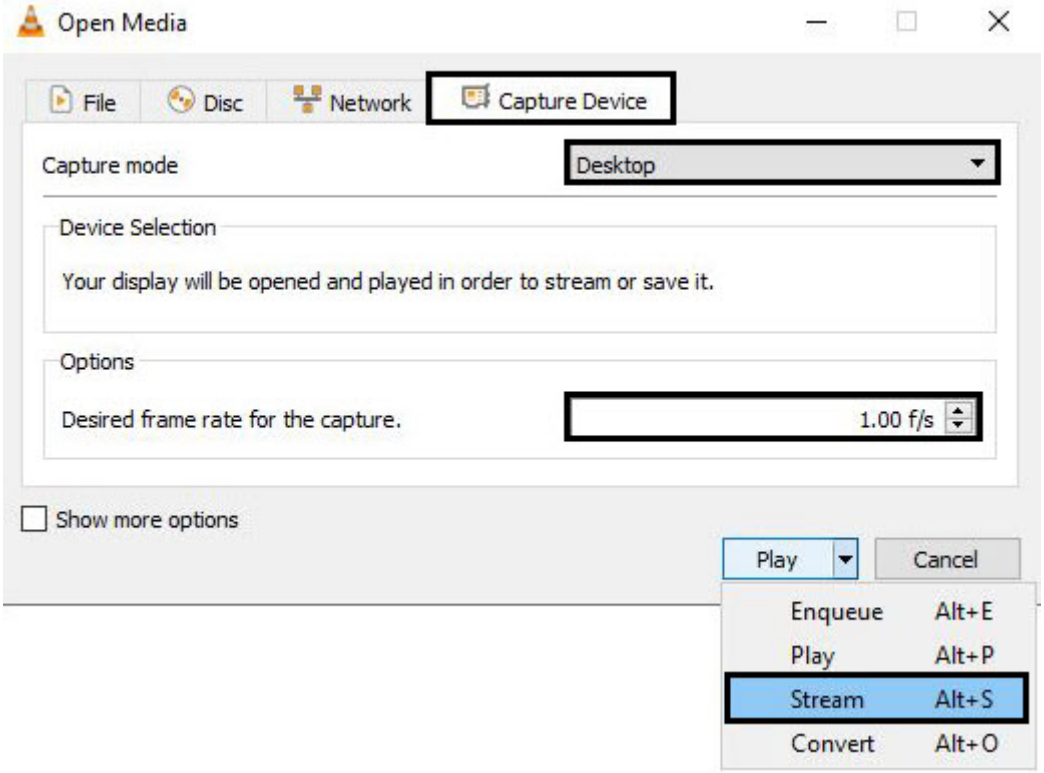
This section describes how to configure VLC Media Player to broadcast video from the computer monitor to *Axxon One* via the RTSP protocol. Configuring *Axxon One* to receive and record such a video stream is performed in a standard way as described in Configuring the RTSP server(see page 167) and Configuring recording to an archive(see page 295).

Configuring VLC Media Player to broadcast video from the computer monitor to *Axxon One* via the RTSP protocol is performed in the following way:

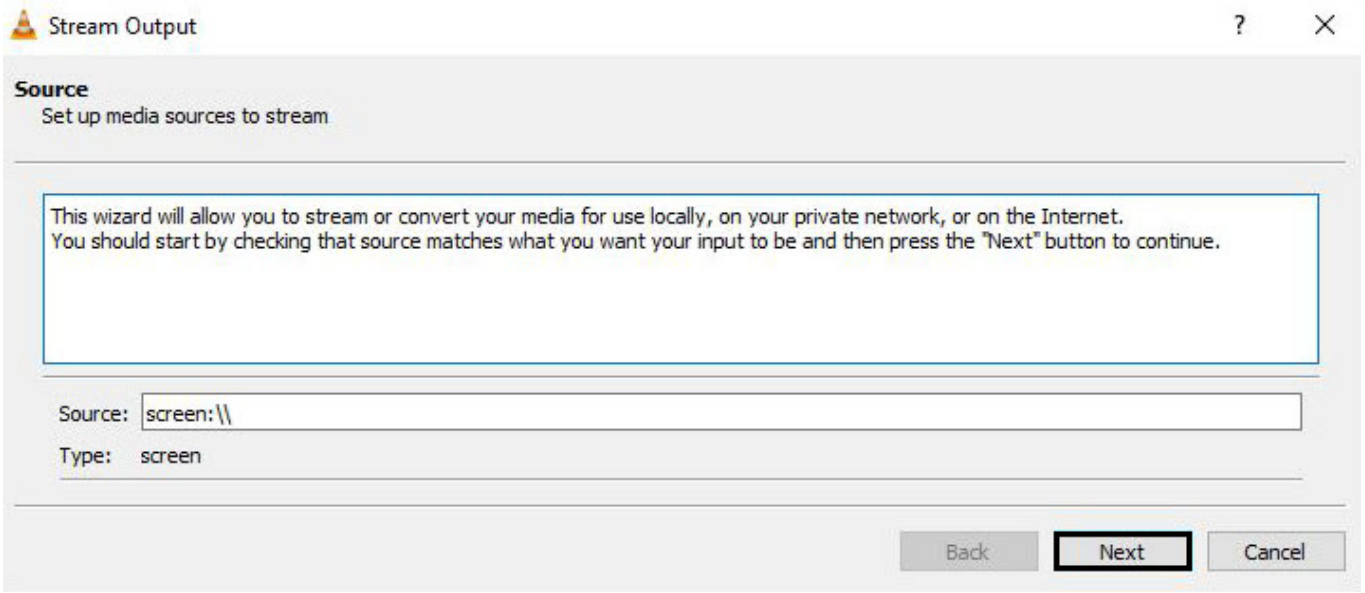
1. Run VLC Media Player.
2. Select the **Open Network Stream...** item in the **Media** menu.



3. In the appeared window go to the **Capture Device** tab.

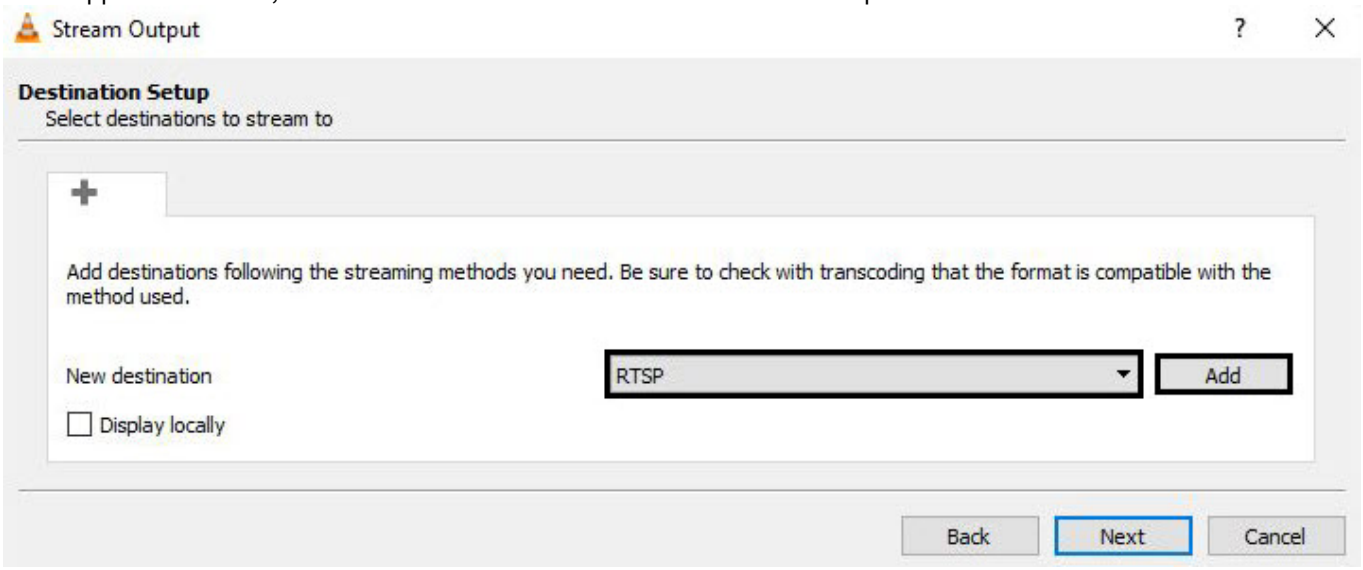


4. From the **Capture mode** drop-down list, select the **Desktop** value.
5. Set the required frame rate value for the capture in the corresponding field.
6. In the **Play** drop-down list, select the **Stream** value. As a result, the **Stream Output** window will appear.

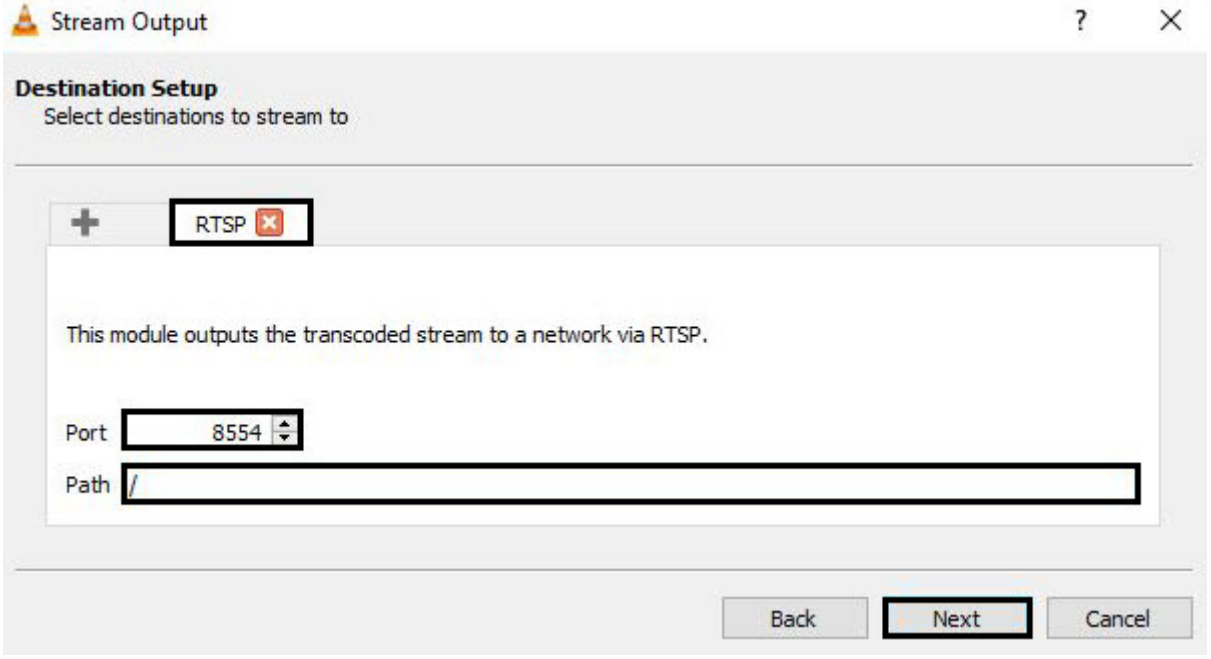


7. Click the **Next** button.

8. In the appeared window, select the **RTSP** value from the **New destination** drop-down list and click the **Add** button.

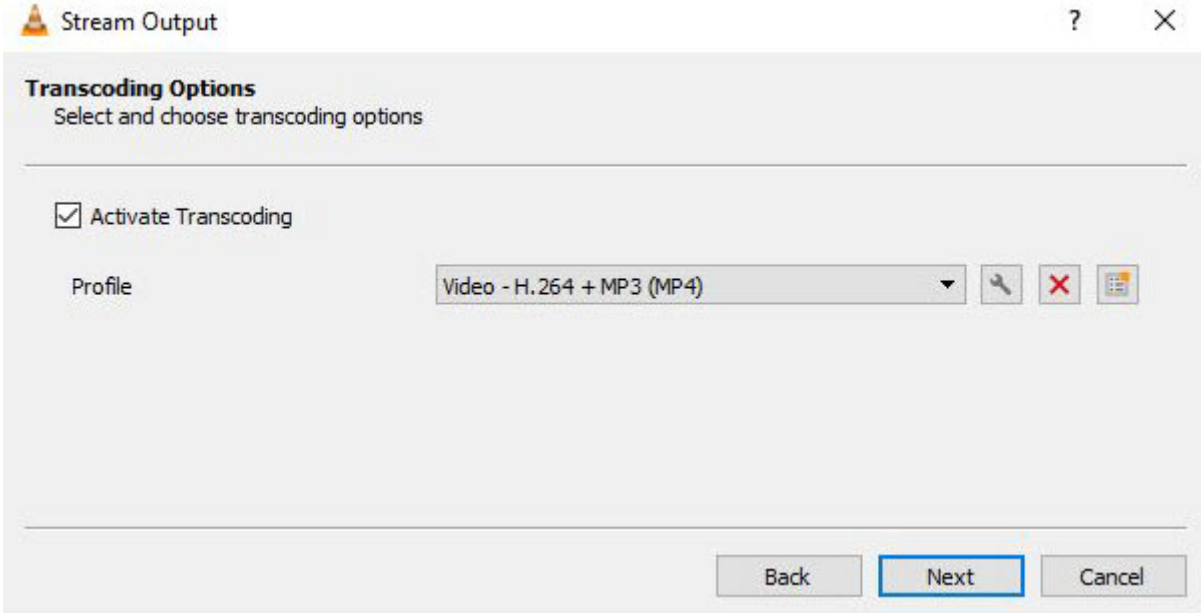


9. Go to the **RTSP** tab.
10. Specify the port and the path to the stream, if necessary.

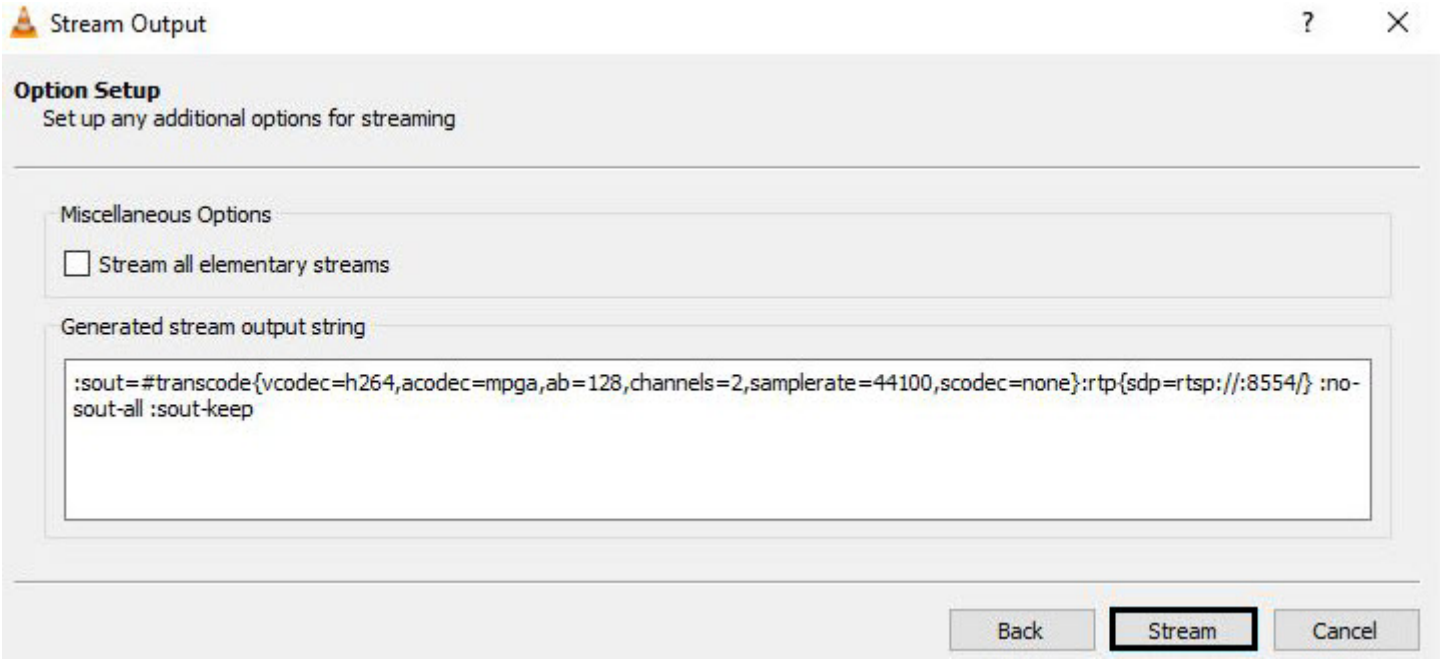


11. Click the **Next** button.

12. Specify the parameters of video transcoding and click the **Next** button.



13. Click the **Stream** button in the appeared window.



After that, you can configure *Axxon One* to receive the RTSP stream and record it to the archive (see Configuring connection of devices via RTSP(see page 187) and Configuring recording to an archive(see page 295)).

Configuring VLC Media Player to broadcast video from the computer monitor to *Axxon One* via the RTSP protocol is completed.

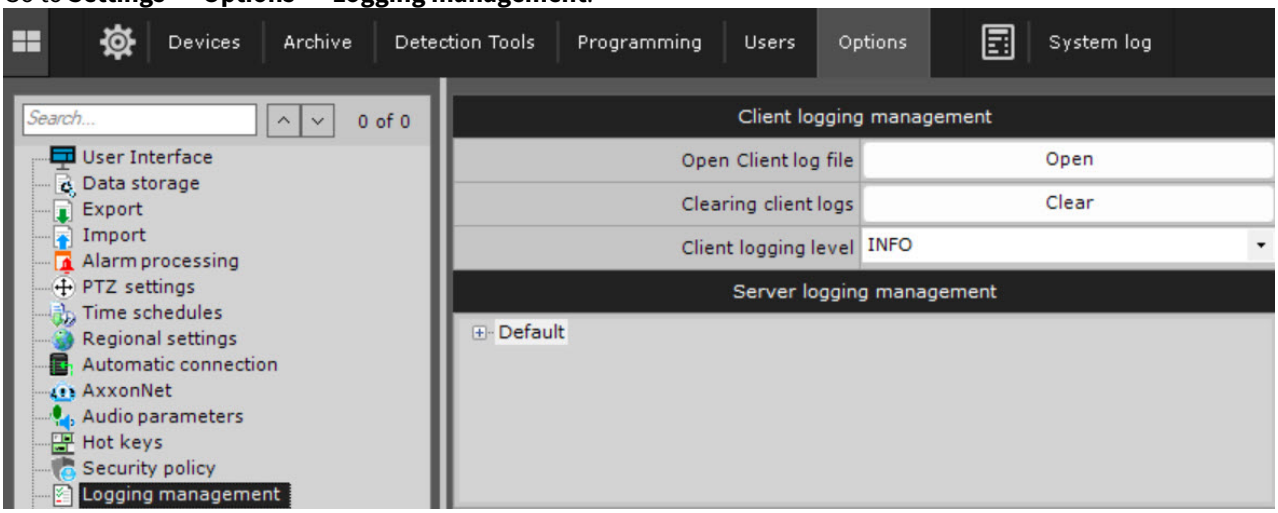
19.10.2.7 Configuring the Client logging level

By default, the Client logging level is determined by the settings specified in a special utility (see Log management utility(see page 1414)). But you can temporarily change the Client logging level for operational analysis of current logs.

Changes made to the logging level will remain in effect until the Client is turned off. The next time you start the Client, the logging level will correspond to the one specified in the Log management utility.

To temporarily change the Client logging level, do as follows:

1. Go to **Settings** → **Options** → **Logging management**.



2. Select the required level from the **Client logging level** list. Levels are described in Log management utility(see page 1414).
3. Click the **Apply** button 

.

The Client logging level is temporarily changed.

You can also delete all Client logs. To do this:

1. Next to the **Clearing client logs** area, click the **Clear** button.
2. Click the **Apply** button.

All Client logs are deleted.

19.11 Configuring Failover VMS

19.11.1 General information about a failover system

A failover system automatically prevents data loss when one of the Servers in the system fails.

In a failover system, the Servers are combined into a logical structure—the cluster.

The *Axxon One* Failover system has two types of configuration.

1. The basic configuration allows system supervisors to permit launching *Axxon One* servers (nodes) on any Servers within the system.

   Note

   When selecting a Server to transfer a node to, the supervisor tries to keep in balance the whole cluster's performance. If all Servers deliver more or less the same performance, the selection is performed randomly. If Servers significantly differ in their performance, the supervisor may launch several nodes on a more capable Server, and no nodes on a less capable one.

2. In the configuration with the specified backup Server, a node from the primary Server can be migrated only to the backup Server. After the primary Server is back online, the node is returned.

Node migration is automatic and takes no more than one minute.

Note

In a system counting 100 cameras, the node is transferred in less than one minute in both Failover System configuration types. All Servers within the system have identical specifications: Intel i5-7400 3GHz 4-core CPU, 16Gb RAM.

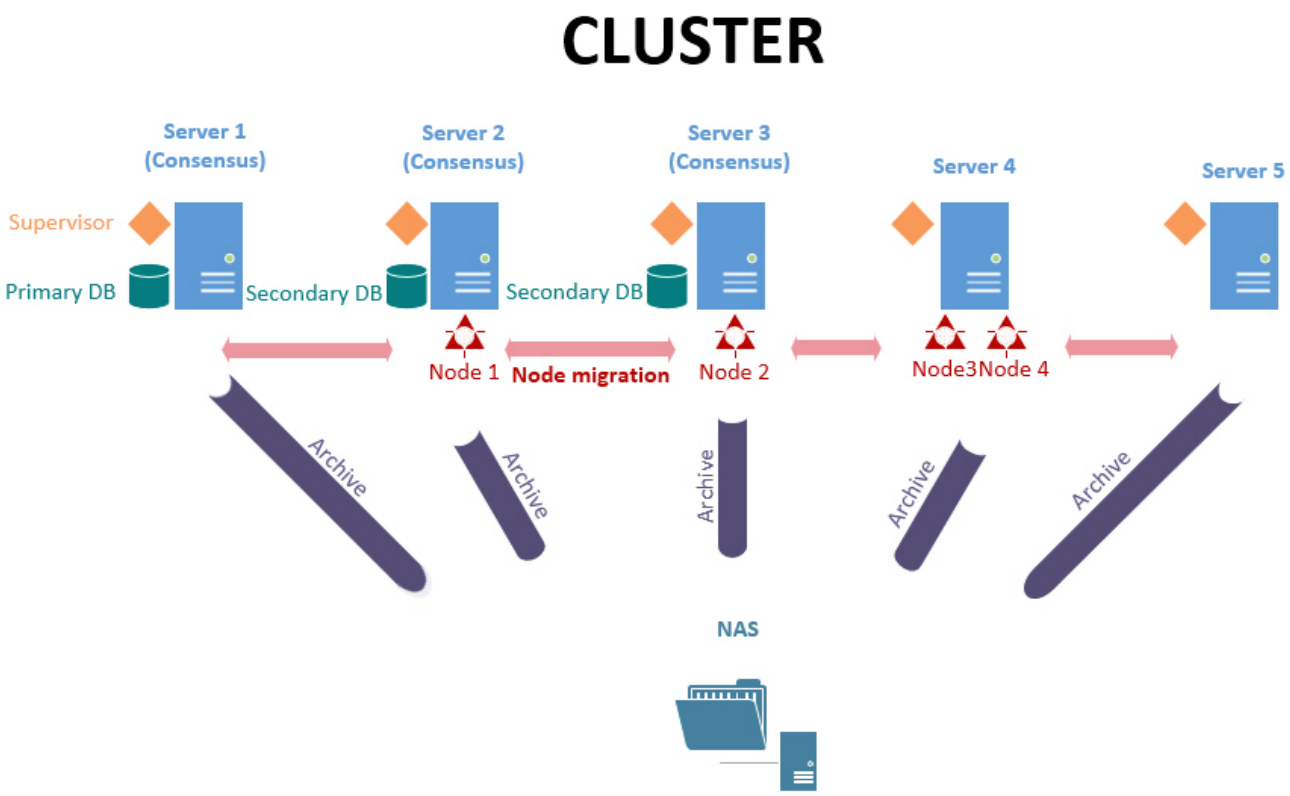
This section contains the following terms:

- **Server**—a computer with **Failover Server and Client** configuration of *Axxon One* installed;
- **Node**—an instance of the Server services. A Server can have multiple nodes running;
- **Cluster**—logical grouping of Servers that allows migration of nodes between them. A cluster may encompass nodes from different Axxon-domains;
- **Supervisor**—the service that monitors the status of nodes and their migration.

To implement Failover in your system, we strongly recommend that:

- the system administrator should have full control over all communication channels and hardware that provides fault tolerance at all times;
- you should build a cluster from servers in the same LAN;
- use only the network archives, that are available from all servers in the cluster.

Example of a Failover system:



Note

You can install *Axxon One* Server in the Failover mode in Linux OS (see Installing the server from repository[370], Installing the server in Linux OS[371]).

19.11.2 Ports used by the failover system

Each failover system Server uses the following ports:

- 4000 (Supervisor Web-Interface(see page 1066), only TCP),
- 4646 (Nomad[372] HTTP API, only TCP),
- 4647 (Nomad[373] RPC, only TCP),
- 4648 (Nomad[374] LAN/WAN Serf (Gossip), TCP and UDP),

370 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486752/Installing+the+server+from+repository
371 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486754/Installing+the+server+in+Linux+OS
372 https://www.nomadproject.io/docs/install/production/requirements#ports-used
373 https://www.nomadproject.io/docs/install/production/requirements#ports-used
374 https://www.nomadproject.io/docs/install/production/requirements#ports-used

- 8300 (Consul[375] Server RPC, only TCP),
- 8301 (Consul[376] LAN Serf (Gossip), TCP and UDP),
- 8302 (Consul[377] WAN Serf (Gossip), TCP and UDP),
- 8500 (Consul[378] HTTP API, only TCP),
- 8600 (Consul[379] DNS, TCP and UDP).

Moreover, each node of the cluster has its pre-defined unique port range (see Installation(see page 98)).
For best results, use port numbers from 20111 to 32000.

Changing ports in the nodes of the failover system(see page 1093)

19.11.3 Supervisor Web-Interface

You can configure a failover system in the Supervisor Web-Interface at http://localhost:4000[380].

Note

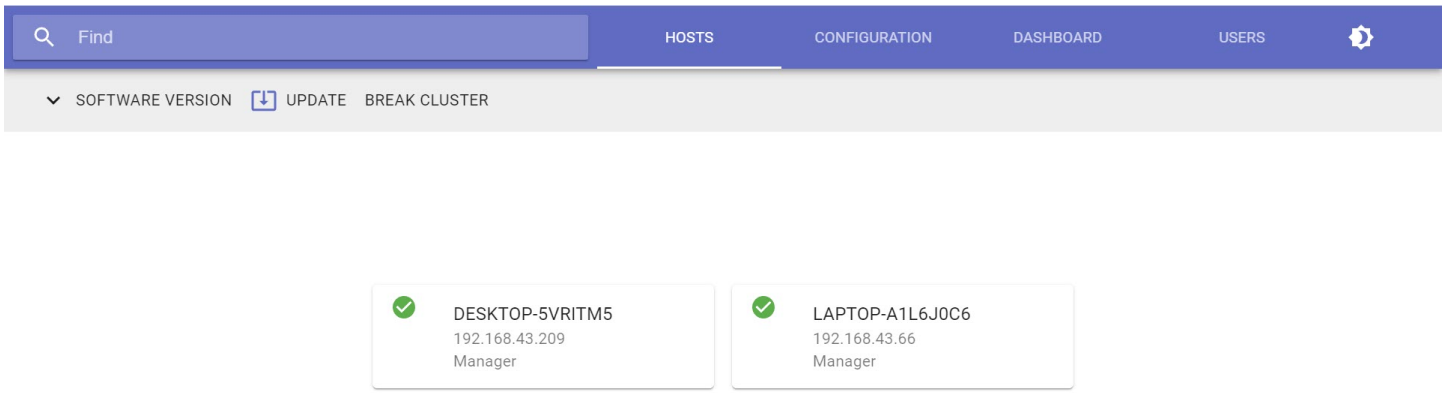
After installation, a shortcut is added to your desktop.



On Linux OS, no additional shortcuts are created after installation. To access the Supervisor Web-Interface, go to http://localhost:4000[381].

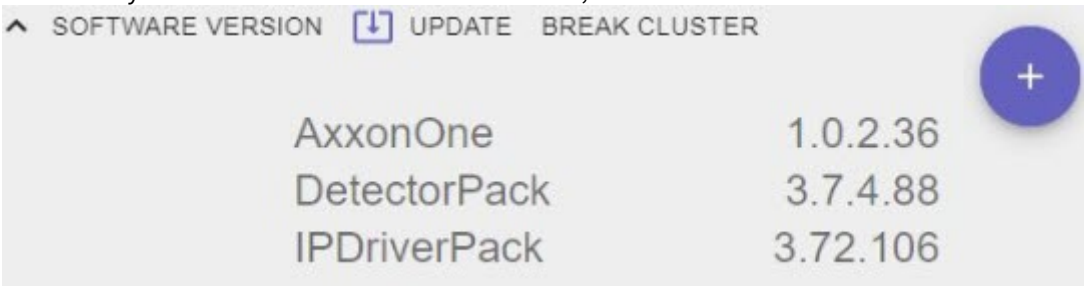
The Supervisor Web-Interface has four tabs:

1. **HOSTS**—Creating a cluster(see page 1067).
2. **CONFIGURATION**—Failover database(see page 1071), Configure a Failover System Cluster(see page 1072).
3. **DASHBOARD**—Monitoring the status of a cluster(see page 1089).
4. **USERS**—Set up access to a supervisor(see page 1086).



375 https://www.consul.io/docs/install/ports#required-ports
376 https://www.consul.io/docs/install/ports#required-ports
377 https://www.consul.io/docs/install/ports#required-ports
378 https://www.consul.io/docs/install/ports#required-ports
379 https://www.consul.io/docs/install/ports#required-ports
380 http://127.0.0.1:4000.
381 http://127.0.0.1:4000.

To find out your version of *Axxon One* and *DriverPack*, click **SOFTWARE VERSION**.



To search hosts and servers, enter their names in the search bar in the **HOSTS** or **DASHBOARD** tabs in the top left part of the interface.

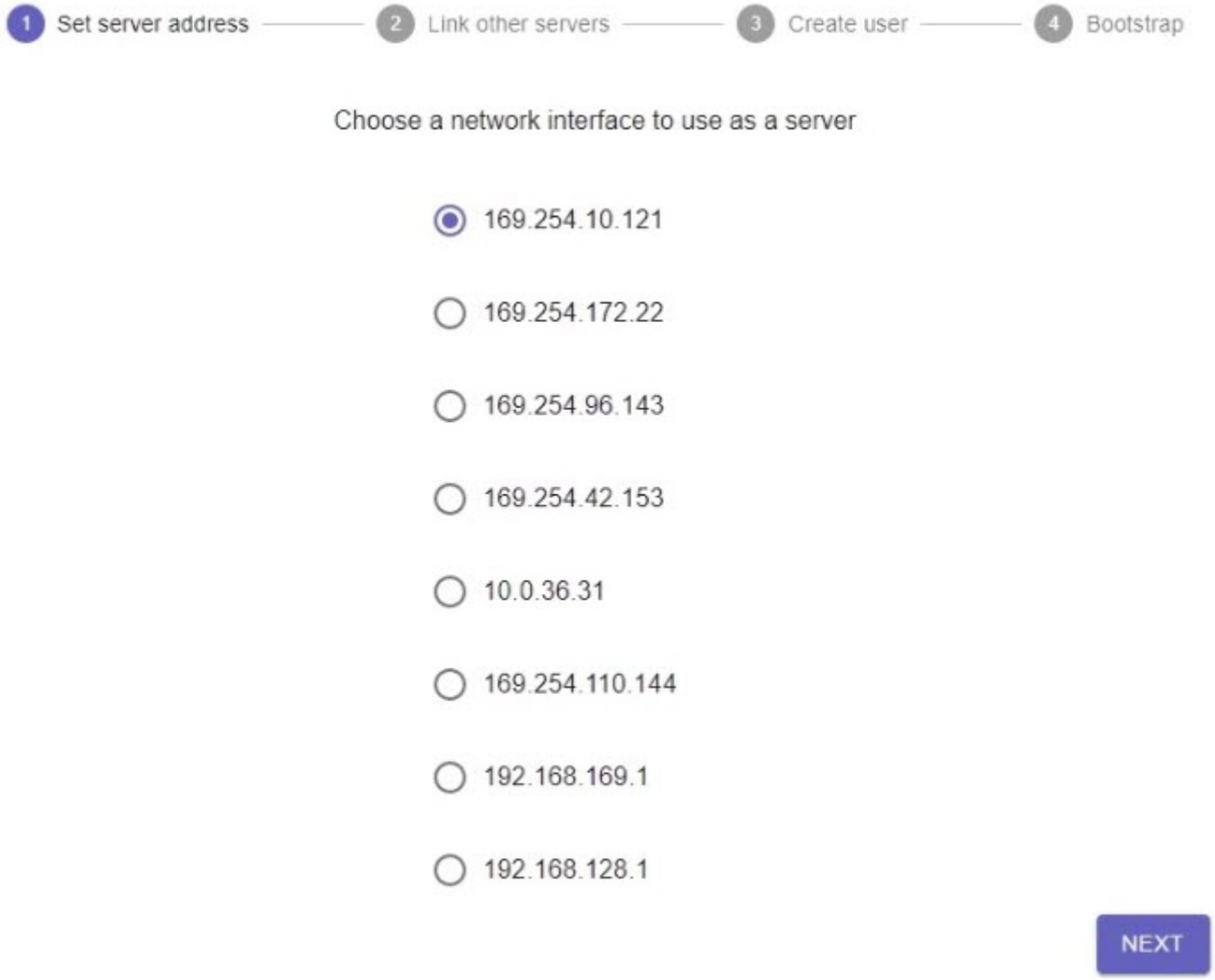


You can choose the Supervisor theme in the Web-Interface: dark or light. To enable the dark theme of the Supervisor Web-Interface, click the  button in the top right part of the interface. To enable the light theme of the Supervisor Web-Interface, click the  button.

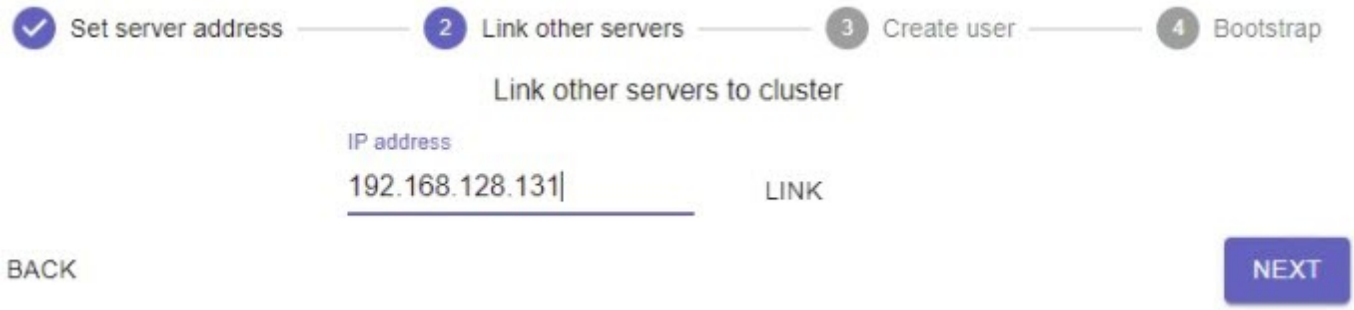
19.11.4 Creating a cluster

The first time you launch the supervisor, you must initialize the cluster. To do this, do the following:

1. Select the server's IP address from the list and click **NEXT**.



2. Add the required servers to the cluster. To do this, enter the IP address and click **LINK**.

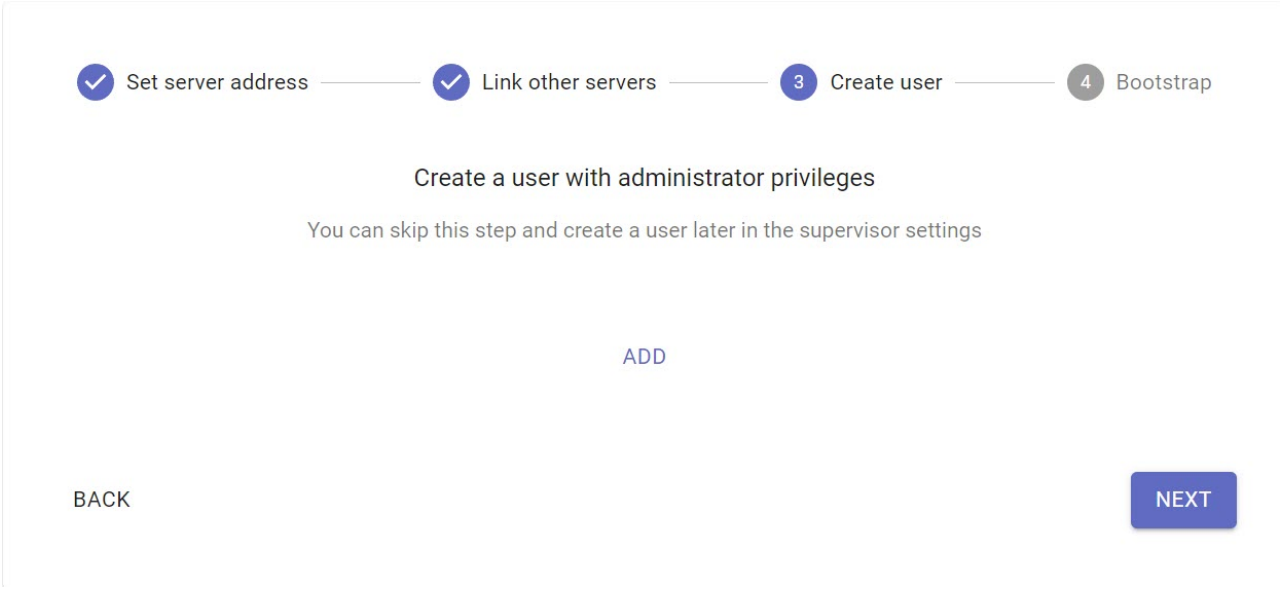


Attention!

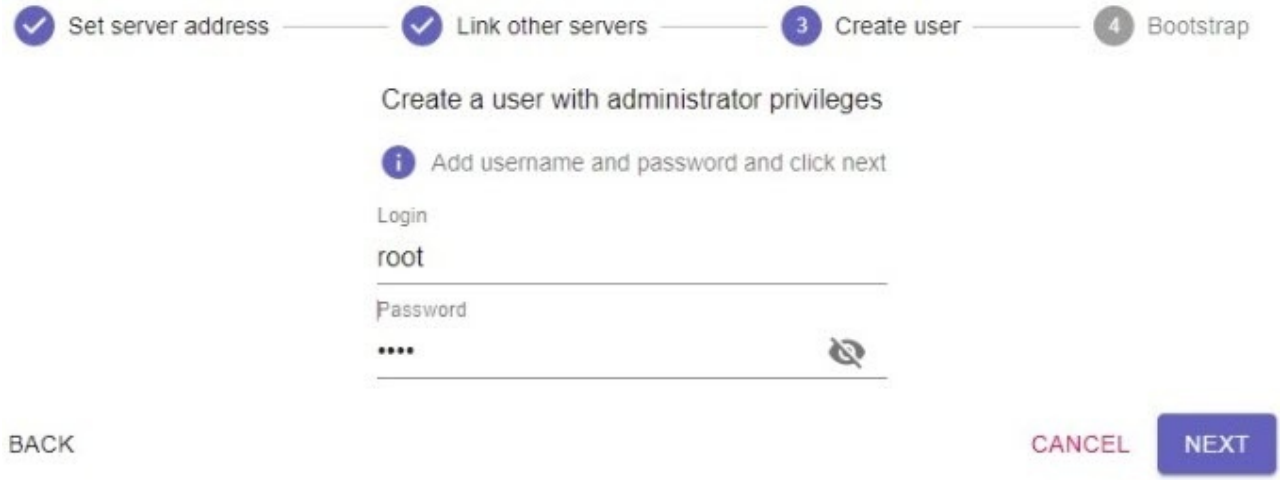
- All cluster servers must be available to each other.
- You must use servers with the same architecture (x64), OS type, and PostgreSQL version.
- The first three servers added become the manager servers.
- The operation of the cluster is coordinated by its manager servers, which, in particular, take decisions to migrate nodes from one server to another.
- The number of manager servers in the cluster must be either 3 or 5.

- The role of the manager server doesn't affect the configuration and implementation of fault tolerance. Thus, the manager server can be used as a fault-tolerant one (for example, to implement a **2+1** configuration).
- If you add only two servers, they can be configured as **1+1**—master + backup server (see 1+1 cluster configuration(see page 1081)).

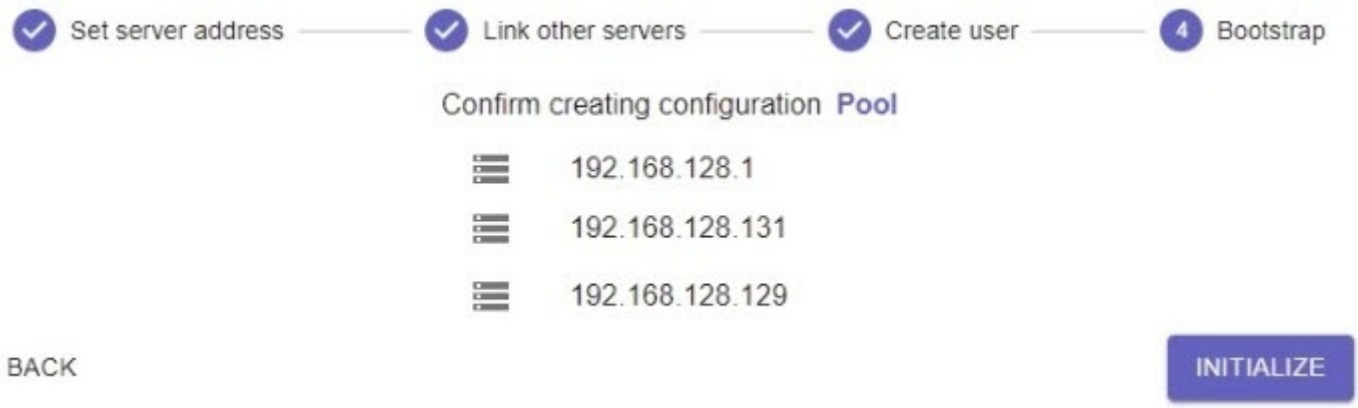
3. If necessary, you can add a user with administrator privileges (see Set up access to a supervisor(see page 1086)). After the cluster is created, only this user will have access to the supervisor. Do the following:
   a. Click the **ADD** button.



   b. Enter access credentials and click the **NEXT** button.



4. After you add all servers, click the **INITIALIZE** button.



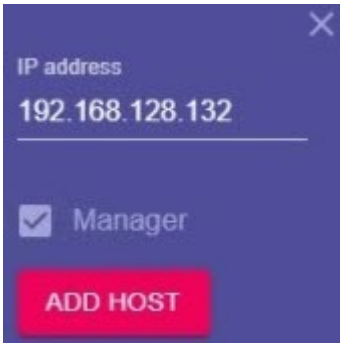
This will initialize the cluster based on the selected servers.

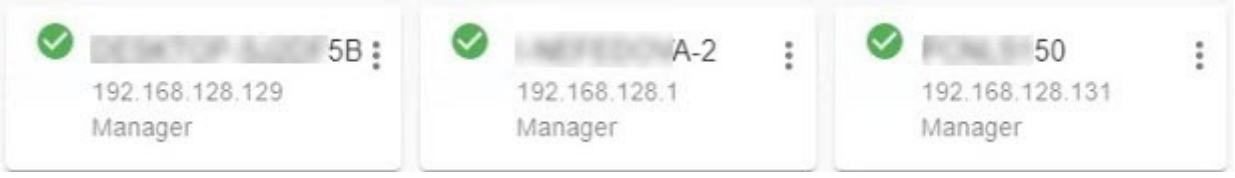
Attention!

- If, during the process of cluster creation, you add the servers that were already added to another cluster, they will be unavailable. If you try to initialize the cluster with unavailable servers, they will be marked red, and the cluster won't be initialized. In this case you must go back to the step of adding the servers and add the available servers.
- If you add servers with different *Axxon One* versions to the cluster, the following version mismatch notification will appear on the **Servers** tab—**Some versions don't match. Please update!**
  In this case, for the cluster to work correctly, we recommend updating all servers to the same version of *Axxon One*.
- In case of a network connection loss with a specific server within a cluster, the system initiates the migration of nodes to other servers with an available and stable network. The nodes that are left on servers with limited or absent network connection keep working locally. This allows increasing the cluster's stability and ensures its correct functioning even in conditions of an unstable or partially unavailable network.

To add other servers to the cluster, do the following:

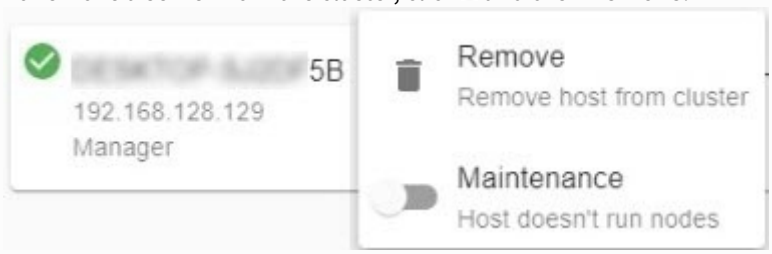
On the **Servers** tab, click the + button.

1. Enter the IP address of the server.
   

2. If the server that you add is the manager one, set the corresponding checkbox.
3. Click the **ADD HOST** button.
4. Add all required servers.
   

Note

To remove a server from the cluster, click ⋮ and then **Remove**.



Attention!

If you want to change the IP addresses of the server in the cluster, do the following:

1. Remove the server from the cluster.
2. Change the IP address of the server.
3. Add the server with a new IP address.

19.11.5 Failover database

By default, the database is created automatically when the cluster is initialized and its agents are launched on the master servers. Database agents are automatically configured when the cluster is initialized.

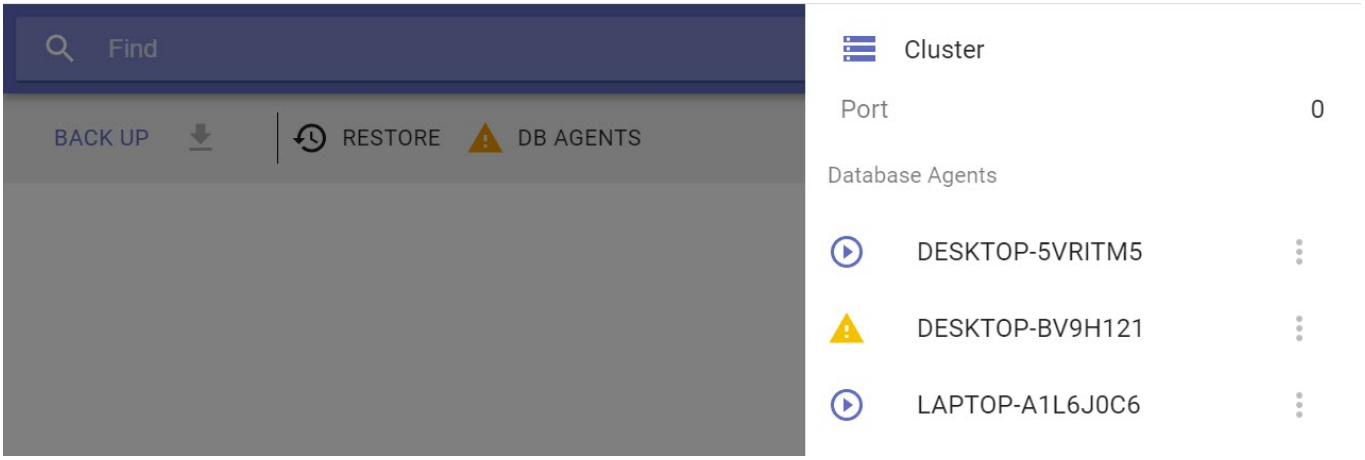
Attention!

For the database to work correctly, its agents must be running on the servers with the same type of operating system.

Database agents are a key component of a failover clustered DBMS. Each database record is first received by the master agent and then automatically replicated to one or two standby agents. This ensures high availability and protects data from loss in case of failure of one of the servers. The system supports streaming replication. Data written to the master agent is synchronously replicated to the standby agents. This provides data redundancy at the agent level and allows the database to be restored without data loss in case of failure of the master node.

You can manage database agents in the supervisor interface. To do this:

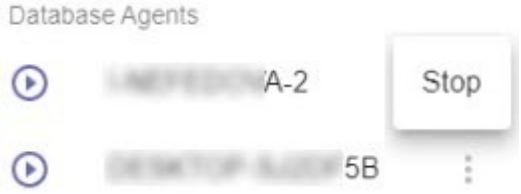
1. Go to the **CONFIGURATION** tab.
2. Click the **DB AGENTS** button.



3. The **Port** field specifies the value of the port that the database agents use. If the value is **0**, the database agents use dynamic ports.
4. The icon next to the server indicates the current status of the agent.

Icon	Status
	Launch expected
	Launched
	Stopped
	Unavailable

5. Click ⋮ to stop or launch the agent and select the required action.



19.11.6 Configure a Failover System Cluster

A failover system can be configured in two ways:

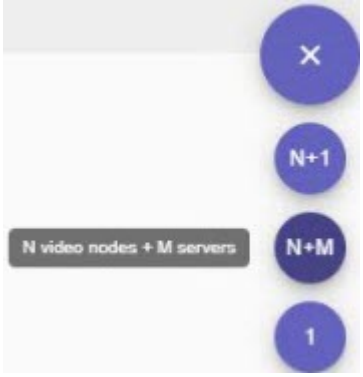
1. Basic configuration. There are no pre-assigned backup Servers in this configuration. The supervisor independently decides where to host a particular node. Only network archives can be used in this configuration.
2. Configuration with the specified backup Server. In this configuration, a backup server is assigned to host a node which for some reason cannot operate on its primary server. Along with network archives, local archives can be used in this configuration.

In addition, you can create independent nodes.

19.11.6.1 Setting up basic configuration

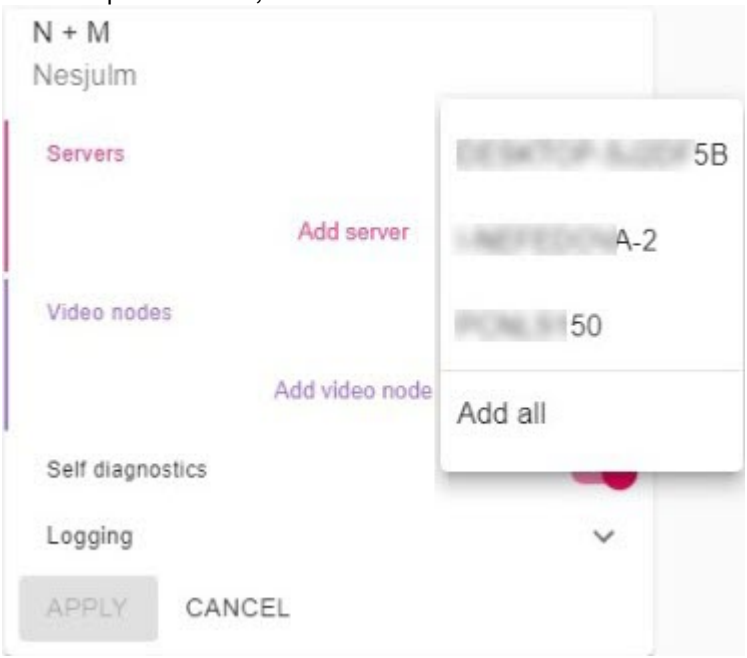
To set up a basic configuration of a Failover system, do the following:

1. Go to the **CONFIGURATION** tab.
2. Hover the mouse cursor over the + button and click the **N+M** button.



3. Add Servers to the configuration.
   a. Click + .

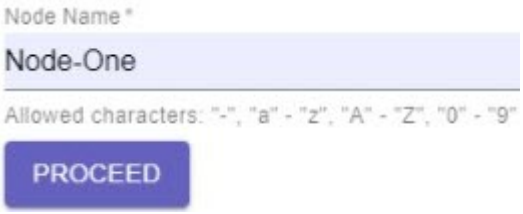
b. Select a specific Server, or add all Servers at once.



4. Create nodes:

a. Click  .

b. Enter the node name and click the **PROCEED** button.

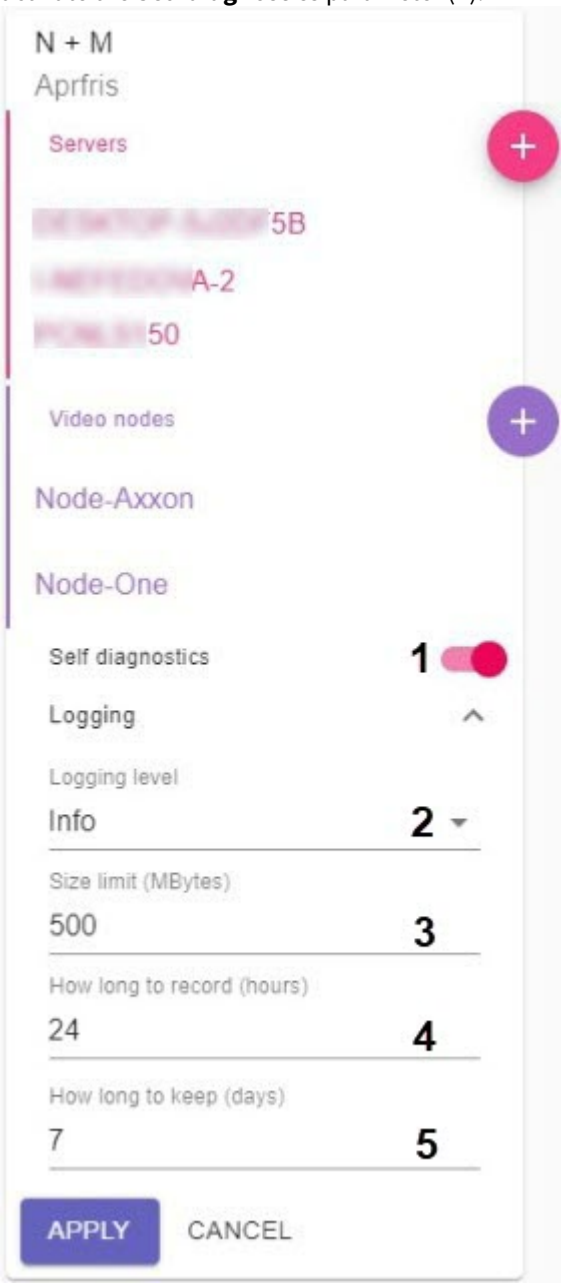


> **Attention!**
>
> A node name may contain Latin and numerical characters, and the "-" symbol.

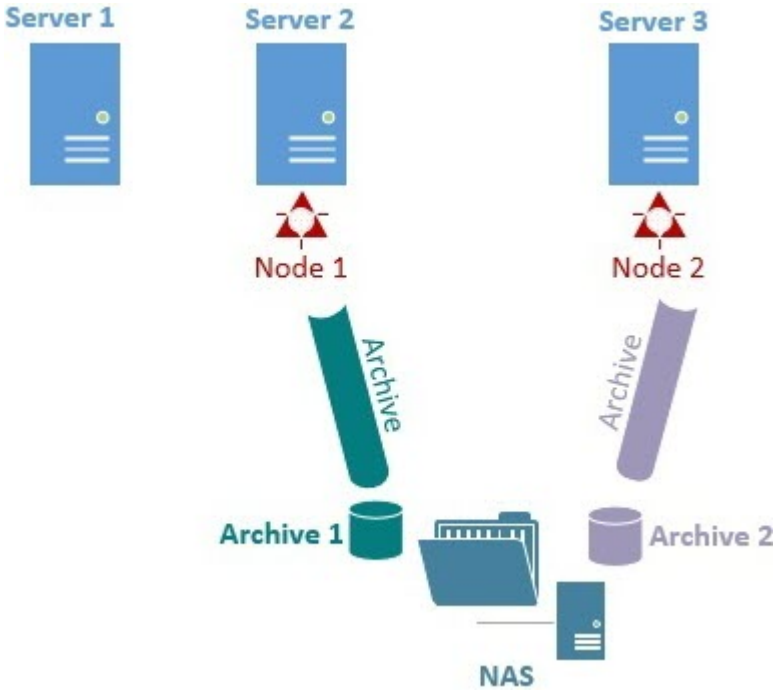
c. Create the required number of nodes.

> **Attention!**
>
> - The number of nodes must be less than the number of Servers.
> - No more than 10 nodes must be connected to a single event cluster database.

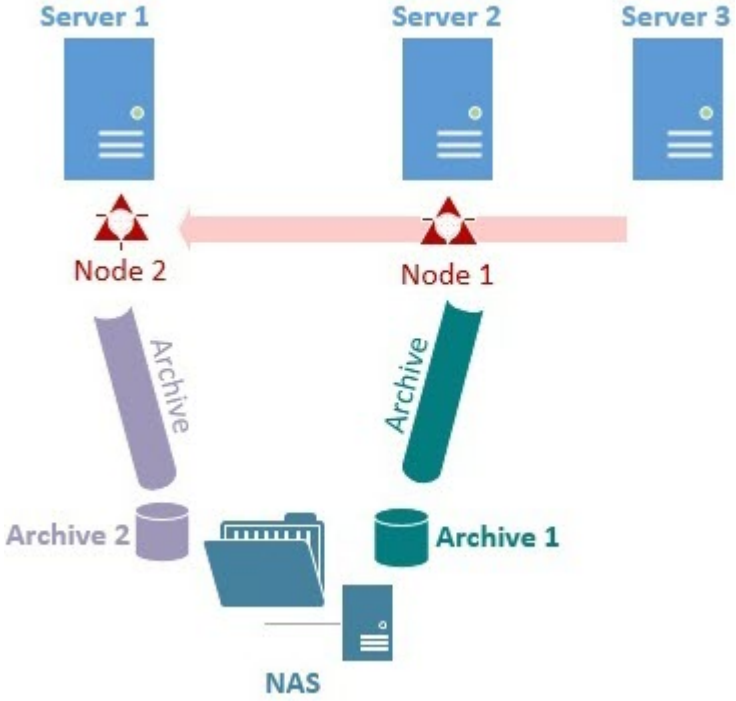
5. By default, the self-diagnostics service is running on all nodes (see Self-diagnostics service(see page 1097)). To stop it, deactivate the **Self diagnostics** parameter (**1**).



6. Click the **Logging** button to set the logging options:
   a. Select Logging level (**2**, see Log management utility(see page 1414)).
   b. Specify the log archiving options (**3**-**5**, see Log management utility(see page 1414)).
7. Click the **APPLY** button.
   The configuration is now created, and the nodes are now automatically started.
8. Merge all nodes into a single domain (see Connecting to a Node and Configuring of an Axxon domain(see page 1091)).
9. Set up the archive of the Failover system.
   In a Failover system, we recommend you to physically locate the archive on a separate NAS remote storage that all servers in the cluster have access to.
   For each node, create a separate archive in the remote storage (see Creating a remote archive(see page 280)).



If the node is moved to a different server, it will continue to write to the specified archive.

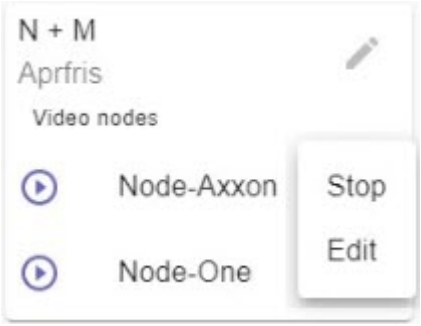


The basic configuration of the Failover system is now complete.

If necessary, you can further edit the configuration. To do so, click . You can perform the following actions:

- add/remove Servers;
- add/delete nodes;
- activate/de-activate the self-diagnostics service;
- change logging parameters;
- completely remove the configuration.

To manually stop or launch a node, click and select the required action.



19.11.6.2 Setting up a configuration with the backup Server

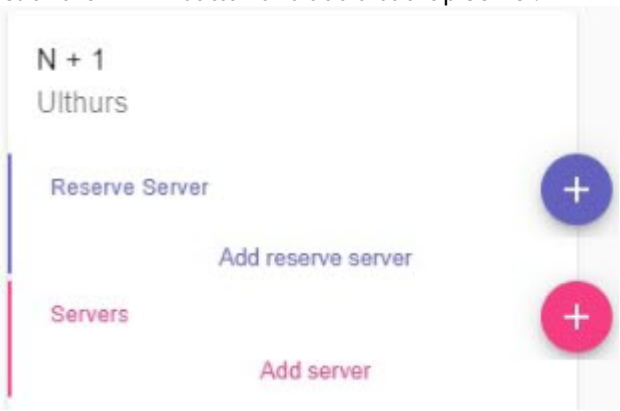
A configuration with the backup Server can include two or more Servers.

To set up the configuration, do the following:

1. Hover the mouse cursor over the  button and click the **N+1** button.

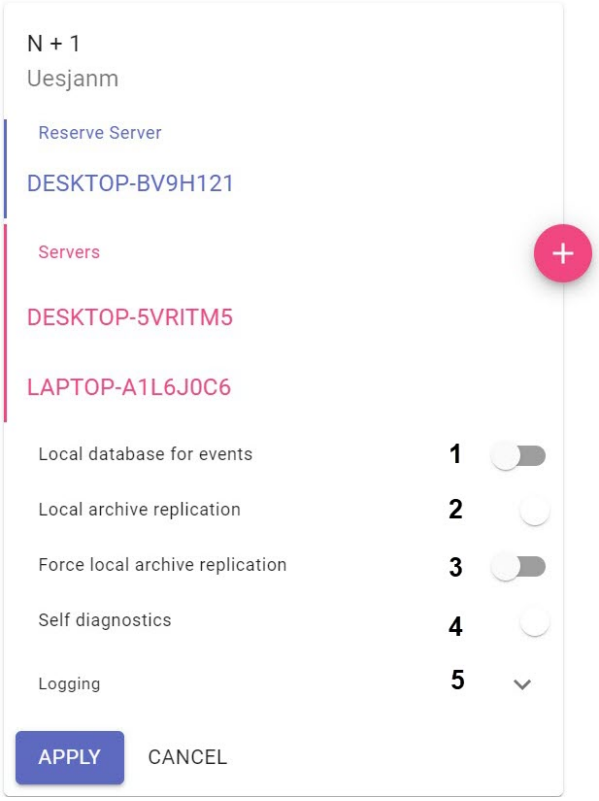


2. Click the  button and add a backup Server.



3. Click the  button and add primary Servers.

4. If you need to maintain a local event database on Servers, activate the corresponding switch (**1**).

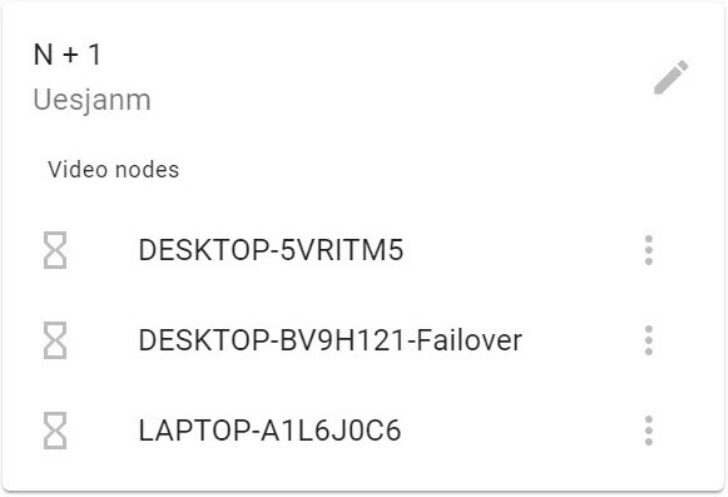


5. If you want to replicate the local archive when the master node is on the backup Server, activate the corresponding switch (**2**).

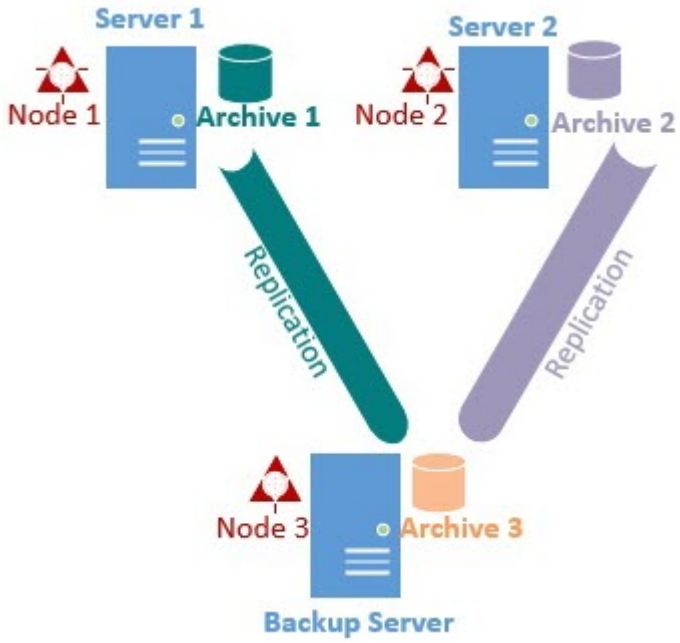
> **Attention!**
>
> The local archive must be created on the master node (see Creating a local archive(see page 276)).

6. If you need to replicate local archives to the backup Server on permanent basis, activate the corresponding switch (**3**). Otherwise, the replication will be performed only when the corresponding node is migrated to the backup Server.
7. By default, the self-diagnostics service is running on all nodes (see Self-diagnostics service(see page 1097)). To stop it, deactivate the **Self diagnostics** parameter (**4**).
8. Click the **Logging** button to set the logging parameters (**5**):
    a. Select the logging level (see Log management utility(see page 1414)).
    b. Set the log archiving options (see Log management utility(see page 1414)).
9. Click the **APPLY** button.
The configuration is now created, and the nodes are now automatically started. "Failover" string will be automatically

added to the name of the backup node.

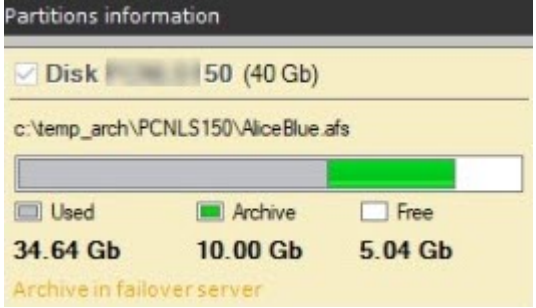


10. Merge all nodes into a single Axxon-domain (see Connecting to a Node and Configuring of an Axxon domain(see page 1091)).
11. Configure the archives operation:
    a. On the backup node, create an archive for replication (see Creating archives(see page 276)).
    b. On the master nodes, configure the replication from the master Servers' archives to the backup node's archive (see Configuring data replication(see page 298)). The replication period should be set to **Always** regardless of the value of the **Force archive replication** parameter (see item **6**).



Setting up a configuration with the backup Server is now complete.

When a master node is migrated to the Failover Server, a temporary archive will be automatically created in the C:/temp_arch folder of the backup Server as a 10 GB file. In *Axxon One*, the temporary archive will be marked as **Archive in failover server**.

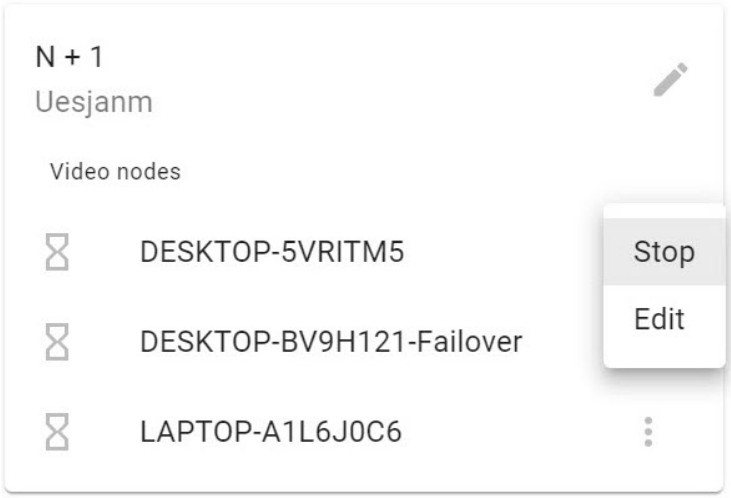


The records from the temporary archive will be replicated to the archive for replication (see **Archive 3** on the figure above) of the backup Server.

If necessary, you can further edit the configuration. To do so, click the button. You can do the following

- add/remove Servers;
- add/delete nodes;
- activate/deactivate the self-diagnostics service;
- change logging parameters;
- completely remove the configuration.

To manually stop or start a node, click and select the required action.

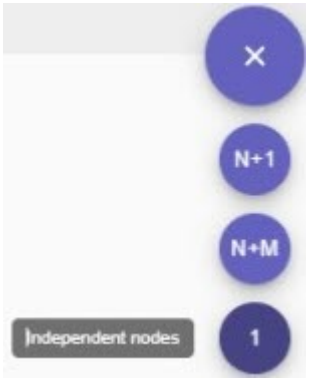


19.11.6.3 Creating and configuring independent nodes

You can host separate nodes on cluster's Servers which are not used by any configuration.

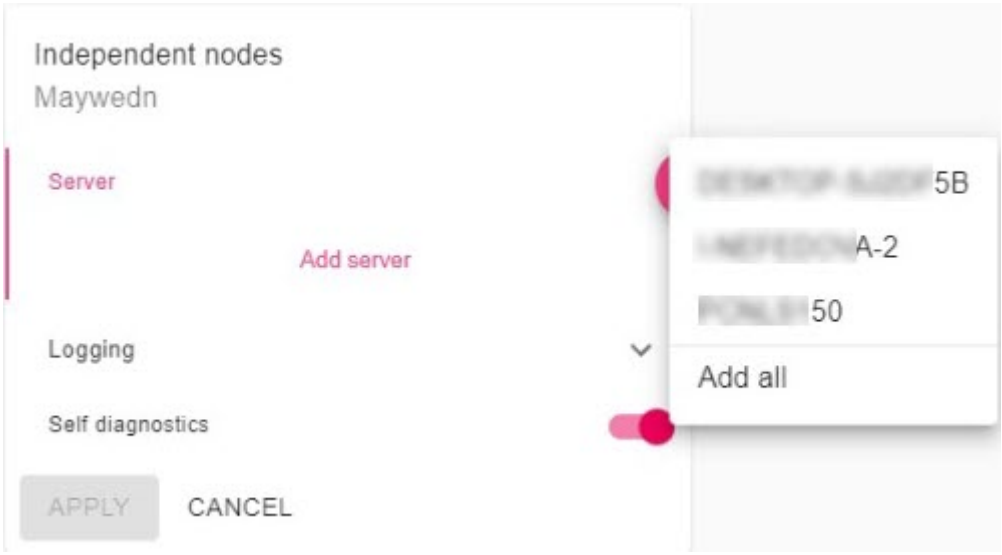
Failover doesn't cover these nodes since they rely on local databases. If the host Server fails, the nodes can not be migrated.

To create an independent node, do as follows:

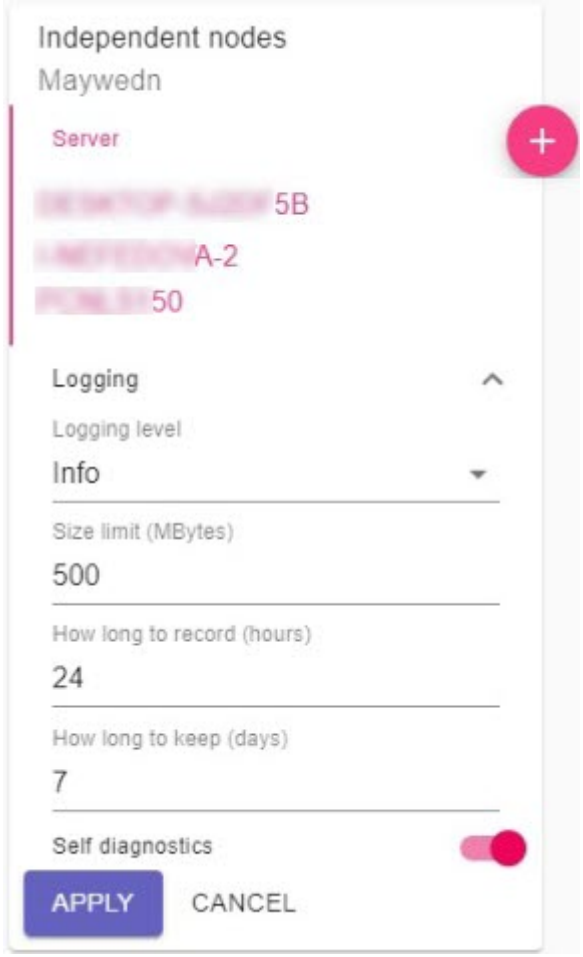
1. Go to the **CONFIGURATION** tab.
2. Point the cursor at  and click **1**.


3. Click  and select Servers where independent nodes should be launched.

> **Attention!**
>
> You can create only one independent node on each Server.

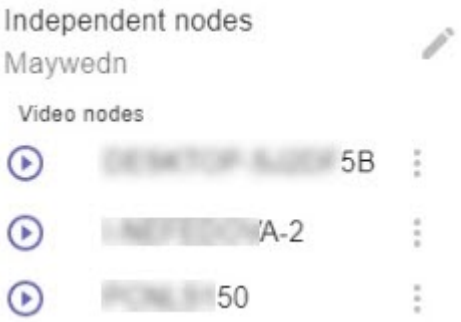


4. By default, the self-diagnostics service is running (see Self-diagnostics service(see page 1097)). To stop it, de-activate the **Self diagnostics** parameter.
5. Click the **Logging** button to set the logging options.



6. Click the **APPLY** button.

The nodes are now created; they should start automatically.



19.11.6.4 1+1 cluster configuration

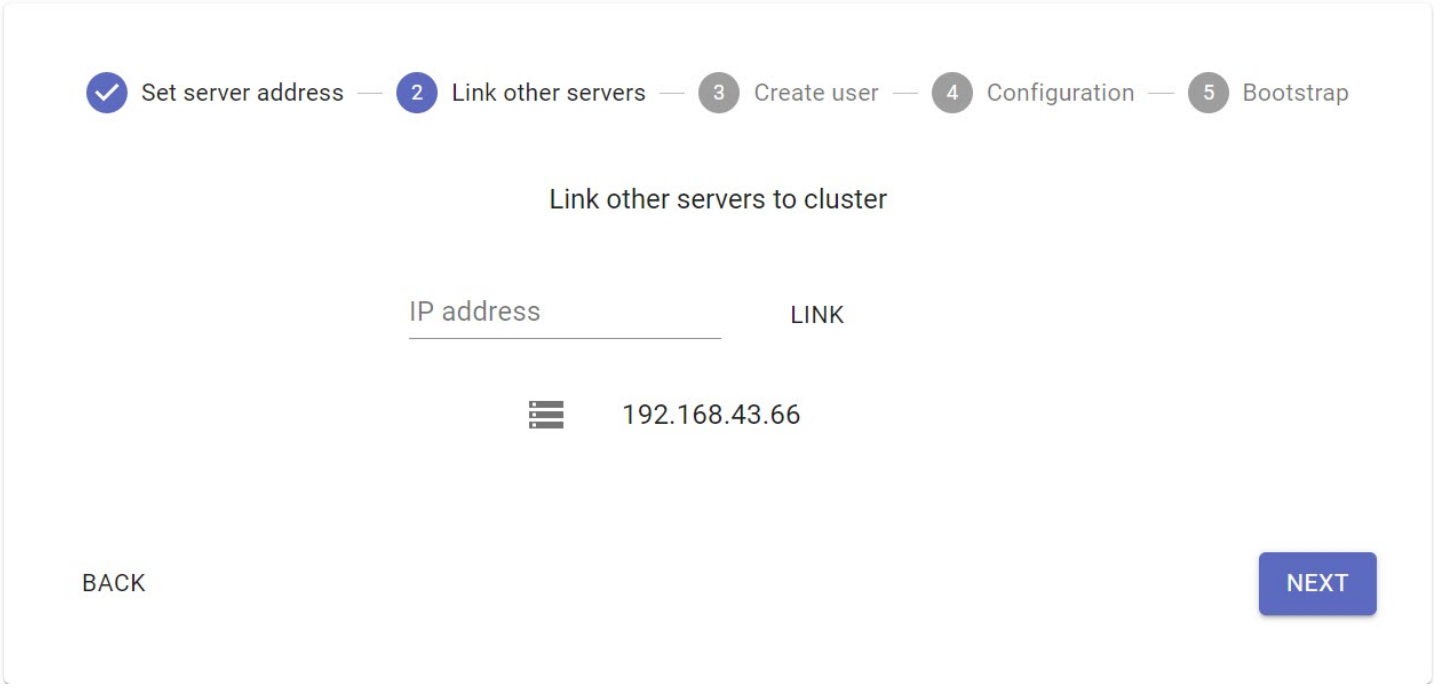
On this page:

- Setting up 1+1 configuration(see page 1081)
- Converting to 1+1 configuration(see page 1082)
- Editing the configuration(see page 1083)
- Setting up archive replication(see page 1084)
- How replication will run(see page 1085)

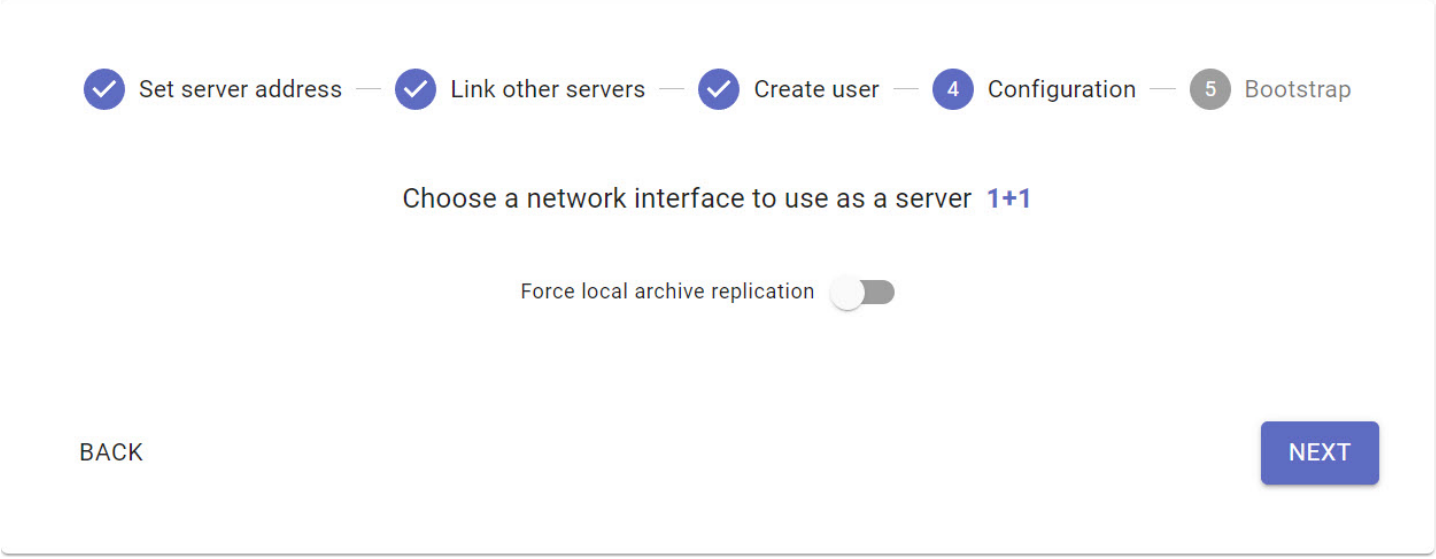
Only two Servers can be added into 1+1 configuration.

19.11.6.4.1 Setting up 1+1 configuration

To initialize 1+1 configuration, add a second Server to the configuration. To do this, enter the IP address and click **LINK**.



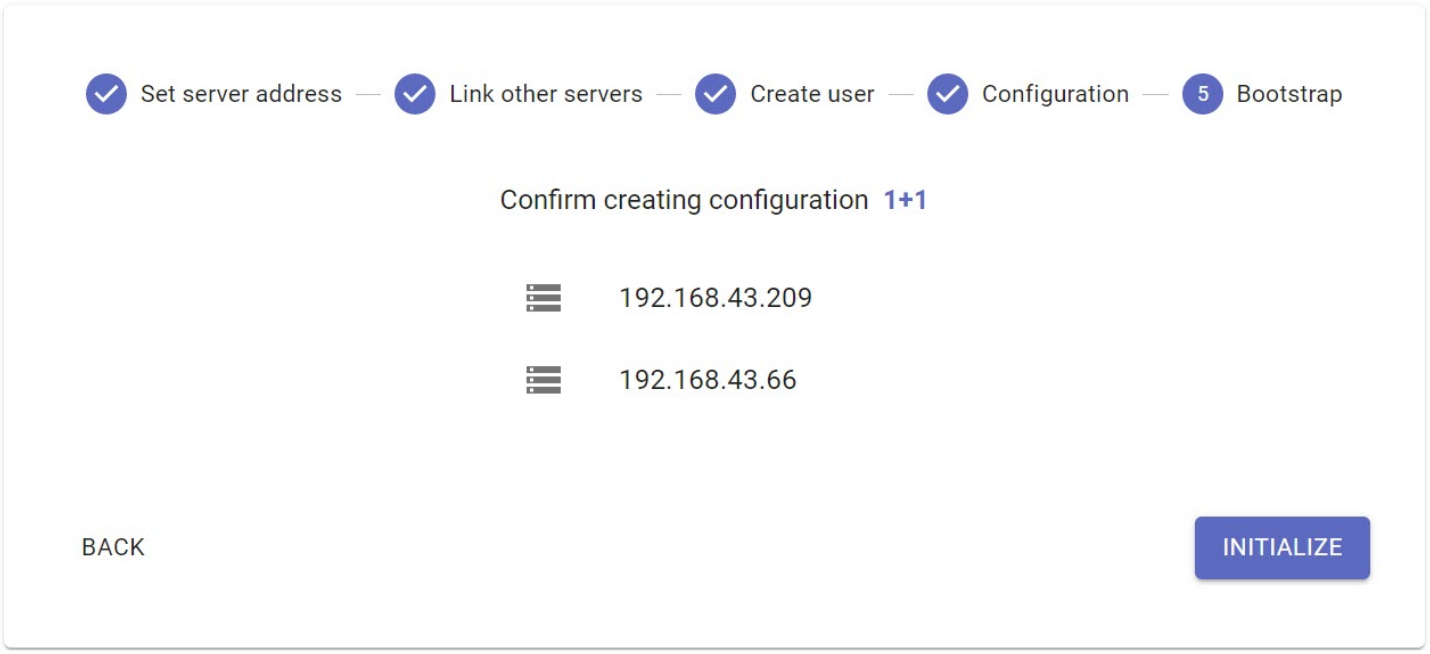
Next, activate the **Force local archive replication** parameter if you want the replication to the backup archive to be continuous regardless of the location of the master node.



Note

You can activate this parameter only at the 1+1 configuration setting stage or at the conversion to 1+1 configuration stage. Then you can activate this parameter only if you recreate the cluster.

To set up a cluster in this configuration, you must initialize the cluster after adding two Servers.



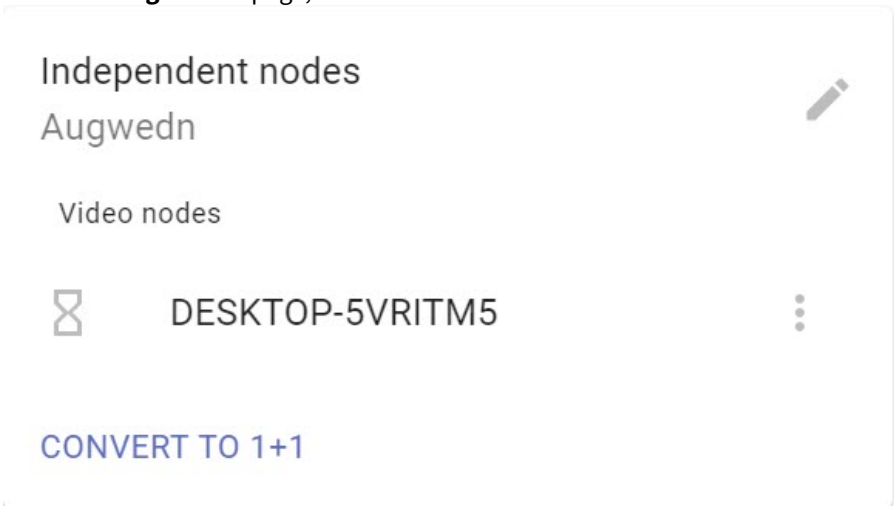
In this case, the master node will be located on the Server from which the cluster was initialized.

19.11.6.4.2 Converting to 1+1 configuration

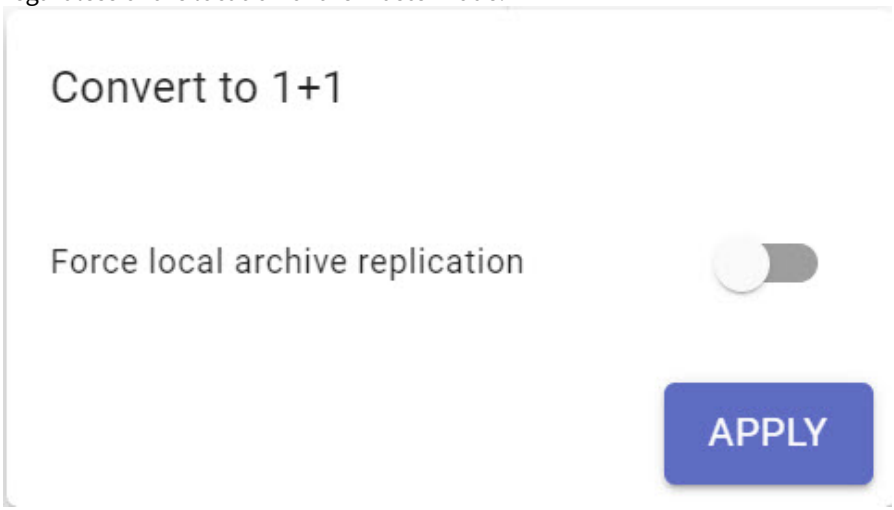
If a cluster was initialized on one Server, do the following:

1. Add a second Server to the configuration (see Creating a cluster(see page 1067)).

2. On the **Configuration** page, click **CONVERT TO 1+1**.



3. Activate the **Force local archive replication** parameter if you want the replication to the backup archive to be continuous regardless of the location of the master node.

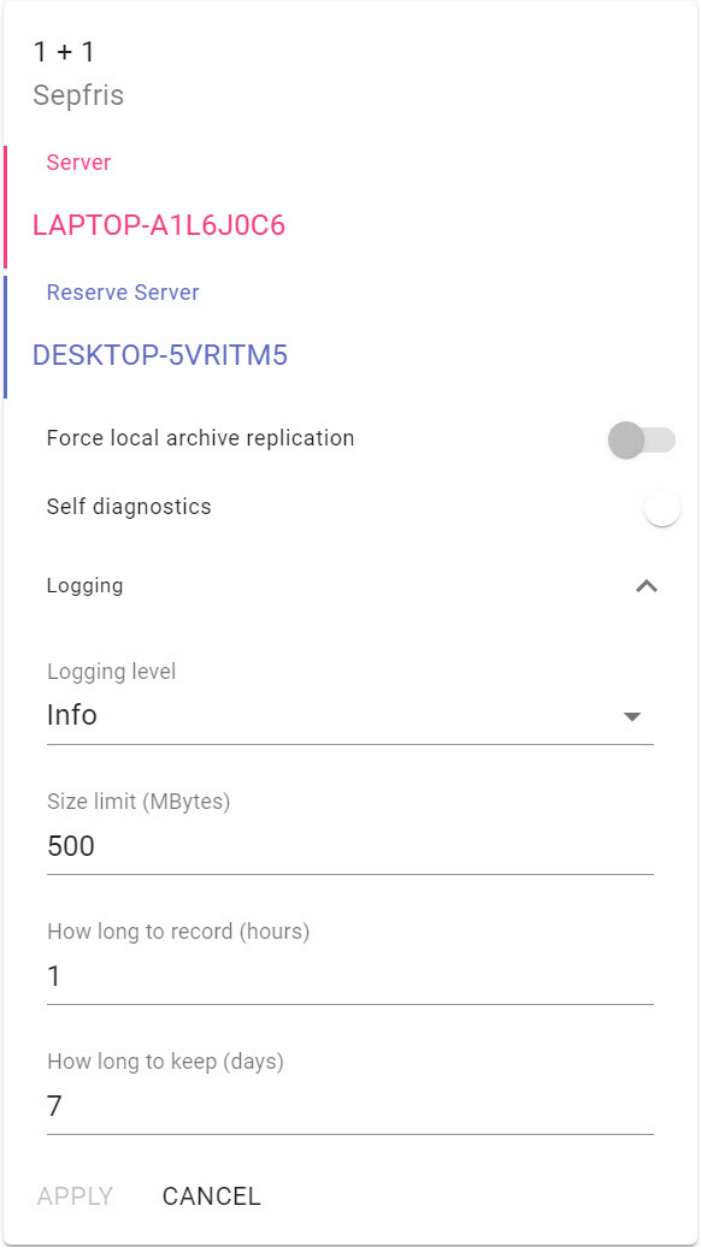


4. Click the **APPLY** button to convert to 1+1 configuration.

19.11.6.4.3 Editing the configuration

You can edit the configuration. To do so, click the button. You can do the following:

- activate/deactivate the self-diagnostics service (see Self-diagnostics service(see page 1097));



- change the logging level (see Log management utility(see page 1414));
- change the log archiving options (see Log management utility(see page 1414)).

19.11.6.4.4 Setting up archive replication

To set up archive replication, do the following:

1. Combine the master and the backup nodes into one domain (see Adding a Server to an existing domain(see page 153)).
2. Create a local archive on the master node (see Creating an archive[382]).
3. Add video cameras on the master node (see Searching, adding, configuring, and removing IP devices(see page 157)).
4. Set up video camera recording to the local archive (see Configuring recording to an archive(see page 295)).
5. Create an archive for replication on the backup node.
6. Set up the replication from the local archive to the archive for replication (see Configuring data replication(see page 298)). The replication period should be set to **Always**.

382 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486939/Creating+an+archive

Attention!

Archive replication is available only with the *Axxon One* Enterprise or Unified license (see Axxon One license types(see page 128)).

19.11.6.4.5 How replication will run

When the master node is migrated to the backup Server:

- a temporary archive will be automatically created in the C:/temp_arch folder of the backup Server as a 10 GB file;
- video cameras will record into the temporary archive;
- replication from the temporary archive to the archive for replication will be simultaneous.

If the master node is migrated bask to the master Server, the recording will be made to the local archive.

You need to use different archives to view camera recordings:

- to view the recordings when the master node was on the master Server, use the local archive;
- to view the recordings when the master node was on the backup Server, use the archive for replication (see Selecting an archive(see page 1189)).

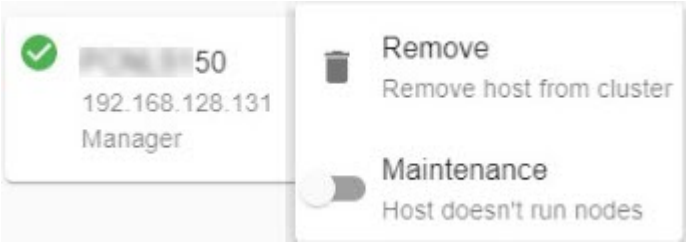
Attention!

- If the backup Server fails when the system is running, you cannot stop the master node.
- If the backup Server is unavailable, you cannot restart the master node.
- If the main node is located on the backup Server, then face recognition and license plate recognition by lists using detection tools will not be available until the main node is moved back to the master Server.

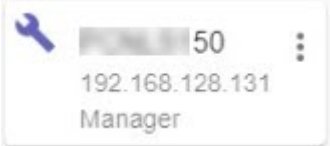
19.11.6.5 Suspending a Server within a cluster

In some cases, you may need to temporarily suspend the operation of a Server within a cluster. To do this:

1. Open the Server menu on the **Configuration** page.
2. Activate the **Maintenance** switch.



All Server's nodes then migrate to other Servers, and the status of the Server is updated.

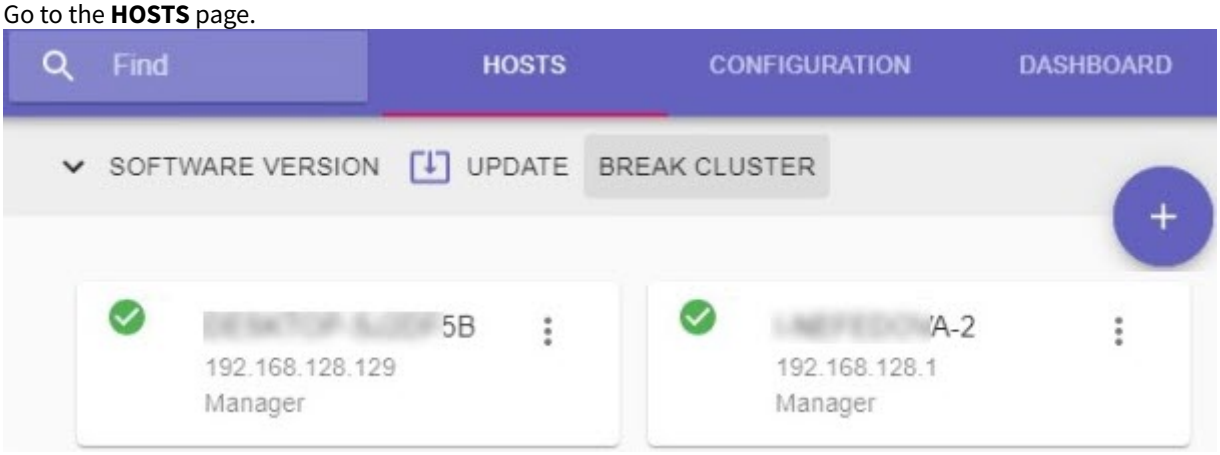


To resume the Server's operation within the cluster, toggle the Service switch to its initial position.

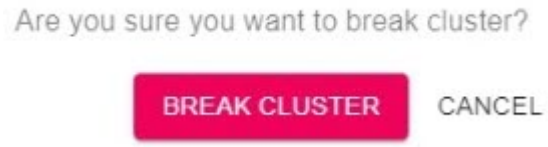
19.11.6.6 Disbanding a cluster

To disband a cluster, do the following:

1. Go to the **HOSTS** page.



2. Click the **BREAK CLUSTER** button.
3. Confirm the action.



The cluster is now disbanded.

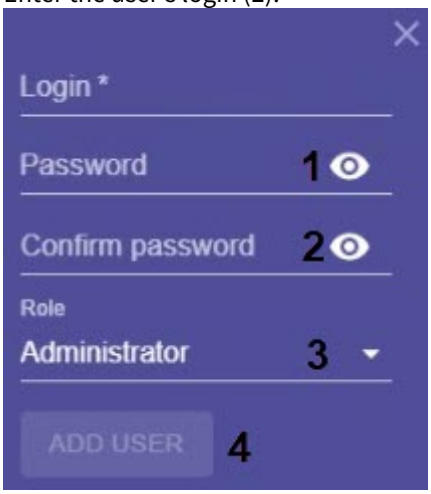
19.11.7 Set up access to a supervisor

When you launch the supervisor for the first time and create the cluster, you can create a user with the Administrator role (see Creating a cluster(see page 1067)).

In the future, you can create users with two roles: Administrator or Operator. Administrators have full access to the cluster configuration while operators can only view the configuration and monitor the state of the system.

Users can created in the **USERS** tab. To create a user:

1. Click the  button.
2. Enter the user's login (**1**).



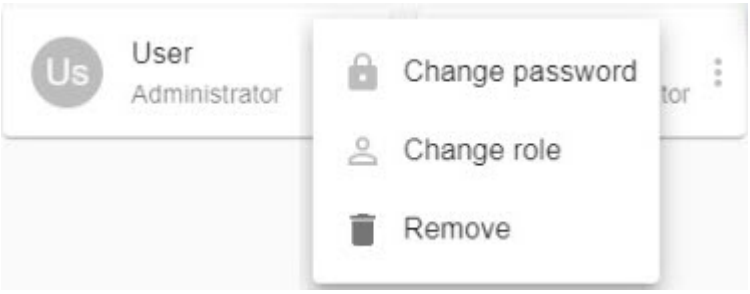
3. Enter the user's password (**2**).
4. Select the role to which the user will be added (**3**).

> **Note**

The first user you create will be automatically added to the Administrator role.

5. Click the **ADD USER** button (**4**).

User creation is complete. Click ⋮ to edit the user.



The following operations are allowed:

- change password,
- change role,
- delete user.

If at least one user was created, then the authentication is required when connecting to the Supervisor web interface.



19.11.8 Configuration backup and restore for failover VMS

You can back up your cluster, database, and nodes configuration and restore it.

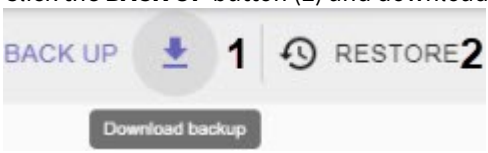
By default, backup copies of the cluster configuration are created each 24 hours on each Manager Server. If a backup copy was created by operator's command, the next automatic backup will be performed not earlier than after 24 hours.

Attention!

The object trajectory DB cannot be backed up. In the event of server hardware failure, all metadata stored in the database will be lost irretrievably.

To create a backup:

1. Go to the **CONFIGURATION** tab.
2. Click the **BACK UP** button (**1**) and download the backup by clicking the button.

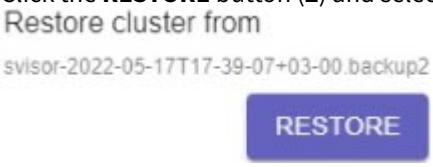


To restore a configuration from a backup:

Create a cluster first.

1. Go to the **CONFIGURATION** tab.

2. Click the **RESTORE** button (**2**) and select the file with the configuration backup.



3. Click the **RESTORE** button.

> **Attention!**
>
> Restoring configuration will stop all active tasks.

Configuration restore is completed.

19.11.9 Transferring configuration from common server to failover server

> **Attention!**
>
> - If you transfer the configuration, old events from the database are lost.
> - The VMDA metadata are saved if they are stored on the network drive.
> - The failover system must have the **Enterprise** or **Unified** license type (see Types of licenses[383]). In the license file, you must specify the real node names of the future cluster. Otherwise, the configuration backup is transferred with the incorrect license.

To transfer the configuration from the common security server to the failover system node, do the following:

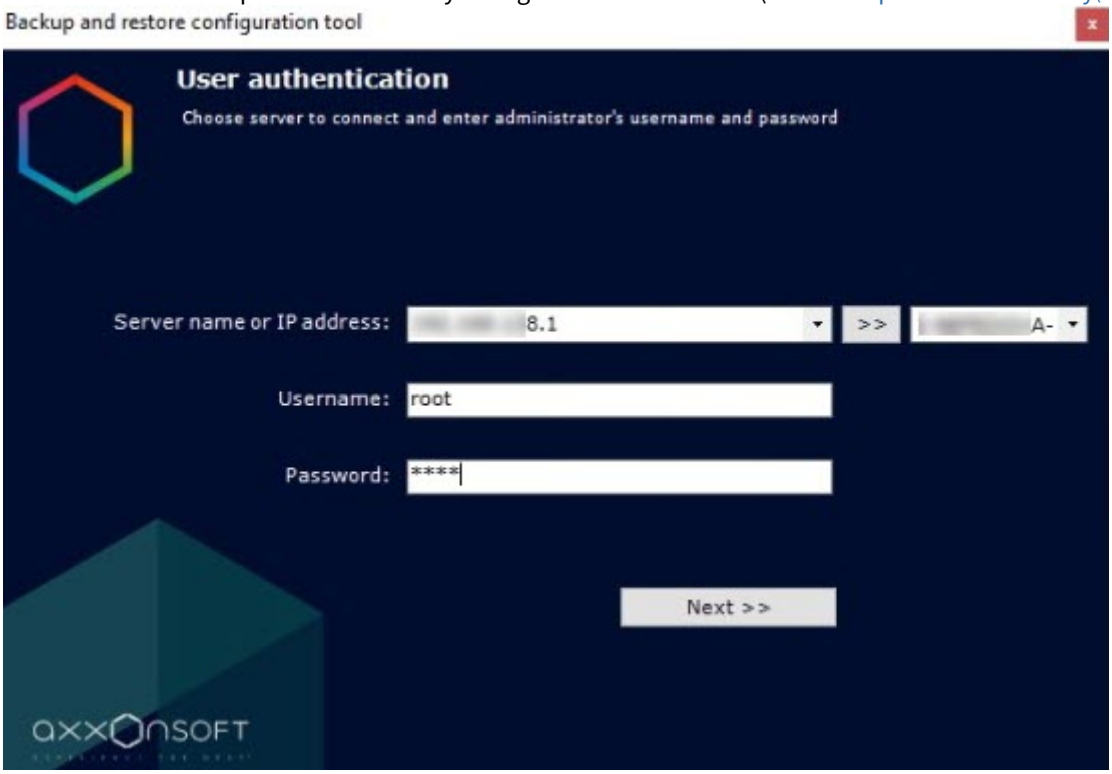
1. Create a copy of the configuration on the server (see Backup and restore utility(see page 1384)).
2. Remove *Axxon One* from all servers of the domain, saving the configuration (see Removal(see page 117)).
3. Install *Axxon One* on all servers using the **Failover server and client** installation type (see Installation(see page 98)).
4. Initialize a cluster (see Creating a cluster(see page 1067)) using the supervisor Web-interface (see Supervisor Web-Interface(see page 1066)).
5. Add servers that are used in the domain to the cluster.
6. Add nodes to the cluster.

> **Note**
>
> The node names in the cluster must match the names of the servers that are used in the common *Axxon One* security system.

7. Connect the client to one of the cluster nodes (see Connecting to a Node and Configuring of an Axxon domain(see page 1091)).
8. Add nodes to the domain.

383 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486819/Types+of+licenses

9. Connect to the backup and restore utility configuration via the node (see Backup and restore utility(see page 1384)).

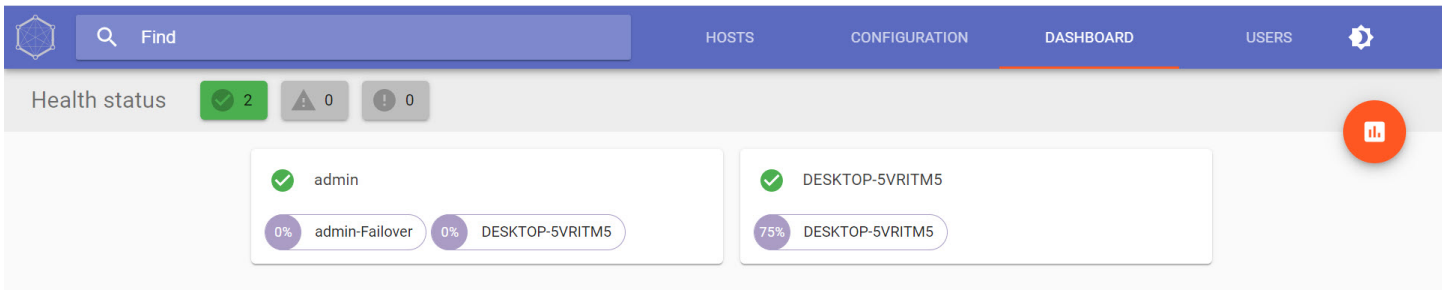


10. Restore the saved configuration (see Backup and restore utility(see page 1384)).

As a result, the configuration is transferred from the common security system to the failover system.

19.11.10 Monitoring the status of a cluster

You can monitor the status of a cluster on the **DASHBOARD** tab.



The following information is available:

1. The status of all Servers of a cluster. All Servers of a cluster are cross-checked against a number of criteria. The status info of a server reflects the cross-check results.

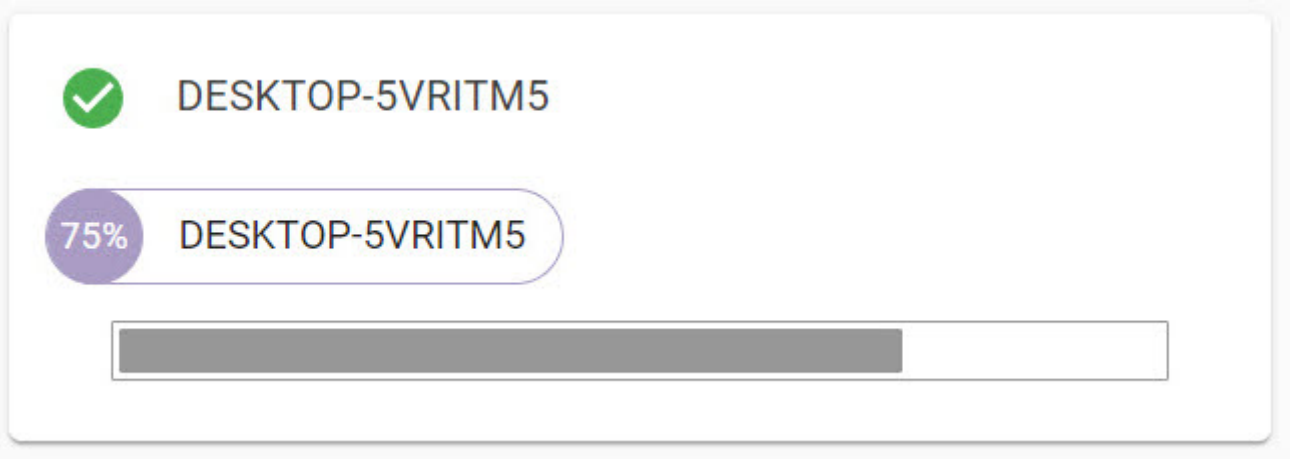
Status	Description
	The server successfully passed all checks
	The server didn't pass some checks. The red stripe around the icon reflects the percentage of failed checks

2. Running nodes and the percentage of CPU resources allocated to them of the total CPU resources of the Server. For example, if a node has been allocated 9300 CPU units and the total number of CPU resources of the Server on which it is running is 12400 CPU units, the following value is displayed: (9300/12400)*100%=75%.

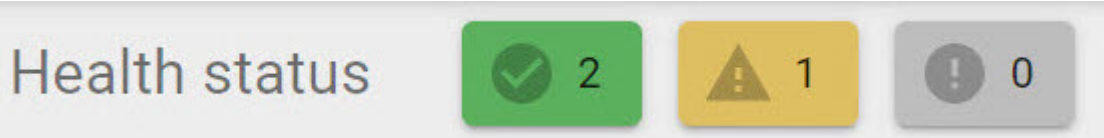
Attention!

This parameter doesn't reflect the actual CPU load of the Server by the node. The amount of the node related load can be either higher or lower than the displayed value.

To open the diagram of allocated CPU resources, click the button.



You can filter the Servers by their status using the **Health status** panel.

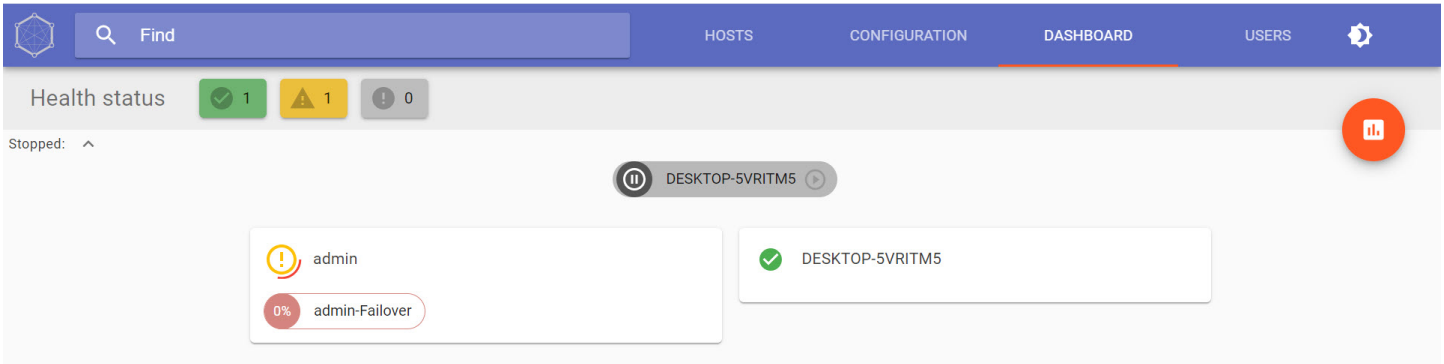


Status	Description
2	Servers that passed all checks
1	Servers that didn't pass some checks
0	Servers that failed all checks

Note

The icon indicates the number of Servers of a cluster in this status.

If some nodes of the cluster have been stopped, they will be displayed on the **Stopped** tab.



To

- minimize the tab and hide the stopped nodes, click the button;
- open the tab, click the button.

You can start the stopped nodes by clicking the button.

19.11.11 Connecting to a Node and Configuring of an Axxon domain

When the cluster is configured, it is necessary to connect the client to the node. To do this:

1. Start the Client (see Starting the client(see page 138)).



2. Enter the IP address of any cluster server (**1**) and click the >> button.
3. Select from the list the node you want to connect to (**2**). Enter the first characters of the node name into this field, and the fast search starts.
4. Enter the username and password (**3**) and click the **Connect** button (**4**).

During the first connection to the node, you will be prompted to create an Axxon domain (see Creating a new domain(see page 152)).

You can then merge nodes into a unified logical structure following standard procedures of Axxon domain configuration (see Configuring domains(see page 151)).

Attention!

An Axxon domain cannot include nodes from different clusters.

If necessary, you can switch the domain operating mode to a cluster domain. To do this, create a system variable NGP_ENABLE_CLUSTER_DOMAIN (see Creating system variable(see page 126)) and specify the value: 1—enable the cluster domain mode, 0—disable it.

Attention!

- This variable must be created on each Server in the cluster where domain nodes will be running.
- When the NGP_ENABLE_CLUSTER_DOMAIN variable is enabled, the nodes will belong to the domain in which they were created.

19.11.12 Configuring automatic connection to nodes

You can configure the connection to a node of the FailOver system through any Server of the FailOver system cluster. You can add a node to autoloading similarly to adding a regular Server (see Automatic connection(see page 1041)).

19.11.13 Updating cluster servers

Attention!

To update cluster servers, you cannot use the **UPDATE** button since it is added for testing purposes.

To update all cluster servers, do the following:

1. Back up the configuration (see Configuration backup and restore for failover VMS(see page 1087)).
2. Stop the operation of all nodes.
3. Update each cluster server (see Update(see page 123)).
4. Restart all nodes.

Updating cluster servers is complete.

19.11.14 Setting network interfaces for system nodes operation

By default, the Failover system nodes use all available network interfaces.

To limit the number of the used network interfaces, do the following:

1. Add the following parameter to the C:\Program Files\AxxonSoft\Axxon One\bin\raft\raft-settings.xml file:

   ```
   <item key="NGP_IFACE_WHITELIST">172.17.0.0/16</item>
   ```

   Use the following interfaces setting format: "IP-address1/number of unit bits in the mask, IP-address2/number of unit bits in the mask".

By default, the stale mode is activated to reduce the network traffic and the load on the CPU. In this mode, any Server in the Failover system can process queries, regardless of whether it is the master Server.

To disable the stale mode, do the following:

1. Change the value of the following parameter to 0 in the C:\Program Files\AxxonSoft\Axxon One\bin\raft\raft-settings.xml file:

   ```
   <item key="SVISOR_CONSUL_STALE_MODE_THRESHOLD_MS">0</item>
   ```

To activate the stale mode, change the value of the parameter to 200 in the file.

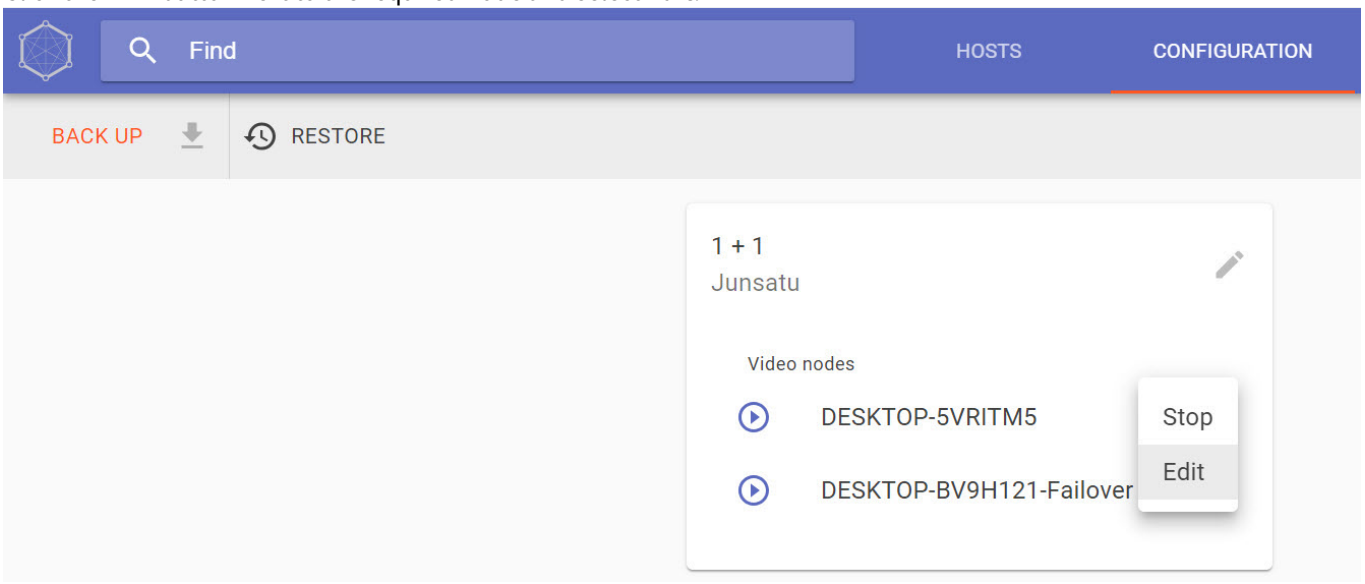
> **Note**
>
> Effective work in the stale mode is performed in the clusters with a large number of added Servers.

19.11.15 Changing ports in the nodes of the failover system

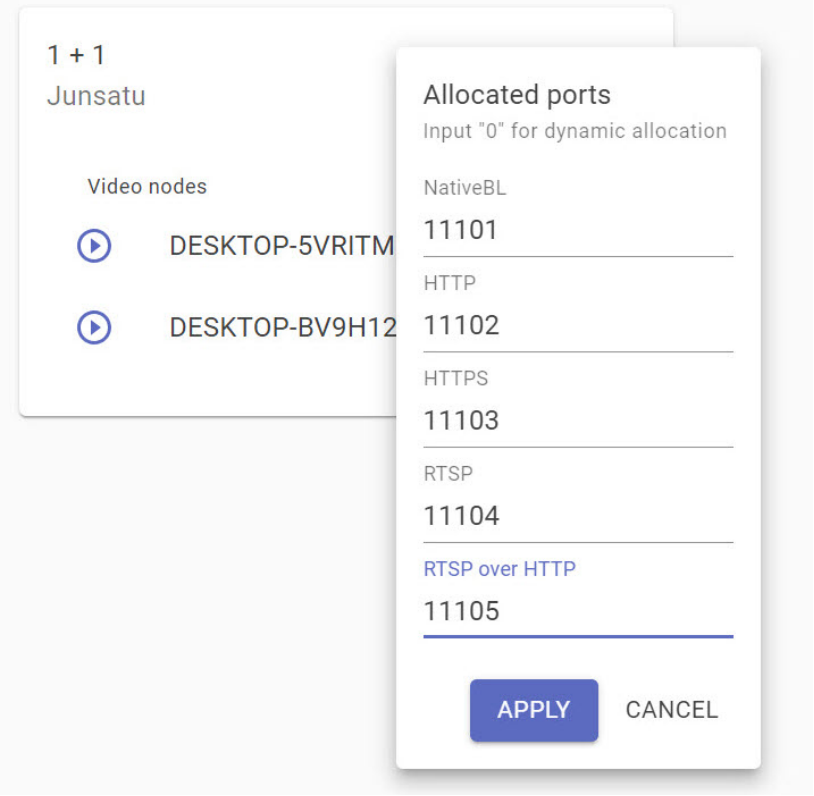
By default, nodes in the cluster are assigned dynamic ports. If necessary, you can explicitly specify ports for NativeBL, Web-Server, and so on. You can configure ports individually for each node in the cluster.

To change the ports in a node, do the following:

1. Go to the **CONFIGURATION** tab.
2. Click the button next to the required node and select **Edit**.



3. In the **Allocated ports** window, specify an unused port. You can change all ports, a few ports, or any specific port.



4. Click the **APPLY** button.

As a result, the node will automatically restart and operate on the specified ports.

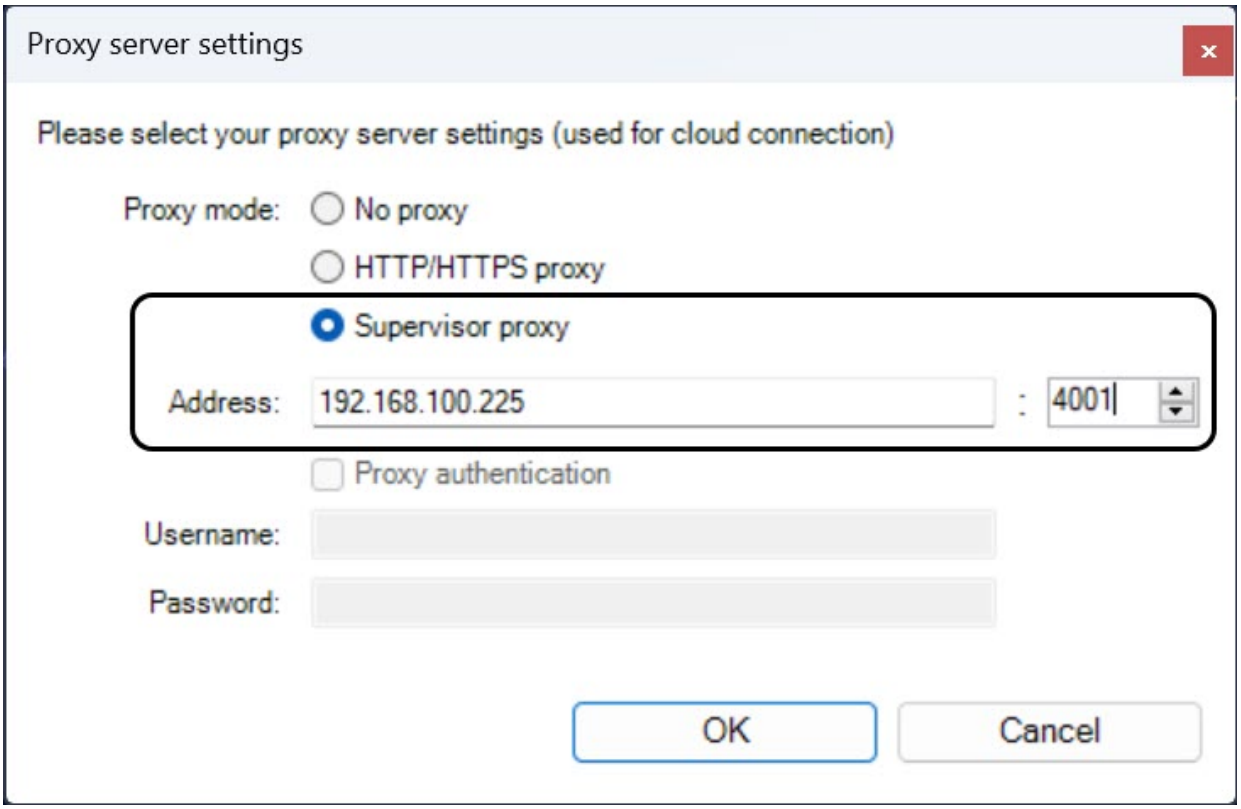
The allocated ports in the node must not be the same as the ports specified in Ports used by the failover system(see page 1065).

If you want to return the dynamic port allocation, enter the **0** value.

19.11.16 Connecting the Client to the Failover Server behind NAT

To connect the Client to the Failover Server behind NAT, do the following:

1. Create a cluster and add Servers to it (see Creating a cluster(see page 1067)).
2. On one of the cluster Servers, via which the Client will connect to the Failover Server behind NAT, in the C:\Program Files\AxxonSoft\Axxon One\bin\raft-settings.xml file, specify the port value for the SVISOR_GRPC_PROXY_PORT parameter. For example, specify port 4001 (see Ports used by Axxon One(see page 95)).
3. Forward ports 4000 and 4001 to the internal IP address of the Server specified in step 2.
4. Start the Client and in the proxy server settings, specify the Server external IP address and the forwarded port from step 2 (see Starting the client(see page 138)).



5. Enter the external IP address of the cluster Server (**1**) and click the >> button.



6. From the list (**2**), select the node you want to connect to. To quickly find the node, you can enter the first characters of its name in this field.
7. Enter the username and password (**3**) and click the **Connect** button (**4**).

Attention!

If the connection to the Server to which the ports are forwarded fails, the connection to the cluster nodes behind NAT becomes unavailable. If necessary, configure the network infrastructure so that a proxy server is configured for multiple cluster Servers. This will provide fault tolerance and the ability to connect to the cluster even if one of the Servers becomes unavailable.

19.11.17 Changing logging levels for the Consul and Nomad processes in a failover system

On the page:

- Changing the logging level for Consul(see page 1096)
- Changing the logging level for Nomad(see page 1096)

By default, the logging level for the Consul and Nomad processes is set as **Info** (see Log management utility(see page 1414)). If you want to log debugging events, you must change the logging level for the Consul and Nomad processes to Debug.

19.11.17.1 Changing the logging level for Consul

To change the logging level for the Consul process, do the following:

1. Open the file in a text editor:
   - **Windows OS**: C:/ProgramData/AxxonSoft/Axxon One/RaFT/cluster/consul/config/main.json.
   - **Linux OS**: /opt/AxxonSoft/RaFT/data/cluster/consul/config/main.json.
2. Change the value of the log_level parameter to DEBUG.

   ```
   "log_level": "DEBUG"
   ```
3. Save the file:
   - **Windows OS**: C:/ProgramData/AxxonSoft/Axxon One/RaFT/cluster/consul/config/main.json.
   - **Linux OS**: /opt/AxxonSoft/RaFT/data/cluster/consul/config/main.json.
4. Run command prompt as administrator and go to the folder:
   - **Windows OS**: C:/Program Files/RaftLauncher/current/.
   - **Linux OS**: /opt/AxxonSoft/RaFT/bin/.
5. Execute the command to restart the process and change the logging level:
   - **Windows OS**:

     ```
     consul.exe reload
     ```
   - **Linux OS**:

     ```
     consul reload
     ```

19.11.17.2 Changing the logging level for Nomad

To change the logging level for the Nomad process, do the following:

1. Open the file in a text editor:
   - **Windows OS**: C:/ProgramData/AxxonSoft/Axxon One/RaFT/cluster/nomad/config/misc.json.

- **Linux OS**: /opt/AxxonSoft/RaFT/data/cluster/nomad/config/misc.json.

2. Change the value of the log_level parameter to DEBUG.

```
"log_level": "DEBUG"
```

3. Save the file:
   - **Windows OS**: C:/ProgramData/AxxonSoft/Axxon One/RaFT/cluster/nomad/config/misc.json.
   - **Linux OS**: /opt/AxxonSoft/RaFT/data/cluster/nomad/config/misc.json.
4. Run command prompt as administrator and go to the folder:
   - **Windows OS**: C:/Program Files/RaftLauncher/current/.
   - **Linux OS**: /opt/AxxonSoft/RaFT/bin/.
5. Execute the command to restart the process and change the logging level:
   - **Windows OS**:

```
nomad.exe reload
```

   - **Linux OS**:

```
nomad reload
```

As a result, the process will restart and from the moment it restarts, the detailing in the logs will increase because the logging level will change to Debug.

19.12 Self-diagnostics service

19.12.1 General information about the self-diagnostics service

The self-diagnostics service collects information about the system metrics and checks the operation of all *Axxon One* components. The data obtained are compared with the indicators of the normal operation of the system. When deviations occur, system health alerts are generated, which can be tracked in the web interface (see Viewing metrics in the self-diagnostics service(see page 1100)).

Examples of errors that are tracked:

- **Hight CPU load.**
- **Low OS virtual memory**.
- Camera is connected, but doesn't send data (**ipint_no_samples**).
- Archive doesn't work (**archive_source_not_activated**).
- Storage cannot handle record load (**archive_overloaded**).
- No video is recorded on events from a detector (**archive_no_ping_from_detector**).

The self-diagnostics service implements rules that allow you to monitor various system statuses. You can see a full list of rules available for a particular server in the web interface of the self-diagnostics service in the **Status** → **Rule** section: http://127.0.0.1:20040/rules, where:

- **alert** is a rule name;
- **expr** is a rule triggering condition;
- **actions** are actions of the rule;
- **summary** is a rule description.

> **Note**
>
> There are rules that generate alarms, but don't perform any **actions**. Such rules are labeled **disabled: true**.

Examples of rules:

alert	expr	actions	summary
Low disk free space (logs)	If free space on the system disk is less than 20 GB, all server logs, including archived logs, are deleted to free up space: See an example of a rule... `wmi_logical_disk_free_bytes{volume="C:"} / (1024 * 1024) < 20480`	ACTION_CLEANUP_LOGS	Clean up of the logs directory when there is insufficient space on the system disk
Low disk free space (database)	If free disk space for the database is less than 15 GB, all events older than one week are deleted: See an example of a rule... `wmi_logical_disk_free_bytes{volume="C:"} / (1024 * 1024) < 15360`	ACTION_CLEANUP_DB	Clean up of Postgres database when there is insufficient space on the disk. If free disk space for the database is less than: • 10 GB—all events older than one day are deleted. • 5 GB—all events older than one hour are deleted. • 3 GB—all events are deleted
archive_no_samples	Rule checks if new frames go to the archive. If new frames don't go to the archive within five minutes, the archive process is restarted: See an example of a rule... `((changes(ngp_archive_channel_state_change {ep_name="hosts/SERVER/MultimediaStorage"}[5m]) + ngp_archive_channel_current_state {ep_name="hosts/SERVER/MultimediaStorage"} > 0) unless (changes(ngp_input_sample_counter {ep_name="hosts/SERVER/MultimediaStorage"}[5m]) > 0)) and ignoring(ep_name) ngp_fps{ep_name="hosts/SERVER/DeviceIpint"}`	ACTION_RESTART_NGP_UNIT	Restart of the archive service if new frames don't go to the archive

alert	expr	actions	summary
detector_no_sample	Rule checks if frames go to the detector. If new frames don't go to the detector, the detector service is restarted: See an example of a rule... `(absent(ngp_fps{ep_name="hosts/SERVER/AVDetector"}) * scalar(ngp_fps{ep_name="hosts/SERVER/DeviceIpint"}) * scalar(changes(ngp_fps{ep_name="hosts/SERVER/AVDetector"}[3m])) * scalar((ngp_service_desired_state{ep_name="hosts/SERVER/AVDetector"} == 0) + 1)) > 0`	ACTION_RESTART_NGP_UNIT	Restart of the detector service if the active detector doesn't receive new frames
statistics_server_unhealthy	If the statistics server doesn't update the item counter or becomes unavailable, the statistics services are automatically restarted: See an example of a rule... `absent(changes(ngp_work_item_counter{ep_name="hosts/SERVER/StatisticsServer"}[5m])) or absent(up{job="node.SERVER"})`	ACTION_RESTART_NGP_UNIT	Restart of the statistics service if there are no statistics events

19.12.2 Starting and stopping the self-diagnostics service

Starting and stopping the Axxon One self-diagnostics service in Linux OS[384]

Note

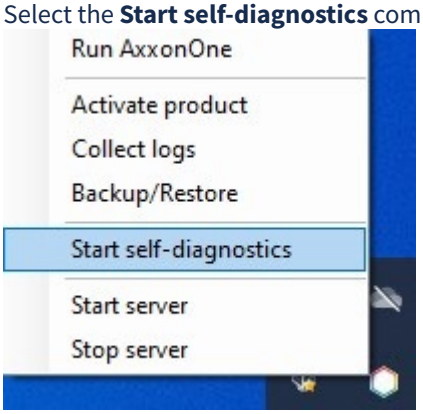
The *Axxon One* self-diagnostics service is running by default.

19.12.2.1 Starting the service

To launch the self-diagnostics service, complete one of the two following actions:

384 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/248444812/Starting+and+stopping+the+Axxon+One+self-diagnostics+service+in+Linux+OS

1. Select the **Start self-diagnostics** command in the Tray Tool utility(see page 1378).



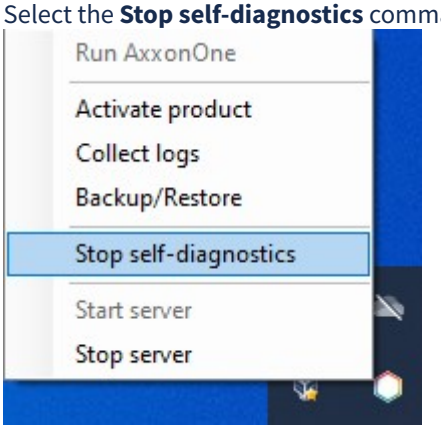
2. Launch the **NGP_Self_Diagnostics**.

As a result, the self-diagnosis service will be launched.

19.12.2.2 Stopping the service

To stop the self-diagnostics service, complete one of the two following actions:

1. Select the **Stop self-diagnostics** command in the Tray Tool utility(see page 1378).



2. Stop the **NGP_Self_Diagnostics**.

> **Note**
>
> In a failover system, the self-diagnostics service is activated/deactivated in cluster settings (see Configure a Failover System Cluster(see page 1072)).

As a result, the self-diagnosis service will be stopped.

19.12.3 Viewing metrics in the self-diagnostics service

On the page:

- General information(see page 1101)
- Access to the self-diagnostics service(see page 1101)
- Interface and queries execution(see page 1101)

- Examples of useful queries for Windows OS(see page 1105)
- Examples of useful queries for Linux OS(see page 1105)

19.12.3.1 General information

The web interface of the self-diagnostics service is available for monitoring the system statuses and analyzing its performance.

19.12.3.2 Access to the self-diagnostics service

To go to the monitoring interface, do the following:

1. Open the web browser.
2. In the address line, enter: http://127.0.0.1:20040/.
3. Click the **Enter** button.

19.12.3.3 Interface and queries execution

The service interface allows viewing metrics as a table or graphs. To run a query, do the following:

1. Select the metric from the drop-down list **1** or enter the query manually in the **Expression** field. You can:
   a. Use several metrics at a time. The system has the following available metrics:

Metric	Description
ALERTS_FOR_STATE	Found and fixed malfunctions. Contains the alertname parameter with the problem type. **Example** `ALERTS_FOR_STATE{alertname="ipint_is_not_activated",ep_name="hosts/Server1/DeviceIpint.99",instance="127.0.0.1:20108",job="ngp_exporter",ngp_alert="true"}` Decryption of the **alertname** values (see General information about the self-diagnostics service(see page 1097)) for the **ALERTS_FOR_STATE** metric: • **low_os_memory**—out of RAM. • **ipint_is_not_activated**—camera is connected, but there is no data from it. • **no_samples_in_detector**—no events from the detector. • **restart_services_when_archive_source_not_activated**—the archive recording isn't working. • **restart_services_when_no_samples_in_archive**—recording to archive with **0** fps. • **restart_services_when_no_ping_from_detector_to_archive**—no recording to the archive at the event from the detector. • **logs_disk_space_is_low / db_disk_space_is_low**—out of system disk space.
ngp_archive_channel_fps	The frame rate of all cameras when recording to the archive
ngp_archive_volume_size	The current total size of the archive (in bytes)

Metric	Description
ngp_cpu_total_usage	The CPU load of the server
ngp_fps	The frame rate of all server cameras, detectors and decoders
ngp_people_count	The last captured number of people in the frame by the Crowd estimation VA(see page 765) detector
ngp_errors	Number of errors in the detectors' operation: • **Neural tracker**(see page 405) • **Neural counter**(see page 771) • **Human pose detector**(see page 669) • **Neural classifier**(see page 701) • **Stopped object detector**(see page 440) • **Smoke detector**(see page 725) • **Fire detector**(see page 706) • **Water level detector**(see page 729) with a neural network • **Barcode detector**(see page 760) • Meta-detector(see page 768) • **Person-based privacy masking**(see page 694) • Object tracker(see page 414) (with a **Neural filter**) • Crowd estimation VA(see page 765)
ngp_skipped_pp	Number of missed frames by the Crowd estimation VA(see page 765) detector due to the lack of resources for processing

b. Apply logic and arithmetic operators for anomaly searching. The full list of logic and arithmetic operators is specified in the official Prometheus documentation[385].

Example. All metrics where fps is less than 17

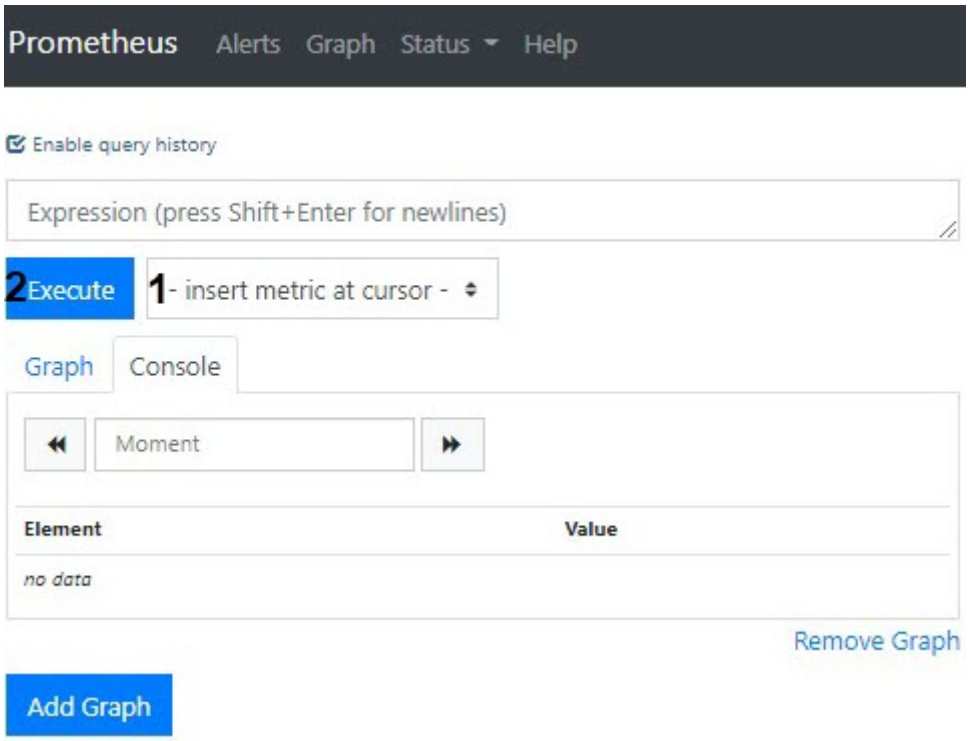
```
ngp_fps < 17
```

c. Faltering by metrics parameters using curly brackets.

Example. Fps values only for the specified source

```
ngp_fps{ep_name=~"hosts/TEST/DeviceIpint.2/SourceEndpoint.video:0:0"}
```

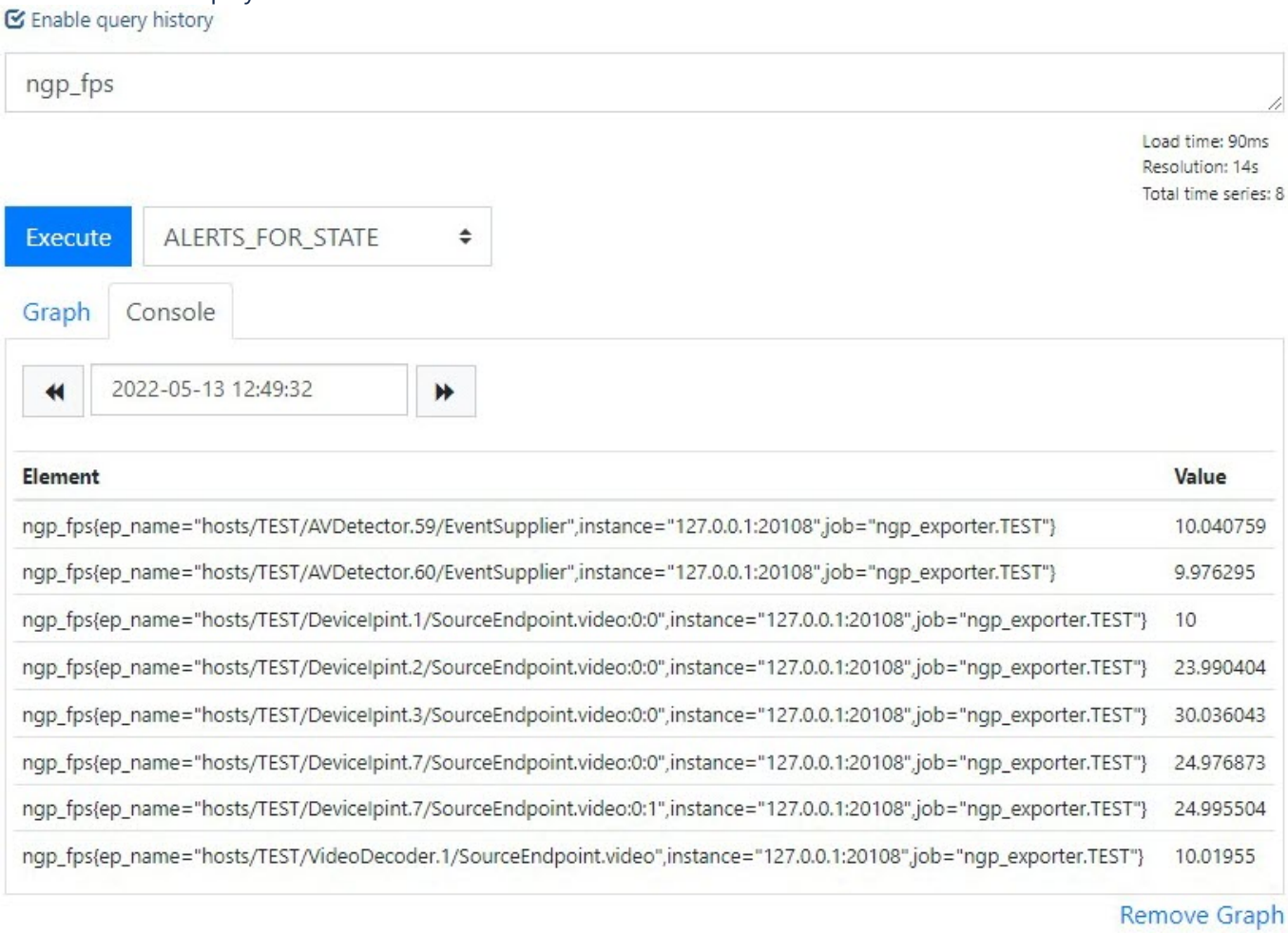
385 https://prometheus.io/docs/prometheus/latest/querying/operators/



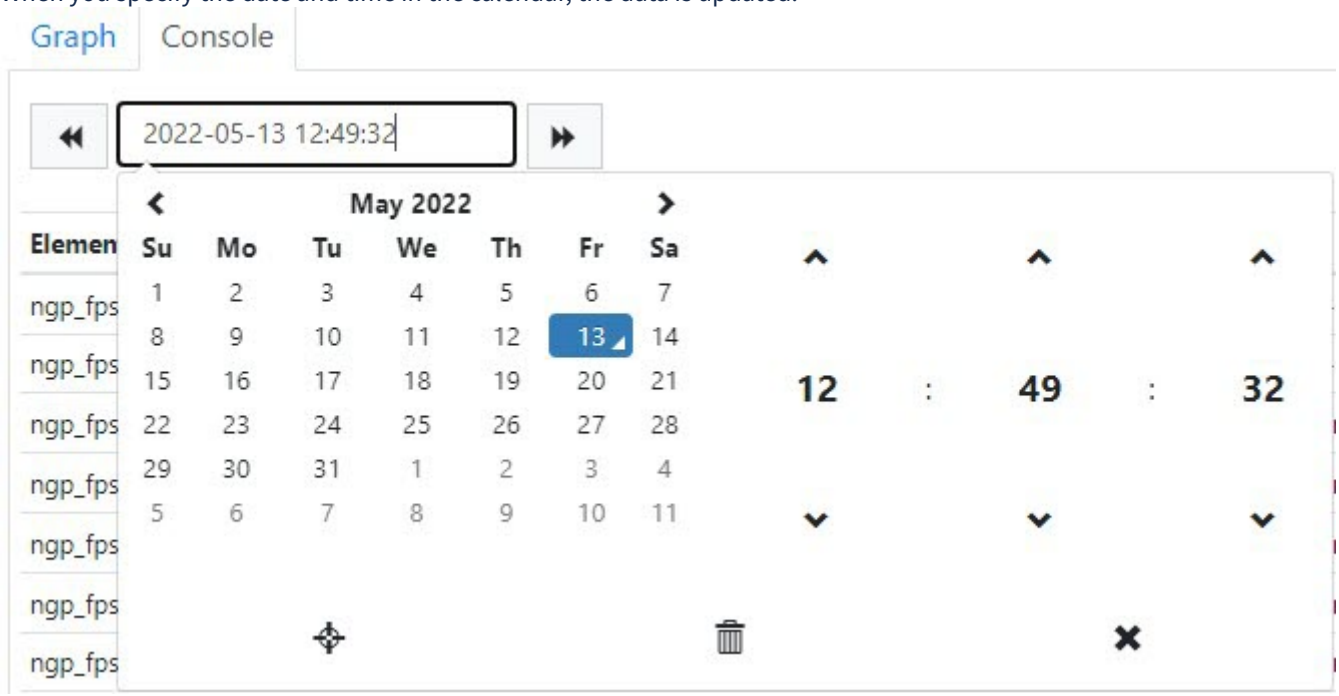
2. If necessary, set the time range for the data.
3. Click the **Execute** button.

Viewing results:

- The **Console** tab displays the current metrics values in the table format.

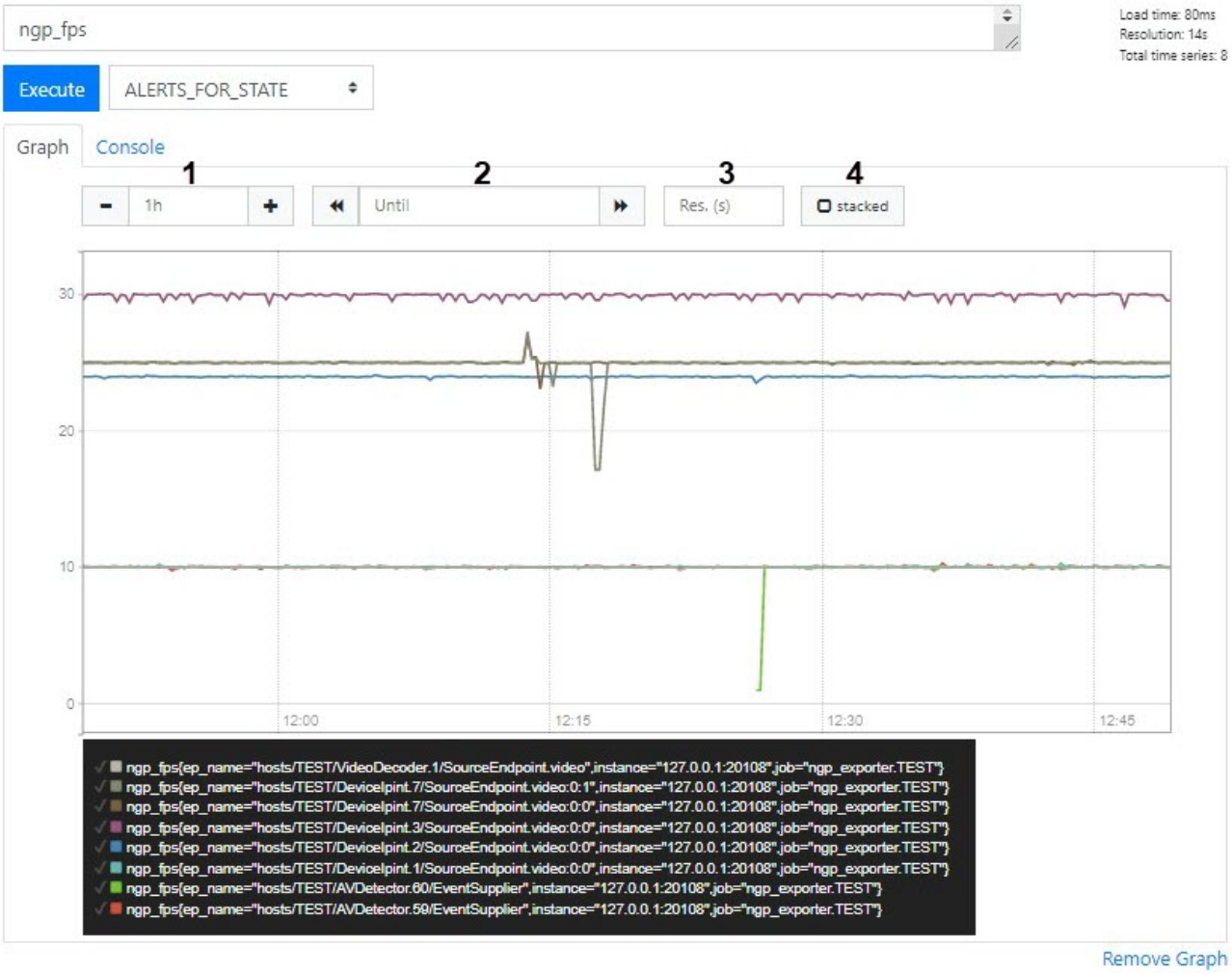


When you specify the date and time in the calendar, the data is updated.



- On the **Graph** tab you can create the graph of selected metrics at the specified period.
  - The **1** field—sets the graph time interval.
  - The **2** field—specifies the end graph point.

- The **3** field—sets the interval between data points.
- The **4** checkbox—enables the display mode with accumulation (filling the areas under the graph).



19.12.3.4 Examples of useful queries for Windows OS

1. The CPU loading graph (analog of the System monitor):

```
sum by (process_id) (100 / scalar(wmi_cs_logical_processors) *
(irate(wmi_process_cpu_time_total{process="AppHost"}[10m]))) or ngp_cpu_total_usage
```

2. RAM usage by the **AppHost** processes and a total memory space:

```
sum by (process_id) (avg_over_time(wmi_process_working_set{process="AppHost"}[5m])) / 1024
 or avg_over_time(wmi_os_virtual_memory_bytes[5m]) / 1024
```

3. The percentage of RAM usage:

```
100.0 - 100 * avg_over_time(wmi_os_virtual_memory_free_bytes[5m]) /
avg_over_time(wmi_os_virtual_memory_bytes[5m])
```

19.12.3.5 Examples of useful queries for Linux OS

1. The total RAM usage by the **AppHost** processes:

```
sum by (groupname) (namedprocess_namegroup_memory_bytes{memtype="resident"})
```

2. The percentage of RAM usage:

```
100 - node_memory_MemAvailable_bytes * 100 / node_memory_MemTotal_bytes
```

3. The CPU load by the **AppHost** processes as a percentage:

```
sum by (object_id) (rate(namedprocess_namegroup_cpu_seconds_total{groupname="AppHost"}
[1m])) * 100
```

4. The total CPU load as a percentage:

```
100 * avg without (cpu) (1 - rate(node_cpu_seconds_total{mode="idle"}[1m]))
```

5. RAM usage by the **AppHost** processes to detect the memory leak:

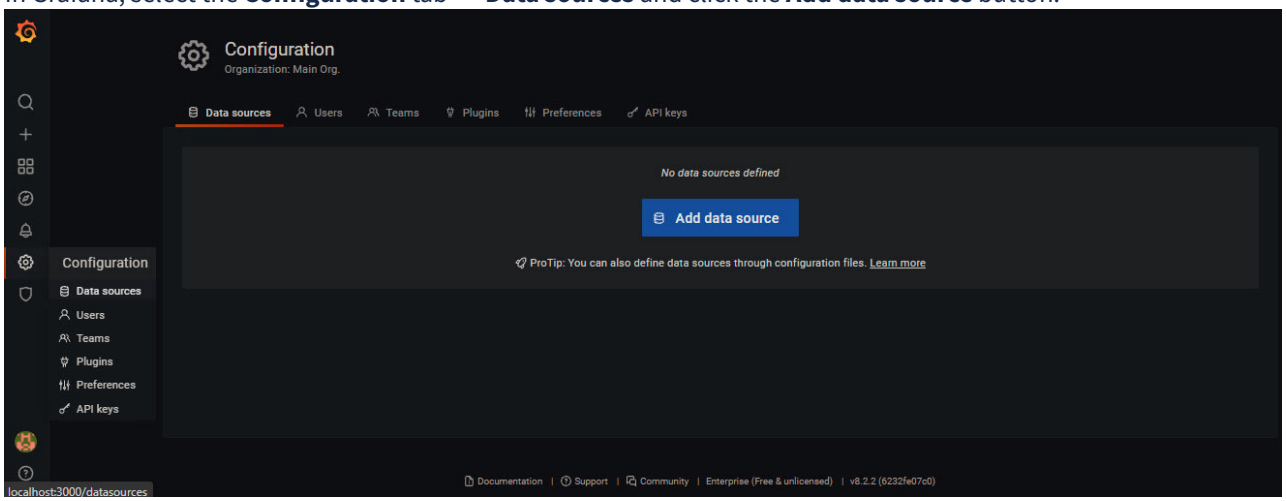
```
namedprocess_namegroup_memory_bytes{object_id=~"APP_HOST.*",memtype="proportionalResident"
}
```

19.12.4 Viewing self-diagnostics metrics using third-party Grafana | Prometheus software

> **Attention!**
>
> AxxonSoft isn't a developer and doesn't provide technical support for Grafana | Prometheus[386] software.

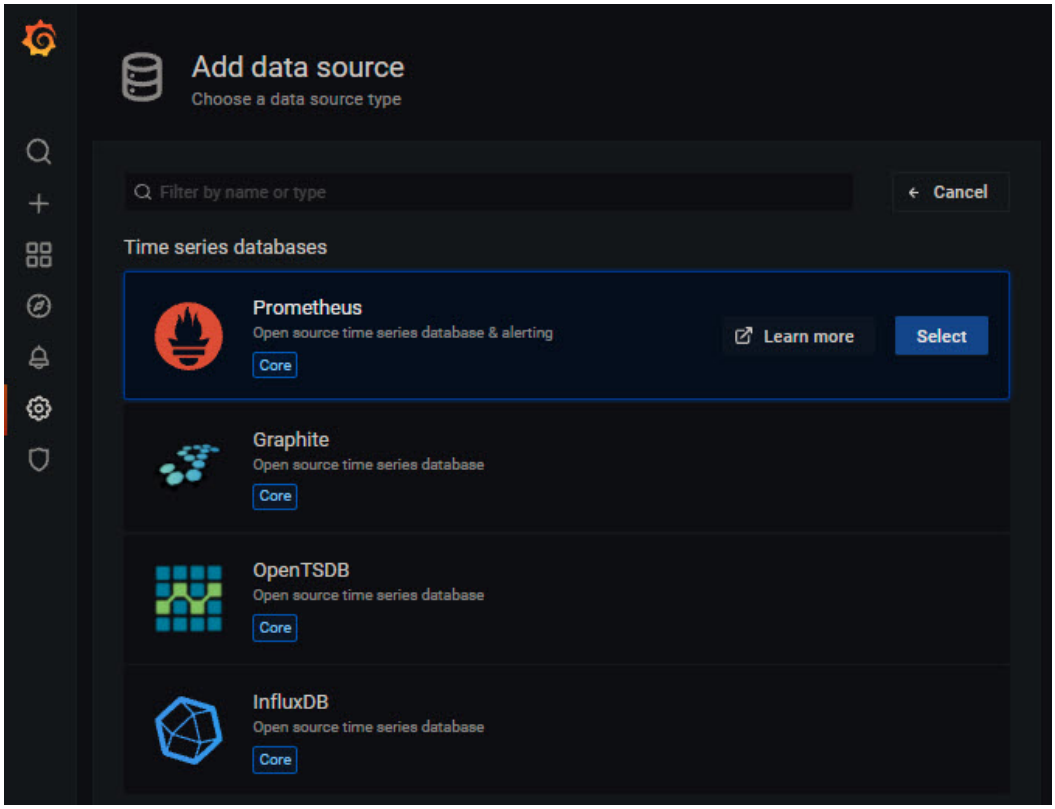
To view the self-diagnostics metrics using third-party Grafana | Prometheus software, do the following:

1. Download and install Grafana[387].
2. Go to the web interface of Grafana self-diagnostics service: http://localhost:3000.
3. Add Prometheus as a data source in Grafana:
   a. In Grafana, select the **Configuration** tab → **Data sources** and click the **Add data source** button.



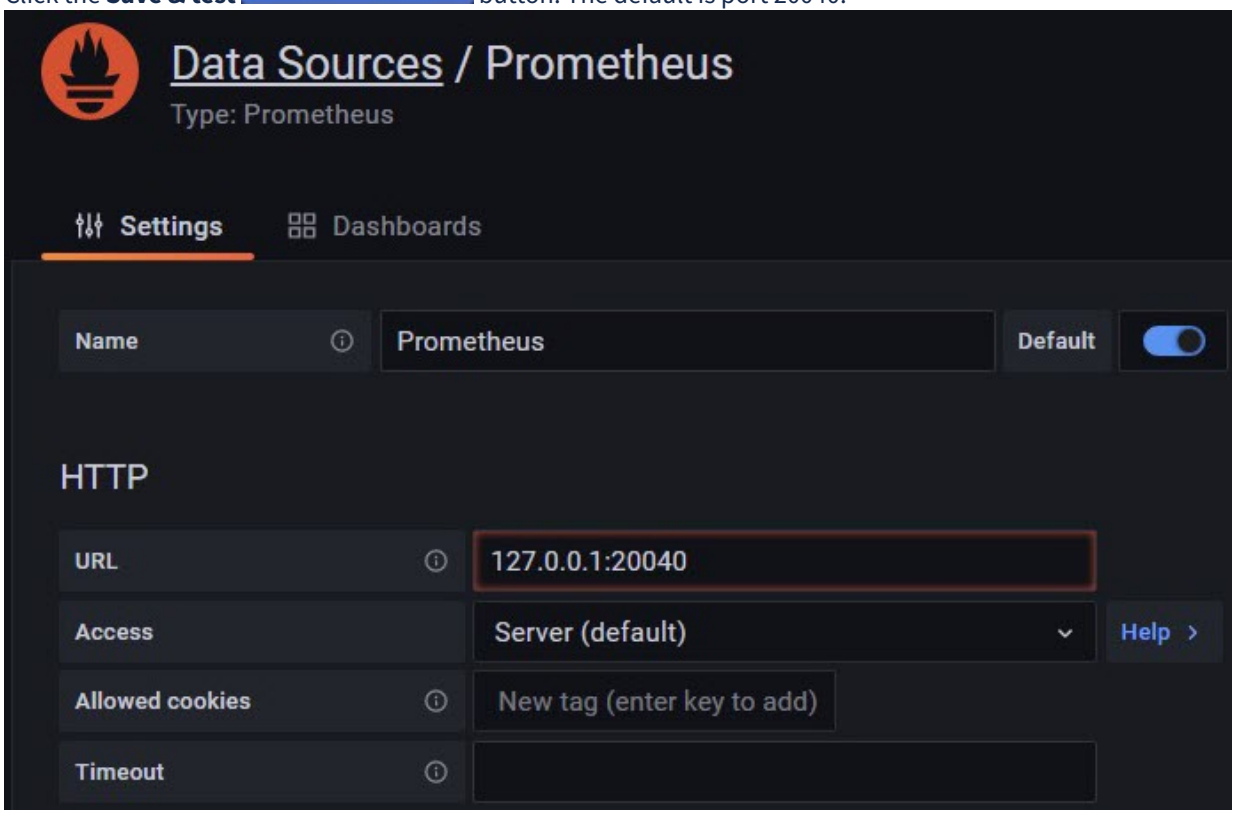
386 https://prometheus.io/docs/visualization/grafana/
387 https://grafana.com/grafana/download?platform=windows

b. Select **Prometheus** and click the **Select** button.

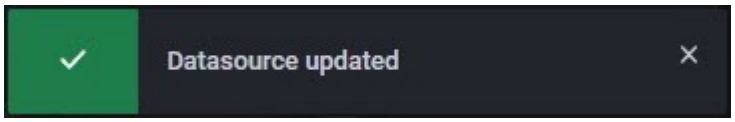


c. Specify the URL address and Prometheus port.

d. Click the **Save & test**  button. The default is port 20040.



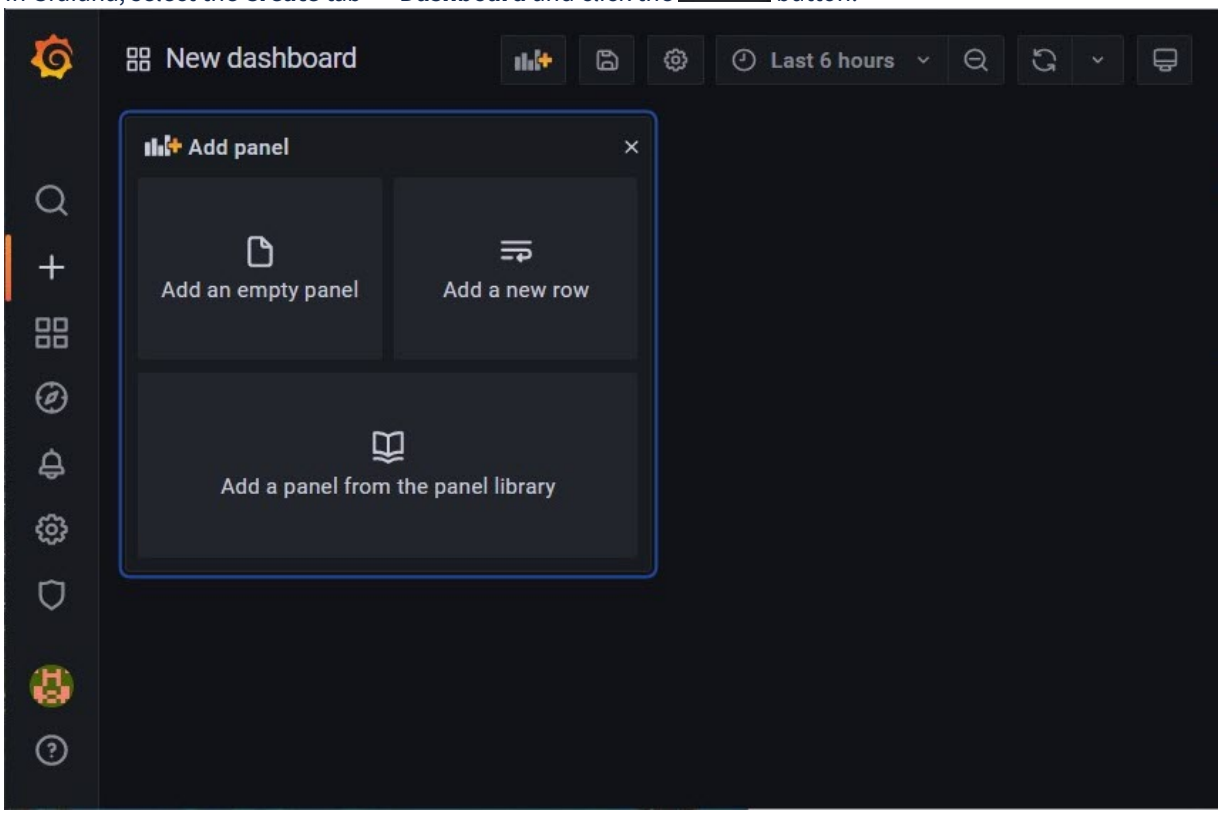
When Prometheus is successfully added to Grafana, the following window will be displayed:



4. Configure the display of dashboards in Grafana.

   To get informative charts with the right frequency and with the right time intervals on dashboards, use Querying Prometheus[388].

   a. In Grafana, select the **Create** tab → **Dashboard** and click the  button.



   b. Configure the dashboards to display the necessary information (see official documentation[389]).

After configuring dashboards in Grafana, you will be able to view the self-diagnostics metrics.

388 https://prometheus.io/docs/prometheus/latest/querying/basics/
389 https://grafana.com/docs/grafana/latest/dashboards/

20 Working with Axxon One

20.1 Main Elements of the User Interface

20.1.1 Surveillance window

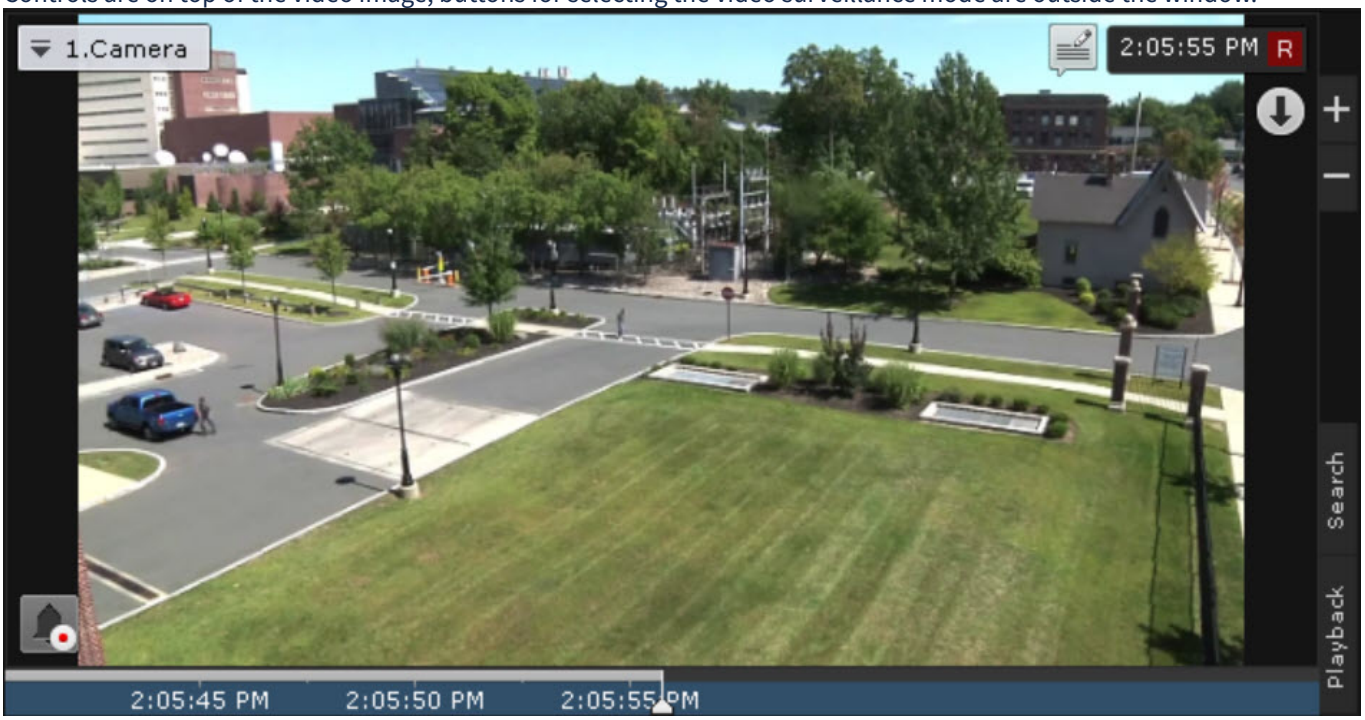
The Surveillance window is used to display a video stream on the monitor of a computer for video surveillance, archive viewing, and search in archive. The Surveillance window also allows you to generate and assess alarm events in the process of video monitoring of a protected facility.

The Surveillance window has several display options (see Configuring the display of the surveillance window(see page 1031)):

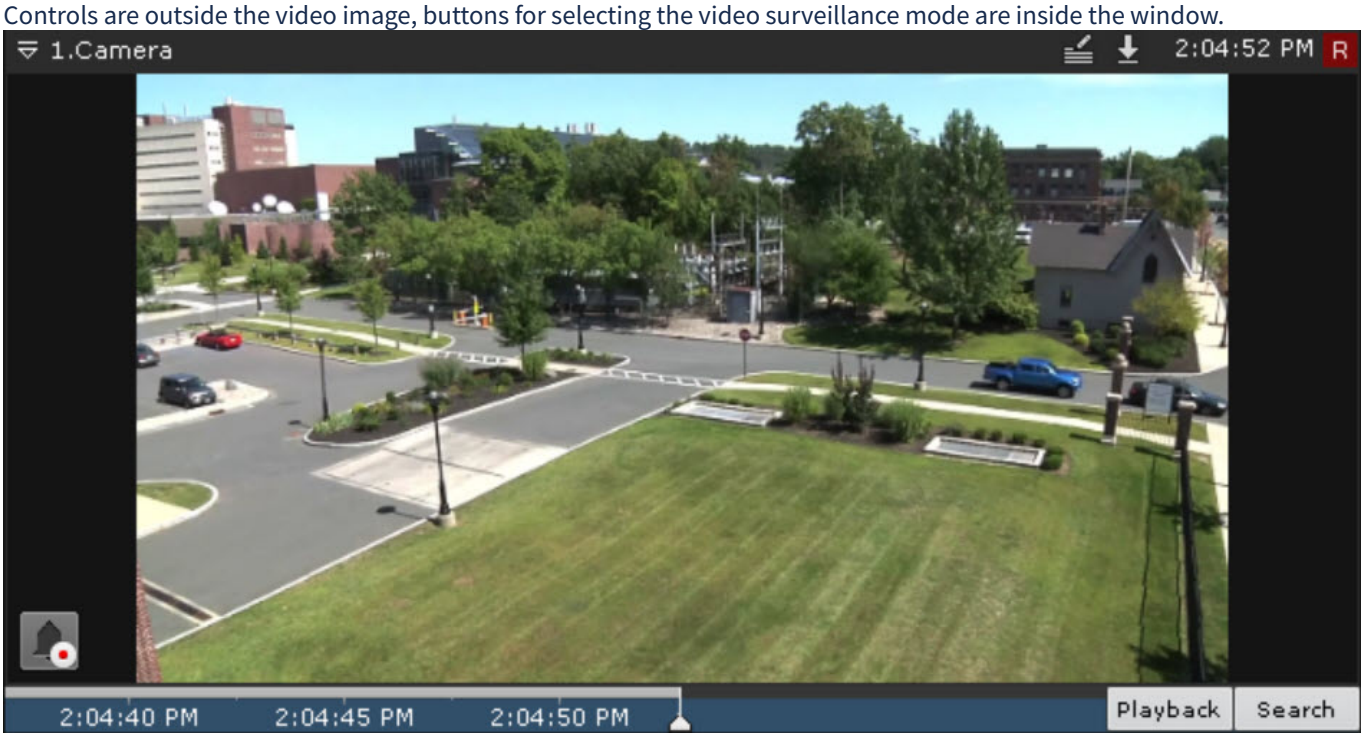
- Controls are on top of the video image, buttons for selecting the video surveillance mode are inside the window.



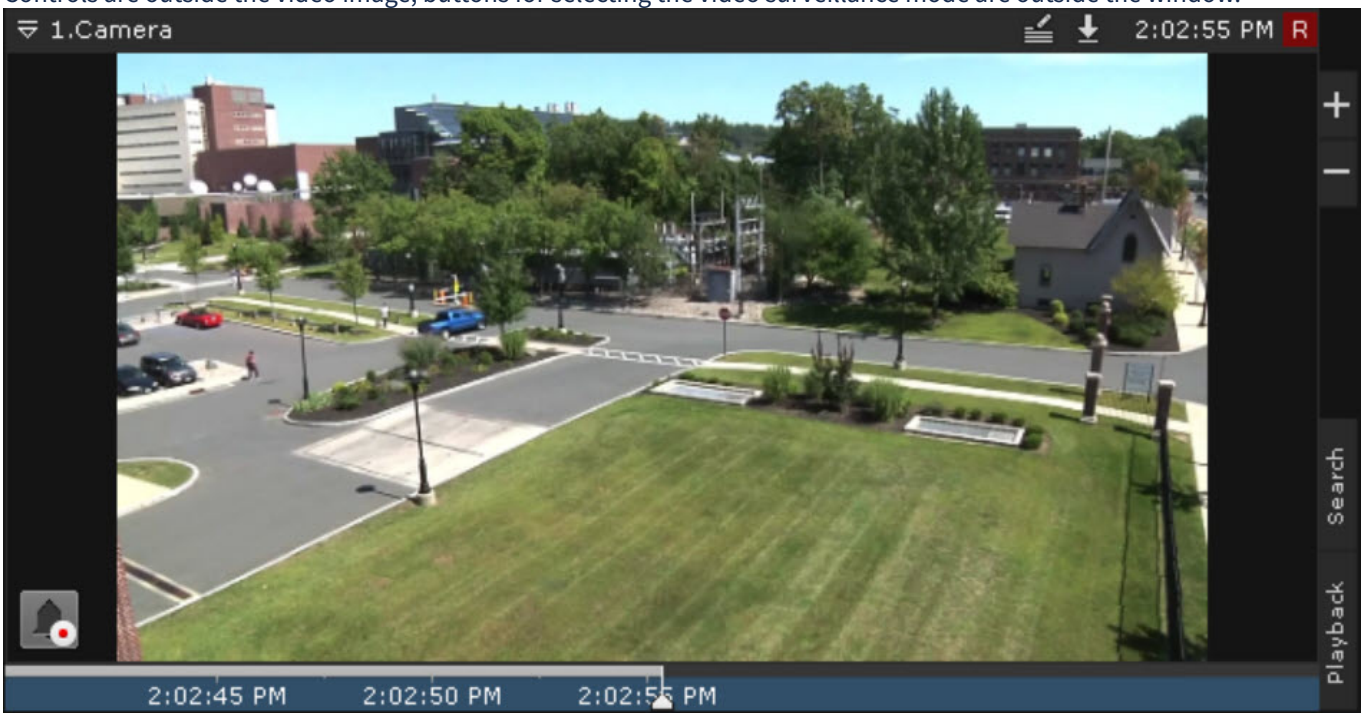
- Controls are on top of the video image, buttons for selecting the video surveillance mode are outside the window.



- Controls are outside the video image, buttons for selecting the video surveillance mode are inside the window.



- Controls are outside the video image, buttons for selecting the video surveillance mode are outside the window.



There are two states of the Surveillance window on the layout: active or inactive.

When the Surveillance window is in an active state, the advanced navigation panel (see Advanced archive navigation panel(see page 1115)) and the tabs for selecting the video surveillance mode are available (see Video Surveillance Mode Selection Tabs(see page 1114)).

To switch the Surveillance window to an active state, click anywhere inside the window. To deselect, click again any area of the window or free space on the layout.

Depending on the settings, all controls of the Surveillance window (see Configuring the display of the surveillance window(see page 1031)) can be hidden in an inactive state.



To copy the camera name to the clipboard, right-click it 

. For a detailed description of the functions of the Surveillance window, see Video surveillance(see page 1138).

When the connection with the camera is lost, the Surveillance window is darkened and displays the **Disconnected** caption.

20.1.1.1 Color coding of frames

Color coding of the frame of a Surveillance window is used to indicate the status of the camera.

Color of the frame of the Surveillance window	**Camera status**
Red	Active alarm
No active camera alarms	
Green	Camera disarmed
Dark gray	Camera armed
Blue	Archive mode

20.1.1.2 Context Menu of the Surveillance window

Context Menu of the Surveillance window is used to access the following functions (depending on the enabled surveillance mode):

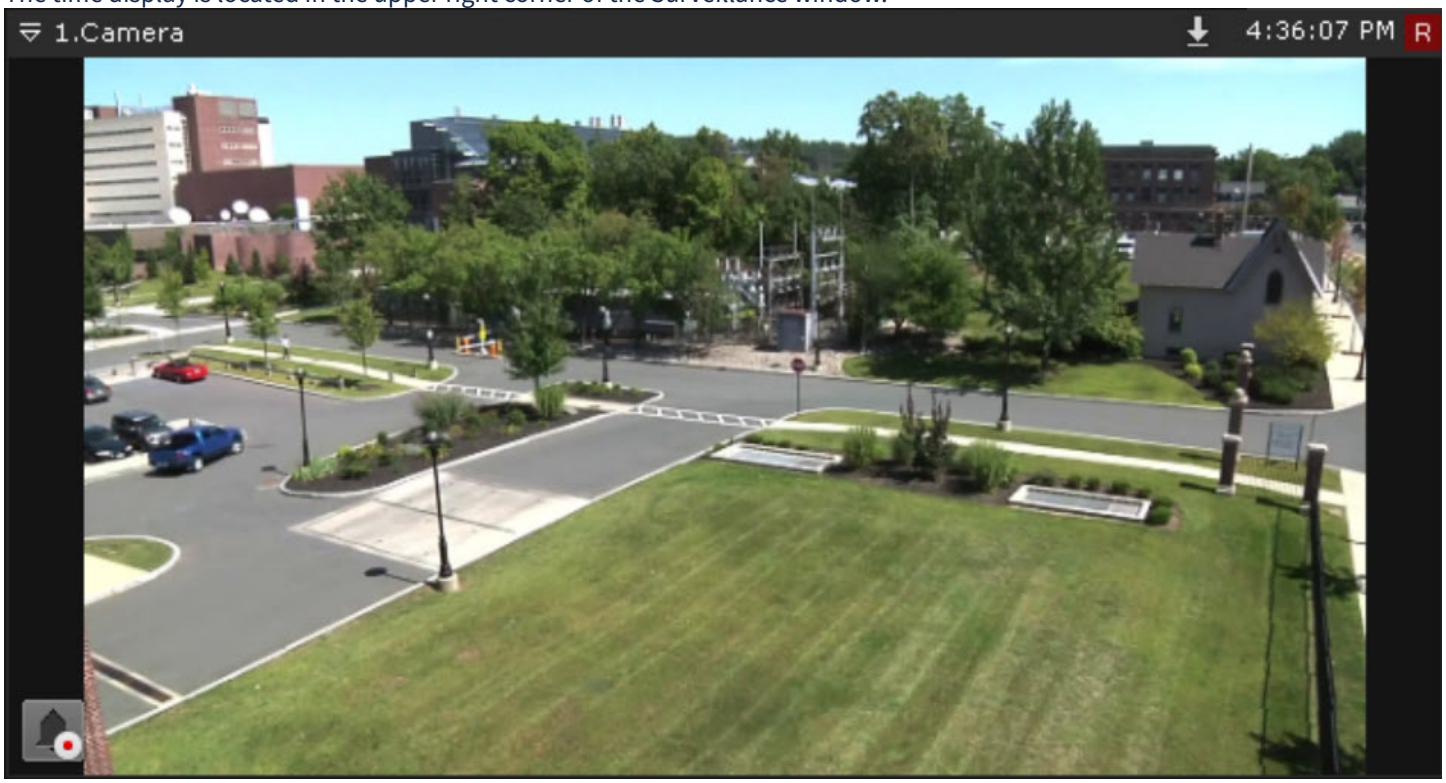
1. Video surveillance.
2. Audio monitoring.
3. Exporting frames and recordings.
4. Object tracking.

To open the Context Menu of the Surveillance window, left-click the video camera icon in the upper left corner of the window.

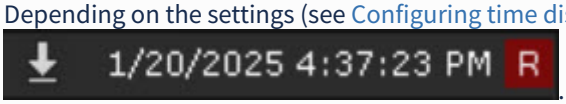


20.1.1.3 Time display

The time display is located in the upper right corner of the Surveillance window.



Note

Depending on the settings (see Configuring time display(see page 1032)), the time display can show the date 

.

Current time of the client is shown on the time display in the real time mode: 

.

In the Archive, Alarm management, and Archive Search modes, it shows the time of the video that you are viewing and the playback mode:

1. Forward playback: 

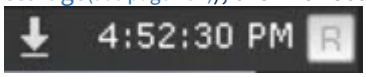
.
2. Reverse playback: 

.
3. Pause: 

.

If the video is currently being recorded from the camera, the letter **R** is displayed in red color to the right of the time display: 

.

If there's no recording to the archive for the camera, but the camera has an embedded storage and it is enabled (see Embedded storage(see page 234)), the "no record" status is displayed in the product interface, that is, the letter **R** is displayed in gray color: 

If the camera isn't linked to the archive, the letter **R** is crossed out: 

.

20.1.1.4 Display of video statistics

You can display video statistics in the Surveillance window (see Configuring display of video statistics(see page 1029)). In the Live mode, the video display statistics are shown. In the Alarm management, Archive, and Archive Search modes, it shows the time of the fragment being viewed and the playback mode:



Video statistic	Parameter description
Client-side FPS	Frame rate of the displayed video stream
Server-side FPS	Frame rate of the video stream received from a video camera or an archive
Bitrate	Bitrate of a compressed video stream
Frame size	Resolution of the displayed video stream

Note

The video stream parameters are updated every 10 seconds.

20.1.1.5 Video Surveillance Mode Selection Tabs

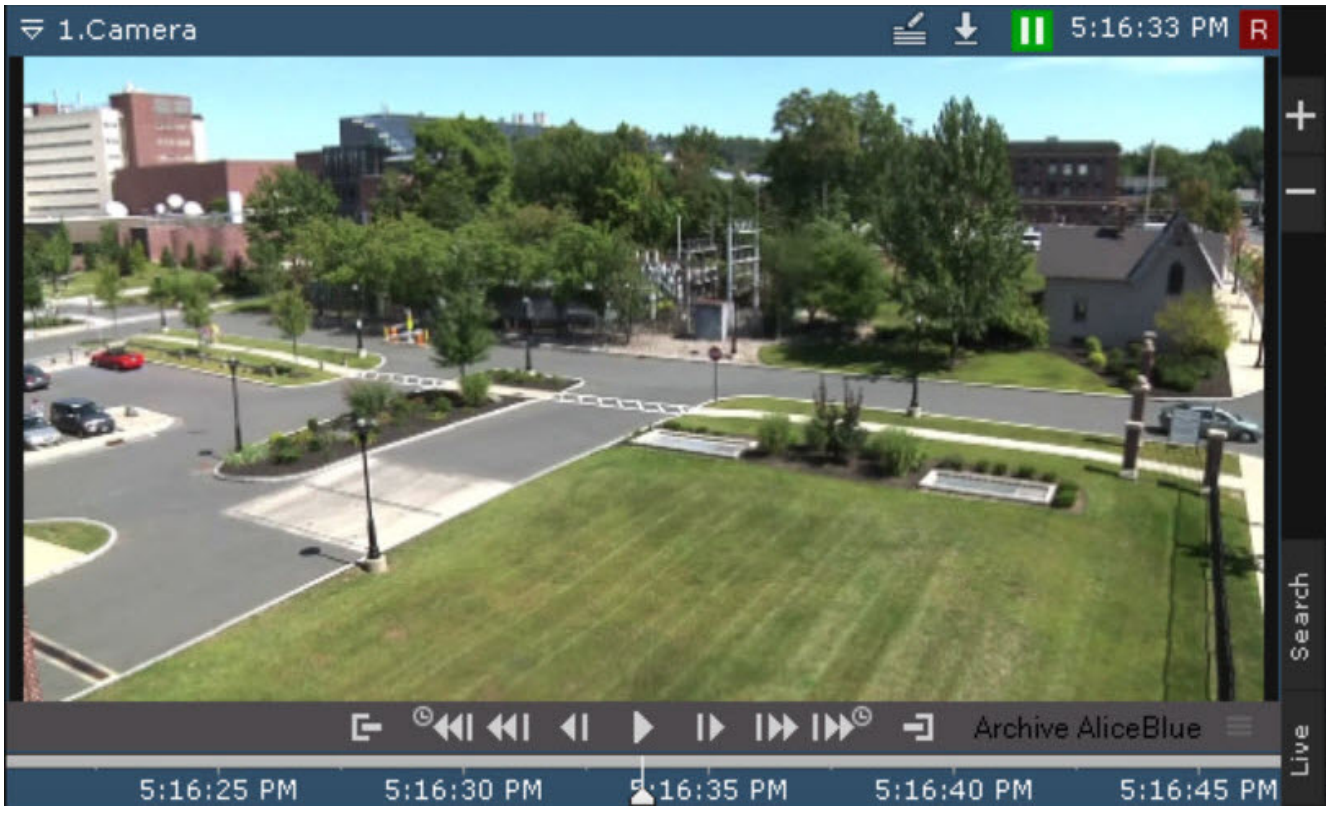
To select the video surveillance mode, use the tabs in the lower right part of the Surveillance window:



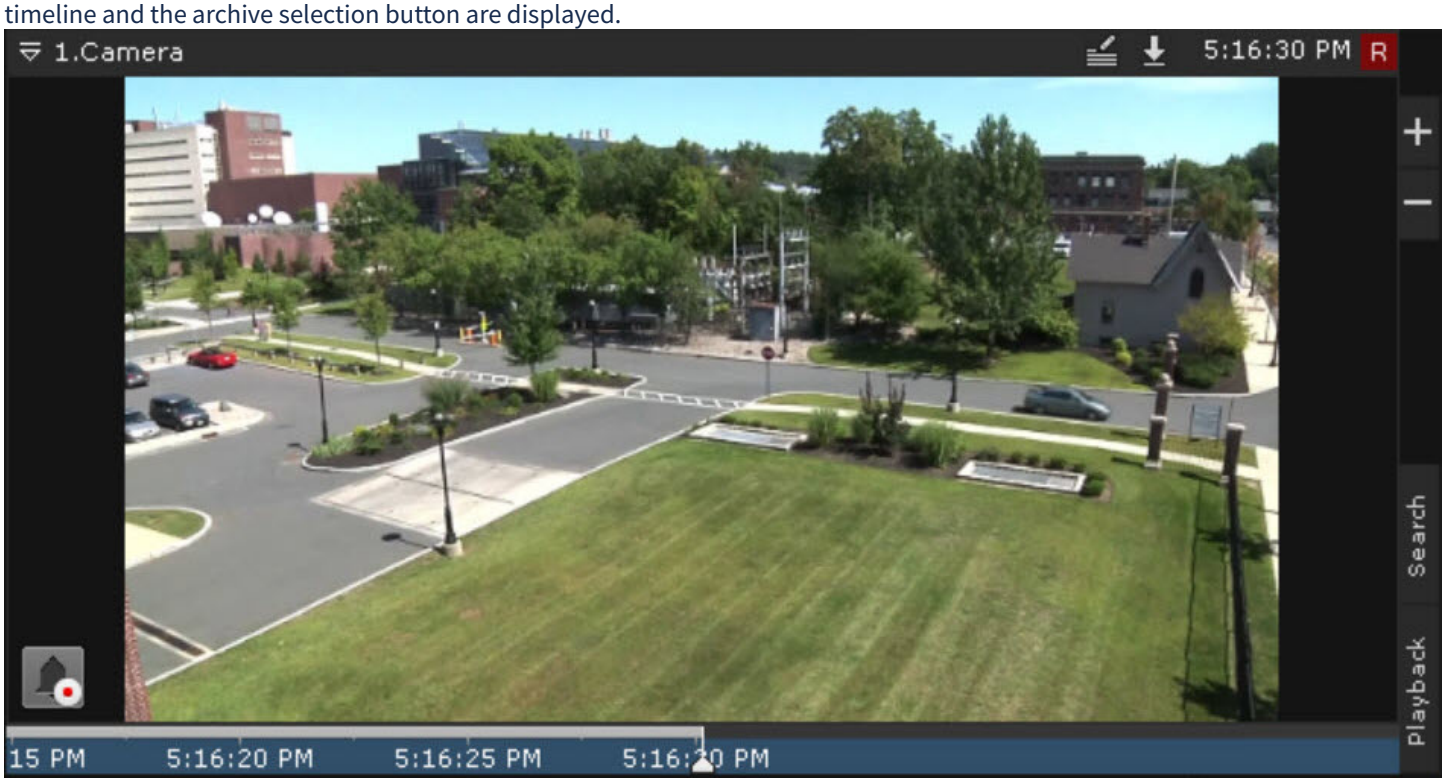
The Alarm Management mode is activated when an alarm is initiated (see Initiating an alarm event(see page 1181)).

20.1.1.6 Advanced archive navigation panel

The advanced archive navigation panel is displayed in the lower part of the surveillance window in the archive or archive search modes.



When you select a surveillance window in the live mode, the advanced archive navigation panel isn't displayed fully—only the timeline and the archive selection button are displayed.



Note

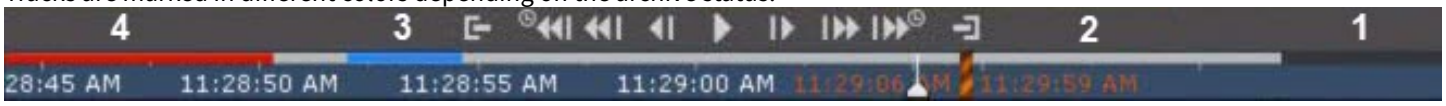
If the camera isn't bound to the archive, the advanced archive navigation panel isn't displayed.

In the live mode, when you click the timeline, you go to the archive mode.

The advanced archive navigation panel includes the following components:

1. Timeline with indicators of the presence of records—tracks.
2. Playback control buttons.
3. Archive selection button.
4. Tabs for compressed and standard archive playback modes.

Tracks are marked in different colors depending on the archive status:



Condition	Track color
Archive absent (**1**)	Black
Archive present (**2**)	White
Archive present, input or detector activated (no alarm) (**3**)	Blue
Archive present, alarm active (**4**)	Red

Additionally, the timeline on the advanced archive navigation panel contains markers of archive breaks in the form of alternating red-orange diagonal stripes. A mark is displayed if the archive is missing for over 40% of the currently visible part of the timeline.

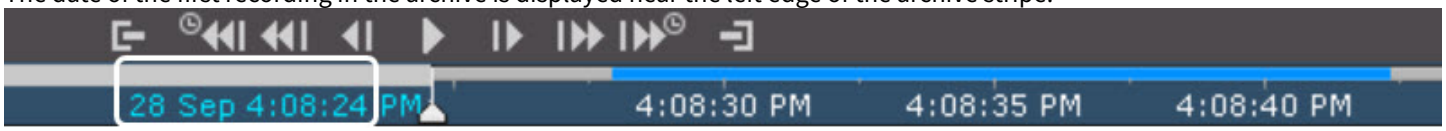
Depending on the duration of the archive break, marks can have different thicknesses:

1. —break is less than one hour.
2. —break is from 1 to 24 hours.
3. —break is more than 24 hours.

The duration of the missing archive is indicated near the mark.



The date of the first recording in the archive is displayed near the left edge of the archive stripe.



The playback control buttons on the advanced navigation panel are the same as the buttons on the playback panel (see The Playback Panel(see page 1127)). The advanced archive navigation panel also has the buttons to jump forward and back by **N** seconds: and .

N is a step value, 30 seconds by default. If you press Ctrl + once, you increase the jump step by 30 seconds. If you press Ctrl + once, you cut the jump step by 30 seconds. The maximum step value is 300 seconds.

You can also use the mouse to change the step value:

1. Hover the mouse cursor over the or button.
2. To increase the step value, scroll the wheel up. To decrease the step value, scroll the wheel down.

> **Note**
>
> The archive period to the left of the marker means that the camera was not bound to the archive (see Configuring recording to an archive(see page 295)).

The advanced archive navigation panel is used to position the archive at a specific time, control playback, and switch to compressed archive playback mode.

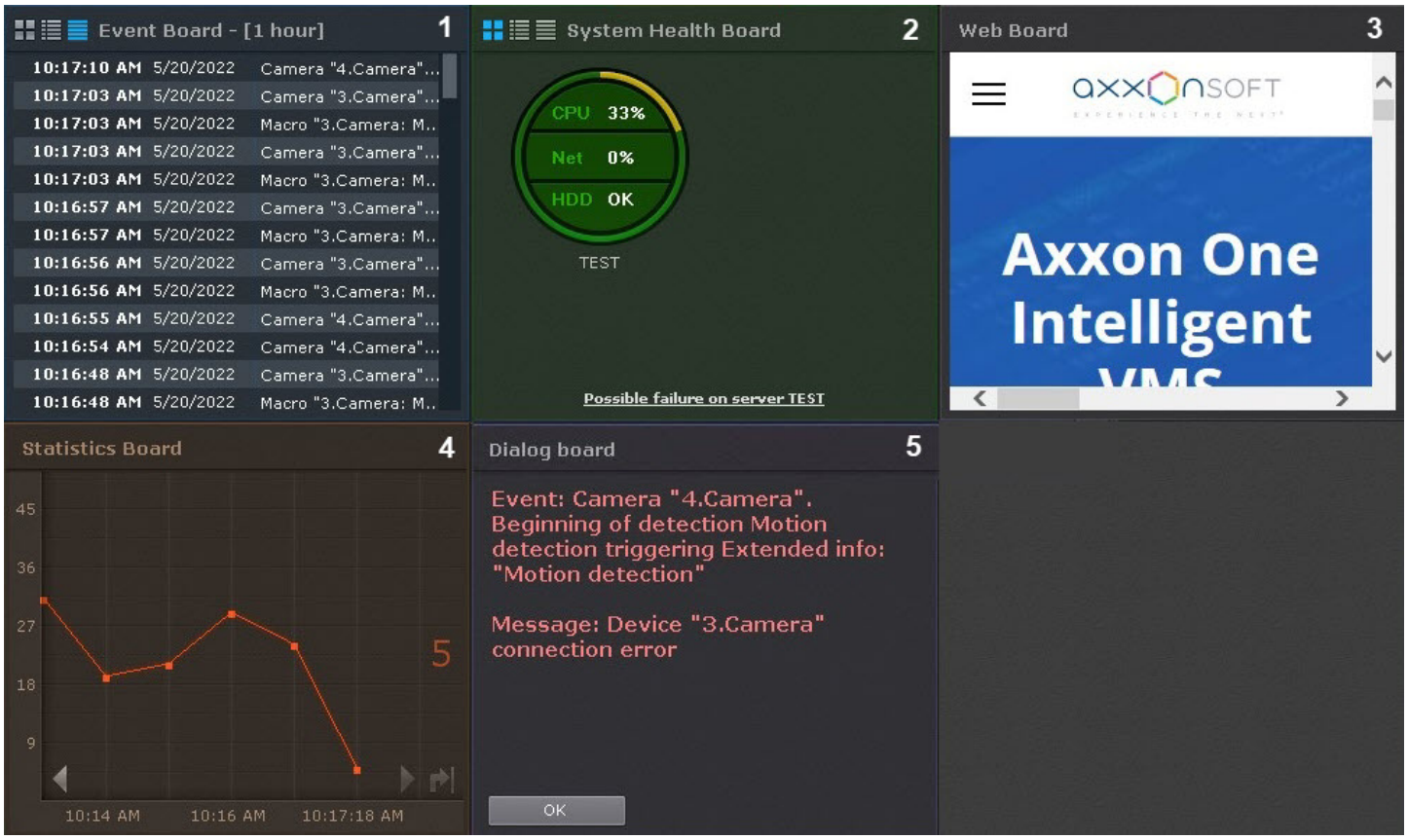
The advanced archive navigation panel works completely in sync with the playback panel (see The Playback Panel(see page 1127)) and the timeline (see The Timeline(see page 1122)):

1. The playback mode selected on the advanced navigation panel is displayed on the playback panel.
2. The playback speed that is set on the playback panel is used as the playback speed when playback is started on the advanced navigation panel, and vice versa.
3. Any movement through the main timeline is duplicated onto the timeline of the advanced navigation panel.

20.1.2 Information boards

Information boards offer a quick view of system status and events. There are five kinds of information boards, each displaying a specific type of information:

1. Event Board(see page 1266) (**1**).
2. System Health Board(see page 1268) (**2**).
3. Web Board(see page 1275) (**3**).
4. Statistics Board(see page 1273) (**4**).
5. Dialog board(see page 1276) (**5**).

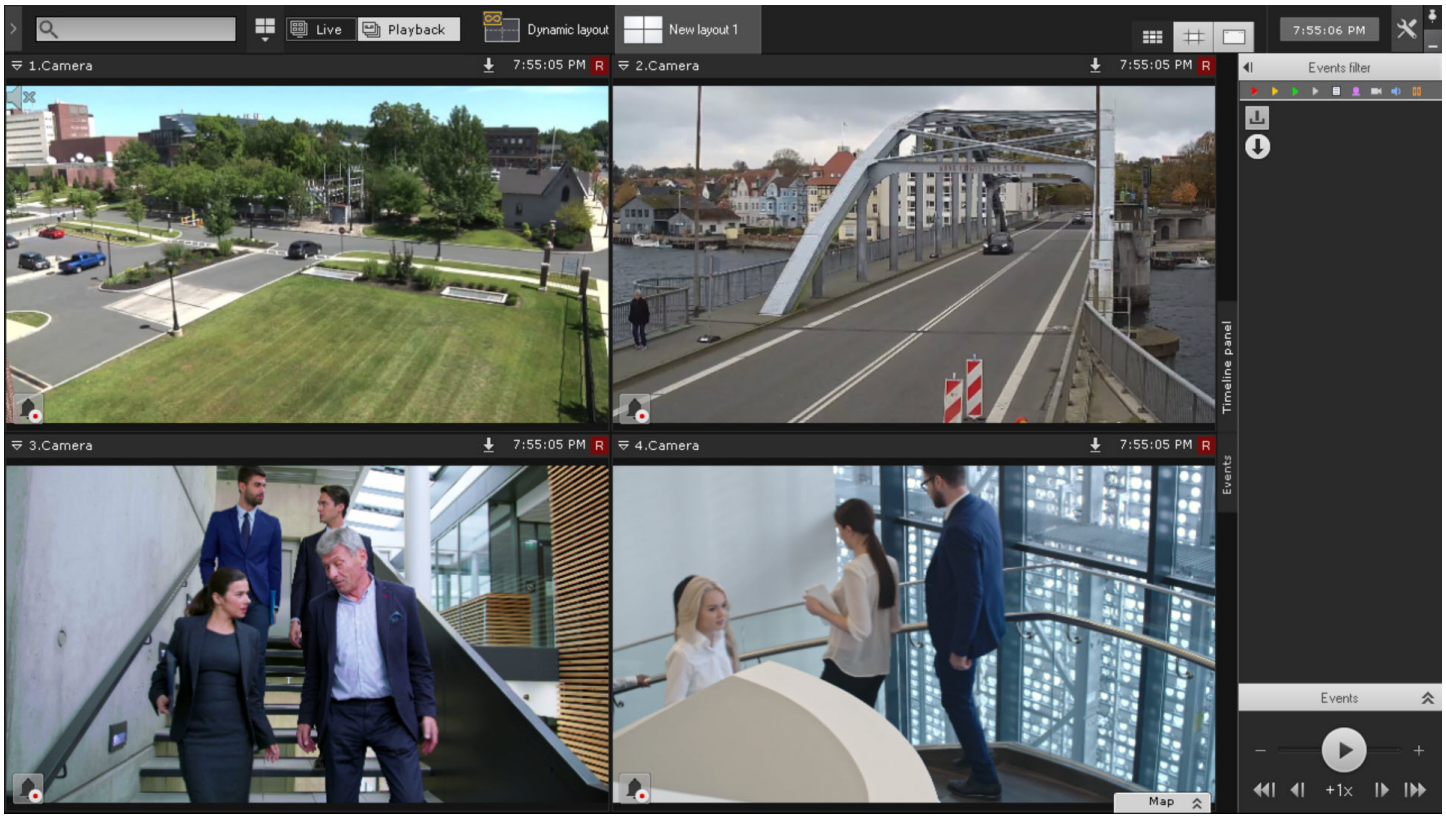


To learn about information boards, consult the relevant section(see page 1265).

20.1.3 The Archive Navigation Panel

20.1.3.1 Displaying and hiding the archive navigation panel

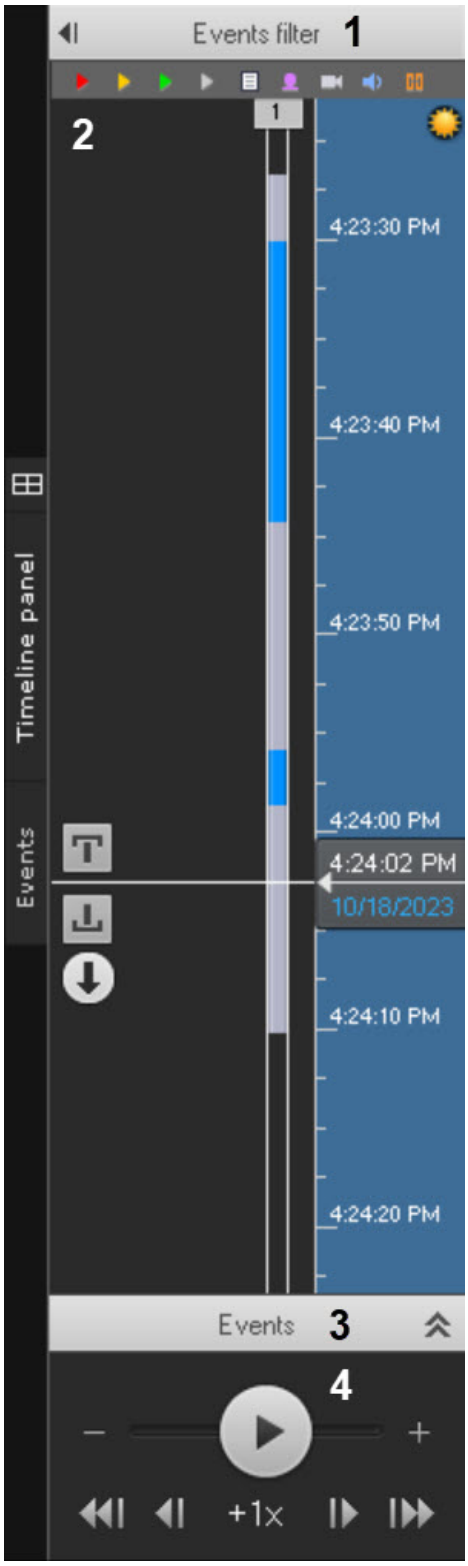
The archive navigation panel is located in the right part of the screen on the layout panel. To display or hide the panel, click the **Timeline panel** button.



The navigation panel displays timelines of the cameras selected on a layout (see The Timeline(see page 1122)). To display a timeline on the navigation panel, you must switch to the Archive mode of the selected camera (see Switching to the Archive mode(see page 1187)). Starting with *Axxon One* 2.0.8, if no camera on a layout is in the Archive mode, timelines aren't displayed on the navigation panel.

20.1.3.2 Structure and function of the archive navigation panel

The archive navigation panel is automatically displayed in the right part of the screen when you switch the surveillance window to Archive or Search for Clip by Frame mode.



The archive navigation panel includes the following components:

1. The alarm events filter(see page 1121) (**1**).
2. Timeline(see page 1122) (**2**).
3. Events List(see page 1125) (**3**).
4. Playback panel(see page 1127) (**4**).

The archive navigation panel is used for the following functions:

1. Navigating through the archive.

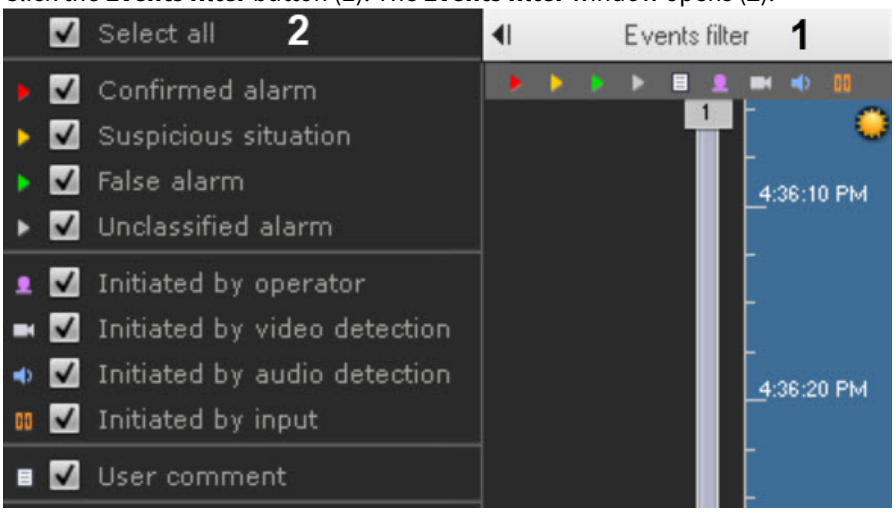
2. Playing back recordings.
3. Selecting playback mode: forward or backward.
4. Setting playback speed.
5. Selecting events for display on the timeline and in the events list.
6. Viewing the list of events of the selected type.

20.1.3.3 Events filter

The **Events filter** component allows selecting the type of events that are displayed on the Archive Navigation Panel.

To select an event type:

1. Click the **Events filter** button (**1**). The **Events filter** window opens (**2**).



2. Select the checkboxes for the types of alarms that must be displayed on the Archive Navigation Panel, according to their status:
   a. Confirmed alarm.
   b. Suspicious situation.
   c. False alarm.
   d. Unclassified alarm.

   Note

   If you clear the checkbox for a certain type of alarm, this type of alarm and the corresponding track are no longer displayed on the timeline.

3. Select the checkboxes for the types of alarms that must be displayed on the Archive Navigation Panel, according to the cause of their initiation:
   a. Initiated by operator.
   b. Initiated by a video detector (basic or embedded, including their sub-detectors).
   c. Initiated by an audio detector (basic, situation analysis, or embedded).
   d. Initiated by an input.

   Note

   By default, all checkboxes are already selected.

   Attention

   To display alarms on the timeline, select at least one type of alarm event and one initiator.

4. Select the checkbox to display operator comments.
5. Click the **Apply** button.

Note

To close **Events filter**, click the same button again.

Selection of events is now complete.

Events of the selected type are now displayed on the timeline (see The Timeline(see page 1122)) and in the events list (see Events List(see page 1125)).

20.1.3.4 The Timeline

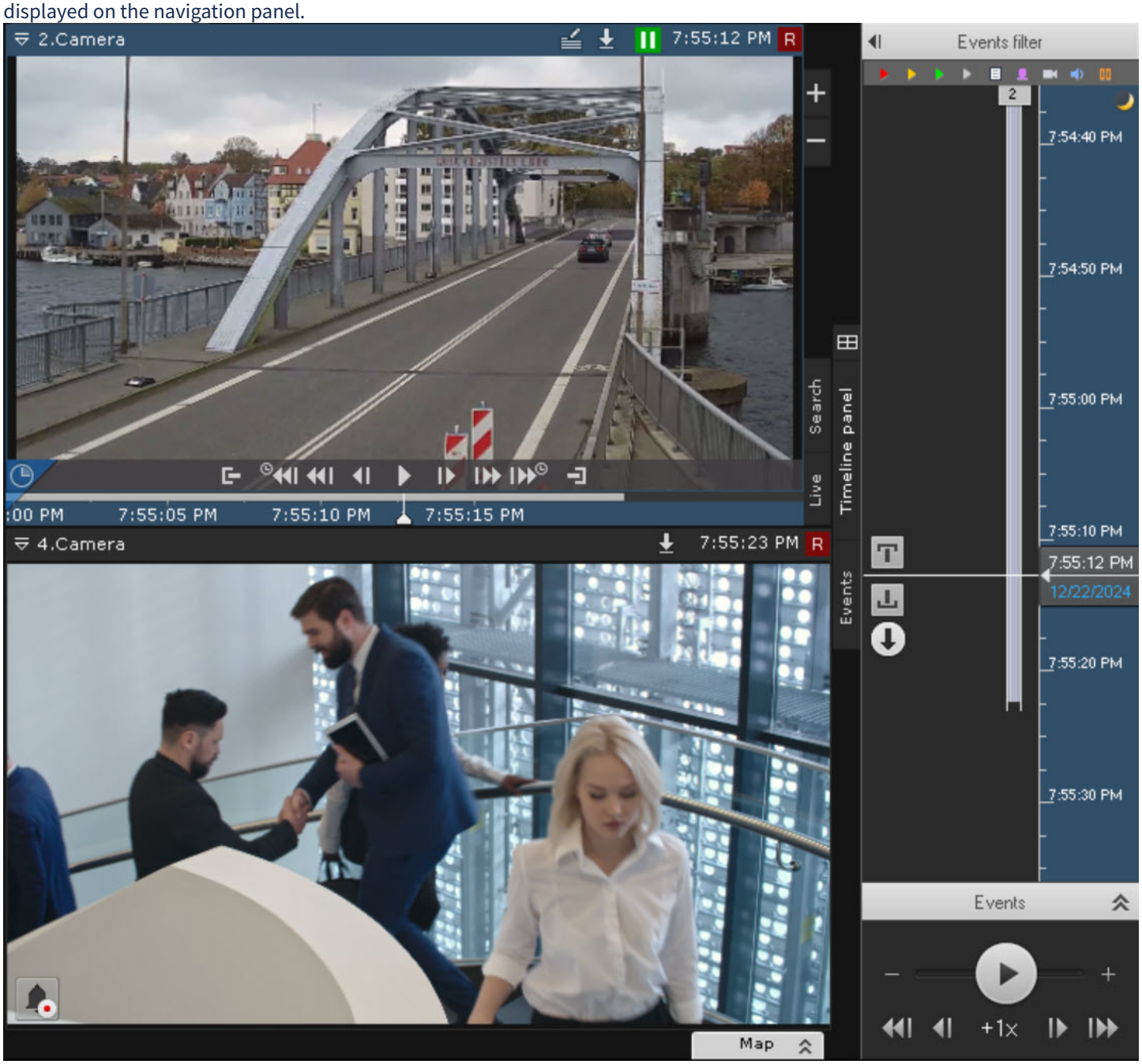
On the page:

- General information(see page 1122)
- Timeline indicators(see page 1124)
- Display of alarms on a timeline(see page 1124)

20.1.3.4.1 General information

The timeline is a graphical representation of the time axis of the archive and is located in the middle part of the navigation panel. To display a timeline on the navigation panel, you must switch to the Archive mode of the selected camera (see Switching to the Archive mode(see page 1187)). Starting with *Axxon One* 2.0.8, if no camera on a layout is in the Archive mode, timelines aren't

displayed on the navigation panel.



You can scroll and zoom the timeline using the mouse. To scroll the timeline, move the cursor on its background vertically while holding down the left mouse button. To change the scale of the timeline, right-click the timeline's background and, while holding down the right mouse button, move the cursor down to zoom out or up to zoom in.

The timeline lets you select at which moment to start playback of a recording in the Surveillance window. To choose at which moment to begin playback, you can either left-click the indicator and hold it down while dragging it to the required position, or just left-click the left part of the timeline.

If there is no recording in the selected position, the indicator automatically moves to the position corresponding to the nearest recording.

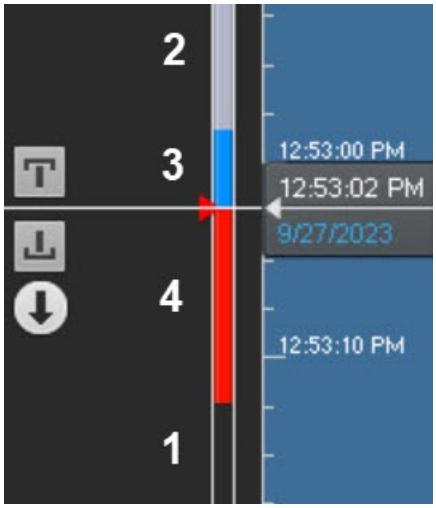
Note

- You can set a timeline indicator in the required position by specifying the exact date and time (see Navigating using the Timeline(see page 1196)).

- You can also position the timeline indicator with the help of the events list (see Events List(see page 1125)).

20.1.3.4.2 Timeline indicators

The timeline contains indicators of the presence of recordings—tracks.



Tracks are marked in different colors depending on the archive status:

Condition	Track color
Archive absent (**1**)	Black
Archive present (**2**)	White
Archive present, input or detector activated (no alarm) (**3**)	Blue
Archive present, alarm active (**4**)	Red

Note

Pre-alarm recordings are white on the timeline, post-alarm recordings are blue.
A track can be replaced by another track when they match in time. The following priority system is used:

1. If there is a video in the archive, then red track has the highest priority and a white track has the least priority.
2. Blue track has a higher priority than a white track.

20.1.3.4.3 Display of alarms on a timeline

At the moment when an alarm is assigned a status (confirmed, suspicious, false, or skipped), a flag is added to the track. A flag is added to the point on the timeline when the alarm began.

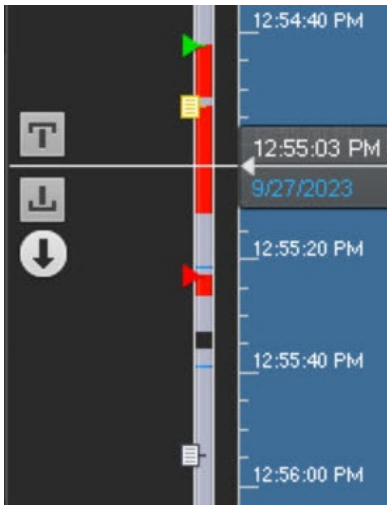


The flag is colored according to the alarm status:

1. Green—false alarm.
2. Yellow—suspicious situation.
3. Red—confirmed alarm.
4. Gray—skipped alarm.

> **Note**
>
> Display of certain alarm events on the timeline is determined by the filter settings (see Events filter(see page 1121)).

Operator comments are displayed with the corresponding icons on the track. An icon is placed on the timeline at the point corresponding to the commented frame (or to the first frame of the interval, if the comment is added for an interval).

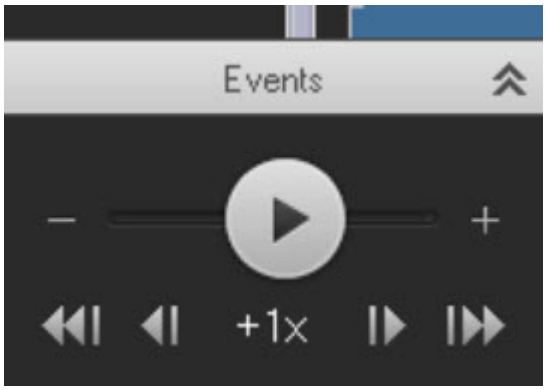


If comments were left during alarm processing, the icons are displayed in the appropriate colors.

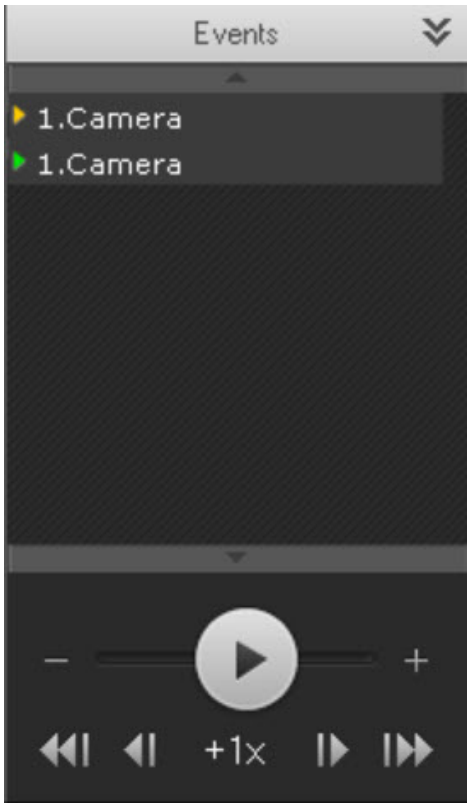
20.1.3.5 Events List

The Events List displays alarms and operator comments.

To display the events list, click the **Events** button.



The events list is now displayed.



Note

Whether or not a particular event is displayed in the list depends on the filter settings (see the section Events filter(see page 1121)).

Note

The list displays only the alarm events that are currently in the visible portion of the timeline.

To hide the events list, click the **Events** button again.
When you place the cursor over an event in the list, detailed event information appears.

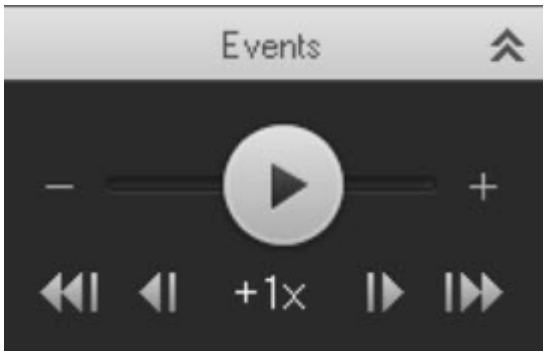


Note

Navigation through the archive by using the events list is described in the section Navigating using the Events list(see page 1199).

20.1.3.6 The Playback Panel

The playback panel is located in the lower part of the navigation panel.



The playback panel contains the following buttons:

1. Go to preceding frame .
2. Go to next frame .
3. Switches to the preceding recording .
4. Switches to the next recording .
5. Play / Pause .

The button also acts as a slider which sets the speed and mode (forward/backward) of playback.

Note

Use of the playback panel is described in detail in the section Navigating Using the Playback Panel(see page 1201).

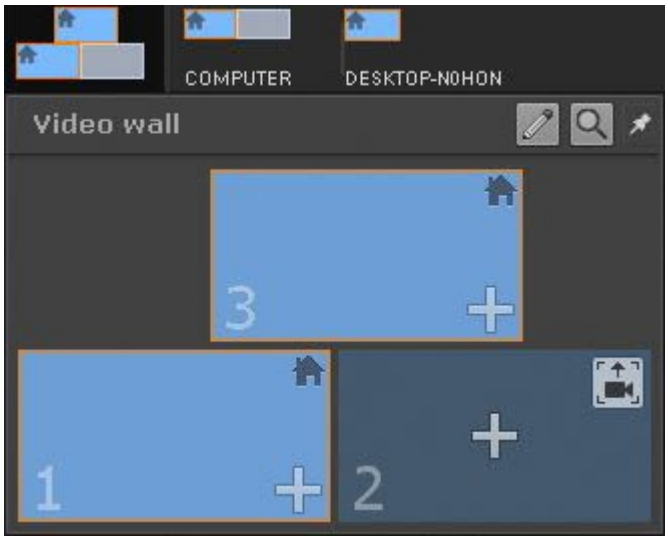
20.1.4 Video wall panel

Configuring Video wall(see page 981)

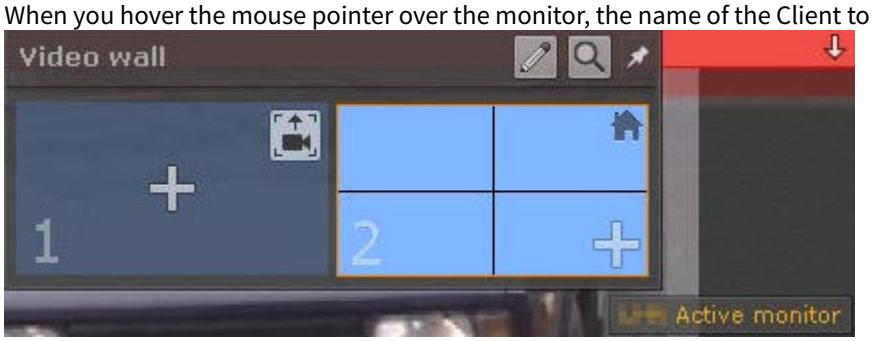
The Video wall panel is automatically displayed at the top of the screen. You can use the panel to configure the video wall from all monitors currently connected the domain Servers which video wall management is available to the current user.

Note

The panel is hidden from users with no permissions for management of video walls of domain Servers (see Roles(see page 920)).



When you hover the mouse pointer over the monitor, the name of the Client to which it belongs and its status will be displayed.



To keep the panel always visible, click the button. To hide the panel, click the button.

20.1.5 Monitor panel

Monitor management(see page 1285)

The Monitor panel is automatically displayed at the top of the screen.

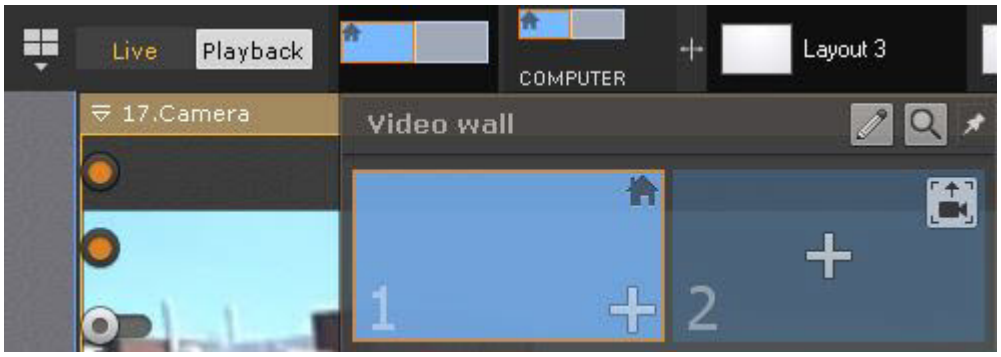
Note

If the user doesn't have permissions to manage the video walls of all domain Servers, only the local monitor management scheme will be displayed (see Roles(see page 920)).



The panel displays the schematic images of the Client monitors currently connected to the domain Servers which video wall management is available to the current user.

To open an expanded monitor images, click their schematic images.



If you want to always display expanded monitor images, click the button.

Note

To disable expanded view, click the bitton.

You can change width of the Monitor panel. To do it, click and drag the panel border .

When you resize the Monitor panel, the size of the Layout panel is automatically changed (see The Layouts panel(see page 1129)).

20.1.6 The Layouts panel

The Layouts panel is automatically displayed at the top of the screen.



The panel shows layouts available in the system.

Note

If the client is connected to multiple Axxon domains, only layouts from the main Axxon domain are available.

Layouts management(see page 1281)

20.1.7 Interactive map

The 3D interactive map is used to visualize the secured facility, control cameras and identify cameras' location.

Interactive maps in *Axxon One* can obtain image data from graphics of the site or geospatial data from OpenStreetMap.

Note

To work with OpenStreetMap maps in *Axxon One*, you need to purchase an OpenStreetMap[390] license.

The map can contain icons for cameras, inputs, and outputs. The area in which live video is displayed and field of view are indicated for each camera.

390 http://www.openstreetmap.org/copyright

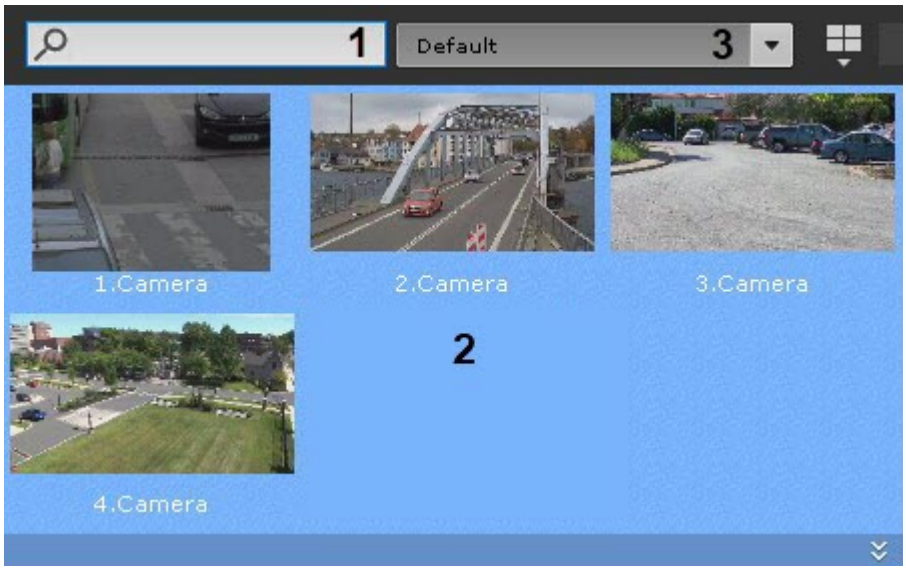


Please refer to the section titled Working with the interactive map(see page 1291) for further details on how to work with the 3D map.

20.1.8 Camera Search Panel

The **Camera Search Panel** is used to search for and display video cameras connected to *Axxon One* VMS.

When the object panel is closed (see Object panel(see page 1133)), after you click on the search bar (**1**), the area (**2**) opens that lists all cameras within your Axxon-domain.



When the object panel is open, the search will be performed inside it. To open the Objects Panel, click the button.

Note

- You can search for cameras in the object tree on additional monitors.
- If the Client is connected to several Axxon-domains, the cameras of the main domain are displayed by default. To search for cameras from another domain, select the domain from the drop-down list (**3**).

To search for a specific camera, enter its full name or part of it into the search bar.



If you click a camera, a layout opens with the minimum number of cells for displaying the selected camera views.

Note

If the current layout contains the selected camera, the corresponding video surveillance window becomes active.

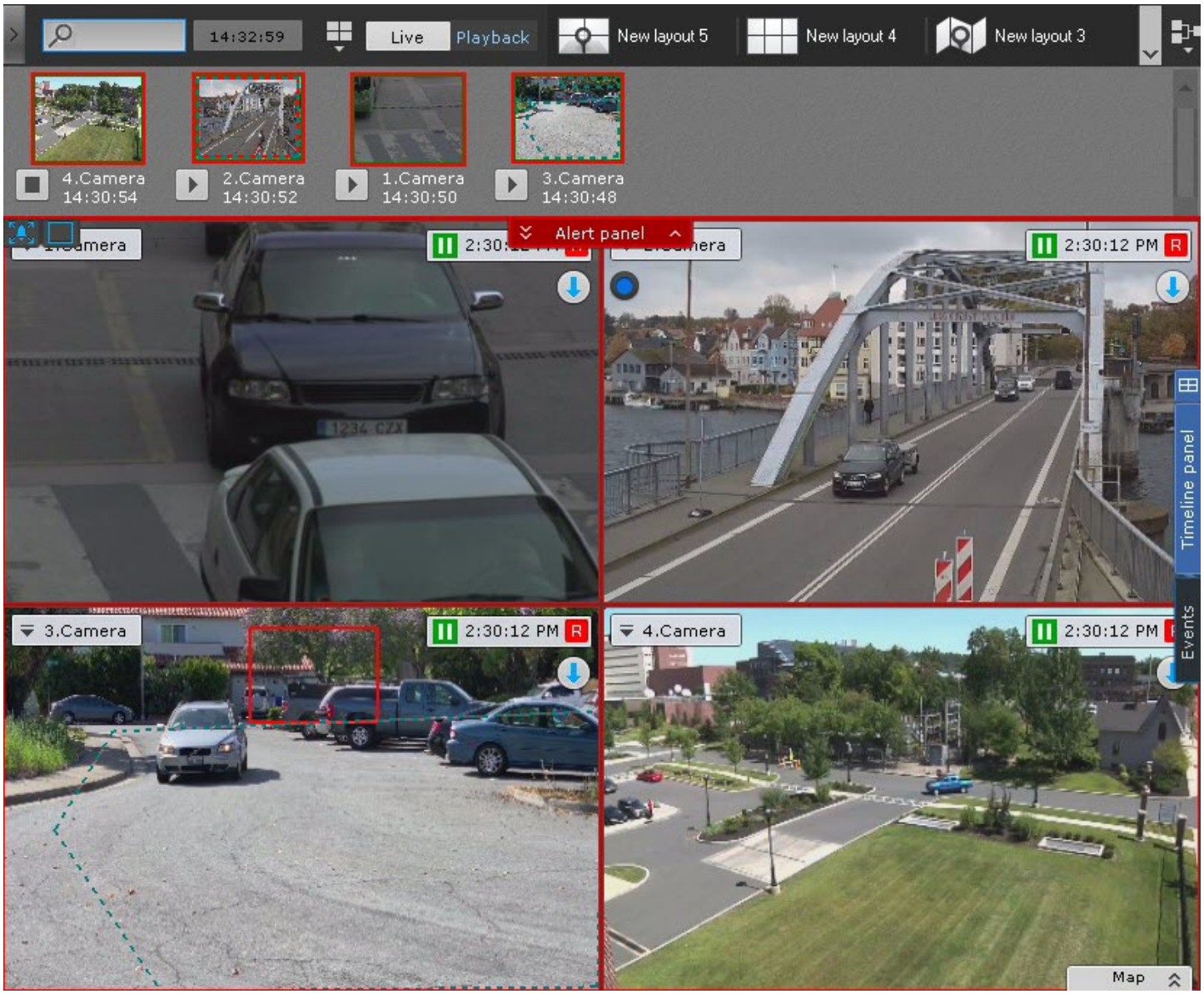
If there is no layout with the selected video camera, a new layout with a single cell is created.

20.1.9 Alert panel

Alert panel is used to display alert events and work with them.

Alert panel displays video segments of all alert events in the system.

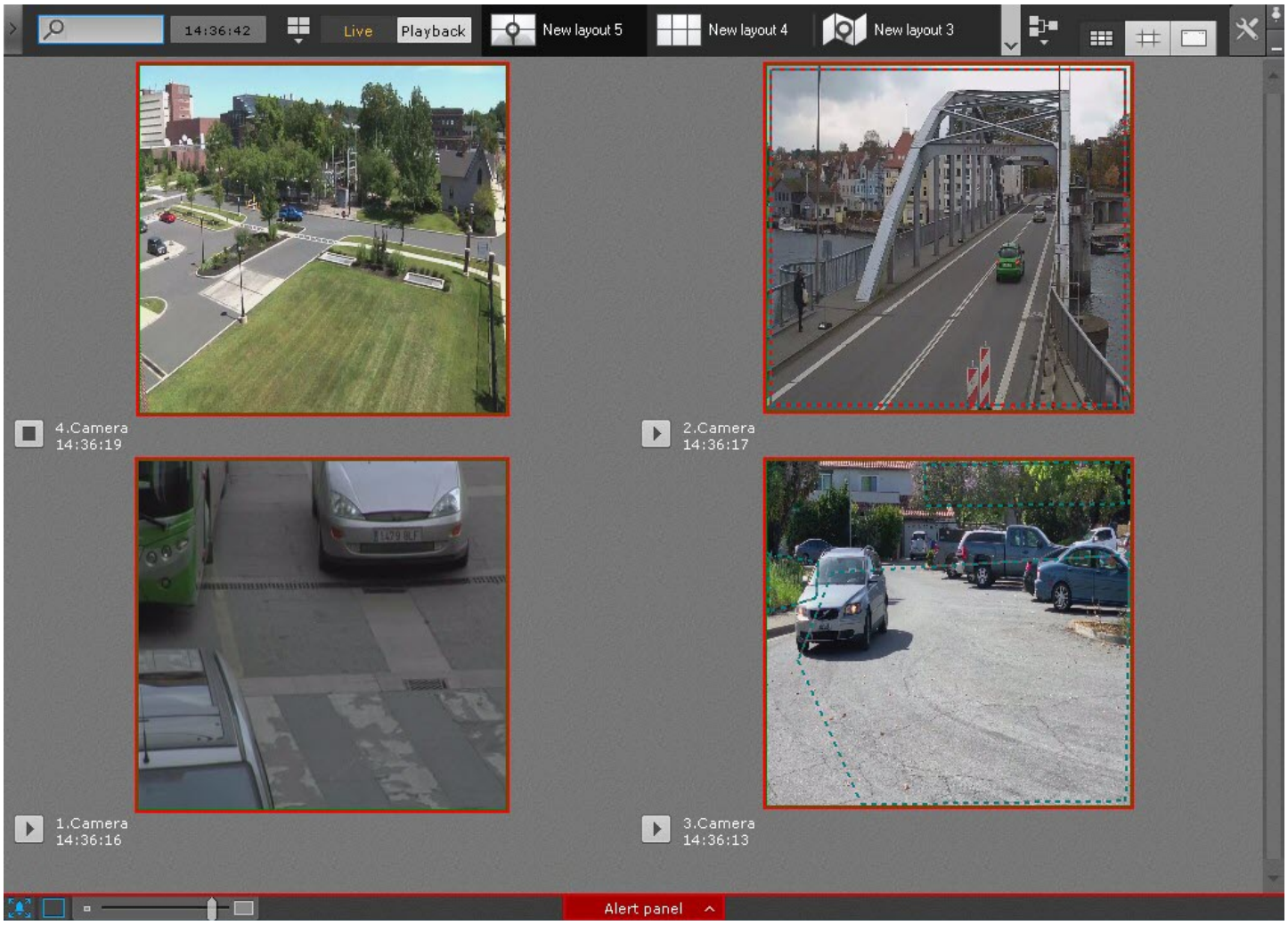
Alert panel is located at the top of the screen and is hidden by default. To open the Alert panel, click the Alert panel button.



The size of the Alert panel is adjustable from 10% to 50% of the screen vertically.

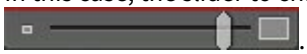
To resize the panel, left-click the **Alert panel** button and, holding it, move the cursor up or down.

You can expand the Alert panel to the full screen. This will hide the layout. To do this, click the button.



You can resize the video segments displayed on the Alert panel.

You can do this, if the size of the panel exceeds the minimum size (10% of the screen height).

In this case, the slider to change the size of the video segments is displayed in the bottom left corner of the panel—  .

To hide the Alert panel, click the button.

Note

The Alert panel button isn't displayed in the Videowall mode.

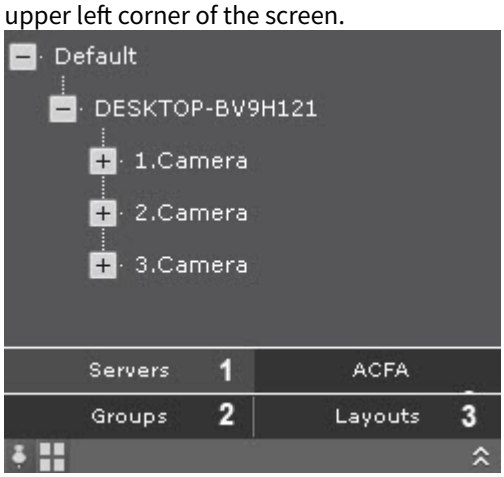
20.1.10 Object panel

If you have permissions, the Objects Panel displays cameras from all Servers in the Axxon-domain, as well as their sensors and relays.

Note

If the Client is connected to several Axxon-domains, you can see cameras from all Axxon-domains according to your permissions.

The Objects Panel is located on the left side of the monitor and is hidden by default. To open this panel, click the button in the upper left corner of the screen.



Note

To open the Objects Panel on an additional monitor (see Monitor management(see page 1285)), click the **Object tree** button on the left side of the screen.

The objects tree on the Objects Panel can be represented as:

- Servers (**1**): all available Servers of the Axxon-domain with created devices are displayed;
- Groups (**2**): all created camera groups are displayed (see Configuring video camera groups(see page 265));
- Layouts (**3**): all available layouts with video cameras added to them are displayed (see Creating and deleting layouts(see page 942)).

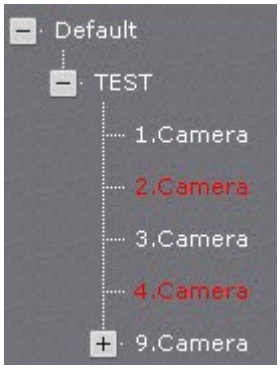
When you click on a layout name in the object tree, the corresponding layout is selected from the list. When you click on the camera name, if it is absent on the current layout, the layout with the selected camera will open.

There are two display modes for the camera selected on the panel:

1. The camera cell is displayed in the existing layout (default mode, to open it click).
2. A temporary layout with a camera cell is created (to open it click).

The display mode toggle buttons are located in the lower left corner of the screen. The selected display mode is saved until the client is restarted.

If the camera connection is lost, it will be highlighted in red on the Objects Panel.



If you select a camera on the panel, it will be the same as if you selected a camera on the video camera search panel (see Camera Search Panel(see page 1130)).

Note

To search for objects inside the panel, use the search bar, same as the search panel for video cameras (see Camera Search Panel(see page 1130)).
If you specify the search query in the search bar, then the Objects Panel will display only those cameras that match the search conditions (see Camera Search Panel(see page 1130)).
On the Objects panel, the cameras can be sorted either by name or short name (see Configuring camera sorting on Objects Panel(see page 1037)).

To lock the panel, click the button in the lower left corner. Click the button to unlock the panel.

You can resize the Objects Panel. To do this, left-click on the right border of the panel and drag it to the right or left.



To hide the panel, click the button.

20.1.11 The PTZ Control Panel

The PTZ control panel is displayed automatically in the right-hand part of the screen when the viewing tile of a PTZ camera is activated in Live Video mode.

Note

The PTZ control panel is displayed only if the **PTZ** object for the particular video camera is enabled (see the section titled PTZ(see page 220)).



The PTZ control panel is used for the following functions:

1. Controlling PTZ video cameras.
2. Setting and switching to camera presets.
3. Launching/stopping PTZ tours.
4. Launching/stopping patrolling.

The PTZ control panel includes the following interface elements:

1. Presets list.
2. PTZ tours list.

3. Dialer.
4. PTZ controls for iris, focus, and optical zoom.

> **Note**
>
> If a camera does not support a function, the controls for this function cannot be accessed.

5. Virtual 3D joystick.

> **Note**
>
> The type of virtual 3D joystick and adjustment scale depend on the type of PTZ cameras: discrete or continuous control of Pan, Tilt, Zoom, Focus, and Iris.
>
> 
>

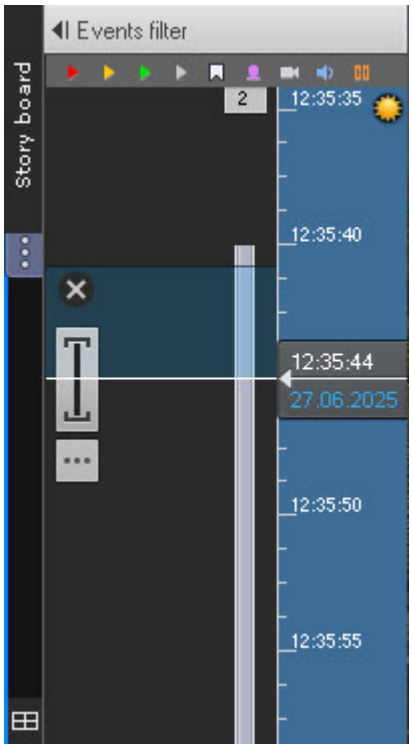
6. Patrol button.

> **Note**
>
> Use of the dialer, PTZ controls, joystick, and patrol button is described in the section Controlling a PTZ camera(see page 1166).

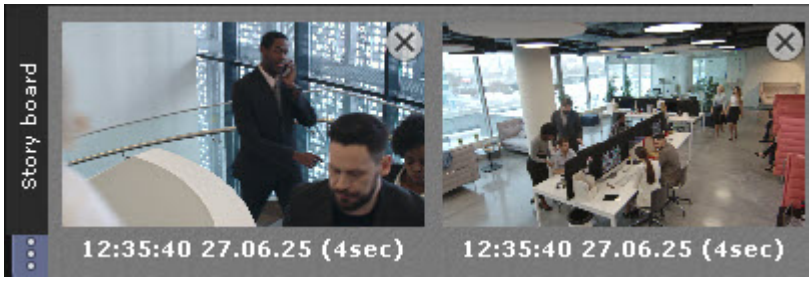
20.1.12 Story board

In the Story board, you can check all videos related to an incident to export them with one click (see Simultaneous export of all event videos(see page 1313)).

The Story board becomes available after you set a time interval on the timeline (see Standard video recordings export(see page 1308)).



To open the board, click the **Story board** button.



To hide the board, click once more the **Story board** button.

20.2 Video surveillance

20.2.1 Video surveillance modes

Use the Video surveillance monitor and Surveillance window client's interface objects to display video image from a camera on the computer monitor.



You can work with the Surveillance window in the following modes:

1. Live mode allows system operators to view and analyze video streams from surveillance cameras in real time. This allows you to quickly react to events and take the necessary actions (see Switching to Live mode(see page 1159)).
2. Alarm management mode analyzes and evaluates occurring events. The mode allows you to process and classify alarm events, determine their significance, and take alarm events into processing (see Switching to the Alarm management mode(see page 1181)).

   > **Note**
   >
   > Alarm management mode is available if the system initiates an alarm.

3. Archive mode stores and manages videos received from surveillance cameras or other video data sources (see Switching to the Archive mode(see page 1187)).
4. Archive Search mode uses videos stored in the archive for the in-depth analysis (see Switching to the Archive Search mode(see page 1207)).

20.2.2 Functions available in all video surveillance modes

The following video surveillance functions are available in all video surveillance modes:

1. Selecting a camera.
2. Scaling a Surveillance window.

3. Digitally zooming video images.
4. Processing video images.
5. Rotating video images.
6. Tracking objects.
7. Detection masks.
8. Operator comments.
9. Viewing captions from POS terminals.
10. Following the link to another camera.
11. Partial decompression of a video signal.

20.2.2.1 Scaling the Surveillance window

You can scale Surveillance windows in one of the three ways:

1. Using the buttons in the upper right part of the active Surveillance window;
2. Using the buttons on the top panel;
3. Using the mouse.

When you click a Surveillance window, you can see the scale control buttons on the right side.



1. —increases the size of the Surveillance window by one step;
2. —resets the Surveillance window to its initial size.

When you increase the size of the Surveillance window, the scale of the entire layout is scaled up, with some cells placed outside the screen.

Surveillance windows are scaled as follows:

1. If a Surveillance window occupies 100% of any side of a layout (maximum Surveillance window size), you cannot scale it.
2. If a Surveillance window occupies 50% or more (but not 100%) of any side of a layout, it can be scaled to a maximum size.
3. If a Surveillance window occupies less than 50% on both sides of a layout, two scale steps are available: the first step scales up the Surveillance window to 50% on the corresponding side of the layout and the second step scales up the Surveillance window to the maximum size. Relevant for layouts containing nine cells or more.

If a Surveillance window is linked to another window or an information board, at the first scale step (up to 50%), the Surveillance window and the other window/information board are displayed together and occupy all of the screen on one side. In this case, the first step takes into account the total size of the linked cells, that is, the linked cells must be less than 50% on both sides of the layout.

When you select a Surveillance window, you can control its scale with the buttons on the top panel:



1.  —resets the Surveillance window to its initial size;
2.  —resizes the Surveillance window up to 50% on one side of the layout;
3.  —scales up the Surveillance window to its maximum size.

You can scale the Surveillance window using a mouse:

1. If a Surveillance window is expanded to the full screen, double-click the left mouse button in the window area to scale it down to a minimum size.
2. Otherwise, double-click the left mouse button to expand the window to the full screen.

> **Note**
>
> When a Surveillance window is scaled up to its maximum size, the timeline isn't hidden when you click in the window area.

20.2.2.2 Digital video zoom

Digital video zoom allows you to gradually zoom in on the video image without changing the size of the Surveillance window.

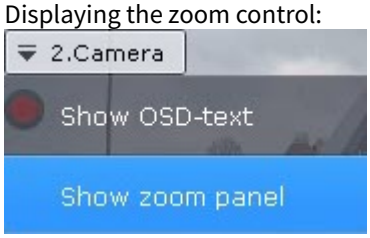
You can zoom in on a video image using the following methods:

1. Using a digital zoom panel(see page 1141).
2. Using area selection(see page 1142).
3. Using the mouse scroll wheel(see page 1143).

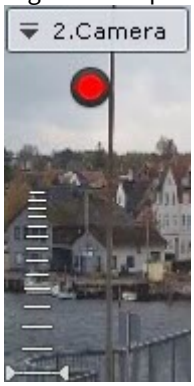
20.2.2.2.1 Zooming in on a video image using zoom panel

To display the digital zoom panel on the Surveillance window, select **Show zoom panel** in the context menu of the Surveillance window.

Displaying the zoom control:

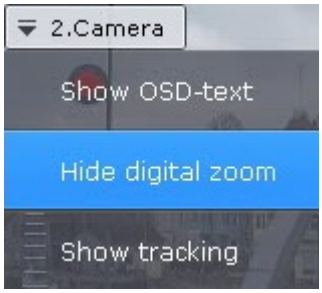


Digital zoom panel:



To zoom in on a video image, left-click the slider and hold and drag the digital zoom scale up to the required value. The maximum zoom is 16x. To return back to the original image, move the slider back to its original position.

To hide the digital zoom panel, select **Hide digital zoom** in the context menu of the Surveillance window. Also, three seconds after you scale down the video image to the minimum, the zoom panel automatically hides.



After hiding the digital zoom panel, the selected zoom level of the image is preserved when switching between image viewing modes.

20.2.2.2.2 Zooming in on a video image using area selection

To zoom in on a video image, do the following:



1. Click and hold down the left mouse button in the Surveillance window.
2. Move the mouse cursor to the required position.
3. Release the left mouse button.

Once you have completed the above actions, the selected area is displayed on the entire Surveillance window.



Note

If you select an area that requires a zoom of more than 16x to display, it is marked with a red frame. In this case, video image isn't zoomed in.



20.2.2.2.3 Zooming in on a video image using the mouse scroll wheel

When you use the mouse scroll wheel, the video image is zoomed in relative to the mouse cursor. Description of this process is given in the table below.

Action	Function
Mouse wheel is scrolled forward by one division	Video image is zoomed in by 2x
Mouse wheel is scrolled backward by one division	Video image is zoomed out by 2x

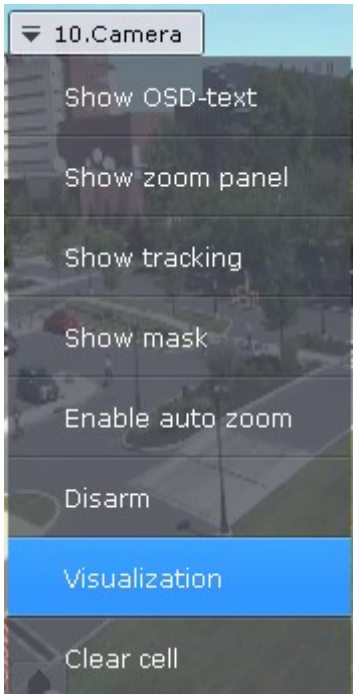
20.2.2.3 Video image processing

In *Axxon One*, the video image processing functions implemented in the Surveillance window enhance the performance and convenience of using the video surveillance system.

The following video image processing functions are available in the Surveillance window:

1. Contrast(see page 1144).
2. Sharpness(see page 1144).
3. Deinterlacing(see page 1145).

To enable video image processing functions, use the **Visualization** option in the context menu of the Surveillance window. Only one image processing function can be enabled at a time.



20.2.2.3.1 Changing the contrast level

An *Axxon One* operator is granted access to adjust the contrast of a video image.

To adjust the contrast, select the **Contrast** option in the **Visualization** context menu.



An example of the **Contrast** function is given in the following image.



To return to the original image, select the **Contrast** option again in the **Visualization** context menu.

20.2.2.3.2 Setting the sharpness level

An *Axxon One* operator is granted access to adjust the sharpness of a video image.

To adjust the sharpness, select the **Sharpness** option in the **Visualization** context menu.



An example of the **Sharpness** function is given in the following image.

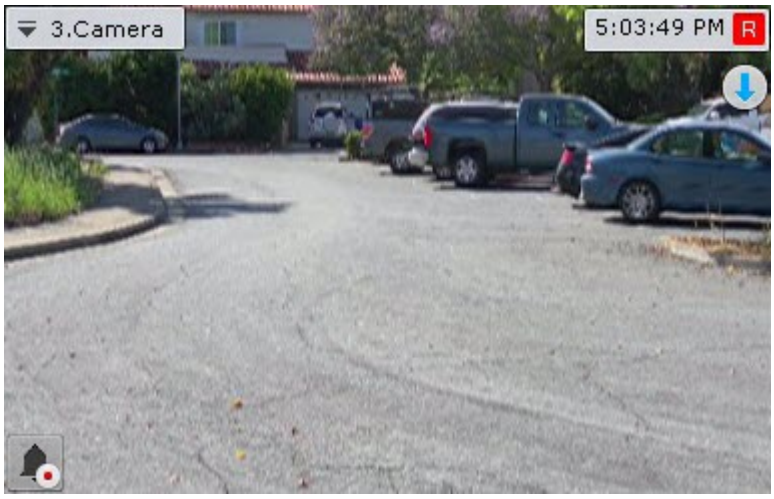


To return to the original image, select the **Sharpness** option again in the **Visualization** context menu.

20.2.2.3.3 Using deinterlacing

The **Deinterlacing** tool is used to correct tooth-type distortions (also called "combing artifacts"), which appear on the borders of video image fragments when objects move quickly relative to the background.

An example of a combing artifact is shown in the picture below.



To use this tool, select the **Deinterlace** option in the **Visualization** context menu.



As a result, the image in the Surveillance window is corrected.



To disable deinterlacing, select the **Deinterlace** option again in the **Visualization** context menu.

20.2.2.4 Video image rotation

You can rotate a video image 90°, 180° or 270° degrees.

Note

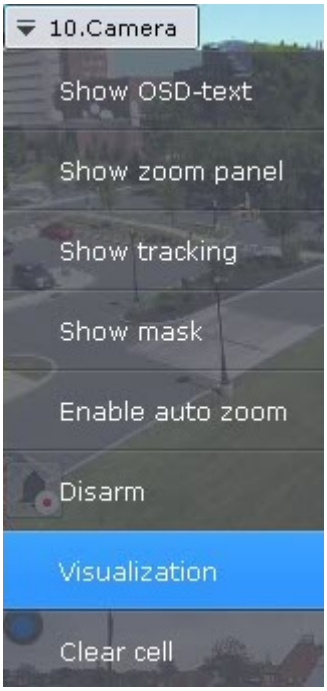
If you enable video rotation, only video in Live and Archive modes is rotated:

- video image is displayed on the map and on the alarms panel without rotation;
- video is recorded to the archive in unchanged form;
- export is performed in unchanged form;

- video image is received unchanged for analysis (metadata generation).

To rotate a video, do the following:

1. In the context menu of the Surveillance window, select **Visualization**.



2. Select the angle of rotation (clockwise).



Video rotation is now complete.



To disable video rotation, select **Visualization** → **Disable rotation** in the context menu of the Surveillance window.



20.2.2.5 Object tracking

Object tracking allows you to visually track the movement of objects in a camera FOV or in a video recording in an archive.

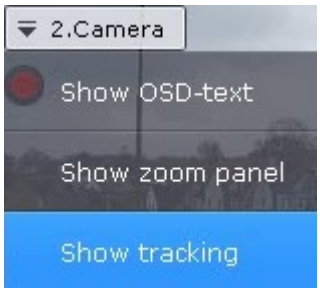
> **Attention!**
>
> Object tracking is available if a camera has at least one source of metadata (see Metadata database(see page 333)).

Object tracking has the following functions:

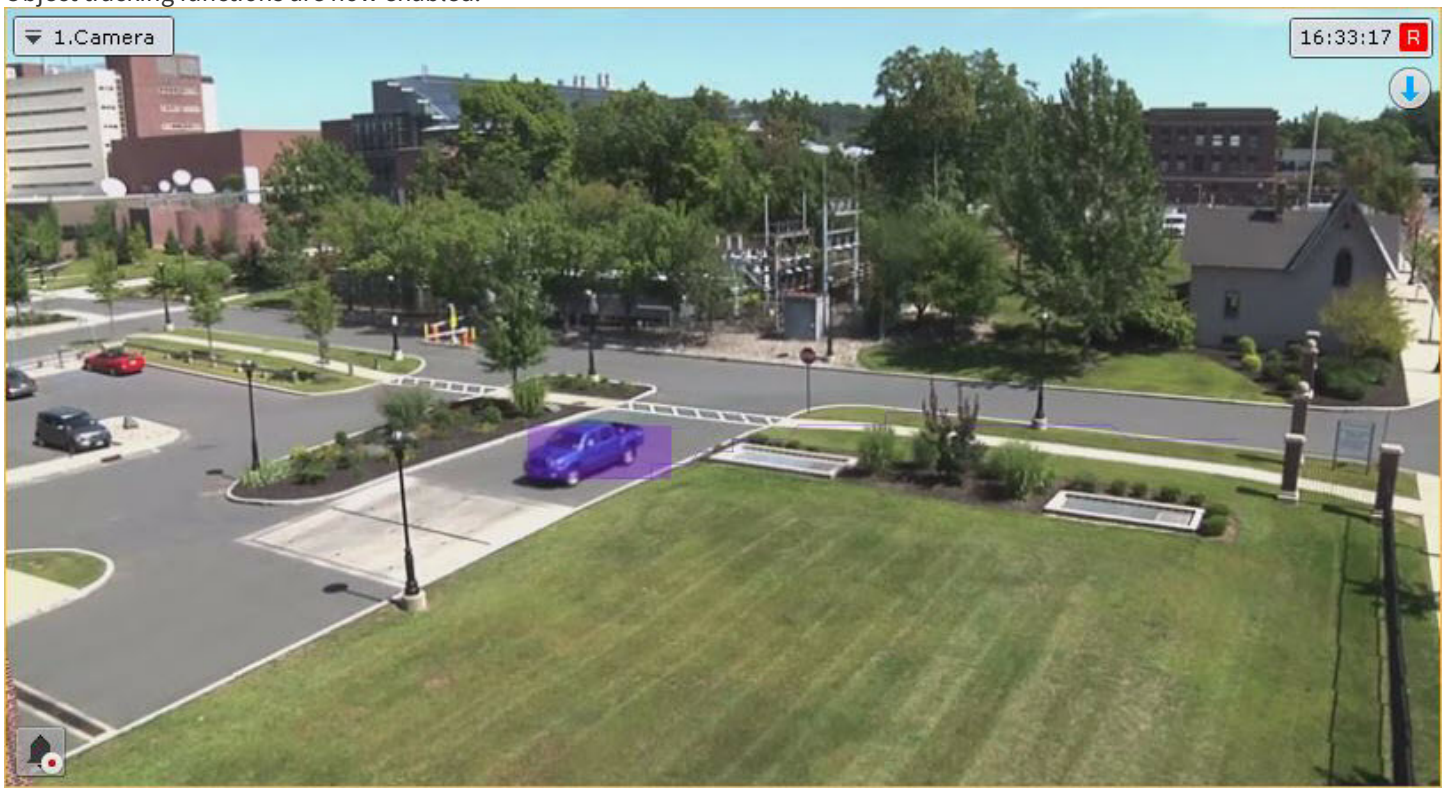
1. recognizes the presence of a moving object and dynamically marks it with a transparent rectangle on the video image;
2. displays the track of the object's movement.

Motion is detected based on the gradient of the inner-frame time difference of the video image.

To enable object tracking, select **Show tracking** in the context menu of the **Surveillance window**.



Object tracking functions are now enabled.



To disable object tracking, select **Hide tracking** in the context menu of the **Surveillance window**.

If you created at least one standard sub-detector for a given camera (see Standard sub-detectors(see page 359)), the parameters of the detector (areas, lines) along with tracking are displayed in the window when viewing live video.



Note

Ignore areas are outlined in dotted black and green lines. Detection areas are outlined in black and gray lines.

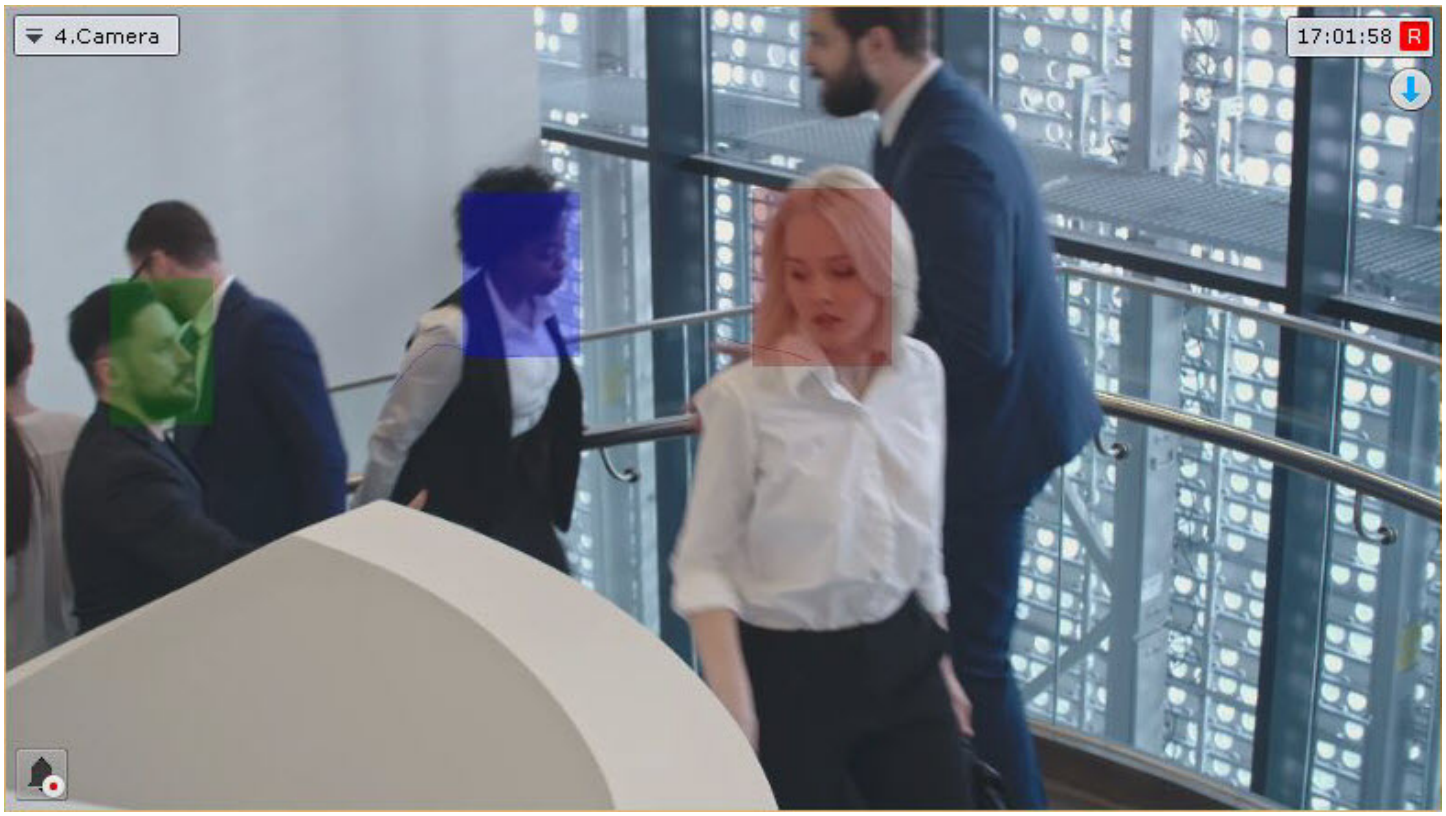
If you created a license plate recognition detector for a camera (see Category: Vehicle(see page 514)), the license plate is outlined in the video.



Attention!

To ensure correct display of the outline of a license plate, you must specify the **Video buffering** parameter of this camera in the range of 500–1000 (see Camera(see page 171)).

If you created a face detector for a camera (see Category: Face(see page 473)), a face is outlined in the video.



If you created a pose detector for a camera (see Configuring the Human pose detector(see page 672)), a human skeleton is outlined in the video.

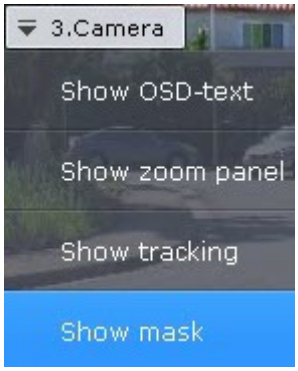


20.2.2.6 Displaying information from a detector (mask)

Some detectors can superimpose different information on the video image:

1. Motion detection (VMD)(see page 446)—motion mask.
2. Equipment detector(see page 711) and Person-based privacy masking(see page 694)—segments of the human body.
3. Neural classifier(see page 701), Fire detector(see page 706) and Smoke detector(see page 725)—the sensitivity scale of the detector.
4. Neural counter(see page 771)—highlighting of the recognized objects.
5. Water level detector(see page 729)—the water level indicator.
6. Queue detector(see page 779)—highlighting of the queue.
7. People masking detection tool(see page 693)—masking people.
8. Privacy masking(see page 450)—hides moving objects.

To enable displaying information from a detector, select the **Show mask** item in the context menu of the Surveillance window.



Note

This item is available only if you have created one of the above mentioned detector for this camera.

As a result, the necessary information will be displayed in the Surveillance window. To disable this function, select the **Hide mask** item in the context menu of the Surveillance window.



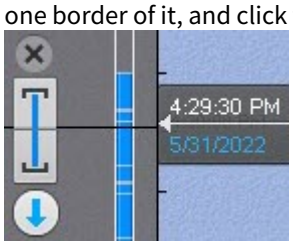
20.2.2.7 Operator comments

Operator comments on past or ongoing events allow for providing a more complete understanding about the situation at the protected facility.

Comments are displayed during archive playback (see Viewing archive with operator comments(see page 1194)) and are marked with tags on the timeline (see The Timeline(see page 1122)). Comments can also be searched (see Comments search(see page 1215)).

20.2.2.7.1 Adding comments in different surveillance modes

In the Archive and Archive Search modes, comments can be added both for specific frames and for intervals of time.
To add a comment for an interval, select an interval on the timeline, place the timeline indicator either inside the interval or at one border of it, and click the button.



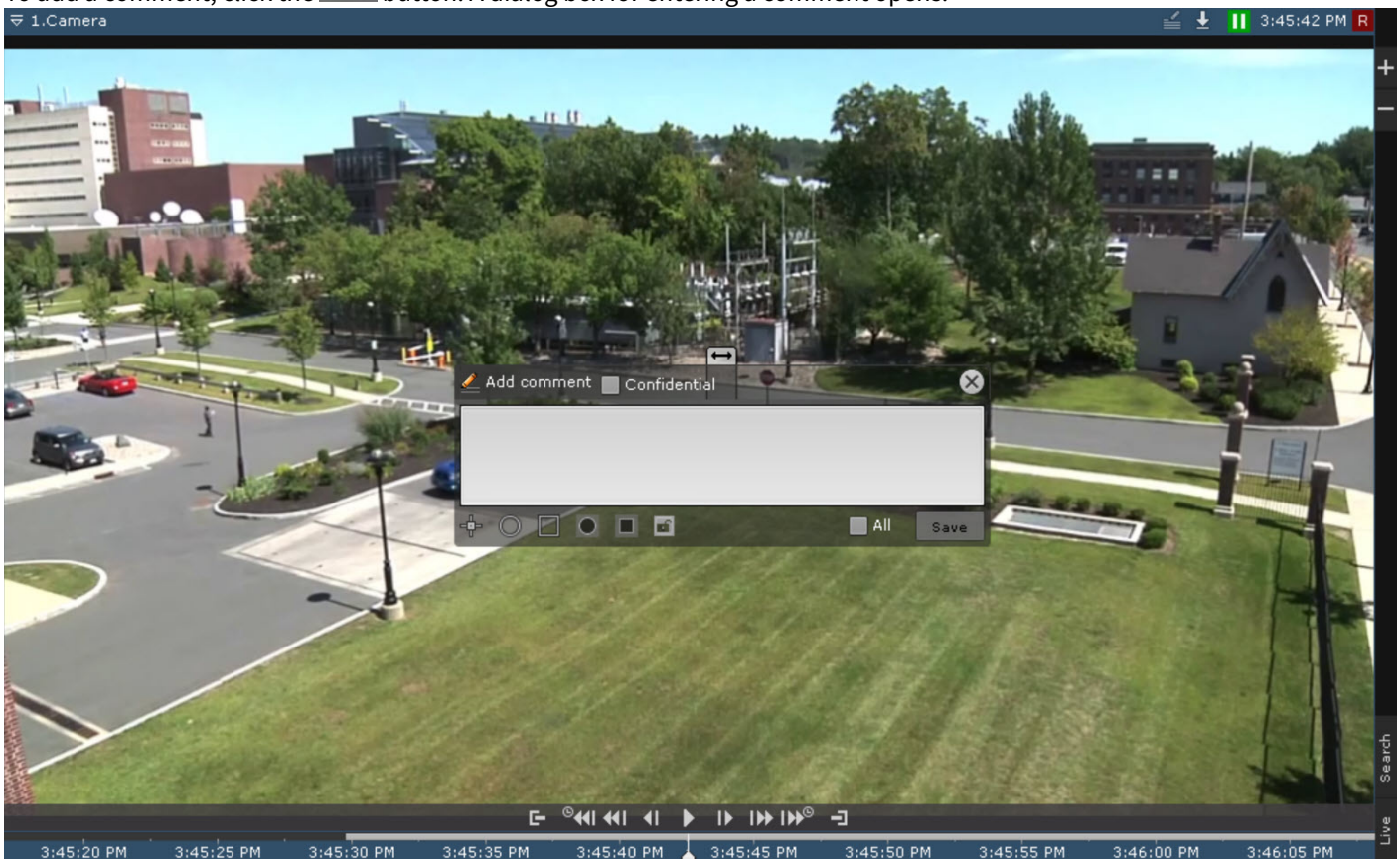
Note

If comments are added during playback in the Archive or Archive Search mode, playback is paused after the button is clicked.

In the Alarm management mode, operators can be required to give comments after processing an event (see Configuring Alarm processing(see page 1011)) or comments can be left in free form, before event processing, by clicking the button. The comment applies to the entire duration of the alarm. You can add a comment in Live mode only if archive recording is enabled.

20.2.2.7.2 Adding a comment

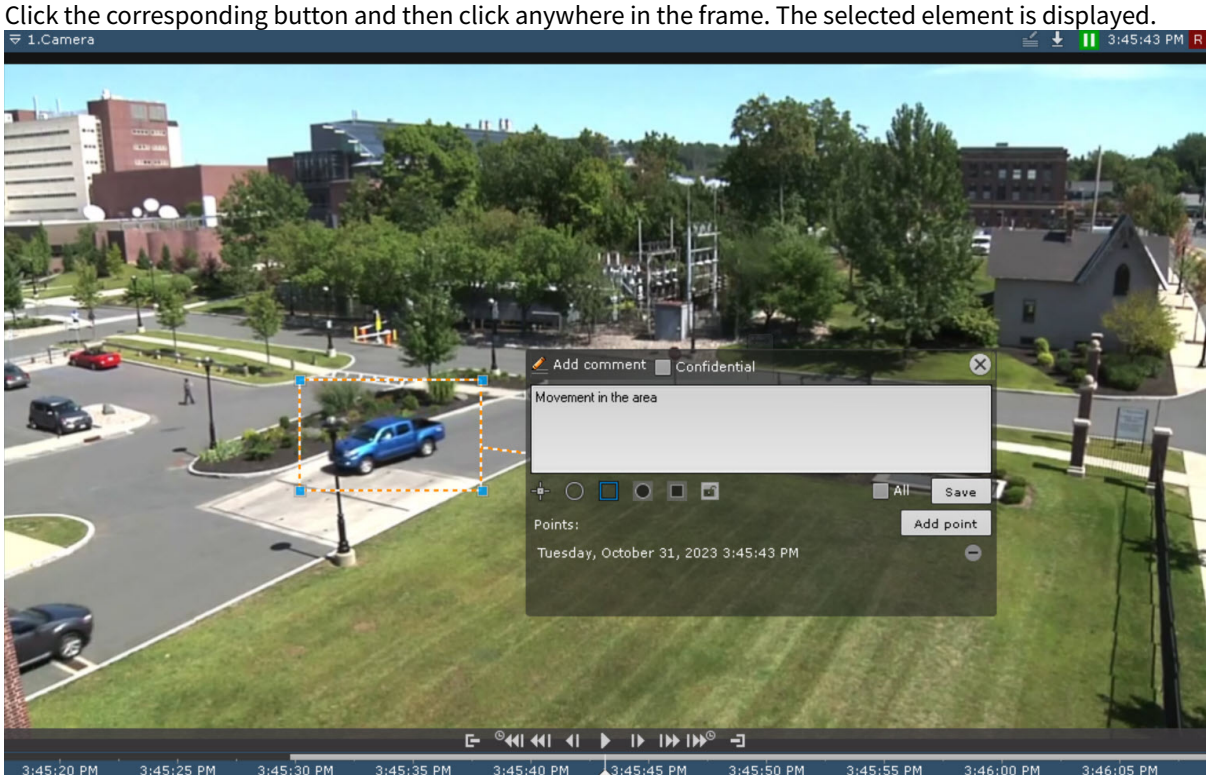
To add a comment, click the button. A dialog box for entering a comment opens.



The number of characters in the comment is limited.

The following parameters can be configured:

1. Position of a comment in the frame—you can move the window with the comment when you click the window title and hold it with the left mouse button.
2. Transparency of the comment window is adjusted by moving the slider from left to right, from opaque to maximum transparency.
3. Marking the area of interest in the frame. You can mark the area with a dot (), an oval (), or a rectangular () area. To do so, do the following:
   a. Click the corresponding button and then click anywhere in the frame. The selected element is displayed.

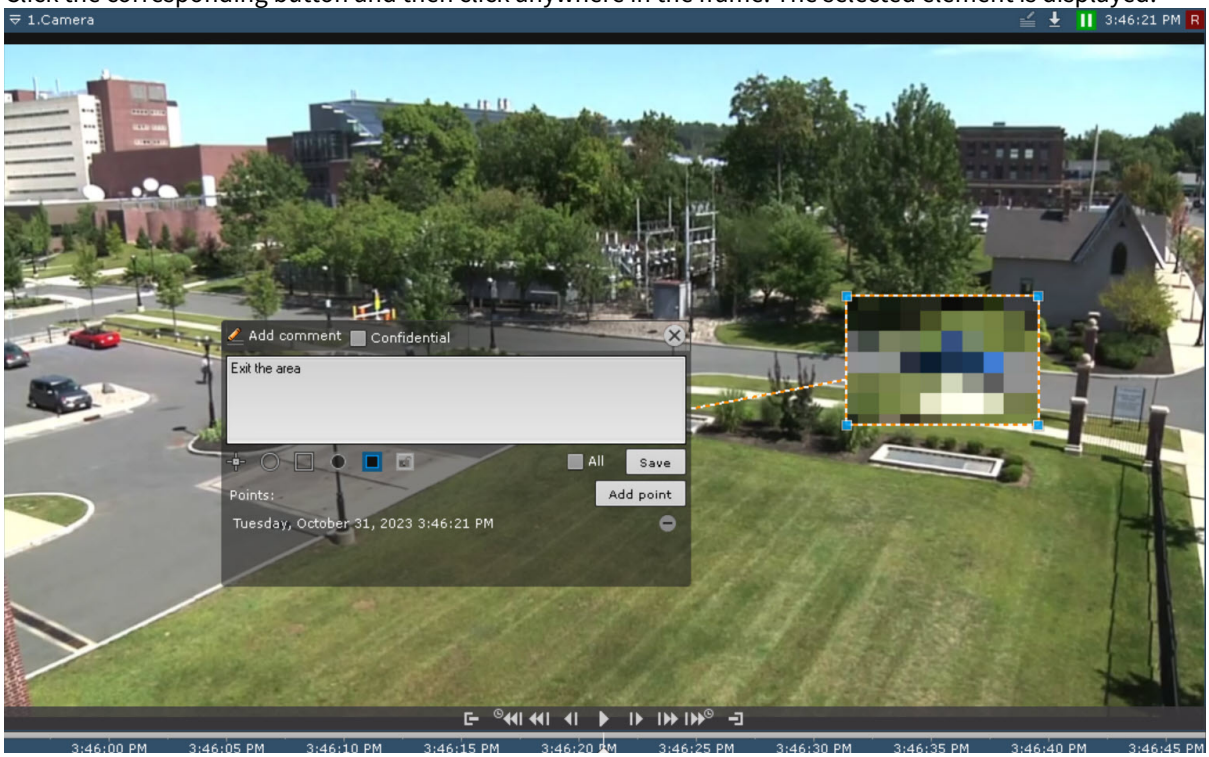


   b. Move the element to the required area of the frame. To do this, left-click on the element and move the cursor without releasing it.
   c. Set the size of the element by stretching its anchor points.
   d. **Points** are displayed below the comment. You can set several points in different frames. To do this, go to another frame, move the element in it to the required area, and click the **Add point** button. To delete a point, click . As a result, one comment is displayed for all added points.

> **Note**
>
> You can set points only for an oval and a rectangular area.

4. Marking the privacy zone—the area of the frame that must be hidden. You can mark it with an oval () or a rectangular ( ) area. To do so, do the following:

a. Click the corresponding button and then click anywhere in the frame. The selected element is displayed.



b. Move the element to the required area of the frame. To do this, left-click on the element and move the cursor without releasing it.
c. Set the size of the element by stretching its anchor points.
d. The **Mask position** is displayed below the comment. You can set several positions in different frames. To do this, go to another frame, move the element in it to the required area, and click the **Add** button. To delete a position, click . As a result, one comment is displayed for all added positions.

> **Note**
>
> The privacy zone cannot be set in real time.
> For one comment, you can specify either the area of interest, or the privacy zone.

5. Protection of an archive interval with a comment from overwriting. To protect archive records with a comment from being deleted, click the button. To cancel protection, click the button (see Configuring video protection(see page 304)).
6. Adding a comment to all cameras on the layout—set the **All** checkbox.
7. To make a comment confidential, set the **Confidential** checkbox. Such comments are visible to users who have rights to access confidential comments (see Roles(see page 920)).

To save the comment, click the **Save** button. Otherwise, click to cancel.

After being saved, a comment is displayed in the frame as specified. To delete the comment, before you perform any other command in the system, click the button.



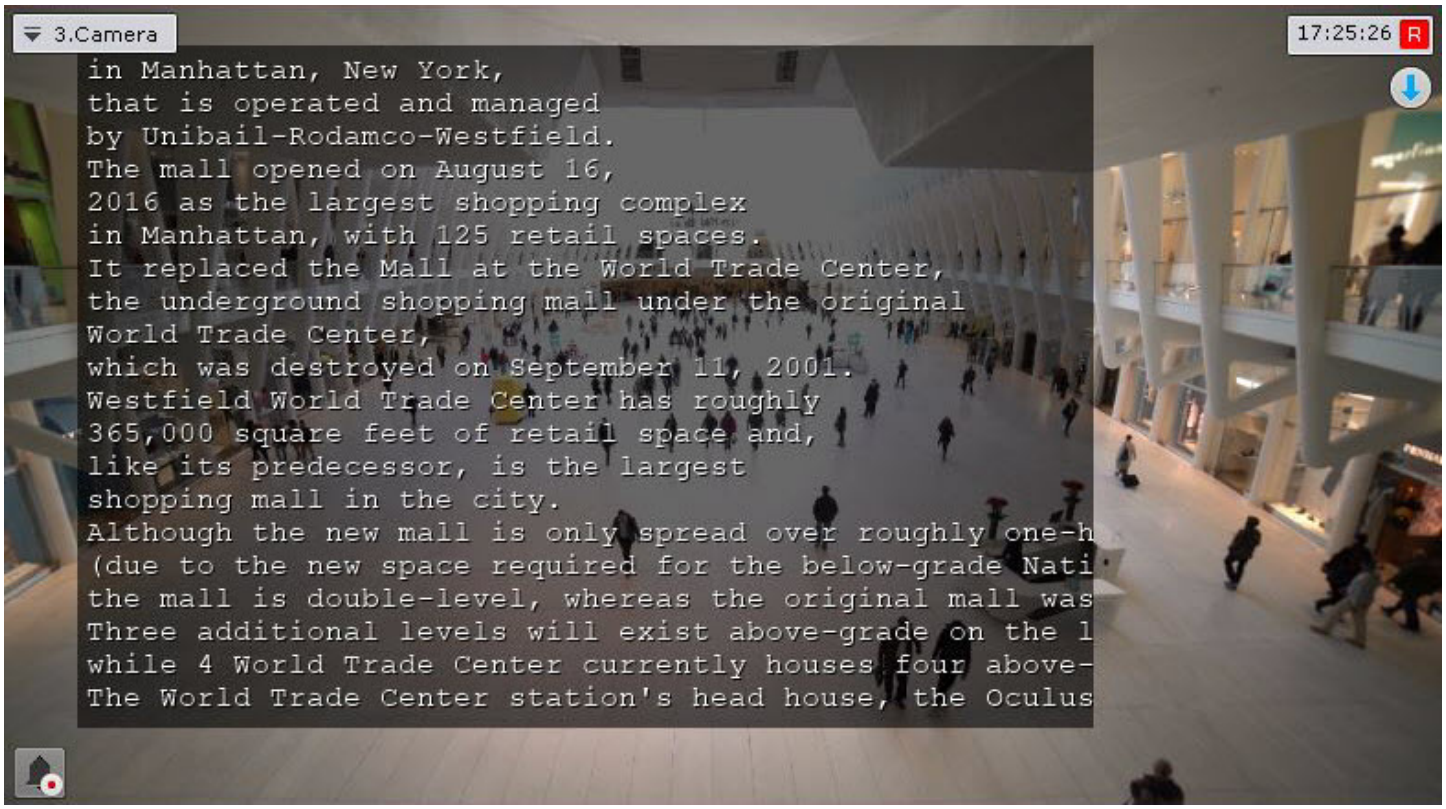
20.2.2.8 Viewing titles from POS terminals

Titles are automatically displayed in the Surveillance window if the corresponding setting was made for the camera (see Configuring titles overlay(see page 258)).

You can have titles from several POS terminals in the same window.

Attention!

Captions/titles are displayed only if the camera is located on the current layout.
If you minimize the Client, then captions are not received.



Note

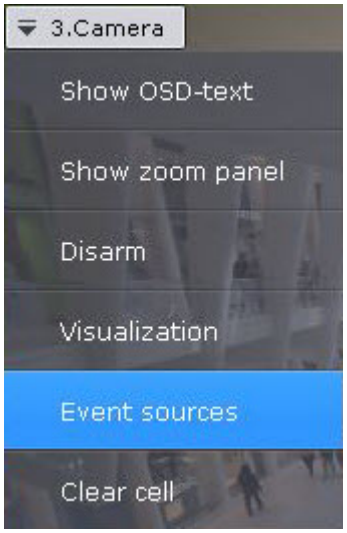
Keywords or lines can be highlighted according to the settings (see Configuring keywords(see page 261)).

If you view archive, titles corresponding to the moment being played back are displayed.

Note

With certain settings of captions output (the **Display duration** parameter = 0, see Configuring titles overlay(see page 258)) and low-intensity events at the checkout, you can have a time lag between the captions displayed and the video time stamp.

To disable titles overlay, select **Event sources** in the context menu of the Surveillance window and then select a POS terminal, the information from which you don't want to display.





20.2.2.9 Partial decompression of video signal

Software video compression is a procedure of software processing of a digitized video stream in order to reduce its volume. Compression is performed according to a specific software algorithm.

To compress video signals from IP devices, standard algorithms (for example, MPEG-4) or algorithms developed by the manufacturers of these devices are used.

To display a compressed video signal on the screen, the video signal is automatically decompressed beforehand.

If the video resolution of the remote devices on the layout is less than the compressed video resolution, *Axxon One* performs partial decompression of the video signal, which reduces the load on the processor of the computer that performs decompression. The network load isn't reduced. Partial decompression is possible with MPEG-2, MJPEG and MxPEG codecs.

20.2.2.10 Switching to other camera via a link in the Surveillance window

Surveillance window can contain links to other cameras (see Adding links to other cameras to the Surveillance window(see page 960)).



When you click a link, the corresponding camera is selected, and the Surveillance window expands.

If a linked camera is not present on the currently selected layout, a layout containing the required camera is selected. If there are multiple layouts containing the required camera, the layout with the least number of Surveillance windows is selected.

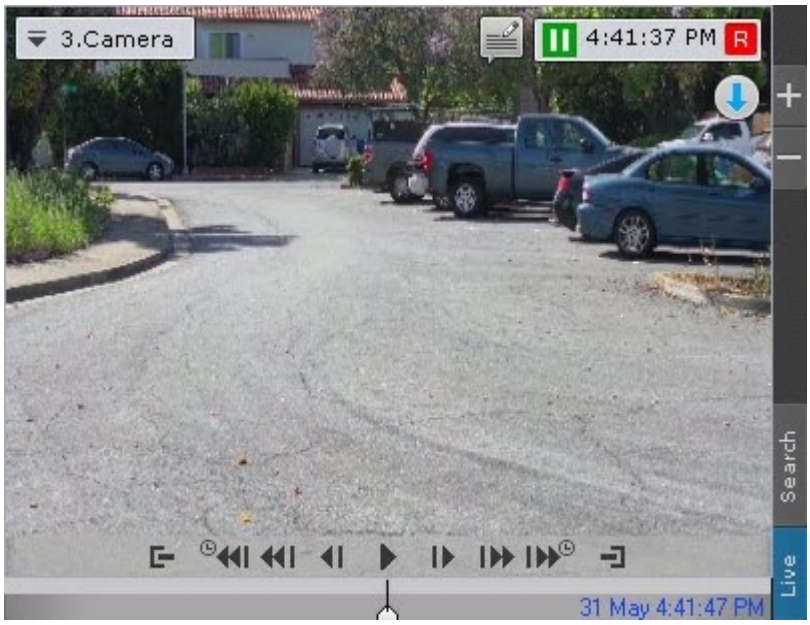
If a linked camera is not present on any layouts, a temporary layout is selected that is automatically deleted after you proceed to another layout.

If at least one of two cameras is in the Archive or Archive Search modes, after you click the link, the camera is also displayed in the Archive or Archive Search modes.

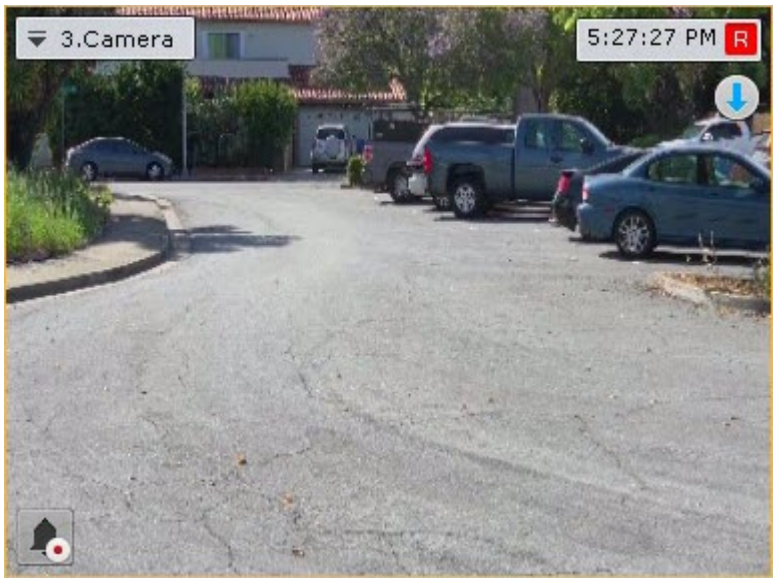
20.2.3 Live video surveillance

20.2.3.1 Switching to Live mode

To switch the Surveillance window from a different surveillance mode to Live mode, click the **Live** tab in the lower-right corner.



As a result, the Surveillance window displays video in Live mode.



20.2.3.2 Video surveillance functions available in Live mode

In the Live mode, the following video surveillance functions are available:

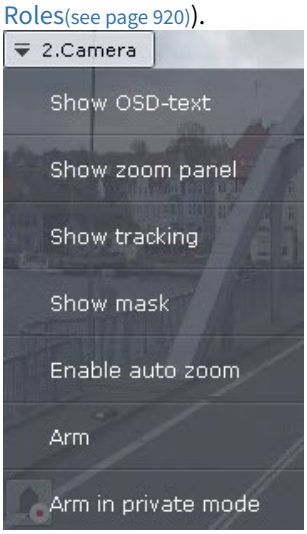
1. Selecting the video stream quality.
2. Autozoom.
3. Moving object tracking functions: Tag & Track and Tag & Track Lite.
4. Arming/disarming a camera.
5. Controlling a PTZ camera.
6. Controlling outputs.
7. Displaying the input status.
8. Automatic replacement of a camera on layouts.
9. Freeze frame.
10. Viewing events of the detection tools of the selected camera.
11. Functions available in all video surveillance modes(see page 1139).

20.2.3.3 Arming and disarming a camera

In *Axxon One*, a camera is armed via all detectors registered for this camera.

To arm a camera, select one of the following two options in the context menu of the Surveillance window:

1. **Arm**. In this case, the camera is available to all users who have access to it.
2. **Arm in private mode**. In this case, the camera isn't available to the users with the **Live in Armed mode** permission (see Roles(see page 920)).



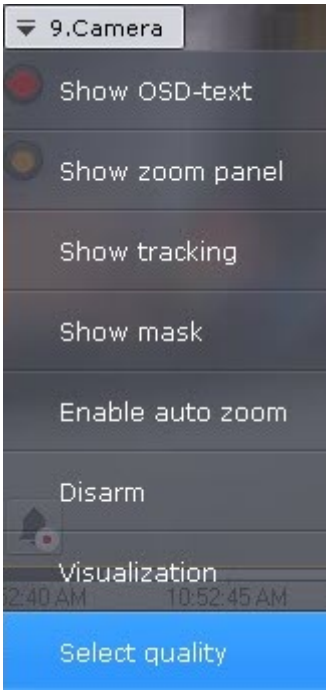
To disarm a camera, select **Disarm** in the context menu of the Surveillance window.

20.2.3.4 Selecting video stream quality in a Surveillance window (GreenStream)

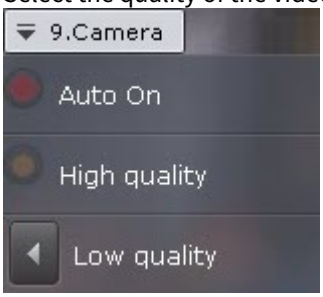
If a camera supports multistreaming, you can select the quality of the video stream that you want to display in the Surveillance window.

To select the video stream quality, do as follows:

1. In the context menu of the Surveillance window, select the **Select quality** item.



2. Select the quality of the video stream that you want for display in the Surveillance window.



Menu item	Description
Auto (GreenStream, default)	Algorithm for displaying a video stream in the Surveillance window if there are several streams in the camera (see Camera(see page 171)): a. a suitable video stream is selected using the following algorithm: i. determine the available space for video output on the layout; ii. select the video streams for which the **Use for GreenStream** option is enabled (see Camera(see page 171)) and sort them in ascending order of the original video width; iii. for each stream: • reduce the original height and width while maintaining the proportions so that the new height and width do not exceed the available space for video output on the layout; • if the size of the stream after inserting it into the output area does not exceed 110% of the original size, select this stream for further output. b. select the stream that has the highest frame rate among other suitable video streams of the same resolution; c. if several video streams were selected in the previous steps, select the video stream with the maximum bitrate among them. If a stream was selected based on the maximum bitrate, then another stream will be selected only if its bitrate is more than 5% higher than the current one (to eliminate frequent switching if the values are approximately equal). When changing the characteristics of video streams, the decision to change the stream to display is made only if the need for a change is confirmed within 35 seconds. This measure is also intended to eliminate frequent switching of video streams. When the Surveillance window is enlarged, it switches to a high-quality video stream. **Note** You can specify the GREEN_STREAM_SCALE_RATIO environment variable (see Creating system variable(see page 126)), which allows you to change the resolution depending on the required video stream quality. • To decrease the resolution (display a video stream of lower quality), set the value of the GREEN_STREAM_SCALE_RATIO variable greater than 1. For example: 1.25, 1.5, 2, or 3. • To improve the resolution (display a video stream of higher quality), set the value of the GREEN_STREAM_SCALE_RATIO variable less than 1. For example: 0.75, 0.5, or 0.25. **Note** You must select the values of the variable empirically.

Menu item	Description
High quality	Algorithm for displaying a high-quality video stream in the Surveillance window if there are several streams in the camera (see Camera(see page 171)): a. select the video streams for which the **Use for GreenStream** option is enabled (see Camera(see page 171)); b. among the selected video streams, select those that have the highest resolution; c. among the selected video streams with the highest resolution, select the one with the highest frame rate; d. if several video streams were selected in the previous steps, select the stream with the maximum bitrate among them
Low quality	Algorithm for displaying a low-quality video stream in the Surveillance window if there are several streams in the camera (see Camera(see page 171)): a. select the video streams for which the **Use for GreenStream** option is enabled (see Camera(see page 171)); b. among the selected video streams, select those that have the lowest resolution; c. among the selected video streams with the lowest resolution, select the one with the highest frame rate; d. if several video streams were selected in the previous steps, select the stream with the minimum bitrate among them
Other	You can select a specific video stream from a video camera to display in the Surveillance window

3. Click in the area between Surveillance windows.

Selection of the video stream quality in the Surveillance window is complete.

20.2.3.5 Autozoom

The **Autozoom** function performs automatic control of digital zoom.

If a Surveillance window is inactive and autozoom is enabled, the following actions are performed:

1. The smallest rectangular area that contains all tracked objects (even if object tracking is disabled, see Object tracking(see page 1148)) is chosen.
2. Maximum digital zoom is performed for the selected area.

If autozoom is enabled but there are no moving objects in the video frame, the contents of the Surveillance window are shown in their original size.

> **Note**
>
> If the Fit screen function is activated for a Surveillance window, the default digital zoom step is used.

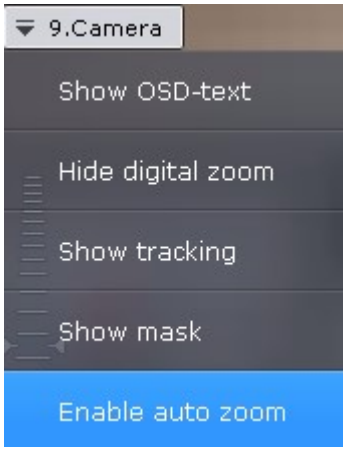
Autozoom stops when a Surveillance window is selected and resumes when the Surveillance window is no longer active.

Autozoom can be enabled both for a single camera and for all video cameras in a layout.

To enable autozoom for a specific camera, in the context menu of the Surveillance window, select **Enable auto zoom**.

> **Important**
>
> Autozoom is available if:

1. object tracking or Neural tracker is activated for this camera (see General information on the standard sub-detectors(see page 359)).
2. object tracking is activated for the Motion detection tool (see Configuring the Motion detector(see page 447)).
3. at least one of the Embedded detection tools is activated (see General information about embedded detectors(see page 811)).

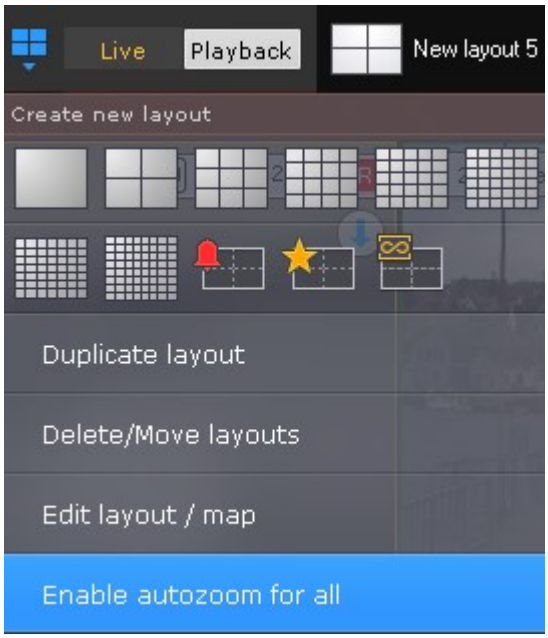


Note

Autozoom resizing takes into account objects from all tracking sources that are activated for a particular camera.

To disable autozoom, select the corresponding command in the context menu of the Surveillance window.

To enable autozoom for all cameras in a layout, select **Enable autozoom for all**.



To disable autozoom for all cameras in a layout, select **Disable autozoom for all**.

Note

If autozoom is activated for at least one camera on a layout, by default the menu displays the **Disable autozoom for all** option.
When you switch to the layout editing mode, the autozoom is disabled for all cameras (see Switching to layout editing mode(see page 945)).

20.2.3.6 Controlling a PTZ camera

You can control a PTZ camera with the PTZ control panel or directly in the Surveillance window (see Controlling a PTZ camera in the OnScreen PTZ mode(see page 1173), Control using Areazoom(see page 1174), Control using Point&Click(see page 1174)).

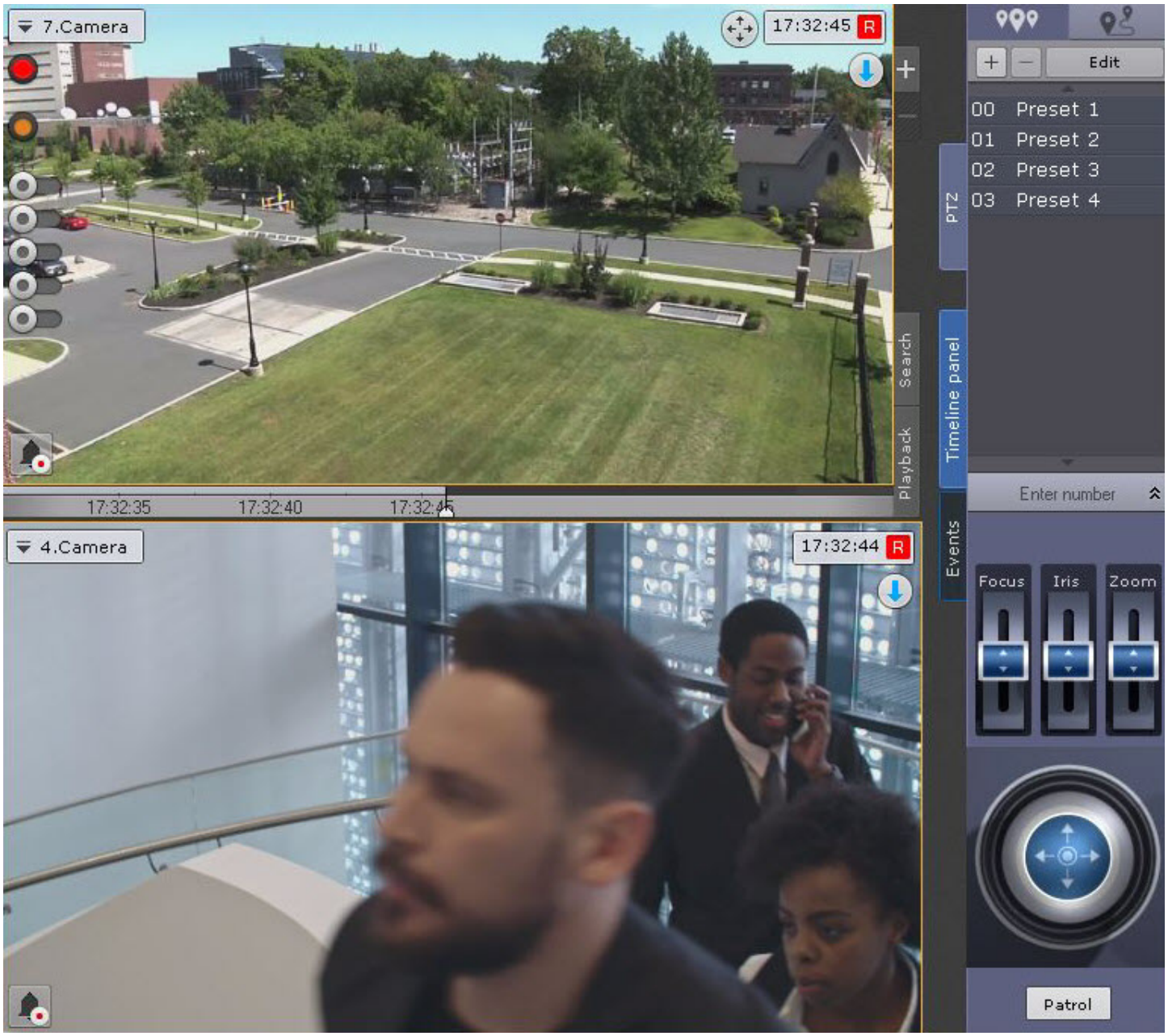
The user gains access to this panel when they select a Surveillance window of a camera in the Live mode that supports a PTZ control interface.

Attention!

A PTZ camera is controlled in accordance with the priority specified in the role settings (see Roles(see page 920)). If the user with a higher priority controls a PTZ camera with the PTZ control panel, users with a lower priority cannot control it (as long as the camera is selected). If the user with a higher priority controls the PTZ camera, the relevant information is displayed on the panel.



Depending on the settings of the PTZ device (see PTZ(see page 220)), multiple users who have the same control priority can control the PTZ camera simultaneously. If you disable the option to simultaneously control the PTZ camera by multiple users, in cases when users have the same priority, the user who connected faster gets the control. However, a user with equal or higher priority can take over the PTZ control. To do this, select the **Yes** value for the **Multiple control** parameter to activate the **Take control** button. If you select the **No** value, the button isn't displayed (see PTZ(see page 220)). If the user who controls the PTZ camera is idle for a certain time (see Configuring PTZ control(see page 1011)), a device automatically unlocked and the control becomes available to all users.



The following actions can be performed using the PTZ device control panel:

1. Use presets.
2. Modify the parameters of the iris, focus, and optical zoom.
3. Modify the horizontal and vertical tilt angle of the camera.
4. Start/stop patrol mode.

Note

For information on specifying presets, see The PTZ Control Panel(see page 1135).
When you exit the PTZ device control panel, it is automatically switched to the default preset if the value in the **Home preset timeout** field is different from **0** (see PTZ(see page 220)).

20.2.3.6.1 Presets

20.2.3.6.1.1 Creating and editing presets

The presets list created for a selected camera is displayed in the upper part of the PTZ control panel in the tab.



For each preset in the list, the following parameters are displayed:

1. Identification number.
2. Name.

The presets list is used for the following functions:

1. Creating presets.
2. Editing the identification number and name of an existing preset.
3. Deleting presets.
4. Switching to a preset.

You can create up to 100 presets with numbers from 0 to 99. To create a preset, do the following:

1. Set the PTZ camera in the position that you want to save as a preset.
2. Click . Fields for entering an identification number and a name for the preset appear.


3. Fill in these fields as required.
4. Left-click anywhere in the presets list and press **Enter** to save the changes.

Creation of a preset is now complete.

To edit the number and name of an existing preset, do the following:

1. Select the required preset in the list.
2. Click Edit. The identification number and name fields become accessible for editing.
3. Edit the preset number and/or name as required.
4. Left-click anywhere in the presets list to save the changes.

Editing a preset is now complete.

To delete an existing preset, do the following:

1. Select the required preset in the list.
2. Click .

The preset is deleted.

To switch to a preset, left-click the corresponding line in the presets list. The camera switches to the required position.

Note

See Selecting a preset(see page 1169).

20.2.3.6.1.2 Selecting a preset

All created presets are displayed in the corresponding list. To switch to a preset, left-click the corresponding line in the given preset list.



To switch to a PTZ camera preset, you can also use the Enter number panel. To display the Enter number panel, click the **Enter number** button.



To switch to a preset using the Enter number panel, do the following:

1. Using digital buttons (0-9), enter the number of the preset to which you want to switch.
   The entered number is displayed in a special field.

   To delete the last digit entered, click the C button.

2. Click the ↵ button to switch to the preset with the number entered. The camera switches to the required position.

Switching to a preset using the Enter number panel is now complete.

Note

Examples of entering a number:

5,  —switch to preset number 5;

0, **5**,  —switch to preset number 5;

5, **7**,  —switch to preset number 57.

20.2.3.6.2 PTZ Tours

During a PTZ tour, the camera automatically scrolls between the listed preset positions.

> **Attention!**
>
> In *Axxon One*, you can set up PTZ tours only for the cameras connected via the ONVIF Generic driver (see Generic Drivers (General device, generic)(see page 190)).

The presets list created for a selected camera is displayed in the upper part of the PTZ control panel in the  tab.



20.2.3.6.2.1 Creating and editing PTZ tours

Axxon One automatically adds PTZ tours created in the camera web interface.

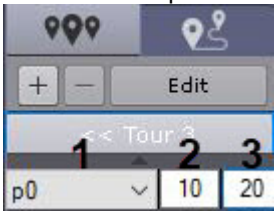


To add a new tour, do the following:

1. Click the  button.
2. Enter a name of the new tour, and click the **Ok** button.



3. Select the first preset of the tour (**1**).



4. Enter the time in seconds during which the camera angle of view corresponds to the selected preset (**2**).
5. Specify the speed of transition to this preset in standard units from 1 to 100 (**3**).

> **Attention!**
>
> This parameter is reserved for future *Axxon One* versions.

6. Click the **Ok** button.
7. Add other presets to the tour in the same way.
8. Click << Tour 3 to return to the PTZ tours list.

To edit a tour, select it in the list and click **Edit**.



To delete a tour, select it and click **–**.

20.2.3.6.2.2 Starting a PTZ tour

To start a tour, do the following:

1. Select a tour from the list.

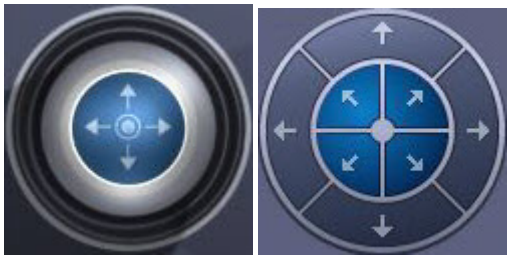


2. Click the **Patrol** button.

To stop a tour, click the **Patrol** button again.

20.2.3.6.3 Control using step buttons and virtual joystick

To control a PTZ camera, you can use both step buttons (discrete PTZ mode) and the virtual joystick (the camera must support continuous PTZ), if the camera supports both modes.



To select, click the  and  buttons.

Otherwise, only one of the modes can be used.

> **Note**
>
> If your camera is set to discrete PTZ control via continuous, your control options are limited to buttons only (see PTZ(see page 220)).

Set the sensitivity level of PTZ step buttons by selecting a value from 1 to 10.



If you press and hold the buttons, the PTZ camera moves continuously.

Attention!

Interaction between PTZ cameras and the Client can cause the cameras to jerk in some cases.
Cameras can also jerk when they are connected via the ONVIF protocol (see Notes on configuring video cameras connected via ONVIF(see page 185)).

Virtual joysticks are controlled as follows:

1. Click and hold down the left mouse button in the central (blue) part of the joystick.
2. Drag the joystick in the necessary direction.

Note

You can also move the joystick by clicking and holding the left mouse button outside of the joystick border.
The turn speed depends on the tilt of the joystick: the greater the tilt, the higher the speed.
If you rotate the camera image 180° (see Video image rotation(see page 1146)), you will have the PTZ controls inverted.

20.2.3.6.4 Patrolling

Patrolling is an automatic change in the position of a camera along a route defined in the camera presets list.

Note

You can use a cycle macro to set up patrolling (see Go to preset of a PTZ camera(see page 874), Wait for timeout(see page 858), Examples of Cycle rules macros(see page 903)).

Patrolling must be activated in the camera settings (see PTZ(see page 220)). In this case, the operator can stop patrolling by clicking the **Patrol** button on the PTZ control panel.



After the manual PTZ control session is over, patrolling resumes automatically. If patrolling is turned off in the camera settings, you can turn it on by clicking the **Patrol** button.

Attention!

Manual control takes priority over automatic control. Any interference in the patrolling process cancels it.

To stop patrolling, click the **Patrol** button again.

Note

Any user, regardless of priority (see Roles(see page 920)) can stop patrolling.

Patrolling automatically stops when a manual PTZ control session is over, or after you close the PTZ control panel.

Note

Control session automatically stops after a set idle time (see Configuring PTZ control(see page 1011)).

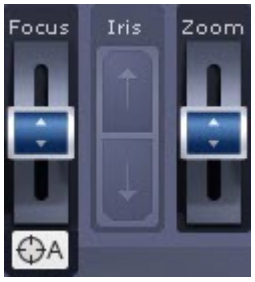
20.2.3.6.5 Controlling focus, iris and optical zoom

To control focus, iris and optical zoom, use the corresponding sliders.



To control focus, iris, and optical zoom, move the corresponding slider up or down.

If the camera has AF (auto focus), you can see the corresponding  button below the slider.



Some devices allow to control optical zoom with the mouse scroll wheel.

To control optical zoom with the mouse, go to the **OnScreen PTZ** mode (see Controlling a PTZ camera in the OnScreen PTZ mode(see page 1173)), otherwise the zooming will be digital (see Digital video zoom(see page 1141)).

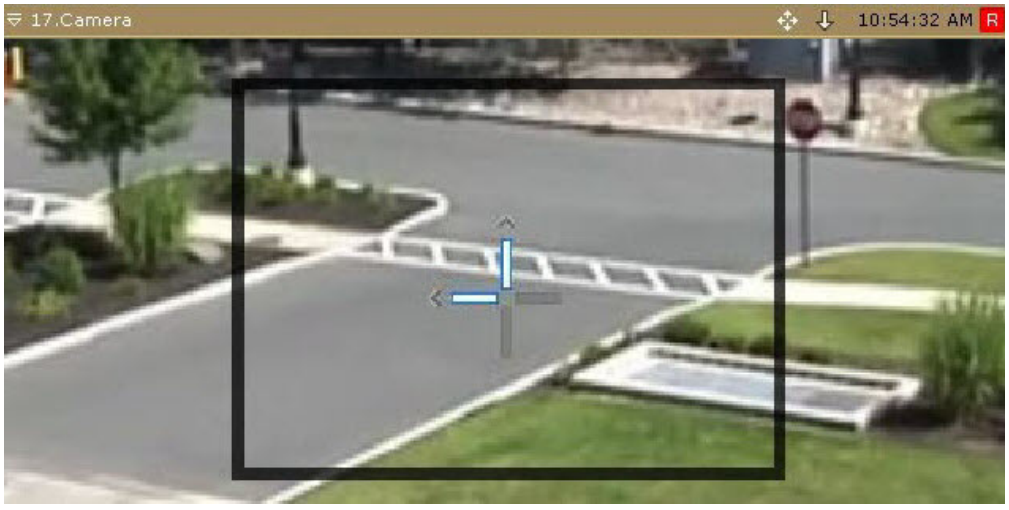
20.2.3.6.6 Controlling a PTZ camera in the OnScreen PTZ mode

The **OnScreen PTZ** mode allows you to control a PTZ camera with mouse manipulations in the Surveillance window.

Click the  button to enable this mode.

> **Note**
>
> In the **OnScreen PTZ** mode, the Areazoom function is disabled (see Control using Areazoom(see page 1174)).

To change the viewing angle, left-click a video image and move the mouse pointer in the required direction. During this action, the software displays a visual element on the image showing the direction of camera lens movement and speed.



The faster you move the mouse, the higher the speed of camera rotation.

Click the  button again to disable the **OnScreen PTZ** mode.

20.2.3.6.7 Control using Point&Click

To change the focus of the camera lens, left-click anywhere in the Surveillance window.

> **Attention!**
>
> To operate Point&Click, go to the **OnScreen PTZ** mode (see Controlling a PTZ camera in the OnScreen PTZ mode(see page 1173)).

After you click in the Surveillance window, the orientation of the camera lens automatically changes so that the selected point of the frame is in its center.

> **Note**
>
> This feature is only available for certain cameras with analog telemetry. For more information, contact AxxonSoft.

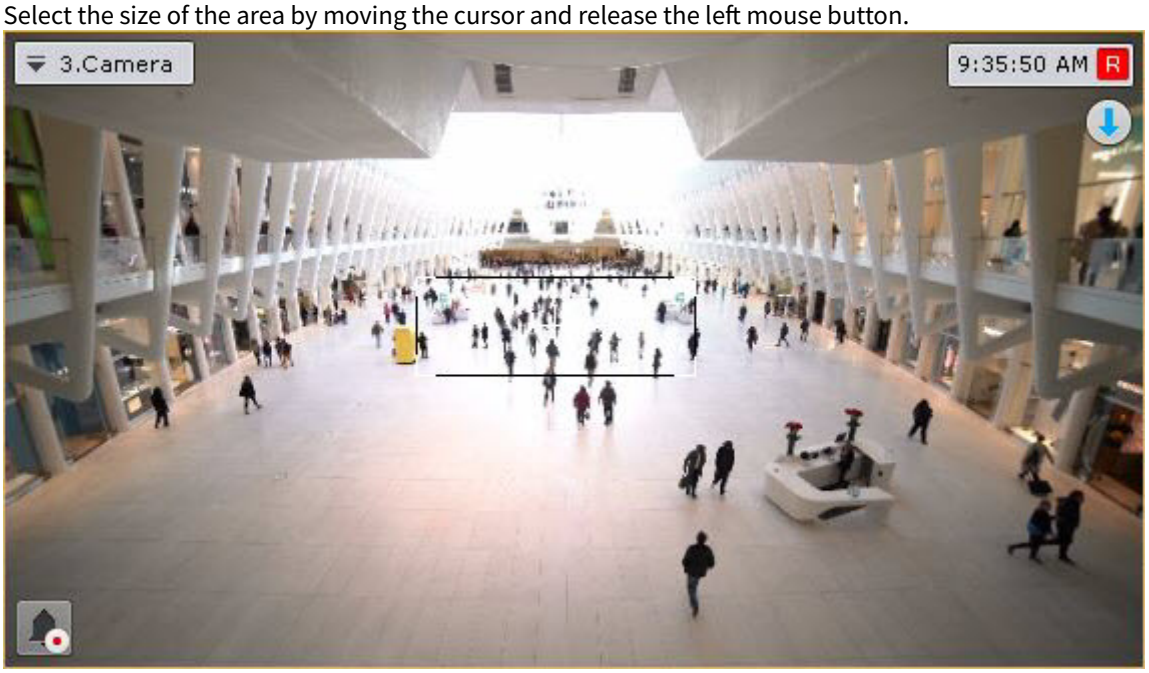
20.2.3.6.8 Control using Areazoom

You can use Areazoom to zoom in on a selected area of the video frame.

> **Note**
>
> Areazoom is unavailable if the **OnScreen PTZ** mode is enabled (see Controlling a PTZ camera in the OnScreen PTZ mode(see page 1173)).

To use Areazoom, do the following:

1. Left-click and hold the mouse button in the frame of the video image. A frame point becomes the center of the area that you want to focus on.
2. Select the size of the area by moving the cursor and release the left mouse button.



After that, the lens orientation changes and the image is enlarged so that the selected area is displayed on the entire

Surveillance window.



Note

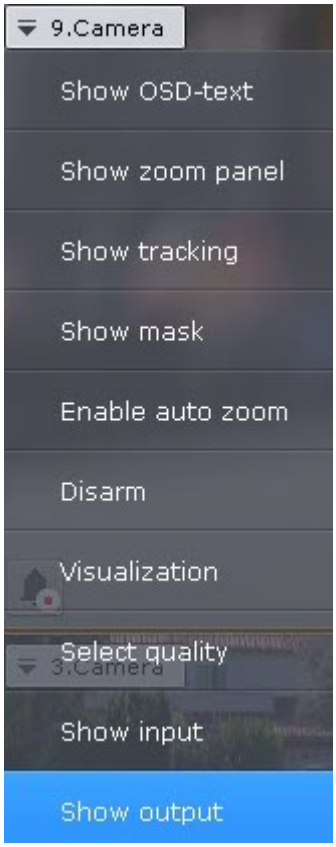
This function is only available for certain cameras with analog telemetry. For more information, contact AxxonSoft.

20.2.3.7 Managing output

To control an output, select **Show output** in the context menu of the Surveillance window.

Note

You must first activate an object before you can control its output.



As a result, the output toggle is displayed.



Note

To hide the toggle, select **Hide output** in the context menu of the Surveillance window.

You can change the output state by clicking the toggle.

Note

If a output is controlled by several operators simultaneously, the output remains activated as long as at least one operator requires it.

Output toggle	Output status
	Normal
	Activated

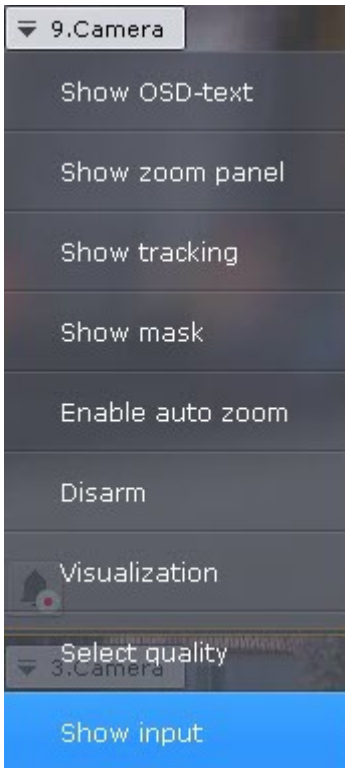
The Output object(see page 227)

20.2.3.8 Displaying the input status

To display the status of the camera input, select **Show input** in the context menu of the Surveillance window.

Note

You must first activate an object to display the status of its input.



As a result, the status of the input is displayed in the Surveillance window.

Note

To hide the input status, select **Hide input** in the context menu of the Surveillance window.



There are four possible statuses of a input.

Input status	Description
	Camera is armed, input is in normal status
	Camera is armed, input is in alarm status
	Camera is disarmed, input is in normal status
	Camera is disarmed, input is in alarm status

The Input object(see page 225)

20.2.3.9 Automatic replacement of the camera on layouts

If a backup camera is specified in the settings of a camera (see Camera(see page 171)), when the connection is lost, a backup camera is displayed instead of the original camera.

Replacement takes place on all layouts created in the system.

When the connection with the original camera is restored, replacement is undone.

20.2.3.10 Freeze frame

In the Live mode, you can "freeze" video. To do this, click the time indicator in the Surveillance window.

As a result, the Surveillance window is highlighted with a blue border. A snowflake icon appears in the time indicator.



The buttons for specifying the time are also be available in the Surveillance window (see Navigating using the time indicator(see page 1201)), if you want to switch to the Archive mode.

To return to live video, click the time indicator again.

20.2.3.11 Viewing events from the detection tools of the selected camera

You can get quick access to events from the detection tools of the selected camera on any layout. To do this, do the following:

1. Select a camera on the layout.
2. Click the **Events** button on the right border of the screen.
   The **Event Board** opens (see Working with Event Boards(see page 1266)). It displays only the events from the detection tools

that were created for the selected camera.



To close the board, click the **Events** button again.

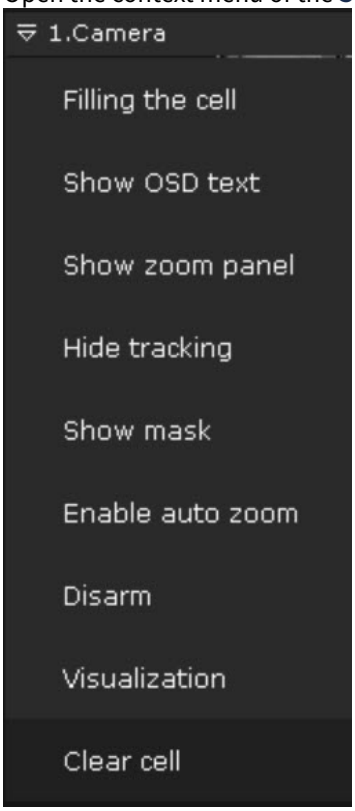
20.2.3.12 Removing a camera from a layout

You can remove any camera from a layout.

> **Attention!**
>
> Changes aren't saved and the original layout will be available when you switch layouts or the next time you start the Client.

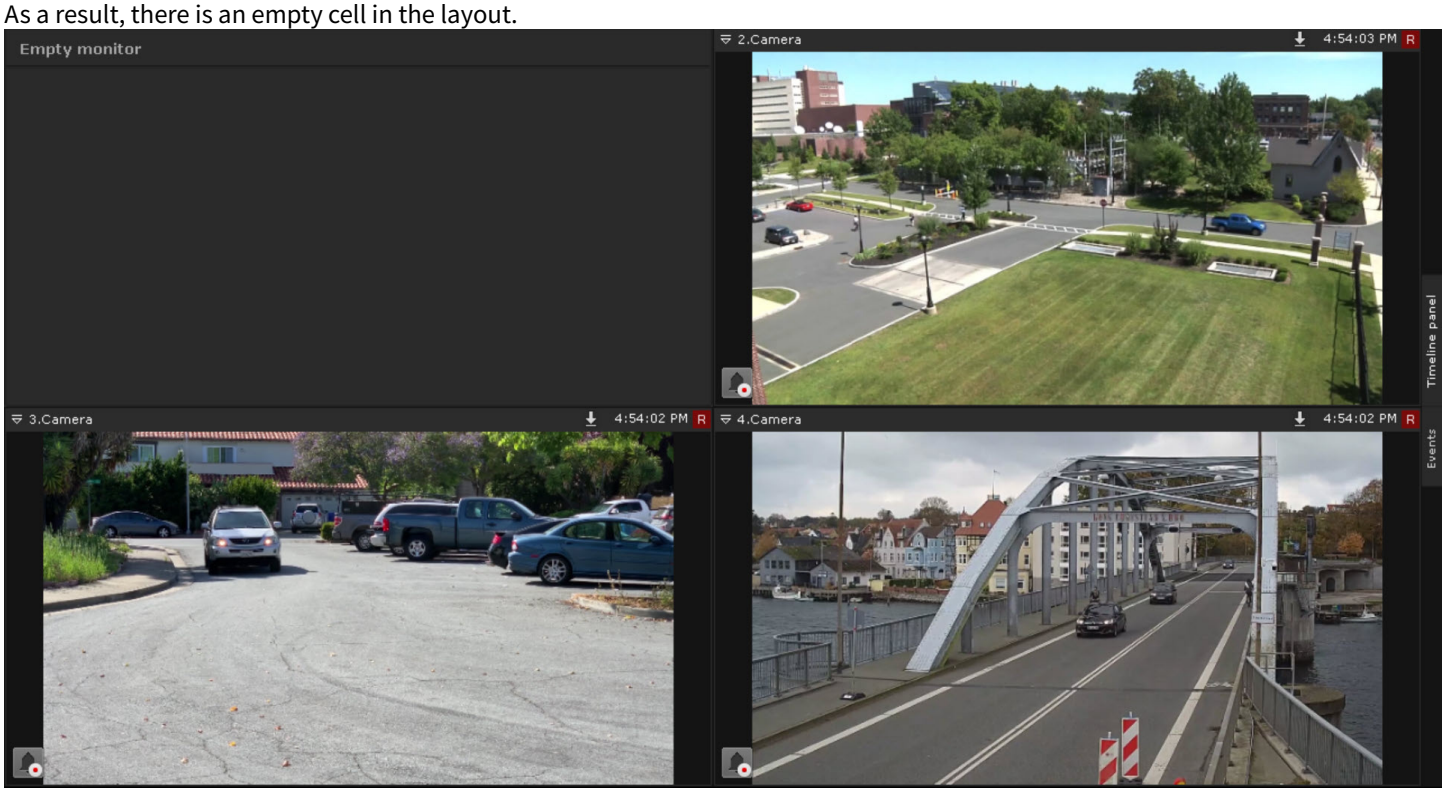
To remove a camera, do the following:

1. Open the context menu of the **Surveillance window**.



2. Select the **Clear cell** item.

As a result, there is an empty cell in the layout.

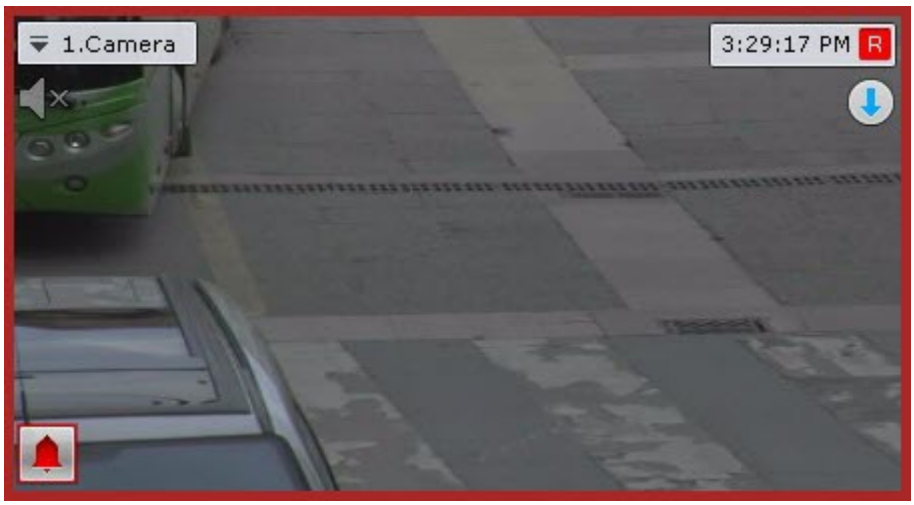


You can further drag a camera to a cell from the **Objects panel**, **Camera Search Panel**, or using an interactive map (see Adding cameras to cells(see page 950)).

20.2.4 Video surveillance in the Alarm management mode

20.2.4.1 Switching to the Alarm management mode

When an alarm is initiated, the system switches to the Alarm management mode automatically at the moment an event is taken into processing. Operator can exit the Alarm management mode. To return a Surveillance window from a different surveillance mode to the Alarm management mode, click the  button in the lower left corner of the window.



As a result, the Surveillance window is displayed in the Alarm management mode.

If there are multiple alarms on a camera, the Alarm management mode displays the most recent alarm.

20.2.4.2 Video surveillance functions available in the Alarm management mode

The following video surveillance functions are available in the Alarm management mode:

1. Initiating an alarm event.
2. Displaying and viewing an alarm event.
3. Forward and reverse playback of an alarm event at various speeds.
4. Outlining an object that initiated an alarm event.
5. Selecting an alarm event for processing.
6. Assessing an alarm event (assigning a status).
7. Functions available in all video surveillance modes(see page 1139).

20.2.4.3 Initiating an alarm event

A system alarm can be initiated in one of two ways:

1. Manually (by an operator)(see page 1181).
2. Automatically (when a detection tool generates an event)(see page 1182).

> **Note**
>
> You can initiate an alarm event only if the specific camera is linked to the archive.

20.2.4.3.1 Manual initiation

To initiate an alarm event manually, do the following:

1. In the lower-left corner of the Surveillance window, click the button.



2. As a result, an alarm event is initiated in the system. The alarm event is displayed on the **Alert panel** (see Alert panel(see page 1131)). To assess an alarm event, click the button again.

> **Note**
>
> - When in the Alarm management mode, the user who initiated the alarm event is displayed at the bottom of the Surveillance window.
> - An alarm event initiated manually has a medium priority.



Manual initiation of an alarm event is now complete.

20.2.4.3.2 Automatic initiation

Automatic initiation of an alarm event is performed if an automatic rule or macro is configured (see Initiate alarm(see page 861)).

If an alarm event is initiated automatically, the **Alert panel** tab is color-coded 

.

To evaluate the situation, click the **Alert panel** tab, select an event and take it into processing (see Selecting an alarm event for processing(see page 1186)).

20.2.4.4 Working with the Alarm management window

20.2.4.4.1 Interface elements of the Alarm management window

The Alarm management window is a Surveillance window which contains, besides the standard interface elements (context menu, time indicator, and so on), the elements for an alarm event playback and assessment:

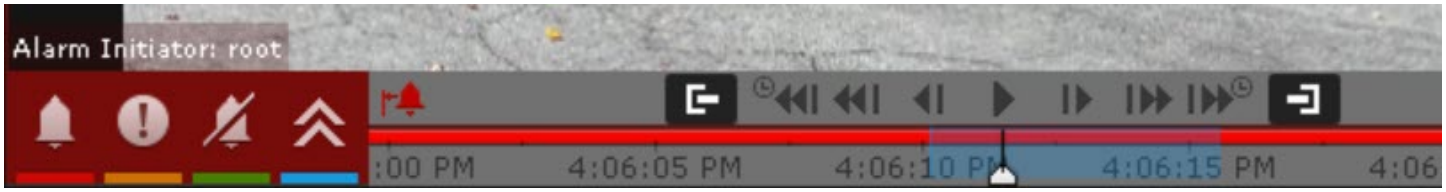
1. Playback panel.
2. Timeline.
3. A button for quick positioning of the timeline indicator in the position corresponding to the beginning of the alarm event.

20.2.4.4.2 Alarm event playback

As soon as an alarm event is taken into processing, the alarm event recording is played back automatically one time, at 1X speed.

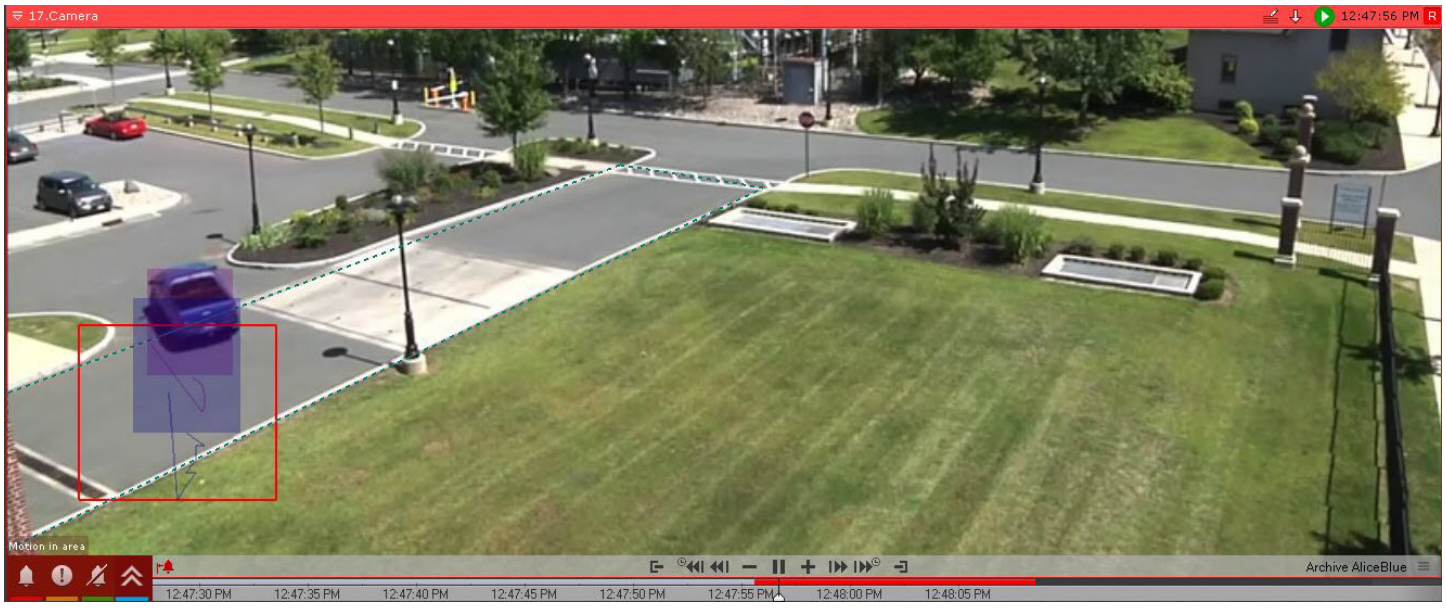
Playback starts:

- either from the beginning of an alarm event;
- or from the moment corresponding to the position of the alarm event flag (only when the alarm event is initiated automatically-see Initiate alarm(see page 861)).



If the alarm event is initiated automatically, the visual element set for the detection tool, which initiated the alarm event, is displayed in the Surveillance window: either a detection area or virtual line that, when crossed, cause the detection tool to generate an event. The object that caused the detection tool to generate an alarm is outlined with a red border.

Display of the **Area** visual element:



Display of the **Line** visual element:



The name of the detection tool that initiated the alarm event is displayed above the buttons for alarm assessment.

To navigate the fragment of the alarm event, use the advanced panel (see Navigating using the advanced panel(see page 1197)) or the Playback panel (see Navigating using the Playback panel(see page 1201)).

To go to the required fragment of the alarm event in order to play it again, hold the timeline pointer with the left mouse button and drag it to the required position.

To go to the beginning of the alarm event, click the  button.

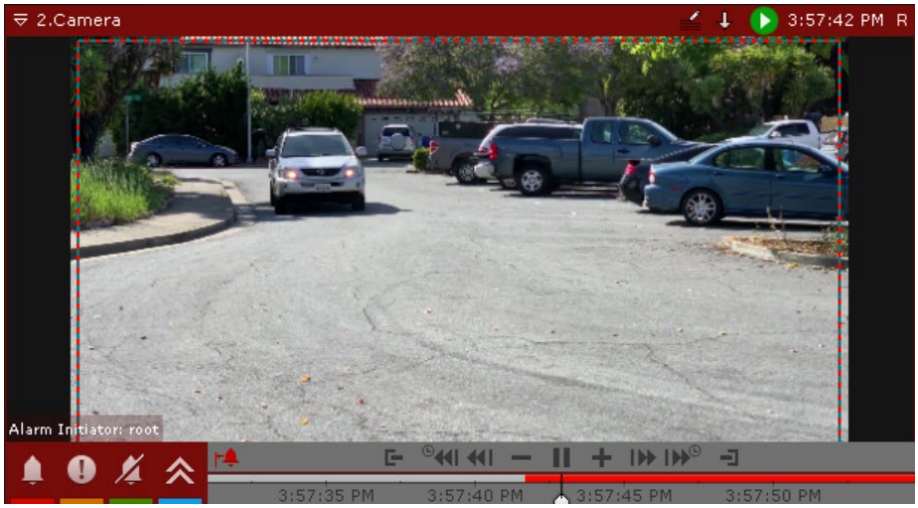
20.2.4.4.3 Assessing an alarm event

Assessing an alarm event allows you to assign statuses to different alarm events based on their significance and criticality.

To assess an alarm event, go to the Alarm management mode (see Switching to the Alarm management mode(see page 1181)). To assess an alarm event, use the group of colored buttons in the lower left corner of the Alarm management window.

After assessing an alarm event, the **Surveillance window** on the given Client automatically switches to the Live mode. The corresponding alarm event is no longer in the **Alert** tab and is assigned a specific status.

> **Attention!**
>
> In the case of multi-user alarm event processing, only the first operator who switched to the Alarm management mode can assess an alarm event (if they have the appropriate permissions). For the rest of the operators, the alarm event assessment buttons are not displayed.



Button	Executed function
	The **Confirmed alarm event** status is assigned
	The **Suspicious alarm event** status is assigned
	The **False alarm event** status is assigned
	Alarm escalation

You can specify the time within which an alarm event must be taken into processing, otherwise it is assigned the **Skipped** status (see Configuring Alarm processing(see page 1011)).

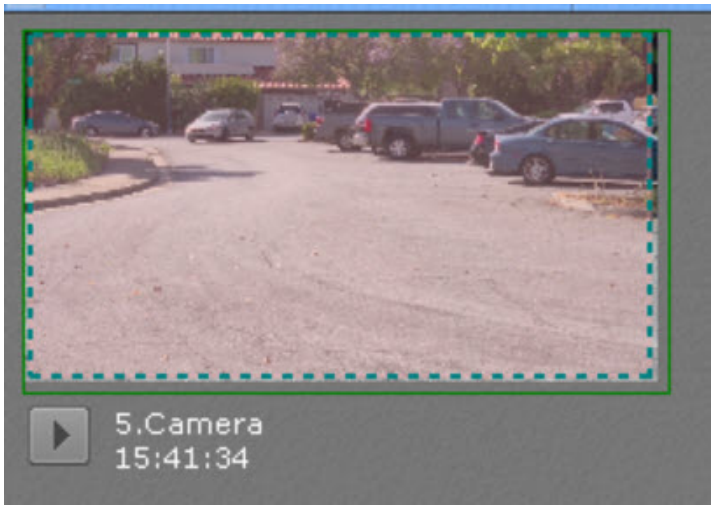
Note

The statuses of alarm events are displayed on the timeline using color indicators (see The Timeline(see page 1122)).

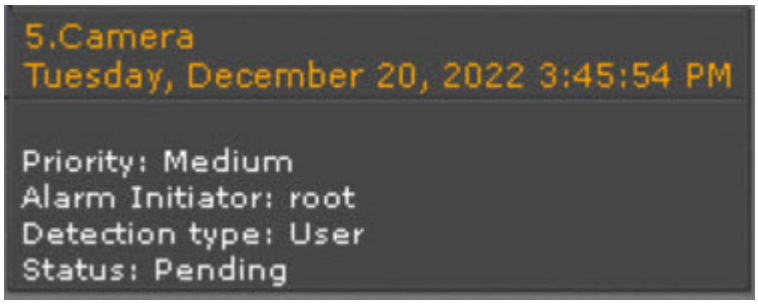
20.2.4.4.4 Working with assessment of an alarm event

20.2.4.4.4.1 Displaying and viewing alarm events

Each alarm event is displayed on the panel as follows: the event preview window with the first frame of the alarm event; under the preview window, there is a playback button, time when the alarm event occurred and the name of the camera.



When you hover the mouse cursor over the event preview window, the additional information about the alarm event is displayed:



When you click the  button, the alarm event is cyclically played back in the preview window. To stop the playback, click the  button.

When you click the alarm event preview window on the panel, the alarm event is played back in the Surveillance window.

If you click the  button on the panel, the alarm event is played back on the temporary layout containing only the specified camera.

If you don't click this button, the alarm event is played back in the Surveillance window on the regular layout.

If the **Alert panel** is added to the regular layout, the **Alert panel** displays alarm events in the top-down priority order. The alarm priority icons are displayed at the top of the event preview window:

 —maximum priority;

 —high priority;

 —medium priority;

 —low priority;

 —minimum priority.

20.2.4.4.2 Outlining an object that initiated an alarm event

In the event preview window, you can outline an object that initiated an alarm event. To do this, click the  button.

> **Note**
>
> The object can be outlined only if the alarm event was initiated by the detection tool.

To undo object outlining, click the  button again.

20.2.4.4.3 Selecting an alarm event for processing

When you click the event preview window, a layout, selected according to the following algorithm, opens on the monitor:

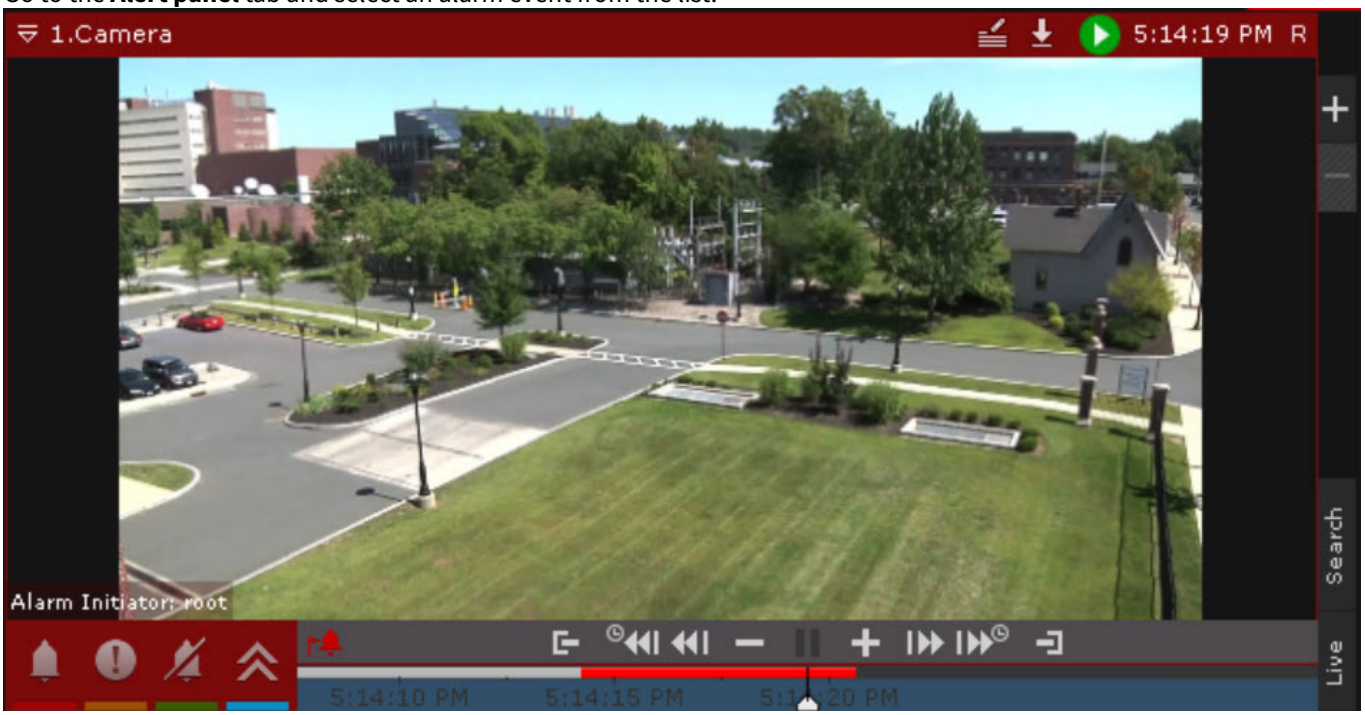
1. The system searches for the layouts that contain a camera that has the selected alarm event and are available for the current user.
2. The system chooses the layout with the minimum number of cells to display the selected camera.
3. If the required layout doesn't exist, the system creates a new layout with a single camera.
4. The system switches to the selected layout.
5. The camera becomes active on the selected layout. The Surveillance window is expanded by one step. It switches to the Alarm management mode (if you selected an active alarm) or to the Archive mode (if you selected a processed or a missed alarm event).

20.2.4.5 Limitations when working with alarm events in case of multi-user processing

In the case of multi-user processing, only one operator can take an alarm event into processing. Other operators can switch to the Alarm management mode with limited functionality for the purpose of playing back the alarm event. This can be done in one of two ways:

1. Click the  button (see Switching to the Alarm management mode(see page 1181)).

2. Go to the **Alert panel** tab and select an alarm event from the list.



In the Alarm management mode with limited functionality, the Alarm management buttons are not displayed. Instead, the name of the operator who is currently processing the alarm event is displayed. Other functions of the alarm processing window remain unchanged.

When an operator takes an alarm event into processing, another operator cannot take this event into processing.

After processing an event on another Client, the assigned status of the alarm event is displayed on this Client instead of the operator name.

If an operator, who took the alarm event into processing, exits the Alarm management mode (switches to the Live mode, Archive or Archive Search mode, to the window of another camera, and so on), and the time equal to the time of operator inactivity has elapsed since the moment of operator exit, then other operators are able to take the alarm event into processing.

If more than one alarm event appears for one camera, any operator can access all events not yet taken into processing.

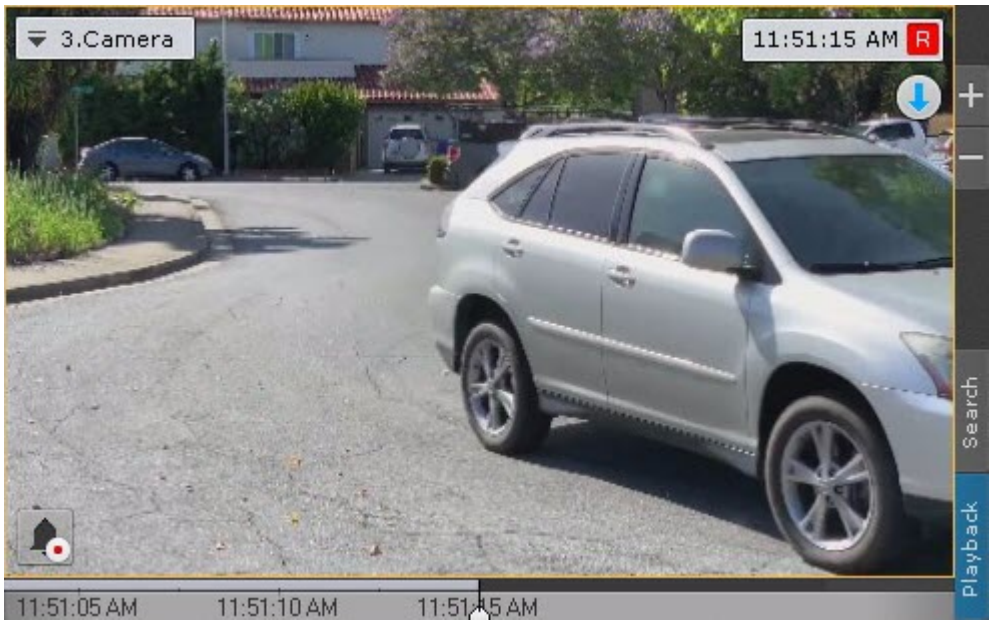
20.2.5 Video surveillance in the Archive mode

20.2.5.1 Switching to the Archive mode

To switch from a different surveillance mode to the Archive mode, click the **Playback** tab in the lower right corner of the Surveillance window.

Note

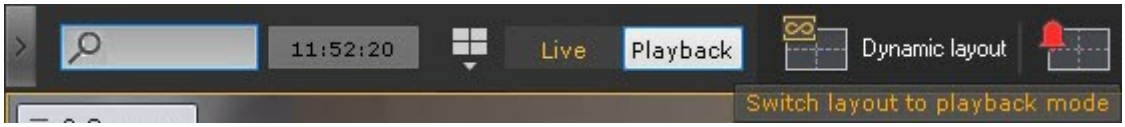
- If a camera isn't linked to a video archive and has no embedded storage, this tab isn't available.
- If you use an embedded storage, you can switch to the Archive mode only after an embedded storage is loaded (the icon of an embedded storage in the device tree on the **Devices** tab turns green).
- If a camera is in the Archive mode and video is paused, then after you drag another camera into its cell (from the device tree, search panel, or map), the new camera remains in the Archive mode with video paused. If the video is played back, the new camera is also displayed in the Archive view mode with the video played black.



You can also switch from the Live mode to the Archive mode using the advanced archive navigation panel (see Advanced archive navigation panel(see page 1115)).

> **Note**
>
> In the Live mode, if the Surveillance window is inactive, the tabs for switching to other modes and the advanced archive navigation panel are not displayed. To display them, click the Surveillance window with any mouse button.

To switch all cameras within a layout to the Archive mode, click the **Playback** button on the upper panel.



To return to the Live mode, click the **Live** button.

If all cameras within a layout are in the Live mode, you must open the Archive navigation panel to switch the cameras to the Archive mode (see Displaying and hiding the archive navigation panel(see page 1118)).

> **Note**
>
> If the Archive mode is selected as the default video mode for a camera in a layout, when you switch to that layout, the camera is immediately in the Archive mode (see Selecting the default video mode for a camera(see page 956)).

The first time you switch to the Archive mode on the timeline (see The Timeline(see page 1122)), the most recently recorded video is selected. In the future, when you go to the archive of a particular camera, the timeline indicator is in the position corresponding to the last position in the Archive mode.

> **Attention!**
>
> If you prefer to open the most recently recorded video when accessing the archive, create the **ResetArchivePosition** key in the HKEY_LOCAL_MACHINE\SOFTWARE\AxxonSoft registry on the client.

Click to create a temporary layout with cameras in the Archive mode only.

This layout is automatically deleted when you select any other layout.

20.2.5.2 Functions of video surveillance available in the archive mode

The following video surveillance functions are available in the archive mode:

1. Autozoom. For the description of the **Autozoom** feature, see Live video surveillance(see page 1159).
2. Selecting an archive for viewing recordings.
3. Viewing combined archive.
4. Synchronized playback of archives.
5. Compressed playback of archives.
6. Viewing archive with operator comments.
7. Viewing external archives.
8. Navigating through the archive.
9. Displaying the reasons the scene analytics detectors generated an event.
10. Viewing the results of a saved search query.
11. Manual archive replication.
12. Tag&Track Lite(see page 253).
13. Functions available in all video surveillance modes(see page 1139).

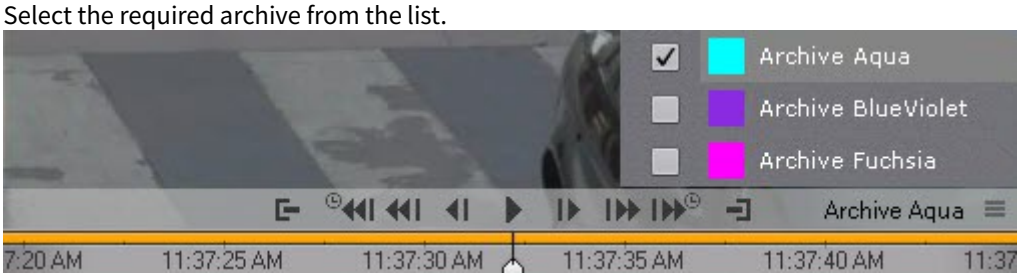
20.2.5.3 Selecting an archive

You can select an archive to view only if the camera is recording to several archives.

Initially, playback is performed from the default archive (see Configuring recording to an archive(see page 295)).

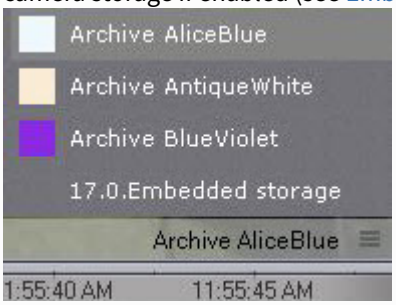
To select another archive for playback, do the following:

1. Click the archive name or the button on the advanced archive navigation panel.
2. Select the required archive from the list.



Note

You can select all available mirror archives if any (see Configuring data replication(see page 298)) and embedded camera storage if enabled (see Embedded storage(see page 234)).



You can now view the selected archive in the Surveillance window.

Attention!

- The next time you switch to the Archive mode, the selected archive (not the default archive) is displayed.
- If there are no recordings in the selected archive, a corresponding message is displayed in the Surveillance window.

20.2.5.4 Viewing a combined archive

In some cases, video from a camera can go into several different archives.

For example, video from Detection tool 1 is recorded into Archive 1, and video from Detection tool 2 is recorded into Archive 2.

For such cases, *Axxon One* provides a visual combination of records from different archives.

To view a combined archive, do the following:

1. Go to the archive selection menu (see Selecting an archive(see page 1189)).
2. Set the checkboxes next to the archives that you want to combine.



As a result, records from the selected archives appear on the timeline. All system functions are available for working with the combined archive.

> **Note**
>
> When you click a particular archive, you go to viewing videos from this archive only.
> If you select multiple archives for a particular camera, and then switch the layout to the Archive mode (see Switching to the Archive mode(see page 1187)), all cameras will be set to multi-archive display.

When combining multiple streams from the same camera into one archive, the highest quality stream is prioritized.

For example, if:

- a lower quality video stream is permanently recorded into Archive 1,
- and a high-quality video stream is recorded into Archive 2 when events are received from the Detection tool,

then the combined archive consists of high-quality videos of the moments when an event is received from the Detection tool and of low-quality videos recorded at other times.

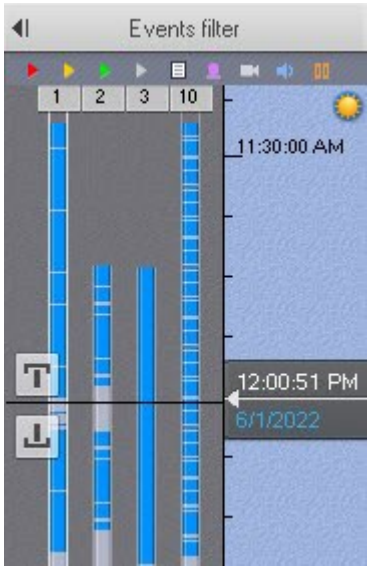
20.2.5.5 Synchronized playback of archives

Synchronized playback of archives allows you to playback archives from several cameras simultaneously.

To enable synchronized playback, switch several cameras into the Archive mode.

> **Note**
>
> You can switch all cameras on the layout to the Archive mode (see Switching to the Archive mode(see page 1187)).

The timeline will then display the time axes of the corresponding archives.



Synchronized archive playback is controlled through the playback panel in the same way as playback of a single archive.

20.2.5.6 Compressed playback of archives (TimeCompressor)

During compressed playback (TimeCompressor), the **Surveillance window** simultaneously displays tracked objects from different moments in time within the selected part of the archive. This allows you to quickly look through the archive to find important events and investigate them in more detail.

For the compressed playback of a camera archive, the following conditions must be met:

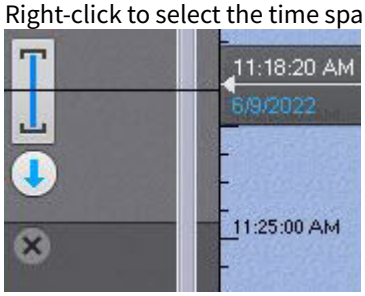
1. Camera is linked to an archive (see Configuring recording to an archive(see page 295)).
2. Camera must have at least one active source of metadata (**Object tracker**, **Motion detection**, **Embedded Detection**).

> **Attention!**
>
> For the **Object tracker**, you must select the video stream currently selected for recording to an archive (see Configuring the Object tracker(see page 415)).

20.2.5.6.1 Switching to the TimeCompressor mode

To switch to the TimeCompressor mode, do the following:

1. You can specify the time span for viewing archive in the TimeCompressor mode on the timeline in one of the following ways:
   a. Set the pointer to the position from which (and to the end) the archive will be viewed (see Navigating using the Timeline(see page 1196)).
   b. Right-click to select the time span.



> **Note**
>
> The TimeCompressor mode allows you to view the results of a specific archive search (see Viewing search results in the TimeCompressor mode(see page 1248)).

2. Click the  button on the advanced archive navigation panel.

The archive is played back in the compressed mode.



Note

- Only one camera can be in the TimeCompressor mode at a time. If synchronized archive playback is started and one camera is switched to the TimeCompressor mode, playback of all other cameras is automatically paused.
- To switch back to the standard archive viewing mode, click the displayed area of the advanced archive navigation panel  .

20.2.5.6.2 Playback control

Playback control in the TimeCompressor mode is managed using the advanced navigation panel and the playback panel.

To specify the required number of tracked objects to be simultaneously displayed, set the slider in the appropriate position (**1**). The extreme left position of the slider corresponds to two objects, the extreme right corresponds to 16 objects.



Note

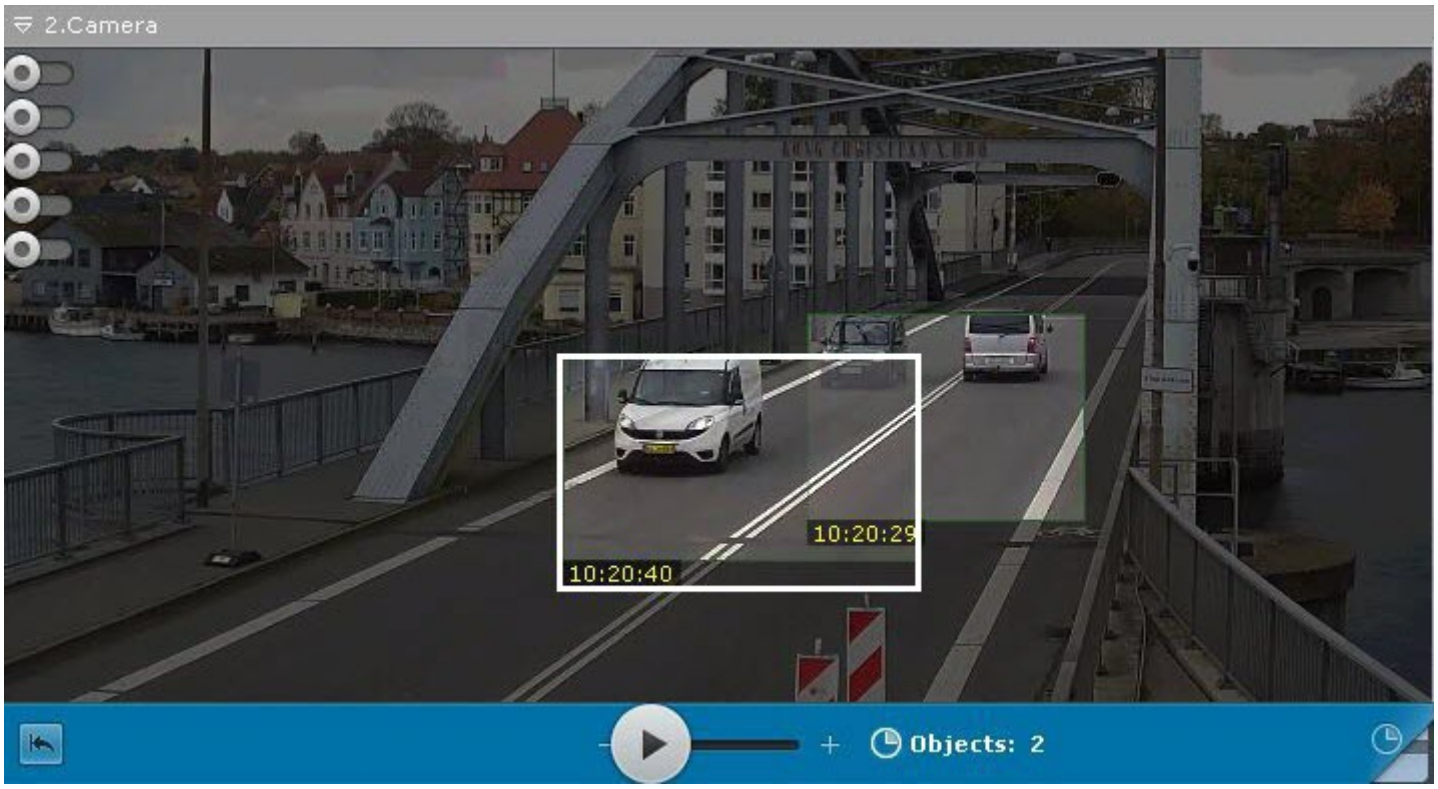
- Once you have specified this setting, playback begins from the beginning of the selected interval.
- According to the logic of the algorithm, the number of displayed objects can be greater than the specified number.

To stop or start playback, use the  and  buttons on the playback panel or the identical buttons on the advanced navigation panel.

To start archive playback in the TimeCompressor mode from the beginning of the selected interval, click the  button (**2**).

20.2.5.6.3 Switching back to the original recording of an object

To switch back to the original recording of an object from the TimeCompressor mode, left-click the required object.



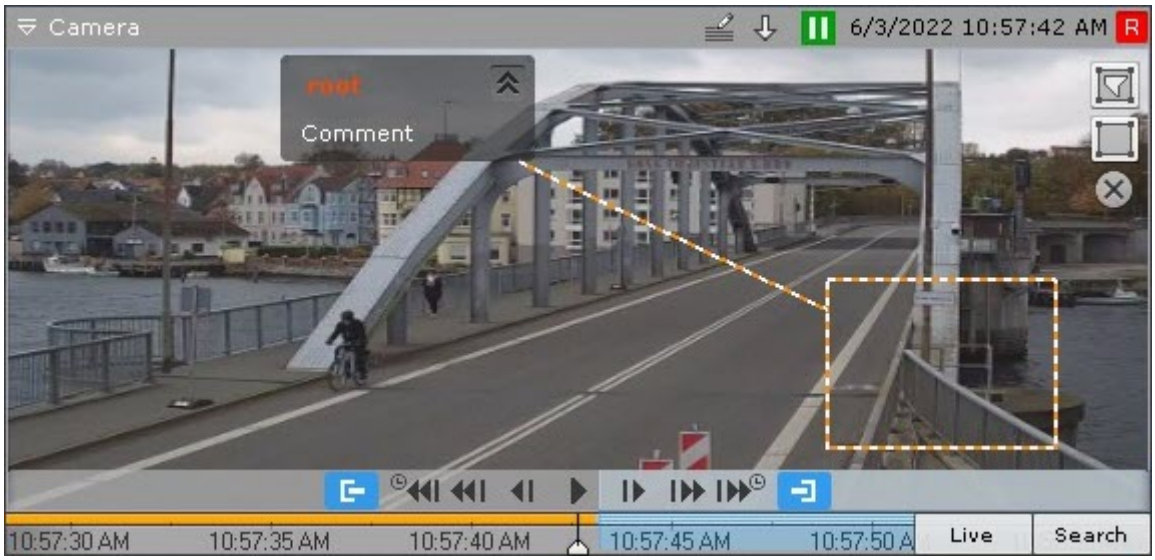
The system automatically switches back to the original recording of the object in the standard archive playback mode. Playback of the recording is paused, and the beginning of the recording corresponds to the moment at which the object was selected. The time when the object appears in the camera FOV is displayed in the Surveillance window.

Note

Once you switched back to the original recording of the object, you can return to the TimeCompressor mode to the time when you switched back to the original recording. To do this, click the  button. In this case, playback in theTimeCompressor mode is paused.

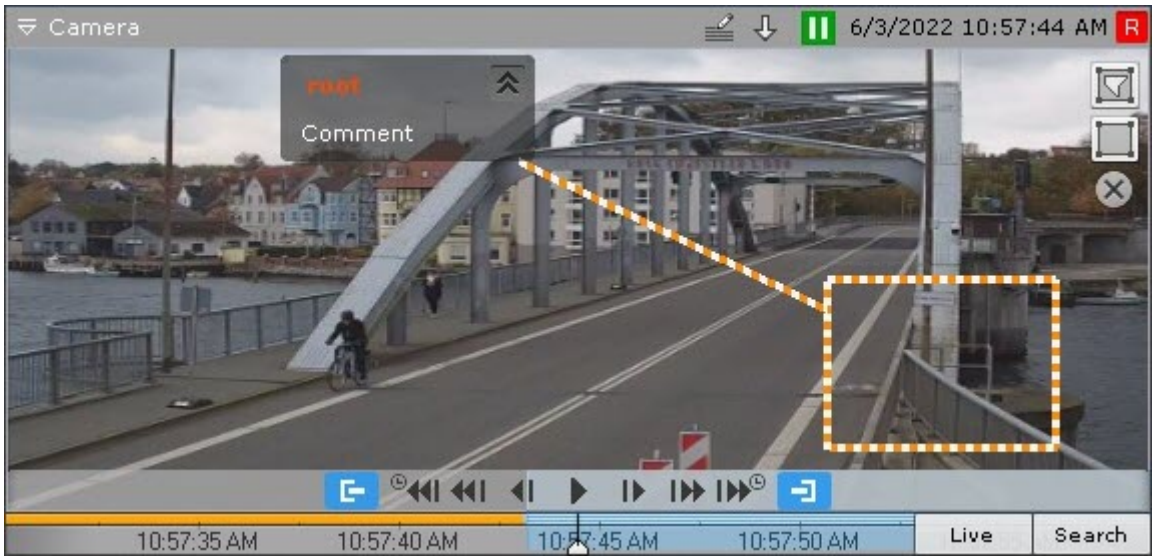
20.2.5.7 Viewing archive with operator comments

When you playback the archive, operator comments are displayed in the Surveillance window.



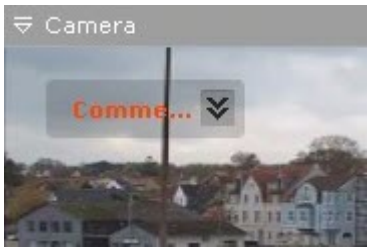
Text of a comment is displayed five seconds before the frame for which the comment was added (before the first frame, if the comment was added for an interval). The area (or point) that was specified when adding the comment is gradually outlined.

When the commented frame is displayed or during the commented interval, the area (or point) is also highlighted.



Five seconds after the commented frame (after the end of the interval, if the comment was added for an interval), the comment is hidden.

To minimize comments and the displayed area, if any was specified, click the button.



To return to the full comment, click the button.

20.2.5.8 Viewing external archive

External archive is a collection of time-referenced videos.

If you go to the Archive mode, the timeline shows available videos. If there is no time overlapping for video recordings, the space between them is blank.

If video recordings overlap, they are displayed as one track that spans from the beginning of the first video to the end of the second.

In this case, the first video is played back entirely, and the second video is played back from the moment corresponding to the end of the first video.

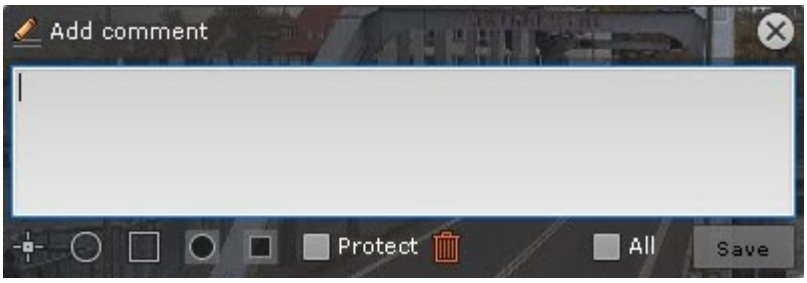
20.2.5.9 Deleting a part of archive

You can delete an arbitrary part of an archive. To do this, do the following:

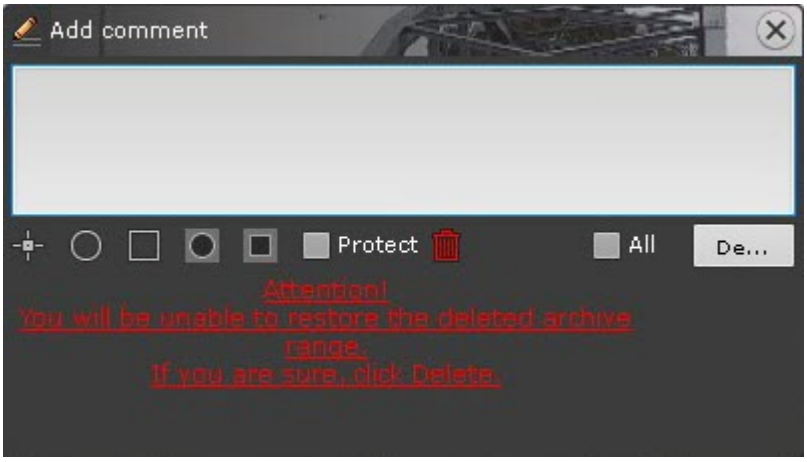
1. Specify the time interval of the archive that you want to delete:
    a. On the main timeline, set the indicator to the beginning of the interval, click the button, then set the indicator to the end of the interval and click the button again. You can also select the export interval with the right mouse button. To delete the interval, click the button.

b. On the advanced navigation panel, you can specify the time interval in the same way using the buttons. You cannot select the interval with the mouse on the advanced panel.

2. Click the button in the Surveillance window.



3. If several cameras are in the Archive mode, to delete the selected interval for several devices, set the **All** checkbox.
4. Click the button.



5. Click the **Delete** button to confirm the deletion.

> **Attention!**
>
> You cannot recover deleted videos.
> If several archives were selected for viewing (see Viewing a combined archive(see page 1190)), video is deleted from all of them.

After deleting a part of the archive, artifacts can appear on the video near the borders of the deleted interval.

20.2.5.10 Navigating in the archive

You can navigate in the archive using the following interface elements:

1. Timeline(see page 1196).
2. Advanced navigation panel(see page 1197).
3. Events list(see page 1199).
4. Playback panel(see page 1201).
5. Time indicator(see page 1201).
6. Using keyboard(see page 1202).

20.2.5.10.1 Navigating using the Timeline

> **Note**
>
> For the detailed information on working with the timeline, see The Timeline(see page 1122).

Using the timeline, you can select a video in the archive for playback in the Surveillance window in two ways:

1. Left-click the indicator and drag it to the corresponding position on the timeline, or left-click the left part of the timeline.

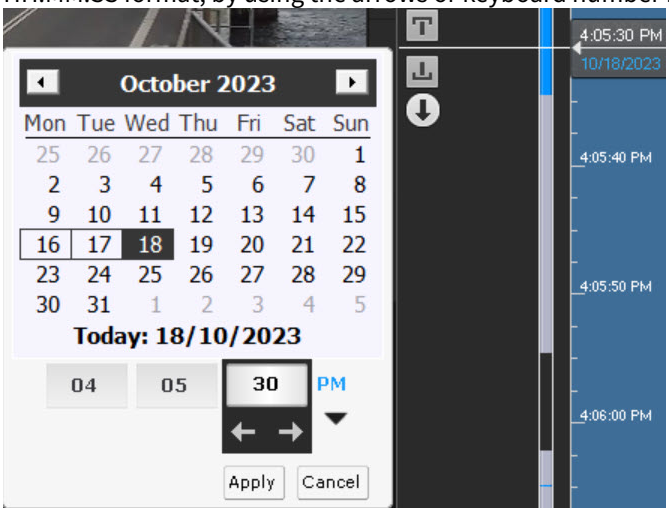
> **Note**
>
> The position on the timeline is a graphical representation of a specific moment in time.

The frame corresponding to the selected position (moment in time) is displayed in the Surveillance window.



> **Attention!**
>
> If the system clock is shifted back one hour (for example, in winter saving), the timeline doesn't display one hour of videos, but access to these videos remains.
> For example, at 3 AM the clock is shifted back one hour. If you place the timeline indicator anywhere after 02:00:00, videos made after the shift are played back.
> If you set the indicator to 01:59:59 or earlier, videos made from 01:59:59 to 02:59:59 (time stamped before the shift) are played back.

2. Click the indicator. The calendar opens. Select the date to which you want to jump in the archive and specify the time in HH:MM:SS format, by using the arrows or keyboard number keys.



> **Note**
>
> You can use the **Tab** key to navigate across various elements of the calendar.

As a result, you go to the specified position in the archive.

If one camera is in the Archive mode and you move the indicator to a point where there is no video, the indicator automatically goes to the position corresponding to the nearest video. If two or more cameras are in the Archive mode, you aren't able to go to the nearest video, the message **No archive** is displayed on the screen.

To playback the selected recording, use the playback panel (see Navigating Using the Playback Panel(see page 1199)).

20.2.5.10.2 Navigating using the advanced panel

You can use the advanced navigation panel to select recordings in the archive for playback in the Surveillance window. To do this, complete one of the following actions:

1. Left-click the timeline and hold down the button while dragging the timeline to the required position.
2. Left-click the required moment in time on the timeline.
3. Left-click and hold the required moment in time on the timeline.



When you left-click and hold left the mouse button and the timeline is moved, you can view the corresponding recording in fast forward. The further left you click, the faster is the playback speed.

Note

The current moment in time is determined by the cursor located in the center of the timeline. The position of the cursor relative to the timeline never changes.

Once the selected moment is reached, playback stops. The speed of playback depends on the speed of the timeline movement.

To start archive playback, click the  button in the middle of the timeline. To pause playback, click the  button or left-click the timeline.

To control playback, use the playback panel (see Navigating Using the Playback Panel(see page 1199)) or the advanced navigation panel.

Playback		Pause	
Icon	Description	Icon	Description
	Decreases playback speed by one step		Go to the previous frame
	Increases playback speed by one step		Go to the next frame

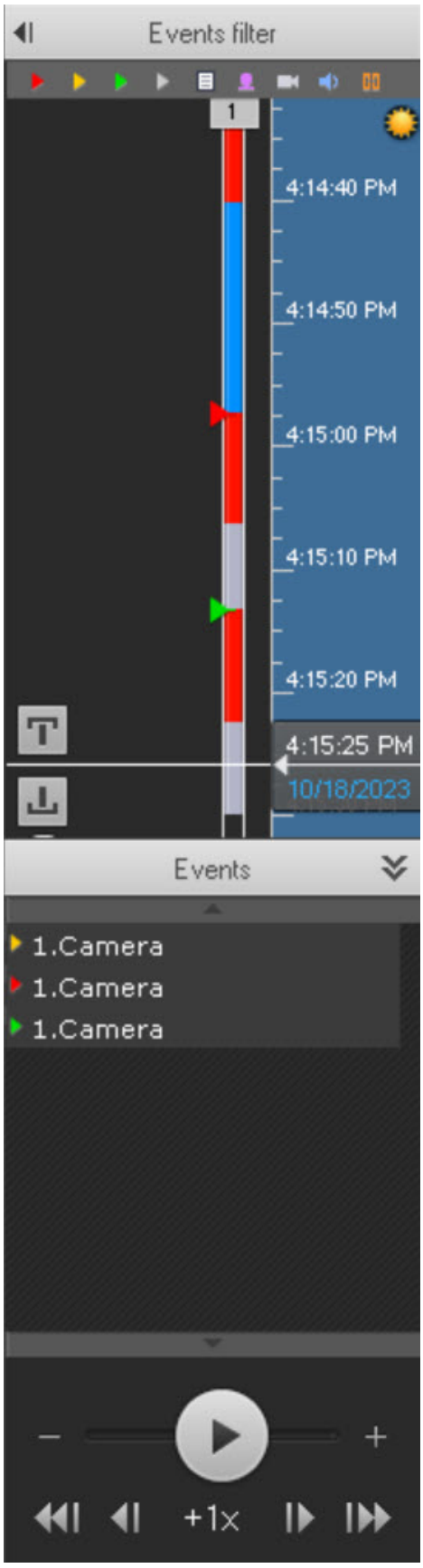
Playback		Pause	
	Go to the previous recording		Go to the previous recording
	Go to the next recording		Go to the next recording
	Jump back by N* seconds		Jump forward by N* seconds
*see Navigating using the advanced panel(see page 1197)			

Attention!

Click and hold for more than 3 seconds the  button to jump to the end of the archive.

20.2.5.10.3 Navigating using the Events list

The Events list and the timeline are dynamically linked: when you select an event in the list, the timeline indicator automatically jumps to the selected position.



For the detailed information, see Events List(see page 1125).

20.2.5.10.4 Navigating using the Playback panel

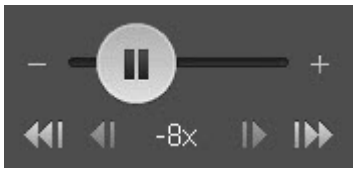
To navigate in the archive using the playback panel, you must first select a recording for playback.

Once you select a recording, the following operations are available:

1. Play recording: .
2. Pause playback: .
3. Go to the previous frame .
4. Go to the next frame .
5. Go to the previous recording .
6. Go to the next recording .

You can speed up, slow down, and change the direction (forward/reverse) of playback.

Fast reverse playback:



Slow forward playback:



For reverse playback of a recording, move the slider to the left of the position corresponding to zero playback speed (the center of the slider); for forward playback, move it to the right. The current playback speed is displayed below the slider. During forward playback of a recording, a + icon appears before the speed; during reverse playback, a − icon appears.

The value **0X** corresponds to zero speed, that is, no playback; the value **1X** corresponds to the frame rate of recording.

To speed up the playback by one step, click +. To slow down by one step, click −. To temporarily change the playback speed, move the slider to the required direction.

To slow down the playback by N-fold, do as follows:

1. Speed up the playback by N-fold.
2. Click the value of the current playback speed below the slider.

This slows the playback by N-fold. To return to the fast playback, click the current speed again.

If one camera is in the Archive mode, you can speed up or slow down the playback by up to 128-fold. If several cameras are in the Archive mode, then you can speed up and slow down the playback by up to 32-fold.

> **Note**
>
> When you play back a recording in the Archive mode at 16X speed or faster, the playback is switched to the playback by key frames.

20.2.5.10.5 Navigating using the time indicator

Using the time indicator in the Surveillance window, you can set the time of the current day on the timeline to which you want to navigate in the archive.

To do so, left-click the indicator and specify the time in HH:MM:SS format using the arrows or keyboard number keys.



As a result, you go to the specified position in the archive.

If one camera is in the Archive mode and you move the indicator to a point where there is no video, the indicator automatically goes to the position corresponding to the nearest video. If two or more cameras are in the Archive mode, you aren't able to go to the nearest video, the message **No archive** is displayed on the screen.

20.2.5.10.6 Navigating using keyboard

You can navigate through the archive and control video playback using the keyboard.

Key or key combination	Action during pause	Action during playback
Spacebar	Begins playback	Pauses playback
Ctrl+Spacebar	Uses the current position to set the export interval	Uses the current position to set the export interval
Up arrow	Increases playback speed by one step	Increases playback speed by one step
Down arrow	Decreases playback speed by one step	Decreases playback speed by one step
Left arrow	Moves back to the previous key frame	-
Right arrow	Moves forward to the next key frame	-
Page up	Moves to the previous recording	Moves to the previous recording
Page down	Moves to the next recording	Moves to the next recording

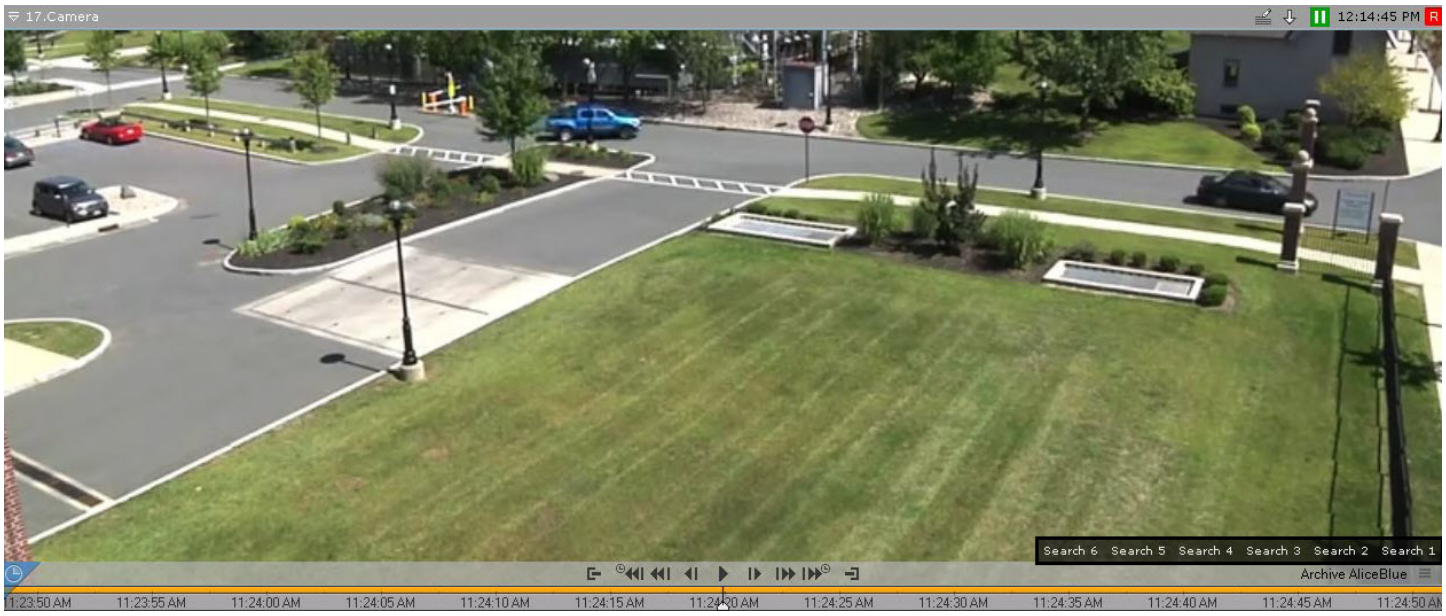
20.2.5.11 Displaying the causes for the Scene analytics detector to generate an event

When positioning the archive in the range [-1 sec; +1 sec] from when the Scene analytics detector generated an event, the objects that caused the event are outlined in the frame.

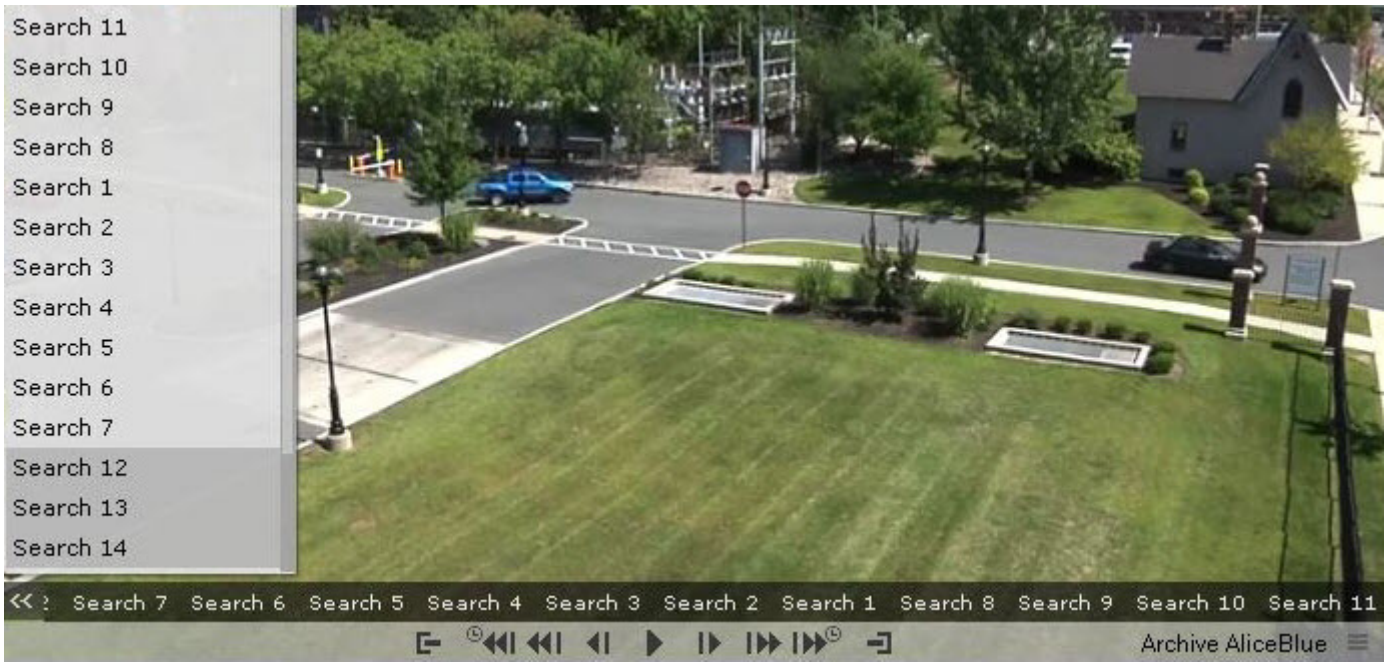


20.2.5.12 Viewing the results of a saved search query

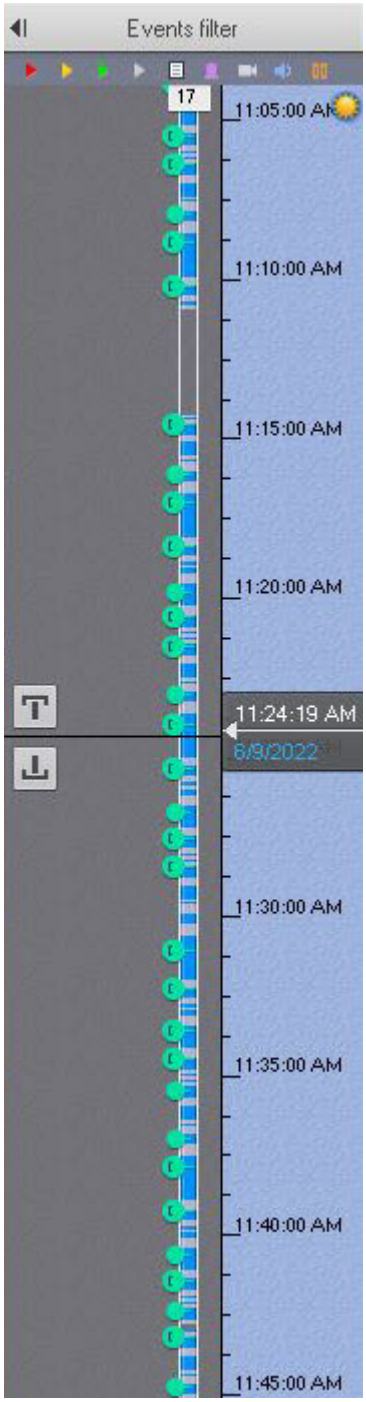
If the system has saved Search in archive queries for a camera, tabs for these queries are displayed in the lower right corner of the corresponding Surveillance window.



If not all tabs fit in the Surveillance window, a full list of saved Search in archive queries is available by clicking the  button.



When you click the tab, you go to the results of the corresponding search that are displayed on the timeline (similar to viewing the search results in the Archive Search mode).



The standard archive mode controls are used for navigating between search results (see Navigating in the archive(see page 1196)).

Note

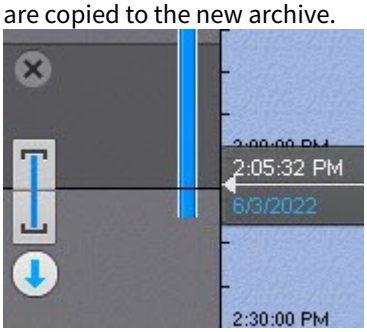
To search in the standard archive mode without displaying search results, click the corresponding tab in the Surveillance window

The parameters for the search are displayed when switching from the search results to the Archive Search mode.

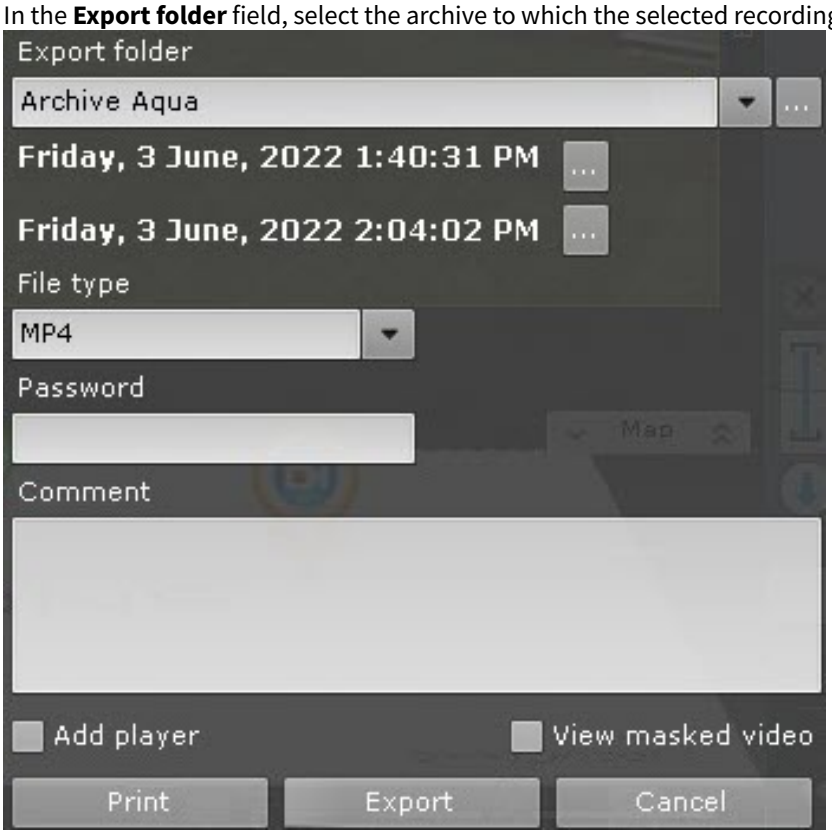
20.2.5.13 Manual archive replication

You can protect the selected part of the archive from being overwritten. To do this, do the following:

1. Create a new archive (see Creating an archive[391]) and configure on-demand replication for it (see Configuring data replication(see page 298)).
2. Switch to the Archive mode (see Switching to the Archive mode(see page 1187)).
3. Specify the time interval on the timeline (see Standard video recordings export(see page 1308)). Recordings from this interval are copied to the new archive.



4. Click the button  .
5. In the **Export folder** field, select the archive to which the selected recordings will be copied.



> **Attention!**
>
> Replication is performed only to the end of the archive. It is not possible to overwrite existing data in the archive. If the selected replication interval is earlier than the end of the mirror archive, replication is impossible (the **Export** button is unavailable).

6. Click the **Export** button.

Selected recordings are copied to the specified archive.

391 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486939/Creating+an+archive

20.2.6 Video surveillance in the Archive Search mode

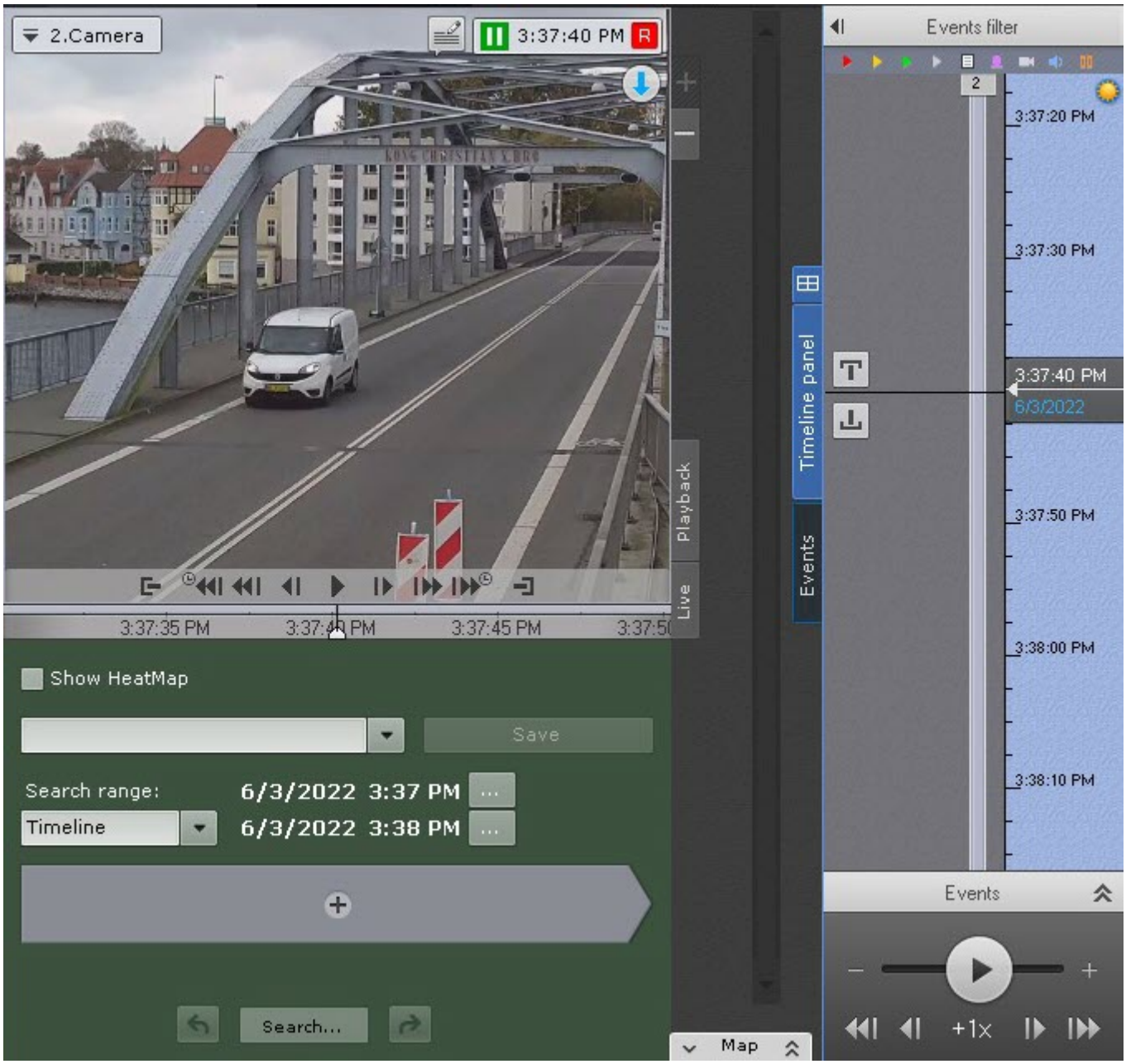
20.2.6.1 Switching to the Archive Search mode

To switch the Surveillance window from a different surveillance mode to the Archive Search mode, click the **Search** tab in the lower right corner of the window.

> **Note**
>
> - If a camera isn't linked to a video archive, this tab is unavailable.
> - In the Live mode, if the Surveillance window is inactive, the tabs for switching to other modes aren't displayed. To display the tabs, click the Surveillance window with any mouse button.



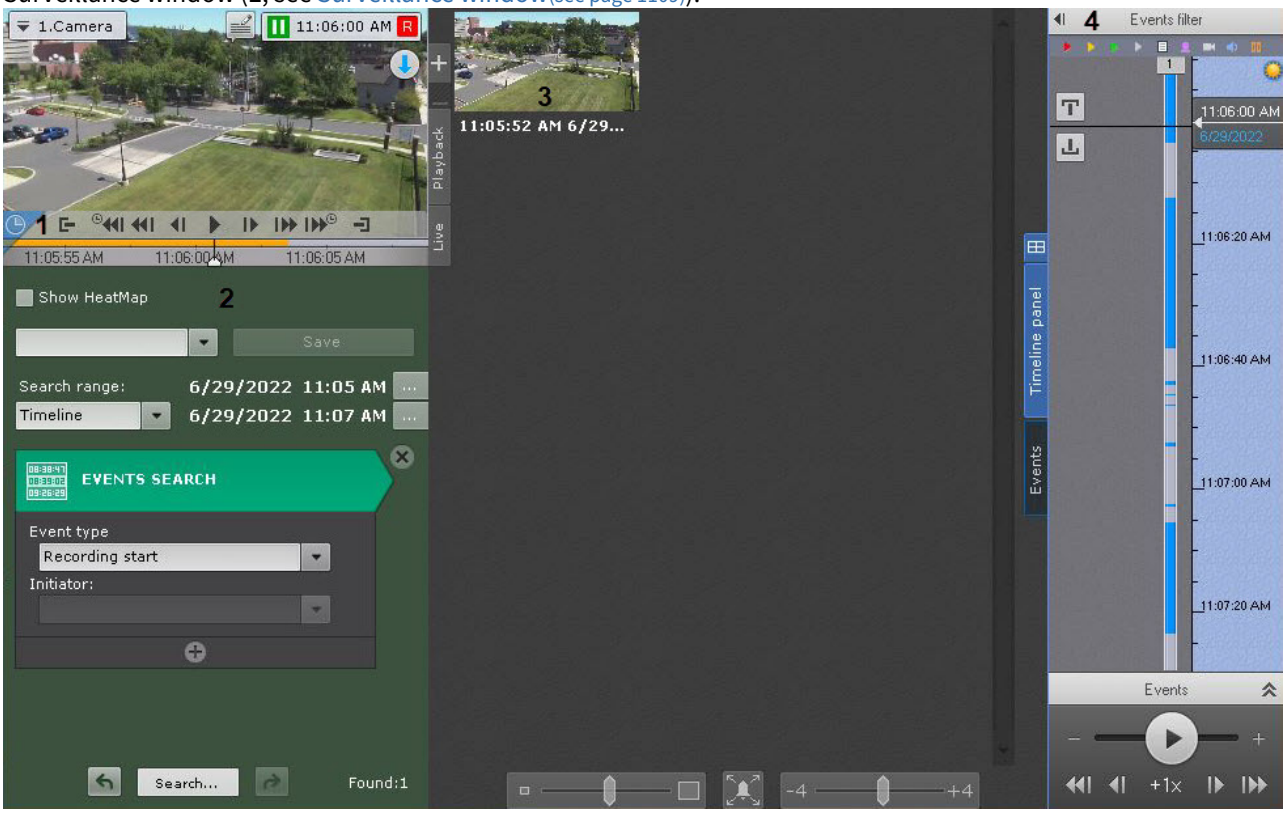
As a result, the interface of the Archive Search mode is displayed.



20.2.6.2 Interface of the Archive Search mode

The visual layout of the Archive Search mode is divided into four parts:

1. Surveillance window (**1**, see Surveillance window(see page 1109)).



2. Search control panel (**2**, see Search in the archive of a single camera(see page 1211)).
3. Search results panel (**3**, see Viewing search results(see page 1247)).
4. Archive navigation panel (**4**, see The Archive Navigation Panel(see page 1118)).

You can hide search parameters for a portrait-oriented camera. To do so, click the button.



To unhide, click the button.

20.2.6.3 Video surveillance functions available in the Archive Search mode

In the Archive Search mode, the following video surveillance functions are available:

1. Selecting an archive for video recording analysis.
2. Autozoom.
3. Navigating through the archive.
4. Display of the causes of receiving events from standard sub-detectors.
5. Viewing archive with operator comments.
6. Events search.
7. Thumbnail search.
8. Comments search.
9. Search in archive.
10. Search by titles.
11. Search by LPs.
12. Face search.
13. Switching between search results.
14. Playing back fragments corresponding to the found moments.
15. Zooming in on an object that caused the detector to generate an event.
16. Functions available in all video surveillance modes(see page 1139).

Note

For the description of the **Autozoom** function, see Autozoom(see page 1164). Navigation through the archive, viewing archive with operator comments, displaying the causes of receiving events from standard sub-detectors, and the **Archive Selection** function are inherited from the Archive mode. For their description, see Video surveillance in the Archive mode(see page 1187).

20.2.6.4 Search in the archive of a single camera

20.2.6.4.1 Selecting the search type

To start the search, click the + button and choose the search type.



Note

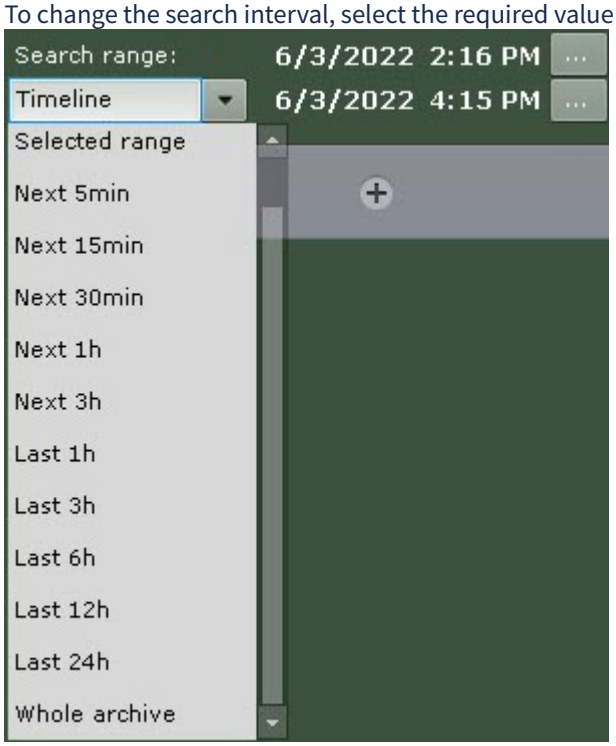
- The current *Axxon One* suite release supports only one type of search at a time.
- In the embedded storage of the camera (see Selecting an archive(see page 1189)), you can only find videos with thumbnail search (TimeSlice).

20.2.6.4.2 Setting a search interval

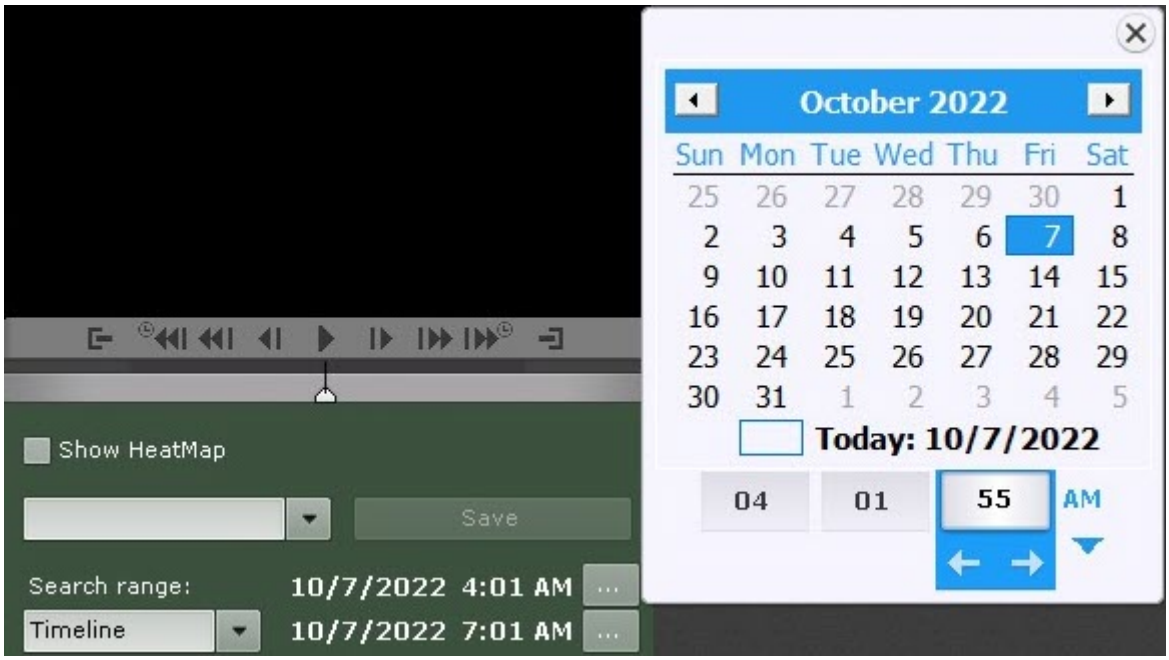
Setting a search interval is a common procedure for all types of the archive search.

By default, the search spans across the part of the archive that is displayed on the timeline (see Navigating using the Timeline(see page 1196)).

To change the search interval, select the required value from the **Search range** drop-down list.



Search range	**Description**
Timeline	The search spans across the part of the archive that is displayed on the timeline. The interval can also be set manually with the upper and bottom buttons ...
Selected range	The search is performed within the interval currently selected on the timeline. You can set the interval using the and buttons
Next 5min/15min/30min/1h/3h	The search is performed within the following interval [specified start of the interval; specified start of the interval + 5min/15min/30min/1h/3h]. To set the beginning of the interval, click the ... button
Last 1h/3h/6h/12h/24h	The search is performed within the last hour (or 3, 6, 12, 24 hours) of the archive
Whole archive	The search is performed in the whole archive

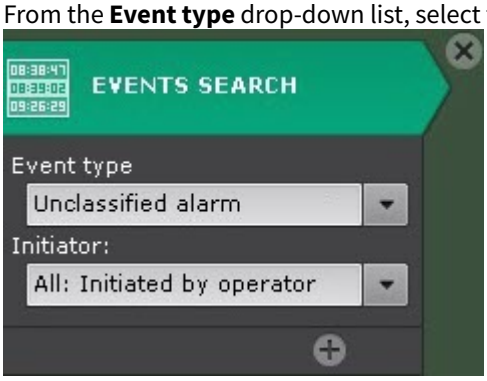


20.2.6.4.3 Events search

This type of search allows you to select events in the archive based on the type of event.

To search for events, do the following:

1. From the **Event type** drop-down list, select the type of events that you want to find.



Event	Description
All alarms	The search finds moments in the archive containing all types of alarms
Non-critical alarm	The search finds moments in the archive containing non-critical alarms
Critical alarm	The search finds moments in the archive containing critical alarms
Unclassified alarm	The search finds moments in the archive containing unclassified alarms
False alarm	The search finds moments in the archive containing false alarms
Triggering	The search finds moments when detectors generated events
Recording start	The search finds the beginning and end of recordings from the specified camera regardless of the initiator

2. In the **Initiator** field, select the event initiator from the list. An operator, camera input, camera detector, or any activated detector in the system can act as the event initiator. The search results show the moments in the archive that contain the events that are started by the initiator. When you search for any type of alarm or for the **Triggering** type of event by searching in the lists of faces (see Faces[392](AxxonNet), Faces[393](AxxonData)) or LPs (see LPs[394] (AxxonNet), LPs[395](AxxonData)), select **Real-time recognition** as an initiator with a specific list. To do this, enable the **Check in lists** parameter in the settings of the Face detectors(see page 473) and License plate detectors(see page 514) (see Checking in lists of faces(see page 499), Checking in lists of LPs(see page 668)).
3. If necessary, click the button and add more similar search conditions.
4. Set the search interval (see Setting a search interval(see page 1211)).
5. Click the **Search** button.

> **Attention!**
>
> - To search in the embedded storage of an IP device (for example, a camera or recorder) for events from the embedded detectors, you must synchronize the server and IP device (see Limitations of Axxon One(see page 84)). If you don't perform synchronization, there can be discrepancies between the time of detector events and the time of frames in the archive.
> - Once started, you can stop the search at any time. To do this, click the **Stop** button that appears instead of the **Search** button.

This starts a search in the archive based on the set criteria. Search results are available on the search results panel.

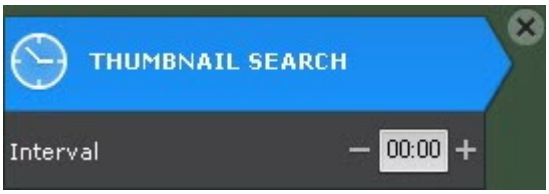
> **Note**
>
> To zoom in on the objects that cause an alarm or an event from a detector, set the **Expand alarm object** checkbox in the lower part of the search results panel.

20.2.6.4.4 Thumbnail search

You can use thumbnail search to quickly search for a moment of interest by sequentially dividing the selected time interval into fragments of a certain duration.

To perform the thumbnail search, do the following:

1. Set a search interval (see Setting a search interval(see page 1211)).
2. In the **Interval** field, specify the duration of fragments into which you want to split the selected time interval in the MM:SS format:



   a. If you don't specify the duration of fragments (00:00), the search splits the selected time interval into fragments of equal duration.
   b. If the fragment duration is different from 0, the search splits the selected time interval into fragments of the specified duration.

> **Attention!**
>
> - We recommend setting the interval to 10 seconds or more.
> - If there are omissions in the archive, they aren't considered during the fragment splitting. The archive with omissions is processed as the continuous data sequence, that is, the parts with the

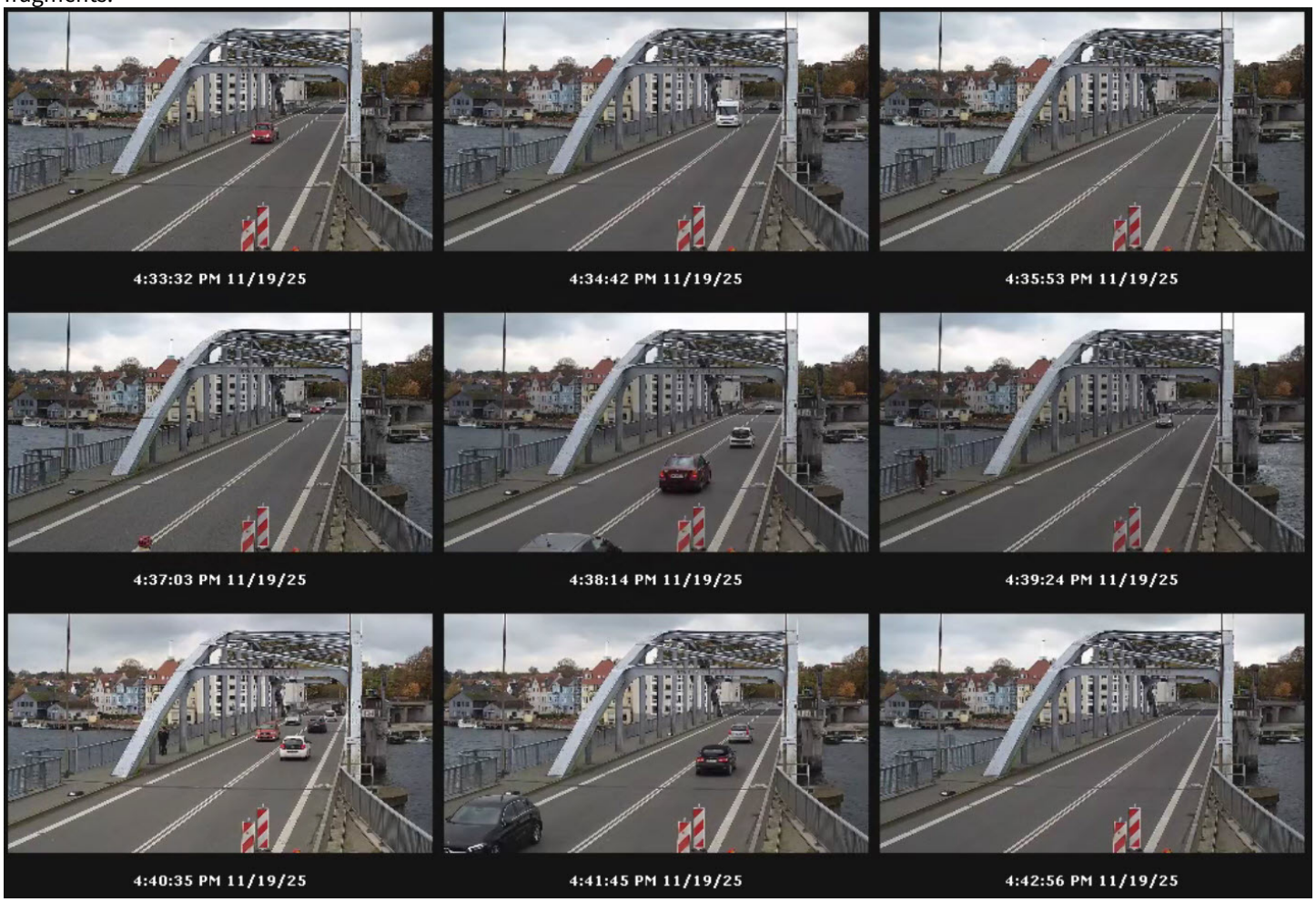
392 https://docs.axxonsoft.com/confluence/spaces/anet/pages/172810390/Faces
393 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426275/Faces+in+AxxonData
394 https://docs.axxonsoft.com/confluence/spaces/anet/pages/184380358/LPs
395 https://docs.axxonsoft.com/confluence/spaces/anet/pages/248426309/LPs+in+AxxonData

missing data are logically "glued", after which the received continuous sequence is split into equal fragments.

3. Click the **Search** 

button. Once started, you can stop the search at any time. To do this, click the **Stop** button that replaces the search button.

The search results panel displays frames that match equal periods of time. The search control panel shows the number of found fragments.



The number of displayed fragments on the results panel depends on the screen resolution and fragment size. You can change the fragment size using the  button.

If you can't find a moment of interest, start the second search iteration: double-click the found moment to search in the time interval from this moment to the next one. Keep searching until the specific moment is found.

Note

For the information on playing back video fragments, see Playback of video fragments(see page 1249).

20.2.6.4.5 Comments search

Comments search allows filtering for comments that contain certain text.

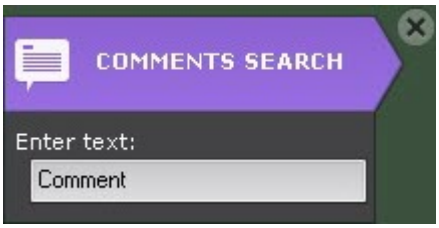
To search comments:

1. Enter the text that you want to find in comments.

Attention!

You must enter at least three characters to make a search. The search is performed for the entire string of entered text, not for separate words.
To search all comments for the selected interval, do the following:

- in *Axxon One* 1.9.0 or later versions, enter ***** (asterisk) in the search field (it represents any number of any characters);
- in earlier versions of *Axxon One*, leave the search field blank.



2. Set the search interval (see Setting a search interval(see page 1211)).
3. Click the **Search** button.

Note

After starting the search, it can be stopped at any time. To do this, click the **Stop** button which replaces the **Search** button.

This starts a search for video fragments based on the defined criteria. The search results panel displays frames, for which there are comments containing the search text. The relevant comment is displayed below each frame.



Note

If the comment was left for an interval, the first frame of the interval is displayed.

20.2.6.4.6 Search in archive

Attention!

To perform Search in archive, you must first configure it (see Configuring Search in archive(see page 999)).

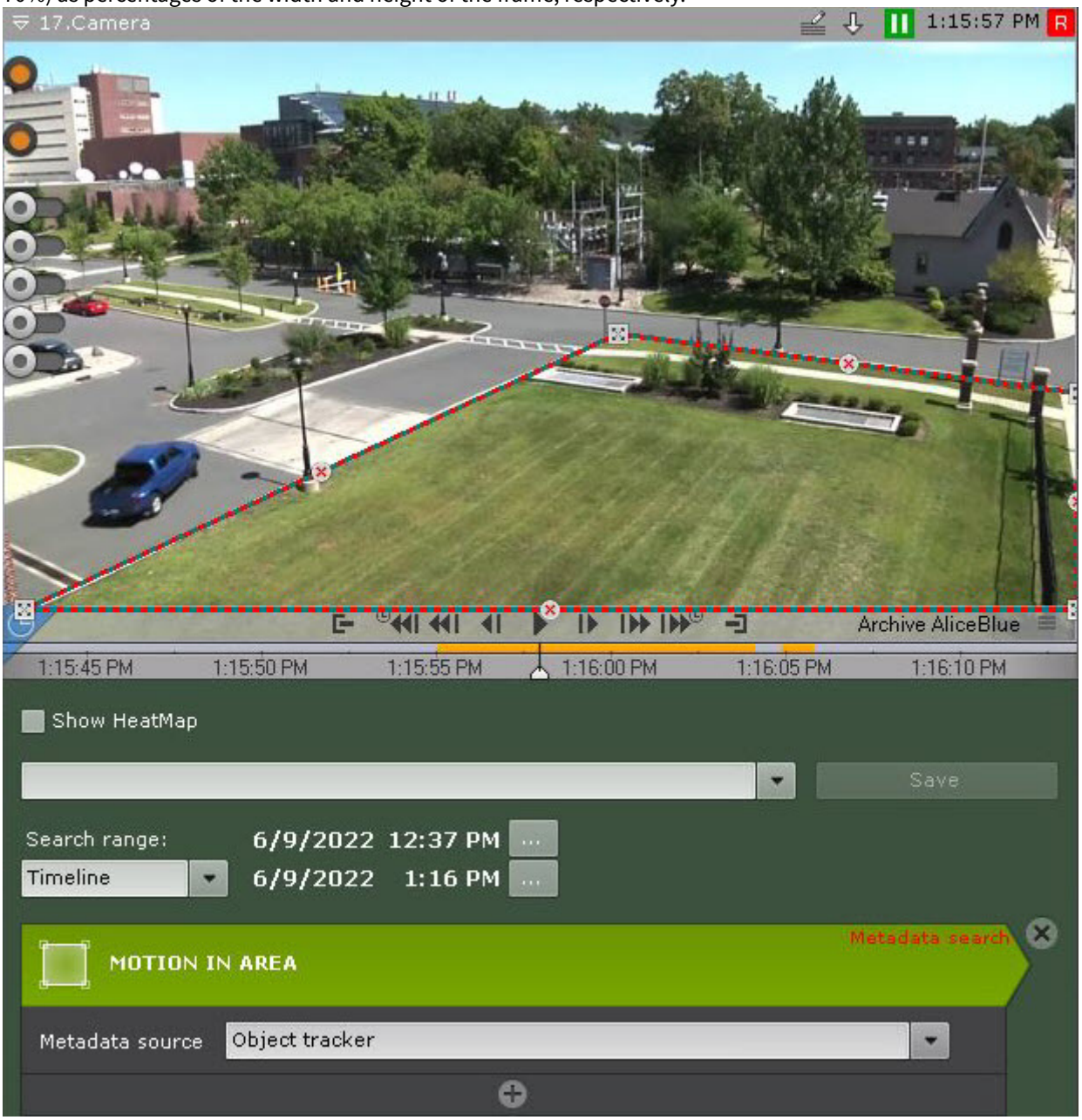
Search in archive allows you to search for moments in the archive using the following criteria:

1. Line crossing.
2. Motion in area.
3. Loitering.
4. Multiple objects.
5. Move from area to area.

20.2.6.4.6.1 Motion in area

To perform Search in archive for motion in area:

1. In the Surveillance window, specify the area you want to analyze during the search in accordance with the selected condition.
   The anchor points of an area are connected by a two-colored dotted line.
   By default, an area is defined by four anchor points with the coordinates (30%, 30%), (70%, 30%), (70%, 70%) and (30%, 70%) as percentages of the width and height of the frame, respectively.



   To edit an area, use the following actions.

Action	Result
Right-click a line	Creates a new anchor point of an area
Right-click a created anchor point	Deletes an anchor point of an area
Hover the cursor over an anchor point and, holding down the left mouse button, move the mouse	Moves an anchor point of an area

2. Select the metadata source if there are several sources for this camera. This parameter isn't displayed if there is only one source.

3. Specify any number of additional parameters by clicking , if necessary (see Configuring the search parameters(see page 1222)).
4. Set the search interval (see Setting a search interval(see page 1211)).
5. Click the **Search** button.

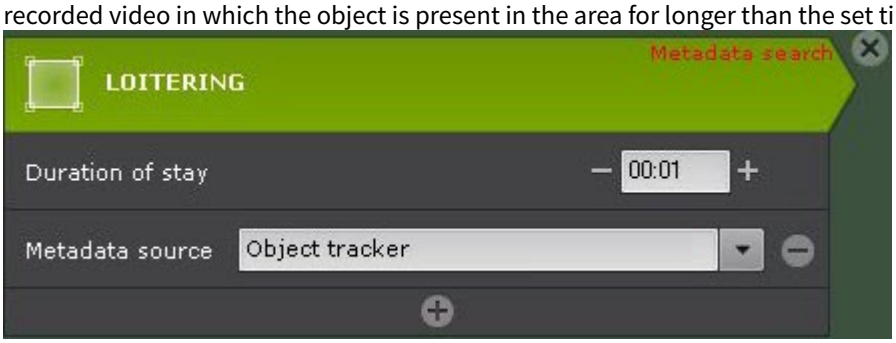
> **Note**
>
> Once started, the search can be stopped at any time. To do this, click the **Stop** button, which appears instead of the **Search** button.

The found moments are displayed in the search results panel.

20.2.6.4.6.2 Loitering of an object in a specific area

To search for moments of an object loitering in an area, do the following:

1. In the Surveillance window, specify the area that you want to analyze during the search in accordance with the selected condition (see Motion in area(see page 1216)).
2. In the **Metadata source** field, select the metadata source from the drop-down list if there are several for this camera. This parameter isn't displayed if there is only one source.
3. In the **Duration of stay** field, set the minimum duration of stay in the area in seconds and minutes. Search results contain recorded video in which the object is present in the area for longer than the set time.



4. Specify any number of additional parameters by clicking the button, if necessary (see Configuring the search parameters(see page 1222)).
5. Set the search interval (see Setting a search interval(see page 1211)).
6. Click the **Search** button.

> **Note**
>
> Once started, you can stop the search at any time. To do this, click the **Stop** button, which appears instead of the **Search** button.

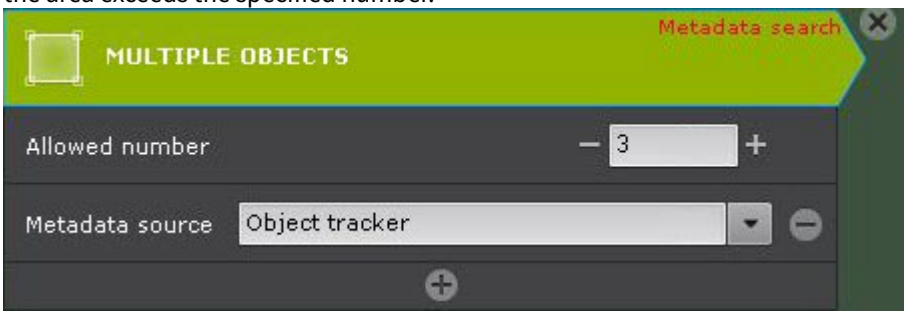
The found moments are displayed in the search results panel.

20.2.6.4.6.3 Simultaneous presence of multiple objects in a specific area

To search for moments of simultaneous presence of multiple objects in a specific area:

1. In the Surveillance window, specify the area that you want to analyze during the search in accordance with the selected condition (see Motion in area(see page 1216)).
2. Select the metadata source if there are several for this camera. This parameter isn't displayed if there is only one source.

3. Specify the number of objects allowed in the area. Search results contain recorded video in which the number of objects in the area exceeds the specified number.



4. Specify any number of additional parameters by clicking , if necessary (see Configuring the search parameters(see page 1222)).
5. Set the search interval (see Setting a search interval(see page 1211)).
6. Click the **Search** button.

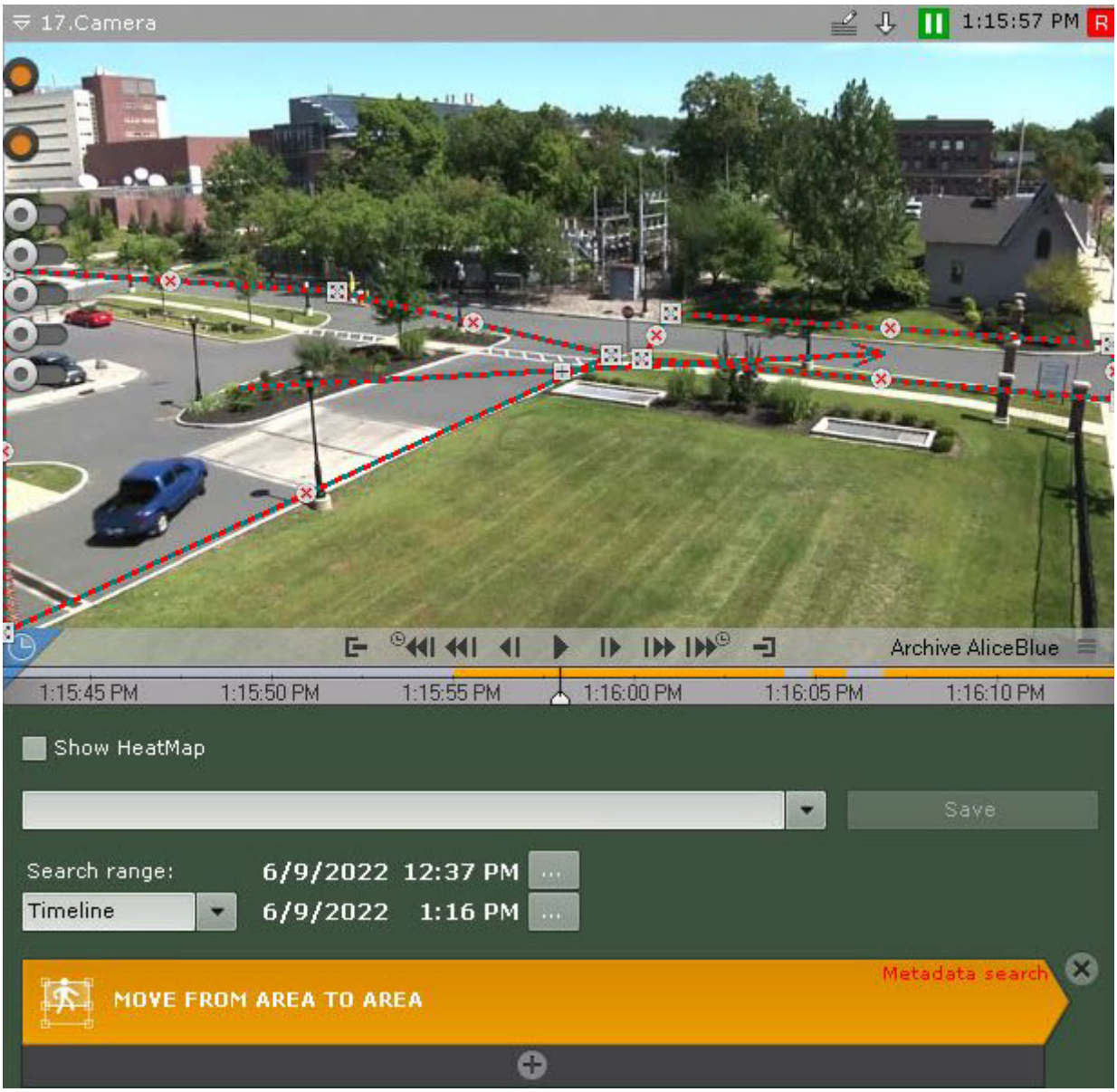
> **Note**
>
> Once started, the search can be stopped at any time. To do this, click the **Stop** button, which appears instead of the **Search** button.

The found moments are displayed in the search results panel.

20.2.6.4.6.4 Move from area to area

To search for moments when the object moves from one area to another:

1. Set two areas in the Surveillance window: the area the object moves from and the one it moves to.
   The anchor points of each area are connected by a two-colored dotted line. The direction of movement between the areas is indicated by a dotted arrow.
   By default, each area is defined by four anchor points. The anchor points of the first area have the coordinates (20%, 40%), (40%, 40%), (40%, 60%), (20%, 60%), and the anchor points of the second area have the coordinates (60%, 40%), (80%, 40%), (80%, 60%), (60%, 60%) as percentages of the width and height of the frame, respectively.



Area editing operations are described in Motion in area(see page 1216).
To change the direction of movement between the areas, click the ⊞ button on the direction arrow.

2. Select the metadata source if there are several for this camera. This parameter isn't displayed if there is only one source.
3. Specify any number of additional parameters by clicking ⊕, if necessary (see Configuring the search parameters(see page 1222)).
4. Set the search interval (see Setting a search interval(see page 1211)).
5. Click the **Search** button.

> **Note**
>
> Once started, the search can be stopped at any time. To do this, click the **Stop** button, which appears instead of the **Search** button.

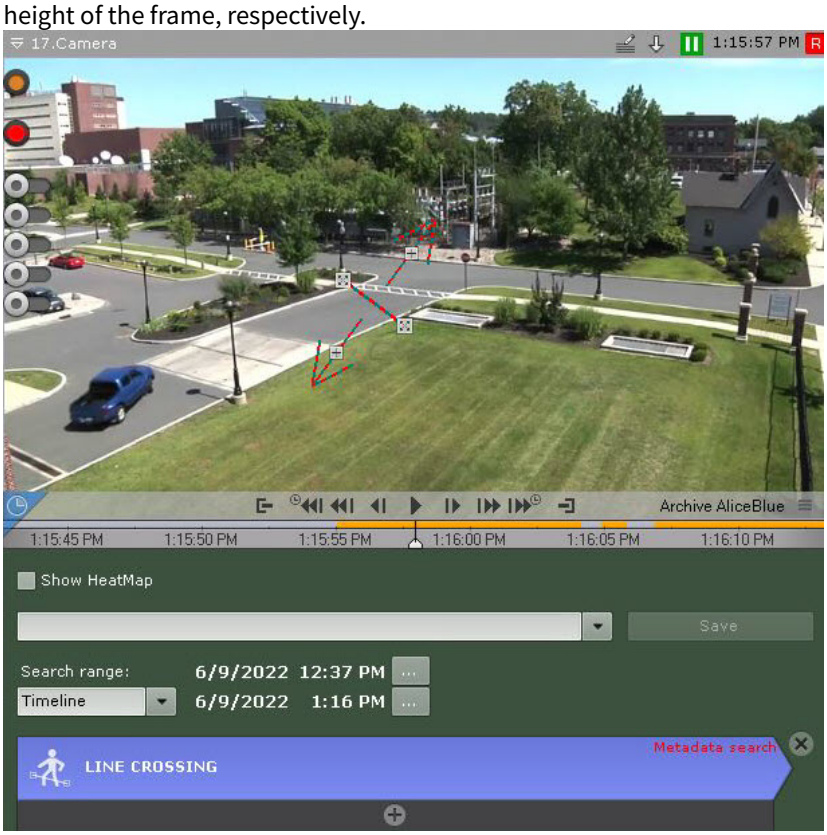
The found moments are displayed in the search results panel.

20.2.6.4.6.5 Line crossing

To search for moments when the object crosses a virtual line:

1. In the Surveillance window, set the virtual line.

The end points of the line are connected by a two-colored dotted line. The direction of the object movement across the line is indicated by dotted arrows.
By default, the end points of the line have the coordinates (50%, 30%) and (50%, 70%) as percentages of the width and height of the frame, respectively.



To move the end point of a line, hover the cursor over the end point and, holding down the left mouse button, move the mouse.
By default, both directions of movement across the virtual line are taken into account when searching the archive. If you do not need to search in a specific direction, click the ⊞ button corresponding to that direction.

> **Attention!**
>
> At least one direction must be selected for the search.

> **Note**
>
> A disregarded direction of object movement is indicated by a dimmed arrow.

2. Select the metadata source if there are several for this camera. This parameter isn't displayed if there is only one source.
3. Specify any number of additional parameters by clicking ⊕, if necessary (see Configuring the search parameters(see page 1222)).
4. Set the search interval (see Setting a search interval(see page 1211)).
5. Click the **Search** button.

> **Note**
>
> Once started, the search can be stopped at any time. To do this, click the **Stop** button, which appears instead of the **Search** button.

The found moments are displayed in the search results panel.

20.2.6.4.6.6 Configuring the search parameters

It is not required to specify the search parameters, but for a more precise search, you can specify one or more parameters for each criterion:

The search criteria	Possible parameters
Motion in area	Direction of movement Maximum and minimum object size Maximum and minimum object speed Object color Object type Enter/exit an area
Loitering	Maximum and minimum object size Object color Object type
Multiple objects	Maximum and minimum object size Object color Object type
Line crossing Move from area to area	Maximum and minimum object size Maximum and minimum object speed Object color Object type

Configuring minimum and maximum object size

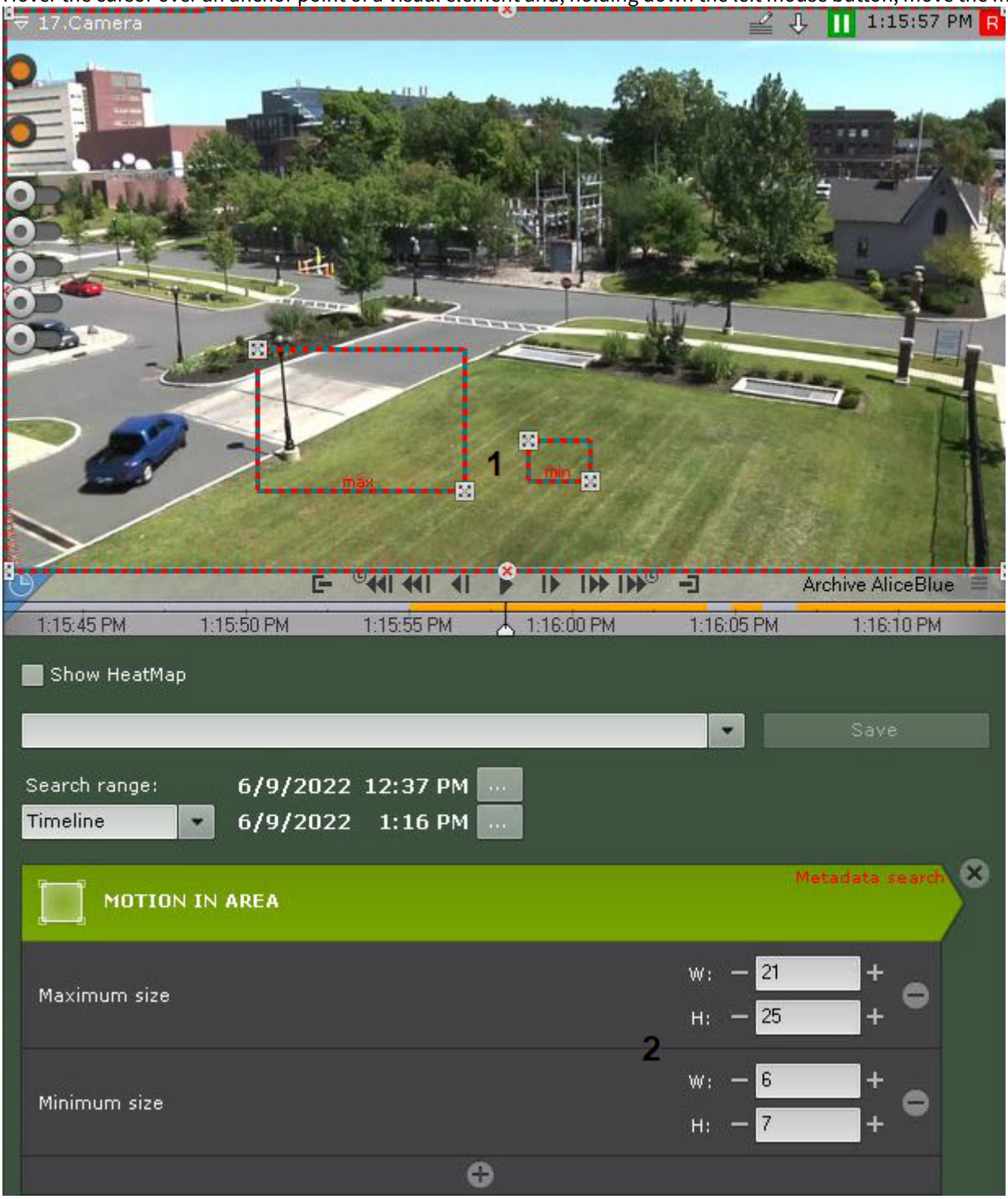
The procedures for specifying the minimum and maximum size of a moving object are identical.

You can specify the minimum (or maximum) size of a moving object using any of the following methods:

Note

The first method lets you roughly configure the size, and the second method allows you to set the size precisely.

1. Hover the cursor over an anchor point of a visual element and, holding down the left mouse button, move the mouse (**1**).



2. Specify the width and height of an object of the minimum (maximum) size using the **+**/**-** buttons (**2**). The dimensions of a visual element in the Surveillance window change accordingly.

The minimum (maximum) size of an object is configured.

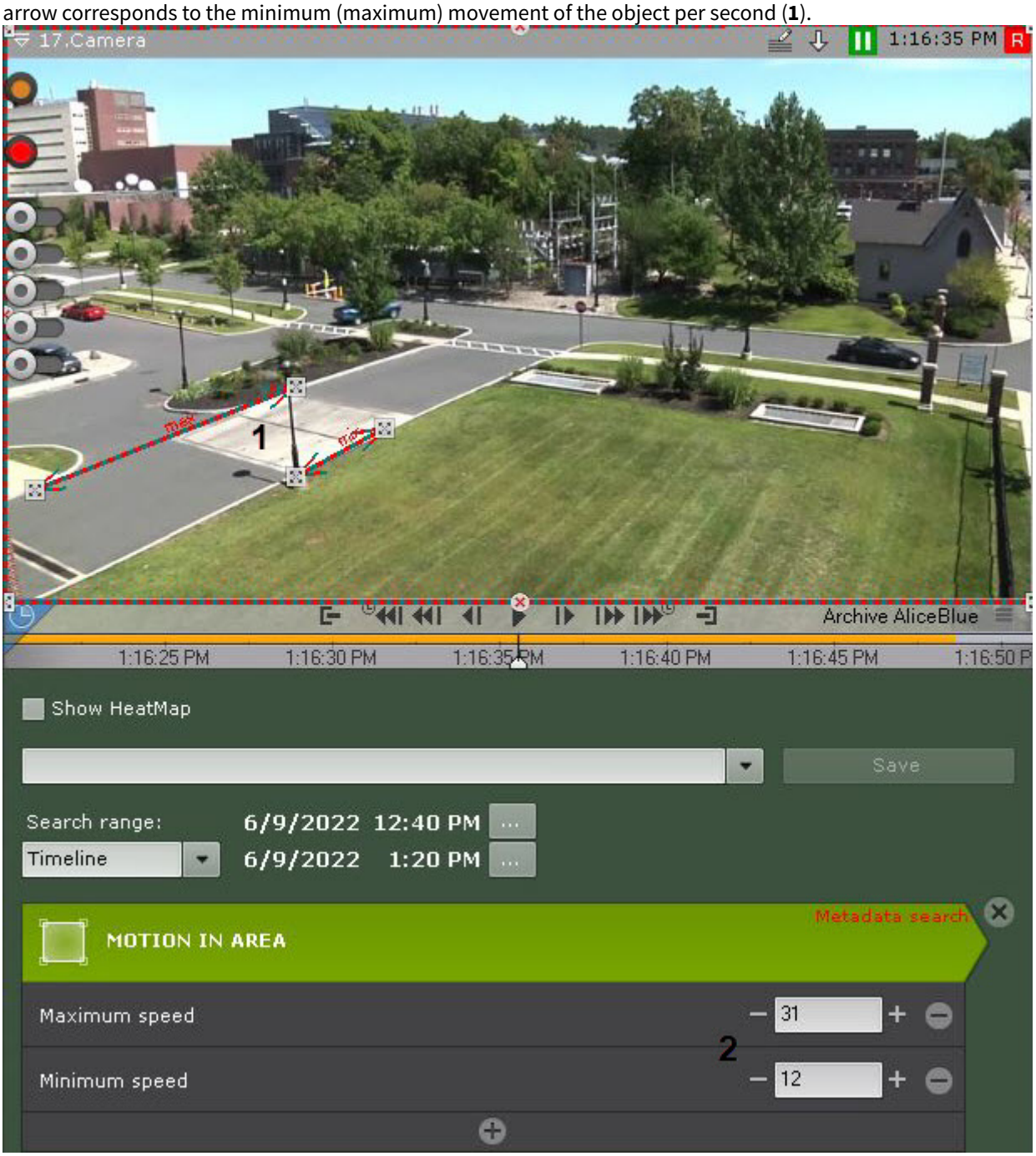
Configuring minimum and maximum object speed

In *Axxon One*, the speed is a conditional value that is calculated using values of different dimensions. The speed calculation algorithm takes into account both the frame width and height. For a more accurate search, we recommend performing several search iterations and selecting the necessary speed values empirically.

The procedures for specifying the minimum and maximum speed of a moving object are identical.

You can specify the minimum (or maximum) speed of a moving object using any of the following methods:

1. Hover the cursor over an end point of the arrow and, holding down any mouse button, move the mouse. The length of the arrow corresponds to the minimum (maximum) movement of the object per second (**1**).



2. Use the **+**/**-** buttons to specify the minimum (maximum) speed of the object as percentages of the frame per second (**2**).

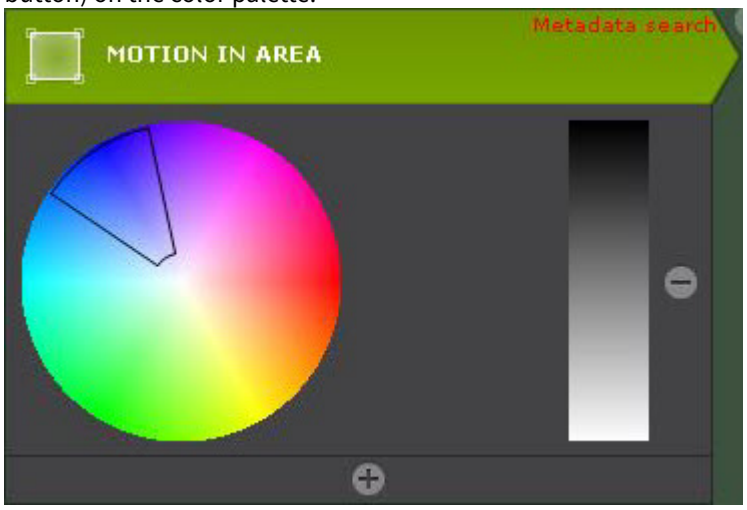
The minimum (maximum) speed of a moving object is now configured.

The following objects are included in the search results:

- If you specify only the maximum speed—the objects that move slower than the maximum speed.
- If you specify only the minimum speed—the objects that move faster than the minimum speed.
- If you specify both the maximum and minimum speed—the objects, the speed of which doesn't exceed the maximum, but is greater than the minimum speed.

Configuring object color

You can set the color range by dragging and dropping (click and hold any mouse button, move the mouse, then release the button) on the color palette.



Any click on the palette is interpreted as the start of drawing a new area. The previous area is hidden.

> **Attention!**
>
> *Axxon One* uses a logic according to which all objects are monochrome. The color of an object in *Axxon One* is an average of all object colors in the video image.
> All objects of the specified colors are displayed in the search results.
> You cannot search by color when using metadata from the **Motion detection** (see Motion detector(see page 446)).

Use Case for Color Filter

The AI analysis extracts metadata from moving objects and stores it in a database. The color filter allows you to focus the search on objects with selected colors. For example, if a person is wearing clothing of a specific color, or a car is red, blue, or green, *Search in archive* will search for people, objects, or vehicles that match the selected color spectrum.

By utilizing the search and filtering capabilities based on color, you can search by predominant color within a person's or object's track. For example, you can search for a person wearing a red shirt (if it constitutes 80% or more of the total track size) or locate a blue car.

Configuring direction of object movement

By default, when searching the archive, the system searches for movement in all directions. You can stop the search for movement in one or several specific directions.

To do this, click the direction in which you want to stop the search for movement with any mouse button. As a result, the sector corresponding to this direction is grayed out.

If necessary, repeat this action for other directions. To reactivate the search for inactive direction, click it again with any mouse button.



If incorrect search results occur, we recommend setting the **Advanced mode (requires more processing time)** checkbox. This increases the accuracy of the search, but the search process requires more time.

The required directions of an object movement are now set.

Configuring object entry/exit from an area

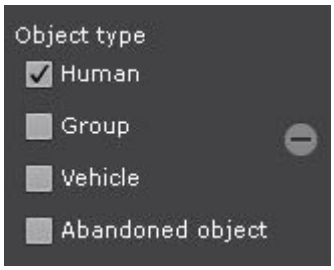
Entry occurs when an object enters the field of view and crosses its borders. Exit occurs when an object disappears from the field of view and crosses its borders.

To find moments when an object enters an area, select **Enter**, or for moments when an object exits an area, select **Exit**.



Choosing the object type

You can search for moving objects of one or several types: human, group of people, vehicle, or abandoned object. To do this, set the corresponding checkboxes.



Attention!

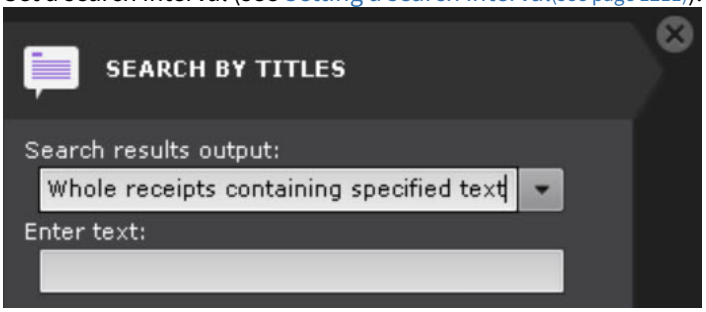
The object type is determined by analyzing its appearance. An object that doesn't move for some time is considered to be abandoned, for example, a parked car.
You cannot search by object type when using metadata from the Motion detection (see Motion detector(see page 446)).

20.2.6.4.7 Search by titles

Search by titles allows you to find the necessary words in the titles database received from the POS devices.

To search by titles, do the following:

1. Set a search interval (see Setting a search interval(see page 1211)).



2. In the **Search results output** drop-down list, select one of the search methods:
   - **Whole receipts containing specified text**—video fragments containing receipts with the searched text are displayed as search results. The number of video fragments is equal to the number of receipts that include the searched text.
   - **Single titles containing specified text**—video fragments containing the searched text are displayed as search results. The number of video fragments is equal to the number of search words in the receipts.

Note

For example, the word "Milk" appears on two receipts, and is mentioned twice in each of them. The search results are as follows:

- **Whole receipts containing specified text**—two video fragments are displayed, since the word is contained in two receipts;
- **Single titles containing specified text**—four video fragments are displayed, since in total the word appears four times in receipts.

3. Enter the text that you want to find in the titles. You can search the whole word or part of it.

Attention!

- You must enter at least three characters to make a search.
- The search is performed by the entire text that you entered, not by individual words.
- You cannot search by empty string.

4. Click the **Search** button.

Note

After starting the search, you can stop it at any time. To do this, click the **Stop** button, which replaces the **Search** button.

The search process based on the specified criteria starts. The search results panel displays frames with titles containing the search text.

Attention!

The time of the found events corresponds to the start time of the receipt, not the time of occurrence of the searched text.

20.2.6.4.8 Search by LPs

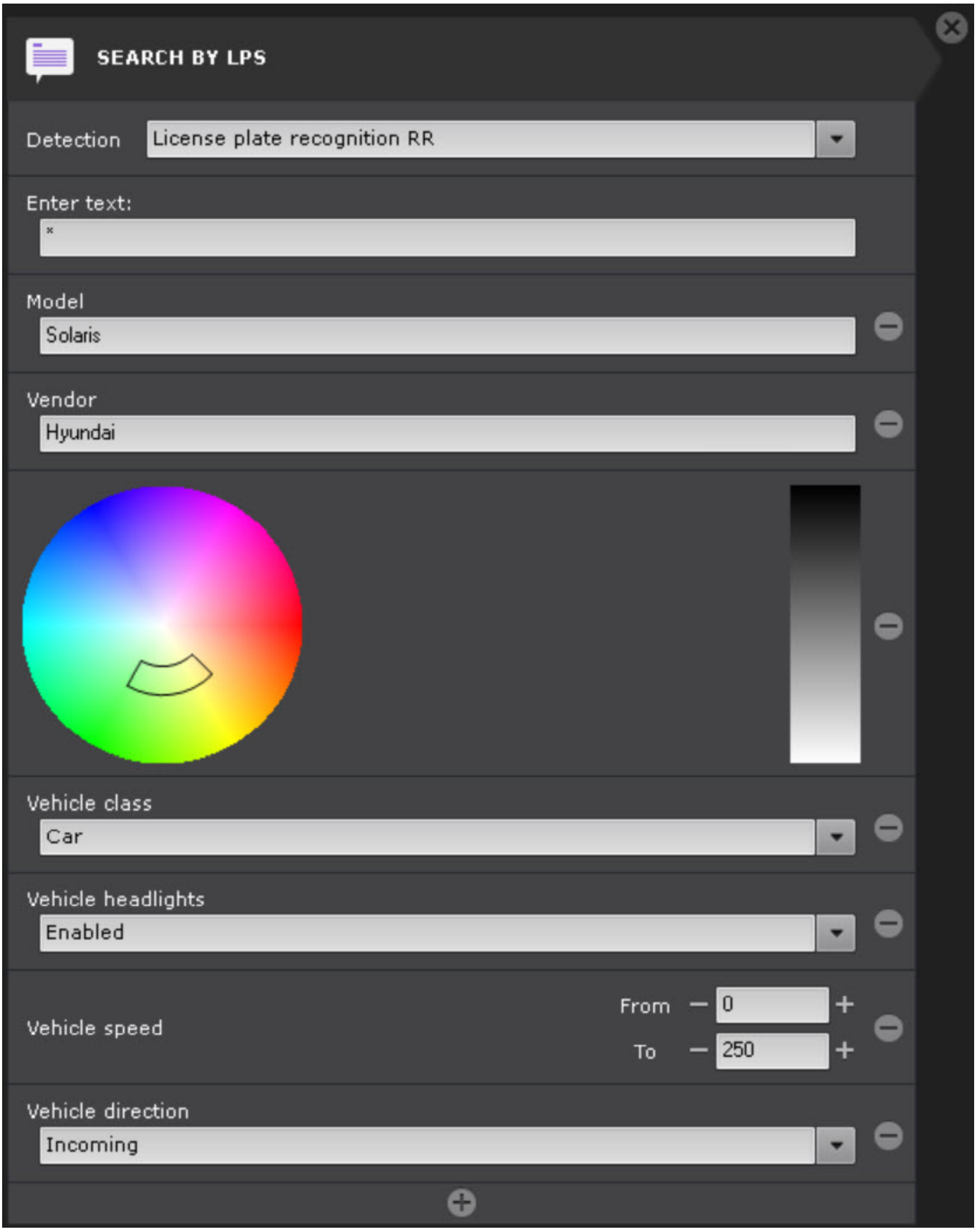
With search by LPs, you can find the recognized license plates in the archive, as well as filter them according to specified criteria.

To search by license plates, do the following:

1. Set a search interval (see Setting a search interval(see page 1211)).
2. From the **Detection** drop-down list, select the detector, the events from which you want to use as a search criterion.
3. In the **Enter text** field, enter the license plate that you want to find. You can enter either a full license plate or a part of it using the **?** character (any character in the license plate) and the ***** character (any number of any characters in the license plate). For example, a search query **?20*** shows all vehicles with license plates containing **2** and **0** in the second and third positions, respectively. License plates can contain any number of characters.

Note

To search by all recognized license plates, enter ***** (asterisk).



4. If necessary, set additional search criteria by clicking the button:

> **Note**
>
> To search by additional criteria, the **Vehicle recognition** option must be enabled in the **License plate recognition RR** settings (see Configuring License plate recognition RR(see page 555), Configuring License plate recognition RR—Parking(see page 594)).

a. In the **Model** field, enter the full name of the car model in numbers or Latin letters, case-insensitive. Correct spelling examples: Outlander, Teana, Creta, 406 (for Peugeot 406).

> **Note**
>
> For a full list of models and vendors, see Functionality of License plate recognition RR(see page 535).

b. In the **Vendor** field, enter the full name of the car manufacturer in Latin letters, case-insensitive. Correct spelling examples: Mitsubishi, Nissan, Hyundai.
c. In the **Color** area, set the color of the vehicle (see Configuring object color(see page 1224)).
d. From the **Vehicle class** drop-down list, select one of the following class:
   i. **Car**.
   ii. **Truck**.
   iii. **Bus**.
   iv. **Motorcycle**.
   v. **Mini truck**.
   vi. **Unknown**.
e. From the **Vehicle headlights** drop-down list, select one of the following vehicle headlights state:
   i. **Unknown**.
   ii. **Enabled**.
   iii. **Disabled**.
f. In the **Vehicle speed** area, in the **From** and **To** fields, set the vehicle speed range depending on the unit of measurement selected in the **Speed detection** field in the detector settings (see Configuring License plate recognition RR(see page 555), Configuring License plate recognition RR—Parking[396]):
   i. Kmph: possible range from 0 to 250.
   ii. Mph: possible range from 0 to 155.
g. In the **Vehicle direction** field, select the vehicle direction from the drop-down list:
   i. **Unknown**—the direction of movement of the vehicle is not detected.
   ii. **Incoming**—the vehicle is moving towards the camera.
   iii. **Outgoing**—the vehicle is moving away from the camera.

> **Note**
>
> To remove a search criterion, click the  button.

5. Click the **Search** button 

.

> **Note**
>
> Once started, the search can be stopped at any time. To do this, click the **Stop** button that appears instead of the **Search** button.

This starts a search based on the selected criteria. The search results panel displays frames with vehicles whose license plates contain the text from the search query and also meet the specified additional parameters.

396 https://docs.axxonsoft.com/confluence/spaces/ONE2025/pages/340754554/Configuring+License+plate+recognition+RR%E2%80%94Parking

A recognized license plate is outlined with a red border in the Surveillance window.



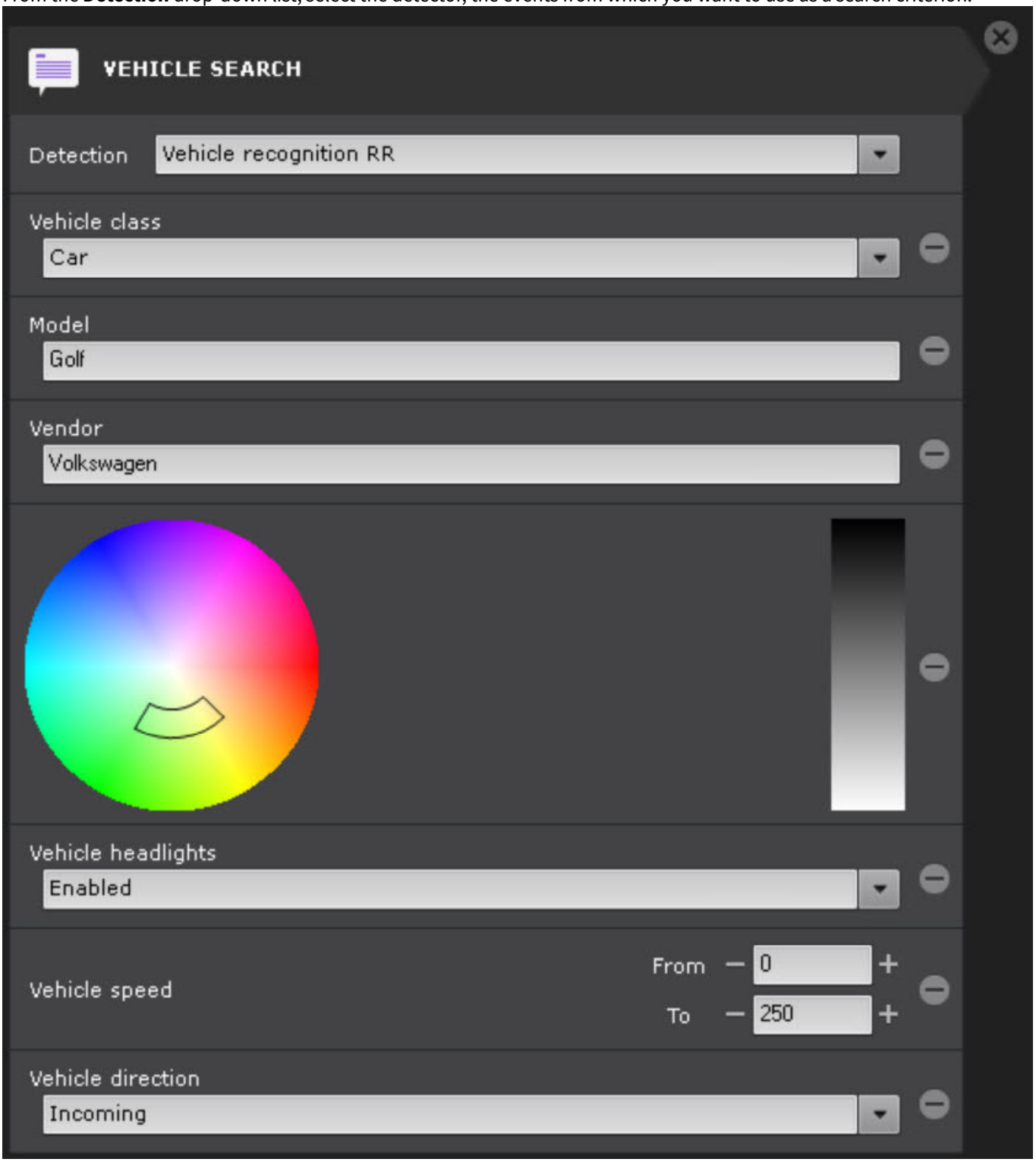
20.2.6.4.9 Vehicle search

Vehicle search allows you to find recognized vehicles in the archive, and to filter vehicles according to specified criteria.

You can search for vehicles in the following way:

1. Set the search interval (see Setting a search interval(see page 1211)).

2. From the **Detection** drop-down list, select the detector, the events from which you want to use as a search criterion.



3. If necessary, set additional search criteria by clicking the button.
    a. From the **Vehicle class** drop-down list, select one of the following class:
        i. **Car**.
        ii. **Truck**.
        iii. **Bus**.
        iv. **Motorcycle**.
        v. **Mini truck**.
        vi. **Unknown**.

b. In the **Model** field, enter the full name of the vehicle model in numbers or Latin letters, case-insensitive. Examples of correct spelling: Outlander, Creta, 406 (for Peugeot 406).

> **Note**
>
> For a full list of possible vendors and models, see Functionality of License plate recognition RR(see page 535).

c. In the **Vendor** field, enter the full name of the car manufacturer in Latin letters, case-insensitive. Examples of correct spelling: Mitsubishi, Hyundai.
d. In the **Color** area, set the color of the vehicle (see Configuring object color(see page 1224)).
e. From the **Vehicle headlights** drop-down list, select one of the following vehicle headlights state:
   i. **Undefined**.
   ii. **Enabled**.
   iii. **Disabled**.
f. In the **Vehicle speed** area, in the **From** and **To** fields, set the vehicle speed range depending on the selected unit of measurement in the **Speed detection** field in the detector settings (see Configuring Vehicle recognition RR(see page 615)):
   i. Kmph. Possible range: 0 to 250.
   ii. Mph. Possible range: 0 to 155.
g. From the **Vehicle direction** drop-down list, select one of the following vehicle directions:
   i. **Undefined**—the direction of movement of the vehicle is not detected.
   ii. **Incoming**— the vehicle is moving towards the camera.
   iii. **Outgoing**—the vehicle is moving away from the camera.

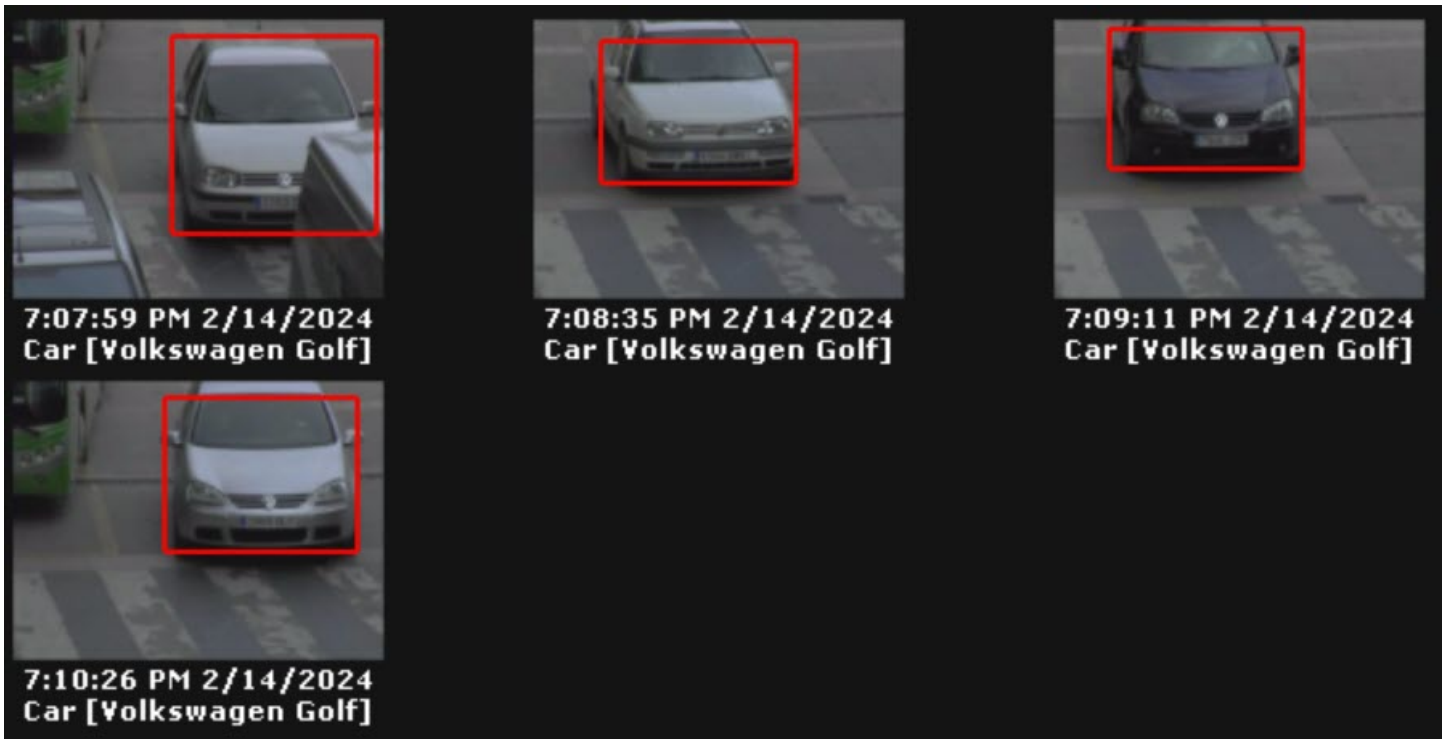
> **Note**
>
> To delete a search criterion, click the  button.

4. Click the **Search** button 

.

> **Note**
>
> After you start the search process, you can stop it at any time. To do this, click the **Stop** button that replaces the search start button.

The search process begins based on the specified criteria. The search results panel displays frames with vehicles that meet the specified search criteria.



20.2.6.4.10 Face search

> **Attention!**
>
> The processor must support the AVX2 or AVX512 instruction set (see ark.intel.com[397], Hardware requirements for neural analytics operation(see page 339)).

Face detection tool (see Category: Face(see page 473)) recognizes faces that are in the field of view of the cameras connected to the *Axxon One* Server.

If the recognized face meets the requirements (see Video stream and scene requirements for the Face detector VA and its sub-detectors(see page 486)), a biometric vector is created on its basis. It is stored in the Server database and used for comparison.

A biometric vector is a set of numbers of a given length that implicitly characterizes the visual identity of the owner of the biometric sample.

When you search for faces on the Client, the selected image is sent to the Server, where a biometric vector is created based on the received data.

The information about the biometric vectors stored in the database on the selected cameras for the specified time interval (see Setting a search interval(see page 1211)) is uploaded to the RAM on the Server side and compared with the biometric vector created on the basis of the image received from the Client.

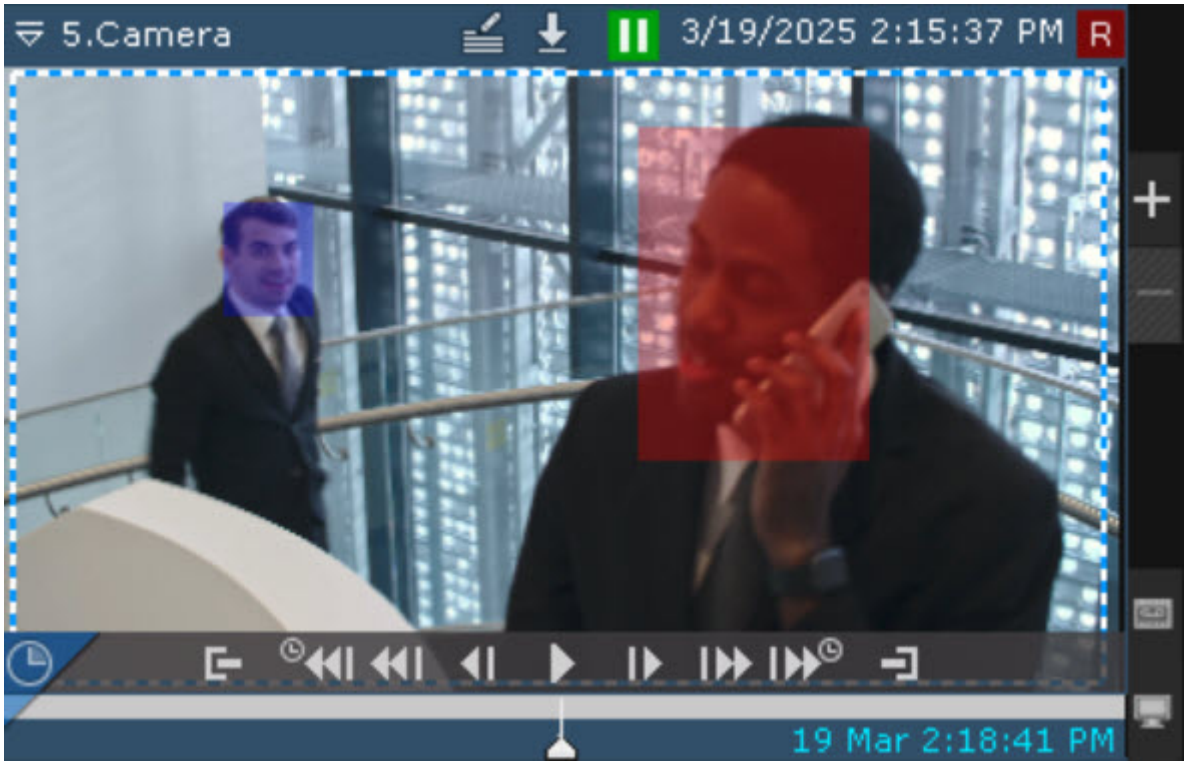
> **Attention!**
>
> The data in RAM is stored for about two hours. If you search for faces on the previously selected cameras and for a time interval shorter or equal to that stored in RAM, the search results will be obtained faster.

Face search helps you find in the archive:

1. Similar faces (see Search for similar face(see page 1234)).
2. Recognized faces (see Search for all recognized faces(see page 1236)).
3. Face contacts (see Search for face contacts(see page 1237)).

397 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3533&1_Filter-Family=595

Face tracks are always highlighted in the surveillance window during face search.



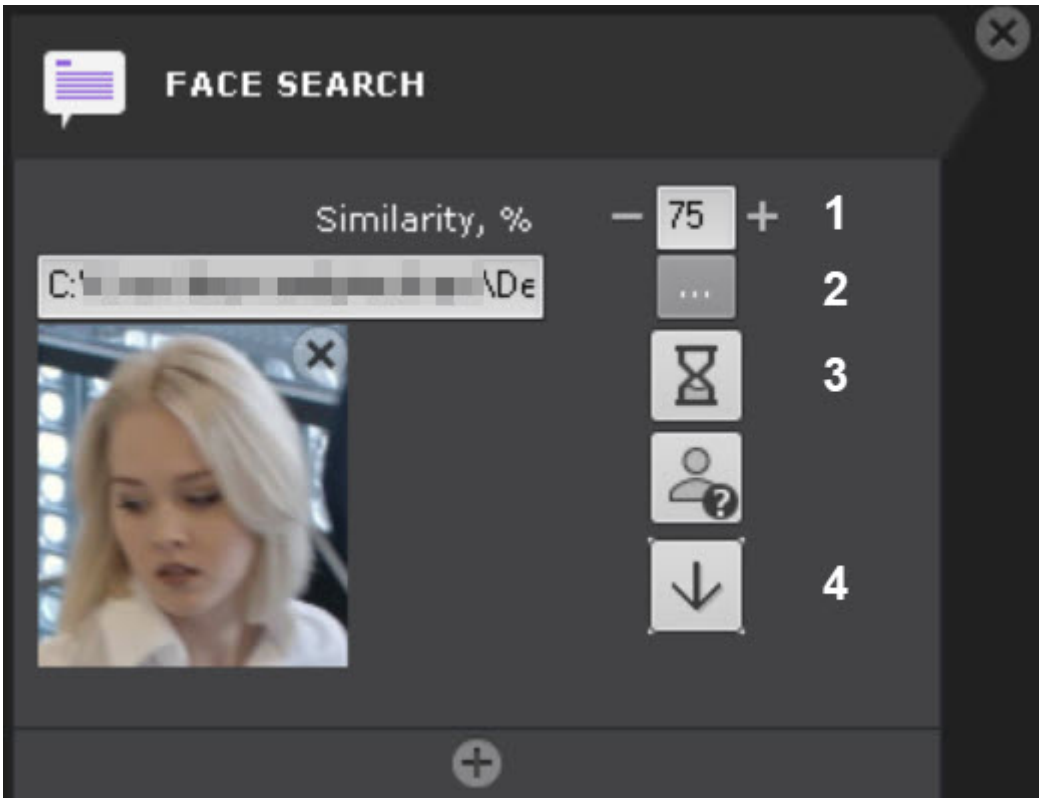
20.2.6.4.10.1 Search for similar face

Face search allows you to find faces similar to a given photo in the archive.

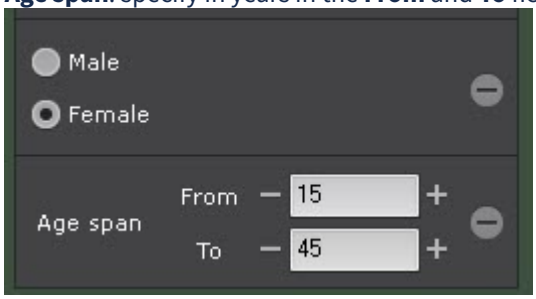
To perform face search:

1. Set the search interval (see Setting a search interval(see page 1211)).
2. Set the similarity level (in %) between the face in the photo and faces from the archive (**1**). The search results contain only the video recordings with faces with similarity levels above the set value.

> **Note**
>
> By default, the similarity level is **75**%. Starting with the *Axxon One* 2.0.10, the minimum allowable similarity level is **40**%.



3. Select a photo with the face that must be found in the archive (**2**). Supported formats: **png**, **jpg**, **jpeg**, **jpe**. When you click the face in the Surveillance window, this face us selected for search. If you do not select a photo, then all faces recognized during the specified time are displayed. To delete a photo from the search, click the button.
4. Select, how to sort the search results: —by the similarity level; —by time (**3**).
5. If necessary, set additional search criteria by clicking the button:
   a. **Gender**: select the required option;
   b. **Age span**: specify in years in the **From** and **To** fields.



> **Note**
>
> - Saving information about gender and age to the database must be enabled in the detection tool settings (see Configuring Face detection[398]).
> - To delete a criterion, click the button.

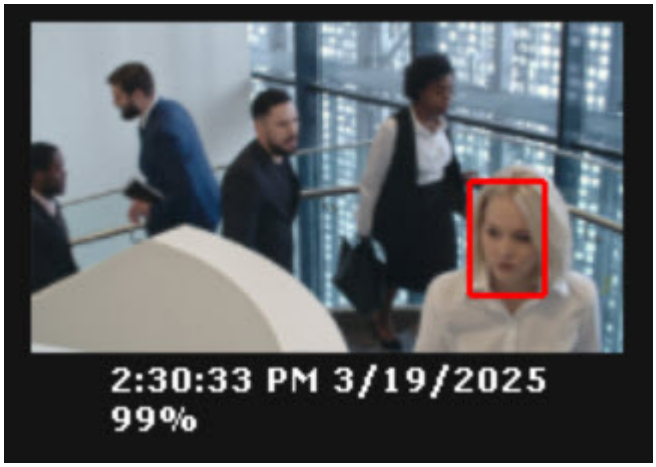
6. Click the **Search** button Search...

> **Note**

398 https://docs.axxonsoft.com/confluence/spaces/next46en/pages/202673195/Configuring+Face+detection

Once started, the search can be stopped at any time. To do this, click the **Stop** button, which appears instead of the **Search** button.

This starts the search based on the specified criteria. The video frames with the faces that meet the search conditions are displayed on the search results panel. A recognized face is outlined with a red border, and the face similarity level (in %) is displayed below.



To instantly export a face image from the frame, do the following:

1. Click a face track in the Surveillance window.
2. Click the  button (**4**).

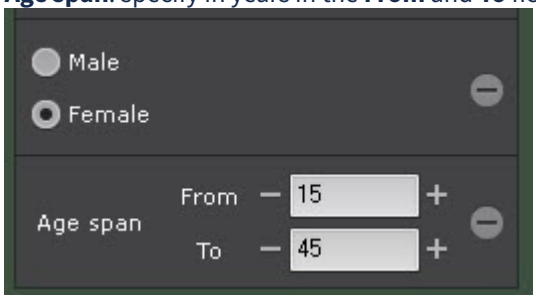
The face image is saved to the folder specified in the settings (see Configuring export options(see page 1048)).

20.2.6.4.10.2 Search for all recognized faces

Face search allows you to find all recognized faces in the archive.

To find all recognized faces, do the following:

1. Set the search interval (see Setting a search interval(see page 1211)).
2. If necessary, set additional search criteria by clicking the  button:
   a. **Gender**: select the required option;
   b. **Age span**: specify in years in the **From** and **To** fields.



Note

- Saving information about gender and age to the database must be enabled in the detector settings (see Configuring the Face detector TV(see page 505), Configuring the Face detector VA(see page 491)).
- To delete a criterion, click the  button.

3. Click the **Search** button  .

> **Note**
>
> Once started, the search can be stopped at any time. To do this, click the **Stop** button, which appears instead of the **Search** button.

This starts a search for all recognized faces. The search results panel displays video frames that contain recognized faces that match the search criteria. Recognized faces are outlined with a red border:



To instantly export a face image from the frame, do the following:

1. Click a face track in the Surveillance window.
2. Click the  button.

The face image is saved to the folder specified in the settings (see Configuring export options(see page 1048)).

20.2.6.4.10.3 Search for face contacts

Face contacts search allows you to find in the archive all people who contacted with any person for a specified time.

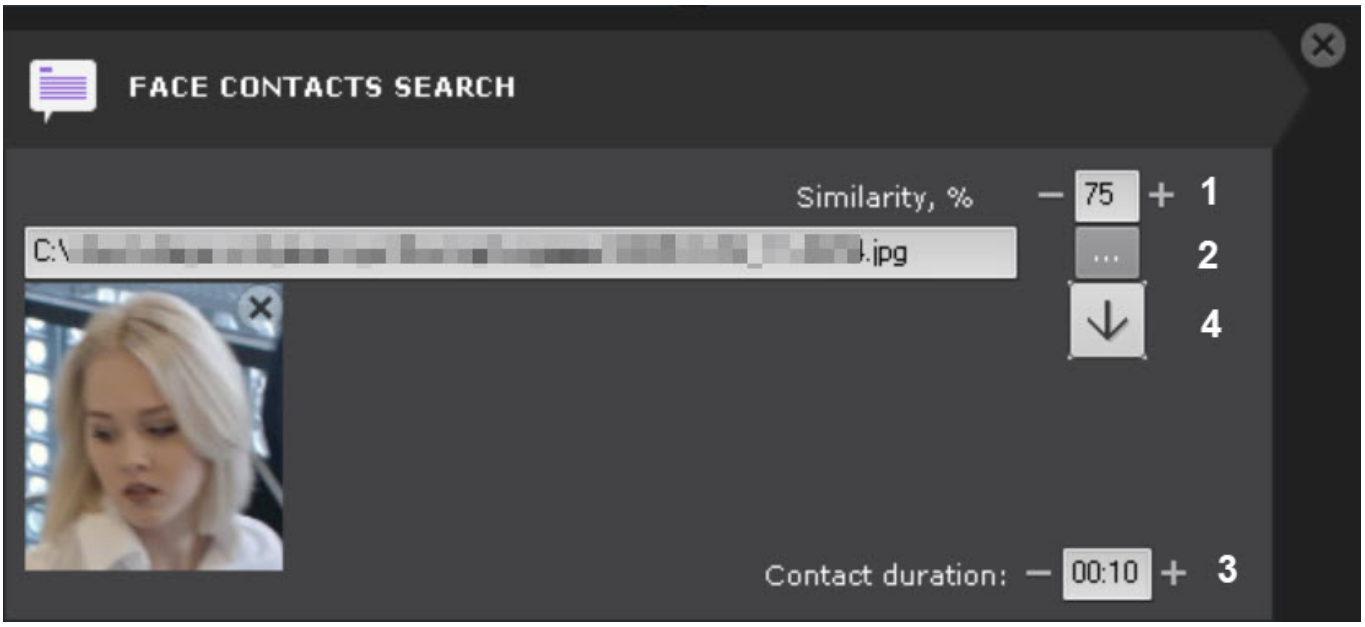
The search algorithm works as follows:

1. Finds all people in the archive who look like the person from the uploaded photo.
2. Analyzes the archive fragments, in which there is a person from the photo and other people are present as well.

To search for face contacts, do the following:

1. Set the search interval (see Setting a search interval(see page 1211)).
2. Set the similarity level (in %) between the face in the photo and the faces from the archive (**1**). If the similarity level is below the set value, these results are ignored during the search.

> **Note**
>
> By default, the similarity level is **75**%. Starting with the *Axxon One* 2.0.10, the minimum allowable similarity level is **40**%.

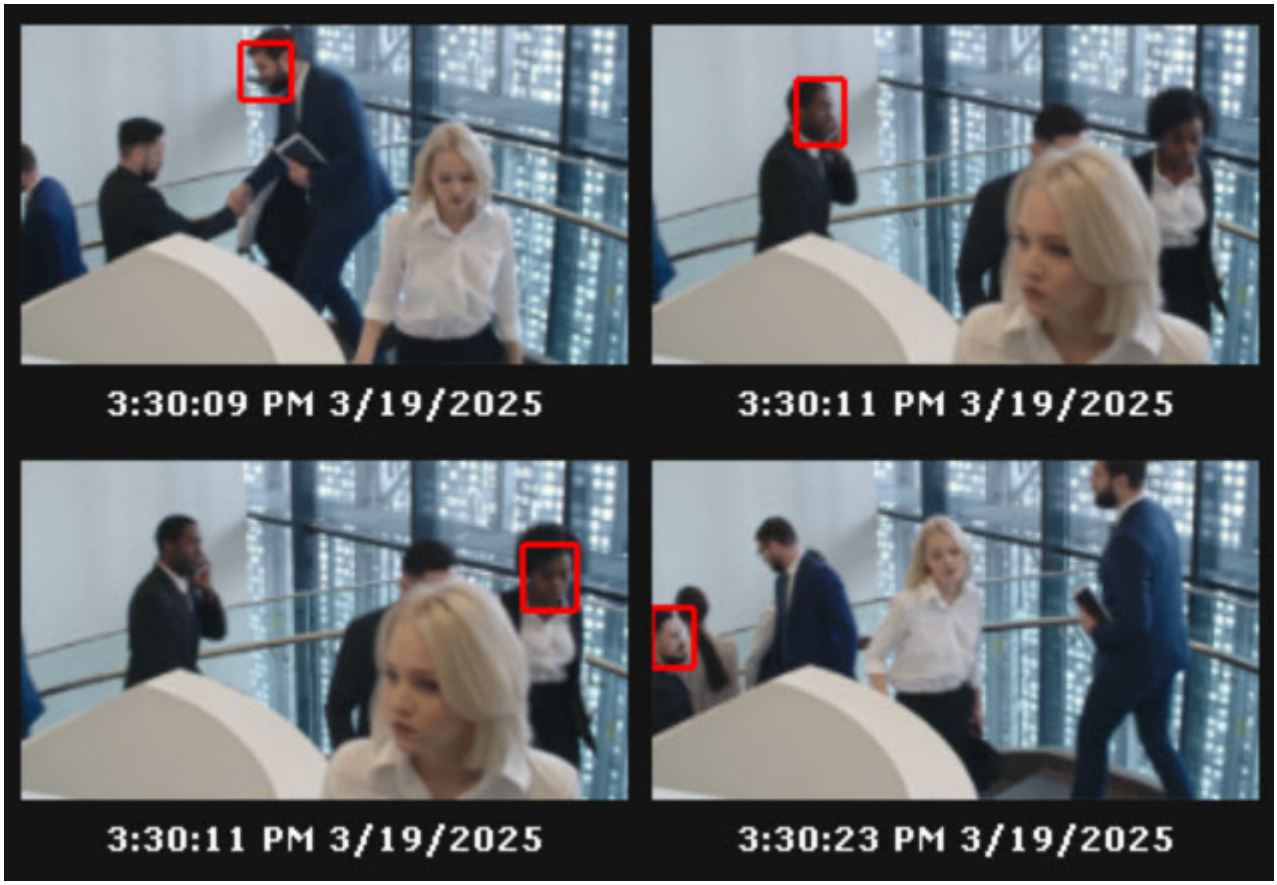


3. Select a photo of the person whose contacts you want to find (**2**). Supported formats: **png**, **jpg**, **jpeg**, **jpe**. When you click the face in the Surveillance window, this face is selected for search. If you do not select a photo, then all faces recognized during the specified time are displayed. To delete a photo from the search, click the button.
4. Set the minimum contact time of other persons in the frame with the person on the photo in the MM:SS format (**3**). If the contact time is below the specified value, these results are ignored during the search. The maximum contact time is 59 seconds.
5. Click the **Search** button Search... .

> **Note**
>
> Once started, the search can be stopped at any time. To do this, click the **Stop** button, which appears in place of the **Search** button.

This starts a search based on the specified criteria.

The search results panel displays video frames that contain persons who contacted with the person on the photo. Recognized faces are outlined with a red border.



To instantly export a face image from the frame, do the following:

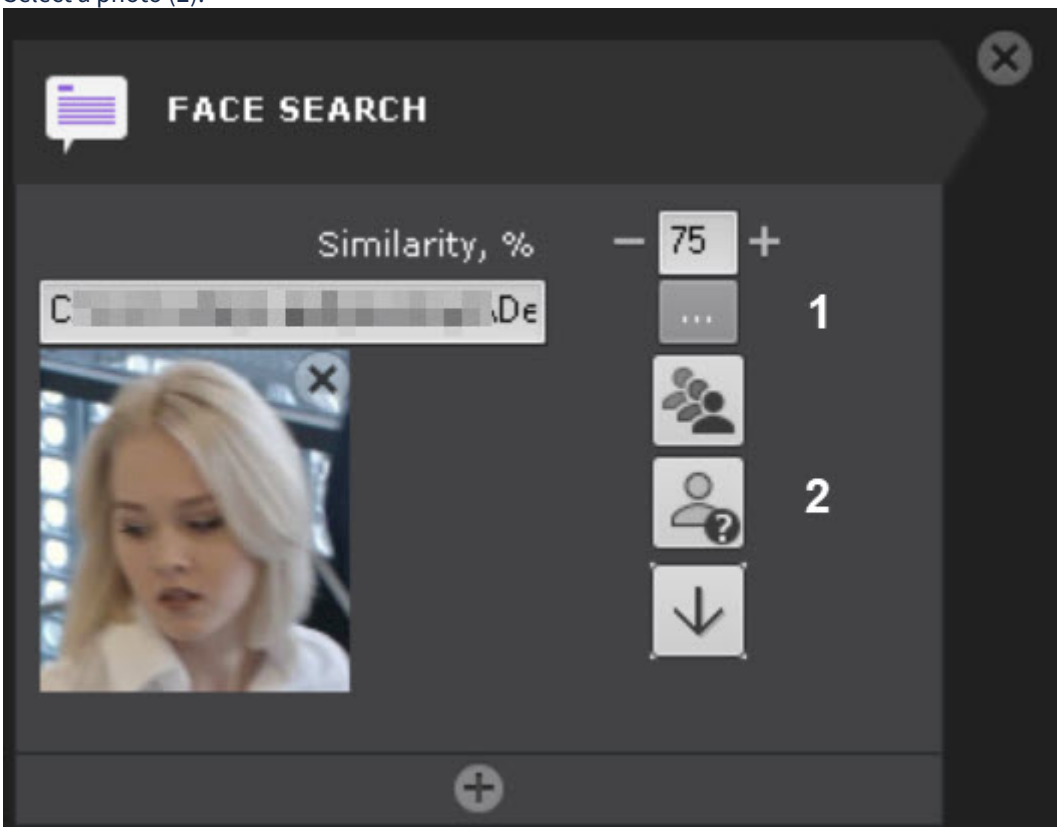
1. Click a face track in the Surveillance window.
2. Click the  button (**4**).

The face image is saved to the folder specified in the settings (see Configuring export options(see page 1048)).

20.2.6.4.10.4 Identifying "familiar face" or "stranger" from a photo

To identify the "familiar face" or "stranger" status, do the following:

1. Select a photo (**1**).



2. Click the  button.

The search panel (**2**) will display the probability that the person is a "stranger".

The algorithm is as follows:

1. The person is compared to all recognized persons in the last 30 days.
2. The number of days (**N**) in which the person was captured by camera and recognized is calculated.
3. The probability is calculated according to the formula (1–**N**/30)*100.

20.2.6.4.11 Similitude search

Similitude search allows you to find in the archive similar images using a certain track or an image.

Attention!

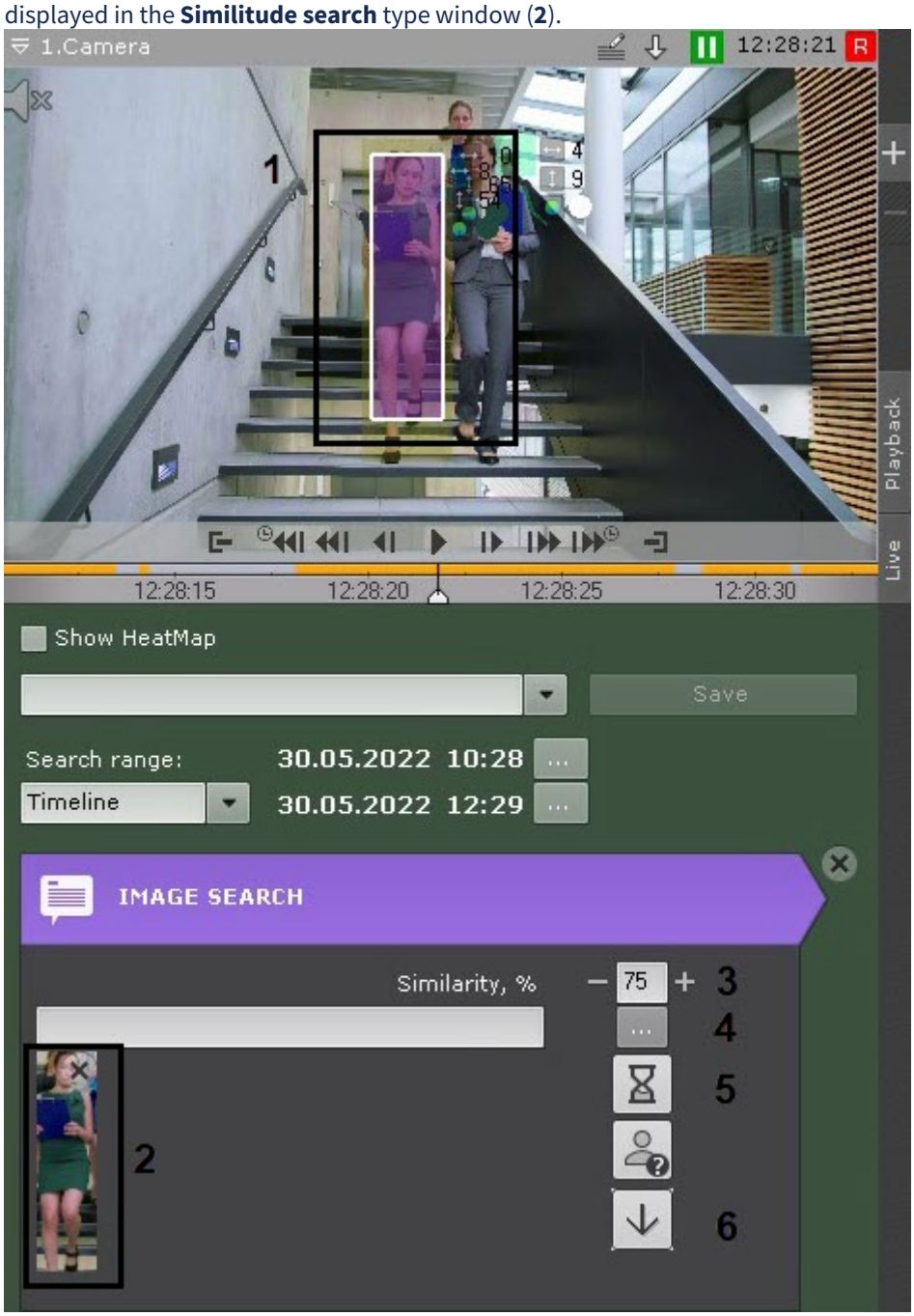
- The processor must support the AVX2 or AVX512 instruction set (see ark.intel.com[399], Hardware requirements for neural analytics operation(see page 339)).
- To use Similitude search, it is necessary to configure the Neural tracker(see page 405) by enabling the **Similitude search** option in it, and setting the time required for the algorithm to process the track in the **Time of processing similitude track (sec)** field.

You can search by images in the following way:

1. Set the search interval (see Setting a search interval(see page 1211)).
2. Select the **Similitude search** type (see Selecting the search type(see page 1211)).
3. Select a search method:
   a. Search for a similar image by track:

399 https://ark.intel.com/content/www/us/en/ark/search/featurefilter.html?productType=873&1_Filter-InstructionSetExtensions=3533&1_Filter-Family=595

i. Select a track by left-clicking an object in the Surveillance window (**1**). When you use Similitude search, the image track is highlighted and its dimensions are displayed in the Surveillance window. The track image is displayed in the **Similitude search** type window (**2**).



ii. Enter the minimum level of similarity (in percent) of the selected track with images in the archive (**3**). The search results display only those videos that have images with a similarity level greater than the specified one. To remove a track from the search, click the button.

b. Search for a similar image by image:

i. Select an image that is similar to the image you want to find in the archive (**4**). Supported formats: png, jpg, jpeg, jpe. If no image is selected, the search results display all images recognized within the specified time range. To clear the search criteria, click the button.

ii. Enter the minimum level of similarity (in percent) of the selected image with images in the archive (**3**). The search results display only those videos that have images with a similarity level greater than the specified one.

> **Note**
>
> When you search for a person, make sure that the track or image displays the person in full height.
> If the image is not complete, then incorrect recognitions can be included in the search results.
> If the search does not give required results at the selected level of similarity, then reduce its value.
> Note that lowering the similarity level below 50% can lead to incorrect recognitions.

4. Select the type of search results sorting:  —by similarity level;  —by time (**5**).
5. Click the **Search** button.

> **Note**
>
> Once you start the search, you can stop it at any time. To do this, click the **Stop** button, which is displayed in place of the **Search** button.

The search according to the specified criteria will start.

> **Note**
>
> The first time you search by images, the results appear with some delay (about three minutes).
> Next time, results can be delayed for other reasons. For example, if there is a lot of data in the archive or if the hard disk is overloaded.

The search results panel displays video frames with images that match the search criteria. The recognized image is outlined with a red border, and the level of similarity is displayed below.



To quickly export an image from a frame:

1. Click on the image track in the Surveillance window.
2. Click the  button (**6**).

The image is saved to the folder specified in the settings (see Configuring export options(see page 1048)).

20.2.6.4.11.1 Use case for Similitude search

AI analytics extracts human appearance metadata and stores it in a database. Sorting through metadata sourced from multiple cameras, an intelligent algorithm identifies and presents similar individuals. Having said that, if a person is wearing a backpack, bag, or hat for example, the engine searches for people who have these same characteristics.

20.2.6.4.12 Search by barcode

Search by barcode allows you to find text in the archive that was detected when detecting barcode.

To search by barcode, do the following:

1. Set the search interval (see Setting a search interval(see page 1211)).
2. Enter the text that you want to find.



> **Note**
>
> - To search by all detected barcodes, you must enter * (asterisk)
> - The minimum number of characters in the search text is three.

3. Click the **Search** button.

> **Note**
>
> After the search is started, you can stop it at any time. To do this, click the **Stop** button that replaces the **Search** button.

The search process starts according to the specified criteria. The search results panel displays the frames with barcodes that contain text from the search query. When you hover over the search result, the recognized text in the barcode is displayed.



20.2.6.4.13 Heat map

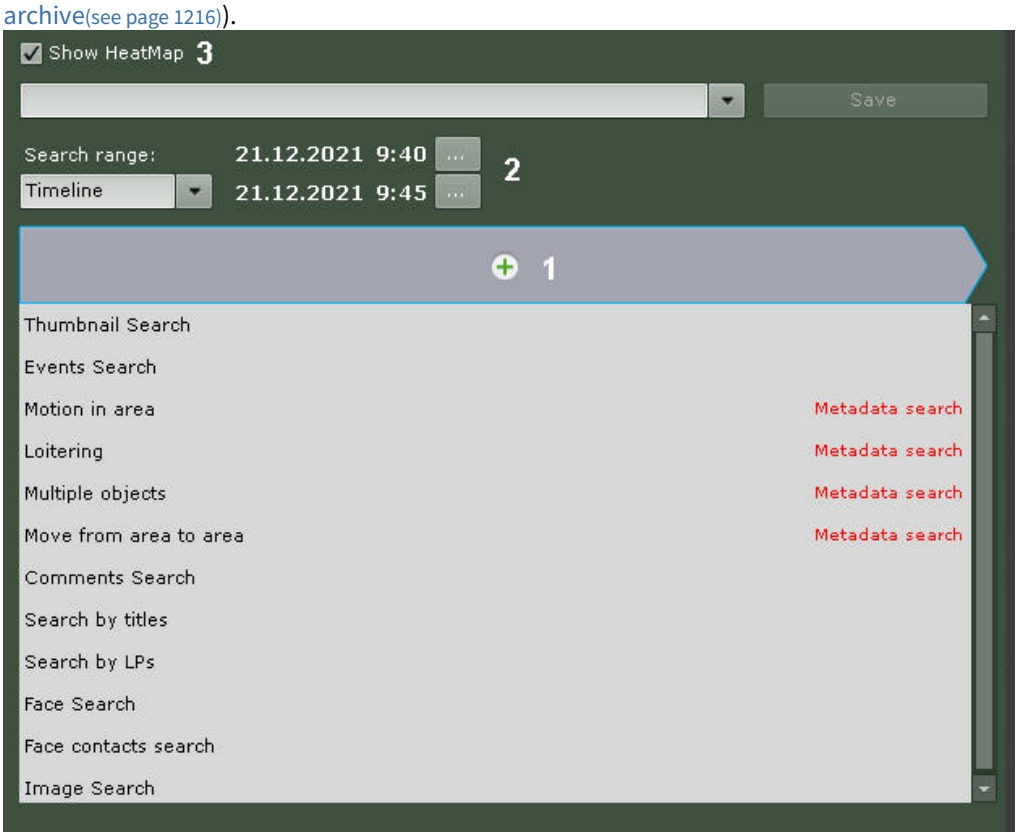
20.2.6.4.13.1 Configuring the heat map

> **Attention!**
>
> At least one metadata source is required for displaying a heat map (for example, an object tracker—see Metadata database(see page 333)).

The heat map allows you to check the movement activity in the frame and determine the areas where the objects move mostly.

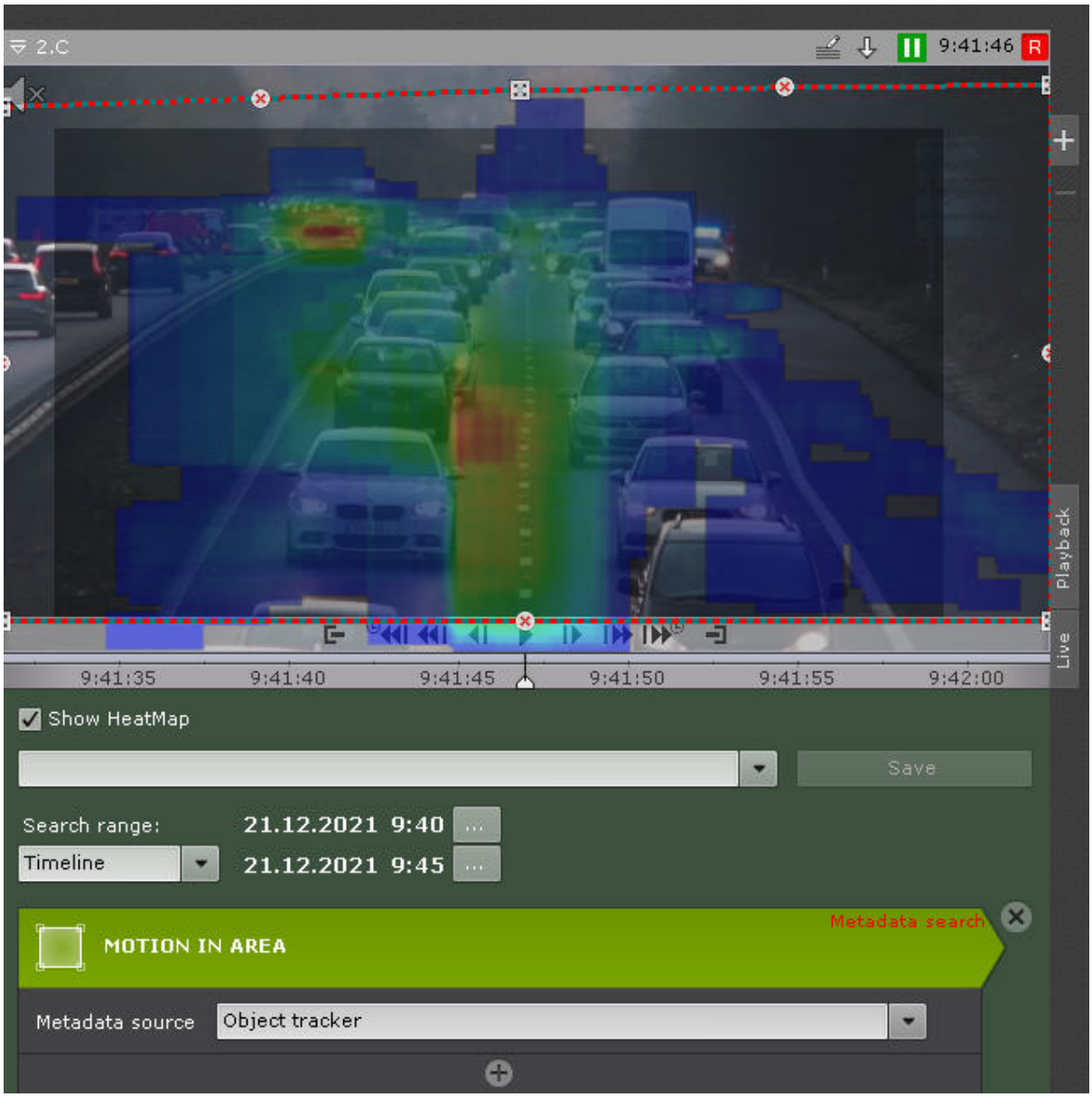
To display a heat map, do the following:

1. Select the type of search using metadata (**1**, see Search by LPs(see page 1227), Search for similar face(see page 1234), Search in archive(see page 1216)).



2. Set the time period, according to the data from which the heat map must be generated (**2**, see Setting a search interval(see page 1211)).
3. Set the **Show HeatMap** checkbox (**3**).
4. Click the **Search** button.

When the search is completed, a heat map will be displayed on the map:



The colors on the map change from blue to red depending on the activity:



where blue is low activity, red is high.

20.2.6.4.13.2 Configuring advanced heat map options

You can specify one or more additional parameters to improve the accuracy of search results. The number of possible additional parameters depends on the search criteria (see Configuring the search parameters(see page 1222)).

To set additional search parameters, click the  button (see Configuring the search parameters(see page 1222)). When setting additional parameters, only the zones of the heat map with objects detected motion will be displayed.

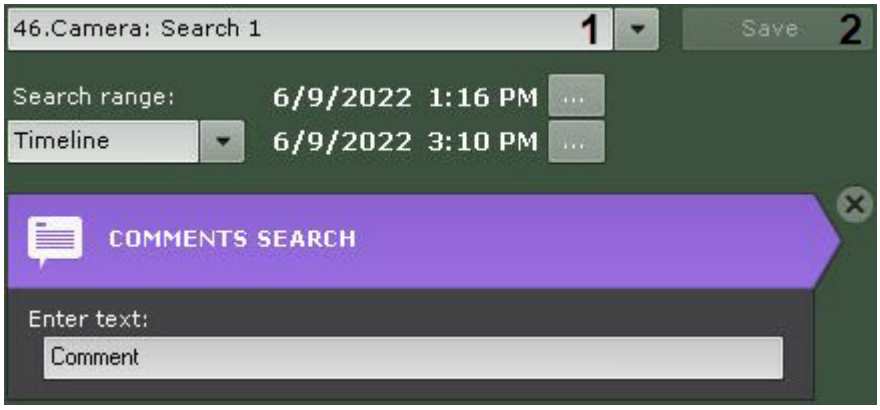
For example, setting the color range of an object allows you to more accurately highlight areas of the video where objects of the specified color are moving (see Configuring object color(see page 1224)). In this case, the size of the heat map can change slightly while maintaining focus on moving objects.

20.2.6.4.14 Saving search queries

Saving a search query allows you to:

- quickly go to search results;
- apply search criteria to other cameras.

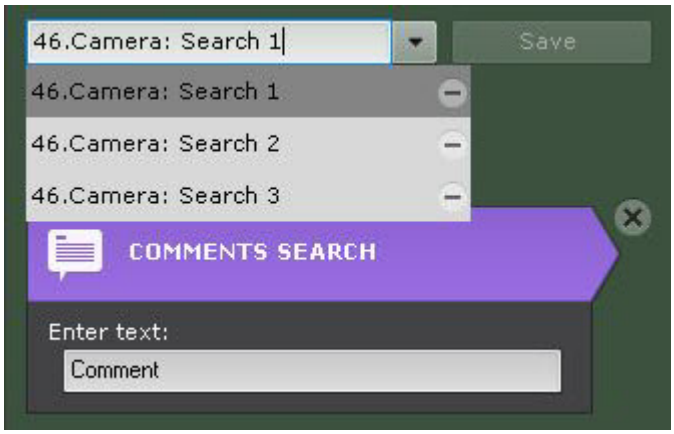
To save a search query, specify its name (**1**) and click the **Save** button (**2**). After this, the tab for the search query becomes available in the lower right corner of the Surveillance window (see Viewing the results of a saved search query(see page 1203)).



Attention!

You cannot save search range.

To apply the saved search criteria to another camera archive, switch the camera to the Archive Search mode and select the required search query.



To edit a search query, view the list and select the relevant query.

Changes are not saved until you click the **Save** button. If the query name is changed, the query is saved under the new name and the old, unchanged query remains available.

To delete a search query, click the button.

20.2.6.4.15 Switching between search results

If you run a search more than once and haven't exited the Archive Search mode during that time, you can switch between search results.

Note

The number of stored search results is limited only by the RAM of the Server.

Click on the search control panel to go to the previous search result, and click to go to the next result.

Each time you switch between results, the search results panel displays the moments corresponding to the previous/next result.

20.2.6.4.16 Working with search results

20.2.6.4.16.1 Viewing search results

The search control panel shows how many moments are found when the search is complete.



The search results panel displays the precise moments in the archive that correspond to the specified search criteria. The time and date of each moment are displayed below it (**1**). The found results are the beginning of video recordings.

Note

- To copy the time and the start date of the video fragment to the clipboard, right-click them.
- An alarm object is outlined with a red border.



A scroll bar is located on the right side of the search results panel (**2**). Below it, there is a scale slider (**3**).

When positioning on the timeline (see Navigating using the Timeline(see page 1196)), the positioning is automatically performed among the search results. The search result closest to the positioning point is highlighted among the search results.

Note

If you select search results close to the limits of the timeline (see Setting a search interval(see page 1211)), the search range can shift.

You can filter the search results and keep only the important moments. To do this, do the following:

1. Double-click the moment that you want to keep for further analysis. Its thumbnail is tagged with a star .

   Note

   To remove the tag, click the star again .

2. Tag all moments that you want to keep.
3. Click the **Clear** button to delete untagged moments from the search results.



20.2.6.4.16.2 Viewing search results in the TimeCompressor mode

You can view search results by metadata in the archive (Search by LPs(see page 1227), Face search(see page 1233), Search in archive(see page 1216)), in the TimeCompressor mode (see Compressed playback of archives (TimeCompressor)(see page 1191)).

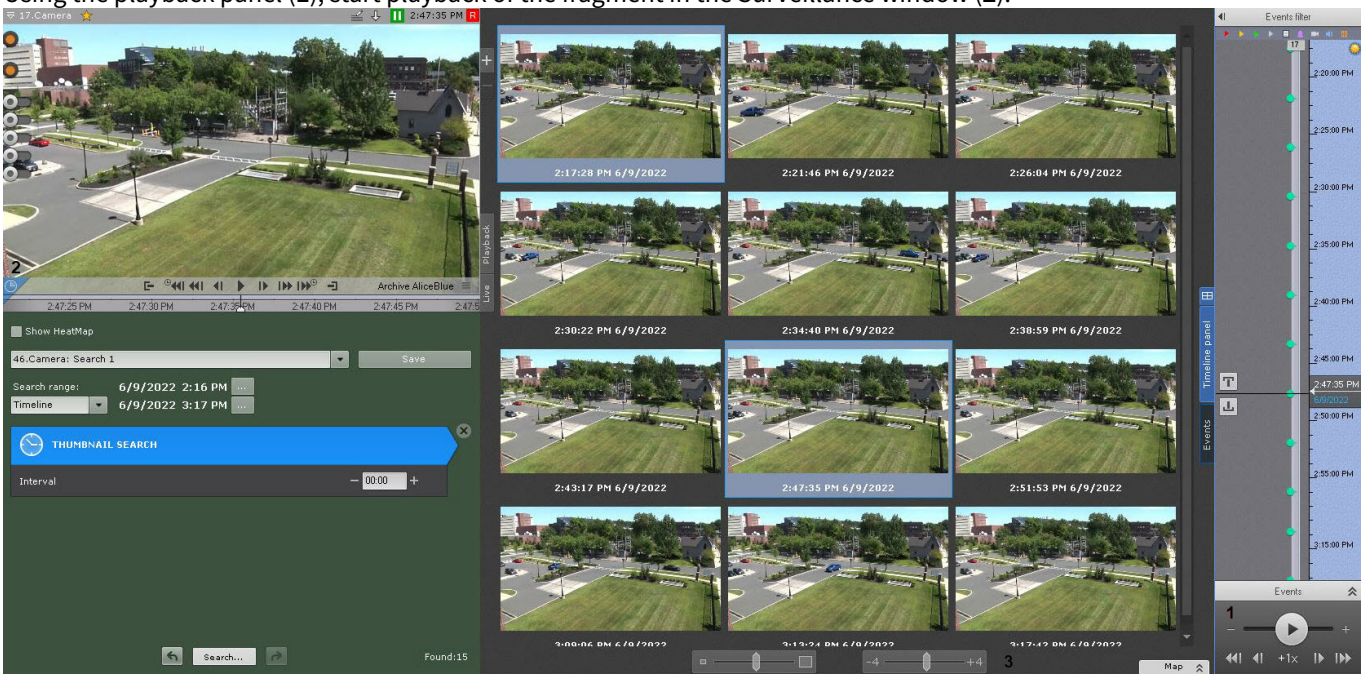
To do this, click the button on the timeline in the Surveillance window.



20.2.6.4.16.3 Playback of video fragments

To view the video fragment corresponding to a found moment in the archive, do the following:

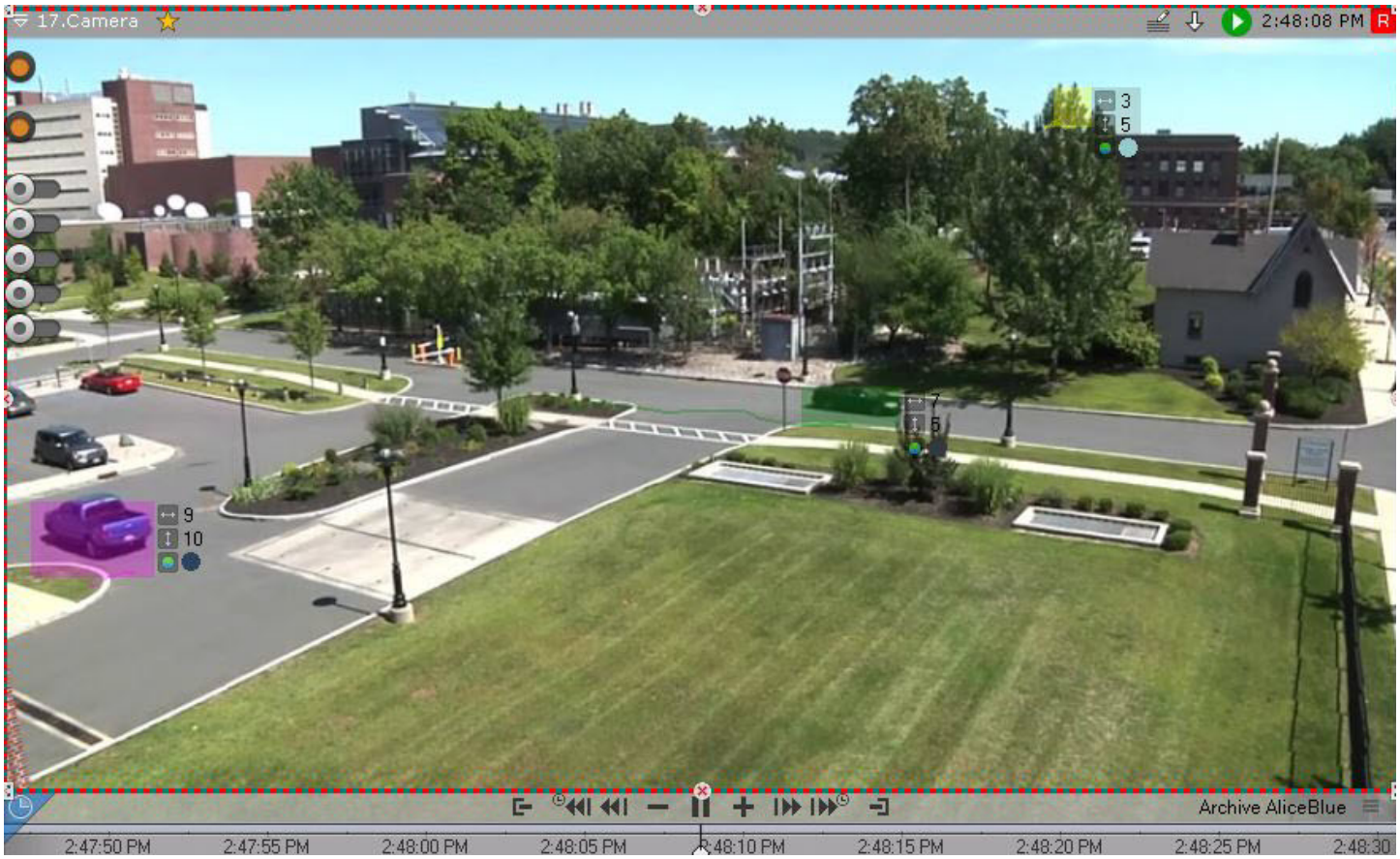
1. Left-click the found moment on the search results panel.
2. Using the playback panel (**1**), start playback of the fragment in the Surveillance window (**2**).



By default, the playback starts with the time specified below the thumbnail. You can use the control (**3**) to change the start time. If the control is in the leftmost position, playback starts four seconds later then the start time. If the control is in the far right position, playback starts four seconds earlier.

Note

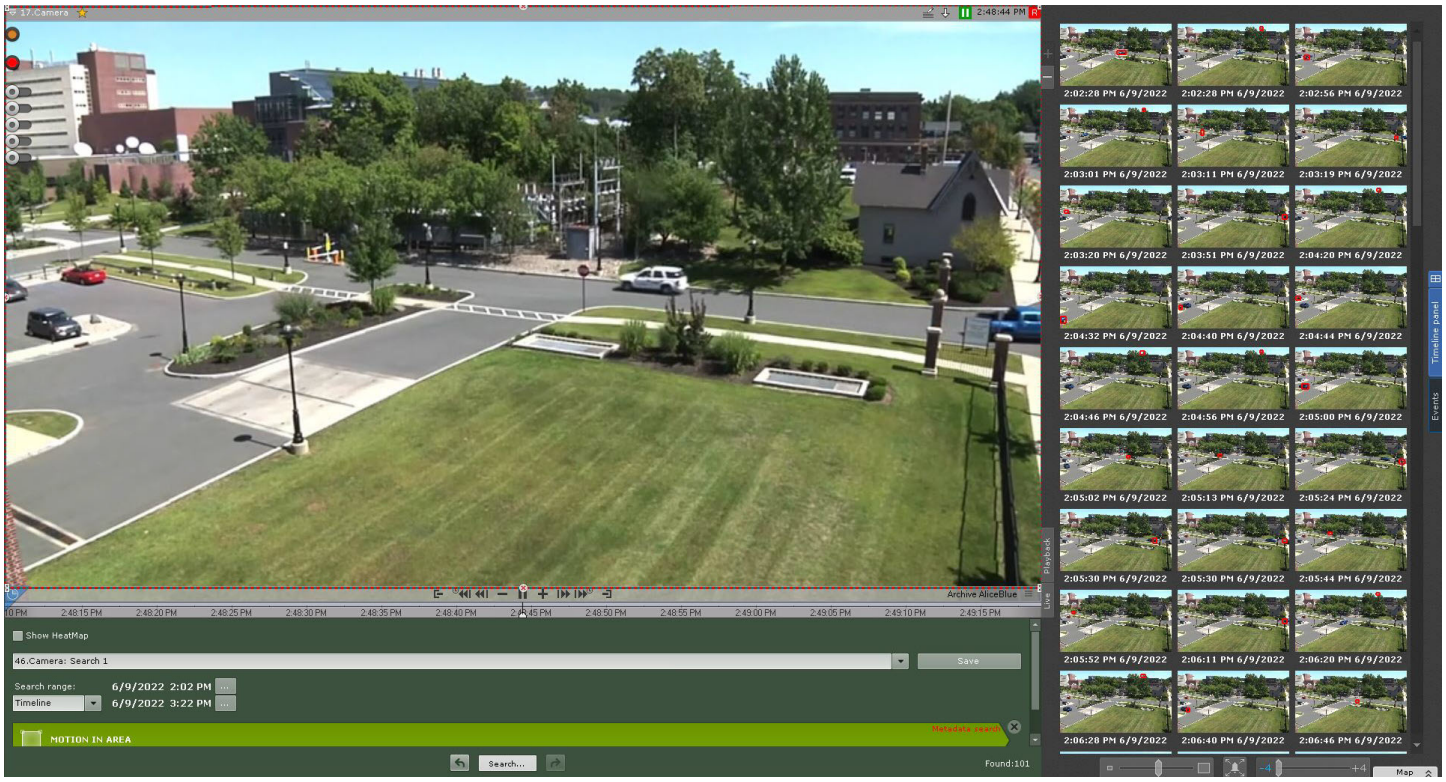
If object tracking is activated in the Surveillance window, then the properties of tracked objects (width and height as a percentage of the width or height of the frame) are displayed when viewing video fragments found using the Search in archive.



Note

To switch between video fragments, use the corresponding buttons on the playback panel or on the advanced navigation panel (see Navigating using the advanced panel(see page 1197) and Navigating using the Playback panel(see page 1201)).

When the Surveillance window is maximized (see Scaling the Surveillance window(see page 1140)), the search conditions and the archive navigation panel are hidden.



20.2.6.4.16.4 Zooming in on found moments

You can zoom in the following objects on found moments:

- an object that initiated an event from a detection tool (during an event search);
- a track (during the Search in archive);
- selected area when entering a comment (during a comment search).

To do this, click the  button below the search results.



Attention!

Zooming in occurs only in the following cases:

1. If the height and width of the visual element specified in the settings of the Search in archive is less than 1/3 of the frame.
2. If the tracking object occupies less than 1/3 of the frame (for detection tool search).
3. If the object selected when entering a comment occupies less than 1/3 of the frame (for comments search).

In all other cases, the found moments are displayed in their entirety.

To close zoom, click the  button again.

20.2.6.4.16.5 Exporting video fragments and repeated search

To export the video fragment corresponding to a found moment in the archive, do the following:

1. Double-click the found moment on the search results panel. The interval for export is selected from this moment until the next found moment.

   Important

   Double-clicking the found moment also causes a repeated search within the selected time interval for export.

2. Export the video (see Exporting Video Recordings(see page 1308)).

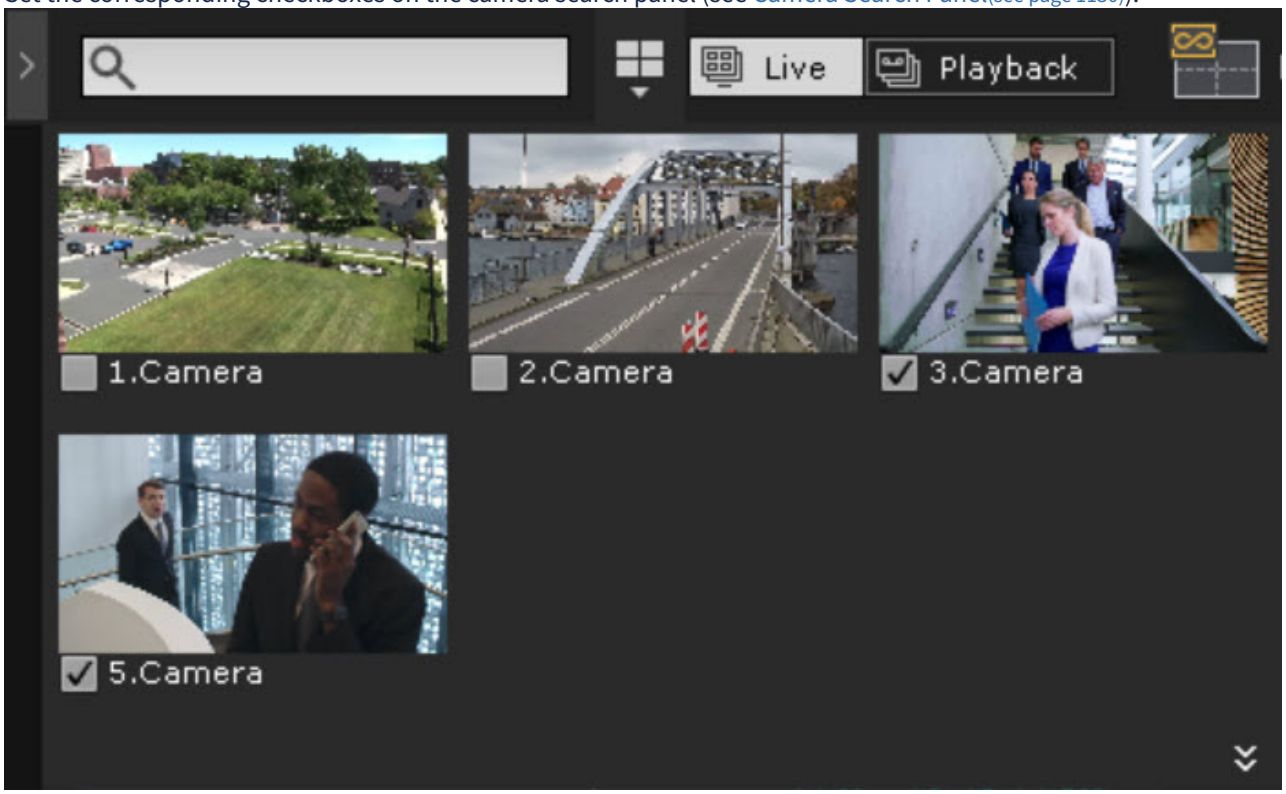
20.2.6.5 Simultaneous search in the archive of several cameras

Attention!

The number of cameras for search is unlimited.

To search in the archive of several cameras simultaneously, do the following:

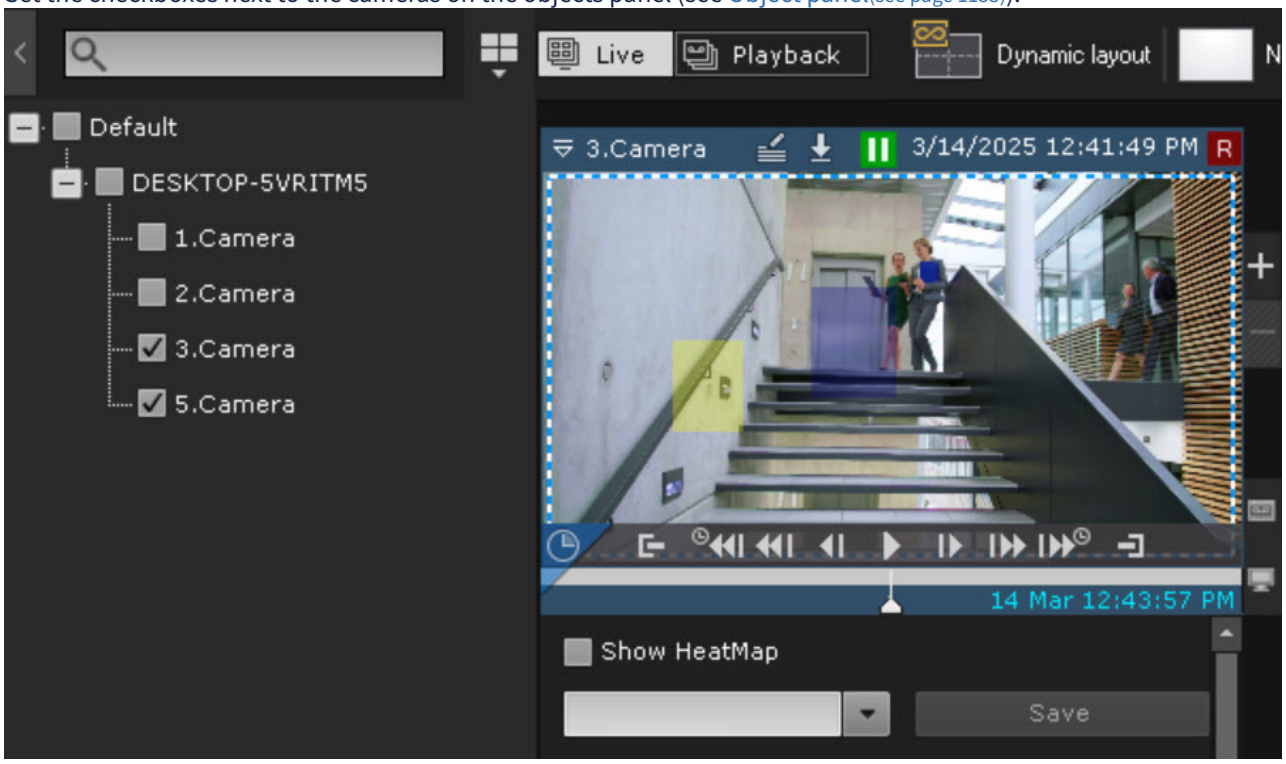
1. Go to the Archive Search mode (see Switching to the Archive Search mode(see page 1207)).
2. Select the search type and set its parameters (see Search in the archive of a single camera(see page 1211)).
3. Select the cameras in the archive of which you want to perform the search in one of the following ways:
   a. Set the corresponding checkboxes on the camera search panel (see Camera Search Panel(see page 1130)).



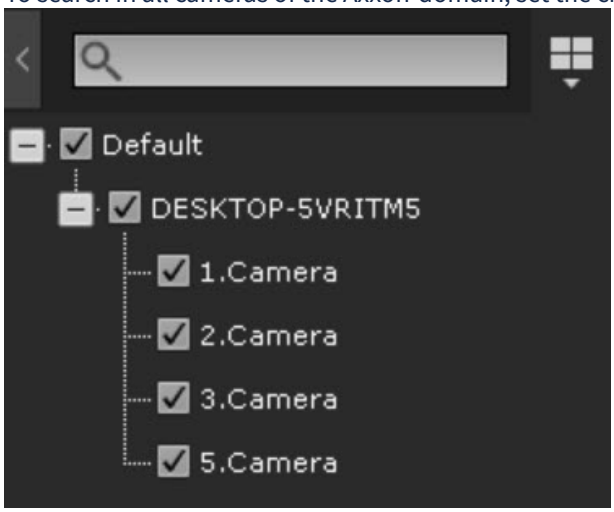
Note

- By default, the checkbox is set next to the camera to which you switched in the Archive Search mode. You cannot clear the checkbox next to this camera.
- If you want to change the active camera, you must reopen the Archive Search mode.

b. Set the checkboxes next to the cameras on the objects panel (see Object panel(see page 1133)).



To search in all cameras of the Axxon-domain, set the checkbox next to the name of the Axxon-domain.



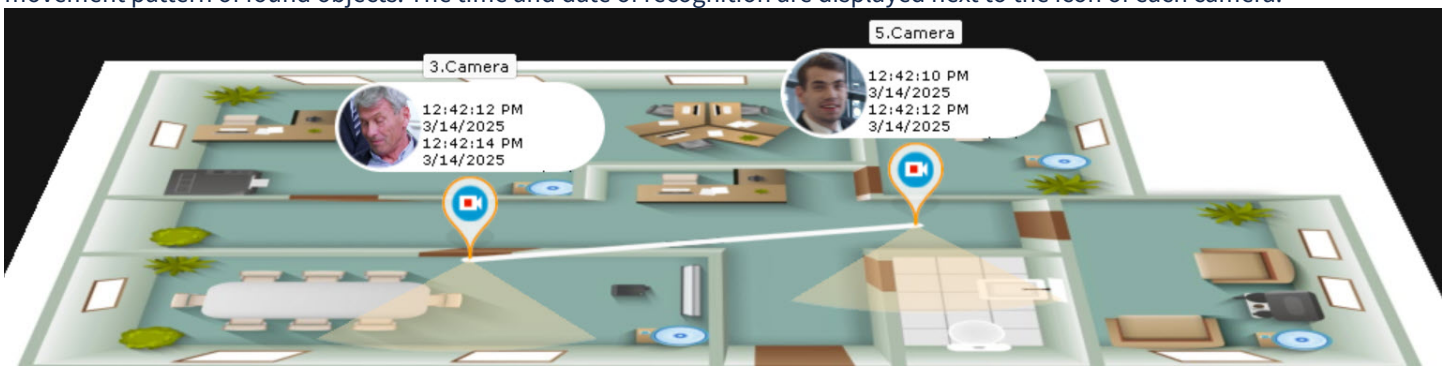
4. Click the **Search**  button.

After the search is performed, the search results panel displays the moments in the archive that match the specified search criteria (see Viewing search results(see page 1247)).

Note

- When you search in the archive of several cameras simultaneously, the timeline is used (see The Timeline(see page 1122)) to set the beginning and end of the viewed channel segments. This can affect the search result. The closer you zoom in on the timeline, the smaller channel segments are used for the search.
- Starting with *Axxon One* 2.0.10, only **one** timeline is displayed for all selected cameras in the Archive Search mode.

If you search for faces (see Search for similar face(see page 1234)) or license plates (see Search by LPs(see page 1227)) in the archive of several cameras simultaneously, the interactive map (see Opening and closing the map(see page 1291)) displays the approximate movement pattern of found objects. The time and date of recognition are displayed next to the icon of each camera.



20.2.7 Working with fisheye cameras

20.2.7.1 Viewing modes for video from fisheye cameras

Axxon One allows you to view the video stream and video archive from fisheye cameras by converting the video image into one of the following formats:

1. 360° panorama.
2. Regional view.
3. 180° panorama (for cameras with an Immervision lens).

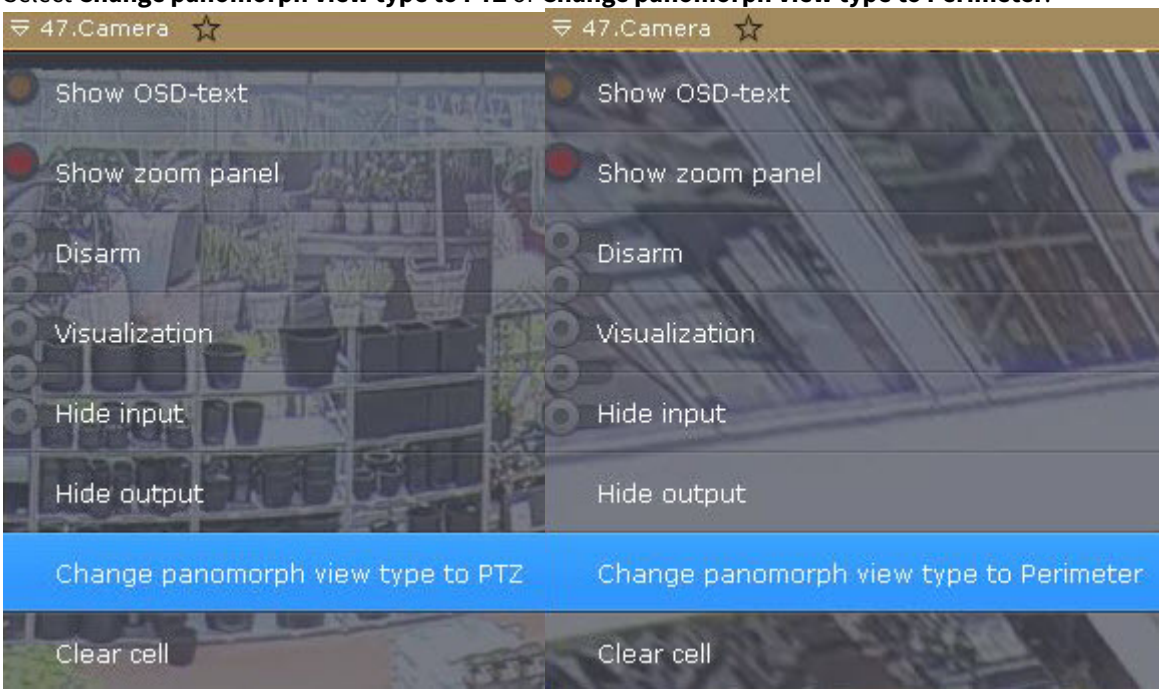
20.2.7.1.1 Selecting viewing mode for videos from a fisheye camera

The default mode for fisheye cameras is either the mode specified in the device settings (see Configuring fisheye cameras(see page 183)), or the mode specified in the layout settings (see Selecting default functions for Surveillance windows(see page 955)).

To change the viewing mode, do the following:

1. Open the camera context menu.

2. Select **Change panomorph view type to PTZ** or **Change panomorph view type to Perimeter**.



Note

This setting is not preserved if you switch to another layout.

20.2.7.1.2 360 degree Panorama and Regional view (virtual PTZ)

By default, video from fisheye cameras is displayed in the Surveillance window as a 360° panorama.

Note

This display format is only available in the Live and Archive modes.



When digital zoom is applied to video (see Digital video zoom(see page 1141)) by one scale bar or more, it switches to the virtual PTZ mode.

The following actions are available when viewing video in this mode:

1. Point & Click functionality (see Control using Point&Click(see page 1174)).
2. Change the angle of view of the fisheye camera by left-clicking in the Surrveillance window.



In both viewing modes, all standard video surveillance functions are available for the fisheye camera.

When using a dual lens camera, the default viewing mode is set to two 180° views.



When you zoom in on one of the images, both views are merged into a single panoramic view.



20.2.7.1.3 180 degree Panorama

This viewing mode is available for:

- cameras with Immervision lenses;
- dual lens fisheye cameras.

> **Note**
>
> If the camera is wall-mounted, the angle of view cannot be configured (see Configuring fisheye cameras(see page 183)).



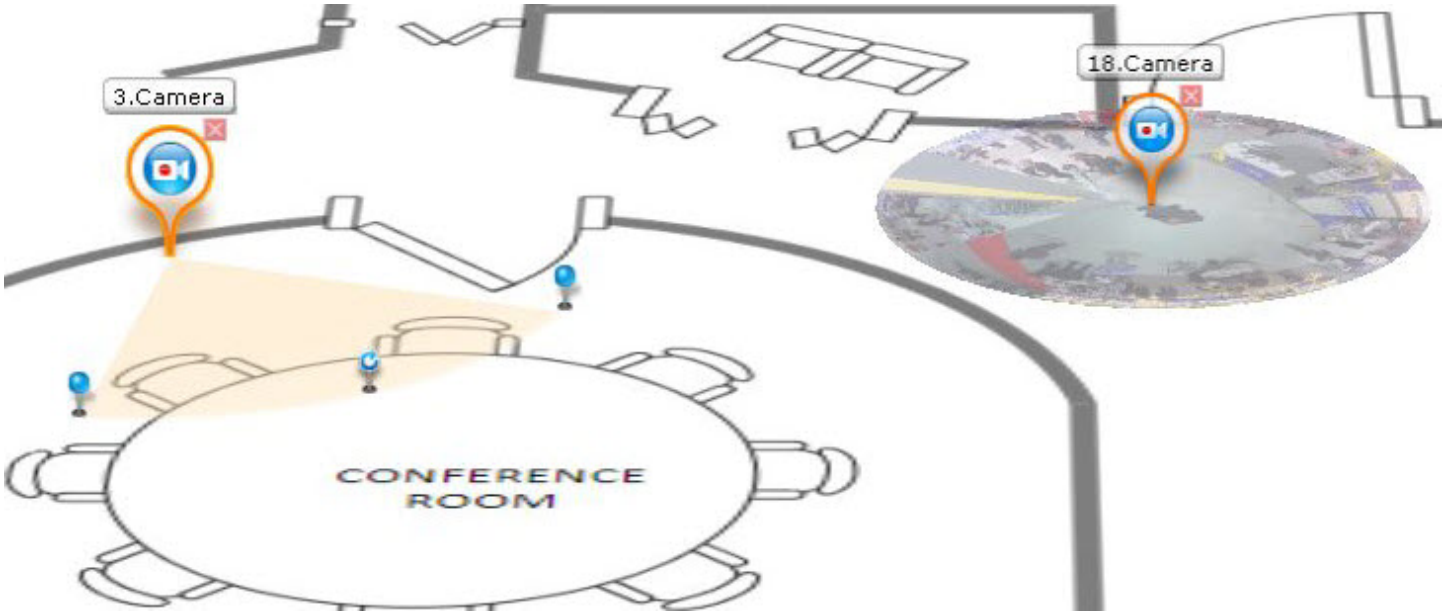
To set the viewing angle, click and hold the  button while moving the mouse cursor to the left or right.

Point&Click (see Control using Point&Click(see page 1174)) and all standard video viewing functions are available when viewing video in this format.

20.2.7.2 Fisheye cameras on interactive map

20.2.7.2.1 Viewing video and controlling a fisheye camera from the map

If a fisheye camera is ceiling-mounted and the **PTZ** view type is selected (see Configuring fisheye cameras(see page 183)) and a 360° field of view is specified for it on the map, the video from the camera is displayed on the map in real time.



When you click the left mouse button on the video image on the map, the angle of view of the fisheye camera changes, so that the click point is in the centre of the frame in the Surveillance window (the Point & Click function, see Control using Point&Click(see page 1174)). To switch to the Immersion mode, you must display the map in 2D format (see Changing the map tilt(see page 1294)) and click the video image.

Note

- If at the moment of clicking, the Surveillance window with the given fisheye camera isn't active, the first click on the video image on the map makes it active, and the following ones perform the Point&Click function.
- If the camera FOV isn't circular, when you click it, you go to the Immersion mode.

In all other cases, the behaviour of the fisheye camera on the map is the same as a regular camera.

20.2.7.2.2 Fisheye cameras in the Immersion mode

If a fisheye camera is ceiling-mounted, the **PTZ** view type is selected (see Configuring fisheye cameras(see page 183)) and a 360° field of view is specified for it on the map, then in the Immersion mode (see Immersion mode(see page 1299)), the camera is displayed on the entire Surveillance window over the map image in the virtual PTZ mode (see Viewing modes for video from fisheye cameras(see page 1254)).



In the Immersion mode, only the following video surveillance functions are available for fisheye cameras.

1. Digital zoom with mouse scrolling (see Zooming in on a video image using the mouse scroll wheel(see page 1143)).
2. Point&Click function (see Control using Point&Click(see page 1174)).
3. Changing the angle of view of the fisheye camera by moving the left mouse button over the video image.

To exit the Immersion mode, click the  button.

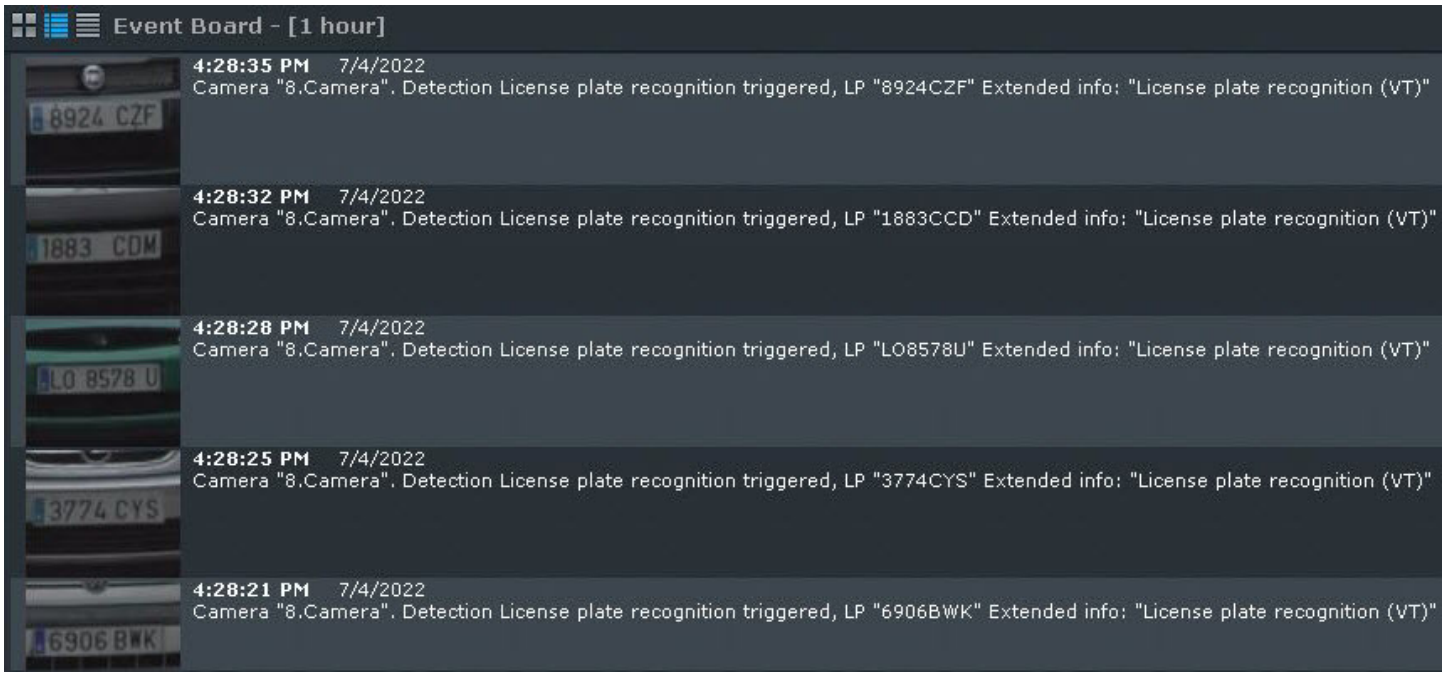
In all other cases, the behaviour of the fisheye camera in the Immersion mode is the same as a regular camera.

20.2.8 Vehicle license plate recognition and search

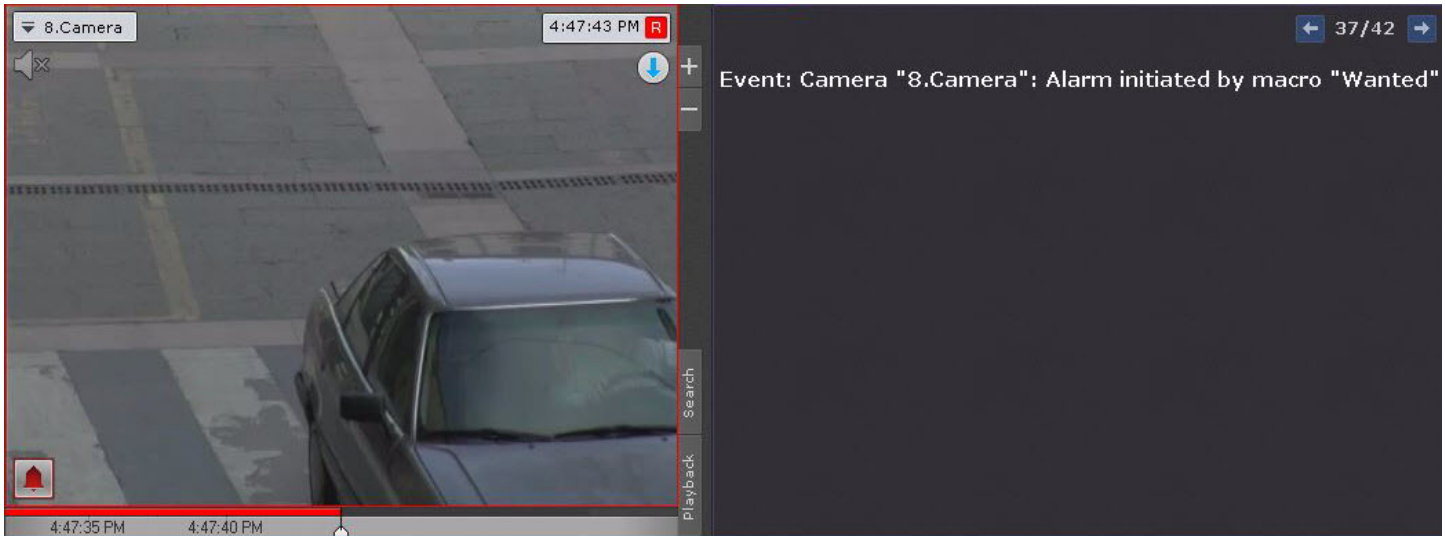
Each recognised license plate is saved in the system log (see System log(see page 1318)).

> **Attention!**
>
> Depending on detector settings (see Configuring the License plate recognition VT(see page 659), Configuring License plate recognition RR(see page 555)), a delay can occur between the license plate recognition and the registration of the corresponding event.
> The event is time-stamped with the time of recognition, not registration.
> For example, if a car passes the camera at 12:05:00, and the detector is set to a 10-second timeout, the event is registered at 12:05:10 and the recognition time in the event is 12:05:00.
> The standard license provides a more than 30-second delay between the license plate recognition and the corresponding event (see Configuring the License plate recognition VT(see page 659)).

All relevant events can be displayed on the Event Board (see Working with Event Boards(see page 1266)) or Dialog Board (see Working with Dialog Board(see page 1276)).



If you have created any lists of LPs in the system, you can program automatic responses (for example, alarm initiation) to the recognition of a license plate from a list (see Checking in lists of LPs(see page 668)).

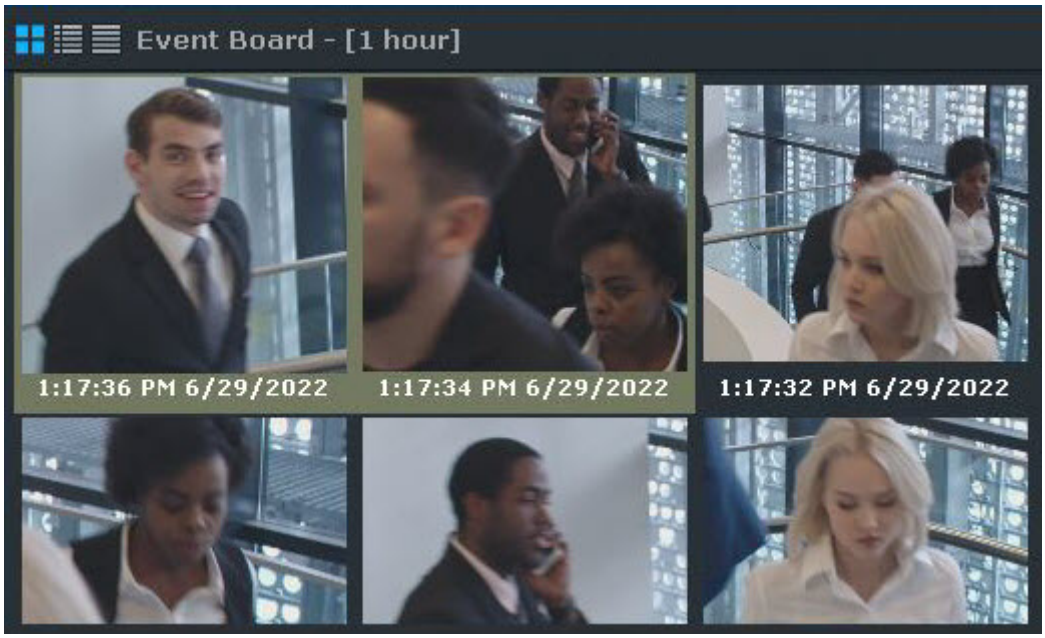


You can search by recognized license plates both in the archive of a single camera (see Search by LPs(see page 1227)) and simultaneously in the archive of several cameras (see Simultaneous search in the archive of several cameras(see page 1252)). You can also search by an event in the system log (see Go to the archive video of a specific event(see page 1323)).

20.2.9 Face recognition and search

Face recognition events are registered in the System log (see System log(see page 1318)).

These events can also be displayed on the Event Board (see Working with Event Boards(see page 1266)) or Dialog Board (see Working with Dialog Board(see page 1276)).



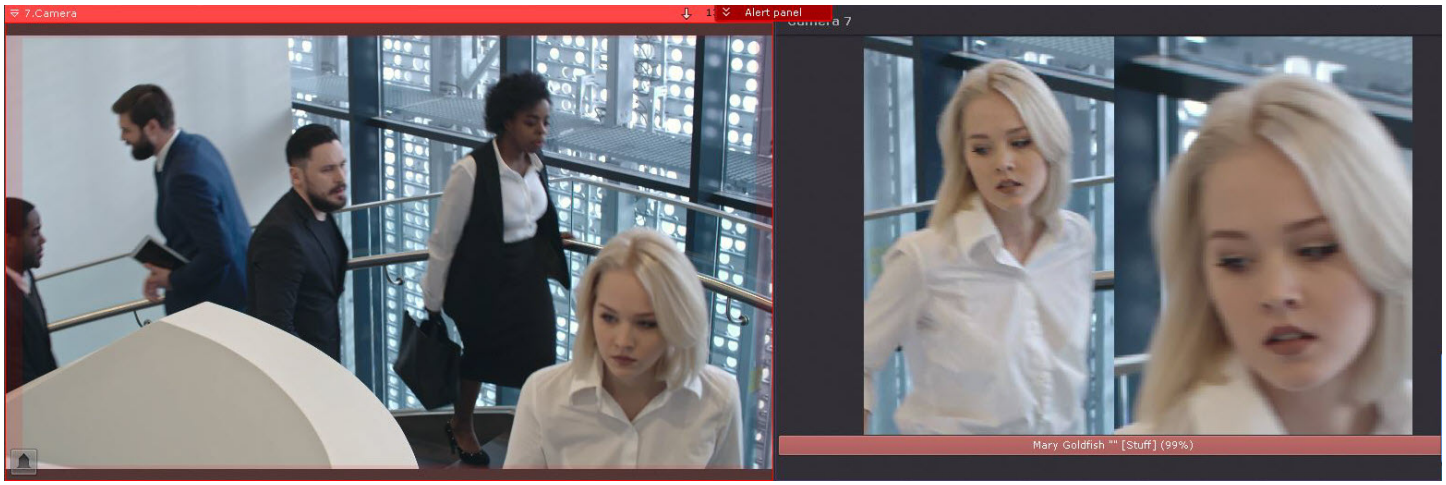
If you enable the age and gender recognition in the settings of the detection tool (see Configuring the Face detector TV(see page 505), Configuring the Face detector VA(see page 491)), this information is also displayed on the Event Board and saved in the System log.



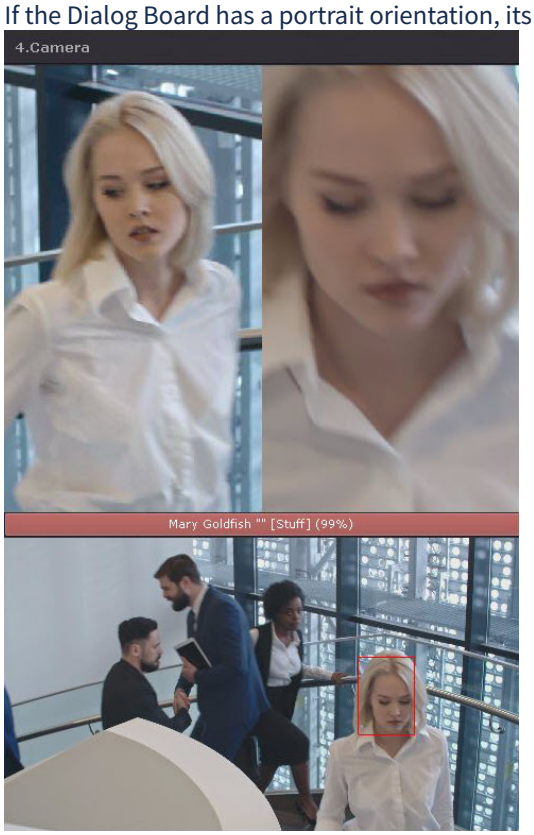
If the Surveillance window is linked to the Event Board (see Linking cells(see page 952)), you can double-click an event to start the search of the captured face in the archive.

If you have created any lists of faces, configured an alarm initiation, and linked the Surveillance window to the Dialog Board (see Examples of macros used when working with lists of faces(see page 906)), when a face from the list is recognized, the following information is displayed on the board:

1. Reference photo from a list of faces.
2. Zoomed in image of the recognised face in the frame.
3. Additional information about the person, and similarity percentage between the recognized face and a reference photo.

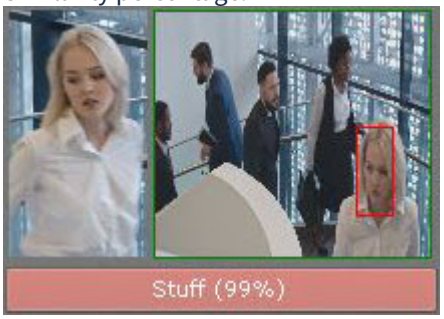


If the Dialog Board has a portrait orientation, its lower part displays the alarm video.



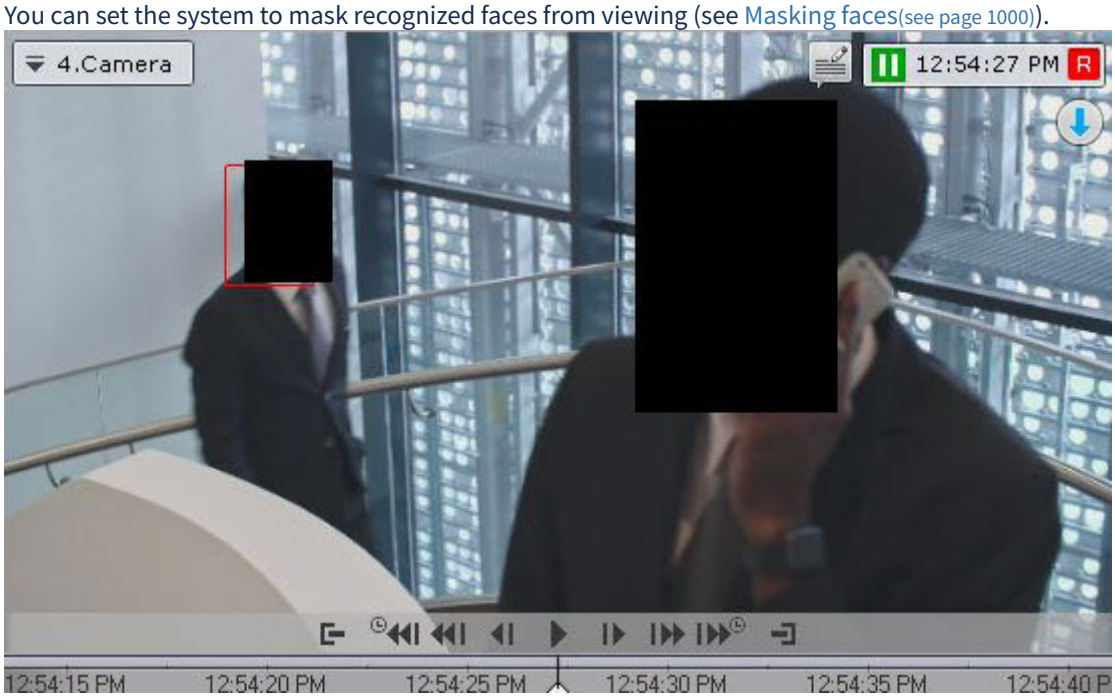
The Alert panel (see Alert panel(see page 1131)) also displays:

1. Reference photo.
2. Thumbnail preview of the source recognition video.
3. Name of the list of faces.
4. Similarity percentage.



You can search for recognized faces both in the archive of a single camera (see Search for similar face(see page 1234)) and simultaneously in the archive of several cameras (see Simultaneous search in the archive of several cameras(see page 1252)).

You can set the system to mask recognized faces from viewing (see Masking faces(see page 1000)).



20.2.10 Temperature screening

In *Axxon One*, only two methods of temperature screening are available:

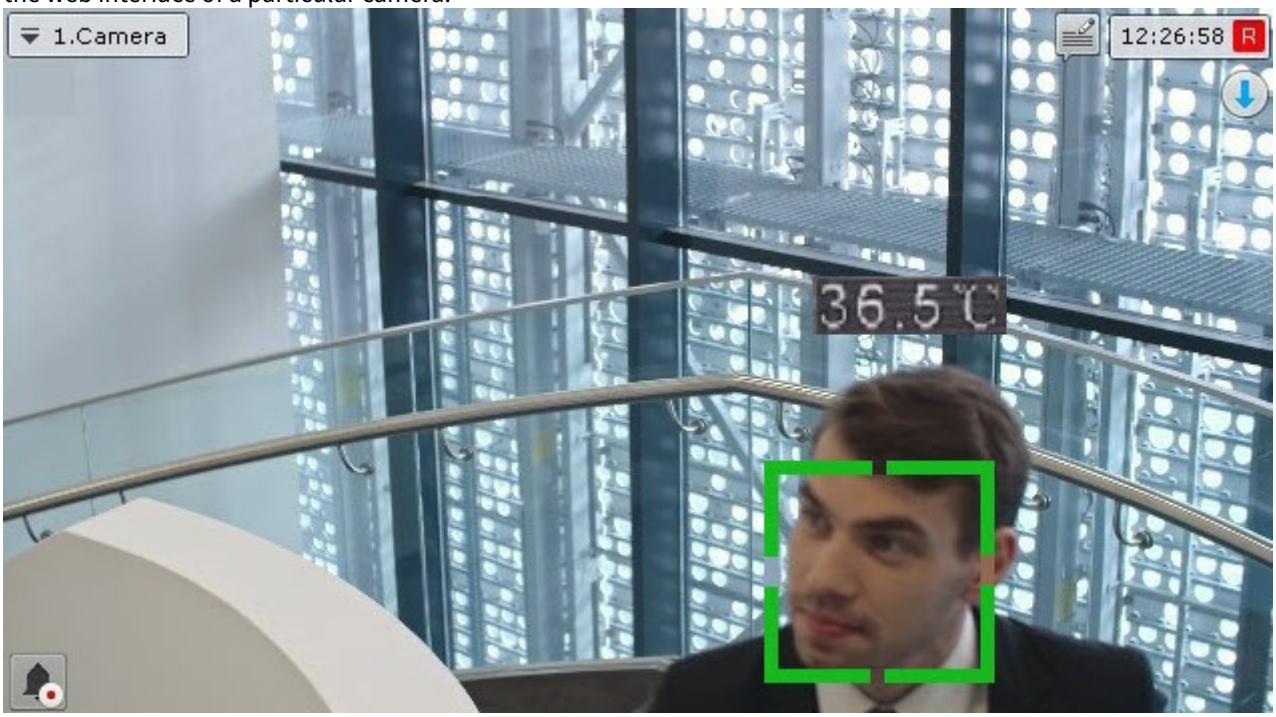
1. When you use Mobotix M16 TR cameras (see Face detection and temperature control with Mobotix M16 TR cameras(see page 818)). In this case, temperature is displayed next to the bounding box of each recognized face.



Each face recognition event contains face temperature that can be displayed on the Event Board (see Working with Event Boards(see page 1266)).

2. When you use the embedded detection tools of selected camera models (see General information about embedded detectors(see page 811)).
   Some cameras display a face bounding box along with temperature of a face. If this option is available, it can be enabled in

the web interface of a particular camera.



20.3 Working with information boards

20.3.1 Resizing information boards

You can resize information boards in the same way as viewing tiles (see Scaling the Surveillance window(see page 1140)).

> **Note**
>
> When the Statistics Board is enlarged, the graph is enlarged as well, displaying data for a broader range of time. When the size of the Statistics Board is reduced, the opposite occurs.
> In both cases, the right-hand border of the graph is constant.

If an information board tile is linked to a viewing tile, at the first enlargement step (to 50%), the viewing tile and information board tile are displayed together and occupy all of the screen on one side.

> **Note**
>
> In this case, the first step takes into account the total size of the related cells: the related cells must be less than 50% of both sides of the layout.

20.3.2 Hiding information boards

Operators can hide information boards on a layout, if this is allowed in the settings.

To hide an information board, in its upper right corner, click the  button.

> **Note**
>
> You can hide the Dialog Board by clicking the button that starts a macro if this feature is enabled in the settings (see Configuring a Dialog Board(see page 966)).

If all cells on the layout have the same size, the space freed up after hiding an information board is allocated to the neighboring cells. Horizontal cells have priority over vertical ones.

If free space cannot be distributed horizontally, it is distributed between the vertical cells.

In more complicated cases (when cell sizes are different), an attempt is made to distribute the free space between horizontal neighboring cells. If this is not possible, free space is distributed between vertical neighboring cells. If even this second attempt is unsuccessful due to the layout configuration, the space remains empty.

Hidden information boards are displayed in two cases:

1. After switching to another layout and back to the original one.
2. When an event occurs that requires the operator's attention. A description of such events for each type of information board is given in the following table.

Types of information boards	**Event after which the panel is displayed**
Dialog and Events	An event matching the board filtering settings occurs
Health	Server condition worsens
Statistics	New events occur

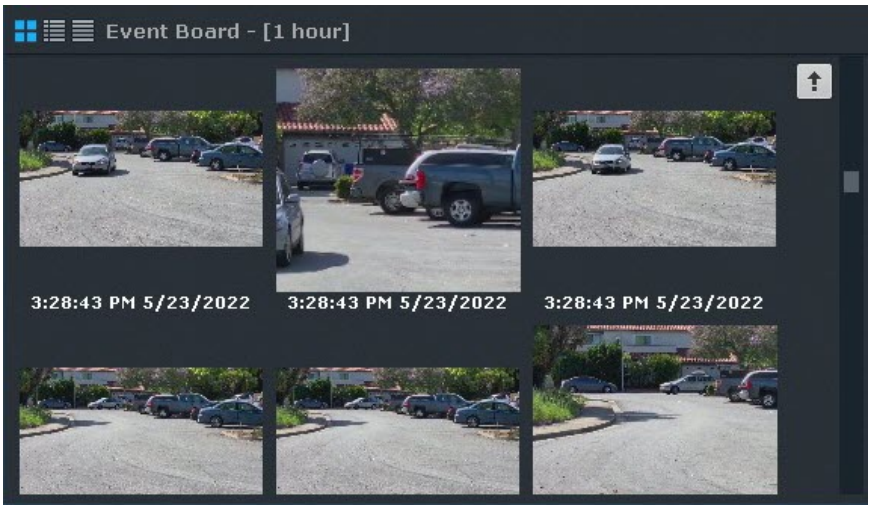
20.3.3 Working with Event Boards

20.3.3.1 Options for displaying information on the Event Board

The **Event Board** displays information about selected system events. Configuration of the events to display is performed in Configuring an Event Board(see page 962).

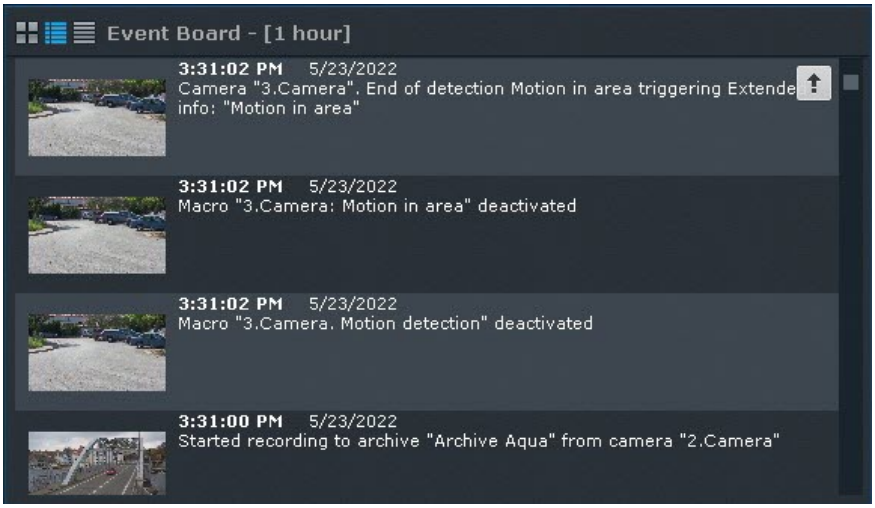
Events on the board can be displayed in three views that you can select using the buttons in the upper left corner of the board:

1. First frame of events and their time:



> **Note**
>
> The frame is not displayed when there is no recording in the archive.

2. First frame of events and text:



3. Text only:



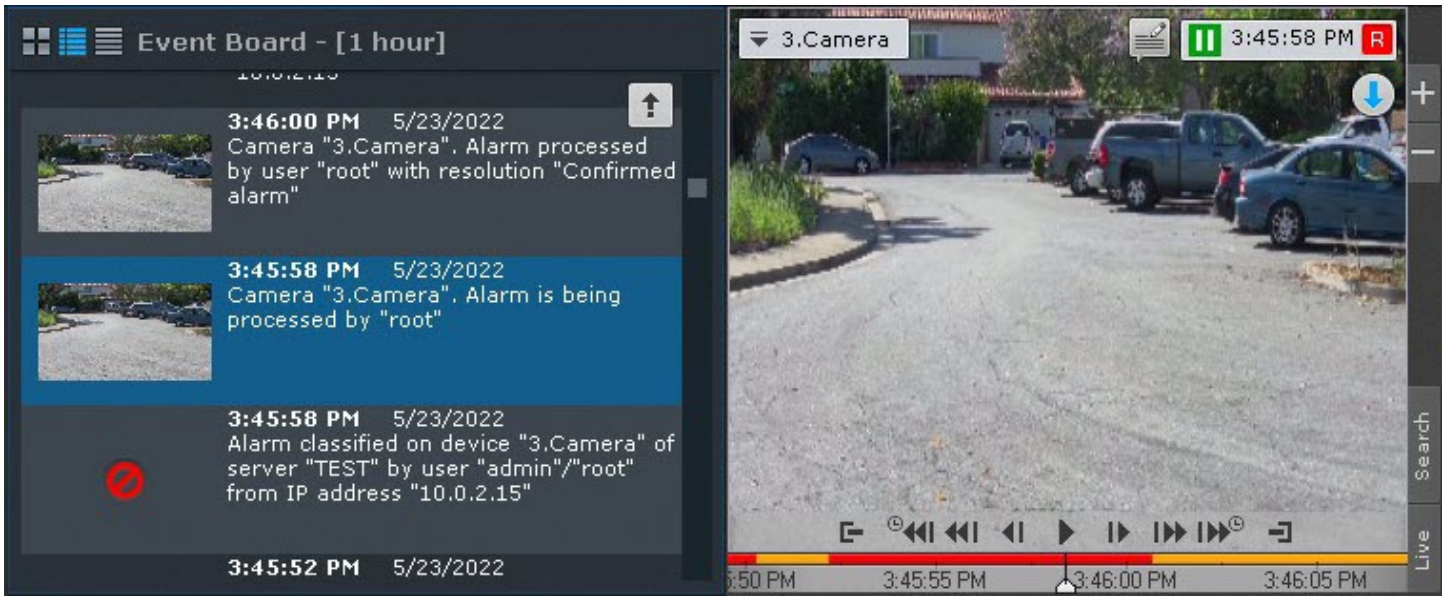
When you go to a layout, the **Event Board** is displayed as configured in the settings, by default.

At the top of the list, there are the most recent events. If you are at the end of the list, you can use the  button in the top right corner of the board to go to the most recent events. New events are highlighted for four seconds. The board can include up to 100 events. If the number of events exceeds the maximum value, the newer events are displayed in place of older ones.

You can also access the **Event Board** on the right side of the screen on any layout (see Viewing events from the detection tools of the selected camera(see page 1178)). In this case, the board displays only the events from the detection tools of the selected camera.

20.3.3.2 Switching a camera linked to an Event Board to the archives

If an Event Board is linked with a camera, clicking an event will switch the camera to Archive mode at the point in time corresponding to the event.



Note

If there is no archive for a camera when an alarm occurs, the archive is positioned at the closest recorded archive entry.

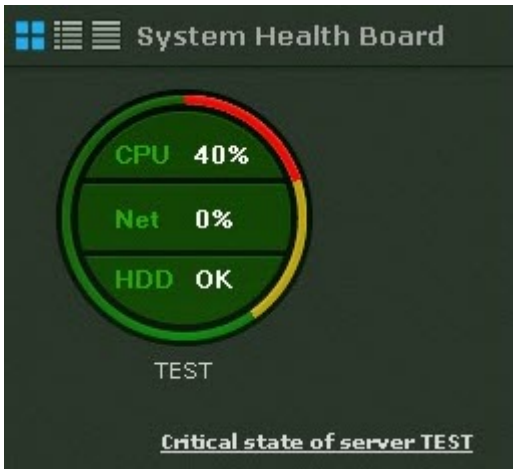
Note

If an Event Board is linked to several cameras, all cameras transition to Archive mode.

20.3.4 Working with System Health Boards

System Health Boards display the status of selected system servers and connected cameras.

By default, the panel displays the status of Servers.



To switch to viewing the status of cameras, click the diagram for the relevant server.



Note

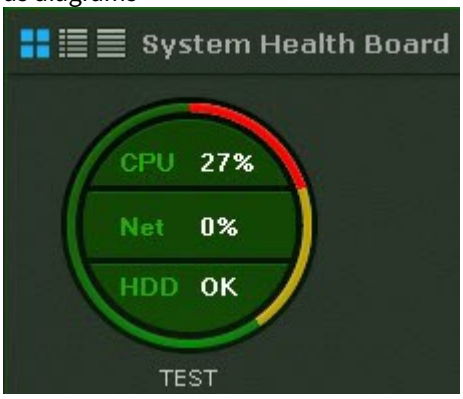
In table mode, you can view server status by clicking the relevant line in the table.

To switch to a view of server status, click the button.

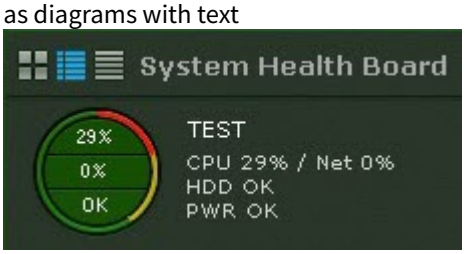
20.3.4.1 Viewing server status

Information about the status of servers can be displayed in three ways, chosen via the buttons in the upper-left corner of the board:

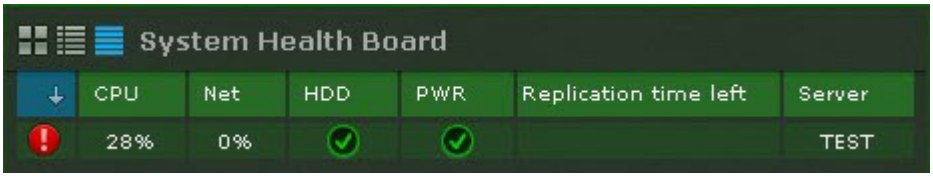
1. as diagrams



2. as diagrams with text



3. as a table



Note

Disconnected Servers are displayed at the end of the list with dimmed brightness.

Tables can be sorted by any column in any direction.

On each server the following metrics are monitored: CPU, Network usage, Disk subsystem status, Power status.

Note

The remaining time of the archive replication is also displayed in the table.

Areas of the diagram change color based on the respective status.

	CPU	**Network**	**HDD**
Red	Load >95%	Connection failure	Critical load on the disk subsystem, data loss when recording to archive over 10%
Yellow	Load from 85% to 94%	At 70% to 100% of capacity	Elevated load on the disk subsystem, data loss when recording to archive under 10%
Green	Load <85%	At less than 70% of capacity	Normal functioning of the disk subsystem (proper operation)

The edge of the diagram changes color based on the status of the connected cameras (see Viewing camera status(see page 1271)).

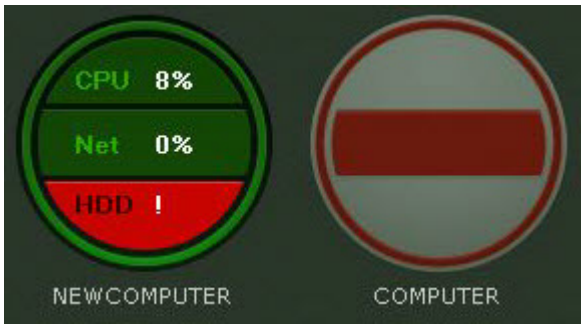
If the entire edge is green, all cameras are in normal condition. If part of the edge is yellow or red, some cameras have borderline or critical status.

Overall server status is determined from the above parameters as follows:

1. Normal – all components and cameras are normal.
2. Borderline – possible problems with the status of at least one component or camera.
3. Critical – at least one component or camera is in critical condition.

Server information is updated every thirty seconds.

If the connection to a server is lost, a corresponding icon is used to depict it.



If all servers are in normal condition, the bottom of the board displays a status bar with information about the number of monitored and distressed servers.



If the status of any server worsens, the status bar is replaced by a message. When the message is clicked, the server status is displayed (if the board is currently displaying camera status).



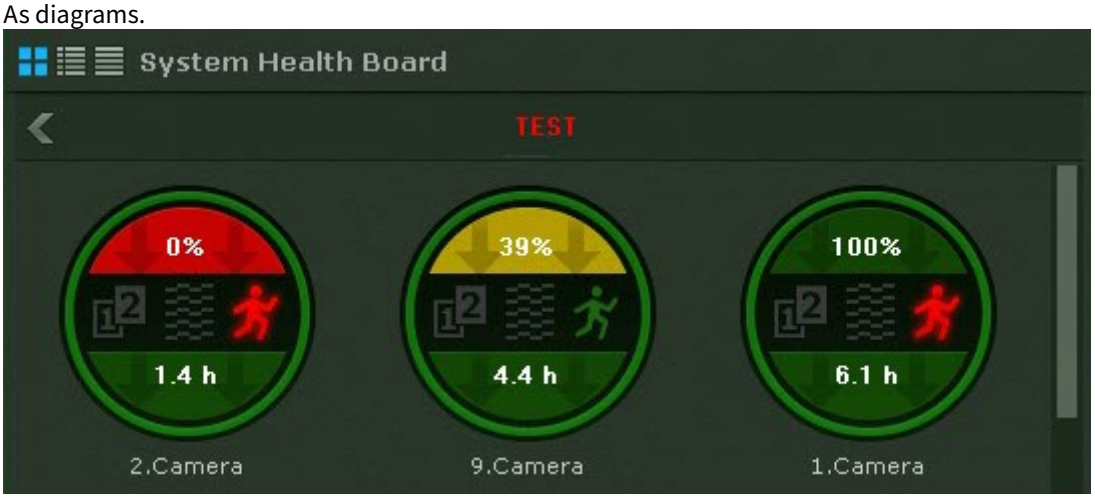
The message then closes and the status bar again appears.

> **Note**
>
> If the status of several servers worsens, a message is shown for the last one.

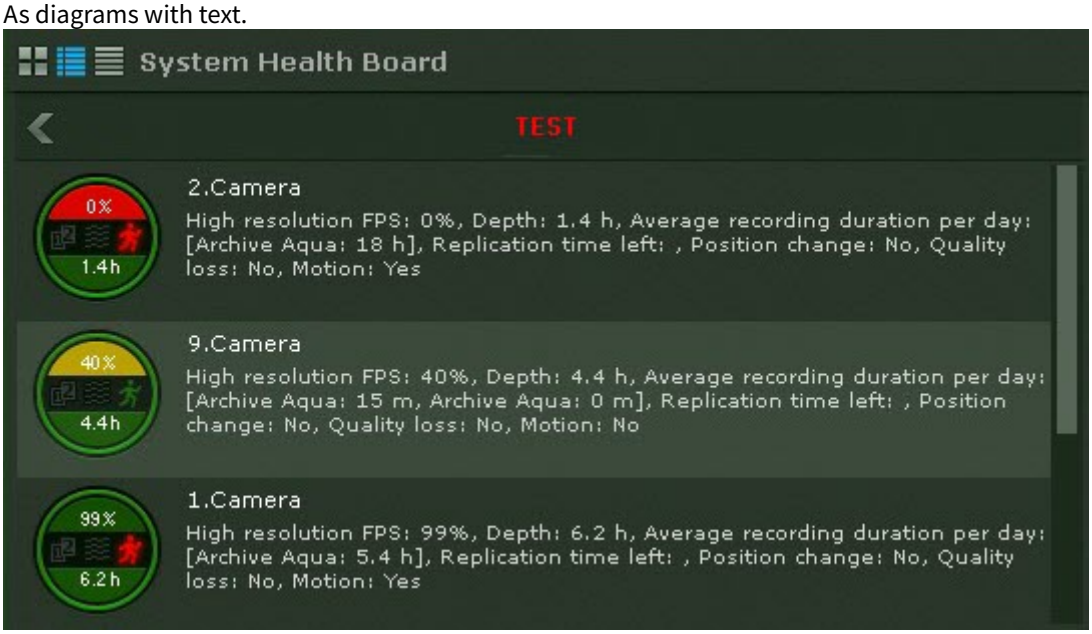
20.3.4.2 Viewing camera status

Information about the status of cameras can be displayed in three views that you can select using the buttons in the upper left corner of the board:

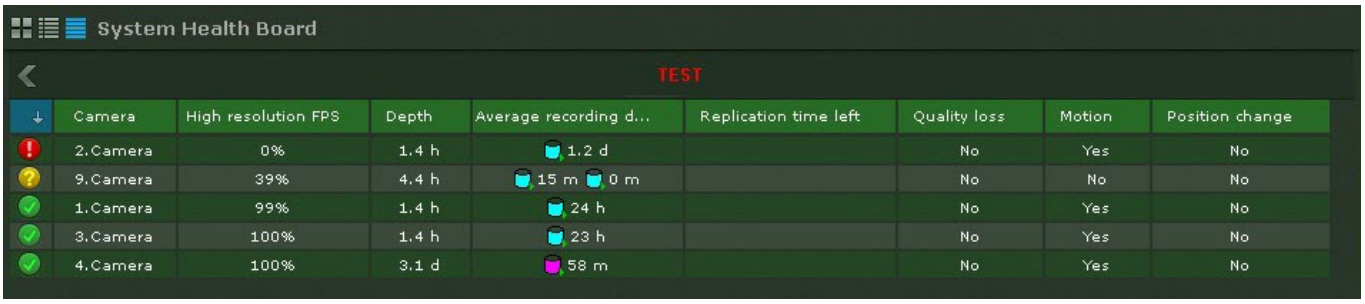
1. As diagrams.



2. As diagrams with text.



3. As a table.



Information in tables can be sorted by any parameter and in any direction.

The following information is displayed for each camera:

1. The percentage rate of actual video FPS to the camera's high definition stream FPS specified in the settings.

   Attention!

   If you configure video streams in the web interface of a camera, the ratio of the received video image FPS to the expected FPS that is set in the settings of the **Camera** object, is displayed (see Camera(see page 171)).

2. Status of detection tools (loss of quality, position change, motion).
3. Maximum possible archive depth (if archive recording is not configured for the camera, this section is grayed out on the diagram).
4. Average density of archive recording—ratio of the total recording time in hours to archive Depth.

   Note

   For constant recording, this parameter value is equal to 24 hours. If the recording takes 50 percent of total time, the value is 12 hours.

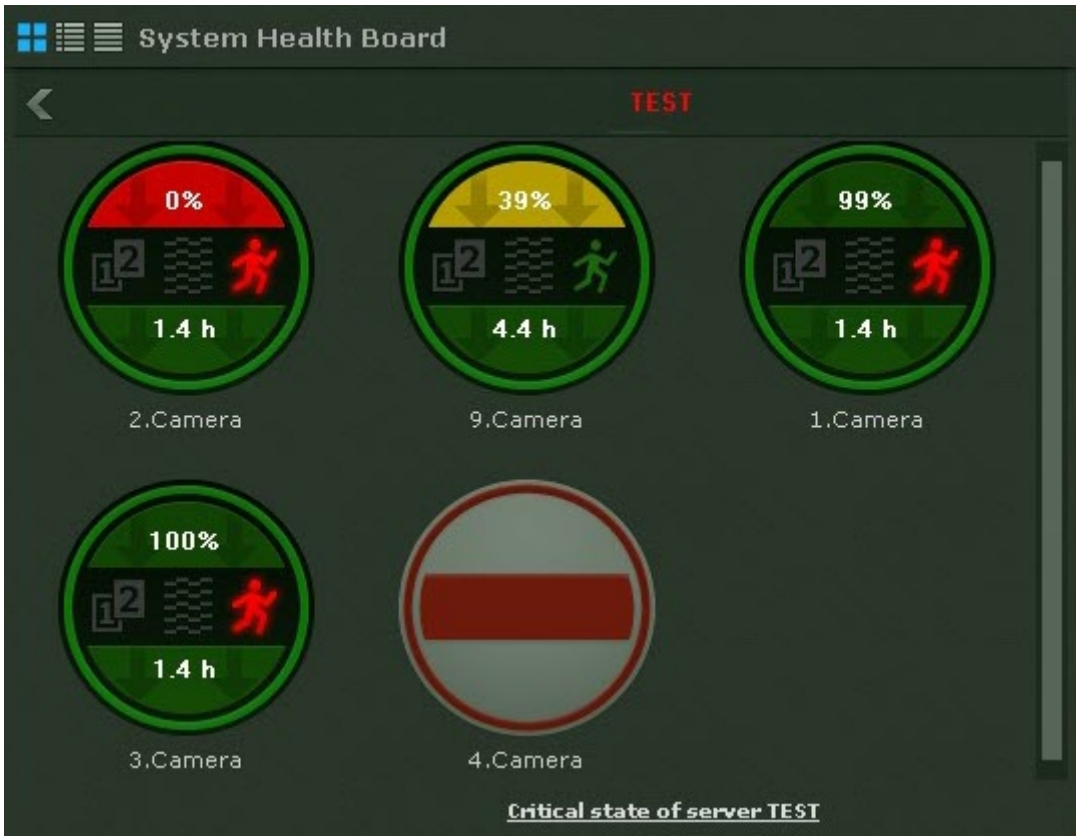
5. Remaining time of archive replication.

The camera status is measured based on the signal from the camera and stream rate:

1. Normal—camera signal present, frame rate is from 70% to 100%. Ccamera is colored green on the diagram and in the table.
2. Borderline—camera signal present, frame rate is from 20% to 70%. Camera is colored yellow on the diagram and in the table.
3. Critical—no camera signal or frame rate is less than 20%. Camera is colored red on the diagram and in the table.

Information is updated every ten seconds.

If there is no signal from a camera, the appearance of the diagram changes accordingly.



Note

Disconnected cameras are displayed at the end of the list with dimmed brightness.

Information about detection tools is received in real time. Depending on the status of detection tools, the corresponding icons change color:

- Green—detection tool status is normal.
- Red—event from a detection tool.
- Gray—detection tool disabled.

20.3.5 Working with Statistics Boards

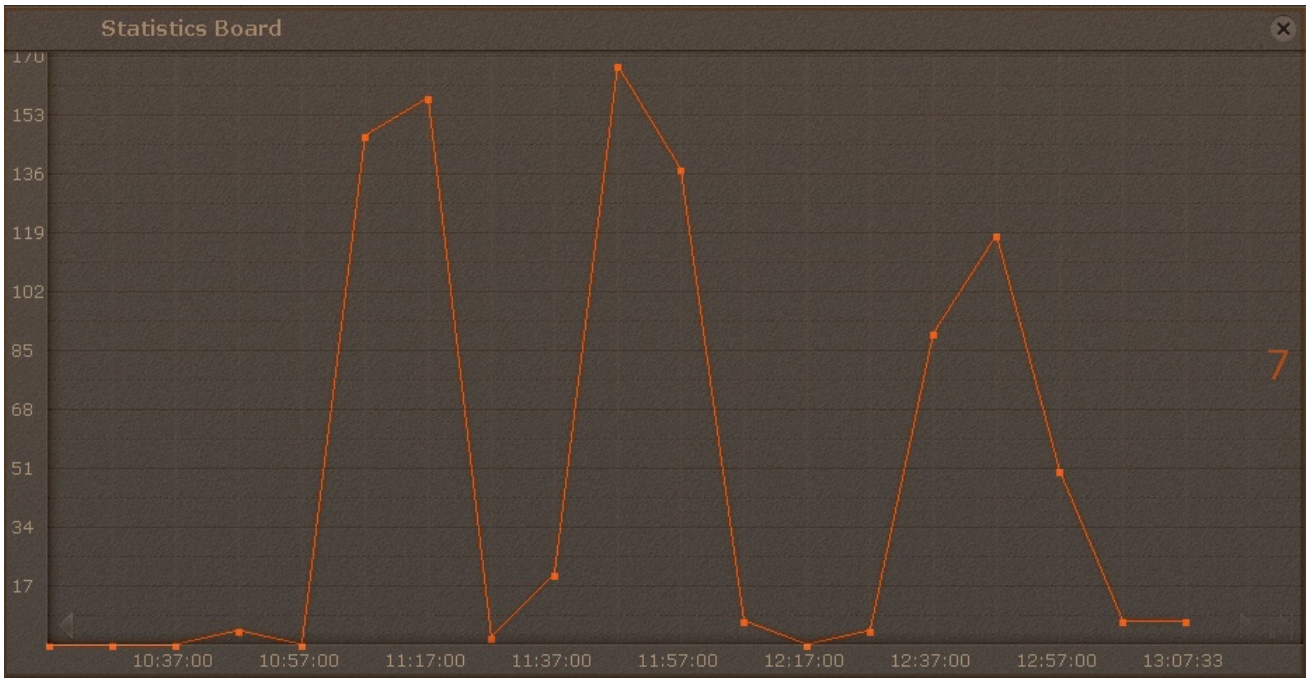
The Statistics Board is a graph of the number of events of a certain type for a specified timeframe. The type of events and amount of time between the points of the graph are configured in the board settings (see Configuring a Statistics Board(see page 964)).

The points of the graph change over time and depend on the current time and interval specified in the settings.

The points are calculated every minute/hour/day/etc. based on the selected unit of measurement (if the interval is specified in minutes, then every minute; if specified in hours, then every hour, and so forth) and is performed as follows:

1. The current time (last point on the graph) is rounded to the nearest whole unit of time (if the interval in the settings is specified in minutes, then the nearest whole minute; if specified in hours, then the nearest whole hour, and so forth).
2. This rounded time is used as the next-to-last point.
3. The formula for the other points is as follows: the adjacent point to the right, minus the interval of time specified in the settings.

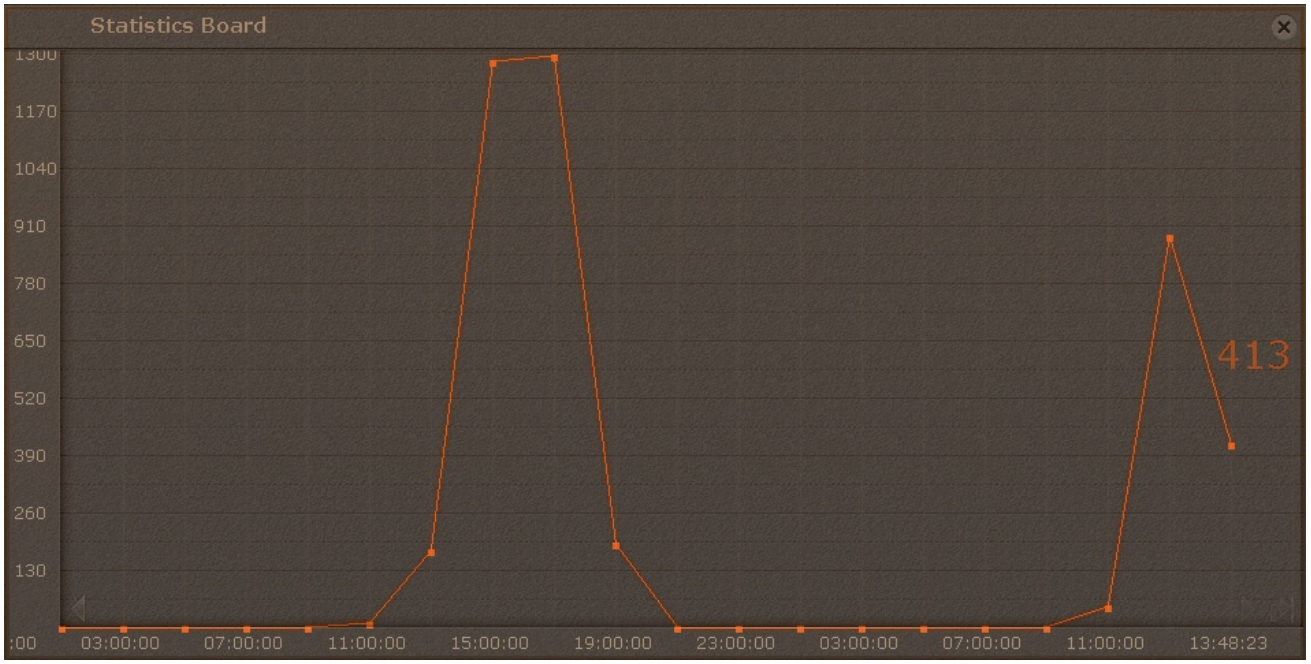
For example, the interval is set to **10** minutes on this sample graph here. The current time (**1:07:33 p.m.**) is the last point on the graph, so after rounding this to the next whole minute we get the value for the next-to-last point: **1:07:00 p.m.** Correspondingly, the points before it are **12:57:00 p.m.**, **12:47:00 p.m.**, etc.



When the current time becomes **1:08:00 p.m.**, the points will be updated to **12:58:00 p.m.**, **12:48:00 p.m.**, etc.

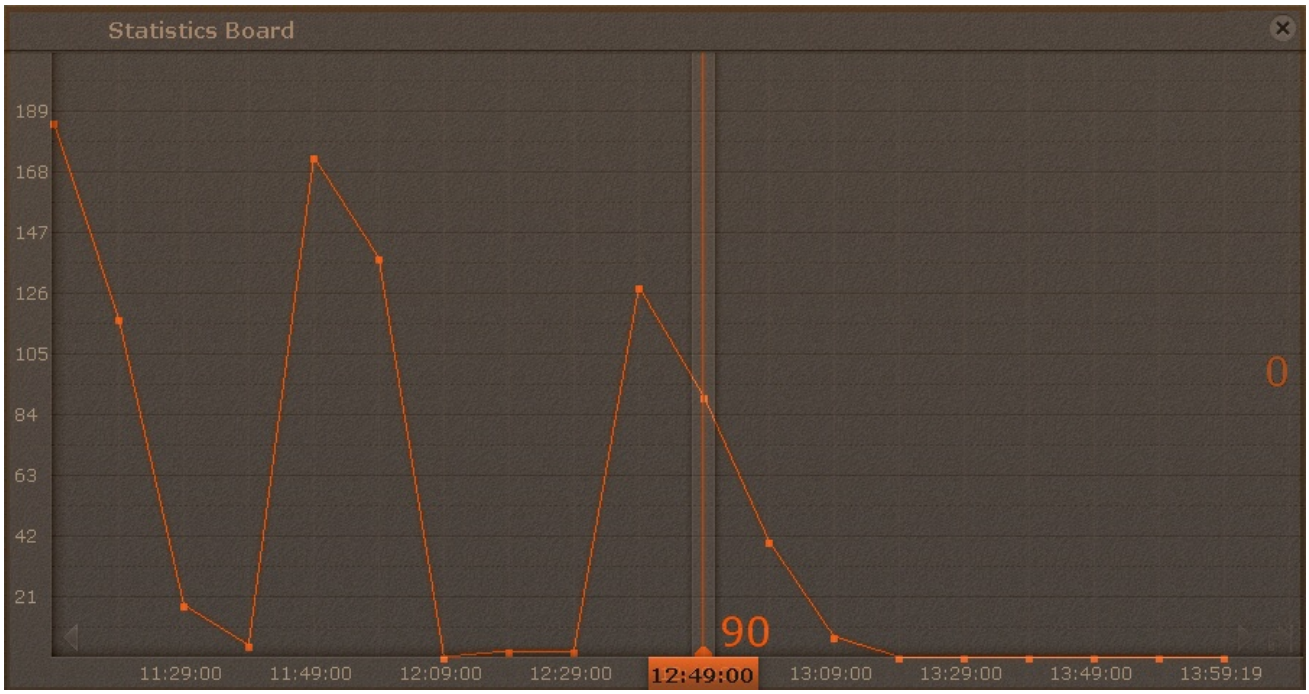
The graph displays the current number of events. The number of events is recalculated every minute and does not depend on the interval chosen.

For example, for this graph with a time interval of **2 hours** and a current time of **1:48:23 p.m.**, the current number of events equals **413**, for the period from **11:48:00 a.m.** to **1:48:00 p.m.**



To scroll through the graph, use the arrows on the graph edges. To jump to the last point on the graph, click the button.

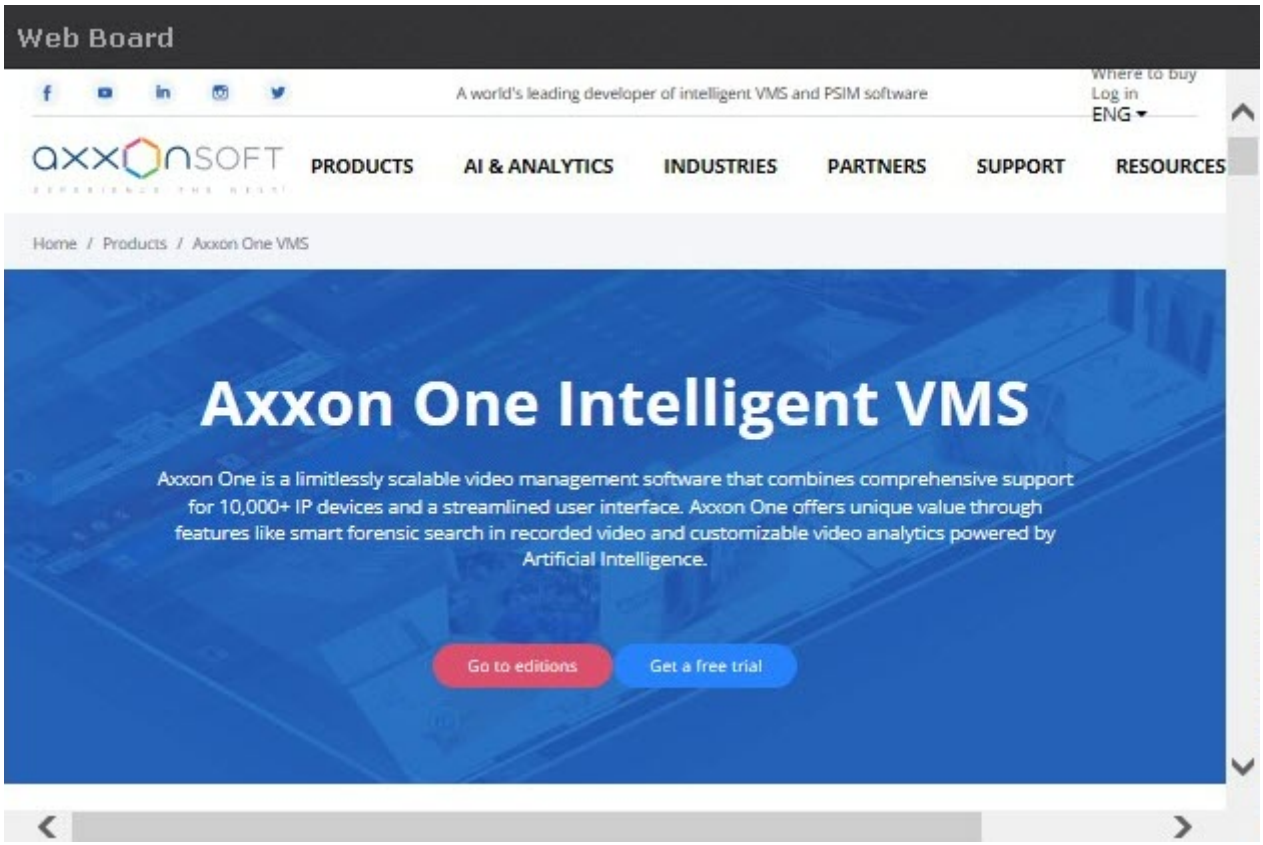
Clicking anywhere on the graph jumps to the nearest point and the relevant value is indicated.



20.3.6 Working with Web Boards

The **Web Board** allows you to view a specific web page on the layout via Chromium or Gecko browser.

If the web page does not fit the board, vertical and horizontal scroll bars are displayed. In this case, the upper-left corner of the web page is displayed.



Note

If there is no network connection, no access to the requested page or if there are other problems, then the Web Board displays standard web browser error messages.

20.3.7 Working with Dialog Board

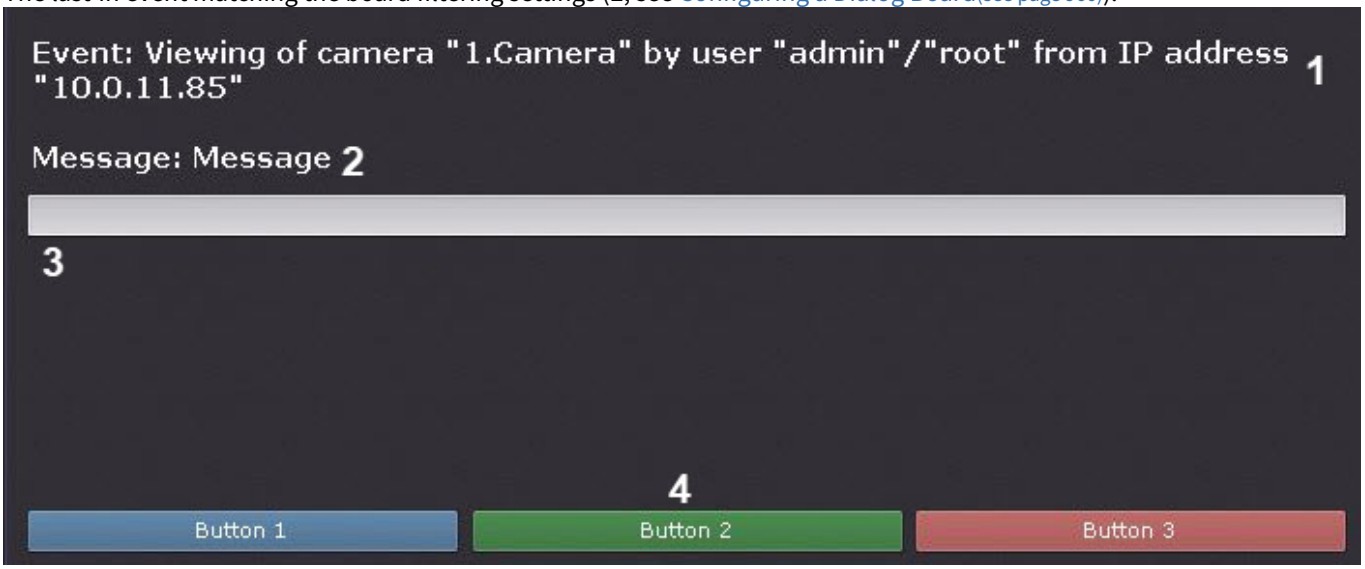
Configuring a Dialog Board(see page 966)

Dialog Board works in three modes:

1. Automated Responses to Events.
2. View and Evaluate Alarm.
3. View Video (Active camera).

In Automated Responses to Events, the board shows:

1. The last-in event matching the board filtering settings (**1**, see Configuring a Dialog Board(see page 966)).

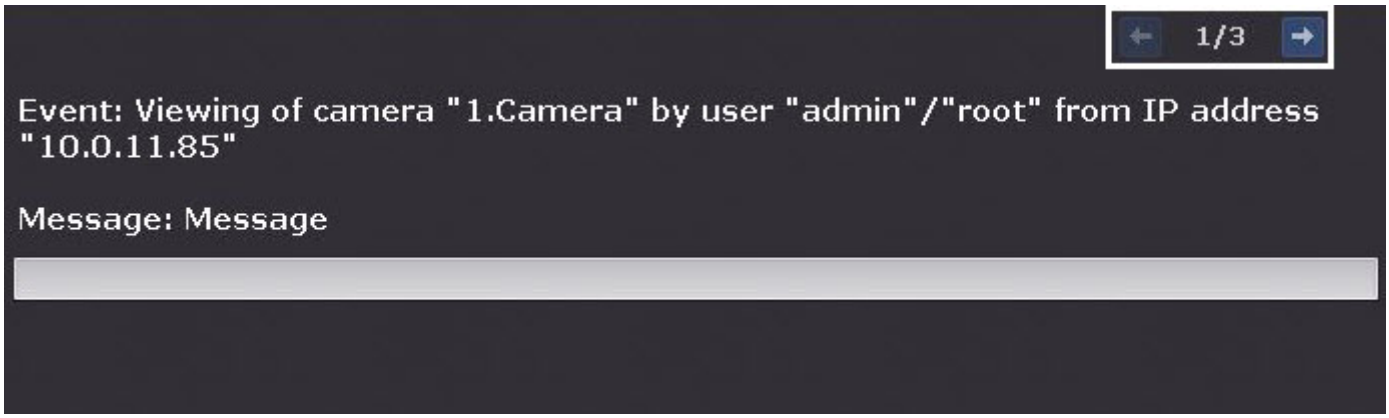


Note

All of the above mentioned elements of the board are optional. You configure the board to show them.

2. Text message as configured (**2**).
3. Comments filed (**3**). Comments input can be optional or mandatory (as configured). Comments are logged to System Log(see page 1318), when you click a response button.
4. Response Buttons (**4**). If you click a response button, the macro starts, and the board auto-hides (if configured, see Hiding information boards(see page 1265)).

If the pane has a history of events (see Configuring a Dialog Board(see page 966)), you can use browse it with arrows in top-right corner. Event history is erased after you switch to another layout.



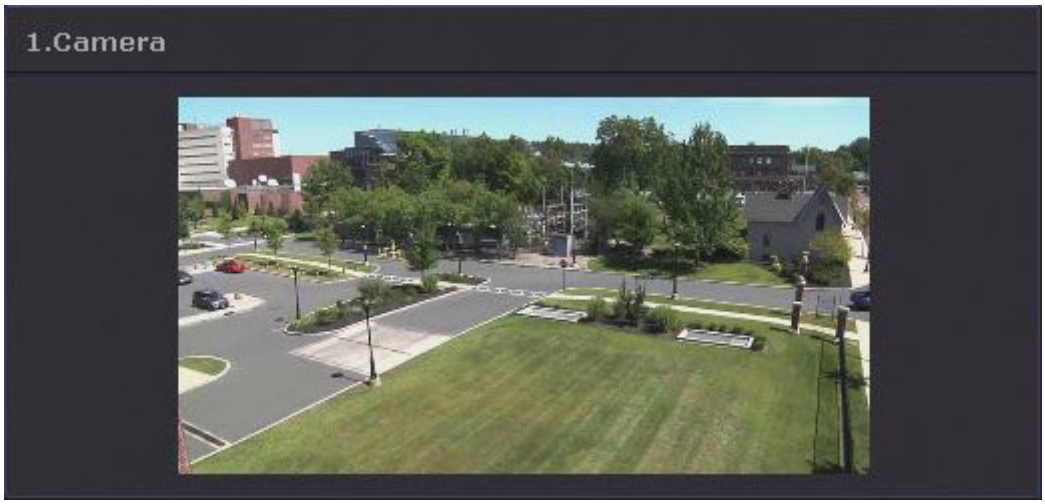
In the second mode, the panel will display an alarm event from the selected or linked camera, depending on the panel setting and the event evaluation buttons.



In the third mode, the panel shows video:

1. from the selected camera;
2. from the stand-by camera for the selected camera;
3. from the stand-by camera for the linked camera.

You can select a camera if you click on its tile on a layout, in the Objects panel (see Object panel(see page 1133)) or on the map (see Working with the interactive map(see page 1291)).

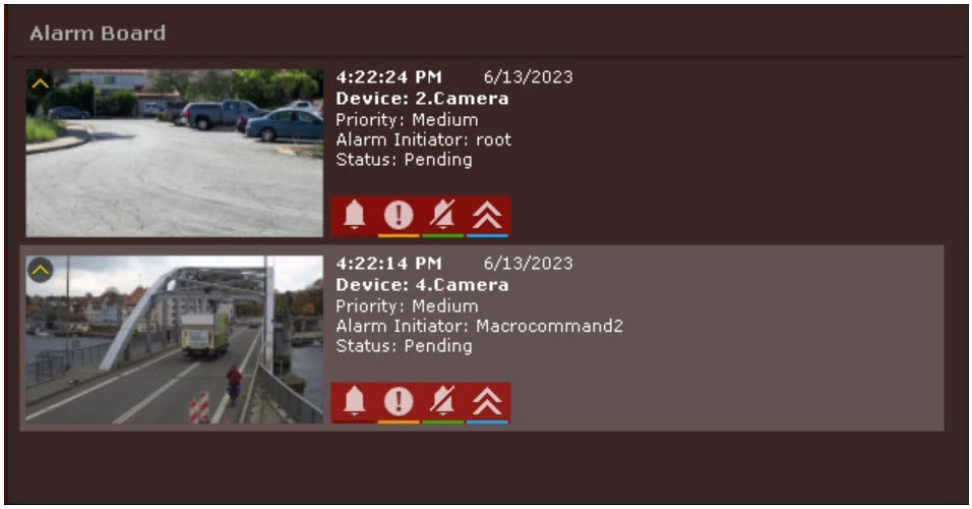


The panel can also display a selected still image.

20.3.8 Working with an Alarm Board

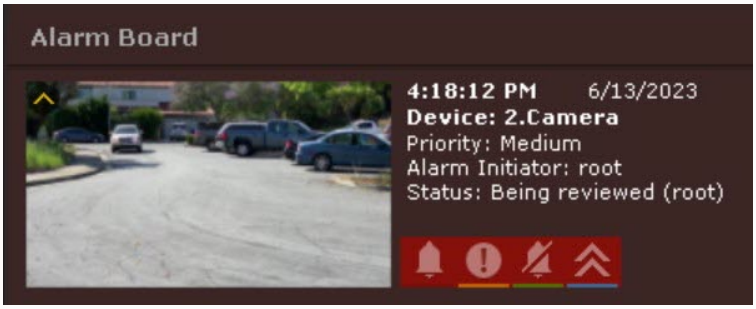
Configuring an Alarm Board(see page 969)

Each alarm event is displayed on the **Alarm Board** as follows: an alarm event window with the first frame of the event, additional information about the alarm event, an event priority icon and the buttons for quick assessment of the alarm event.

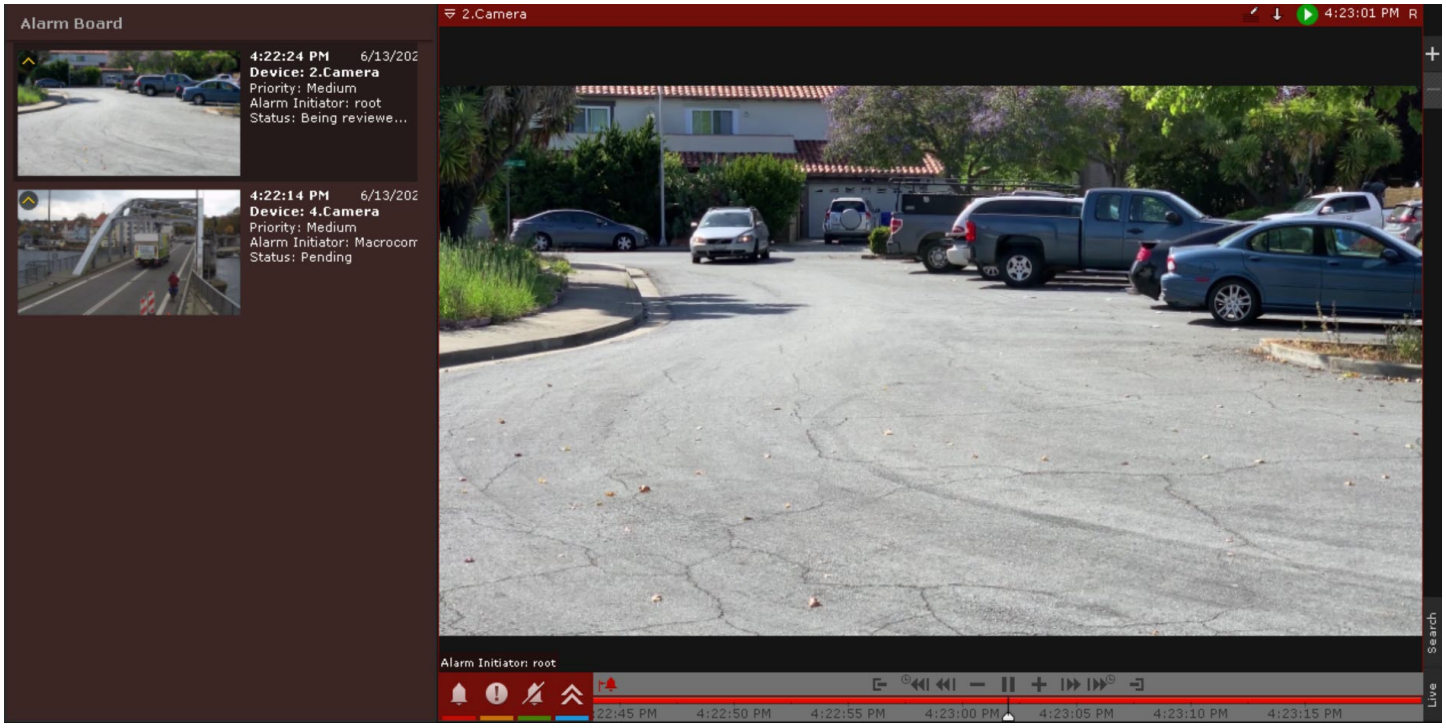


Note

If an alarm event is being reviewed in the **Surveillance window**, the buttons for quick assessment of the alarm event won't be available on the **Alarm Board**.

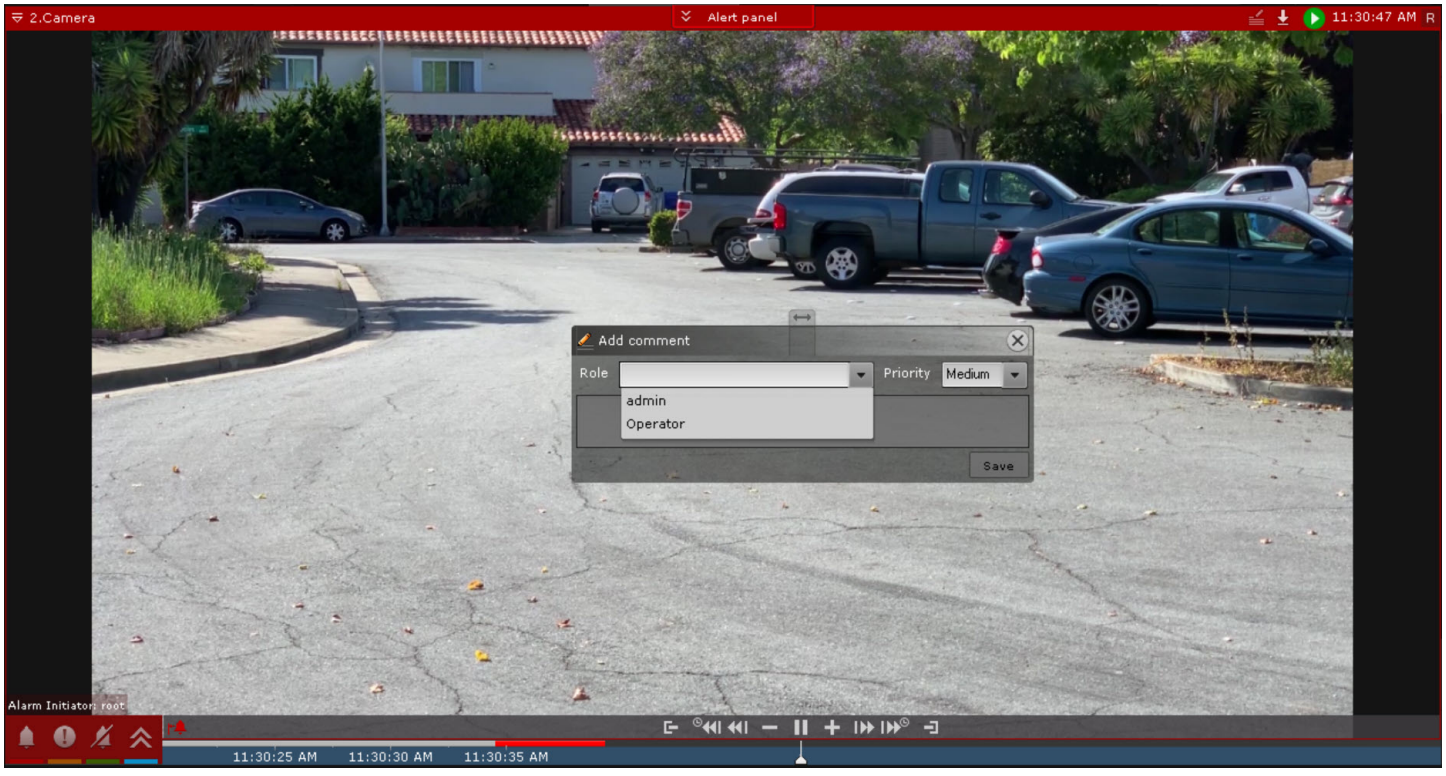


To open a detailed view of an alarm event, double-click the alarm event window on the **Alarm Board**. A detailed view of the alarm event will open. There you can assess the alarm event (see Assessing an alarm event(see page 1184)).



Alarm events are displayed in order of priority on the **Alarm Board** (see Initiate alarm(see page 861)).

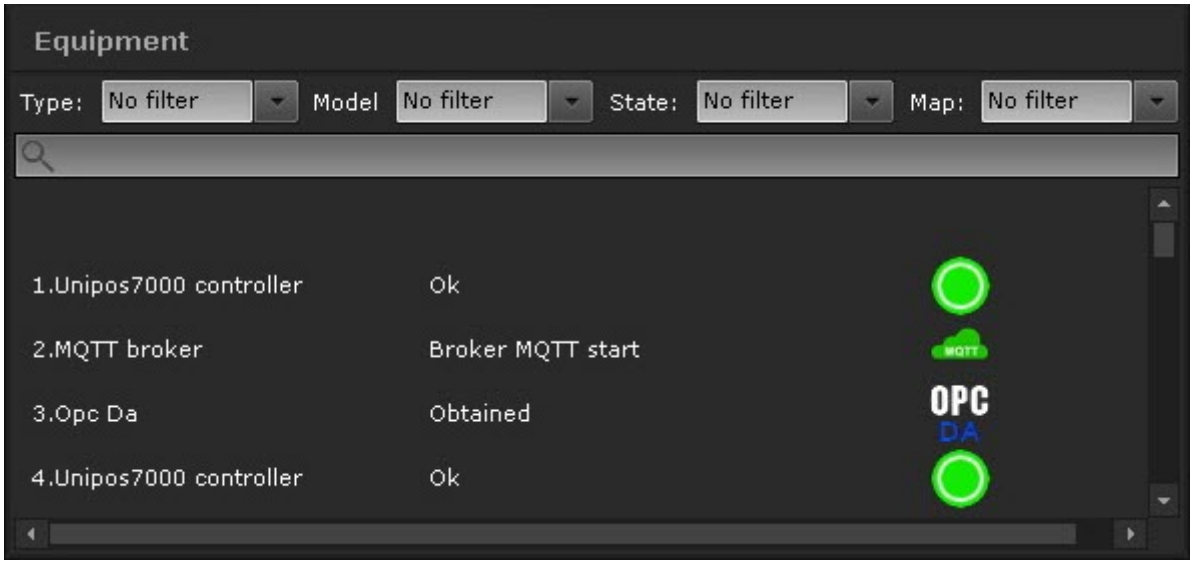
To escalate an alarm, click the  button. A window will open, in which it is possible to set the area of visibility for the roles whose users can see the alarm, as well as change the alarm priority for the selected role. When displayed on the **Alarm Board**, the higher the priority of the alarm, the higher it will be located in the alarms list.



20.3.9 Working with Equipment Board

Configuring an Equipment Board(see page 970)

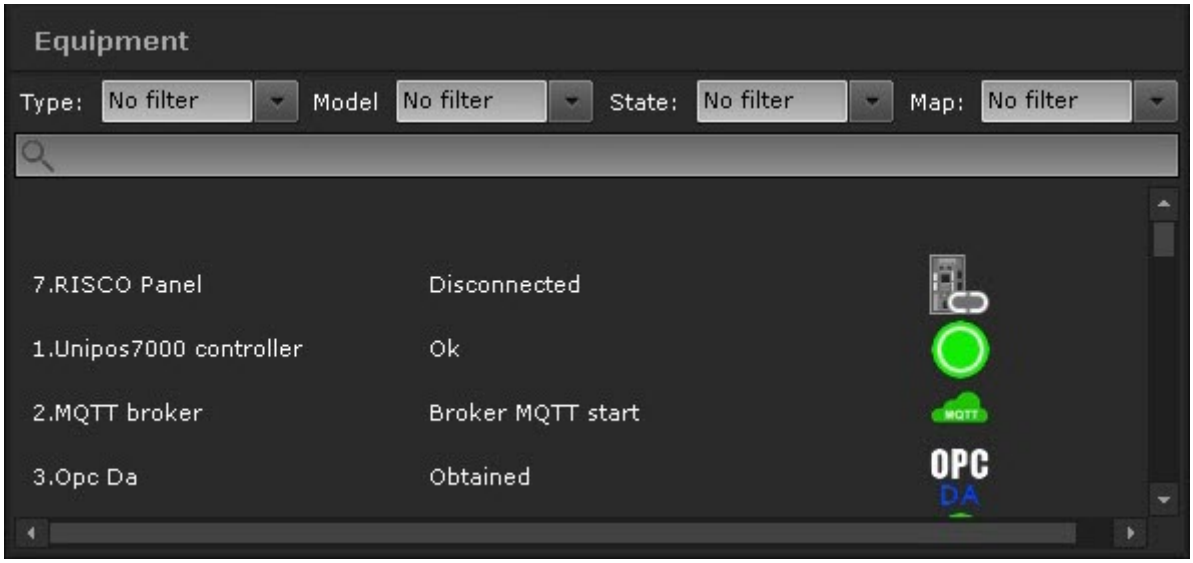
Each *ACFA* integration module is displayed on the **Equipment Board** as follows: equipment, equipment state, and equipment state icon.



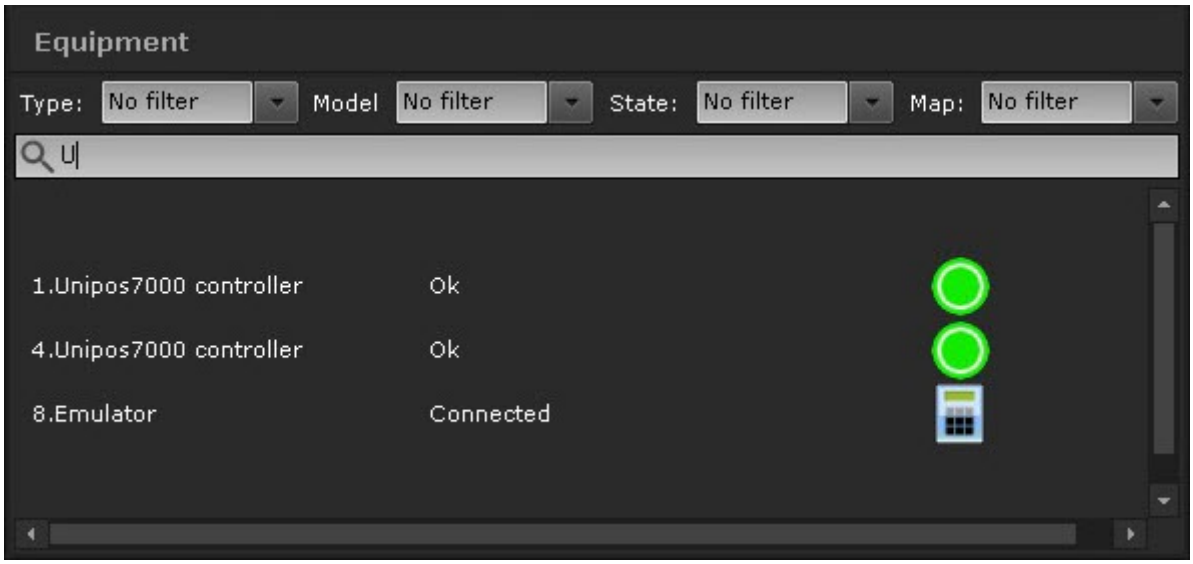
If you didn't set the **Hide filters** checkbox when configuring the **Equipment Board**, you can control board filters in real time.

ACFA integration modules are displayed on the **Equipment Board** in the order in which you added them to *Axxon One*.

On the board, you can sort the devices by equipment and equipment state columns. To do this, left-click the column. The arrow will show the sorting direction.



To search for a specific equipment, enter a part or a full name of the equipment.



20.4 Layouts management

The *Axxon One* user can run the following commands here:

1. Select a layout for display on screen.
2. Start and stop slideshows of layouts. Slideshow is rotation through all available layouts according to an assigned frequency (dwell-time).
3. Create temporary layouts.

You can work with layouts done on the Layouts ribbon (see The Layouts panel(see page 1129)).

20.4.1 Changing cameras on a layout

You can change cameras on the current layout. These changes will not be saved and will be automatically discarded when you switch to another layout.

You can change:

- one of the cameras;
- all cameras on the layout.

To change one camera, drag-and-drop the camera from the Objects Panel (see Object panel(see page 1133)) or from the Camera Search Panel (see Camera Search Panel(see page 1130)) to the layout cell of your choice.

> **Note**
>
> Camera that was dragged-and-dropped to the camera cell in the archive mode (see Switching to the Archive mode(see page 1187)), will also be in the archive mode, if recording to the archive is configured for this camera.

To change all cameras on the layout, select multiple cameras on the Objects Panel, and drag-and-drop them into the layout.

> **Note**
>
> To select multiple cameras, use **Ctrl** and **Shift** keys.

After you drag-and-drop a group of cameras, the layout will display all cameras from this group. After you drag-and-drop an Axxon-domain, the layout will display all cameras from this domain.

> **Note**
>
> Currently disabled cameras will not be added to the layout.

20.4.2 Selection and Slideshow of Layouts

To display a layout, click it with the left mouse button.



If the Client is connected to multiple Axxon-domains, layouts for the main Axxon-domain are listed by default. To view the layouts of other Axxon-domains, select the desired domain on the camera search panel(see page 1130).

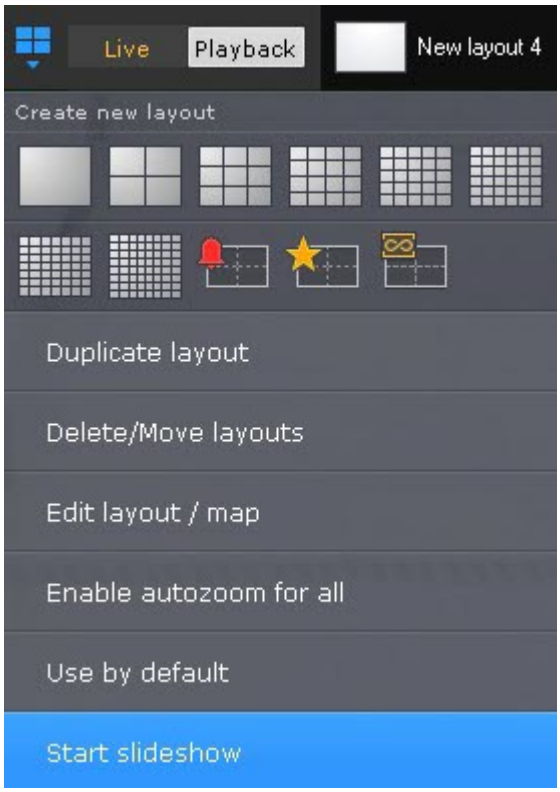
If another user has shared the layout, you will see the following icon:



Shared layouts are by default sorted by name on the Layouts panel.

> **Note**
>
> If you hover the mouse cursor over such a layout, you will see the name of the user that has shared it.

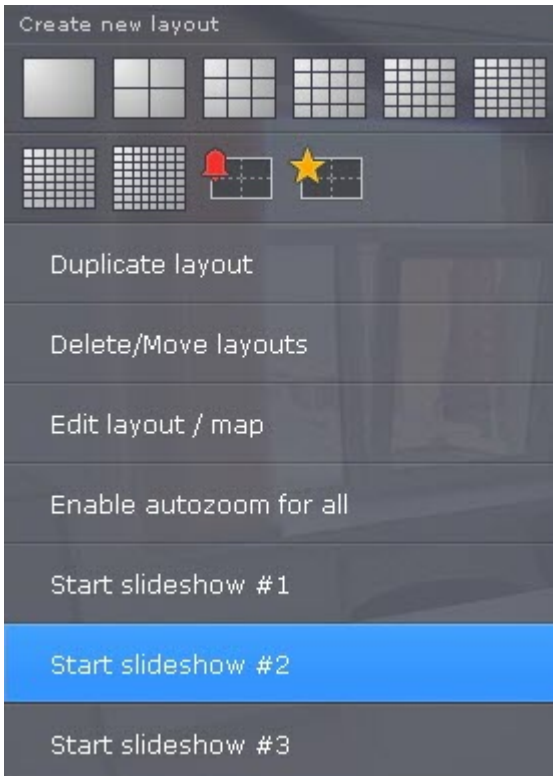
To launch a slideshow, click the  button, and select **Start slideshow** in the context menu of the layout panel.



> **Note**
>
> If you have only one layout in VMS, you do not have **Start slideshow** in the context menu.

This will launch a carousel of all available layouts according to the assigned dwell-time (see Configuring the slideshow parameters(see page 1027)). Special layouts (see Working with Special layouts(see page 1283)) are excluded from slideshows.

To launch a user-defined slide show, select the required one from the list.



Note

To launch a slide show on a video wall (see Monitor management(see page 1285)), select the required monitor in the Video Wall Management Panel (see Monitor panel(see page 1128)).

To turn off Slideshow mode, select **Stop slideshow** in the context menu of the layouts panel or left-click any viewing tile.

20.4.3 Working with Special layouts

Configuring special layouts(see page 973)

Alerted Cameras layout

The first 10 seconds after the alert appears in the special layout, it is highlighted.



Cameras disappear from the Alerted Cameras layout in 2 cases:

1. After the alert is classified and the next camera is on (see Assessing an alarm event(see page 1184)).

2. After the timeout expires (see Configuring Alarm processing(see page 1011)).

> **Note**
>
> The alarm sticks to the layout while the Alarm Management window is open and before the timeout expires. If you select a different camera without classifying the alarm, the alarm evaluation timeout resets.

New alerted cameras will populate the layout as follows:

1. If there are any free cells on the layouts after you have classified or missed the alert, the first free cell is taken.
2. If there are no free cells on the layout, the new alerted cameras takes the next free cell. If there are no free cells, the alerted camera is added to the waiting list

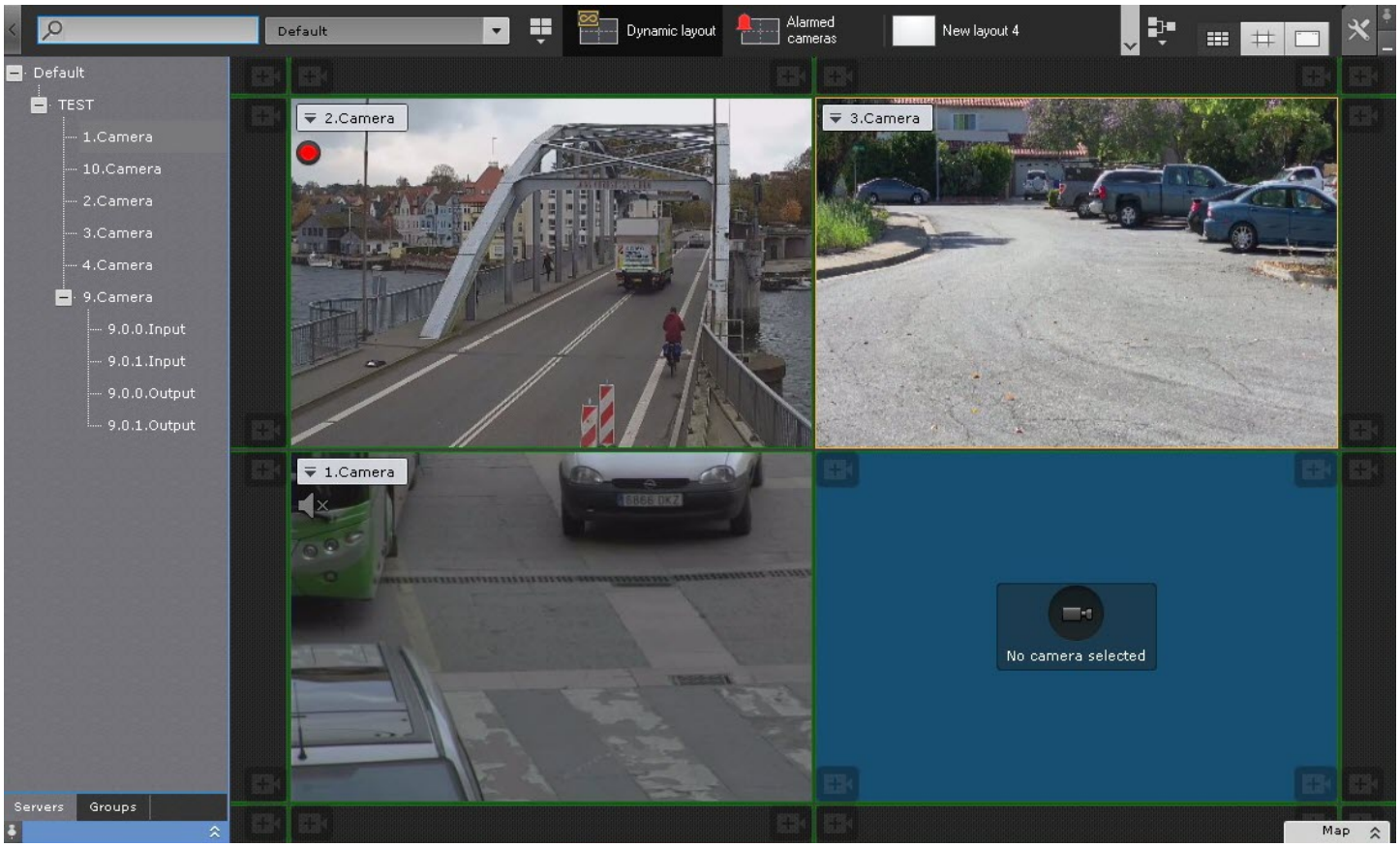
Selected Cameras layout

All selected cameras are displayed on this layout.

Dynamic layout

By default, Dynamic layout is empty. You can add cameras from the object panel (see Object panel(see page 1133)) one by one or several at once (a group, all video cameras of the Server or Axxon Domains).

To do this, select the target unit on the Object panel and drag&drop it to the layout. During camera drag&drop, the layout shows the grid. The empty cell with the cursor in it, is highlighted when you drag the camera.



If you switch from Dynamic layout to any other, all cameras remain in the current mode. Those in the Archive mode, will keep it when you return to Dynamic layout. The pointer position on Timeline remains intact either.

All changes to Dynamic layout are preserved until you exit the Client. After you launch the Client, the Dynamic layout is always empty.

However, you can back up your Dynamic layout at any given time (see Layout copying(see page 944)).

20.5 Monitor management

20.5.1 Managing monitors on a local Client

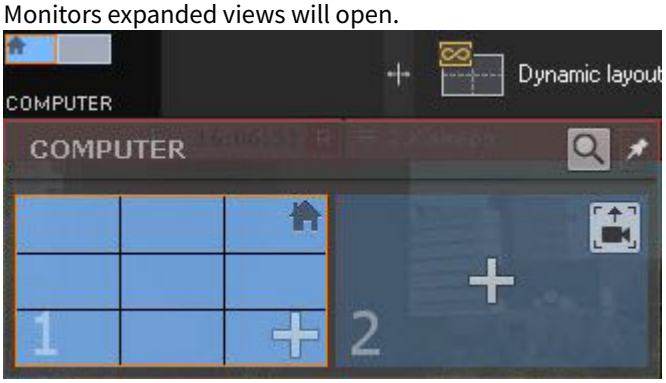
20.5.1.1 **Displaying layouts on monitors**

You can display layout on any hardware monitor of a Client. To do it, do the following:

1. Click anywhere on the local Client monitor layout diagram on the Monitor Panel (see Monitor panel(see page 1128)).

> **Note**
>
> Client monitor management is regulated by the user rights (see Roles(see page 920)).

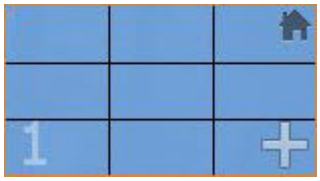
Monitors expanded views will open.

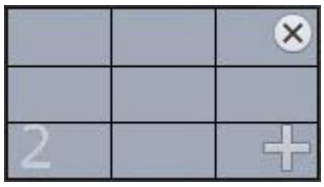
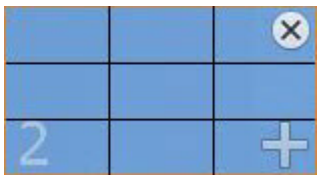


> **Note**
>
> All connected Clients have the NetBiosName name.

> **Note**
>
> Each monitor has its unique ID number. To display the ID number of a monitor, click the  button.

The thumbnails may appear differently, depending on the status of the monitors in *Axxon One*.

Thumbnail	Monitor status
	Active main monitor
	Inactive main monitor

Thumbnail	Monitor status
	Non-distributed additional monitor
	Inactive additional monitor
	Active additional monitor

Note

The thumbnail of the monitors shows the currently open layout.

2. To display the layout on the monitor, do the following:
   a. Click the **+** button on the non-distributed additional video monitor's thumbnail. The additional monitor becomes active, and the layout of the main monitor will be duplicated on it.
   b. Configure the layout of an additional monitor (see Configuring layouts(see page 942)). You can configure the layout of the additional monitor through the main monitor (the additional monitor must be active). Changes affect only the additional monitor; the layout of the main monitor is not changed.
   c. Click the main monitor's thumbnail. The additional monitor becomes inactive, and the original layout is displayed on the main monitor. If the additional monitor becomes inactive, editing of the layout does not affect it.
3. To display a camera selected on the main monitor on the additional monitor, do the following:
   a. Click the  button on the non-distributed additional video monitor.
   b. Selecting a camera on the main monitor makes its video feed visible on the additional monitor.

The additional monitors are now configured.

20.5.1.2 Editing layouts

To edit a layout on an additional monitor, do the following:

1. Activate the additional monitor (by clicking its thumbnail).
2. Edit the layout.
3. Make the additional monitor inactive.

20.5.1.3 Selecting cameras to display on the layout

You can select the cameras that should be displayed on the main and additional monitor by dragging and dropping[400] them:

1. in the cell of the main or additional monitor diagram from the Objects Panel (see Object panel(see page 1133));

400 https://en.wikipedia.org/wiki/Drag_and_drop

2. in the cell of the main or additional monitor diagram using the camera icon from the interactive map (see Working with the interactive map(see page 1291));
3. in the cell of the main or additional monitor diagram from the Camera Search Panel (see Camera Search Panel(see page 1130)).

Similarly, you can drag and drop not only individual cameras, but also group of cameras, all cameras of the Server or Axxon-domain.

Note

The changes are saved only until you restart the Client. The next time you start the Client, the layout will have the original view.

20.5.1.4 Closing the layout of the additional monitor

You can close main and additional monitor separately. To close an additional monitor in *Axxon One*, click the button on its thumbnail.

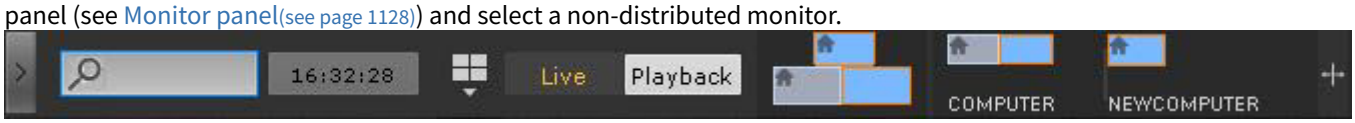
20.5.2 Managing monitors on remote Clients within the Axxon-domain

If you have appropriate user rights, you can remotely manage monitors on remote Clients connected to a Server within the Axxon-domain (see Roles(see page 920)).

The following actions are possible:

1. Add a layout to an additional monitor of the remote Client.
2. Select another layout or a camera on an additional monitor.
3. Edit a layout on the main or additional monitor.
4. Shut down an additional monitor.

To display a layout on the additional monitor of the remote Client, click a monitor diagram of the required Client on the Monitor panel (see Monitor panel(see page 1128)) and select a non-distributed monitor.



Note

You can add a layout to the additional monitor of the remote Client in the same way as for the local Client (see Managing monitors on a local Client(see page 1285)).

To select another layout on the remote Client's monitor, do the following:

1. Select the required layout on the local Client (see The Layouts panel(see page 1129)).
2. Click a monitor diagram of the remote Client, and then click the icon of the required monitor.

The selected layout will be displayed on a selected monitor of the remote Client. If a single camera is displayed on the remote Client's additional monitor, you can switch to another camera by selecting it on the screen of the local Client.

It is possible to temporarily display the layout on the monitor of the remote Client. For this, do the following:

1. Select (see The Layouts Panel(see page 1129)) or configure (see Creating and deleting layouts(see page 942)) the required layout on the local Client.
2. Click a monitor diagram of the remote Client.

3. Click the button on the diagram of the main or additional monitor.



The layout will be available for the remote Client until the Client restarts or until you switch to a different layout. The layout will only be saved if it is shared with the role of the remote Client (see Share layouts(see page 972)) or belongs to the user of the remote Client.

Using the Objects Panel (see Object panel(see page 1133)), you can change the cameras displayed on the main or additional monitor of the remote Client. These changes are not saved, and the initial layout is restored after the Client restarts. For this, do the following:

1. Open and lock the Monitor panel (see Monitor panel(see page 1128)).
2. Open the Objects Panel.
3. Select one or several cameras on the Objects Panel using the **Ctrl** or **Shift** keys.
4. Left-click any selected camera.
5. Drag the camera icon into a required cell on the diagram of the main or additional monitor.
6. Release the mouse button.

Another way to put a camera into a required cell on the diagram of the main or additional monitor is to capture the camera's icon on the interactive Map (see Working with the interactive map[401]).

You can also move a group of cameras, all cameras of a Server or an Axxon-Domain.

To close an additional monitor on the remote Client, click the button on the monitor's thumbnail.

20.6 Audio Monitoring

20.6.1 General Information

Audio monitoring of a situation is carried out using the microphones that correspond to a video camera surveying the situation.

In different viewing tile modes, different audio monitoring functions are accessible:

1. Live playback mode – listening to sound from a microphone in real time; playing back sound from Client microphone on camera speakers.
2. Archive mode, Alarm Management mode, Archive Search mode – playback of sound recorded from a microphone.

Note

In Archive mode and Archive Search mode, an audio recording can be played back only from the microphone corresponding to the currently selected video camera, and only in forward playback mode at a speed of 1x.

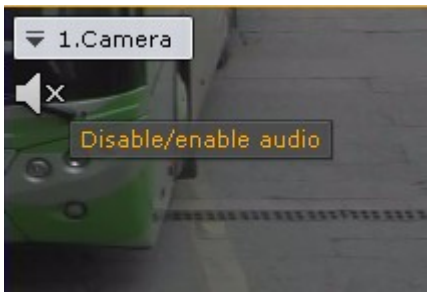
20.6.2 Listening on the Client to sound from a camera microphone

Attention!

The **Microphone** object must be enabled (see the section titled The Microphone object(see page 219)).

To listen on the Client to sound from the microphone of a camera, left-click to activate the speaker icon in the viewing tile.

401 https://docs.axxonsoft.com/confluence/spaces/one1en/pages/226953396/Working+with+the+interactive+map



Note

Audio from only one camera can be played back at a time

The speaker icon now becomes active and a volume slider appears.



Volume is controlled using the volume adjuster.

The far left position of the adjuster represents the minimum volume, and the far right position represents the maximum volume.

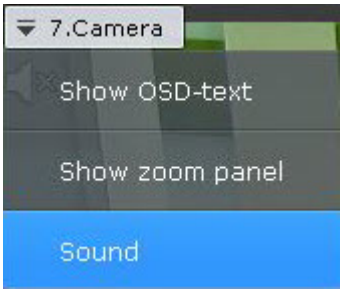
Note

The *Axxon One* VMS has an embedded sound booster.

To turn off audio playback, click the speaker icon again.

If a camera has several microphones connected, use the following procedure to select the audio source:

1. Open the camera's context menu.
2. Select **Sound**.



3. Select the microphone you need.



Note

The currently selected microphone is marked as **On**. If you select a **7.0** microphone, the **9.0** microphone is set to off, and **7.0** microphone to on.

Note

If a currently specified loudspeaker goes offline, the system automatically switches to another available one.
After the first loudspeaker goes back online, no automatic switching will occur.
To automatically activate the first loudspeaker in such a case, you have to create a NGP_PORTSOUND_HOSTAPI system variable and set it to DS (see Creating system variable(see page 126)).

20.6.3 Playing back sound from Client microphone on camera speakers

Audio transmission from the Client's microphone behind NAT to the Server's or camera's loudspeaker(see page 1441)

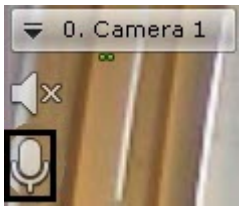
Sound from the Client microphone can be broadcast both on a single camera and on all cameras in a layout.

Attention!

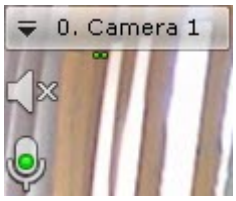
To use this option:

1. Configuration of audio on the Client is now completed (see Configuring audio on the Client(see page 1054)).
2. **Speaker** objects are activated for the corresponding cameras (see The Speaker object(see page 228)).

To broadcast sound on the speaker of a single camera, left-click the microphone icon in the viewing tile.

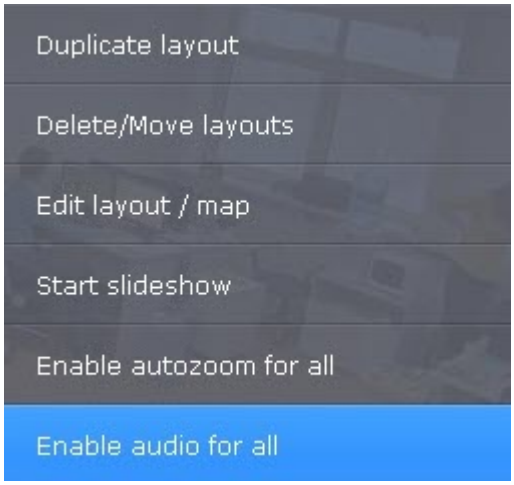


The microphone icon now becomes active.



To turn off broadcasting of sound on a camera speaker, click the microphone icon again.

To broadcast sound on speakers on all cameras in a layout, in the context menu of the layouts ribbon, select **Enable audio for all**.



The microphone icon is then activated for all cameras that have an activated **Speaker** object.

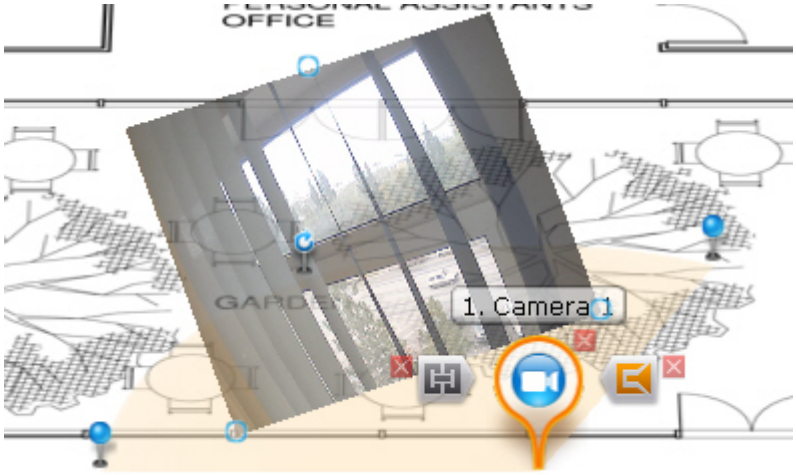
To turn off sound broadcasting on all cameras, select **Disable audio for all**.

20.7 Working with the interactive map

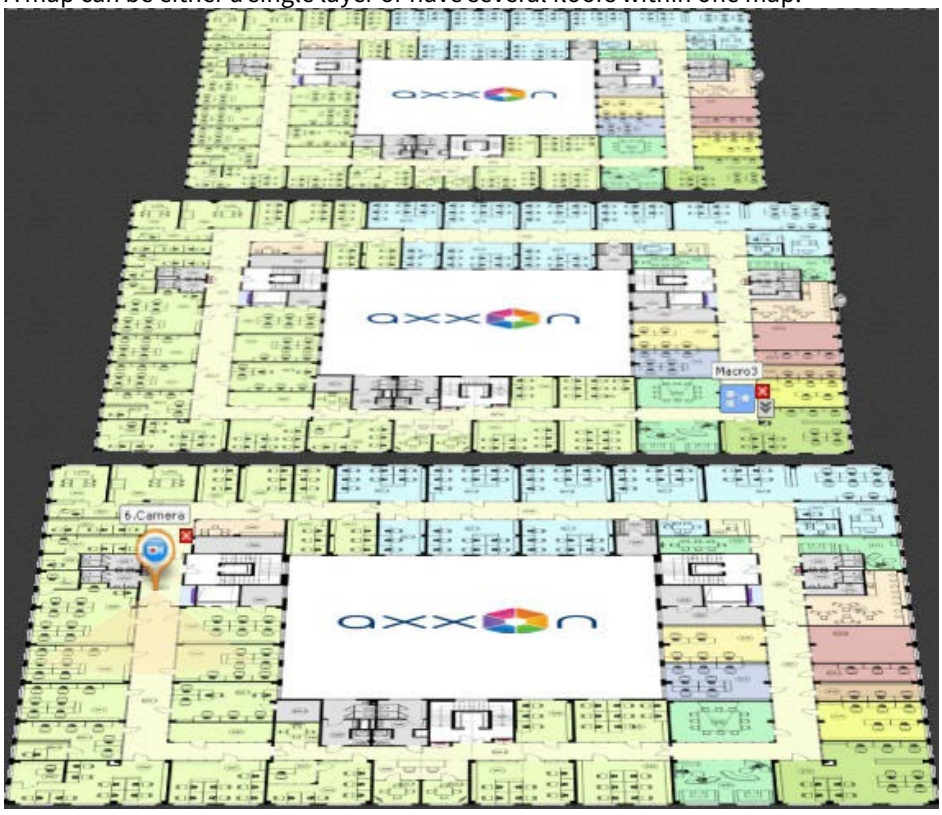
You can use the interactive map in three modes:

1. 3D mode, in which both the map and layout are available.
2. 2D mode, in which only the map is available.
3. Immersion mode, in which video is overlaid on the map.

The map can contain icons for cameras, inputs, outputs, and counters. The area in which live video is displayed and field of view are indicated for each camera.

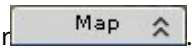


A map can be either a single layer or have several floors within one map:



20.7.1 Opening and closing the map

You can switch to Map View from all modes of operation except for Archive Search.

To go Map View, click the **Map** button in the bottom right corner 

.

The Map will open in a 3D view while the current layout contracts to fit the screen area over the map.



To switch to 2D map view and close the layout, click the button to the left of the **Map** button.

If you expand a tile to full screen, the map auto-hides (see Scaling the Surveillance window(see page 1140)).

Note

When you minimize the tile, the map appears again.

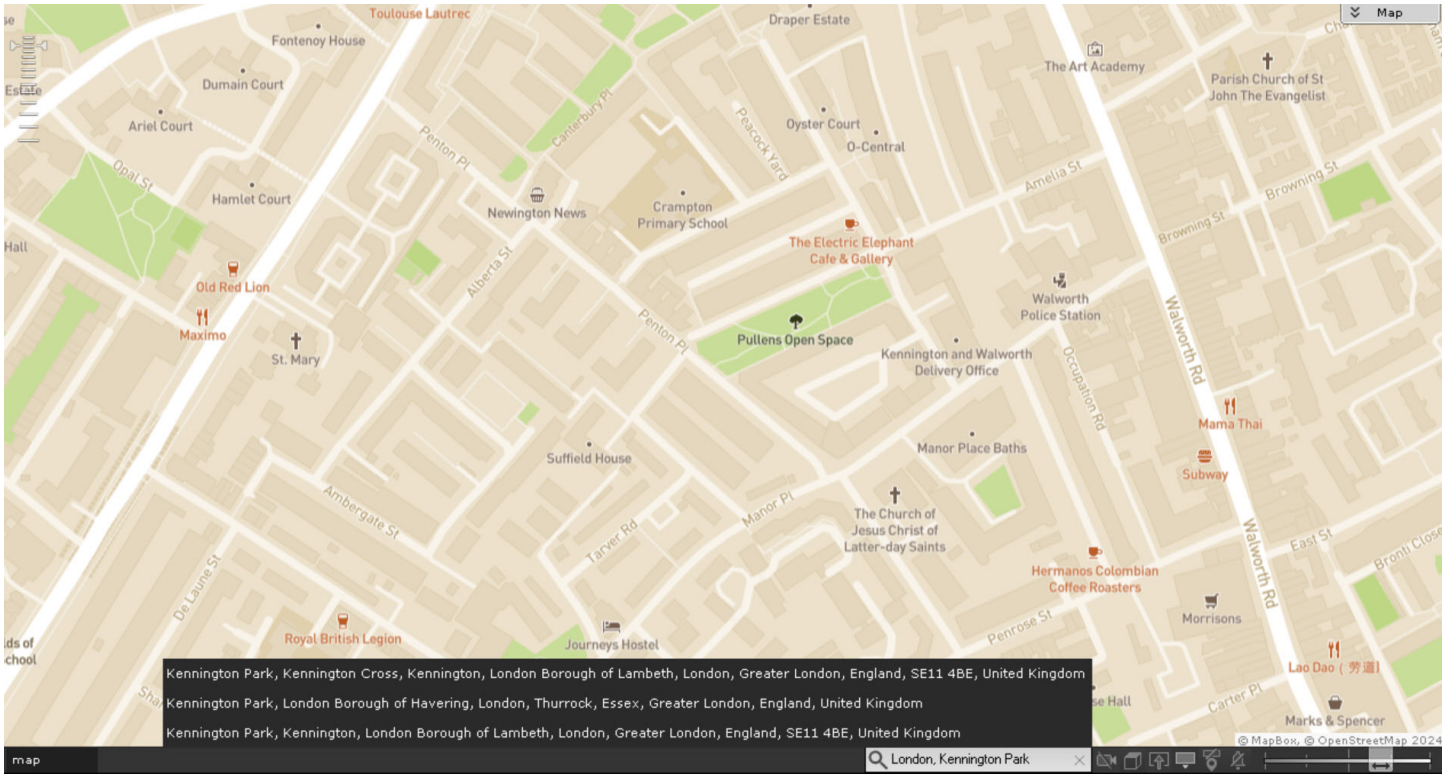
20.7.2 Geomap search

On OpenStreetMap, you can search for any geographical objects or streets in a given city (see Setting keywords for geomap search(see page 997). For detailed information, see the provider's website[402]).

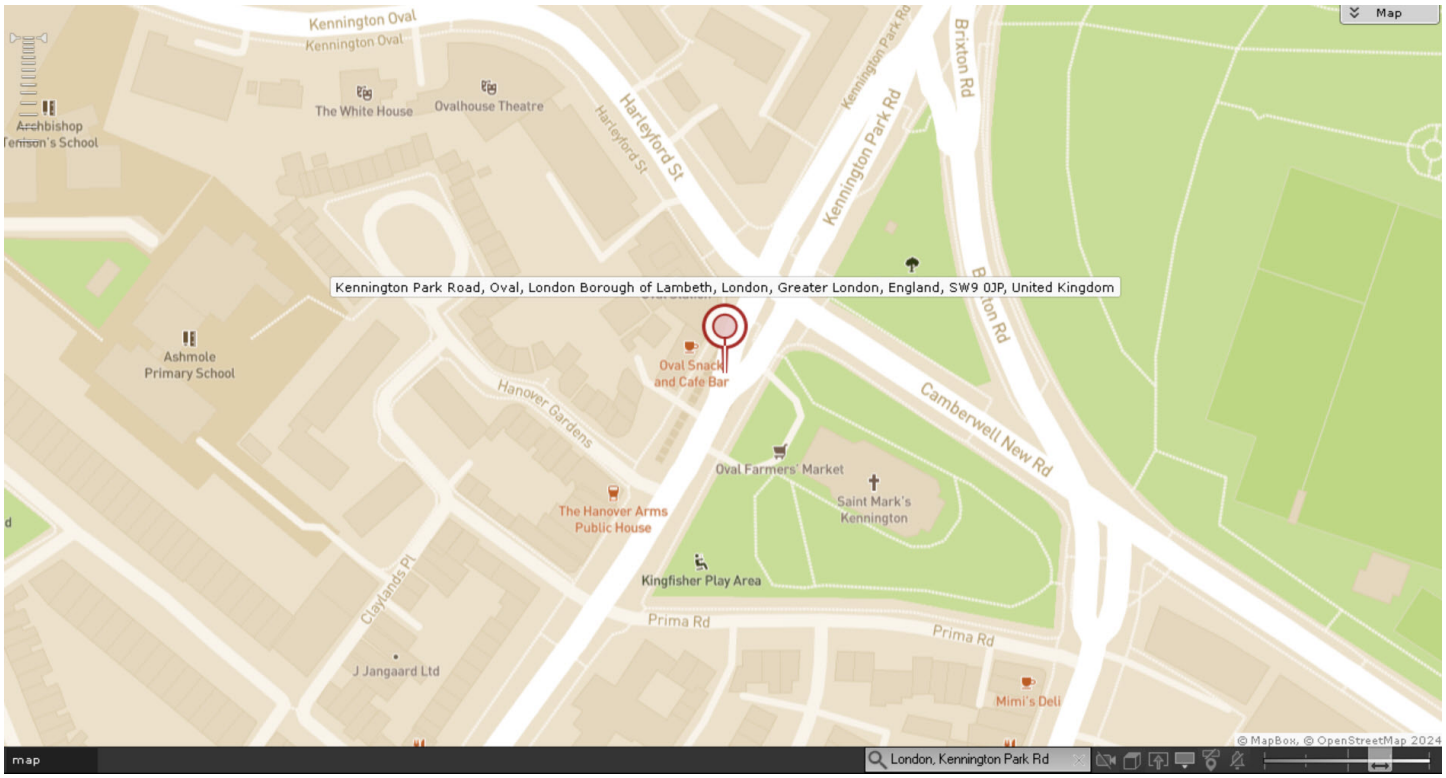
To do this, do the following:

402 https://wiki.openstreetmap.org/wiki/Main_Page

1. Enter the name of the street or geographical object in the search bar.
2. Select the required option from the drop-down list.



As a result, a mark will appear on the map indicating the object or street you are looking for.



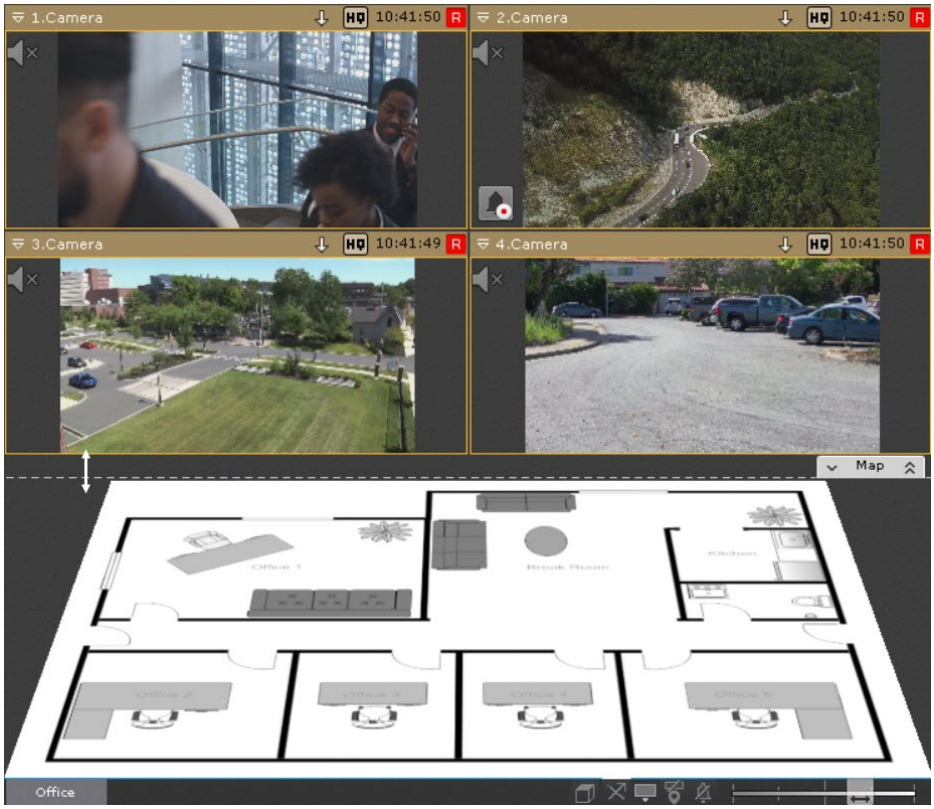
Note

- You can connect different providers for geomap search. To do this, contact the AxxonSoft technical specialists.

- You can search the geomap after adding the geomap to the layout (see Adding a new map(see page 983)) and in the layout editing mode (see Switching to layout editing mode(see page 945)).

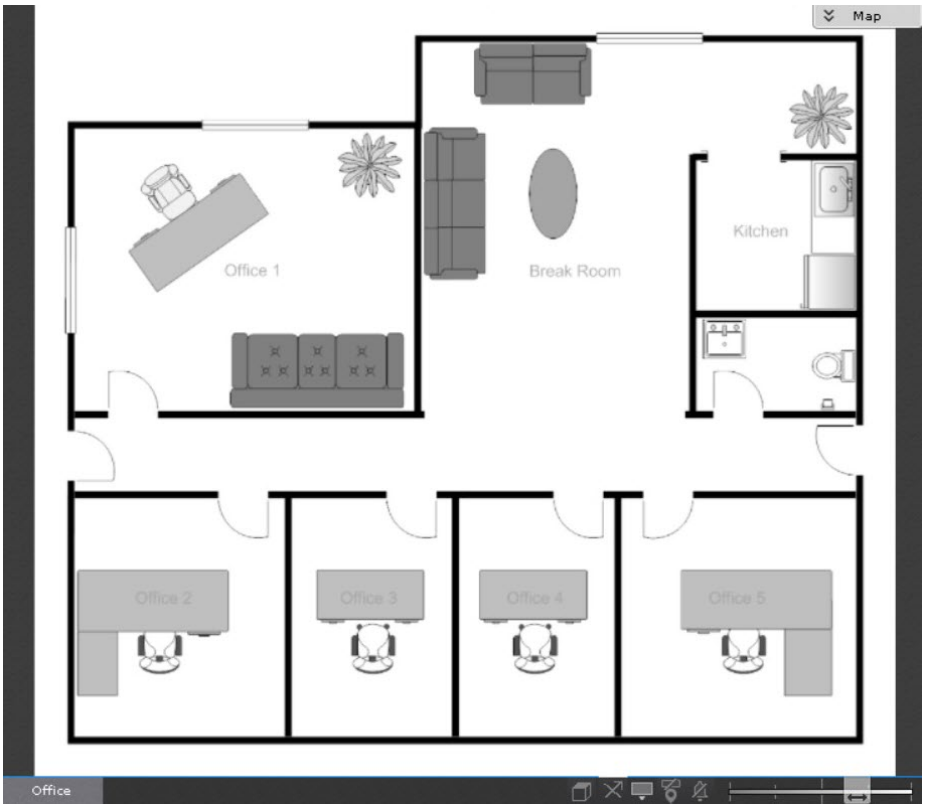
20.7.3 Changing the map tilt

You can change the tilt of the map by adjusting the border between the map and the layout areas.



There are two ways to switch to 2D map view:

1. Click the button to the right of the **Map** button. In this case the layout will close, and the map will be displayed in full screen.



To return to 3D map view, click the **Map** button. To hide the map, click the button.

2. Click the button on the control bar in the bottom right corner of the screen. In this case the layout will not close, and the map will be displayed in the same place.

Note

If the map is hidden, the control bar in the bottom right corner of the screen will not be available.



To return to 3D map view, click the same button, which will look like this  .

20.7.4 Scaling and focusing of map

Map scale and focus can be changed both manually and automatically.

> **Note**
>
> The map is automatically resized and refocused if this function is activated in the settings (see Configuring map auto zoom(see page 1030)).

Automatic adjustment of map scale and focus occurs when a video camera alarm occurs, if no video camera icon is selected on the map.

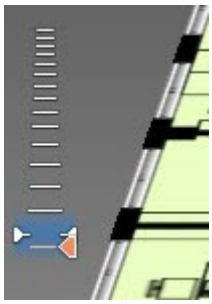
In this case, the map is scaled and refocused to center the icon for the alarm camera on the map.

If alarms occur for several video cameras simultaneously, the map scale and position are adjusted to show all icons for the relevant video cameras.

After a video camera alarm ends and there are no alarms for other video cameras, the map scale and position return to their initial status.

Automatic scaling and focusing of the map stops when the user clicks to select the icon of a video camera on the map or viewing tile.

To manually adjust the map scale, use the mouse scroll wheel (the cursor must be above the map) or use the map scale slider.



After increasing the scale, you can refocus the map with the mouse (by clicking and holding the left mouse button) in the direction of your choice.

20.7.5 Customizing an interactive map

You can change some of the map settings in live video. Use the controls in the bottom right corner of the screen.



You can change the transparency of video on the map using a slider in the bottom right corner.



In the leftmost position of the slider, the video isn't displayed on the map. In the rightmost position, the video isn't transparent.

To change the size of icons on the map, use the slider in the lower left corner.



In the leftmost position of the slider, the icons are of the minimum size. In the rightmost position, the icons are of the maximum size.

To enable/disable the display of device name and identifiers on the map, use the  button.

To enable/disable the display of unavailable devices on the map, use the  button.

To enable/disable camera icon fluttering on alarm, use the  button.

To change the action when you click the camera icon on the map, use the  (takes you to the layout with the camera)/  (goes to Immersion mode (see Immersion mode(see page 1299))) button.

To change the format of the video on the map, use the  (3D view)/  (flat view) button.

Video in 3D view:



Video in flat view:

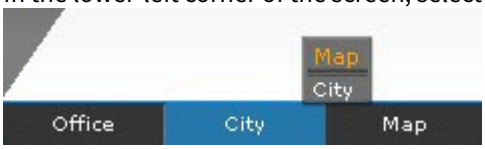


20.7.6 Switching between maps

In any mode, you can switch between the maps that have been created in the system.

You can switch between maps in two ways:

1. In the lower-left corner of the screen, select the corresponding tab.



> **Note**
>
> If many maps have been created, some tabs may not fit on the screen. If this happens, click the » button. In the drop-down menu that opens, select a map.



2. By left-clicking a map icon for switching, if it has been created (see Adding switches to another map(see page 988)). The icon header shows the name of the destination map.



20.7.7 Immersion mode

In Immersion mode, video from a selected camera is displayed on top of the map image.

If you created links between video and the map (see Configuring cameras in immersion mode(see page 991)), an angle will be selected so that objects in the video match the objects as depicted on the map.

If you didn't create links, the map is displayed in such a way so that the video is located in the specified FOV of the camera on the map. The FOV is directed upwards.

You can go to immersion mode in two ways:

1. Click the button on the right border of the surveillance window. The button may not be available at certain display settings of the surveillance window (see Configuring the display of the surveillance window(see page 1031)).
2. On the map, left-click a camera icon, its FOV, or video display area. This method is possible if you didn't click the button (see Customizing an interactive map(see page 1297)).



In Immersion mode, you can view video from only one video camera at a time.

To select another camera, do one of the following:

1. Click the camera icon, its FOV, or image on the map, if possible.
2. Exit Immersion mode and select the required camera on the map.

To exit Immersion mode, do one of the following:

1. Click the  button.
2. Minimize the surveillance window by clicking the button.
3. Click a part of the map that doesn't contain the camera FOV.

Note

- After you exit Immersion mode, the camera on the layout will display live video.
- You cannot apply actions 2 and 3 if a fisheye camera with certain parameters is in Immersion mode (see Fisheye cameras in the Immersion mode(see page 1258)).

20.7.8 Controlling devices from the map

Using the context menu of icons on the map, you can control outputs and logical objects (counters, macros), as well as control video cameras and configure their interface.

Commands for controlling and configuring video camera interface are given in the table below.

Command (context menu item)	Condition	Result after the command is performed

Arm	The camera is disarmed	Icon status: 
Private Arm (see Arming and disarming a camera(see page 1161))	The camera is disarmed	Icon status: 
Disarm	The camera is armed	Icon status: 
Show video	Video image is not displayed	Video image display: 
Hide video	Video image is displayed	Video image is not displayed
Show layout	Additional conditions are not required	The selected camera is displayed on the temporary layout. To display multiple selected cameras on the temporary layout, see Selecting Cameras for a Temporary Layout(see page 1305)
Copy	Additional conditions are not required	If you right- or left-click on any cell of the layout, then the video from the copied video camera will be displayed in this cell. The copied camera will be displayed on the layout until you switch to another layout or restart the client

Commands for controlling outputs are given in the table below.

Command (context menu item)	**Condition**	**Icon status after the command is performed**
Turns the output on	Output in normal status	
Disable output	Output is activated	

Note

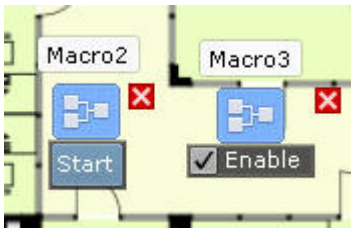
You cannot switch the status of the Output from the map if there are macros with the corresponding action running in the system (see Switch on/off output(see page 873)).

Commands for controlling macros are listed in the table below.

Command (context menu item)	**Condition**	**Command description**
Start	Event-driven macro	Running the macro

Enable	Disabled cyclic macro	Enabling the macro
Disable	Enabled cyclic macro	Disabling the macro

On top of that, you can manage macros with the **Start** button and the **Enable** check box.



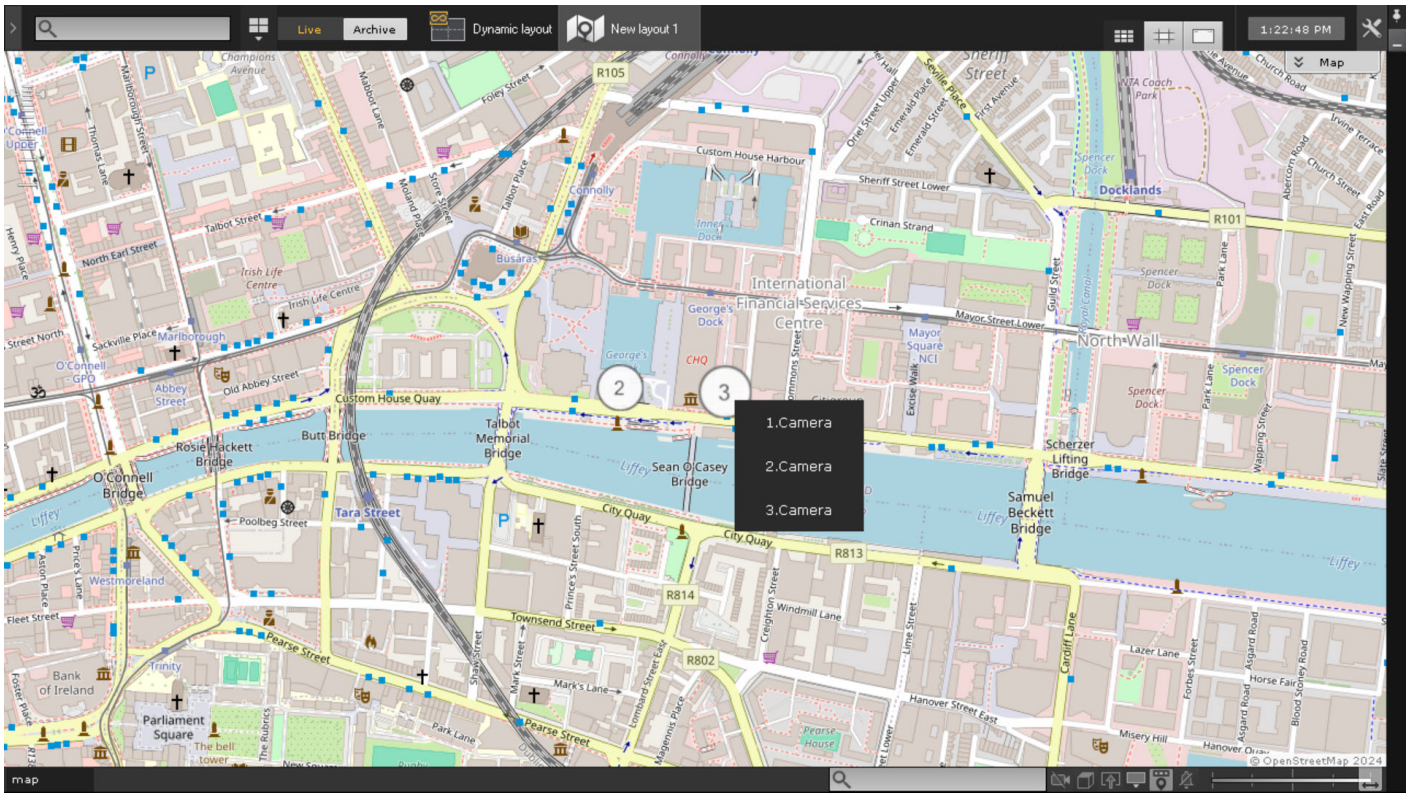
Commands for controlling counters are listed in the table below.

Command (context menu item)	**Condition**	**Command description**
Stop	The counter is running	Stopping the counter. If the counter is on pause, its value does not change
Start	The counter is stopped	Starting the counter. If the counter is running, its value changes as specified
Clear	Any state	Resets the counter value to 0

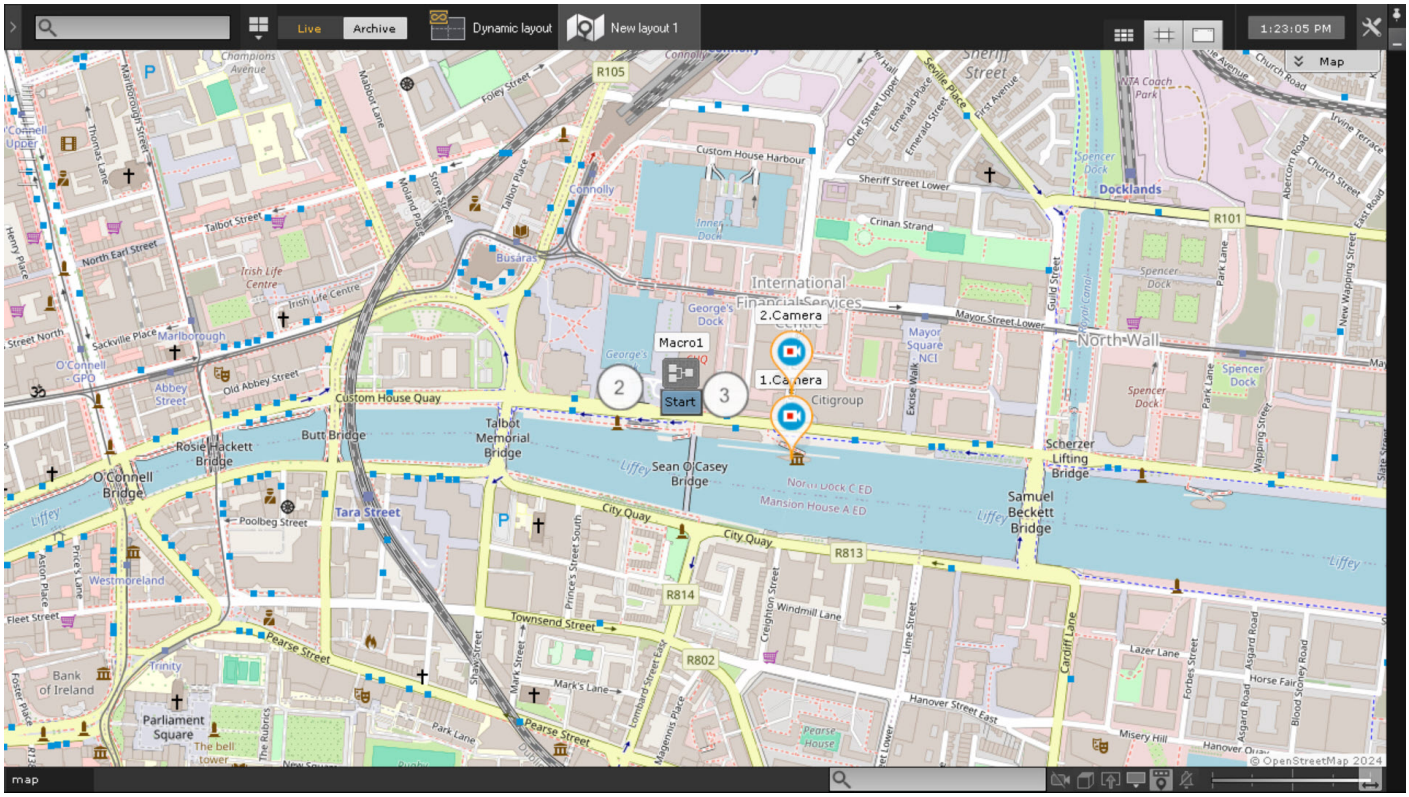
20.7.9 Grouping objects on the map

If the video cameras have the same coordinates or are located close to each other, they automatically merge into a cluster. Each cluster is displayed on the map as a circle, and the total number of cameras in the cluster is indicated in its center. Relays, sensors and macro commands can also be combined into clusters.

You can right-click on a cluster to see a list of all objects included in that cluster.



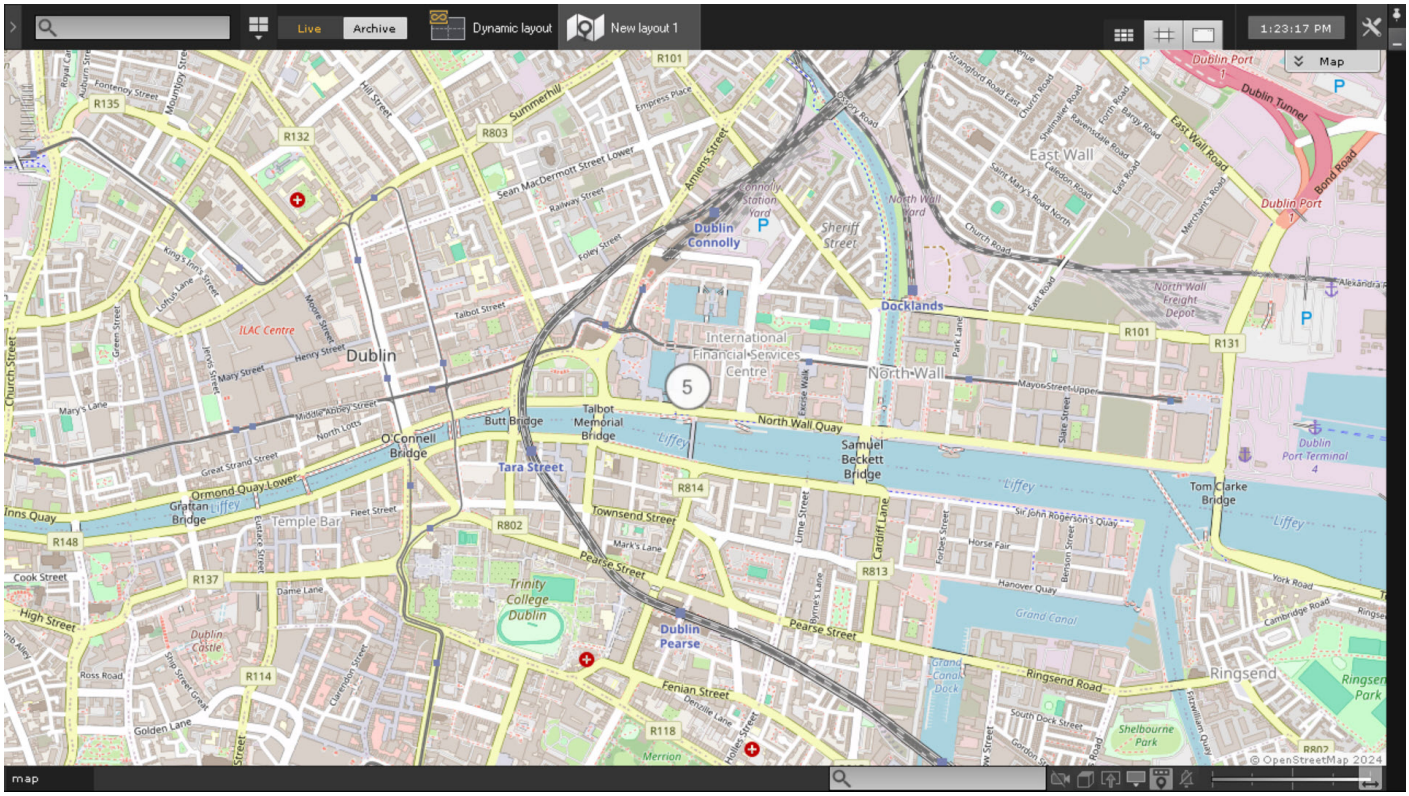
When you select a certain object from the list, it will be displayed next to the cluster.



You can left-click on an object icon on the map to see a context menu for managing the object (see Controlling devices from the map(see page 1300)).

To hide the list of objects and display them as a cluster on the map, zoom out on the map (see Scaling and focusing of map(see page 1296)).

If there are several clusters located close to each other on the map, they will merge into a new cluster when you zoom out on the map. The center of the new cluster indicates the total number of objects of all child clusters.



When you click on a merged cluster, the map will automatically zoom in and the child clusters will be displayed.

20.7.10 Displaying device status

The icons on the map indicate the current status of the corresponding devices.

The possible states of the video camera icon are described in the table below.

Map icon	Camera status
	Camera disarmed, no archive recording
	Camera disarmed, archive recording active
	Camera armed, no archive recording

	Camera armed, archive recording active
	Camera alarm, archive recording active
	Camera connection lost

The possible states of the Output icon are described in the table below.

Map icon	Output status
	Output is activated
	Output in normal status

Note

When a macro changes the Output status, the Output icon on the map does not change.

The possible states of the Input icon are described in the table below.

Map icon	Input status
	Video camera is armed, Input is in normal status
	Video camera is armed, Input is in alarm status
	Video camera is disarmed, Input is in normal status
	Video camera is disarmed, Input is in alarm status

Inputs (sensors) connected to Tibbo boards also show temperature/humidity values on the map (see Setting up Tibbo relay/loop boards(see page 248)).

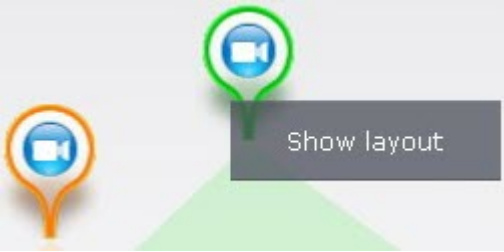


20.7.11 Selecting Cameras for a Temporary Layout

You can use the Map to select cameras for viewing their video feeds on a temporary layout.

Do the following:

1. Press and hold Ctrl, and left-click camera icons.



2. Click the **Show layout** button.

The selected cameras' views appear on the temporary layout which is not preserved after you switch to any other layout.

20.8 Exporting frames and video recordings

On the page:

- General information(see page 1306)
- Playback of exported videos in Movies and TV app(see page 1307)
- Playback of exported videos in the Telegram app on iOS devices(see page 1307)
- Reset of the export settings after you update from Axxon Next 4.5.10 to Axxon One 2.0.2 and higher(see page 1307)

20.8.1 General information

Users with the corresponding permissions can export frames and videos (see General information about users(see page 917)). if a Client is connected to multiple Axxon-domains, export of frames and videos is available only for cameras in the Axxon-domains in which the current user has the corresponding permissions.

You can export frames to JPG and PDF formats, videos can be exported to AVI, MP4, MKV and EXE formats. You can additionally archive exported files in ZIP format and set a password for the archive.

Exported videos are synchronized with audio.

The name of the exported file contains the following information: camera name, export date, and export duration.

Note

- The date and time of the event in the file name correspond to the Windows OS settings.
- File name can contain up to 70 characters.

When you export a frame to PDF, you can also print the document immediately.

A digital signature is added to exported frames and videos. You can check digital signature in Watermark checker utility(see page 1381).

Note

Exported videos and frames are digitally signed with the SHA-256 cryptographic algorithm.

Captions containing a date and time stamp are superimposed on exported video.

Note

Captions are stored in a separate video track and, if necessary, you can disable them in the player.

20.8.2 Playback of exported videos in Movies and TV app

Due to the lack of G.711 and G.726 codec support in Windows 10's "Movies and TV" app, the app does not play audio in exported video.

You can use alternative video viewer applications to obtain the full playback.

20.8.3 Playback of exported videos in the Telegram app on iOS devices

Videos exported in MPEG4 format cannot be played back on iOS devices due to peculiarities of the Telegram app. We recommend exporting videos in other formats to play them correctly in the Telegram app on iOS devices.

20.8.4 Reset of the export settings after you update from *Axxon Next* 4.5.10 to *Axxon One* 2.0.2 and higher

After you update from *Axxon Next* 4.5.10 to *Axxon One* 2.0.2 and higher, the settings of the **PDF template** and **Watermark settings** in the **Options** section → **Export** are reset. You must reconfigure them.

20.8.5 Frame export

You can export frames at any time when working with a camera in *Axxon One*.

To export a frame, do the following:

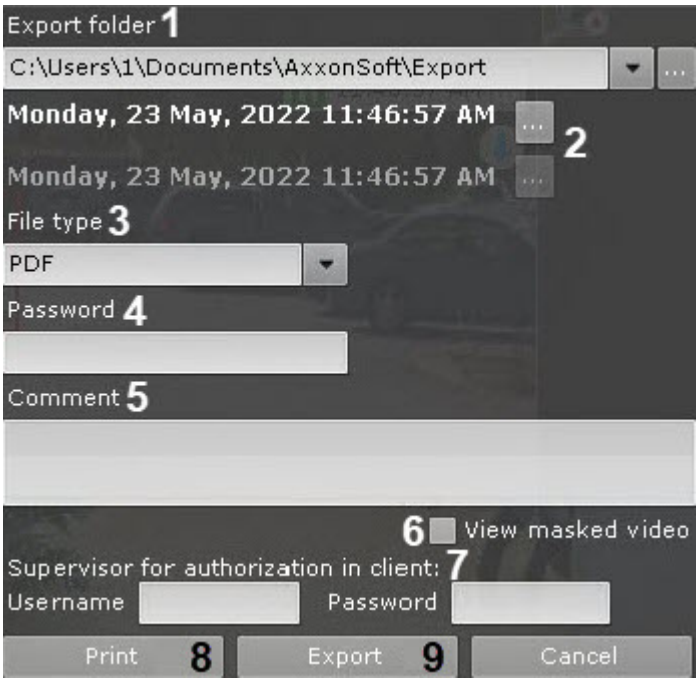
1. If you want to export from an archive mode or archive analysis mode, specify an export area and mask if necessary (see Configuring export area and masks(see page 1315)).
2. In the surveillance window, in the upper-right corner, click the  button.

   Attention!

   To instantly export a frame with standard settings (see Configuring export options(see page 1048)), right-click the  button.
3. Specify the folder to which you want to export the frame (**1**).

   Note

   By default, frames are exported to the folder specified in the export settings (see Configuring export options(see page 1048)). If you change this folder, the new path to the exported files will be kept in memory until the Client restarts.



4. Select the date and time of a frame (**2**). By default, the current frame is selected in the surveillance window. If you are watching an archive video, then the frame that was displayed when you clicked the button is selected.

   Note

   If you are watching a live video, then the frame that was displayed when you clicked the button will be exported. Date and time fields are not displayed.

5. Select the frame format: PDF or JPG (**3**).
6. If you want to export a frame to an encrypted zip archive, set an archive password (**4**).

   Attention!

   Setting a password will be mandatory if it is specified in the user role settings (see Roles(see page 920)).

7. If you exports a frame to PDF format, you can add comments (**5**).
8. To export unmasked frames (see Configuring privacy masking in archive(see page 1001)), the user must have appropriate access rights. To perform such an export, set the **View masked video** checkbox (**6**).
9. Enter the credentials of the supervisor who confirms the launch of export (**7**).

   Note

   The supervisor enters their password only if it is required by user role settings (see Roles(see page 920)). If no export confirmation is required, these fields will not be displayed.

10. If you export to PDF, you can immediately send the file to print (**8**). In this case, the frame is not saved to disk.
11. To export the frame, click the corresponding button (**9**).

Export begins. Progress is shown in the export panel (see Viewing export progress(see page 1316)).

Export of the frame is now complete. The frame exported to JPG will also be placed on the clipboard.

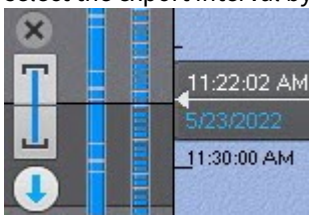
20.8.6 Exporting Video Recordings

20.8.6.1 Standard video recordings export

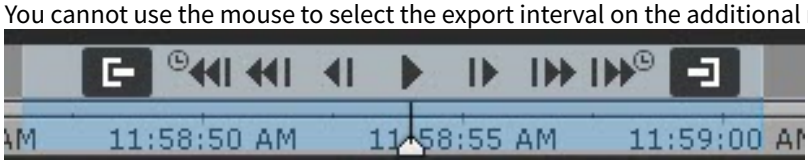
The standard export of the video recordings is performed according to the following procedure:

1. Setting the export interval.
   Set the export interval on the primary or the secondary timeline. You can set the export interval later by entering the date and time (see item 3c below):

   a. on the primary timeline, move the marker to the beginning of the interval that you want to export. Click the button. Move the marker to the end of the interval that you want to export. Click the button. You can also select the export interval by using the right mouse button. To clear the interval, click the button;

   b. you can specify the interval on the additional navigation panel in the same way, by clicking the buttons. You cannot use the mouse to select the export interval on the additional navigation panel.

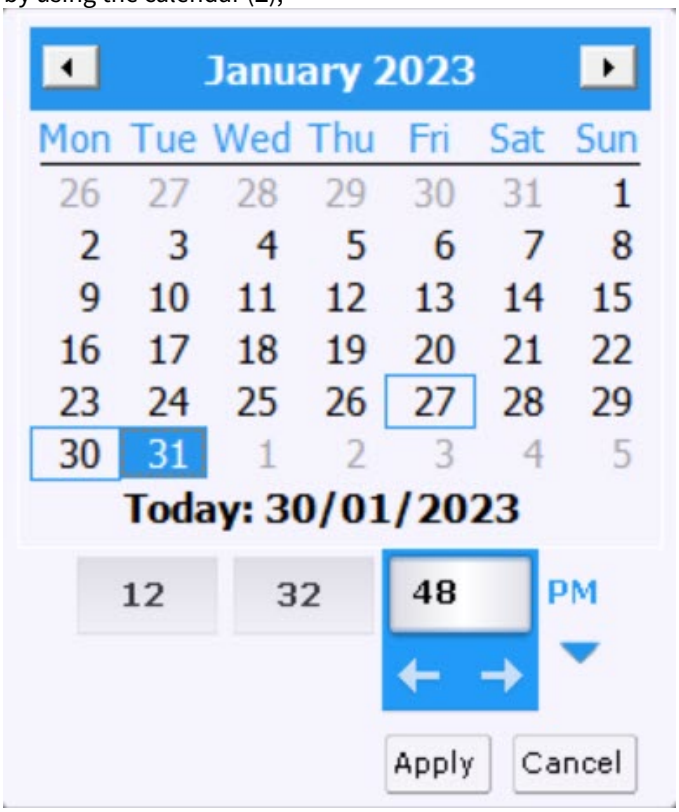
2. Setting the export area and masks (see the Configuring export area and masks(see page 1315)).
3. Setting the export format.

   a. Click the button on the timeline or in the surveillance window.
   The export window opens.

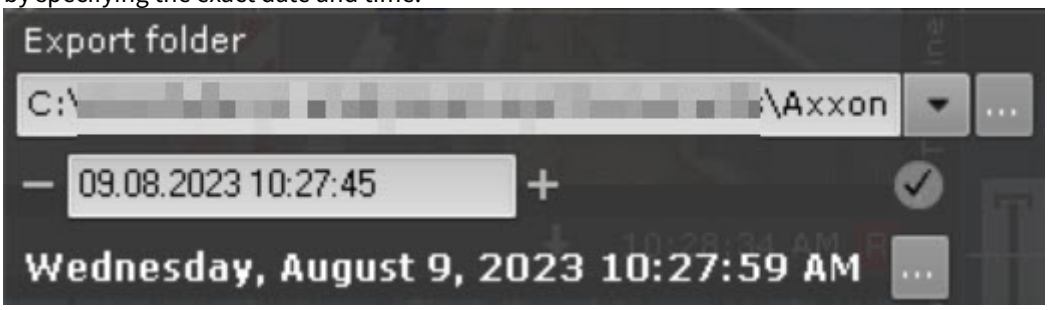
   

   b. If necessary, change the export path (**1**). By default, the file is exported to the folder specified in the settings (see Configuring export(see page 1048)). If the folder was changed, the new path for the exported files is saved until the Client restart.
   c. You can set the start and end time of the exported interval in one of the following ways:

- by using the calendar (**2**);



- by specifying the exact date and time.



d. Click the **Apply** button.
e. If necessary, specify a different file format into which you want to export the video recording (**3**). Video recordings can be exported into the following 4 formats: MP4, MKV, EXE and AVI.

> **Attention!**
>
> - Video recordings are exported into the MKV format without recompression.
> - Video recordings are exported into the AVI format with recompression by the codec selected in the settings. Export into the AVI format may take longer because of recompression. In addition, the AVI format export increases the CPU load, especially when you export several files at once (see Simultaneous export of videos from multiple cameras(see page 1312), Simultaneous export of all event videos(see page 1313)).
> - When video recordings are exported into the EXE format, an executable file is compiled, containing video recording, playback tools, and necessary codecs. When exporting into the EXE format, note that Windows OS does not allow launching executable files of more than 4 GB.
> - If you export video recordings from the fisheye camera in the EXE format, the entire panoramic view is exported, that can be rotated to the desired angle of view in the player. If the export is performed in the MKV, MP4 or AVI formats, the selected section on the camera in the layout interface is exported.

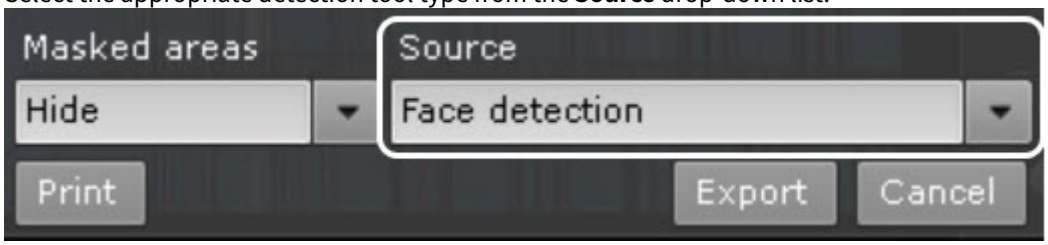
f. If you export a video recording into the MKV or AVI format, and you need to add the Axxon Player utility (see The Axxon Player User Guide[403]) to the same folder, set the corresponding checkbox (**4**).
g. If you want to export into the encrypted ZIP archive, set the archive password (**5**). When exporting into the EXE format, you will need to enter the password when you open the file.

> **Attention!**
>
> Setting a password will be mandatory, if this condition is set in the user role settings (see Roles(see page 920)).

h. If necessary, add a comment to the export. The comment will be displayed as captions when the exported video recording is played back (**6**).
i. If necessary, export the video recording with the display of object tracks. To do this, select the type of detection tool that will be the source of the displayed tracks from the **Tracks** drop-down list (**7**).
j. If necessary, export the video recording with object masking. To do this:
    i. From the **Masked areas** drop-down list (**8**) select one of the values:
        - **Hide**—if you want to mask objects in the exported video;
        - **Invert and hide**—if you want to mask the area around objects in the exported video.

> **Note**
>
> If you select **Hide** or **Invert and hide**, the export may take long time, regardless of the export format. This is because the system needs to re-encode the video to mask faces, which requires additional computing resources and time.

    ii. Select the appropriate detection tool type from the **Source** drop-down list.



k. Enter the username and the password of the supervisor who confirms the launch of the export (**9**).

> **Note**
>
> Entering the supervisor password is only required if this is set in the access rights settings (see Roles(see page 920)). If the confirmation is not required for the export, these fields will not be displayed in the window.

l. Click the **Print** button (**10**) if you want to to print the current video frame.
m. Click the **Export** button (**11**).

The export process starts. The progress is displayed on the export panel (see Viewing export progress(see page 1316)).

> **Note**
>
> You can stop export at any time by clicking the **Stop** button.

> **Note**
>
> The duration of the exported file can be longer than the specified duration, because the key frame is not always at the beginning of the export interval.

403 https://docs.axxonsoft.com/confluence/spaces/player/pages/260905172/The+Axxon+Player+User+Guide

20.8.6.2 Instant video export

You can instantly export video without specifying the export range. To do this, click the  button in the upper right corner of the surveillance window at any time.

If you perform the export:

- in real time, then only the video frame at the moment when you click the  button is available. Then, you must set the required parameters for exporting the frame (see Frame export(see page 1307)).

  Note

  The date and time of the moment when you click the export icon  is specified in the name of the exported file in the surveillance window. The captions with the indication of date and time of the fragment are applied to the exported frame. The date and time in captions correspond to the moment when you click the **Export** button. To display captions with the indication of date and time, you must set the **Export date, time and titles for AVI** checkbox on the **Options** → **Export** tab (see Configuring export options(see page 1048)).

- in the archive mode or the archive analysis mode, the first frame of the exported video is the position of the pointer on the timeline at the moment when you click the  button. Then, you must set the export parameters (see Standard video recordings export(see page 1308)). When you select MP4, MKV, EXE or AVI formats for export, the video recording range is five minutes from the current position of the pointer.

After you click the **Export** button, the export process starts, the status of which is displayed on the export panel (see Viewing export progress(see page 1316)).

The duration of exporting the video or a frame depends on the server resources.

Note

- You can stop the export at any time by clicking the **Stop** button.
- When you export from the archive mode or the archive analysis mode, you can pre-configure the export and mask area (see Configuring export area and masks(see page 1315)).

20.8.6.3 Simultaneous export of videos from multiple cameras

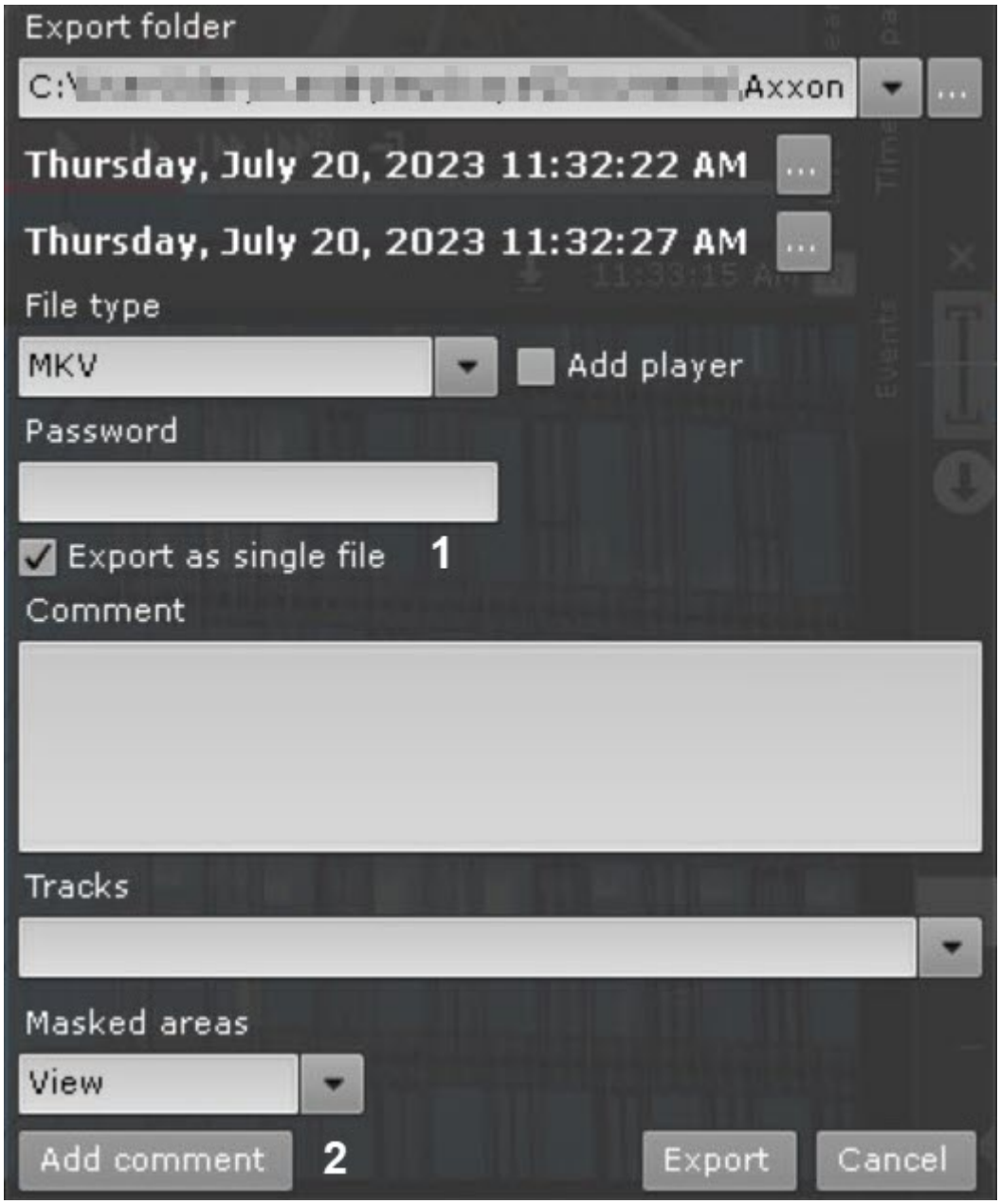
If multiple cameras in a layout have been switched to an archive mode, you can simultaneously export videos from all of them.

To do this, select the export interval on the primary timeline or in the calendar and start exporting (see Standard video recordings export(see page 1308)).

By default, the video is exported to a single file. To export video from different cameras to separate files, clear the **Export as single file** checkbox in the export window (**1**).

Note

When you export to a single file, the streams are written in parallel. To view exported video, use a player that allows playing multiple simultaneously (for example, VLC).



Comments made during export are added to each exported video (**2**).

Note.

For each video you can pre-set an export area and masks (see Configuring export area and masks(see page 1315)).

20.8.6.4 Simultaneous export of all event videos

You can use the Story board (see Story board(see page 1137)) to simultaneously export all found videos of an event from archives of different cameras, having previously collected them on the board.

To do this, do the following:

1. Click the thumbnail of the found video fragment.

2. Set a time interval on the timeline for export (see Standard video recordings export(see page 1308)).
   This will add the thumbnail of the selected video to the Story board.



3. Click the **+** button in the middle of the thumbnail. The video will be added to the export batch.

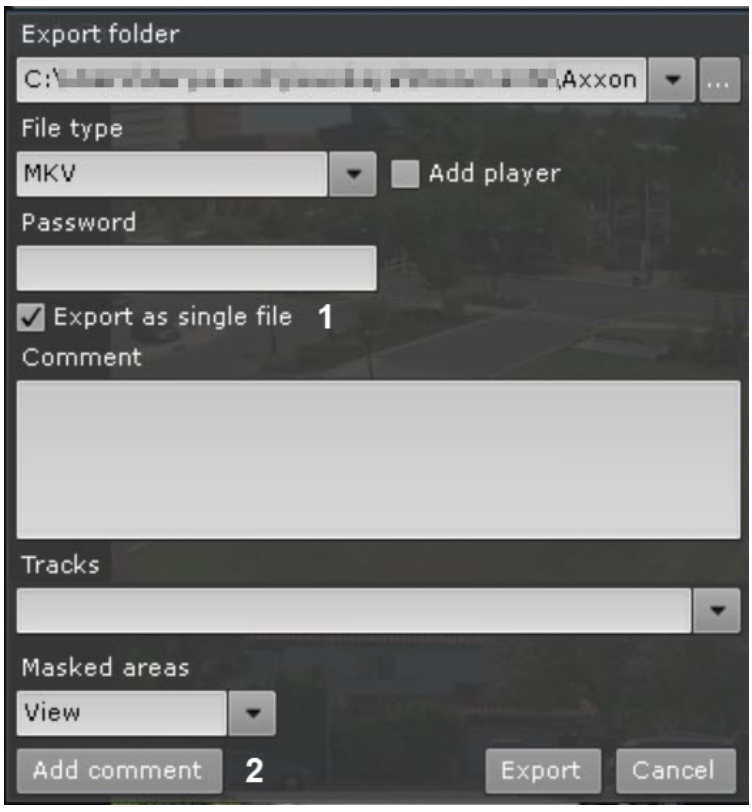
> **Note**
>
> To remove the video from the batch, click the button.

4. Repeat these steps for all videos of interest.
5. Click the button to export all selected videos.

The export window will open, further export steps are identical to the standard export process (see Standard video recordings export(see page 1308)).

By default, the video is exported to a single file. To export video from different video cameras to separate files, clear the **Export as single file** checkbox in the export window (**1**).

> **Note.**
>
> When you export to a single file, the streams are written in parallel. To view exported video, use a player that allows playing multiple streams simultaneously (for example, VLC).



> **Note**

We recommend you to export to the EXE format.

Comments made during export are added to each exported video (**2**).

20.8.7 Configuring export area and masks

If you are exporting a snapsnot or video from Archive mode or Archive Analysis mode, you can specify an export area and masks.

You can specify an export area and masks at the same time.

By specifying an export area, you export only the portion of the frame that is of interest, while omitting the remainder.

To specify an export area:

1. In a viewing tile, click the button.
   A rectangular area with four corner points is displayed.



2. Reposition the corner points to specify the area that you want to export. To reposition the corner points, left-click a corner point and drag it.

Configuration of the export area is now complete.

Masking allows you to hide complex or irrelevant areas of the frame so that they do not appear in an exported file. You can set an unlimited number of masks.

To specify a mask:

1. In a viewing tile, click the button.
2. Use the corner points to enclose the area that you want to mask. To add a corner point, left-click the video. You can add an unlimited number of corner points.

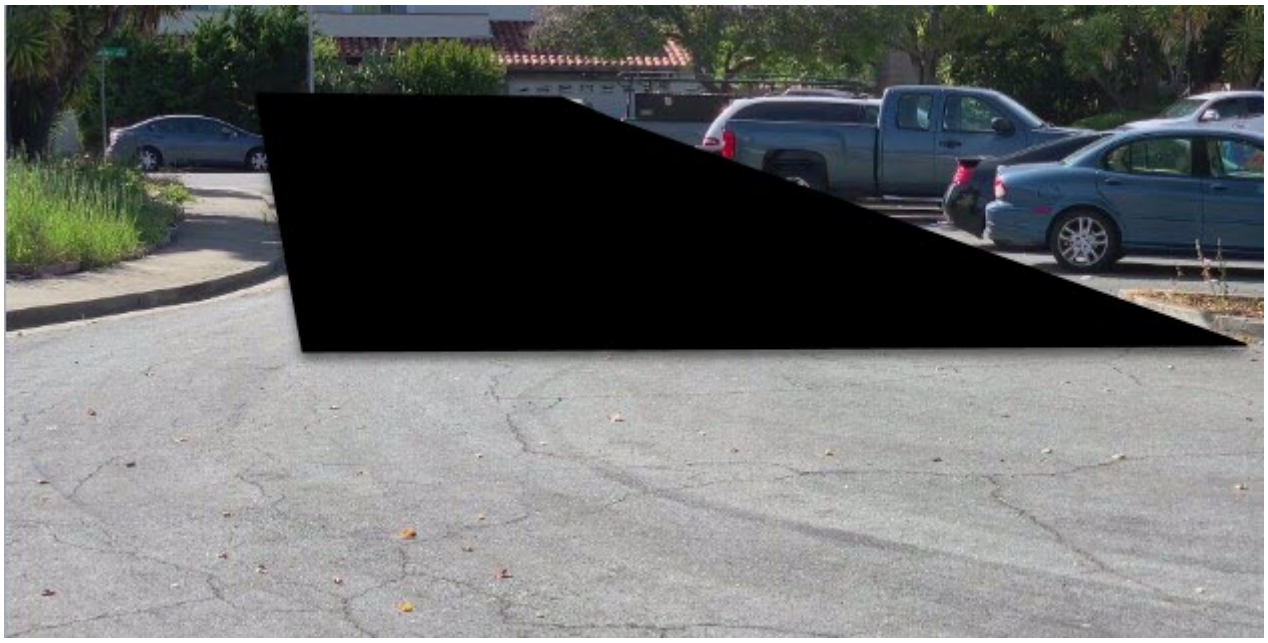


After you add a mask, you can perform the following actions:

- move corner points (left-click a corner point and drag it),
- delete corner points (right-click a corner point),
- delete a mask (click the button),
- add a new mask.

Mask creation is now complete.

In the exported snapshot or video, the masked area is filled in with black.



20.8.8 Viewing export progress

After export is started, the export progress is displayed on the export panel. The export panel is displayed near the top of the monitor after the export process is started, and is hidden after all messages are closed.



To stop the export process, click the **Finish** button. In this case the file will be saved. The length of the exported fragment will depend on the export time and resources of the Server.

To cancel export, click the **Cancel** button. In this case, the file is not saved.

If several export processes are active, you can switch between them by clicking the buttons. The following information is displayed between them: number of the current export operation/total number of export operations (export progress for all operations).

To close the export progress message, click the button.

> **Note.**
>
> If export is active, you cannot close the message.

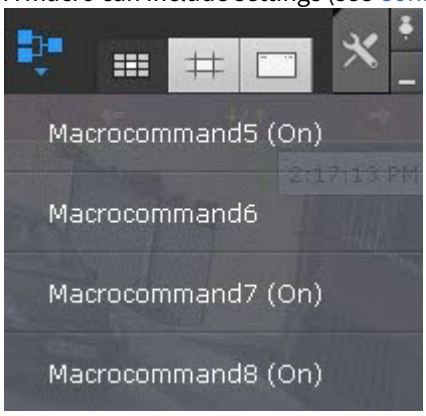
If an error occurs during export, it will be indicated on the dynamic error panel (see Control in Live Video mode(see page 1317)).



20.9 Macros control

You can manage macros from the map (see Controlling devices from the map(see page 1300)) or from the menu on the top panel.

A macro can include settings (see Configuring macros(see page 830)) to display the  control menu in the upper panel.



Those macros that are currently active (enabled as **Always** or within a time schedule, see Configuring macros(see page 830)), are marked as **(On)**. To enable or disable macros, you need to select them in the list. When you disable a macro, the mode is changed to **Never**.

> **Note**
>
> If you disable a macro, which is active within the time schedule, then this mode will be restored after reactivation. The status of the macro in the menu changes only a few seconds after a command is completed.

Event macros can be initiated by using the corresponding buttons on the Dialog Board (see Working with Dialog Board(see page 1276)) or by using hotkeys.

20.10 Event control

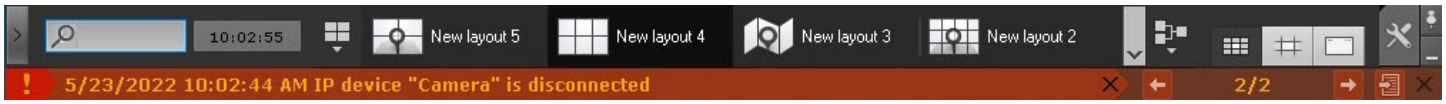
Event control in the *Axxon One* software package can be conducted in three ways:

1. In Live Video mode.
2. Using the system log.
3. By logging events in external logs.

> **Note**
>
> Configuration of logging to external files is carried out through the log management utility (see the section Log management utility(see page 1414)).

20.10.1 Control in Live Video mode

Messages about system errors which have occurred are displayed in real time on a dynamic error panel. When there are no unaccepted errors, this panel is not displayed; when there are such errors, it is displayed in *Axxon One*'s **Layouts** tab.



> **Note**
>
> This feature is configured on the **Permissions** tab (see the section Roles(see page 920)).

To accept an error and delete it from the error panel, click the cross.
To accept all errors and close the error panel, click the cross on the right-hand side of the panel.

To switch between error messages, click the  buttons.

To jump to System log (see System log(see page 1318)), and open error messages, click the  button.

20.10.2 System log

System log is a log that contains information about events that occurred in the system.

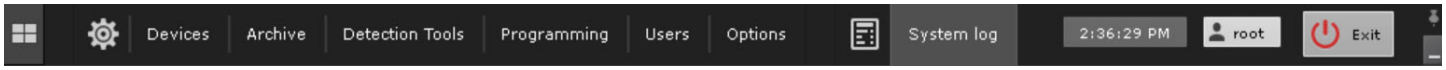
The following user actions are logged in the system log:

- Axxon One client and server
  - logging in and out of the client;
  - unsuccessful login attempt;
  - adding, editing, and deleting settings of hardware, archive, or detectors;
  - creating, editing, and deleting macros;
  - adding, editing, and deleting user permissions;
  - initiating a camera alarm;
  - arming and disarming a camera;
  - controlling a PTZ camera;
  - creating and editing comments;
  - exporting frames and video recordings.
- Axxon One web-client
  - logging in and out of the Web-Client;
  - unsuccessful login attempt;
  - viewing the archive;
  - creating/deleting/editing a layout;
  - initiating a camera alarm.
- AxxonNet mobile client
  - logging in and out of the mobile client;
  - start and end time of macro triggering;
  - arming and disarming a camera.

All events from users include their IP address.

Date & time	Event type	Description
9/26/2024 2:38:31 PM	Audit	Login to server "DESKTOP-5VRITM5" of user "admin"/"root" from IP address "192.168.74.1"
9/26/2024 2:38:18 PM	Audit	Logout from server "DESKTOP-5VRITM5", user "admin"/"root" from IP address "192.168.74.1"
9/26/2024 1:08:55 PM	Audit	Parameter "Enable" of device "Camera" set to "No" by user "admin"/"root" from IP address "ipv4:192.168.56.1:52443"

To access the system log, select **Settings** → **System log**.



As a result, a window opens, in which you can search, view, and export events of the system log (see Filter, searching for events and viewing search results(see page 1318)).

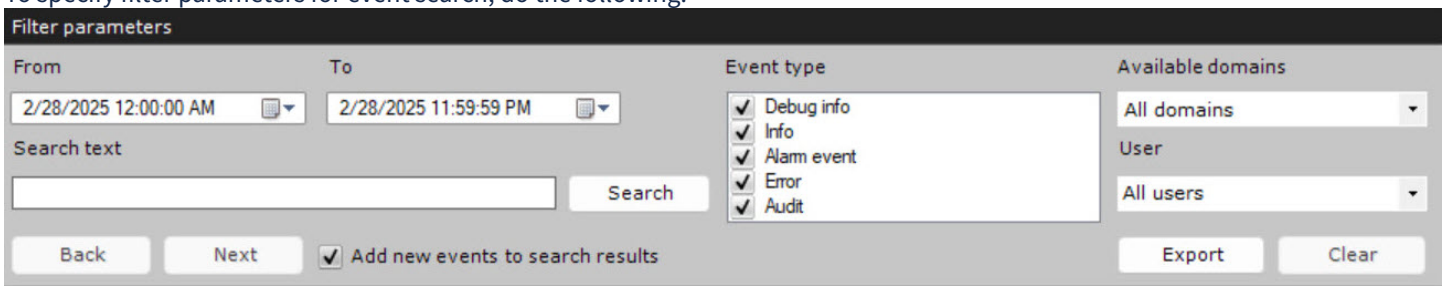
20.10.2.1 Filter, searching for events and viewing search results

On the page:

- Specifying filter parameters for event search(see page 1319)
- Searching for events and viewing search results(see page 1319)

20.10.2.1.1 Specifying filter parameters for event search

To specify filter parameters for event search, do the following:



1. By default, events are searched for the current day. If necessary, enter the period during which the events were registered:
   a. In the **From** field, enter the date and time of the beginning of the period in the format **DD.MM.YYYY HH:MM:SS**.
   b. In the **To** field, enter the date and time of the end of the period in the format **DD.MM.YYYY HH:MM:SS**.

   > **Note**
   >
   > You can select the required dates in the drop-down calendar.

2. In the **Event type** section, set the checkboxes next to the event types you are looking for:
   a. **Debug info**.
   b. **Info**.
   c. **Alarm**.
   d. **Error**.
   e. **Audit** (user actions in the system).
3. From the **Available domains** drop-down list, select the required domains that you want to search:
   a. **All domains**.
   b. **Default**.
4. If you select **Audit** in the **Event type** section, from the **Users** drop-down list, select a specific user. Otherwise, actions of all system users are found.
5. In the **Search** field, enter the initial text of the event that you want to find.

   > **Attention!**
   >
   > - You cannot use **?** and ***** characters.
   > - You can use **OR** and **AND** logical operators when searching in the system log:
   >   - to search with the **OR** logical operator, separate the words with a **|** character.
   >   - to search with the **AND** logical operator, separate the words with a space.
   > - To search by an IP address, you must enter an IP address in quotes and in full format. For example: "192.168.1.12" or "172.19.16.1:50532".

Specifying filter parameters for event search is complete.

20.10.2.1.2 Searching for events and viewing search results

To start the search for events of the system log, click the **Search** button.

As a result, a table with the search results is displayed.

> **Note**
>
> Events in the table are sorted by date, starting from the last one.

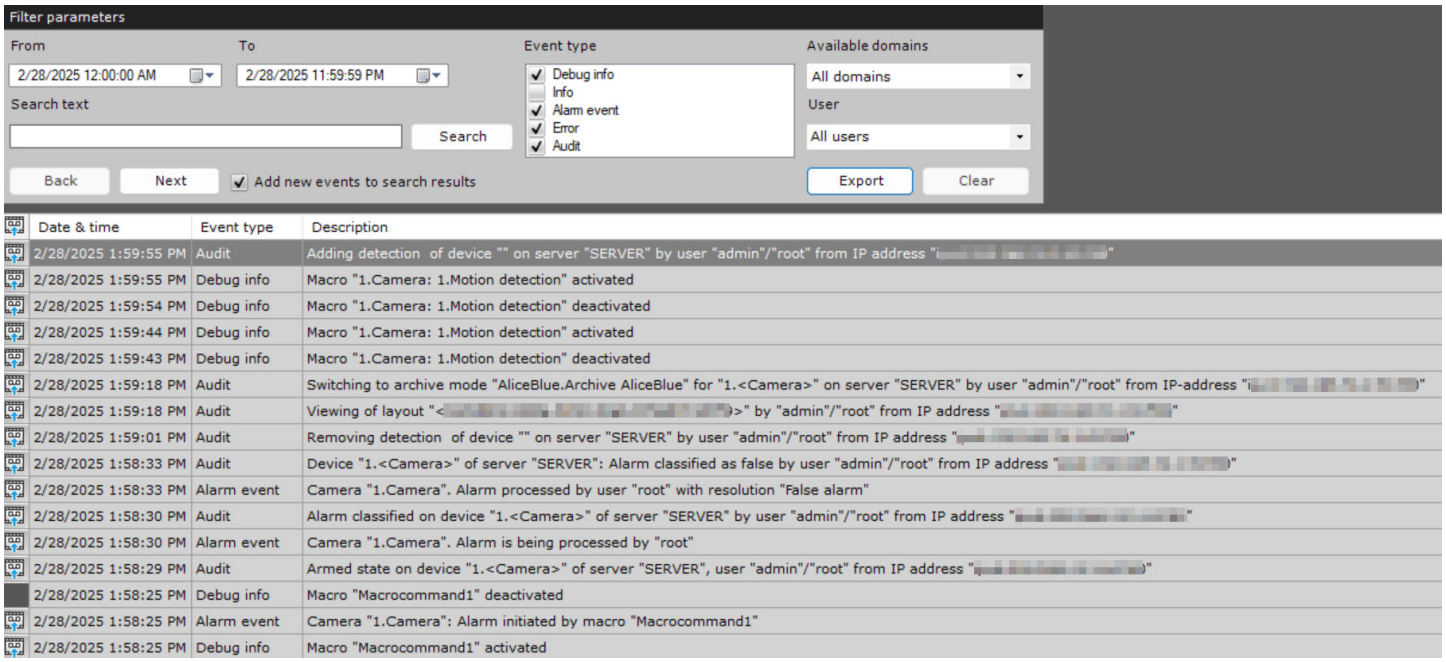


Table column	Description
	This icon means that there is a recording of an event in the archive (see Go to the archive video of a specific event(see page 1323))
Date & time	Date and time when an event was registered in the system in the format **DD.MM.YYYY HH:MM:SS**
Event type	Event type (**Debug info**, **Info**, **Alarm**, **Error**, **Audit**)
Description	Description of an event

The search results table can have more than one page. To navigate through a table that has more than one page, use the following buttons:

1. **Back**—to go back to the previous page of the table.
2. **Next**—to go to the next page of the table.

Immediately after you install *Axxon One*, the system log can show the **Table end violation** error. In this case, such an event is related to the product installation and doesn't mean unauthorized access to the database.

To clear the event search filters and the results table, click the **Clear** button.

20.10.2.2 Events in the system log

The following types of events are stored in the *Axxon One* system log:

Event type	Description
Debug info	Debug events provide detailed information about the execution of various processes in the system
Info	Info events capture important but non-critical events that are useful for general understanding of system operation and monitoring of system status
Alarm	Alarm events indicate potentially problematic situations that require user's attention

Event type	Description
Error	Errors indicate malfunctions or problems in system operation
Audit	User's actions in the system

The system log also includes events when critical errors occur in the system.

The table below shows examples of events for different objects in the system that are included in the system log:

Object	Event
Archive	File or partition of archive is corrupted
	File or partition of archive is restored
	File or partition of archive in suboptimal state. It is still usable but may be not fully operable until the background maintenance job is finished
	Archive partition error
	User added comment
Macro	Macro activated
	Macro deactivated
	Unable to execute macro
	Macro not found
Camera	Started recording to archive from camera
	Finished recording to archive from camera
	Serial number does not match the one specified in settings
	IP device. Signal restored
	Camera armed
	Camera armed in private mode by user
	Camera disarmed
	IP device connected
	IP device disconnected
	Camera. Archive. Export started

Object	Event
	Camera. Archive. Export impossible
	Camera. Archive. Export finished
	PTZ device. Move to preset is impossible. The reason: required preset number is not found on IP device
	PTZ device. Move to preset number
	PTZ device. Manual move
	Camera. User added comment
	Camera. An object recognized from list
	Failed to apply settings
	Authorization failed
	Internal error
	Network failure
	Reboot
Camera (alarm)	Alarm initiated by user
	Alarm initiated by automatic rule on camera, detection {name of the detector}
	Alarm initiated by macro
	Alarm being processed
	User cannot process alarm. Reason: alarm being processed by another user. Alarm status {status}
	Alarm processed by user with resolution {resolution}
	Alarm pending
	Alarm needs processing
Detector	Automatic rule activated
	Automatic rule cannot be executed: executing device unavailable or malfunctioning
	Automatic rule deactivated
	Detection triggered

Object	Event
	Specified detection triggered
	Beginning of detection triggering
	End of detection triggering
	Alarm status change: alarm is processed by user {user} with resolution {resolution}, user comment {comment}
	LP recognized from list
	Specified detection triggered, LP {recognized license plate}
	Detection triggered, LP {recognized license plate}
	Detection triggered. Age. Gender
	Detection specified triggered. Age. Gender. Temperature—{temperature value} {temperature unit}
	Detection triggered. Age. Gender. Temperature—{temperature value} {temperature unit}
	Detection triggered. Max Temperature {maximum temperature} {temperature unit}. Min Temperature {minimum temperature} {temperature unit}. Avg Temperature {average temperature} {temperature unit}
	Face recognized from list
	Face recognized from list. Age. Gender
	Detection triggered, queue (min.: {value}, max.: {value})
	Visitor passage in direction of "Entrance"
	Visitor passage in direction of "Exit"
	Detection triggered. Tamper type
System	System integrity check passed successfully
	System integrity compromised

20.10.2.3 Go to the archive video of a specific event

Filter, searching for events and viewing search results(see page 1318)

To go to the archive video of a specific event, click the  icon next to the event or double-click the relevant row.

Note

You can view archive videos of events from cameras, inputs, and outputs. In this case, inputs and outputs must be linked to a specific camera (see The Input object(see page 225), The Output object(see page 227)).

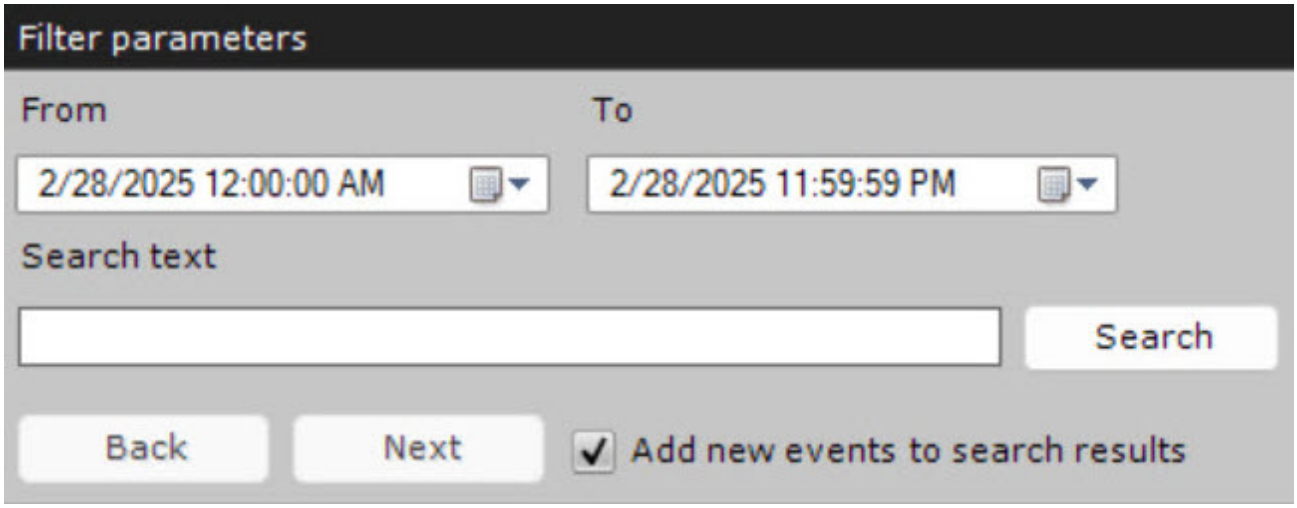
Date & time	Event type	Description
5/23/2022 11:47:01 AM	Info	Camera "3.Camera". End of detection Motion in area triggering Extended info: "Motion in area"
5/23/2022 11:47:01 AM	Debug info	Macro "3.Camera: Motion in area" deactivated
5/23/2022 11:47:01 AM	Info	Finished recording to archive "Archive Aqua" from camera "3.Camera"
5/23/2022 11:46:57 AM	Info	Camera "3.Camera". Beginning of detection Motion in area triggering Extended info: "Motion in area"
5/23/2022 11:46:57 AM	Debug info	Macro "3.Camera: Motion in area" activated
5/23/2022 11:46:57 AM	Info	Started recording to archive "Archive Aqua" from camera "3.Camera"
5/23/2022 11:46:52 AM	Info	Camera "2.Camera". End of detection Motion detection triggering Extended info: "Motion detection"

As a result, the system switches to the Archive mode to the video recording of the selected event.

20.10.2.4 Refreshing the results of the event search

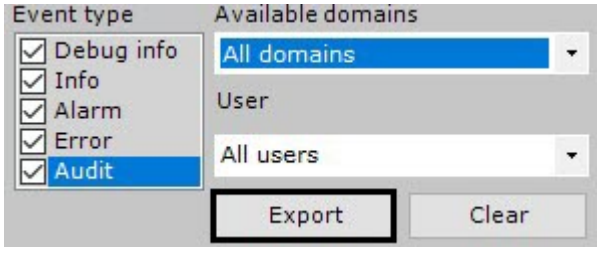
You can automatically refresh the table with the event search results, that is, add events to it that happened after the search started.

To do this, set the **Add new events to search results** checkbox. After you set this checkbox, events are updated automatically without the need to search again.

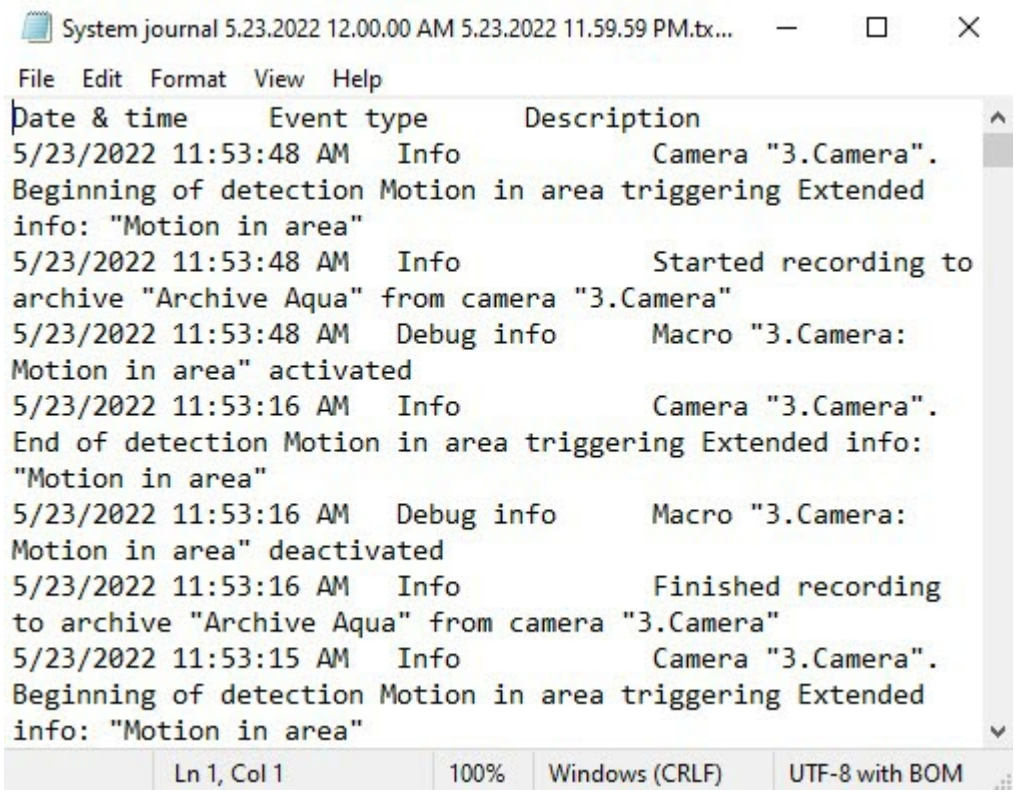


20.10.2.5 Exporting the results of the event search

To export the search results of the system log events, click the **Export** button.



When you do this, the standard Windows **Save as** dialog window opens. You can use it to save the search results to a file with a .txt (text file) extension, or .csv (delimited file) extension.



20.11 Working with Axxon One through the Web-Client

20.11.1 Web-Client overview

Web-Client is an interface that allows you to interact with some components of the *Axxon One* through a web browser.

Before you start working with Web-Client, it is recommended that you learn the hardware and technical requirements for the correct operation of the Web-Client (see Hardware and software requirements for the Web-Client operation(see page 1326)).

To ensure the correct launch of Web-Client, first configure the *Axxon One* Web-Server (see Configuring the Web-Server(see page 165)). Then you can launch and authorize in Web-Client through a web browser using the address of the *Axxon One* Web-Server (see Starting and logging in to the Web-Client(see page 1326)).

The Web-Client user interface (see Web-Client GUI(see page 1329)) can be changed using user preferences (see Web-Client configuration(see page 1330)).

The Web-Client offers the following options:

1. Viewing live videos(see page 1346).
2. Working with layouts(see page 1336).
3. Controlling PTZ cameras(see page 1348).
4. Viewing Archive(see page 1350).
5. Archive search(see page 1356).
6. Archive position selection(see page 1353).
7. Searching for video cameras(see page 1334).
8. Viewing and processing alarms(see page 1365).
9. Listening to a camera's microphone(see page 1367).
10. Exporting still frames and videos(see page 1368).
11. Digital zooming(see page 1368).
12. Working with bookmarks(see page 1374).
13. Viewing events from camera detection tools in the Web-Client(see page 1363).
14. Running macros(see page 1364).
15. Viewing Camera and Archive Statistics(see page 1373).

16. Working with interactive map via the Web-Client(see page 1375).

20.11.2 Hardware and software requirements for the Web-Client operation

Web-Client operates correctly with the latest versions of Google Chrome, Safari, Firefox and Microsoft Edge browsers.

Attention!

- Web-Client doesn't use third-party technologies in its operation, so it can operate in other browsers, but we cannot guarantee its stable operation.
- Internet Explorer browser isn't supported.

Web-Client supports video playback in MJPEG, H.264, H.265 formats. All other formats are transcoded to MJPEG on the server.

Attention!

- Playback of video in H.265 format is possible in Safari, Microsoft Edge browsers with the HEVC video extension[404] installed, Google Chrome version 107 and higher if:
  - hardware acceleration is enabled in the browser settings;
  - video card has hardware support for H.265 codec.
- H.265 format isn't supported in Linux OS.

Two players can playback video in Web-Client: JPEG and MP4. If the browser supports MP4, this player is used. In all other cases, the JPEG player is used.

Attention!

- If a layout with multiple cameras is open on the screen, only key frames are displayed for all H.264 cameras depending on the preferences (see Web-Client configuration(see page 1330)). If you select a specific camera, all frames are always displayed. For MJPEG videos, every frame is always displayed.
- Videos that contain b-frames are played back with jerks.

To display 16 FullHD* cameras on a single browser tab, you need at least an Intel Core i3 CPU and 1GB of free RAM.

* provided that:

- cameras are dual stream,
- frame rate is 25 FPS on each stream,
- resolution of the second stream is 360p,
- if there are more than one camera, the browser displays a stream with lower bitrate on the layout.

20.11.3 Starting and logging in to the Web-Client

You can work with *Axxon One* via the Web-Client remotely using a web browser and the TCP/IP communication environment. Remote video surveillance via a web browser doesn't require installation of *Axxon One*.

To start and log in to the Web-Client, do the following:

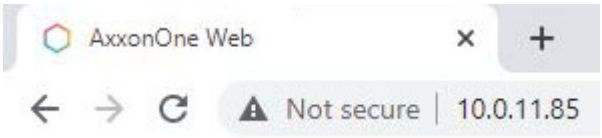
1. Start a web browser.
2. In the address bar, enter the address of the *Axxon One* Web-Server in the following format: <Web-Server IP address>:<Port>/<Prefix>.

   Connecting the Web and Mobile Clients to the Server behind NAT(see page 1440)

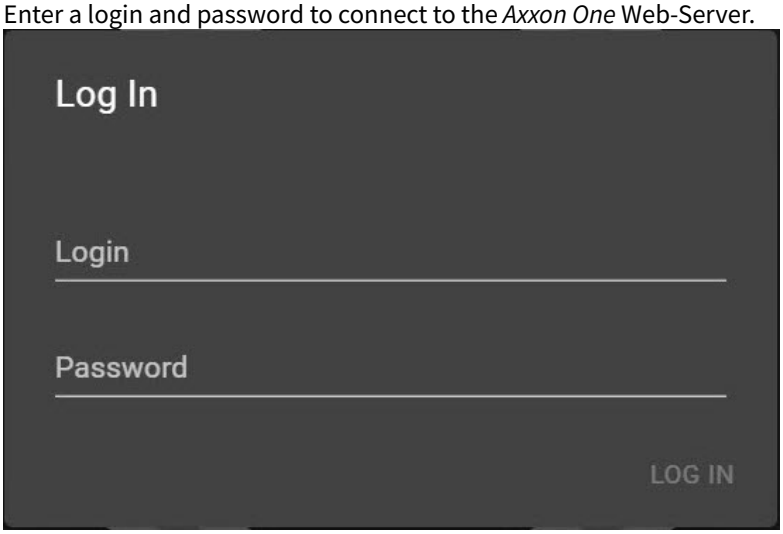
   Attention!

404 https://apps.microsoft.com/detail/9nmzlz57r3t7?hl=en-EN&gl=EN

- The Server URL is case-sensitive. It is necessary to enter the URL exactly in the letter case specified in the settings (see Configuring the Web Server(see page 165)).
- A connection via the secure HTTPS protocol will be automatically established, if the Web-Server is configured accordingly (see Configuring the Web-Server(see page 165)).

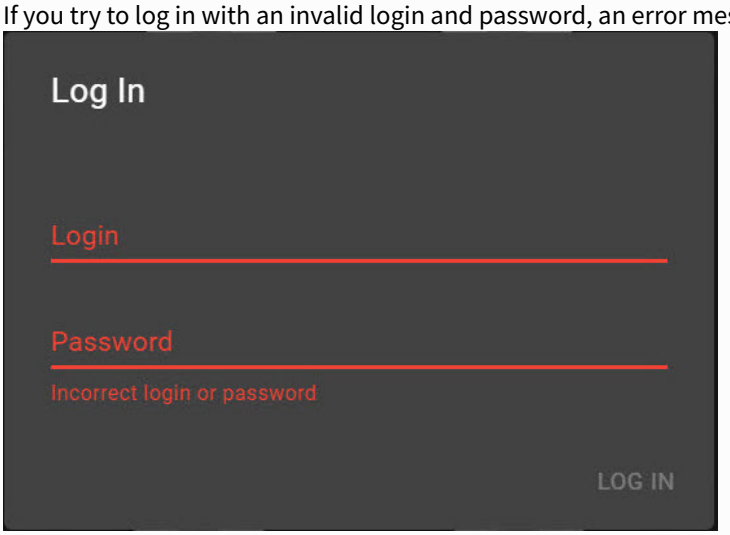


3. Enter a login and password to connect to the *Axxon One* Web-Server.



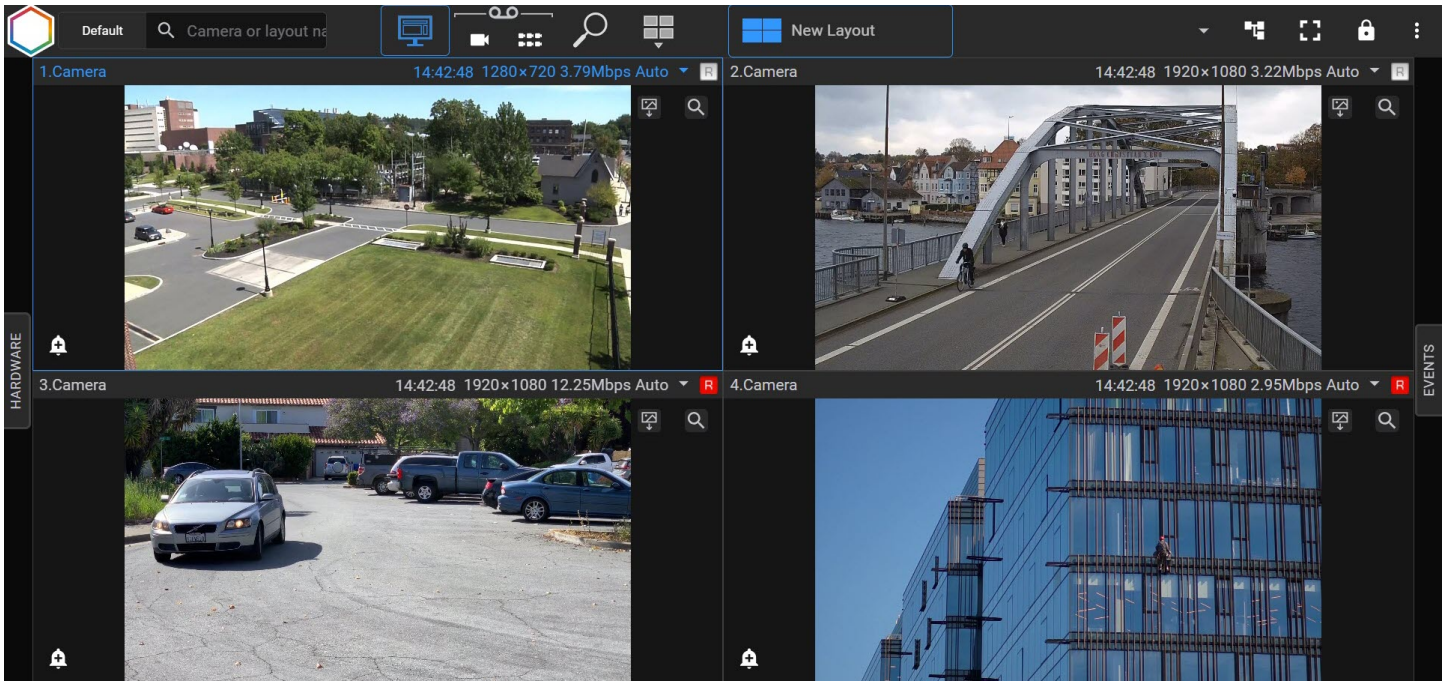
Note

If you try to log in with an invalid login and password, an error message will be displayed.



After five failed log in attempts, the user is blocked for 10 minutes.

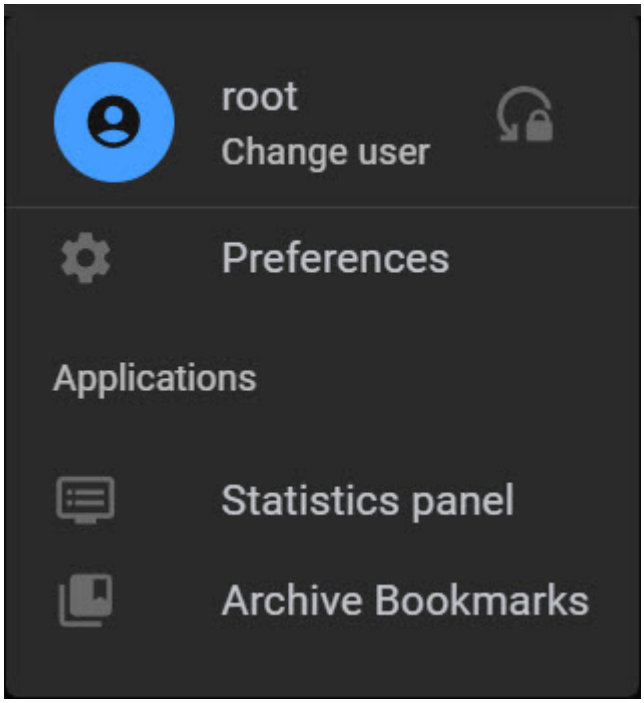
As a result, the Web-Client interface will be displayed. By default, the first listed layout will be displayed. If there are no layouts, the Cameras panel will open on the left and the video image from the first listed video camera will be displayed.



20.11.3.1 Changing the user in the Web-Client

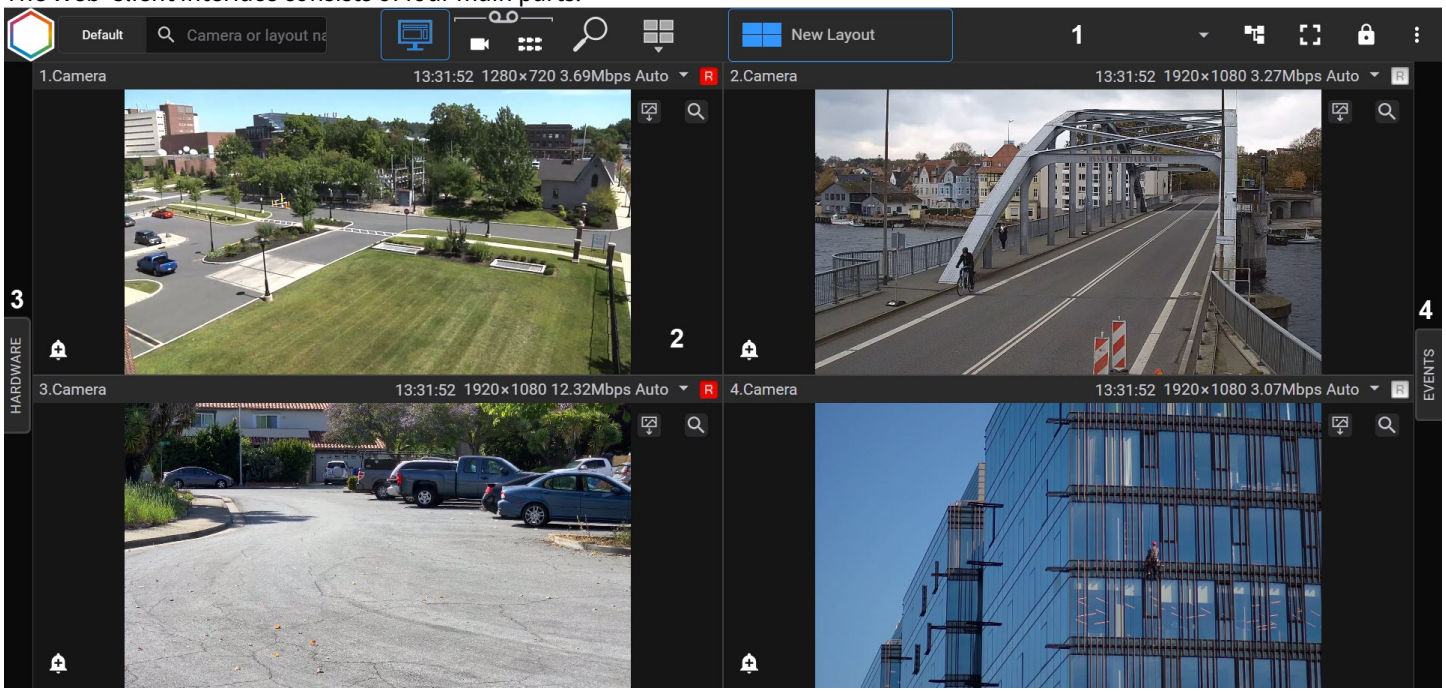
To change the user in the Web-Client, click the  button in the top right corner and select the **Change user** menu item.

> **Note**
>
> The name of the current user is displayed next to this item.



20.11.4 Web-Client GUI

The Web-Client interface consists of four main parts:



1. The top panel (**1**) includes:
   a. the search bar for cameras or layouts (see Searching for video cameras in the Web-Client(see page 1334));
   b. the button to go to the real-time video surveillance mode  (see Real-time video surveillance in the Web-Client(see page 1346));
   c. the button to view the camera archive  (see Viewing video archives through the Web-Client(see page 1350));
   d. the button to switch all video cameras on the layout to archive mode  (see Viewing video archives through the Web-Client(see page 1350));
   e. the button to go to the archive search mode  (see Archive search in the Web-Client(see page 1356));
   f. the layouts menu  (see Working with layouts in Web-Client(see page 1336));
   g. the list of available layouts (see Selecting and searching for a layout(see page 1337));

   > **Attention!**
   >
   > The Web-Client displays the layouts available to a particular user. The number of cameras on the layouts is unlimited.

   h. run macro button  (see Running macros in Web-Client(see page 1364));
   i. the full-screen mode button  ;
   j. the button to hide the top panel  . In this case, the top panel is displayed only when you hover the mouse cursor over it. To pin the top panel, click the  button.
   k. the three-dot menu button  (see Web-Client configuration(see page 1330), Viewing Camera and Archive Statistics(see page 1373)).

2. The Surveillance window (**2**), (see Surveillance window(see page 1109) in the Client). Each Surveillance window includes:
   a. the export button (see Export in the Web-Client(see page 1368));
   b. the button to go to the quick search mode (see Archive search in the Web-Client(see page 1356));
   c. the button to initiate an alarm (see Viewing and processing alarms in the Web-Client(see page 1365)).
3. The **Hardware** panel (**3**) that displays all available cameras (see Searching for video cameras in the Web-Client(see page 1334)).

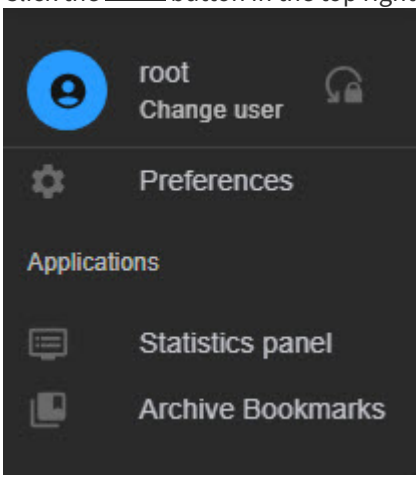
> **Note**
>
> In the Web-Client interface, you can change the width of the **Hardware** panel. To do this, point the cursor to the **Hardware** panel, hold down the cursor and drag it to the left or right.
>
> 
>

4. The **Events** panel (**4**) that displays the selected system events.

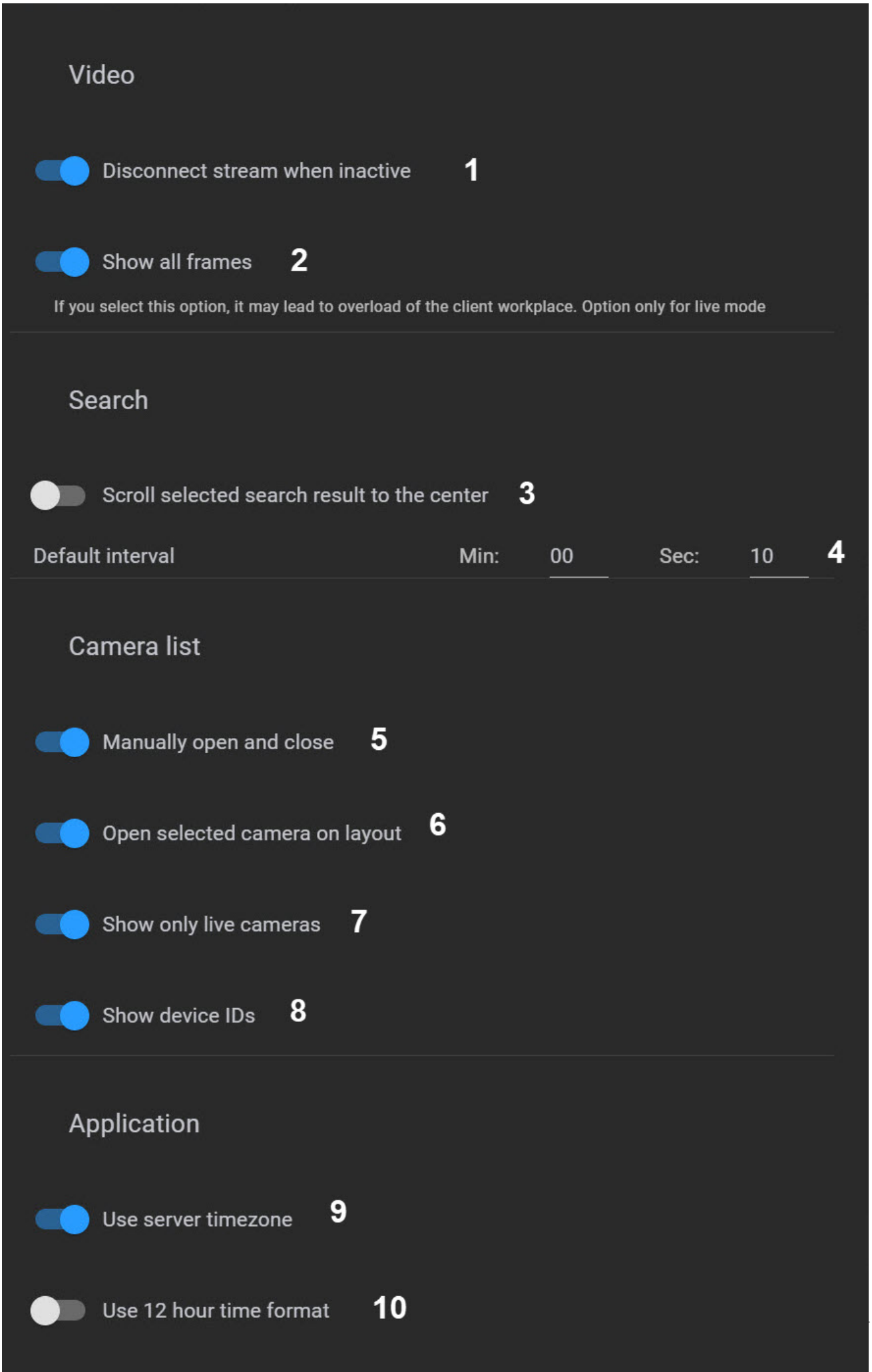
20.11.5 Web-Client configuration

To configure the Web-Client, do the following:

1. Click the button in the top right corner and select **Preferences**.



2. By default, when you switch to another tab in the browser and minimize it, the video stream transmission stops. In order not to interrupt the video stream transmission, disable the **Disconnect stream when inactive** parameter (**1**). This setting is common to all Web-Client users in a particular browser.


Video
Disconnect stream when inactive
1
Show all frames
2
If you select this option, it may lead to overload of the client workplace. Option only for live mode
Search
Scroll selected search result to the center
3
Default interval
Min:
00
Sec:
10
4
Camera list
Manually open and close
5
Open selected camera on layout
6
Show only live cameras
7
Show device IDs
8
Application
Use server timezone
9
Use 12 hour time format
10

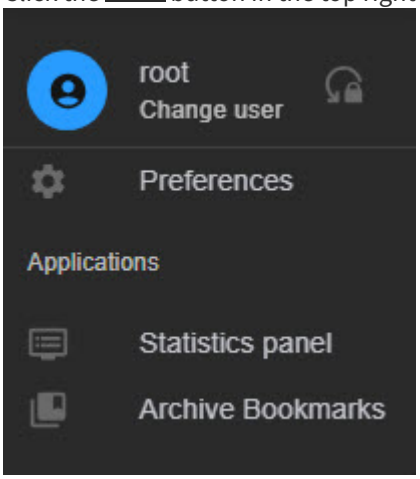
3. By default, if a layout with multiple cameras is open on the screen, only the reference frames are displayed for all H.264 cameras. When you select a specific camera, all frames are displayed. If you want to display all frames of an H.264 video regardless of whether a camcorder is selected or not, enable the **Show all frames** parameter (**2**). This setting is common to all Web-Client users in a particular browser.
4. To position the found fragment in the center of the screen, enable the **Scroll selected search result to the center** parameter (**3**). This setting is common to all Web-Client users in a particular browser.
5. Set the default interval for the TimeSlice search (**4**, see Types of archive search in the Web-Client(see page 1359)). This setting is common to all Web-Client users in a particular browser.
6. By default, the Cameras panel doesn't close after you select a device. To minimize the panel, disable the **Manually open and close** parameter (**5**). This setting is common to all Web-Client users in a particular browser.
7. By default, when you select a camera, it opens full screen. To open the layout containing the selected camera when you select a camera on the Cameras panel, enable the **Open selected camera on layout** parameter (**6**). If the selected camera is on the current layout, it becomes active. If the selected camera is on other layouts, the first layout that has a camera is selected. This setting is common to all Web-Client users in a particular browser.
8. By default, the Web-Client displays only the active cameras. If you want the Web-Client to display all cameras, disable the **Show only live cameras** parameter (**7**). This setting is common to all Web-Client users in a particular browser.
9. By default, the Web-Client displays the cameras IDs. In order to disable the cameras IDs display, disable the **Show device IDs** parameter (**8**). This setting is common to all Web-Client users in a particular browser.
10. By default, the Web-Client cameras and bookmarks display the server time. If you want the Web-Client cameras and bookmarks to display the client time, disable the **Use server timezone** parameter (**9**). This setting is common to all Web-Client users in a particular browser.
11. By default, the Web-Client displays time in the 24-hour format and date in the DD-MM-YYYY format. If you want the time to be displayed in the 12-hour format and the date to be displayed in the MM-DD-YYYY format, enable the **Use 12 hour time format** parameter (**10**). This setting is common to all Web-Client users in a particular browser.
12. If you can view the interactive map in the Web-Client, the names of all camera markers added to the map are displayed by default. To disable the display of marker names on the interactive map, disable the **Show marker names** parameter (**11**). This setting is common to all Web-Client users in a particular browser.
13. By default, in the Web-Client, the size of the surveillance windows in the layout is proportional to the resolution of the video image. To ensure that the video image takes up the entire space of the surveillance window, disable the **Keep aspect ratio** (**12**) parameter. As a result, the video image will be stretched over the entire surveillance window. This setting is common to all Web-Client users in a particular browser.
14. Click the  button.

Configuring the Web-Client is complete.

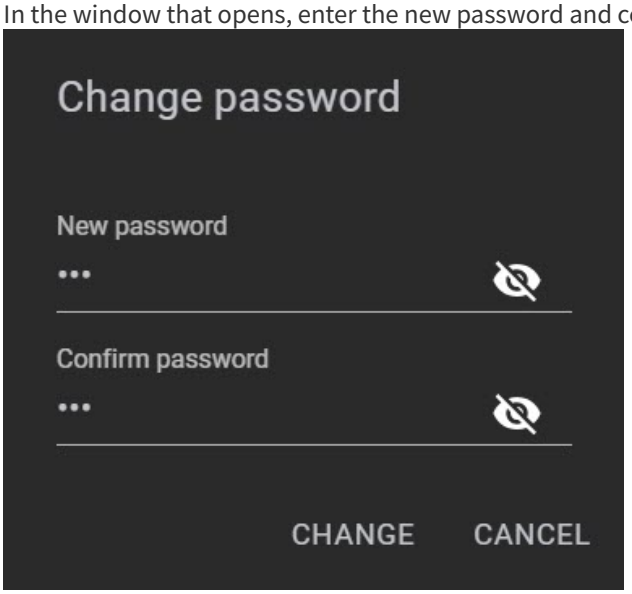
20.11.5.1 Changing the user password in the Web-Client

To change the user password in the Web-Client, do the following:

1. Click the  button in the top right corner and then click the  button.



2. In the window that opens, enter the new password and confirm the new password.

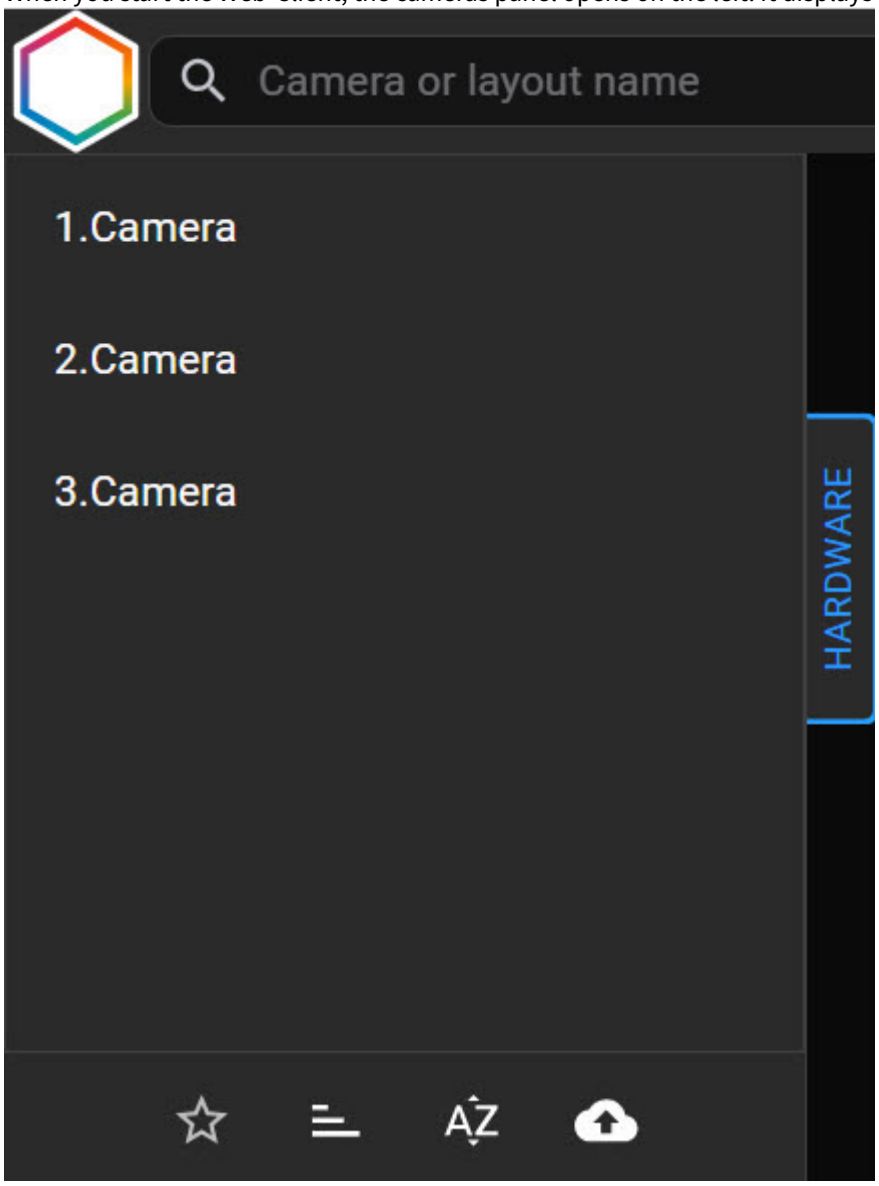


3. Click the **Change** button.

Changing the user password in the Web-Client is complete.

20.11.6 Searching for video cameras in the Web-Client

When you start the Web-Client, the cameras panel opens on the left. It displays the list of all available devices.



By default, the panel displays all available cameras. You can also create a list of the favorite cameras. To do this, do the following:

1. Point the mouse cursor to the camera.
2. Click the  button to add the camera to the list. The asterisk becomes filled  . Another click on the asterisk excludes the camera from the list.

> **Attention!**
>
> The list of the favorite cameras is common for all Web-Client users in a particular browser.

Click the **Favorites** button at the bottom of the panel to display the favorite cameras only. Click the same button again to display all available cameras.

Additionally, it is possible to make favorite the cameras from the pre-prepared list in Excel format. To do this, do the following:

1. Create an Excel file containing two columns: the **id** column for camera IDs and the **name** column for camera names.

	A	B
1	id	name
2	8	Camera1
3	9	Camera2

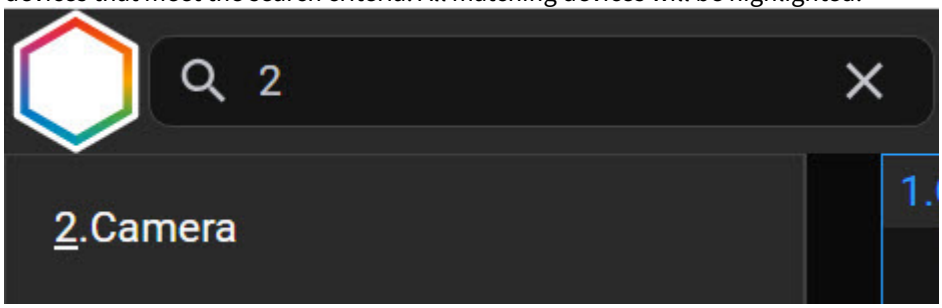
2. Click the  button and select the file.

Attention!

After downloading the file, only the cameras listed in the file will become favorite.

Click the  button to sort the cameras on the panel by ID, or click the  button to sort the cameras by name.

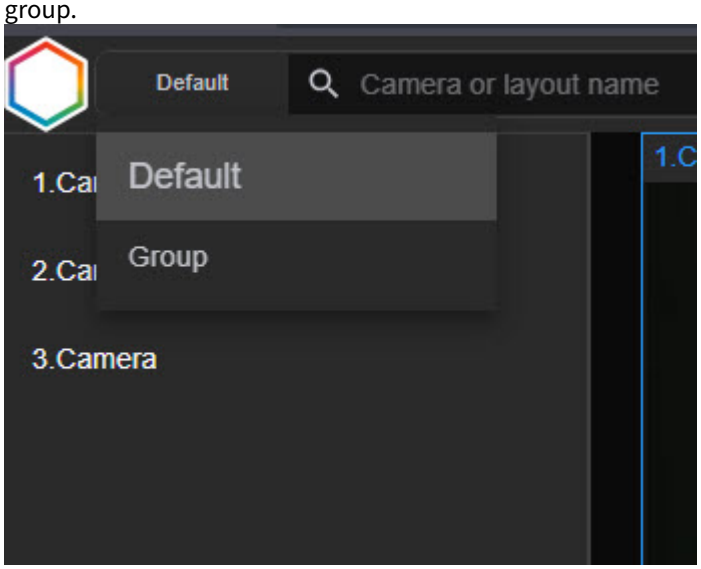
To search for a camera, enter the full or partial device name in the **Camera name** field. The cameras panel will display only the devices that meet the search criteria. All matching devices will be highlighted.



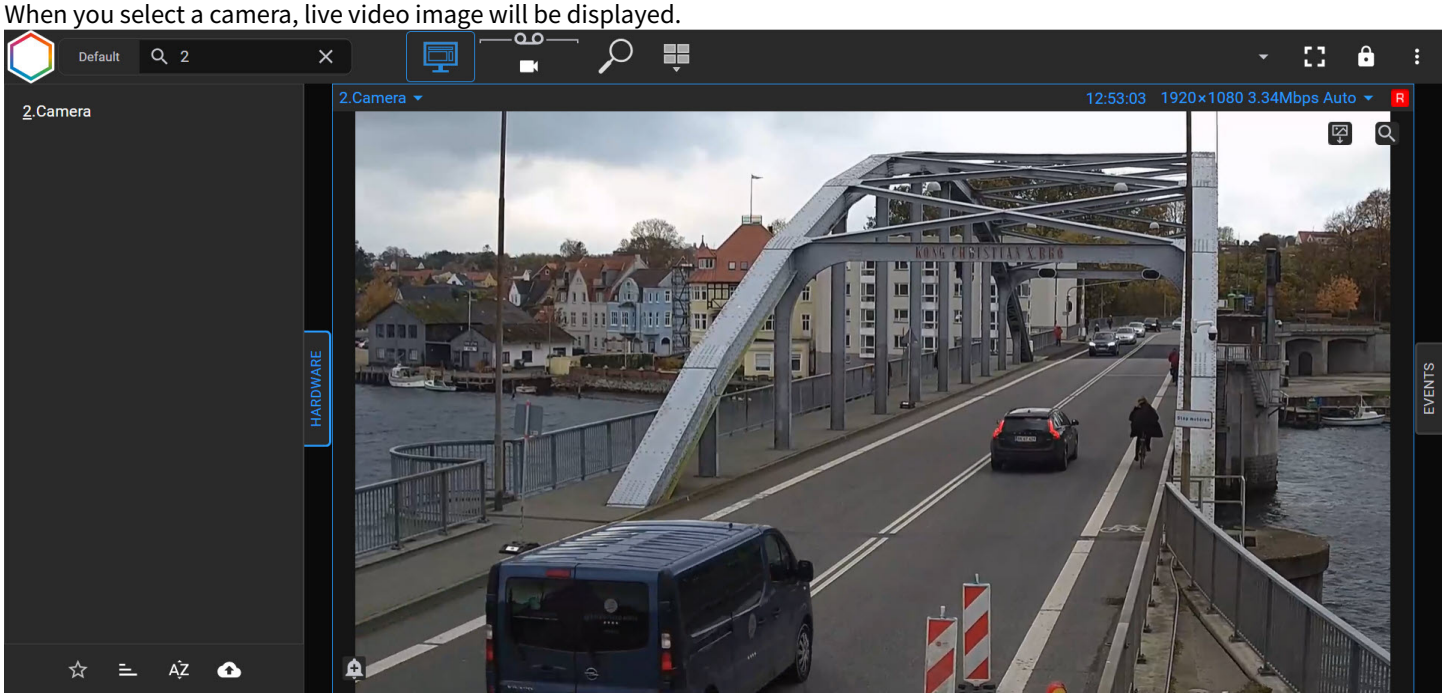
Note

- The search result includes both the list of cameras and the list of layouts.
- When you add new cameras to the Server configuration, they appear in the Web-Client dynamically without page reload.

To display a camera group (see Configuring video camera groups(see page 265)), click the **Default** button and select the required group.



When you select a camera, live video image will be displayed.



Each surveillance window in the upper right corner contains:

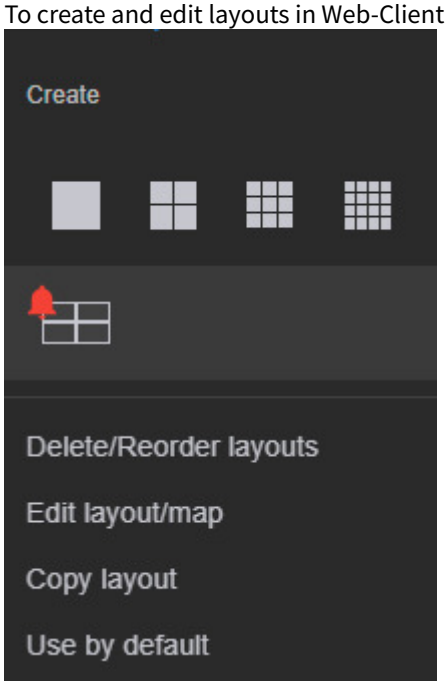
- time display (see Time display(see page 1113) in the main Client);
- video stream parameters;
- archive recording indicator.

20.11.7 Working with layouts in Web-Client

20.11.7.1 Summary of how to work with layouts in Web-Client

Configuring layouts(see page 942)

To create and edit layouts in Web-Client click  to access the corresponding menu.



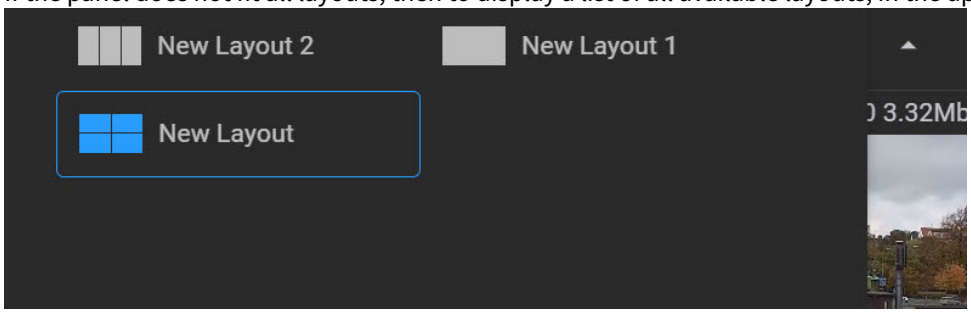
There are a number of things you need to consider when dealing with layouts in Web-Client:

1. In Web-Client, you cannot edit/share/delete layouts created in the main Client. You can only copy layouts or use them by default.
2. Layouts created in Web-Client will not be available in the main Client.

20.11.7.2 Selecting and searching for a layout

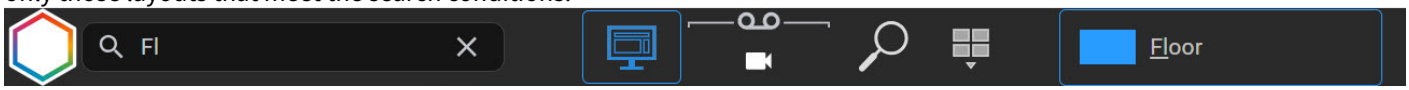
To go to the layout, click it on the panel.

If the panel does not fit all layouts, then to display a list of all available layouts, in the upper right corner click  .



To close the layout list, you need to press a button  .

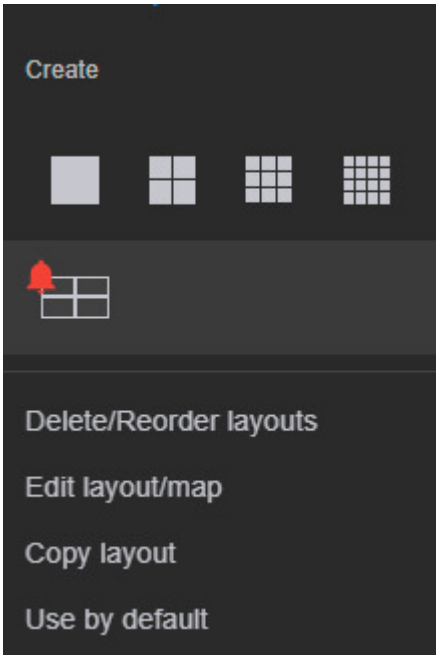
You can also search layouts in the search bar for video cameras. To do this, enter the layout name in part or in full. This will show only those layouts that meet the search conditions.



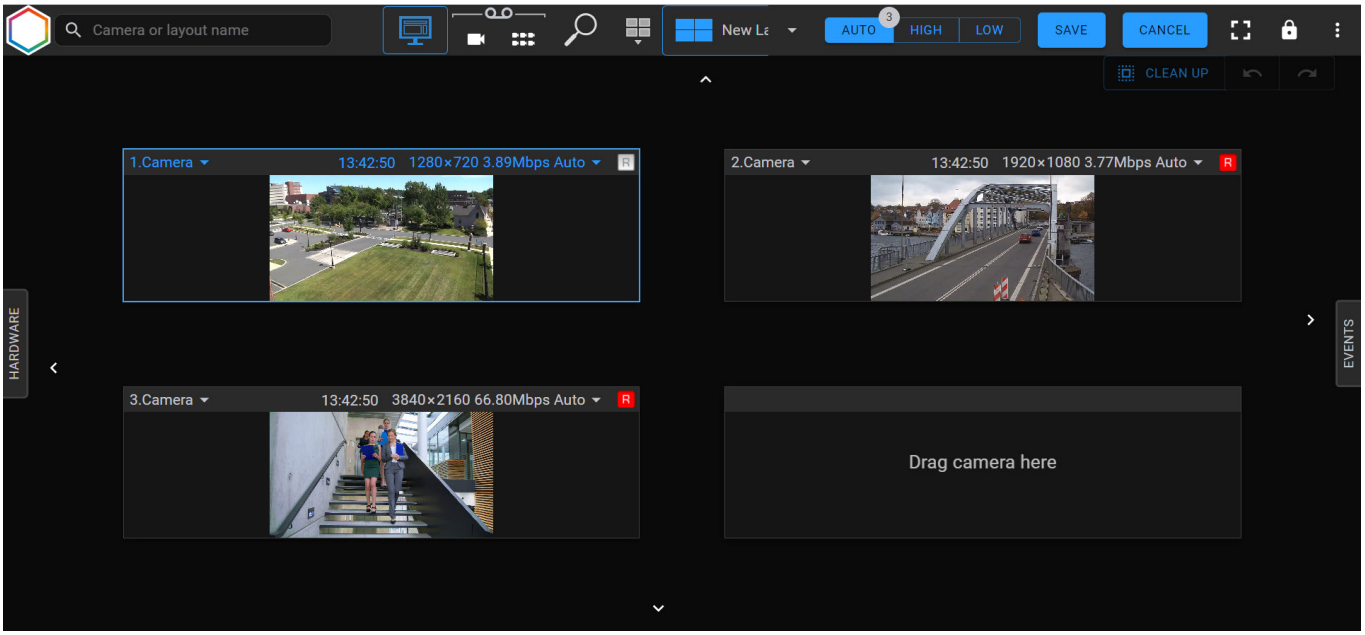
20.11.7.3 Creating a new layout in the Web-Client

To create a new layout in the Web-Client, do as follows:

1. Click the  button and select one of the standard layout types.



A layout will be created, displaying the video images from the cameras in real time from the list of the Cameras panel.

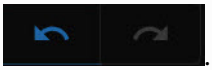


By default, the layouts display only active cameras. If you want the layout to display all available cameras, including inactive, disable the **Show only live cameras** parameter in the Web-Client settings (see Web-Client configuration(see page 1330)).

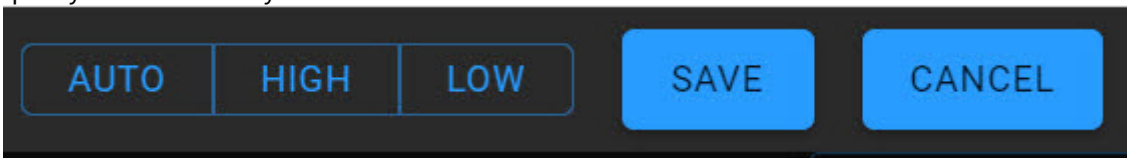
After this, in the **Hardware** panel, video cameras will be highlighted in the following colors:

- white if they are active;
- orange if they are inactive (turned off in the *Axxon One* configuration);
- red if they are active, but with no signal.

2. You can add new columns or rows of cells using arrows on the layout boundaries (similar to the main Client, see Adding new cells to a layout(see page 946)).

> **Note**
>
> - To delete a column or a row of empty cells, click the **Clean Up** button.
> - When editing a layout, the buttons to undo and redo the last action are available  .

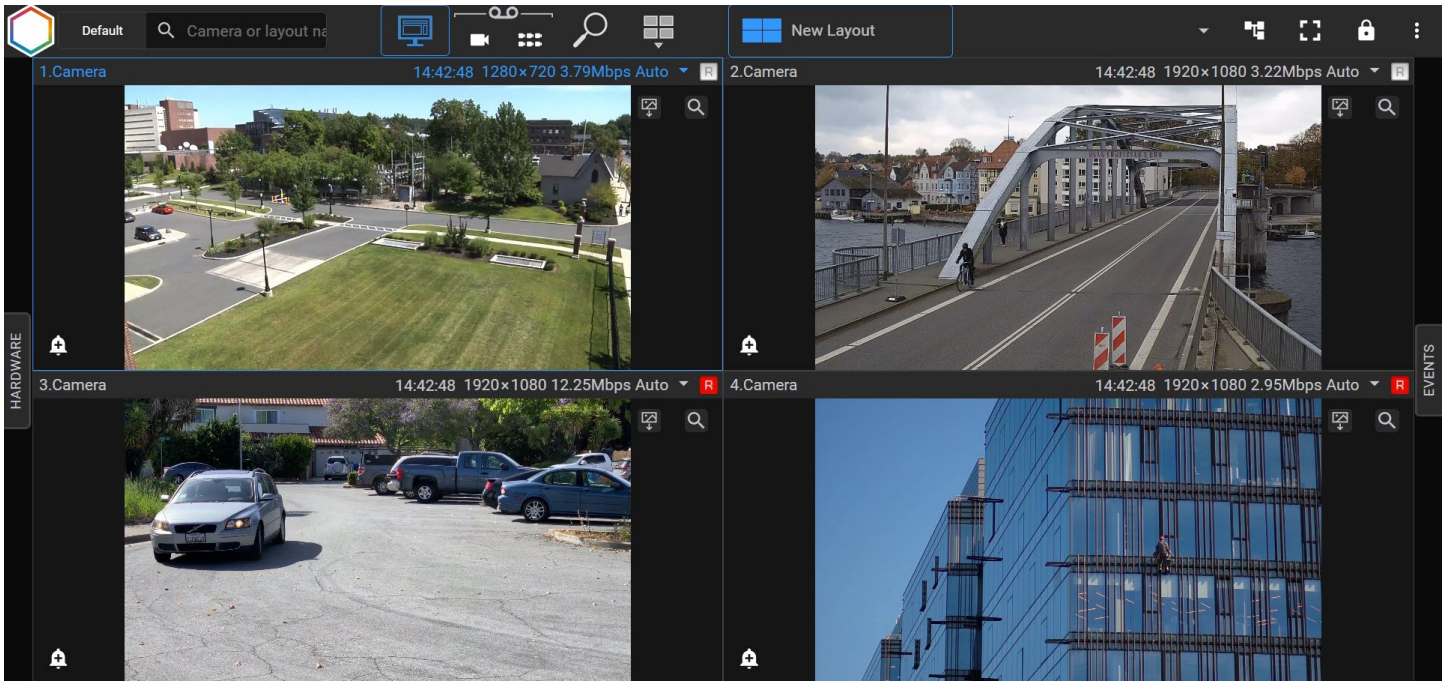
3. You can resize the cells using arrows on the cell boundaries (similar to the main Client, see Resizing cells(see page 949)).
4. Add video cameras to the cells. To do this, drag & drop a camera from the Cameras panel (see Searching for video cameras in the Web-Client(see page 1334)).
5. Select the default stream for each video camera from the **Quality** list. Use the buttons at the top of the screen to select quality for all camera layouts.



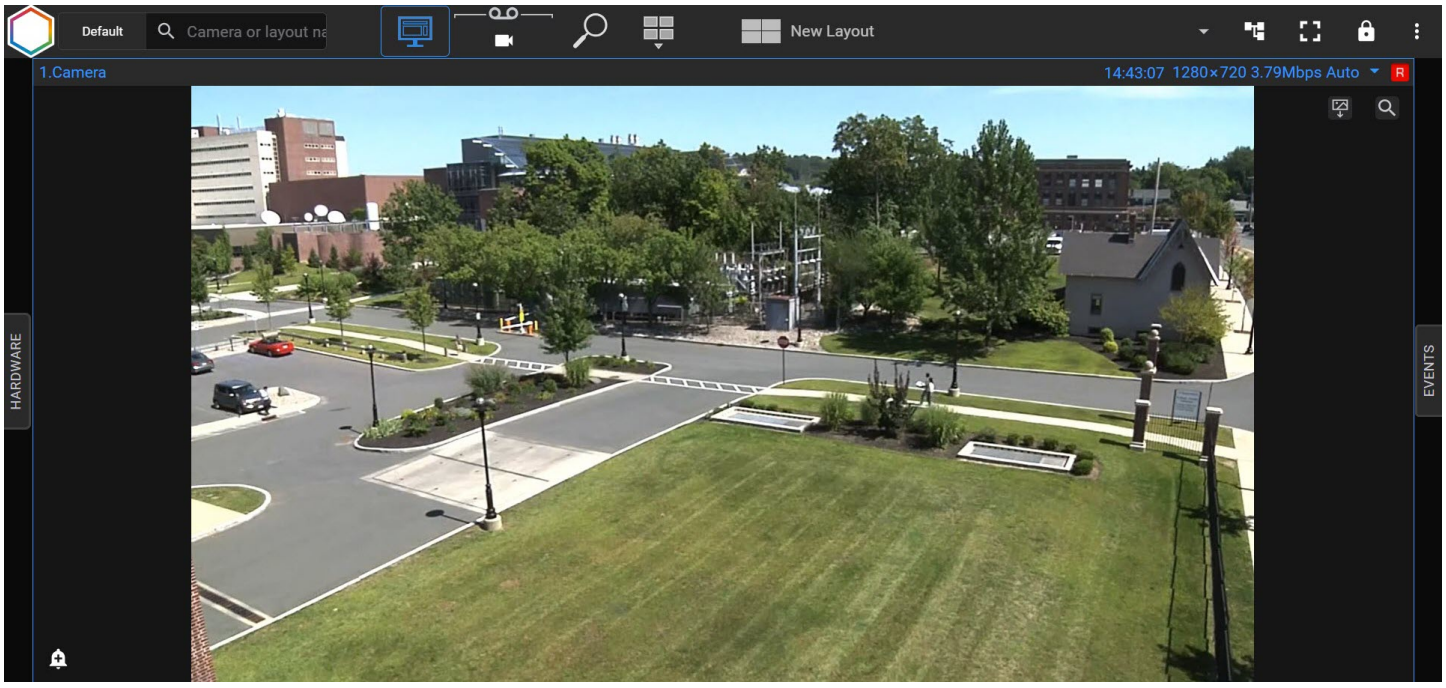
> **Note**
>
> The numbers above the quality buttons indicate the number of video streams of a certain quality.
>
> 
>
>
> In this example, there are three **Surveillance windows** on the layout: the stream quality is automatically selected in two windows (see Selecting video stream quality in a Surveillance window (GreenStream)(see page 1161)), one window displays a high-quality video stream, and another window displays a low-quality video stream.

6. Click the **Save** button. To undo the layout creation, click the **Cancel** button.

The layout is created.



Double left-click the **Surveillance window** to open a temporary layout with this **Surveillance window**:



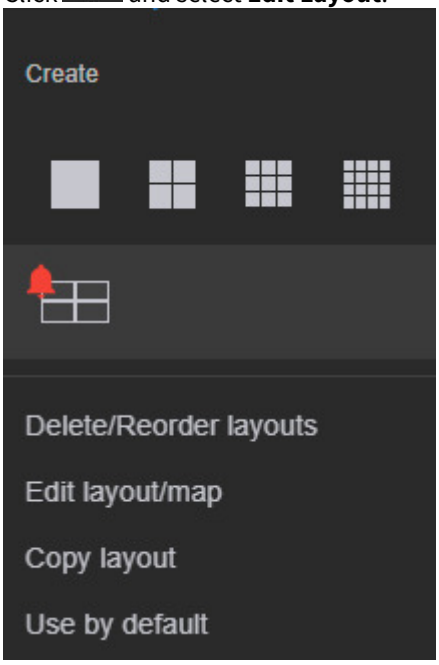
To return to the original view of the layout, double-click the **Surveillance window** again.

20.11.7.4 Editing and deleting layouts in Web-Client

To edit a layout in Web-Client, do as follows:

1. Select the layout.

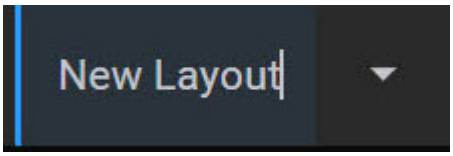
2. Click  and select **Edit Layout**.



3. Make changes.
4. Click **Save**.

To rename a layout, do as follows:

1. Double left-click and enter a new name.



2. Click **Save**.

To rearrange the layouts, do as follows:

1. Click  and select **Delete/Reorder Layouts**.
2. Drag & drop layouts wherever you want.
3. Click **Save**.

To delete a layout, do as follows:

1. Click  and select **Delete/Reorder Layouts**.
2. Click to the right of the layout  .

20.11.7.5 Selecting the default layout in Web-Client

You can select the default layout for each user to be displayed after they launch Web-Client. If you don't set this layout, they'll see a blank screen.

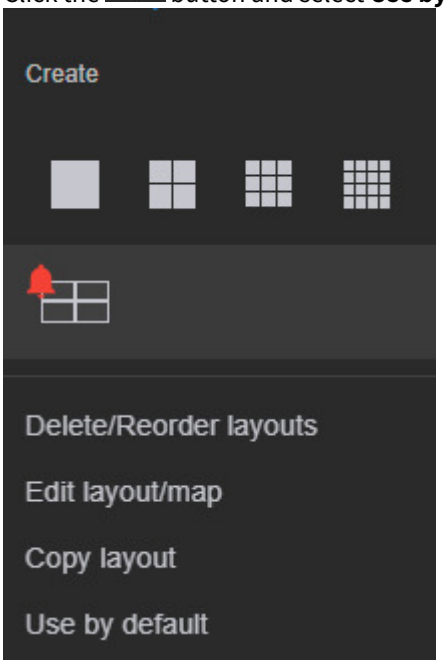
If no layouts have been created before, the video cameras panel opens on the left and displays the video image from the first video camera in order.

If some layouts have been created previously, the first layout in order will be displayed by default.

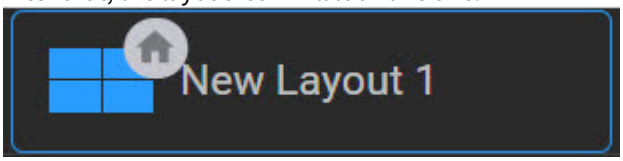
To set the default layout, do as follows:

1. Go to the required layout.

2. Click the button and select **Use by default.**



After that, the layout icon will look like this:



To remove the default layout, click the button and select **Do not use by default**.

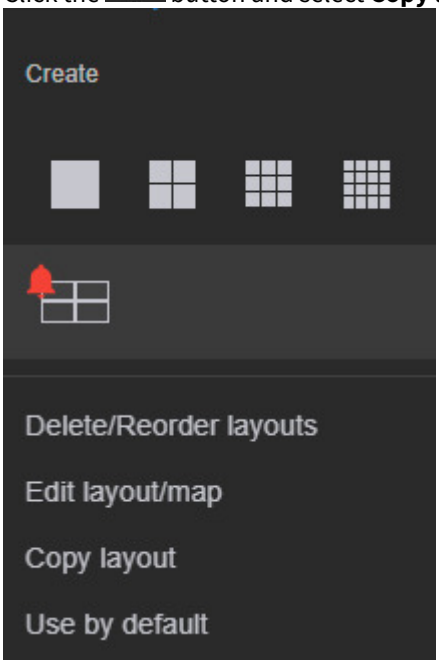
20.11.7.6 Copying layouts in the Web-Client

Layout copying(see page 944)

To copy a layout in the Web-Client, do the following:

1. Select the layout.

2. Click the button and select **Copy layout**.



3. If necessary, you can make changes to the layout.
4. Click the **Save** button.

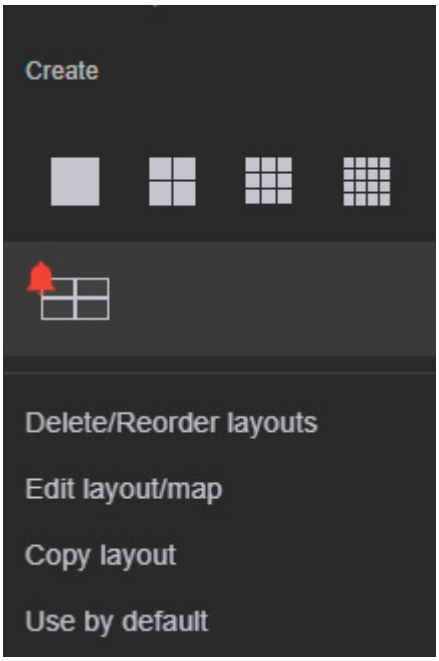
An identical layout will be created with the word "Copy" added to its name. All subsequent copies will have a copy number added to the name of the layout.

20.11.7.7 Sharing layouts in the Web-Client

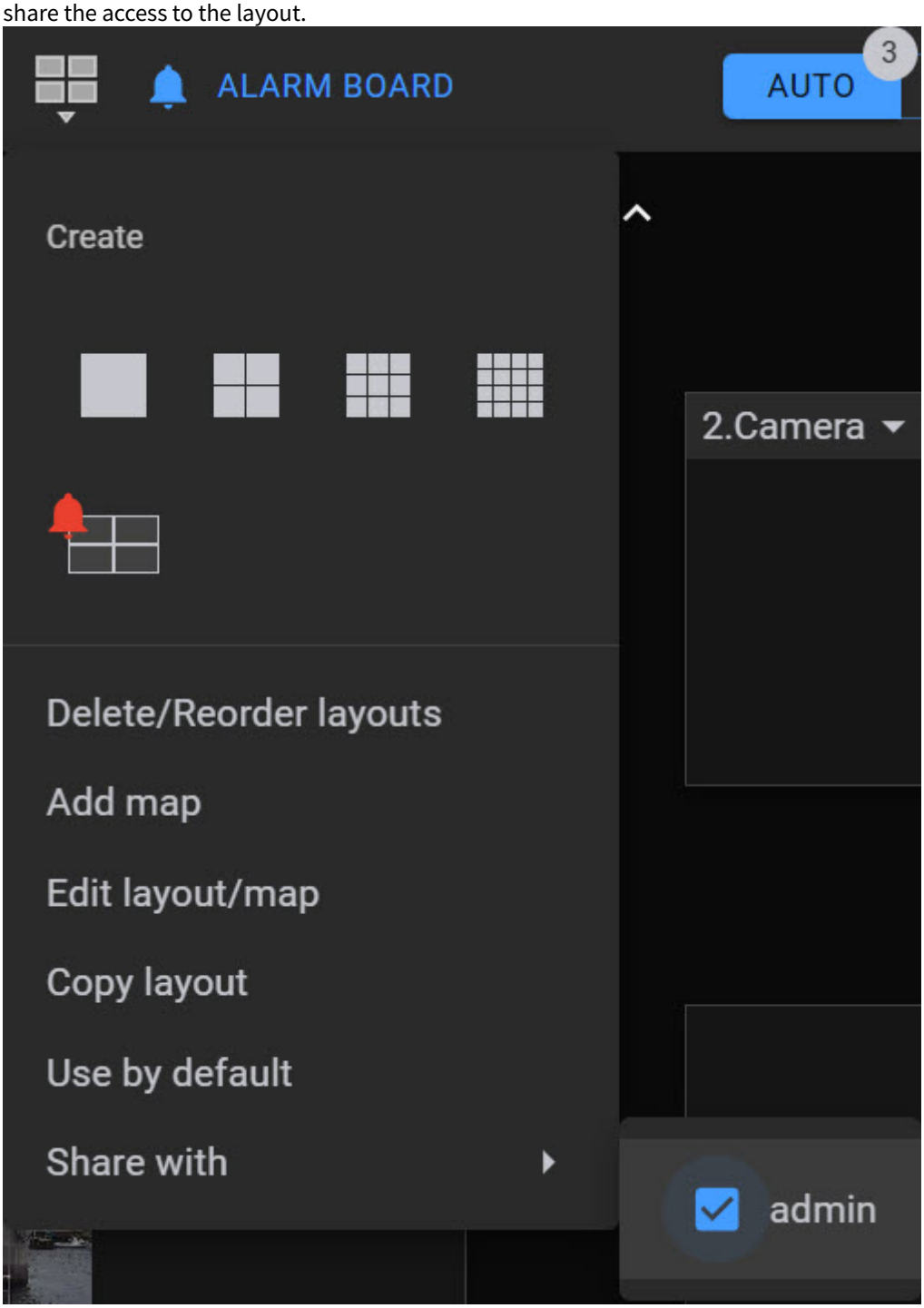
Share layouts(see page 972)

To share a layout in the Web-Client, do the following:

1. Select a layout.
2. Click the button and select **Edit layout**.

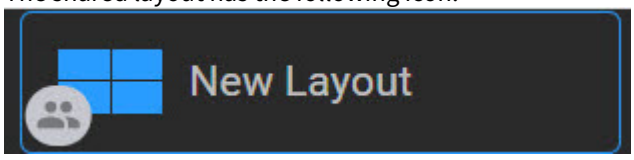


3. Click the button, and in the **Share with** menu item, select one or several roles with the users of whom you want to share the access to the layout.



4. Click **Save**.

The shared layout has the following icon:



Note

Only the user who created the layout can completely delete it in the Web-Client (see Editing and deleting layouts in Web-Client(see page 1339)). If the layout was deleted by a user with whom the access to the layout was shared, the layout will be deleted only for this user.
After the layout is deleted, it will become unavailable to all users. If this layout was opened on the monitor of the user with whom the access to the layout was shared, then it will be available until the browser page is reloaded.

20.11.7.8 Creating a temporary layout in the Web-Client

Using the Web-Client, you can create and open temporary layouts with cameras via the browser address bar. To do this, you can use the following query:

```
http://<server IP>/?cams=CAM_1,...,CAM_N&[mode=live|arch|search]&[hideTopBar=true|
false]&[resolution=0,1,auto]
```

Parameter name	Required	Description
server IP	Yes	Server IP address
cams		Name of the camera that is present on the layout
mode	No	Layout view mode: • **live**—real time mode (default); • **arch**—archive mode; • **search**—search mode
hideTopBar		Top panel of the Web-Client: • **true**—hidden; • **false**—displayed
resolution		Videostream: • **0**—high quality; • **1**—low quality; • **auto**—auto (GreenStream, used by default)

An example request for creating and opening a temporary layout with two cameras in real time without displaying the top panel:

```
http://127.0.0.1/?mode=live&hideTopBar=true&cams=hosts/DESKTOP-O123/DeviceIpint.1/
SourceEndpoint.video:0:0,hosts/DESKTOP-O123/DeviceIpint.2/SourceEndpoint.video:0:0
```

An example request for creating and opening a temporary layout with three cameras in real time, where:

- the first camera has a high quality video stream;
- the second camera has an auto video stream;
- the third camera has a low quality video stream.

```
http://127.0.0.1/?mode=live&hideTopBar=false&cams=hosts/DESKTOP-O123/DeviceIpint.1/
SourceEndpoint.video:0:0,hosts/DESKTOP-O123/DeviceIpint.2/SourceEndpoint.video:0:0,hosts/
DESKTOP-O123/DeviceIpint.3/SourceEndpoint.video:0:0&resolution=0,auto,1
```

You can also create and open a layout via the *AxxonNet* service. To do this, it is necessary to first connect the *Axxon One* domain to *AxxonNet* (see Configuring a domain in AxxonNet[405]):

```
https://<webClientURL in cloud>/?authToken=<accessToken>&cams=CAM_1,...,CAM_N&[mode=live|arch|search]&[hideTopBar=true|false]
```

Parameter name	Required	Description
webClientURL in cloud	Yes	Web-Client URL in the cloud service. To get the Web-Client URL, do the following: 1. Using the browser, open the Web-Client in *AxxonNet*. 2. Press the F12 key to open the developer console. 3. In the developer console, open the **Network** tab → **groups** → **Response**. 4. Find the **webClientURL** field. 5. Copy Web-Client URL
authToken		Authorization token. This parameter specifies the access token URL. To get the token, do the following: 1. Using the browser, open the Web-Client in *AxxonNet*. 2. Press the F12 key to open the developer console. 3. In the developer console, open the **Application** tab → **Storage** → **Local storage** → https://axxonnet.com/. 4. Find the **accessToken** key. 5. Copy the key value

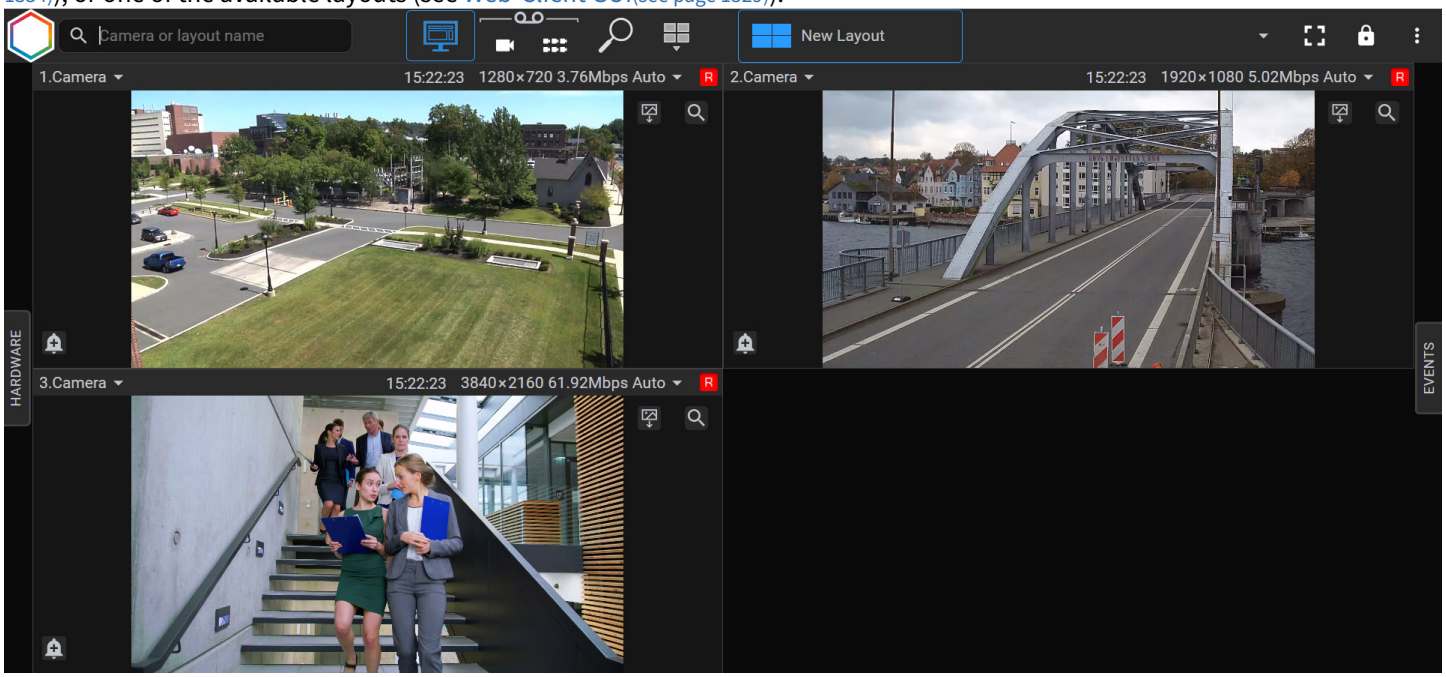
An example of creating and opening a layout via *AxxonNet* with two cameras in the archive mode:

```
https://axxonnet.com/minio/35436_0_co1ri88u45045635cs5g/webclient/?mode=arch&cams=hosts/DESKTOP-O123/DeviceIpint.1/SourceEndpoint.video:0:0,hosts/DESKTOP-0OFNEM9/DeviceIpint.2/SourceEndpoint.video:0:0&authToken=eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJVc2VySUQiOjIxNTI1LCJVc2VyTmFtZSI6ImFsZXhmb25vdjUwQGdtYWlsLmNvbSIsIkNsaWVudElEIjoiY2M5YjQ4MzQwOWZkNTdhMWVlNjA4ZjE5MWRiZDkxOWIiLCJUeXBlIjoiYWNjZXNzVG9rZW4iLCJWZXJzaW9uIjoidjIiLCJDcmVhdGVkQXQiOiIyMDI0LTAzLTI3VDEwOjQyOjM4LjIzMjMwOTc5N1oiLCJleHAiOjE3MTE2MjI1NTgsImlhdCI6MTcxMTUzNjE1OCwiaXNzIjoiQ2xvdWQifQ.Sl5uhUWB7FDc-EtgzPaOIU082iD2PCtROr9JhbEM7CQ
```

405 https://docs.axxonsoft.com/confluence/spaces/anet/pages/157697082/Configuring+a+domain+in+AxxonNet

20.11.8 Real-time video surveillance in the Web-Client

To view a video image, you should select either a camera on the panel (see Searching for video cameras in the Web-Client(see page 1334)), or one of the available layouts (see Web-Client GUI(see page 1329)).



The Web-Client supports video playback in the following video formats: MJPEG, H.264, H.265. All other formats are trans-coded to MJPEG on the Server.

Attention!

H.265 video playback is possible in the following browsers: Safari, Microsoft Edge with HEVC video extension[406] installed, Google Chrome version 107 and higher, if:

- hardware acceleration is enabled in the browser settings;
- the video card has hardware support for the H.265 codec.

You can playback a video in the Web-Client with two players: JPEG and MP4. If your browser supports the MP4 format, the MP4 player is used. Otherwise, your videos will be played back with the JPEG player.

Attention!

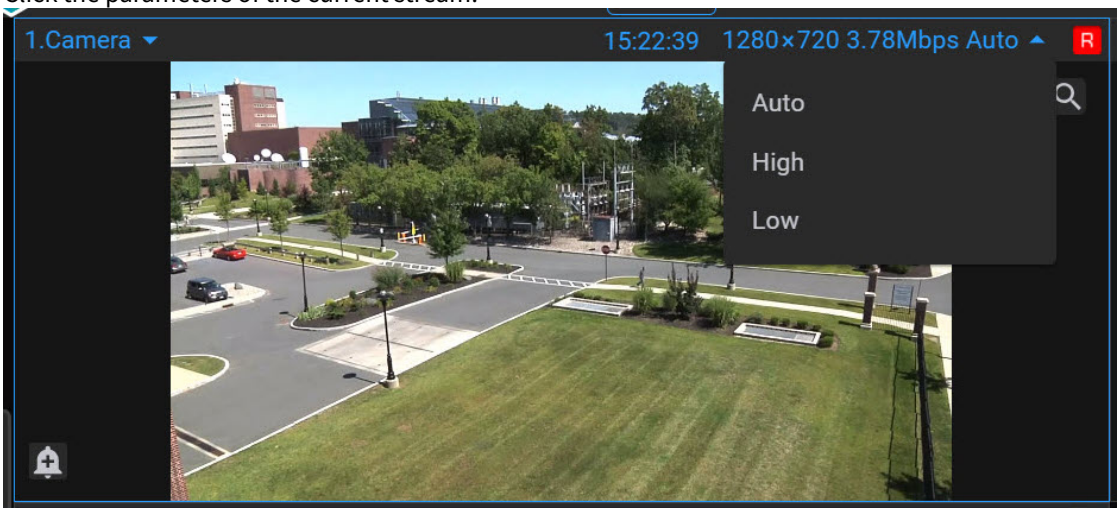
- If your layout contains several video cameras, only the key frames may be displayed in the H.264 format video cameras, depending on the settings (see Web-Client configuration(see page 1330)). If you select a specific camera, all frames will be displayed. In the MJPEG video format each frame is displayed.
- Video records containing b-frames will play choppy.

The Web-Client supports displaying panoramic views for fisheye video cameras. To enable such a display, select **Yes** for **Activate** parameter in **Panomorph** parameters group in the video camera settings in a common Client (see Configuring fisheye cameras(see page 183)).

To select a displayed stream in the Web-Client manually (see Camera(see page 171)), do the following:

406 https://apps.microsoft.com/store/detail/hevc-video-extensions/9NMZLZ57R3T7?hl=en-us&gl=us

1. Click the parameters of the current stream.



2. Select a stream to be displayed:

Menu item	Description
Auto (GreenStream, default)	If a stream was selected based on the maximum bitrate, then another stream will be selected only if its bitrate is more than 5% higher than the current one (in order to eliminate frequent switching if the indicators are approximately equal) (see Camera(see page 171)). When you enlarge the surveillance window, the video stream switches to a high quality video stream
High quality	A high quality video stream is used in the video surveillance window (see Camera(see page 171))
Low quality	A low-quality video stream is used in the video surveillance window (see Camera(see page 171)).

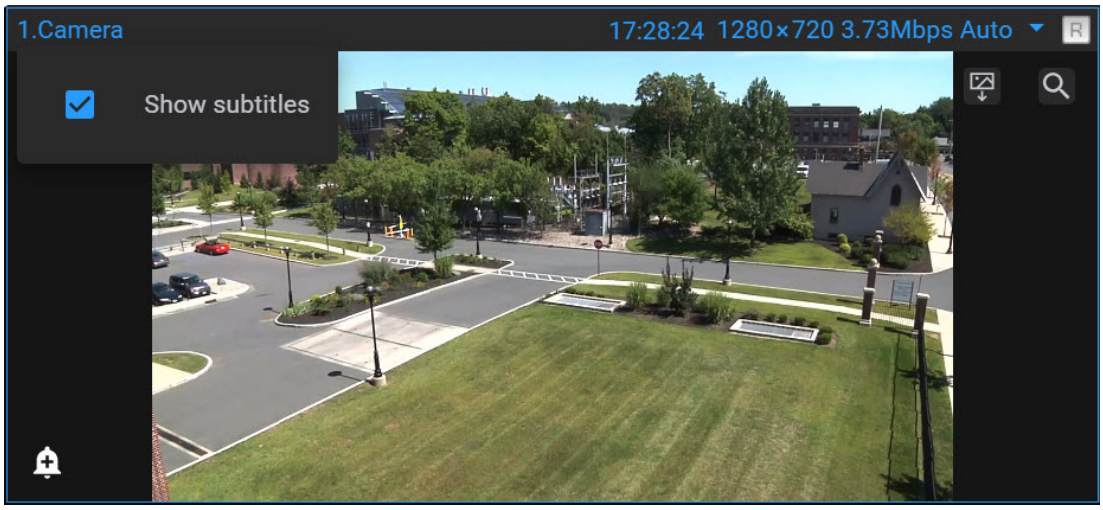
Note

A selected video stream is saved when switching between the layouts, but after the page reloads, the video stream that was specified when creating the layout will be automatically selected.

Click the button to open the window in full screen. To exit the full screen mode, click the button again, or press the **Esc** key.

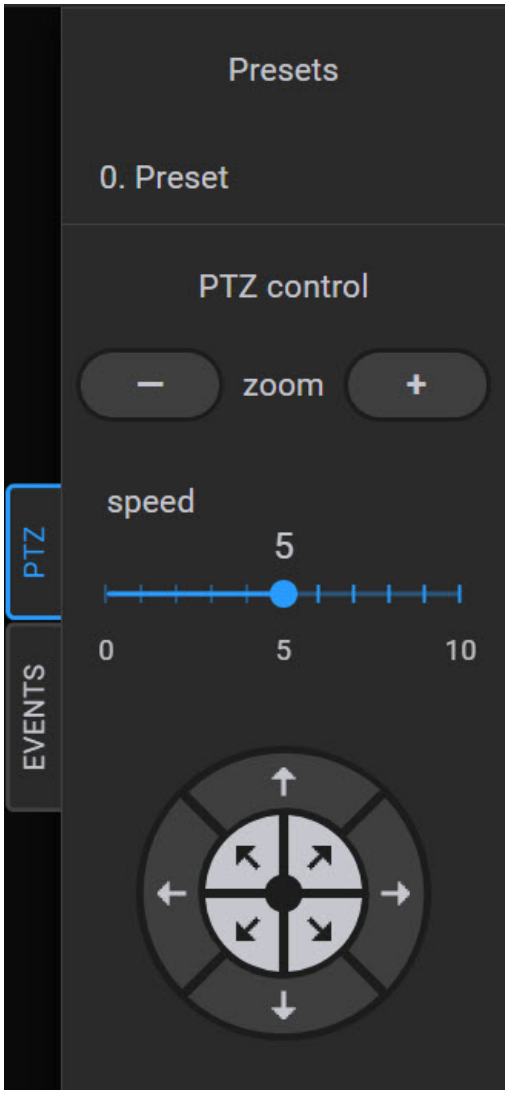
To open a temporary layout from a certain camera on the layout, double right-click the camera video image. To return to the layout, double-click the video image again.

You can enable the display of captions in the video camera viewing window. To do this, click on the name of the camera and set the **Show subtitles** checkbox.



20.11.9 Controlling PTZ cameras through the Web-Client

A PTZ video camera is controlled through the PTZ device control panel. To open the panel, click on the video surveillance window that contains a live video camera which supports a PTZ control interface. As a result, the **PTZ** tab will open on the right side panel. Clicking on the **PTZ** tab to control the PTZ camera.

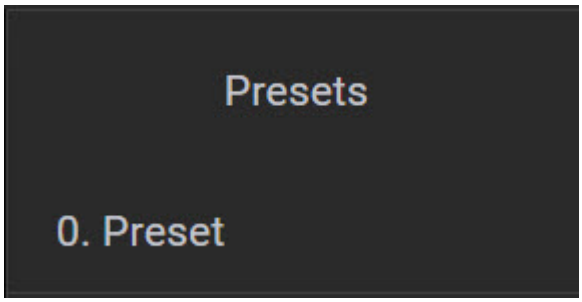


The following actions can be performed using the PTZ device control panel:

1. Use presets.
2. Adjust optical zoom and positioning speed of the video camera.
3. Modify the horizontal and vertical tilt angle of the video camera.

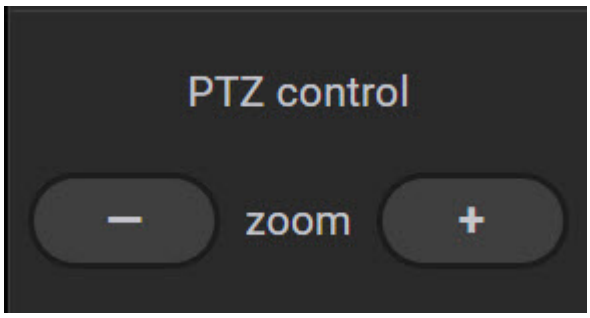
20.11.9.1 Controlling a PTZ camera through the Web-Client by using presets

To go to a preset, select the relevant item in the list of presets.



20.11.9.2 Changing the optical zoom of a PTZ camera in the Web-Client

You can change the optical zoom of the PTZ camera using the buttons of the **zoom** group.

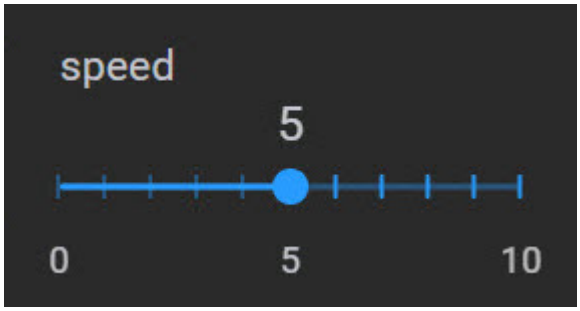


 —zoom in.

 —zoom out.

20.11.9.3 Changing the positioning speed of a PTZ camera in the Web-Client

You can change the positioning speed of a PTZ camera using the slider in the **speed** group.



Move the slider:

- to the right—to increase the positioning speed;
- to the left—to reduce the positioning speed;

The value of the current positioning speed is displayed above the slider.

20.11.9.4 Changing the tilt of a PTZ camera in the Web-Client

You can change the tilt of a PTZ camera using the arrows in the **PTZ control** group.



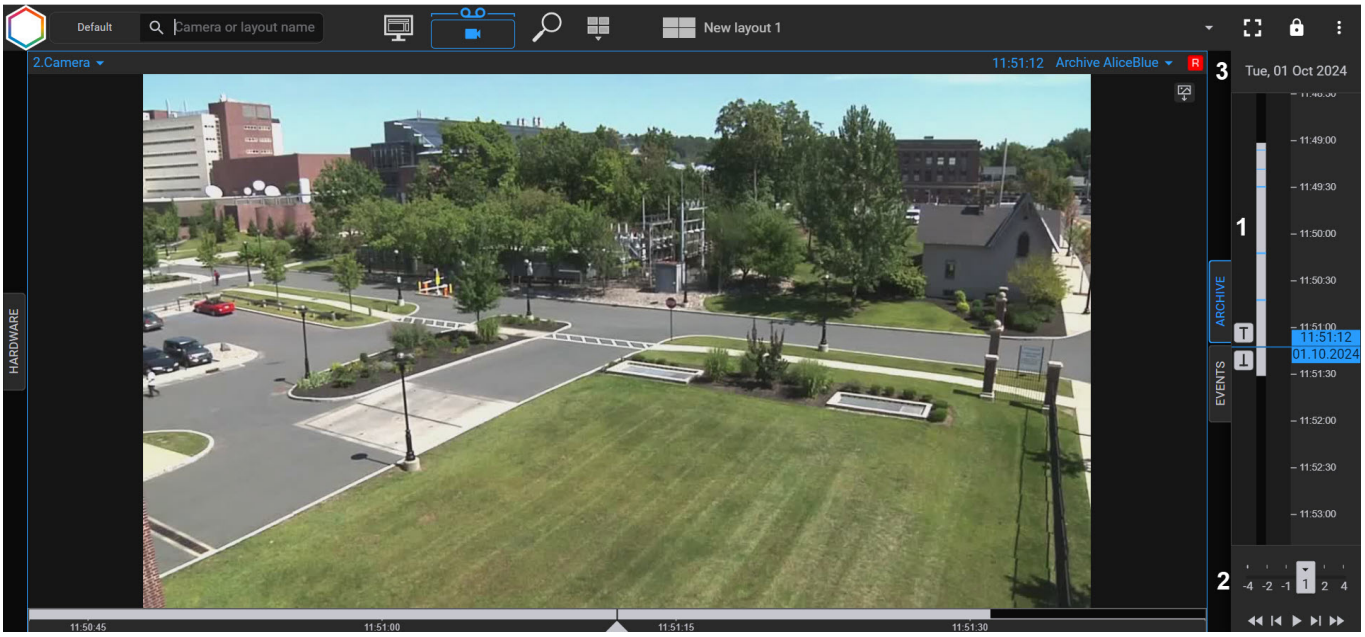
The arrow direction indicates the direction in which the camera lens will be moved when the arrow is clicked.

20.11.10 Viewing video archives through the Web-Client

20.11.10.1 **Single-camera archive view mode**

To view a single camera archive, do the following:

1. Select the required camera on the cameras panel or on the layout.
2. Click the  button.



> **Note**
>
> By default, the archive that is set as a default archive opens (see Configuring the default archive(see page 297)).

3. The archive panel is displayed with the following interface elements:

a. Timeline (**1**). Archive navigation using the timeline in the Web-Client is similar to the video surveillance in the *Axxon One* Client (see Navigating using the Timeline(see page 1196)).

> **Note**
>
> Similar to the Client (see The Timeline(see page 1122)), alarm flags and comment icons are displayed on the timeline.

b. Playback control panel (**2**). The following operations are available for navigating in the archive using the playback panel in the Web-Client:

 —recording playback;

 —stop recording playback;

 —jump to the previous frame;

 —jump to the next frame;

 —jump to the previous recording;

 —jump to the next recording;

The playback can be fast. You can also change the playback direction (forward/reverse) by dragging the slider on the panel or by clicking the digits. The digits indicate a fold increase of the playback speed. Minus indicates the reverse playback.

Example of a forward playback with two-fold increase in playback speed:



Example of a reverse playback with two-fold increase in playback speed:

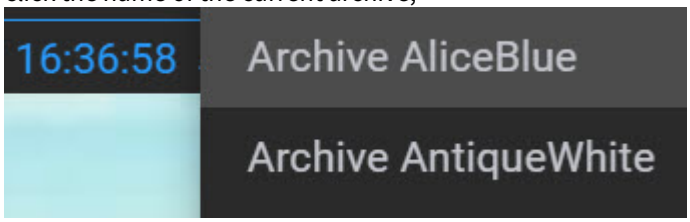


> **Attention!**
>
> - Reverse fast-forward playback of H.264 video is based on key frames, so it isn't smooth.
> - Audio is unavailable during fast forward and reverse playback of the archive video.

c. Archive position selection panel (**3**). The archive position selection panel is opened by left-clicking the date above the timeline (see Archive position selection panel for the Web-Client(see page 1353)).

> **Note**
>
> You can also navigate in the archive using the time indicator similar to the Client (see Navigating using the time indicator(see page 1201)).

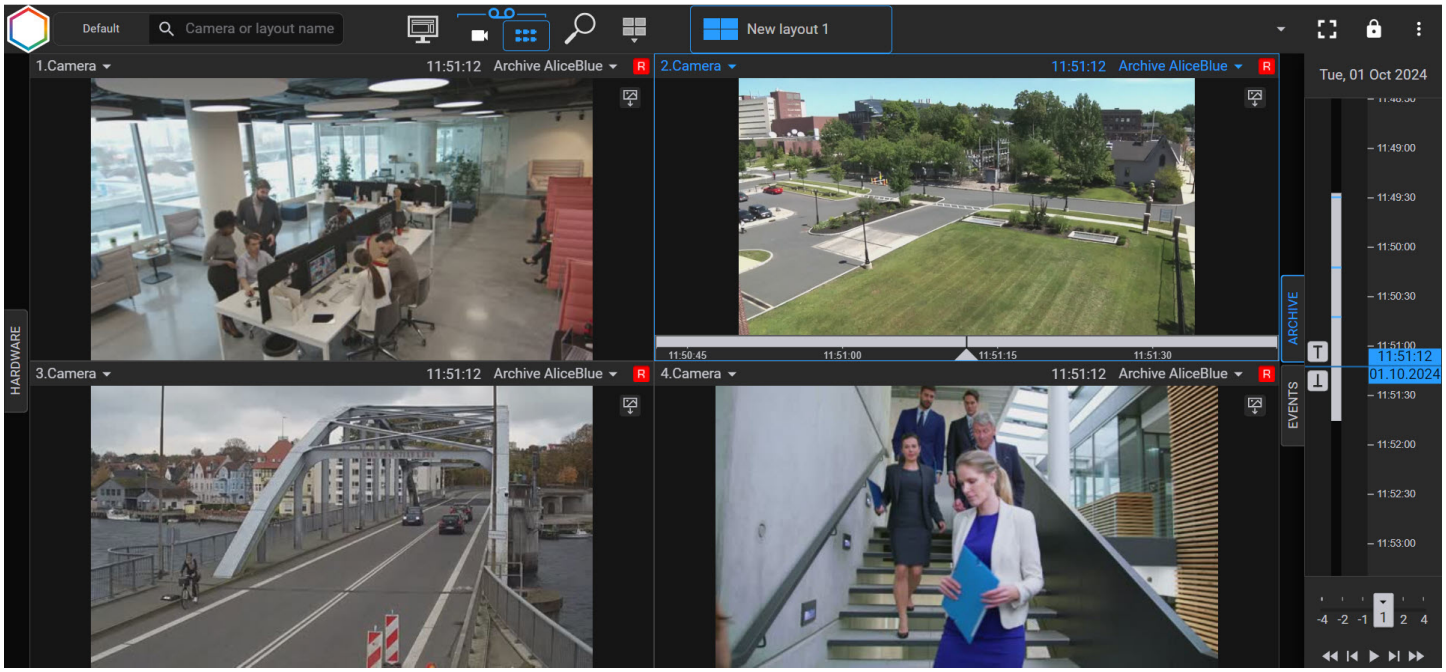
4. To select an archive, do the following:
   a. click the name of the current archive;



   b. select the required archive.

20.11.10.2 **Multi-camera archive view mode**

You can switch all cameras on the layout to the archive mode. To do this, click the  button.

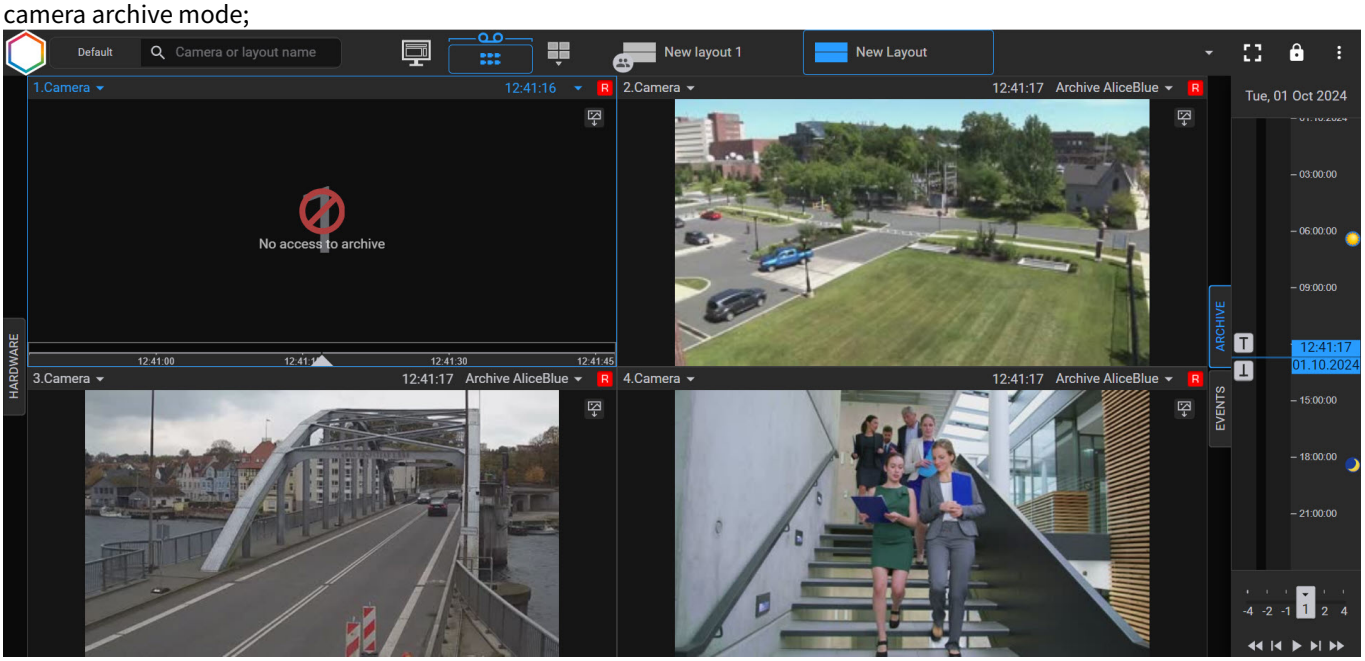


You can control the archive viewing using the playback control panel, the same as when viewing the archive of a single video camera.

When all cameras on the layout are in the archive mode, there is no audio playback. To playback the audio, you need to go to the archive of a single camera.

Access to viewing the archive of a camera depends on the settings of user access permissions to the camera (see Roles(see page 920)). If the user permissions are limited, then:

- if there are several cameras with limited access to the archive on the layout, you can view the archive only in the multi-camera archive mode;
- if you click a camera with limited access to the archive in the multi-camera archive mode, you don't go to the single-camera archive mode;

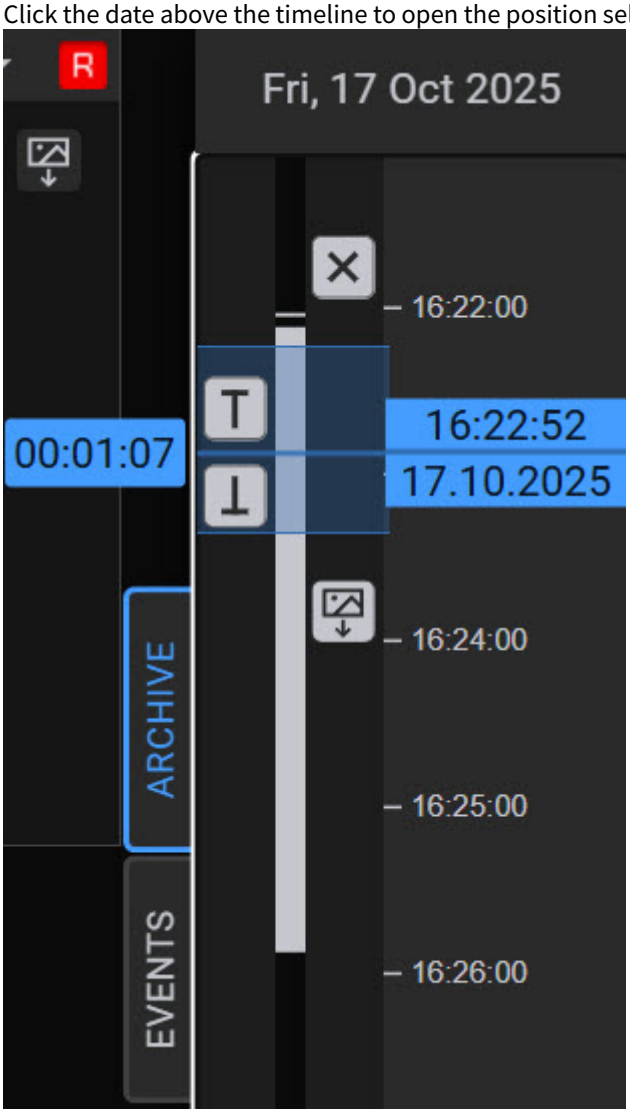


- if there is only one camera with limited access to the archive on the layout, the buttons for changing the mode (archive, search) aren't displayed;
- if the user is already in the archive mode or in the search in a single camera mode, and selects a camera with limited access to the archive, the user automatically goes to the live view mode for this camera, and the archive/search buttons aren't displayed.

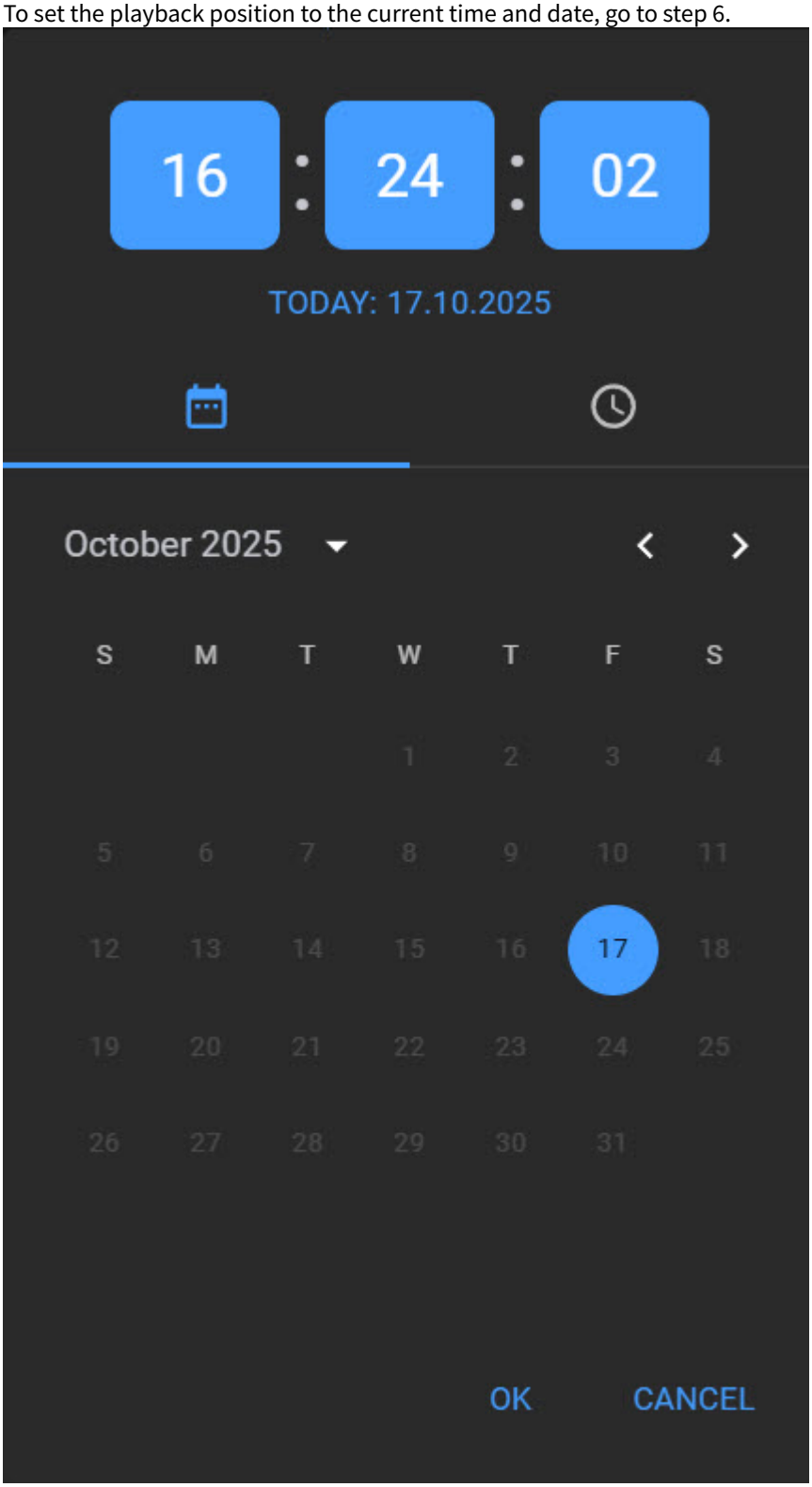
20.11.11 Archive position selection panel for the Web-Client

To choose a time position in the archive by using the archive position selection panel:

1. Click the date above the timeline to open the position selection panel.



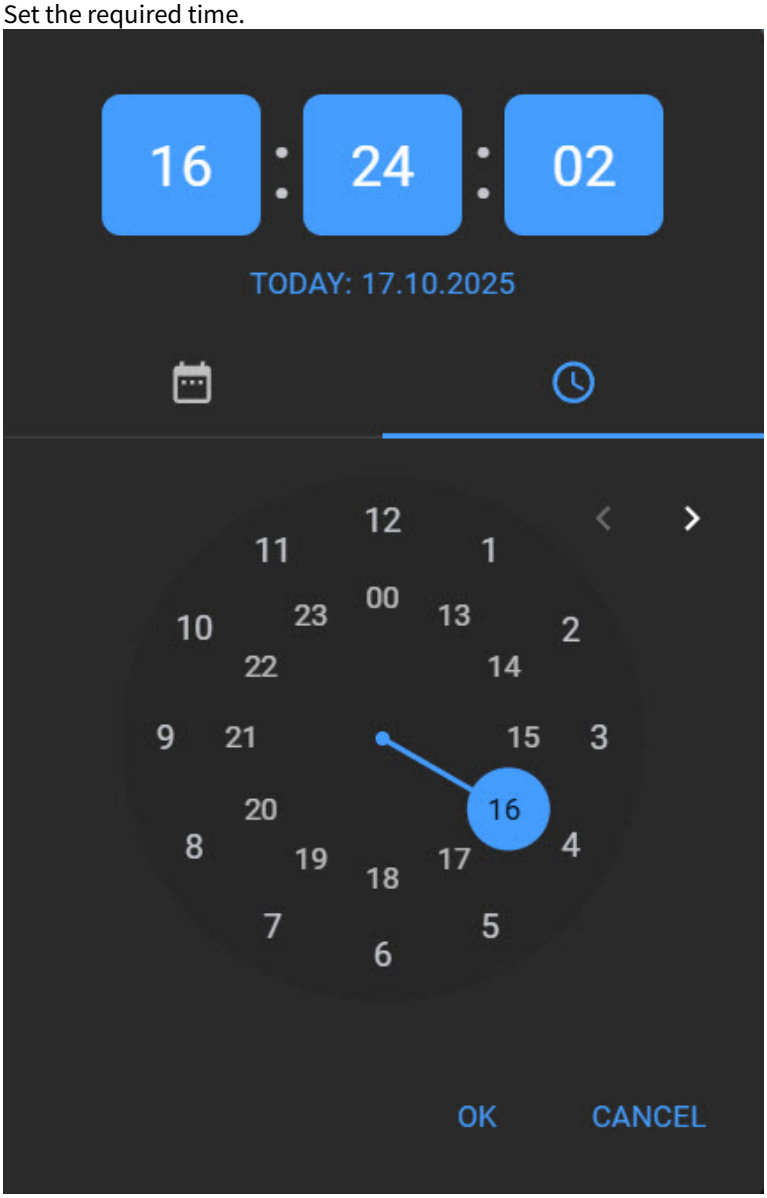
2. To set the playback position to the current time and date, go to step 6.

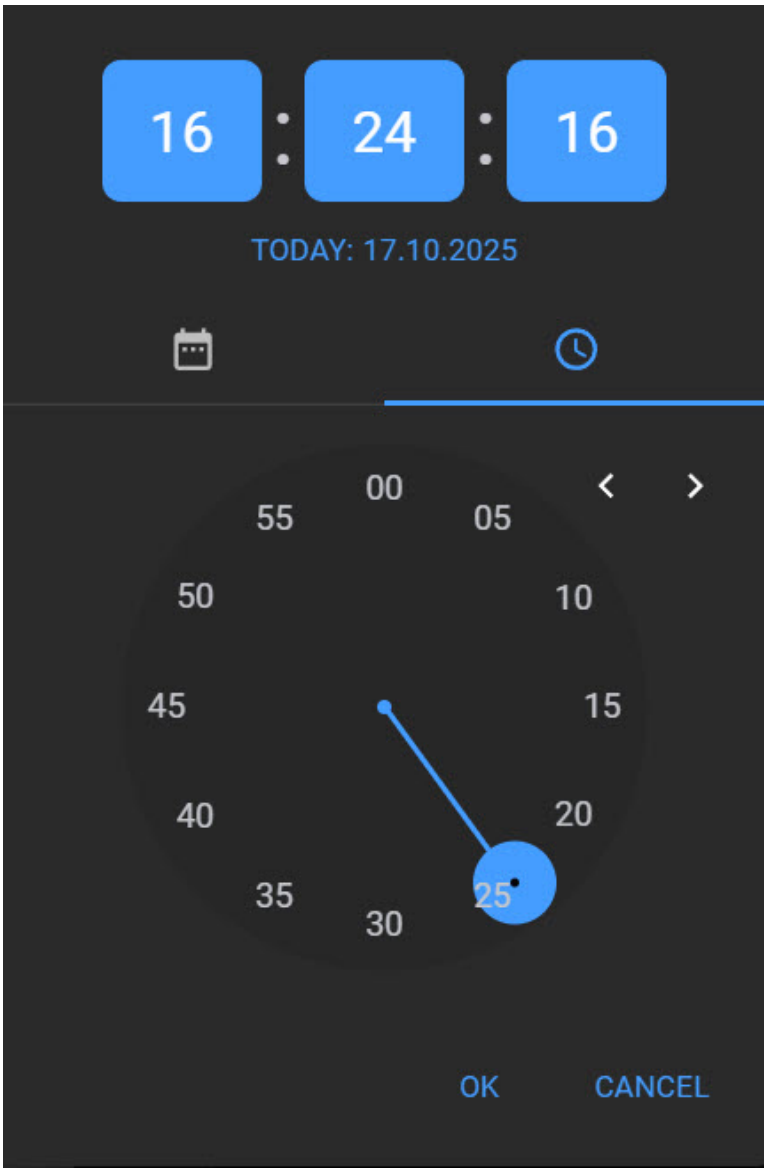


3. Use the and buttons to select a month.
4. Click the necessary date on the calendar to select a day.

> **Note**
>
> The days, for which there is video footage are in light shade.

5. Set the required time.





6. To set the playback position, click the **OK** button.

The time position in the archive is now chosen.

20.11.12 Archive search in the Web-Client

On the page:

- Standard search(see page 1357)
- Fast search(see page 1357)
- Working with search results(see page 1358)
- What to do when you change cameras(see page 1359)

There are two ways to search in the archive in the Web-Client:

- standard search;

- fast search.

20.11.12.1 Standard search

To go to the standard search in the archive, do the following:

1. Select the required camera on the **Hardware** panel or on the layout.
2. Click the **Search** button on the top panel.

As a result, the interface of the archive search in the Web-Client opens. It is similar to the interface of the main client (see Interface of the Archive Search mode(see page 1208)).

20.11.12.2 Fast search

The fast search is designed for the simplified search by movement in the marked area.

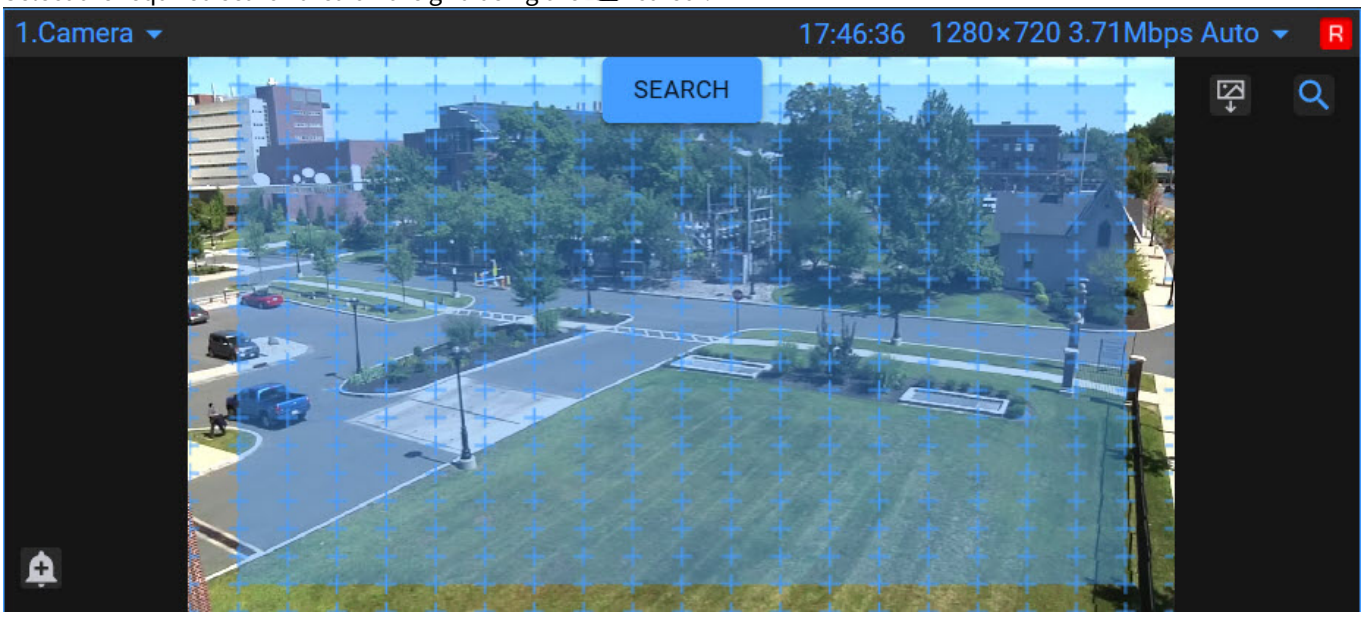
To go to the fast search in the archive, do the following:

1. Select the required camera on the **Hardware** panel or on the layout.
2. Click the **Fast search** button in the camera's crater.

   Attention!

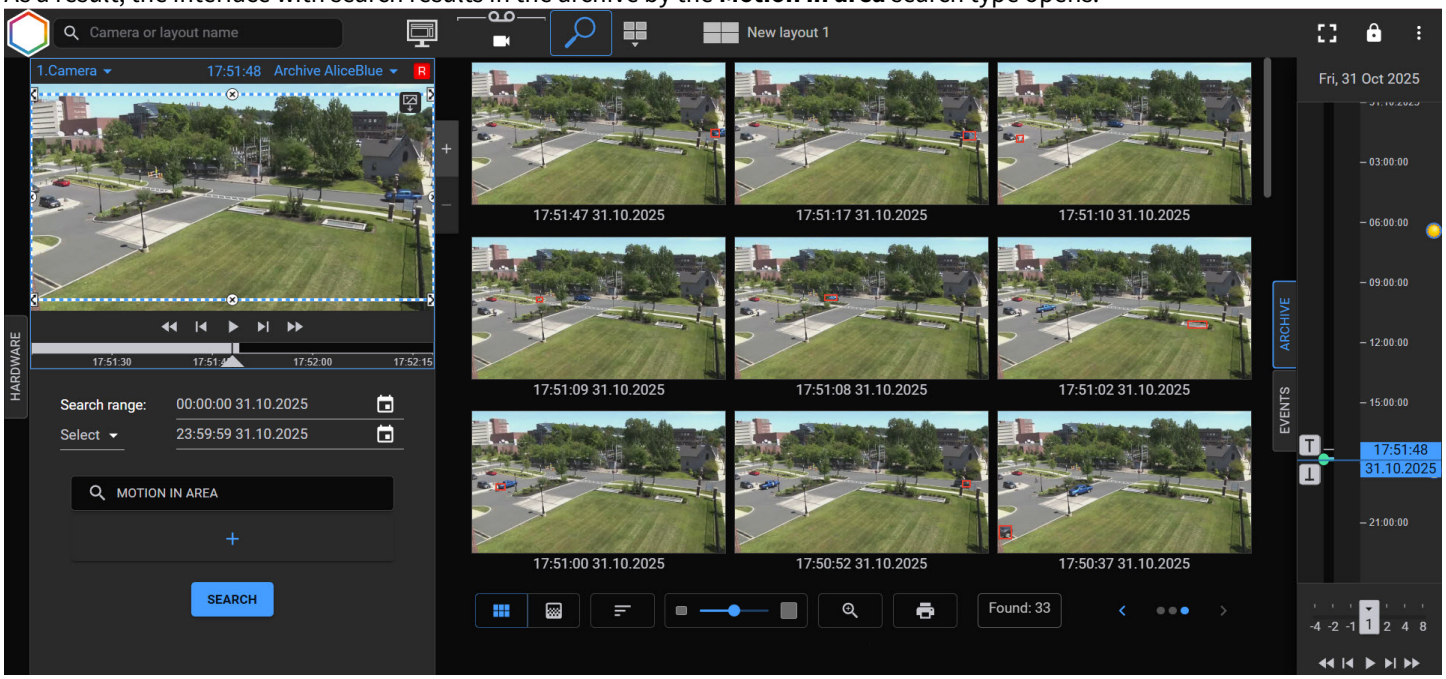
   To display the **Fast search** button in the camera's crater, you must meet the following conditions:
   a. Camera is linked to the archive in which the recording is performed.
   b. The detector from the **Trackers** group upon which events are generated is configured for the camera (see Category: Trackers(see page 389)).

3. Select the required search area on the grid using the cursor.



4. Click the **SEARCH** button.

As a result, the interface with search results in the archive by the **Motion in area** search type opens.



The functionality of the fast search is similar to the search by one camera (see Search in the archive of a single camera(see page 1211)). You can also perform the fast search by several cameras (see Simultaneous search in the archive of several cameras(see page 1252)).

20.11.12.3 Working with search results

Search results are the frames of the archive corresponding to the specified search conditions.

Attention!

- The previews of search results are downloaded gradually and displayed when you scroll the screen.
- The number of results depends on the selected search type and time range. The greater the range, the wider the search area.
- Depending on the search type and the time period, it can take some time for search results to load. The search results loading is displayed using the loading icon in the middle of the screen.

The control elements that are described in the table from left to right are located in the lower part of the window with search results:

Control element	Description
	Displays search results as tiles (by default)
	Displays the frame of the video image on which the heat map is built
	Sorts search results in descending order: from the oldest to the earliest frames (by default)

Control element	Description
	Sorts search results in ascending order: from the earliest to the oldest frames
	Changes the size of the found frames using the scaling switch or **Decrease**/ **Increase** buttons on the left and right sides of the switch, respectively
	Increases the frame fragments with the selected object
	Generates a report by search results (see Reporting the search results(see page 1362))
	Switches between search results if it is performed several times by one camera and the user doesn't close the search tab in the archive

20.11.12.4 What to do when you change cameras

When you select a device on the **Hardware** panel, the following conditions are applied:

- If you switch to the camera that was searched previously, the search conditions of the previous search are saved.
- If you switch to the camera that wasn't searched previously, the search conditions of the camera from which the transition is made are applied.
- When you change a camera within the search interface, the previous results are cleared.

20.11.12.5 Types of archive search in the Web-Client

The following types of search are available in the Web-Client:

1. Motion in area.
2. Line crossing.
3. Motion from one area to another.
4. Multiple objects.
5. Loitering.
6. Face search.

   Attention!

   You can upload only jpeg images.

7. LPN search.
8. TimeSlice.

   Note

   The default interval is set in the Web-Client settings (see Web-Client configuration(see page 1330)).

9. Events search.

The available search types depend on the detection tools that were created on the basis of the video camera. If no detection tools are created on the basis of the video camera, only the Event search and TimeSlice search types will be available in the archive of the selected video camera in the Web-Client.

The interface of the archive search and the parameters of the search in the Web-Client are similar to the Client (see Video surveillance in the Archive Search mode(see page 1207)).

You can also build a Heat Map in the Web-Client (see Building a Heat Map(see page 1360)).

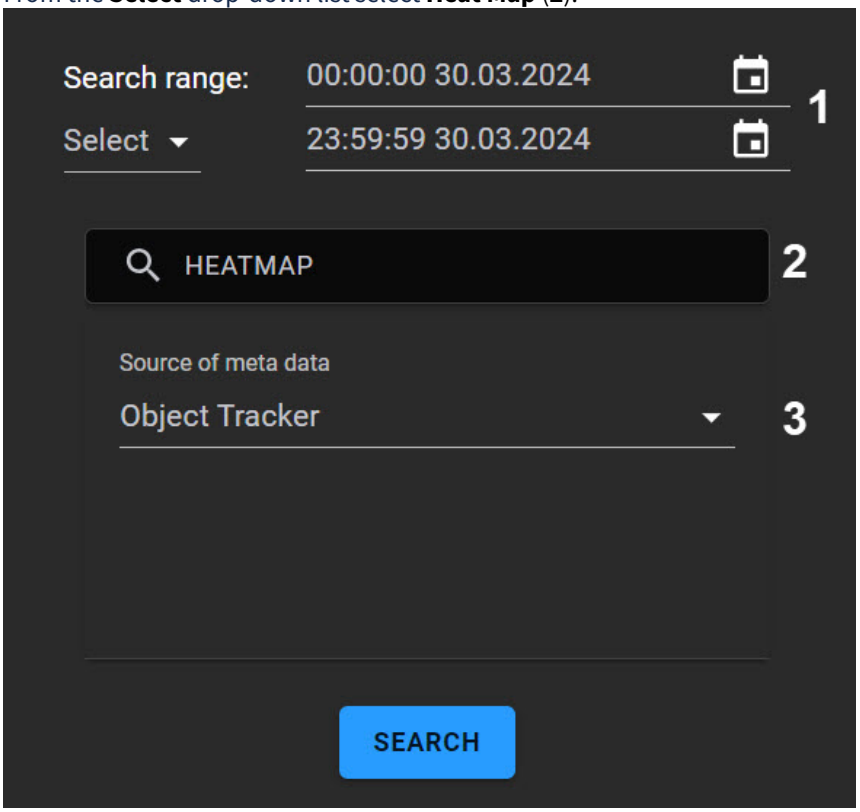
20.11.12.6 Building a Heat Map

> **Attention!**
>
> To build a Heat Map, you need at least one source of metadata (for example, an **Object tracker**).

Heat Maps are useful for evaluation of motion intensity within the scene and determining common trajectories of moving objects.

How to build a Heat Map:

1. Proceed to the Archive search (see Archive search in the Web-Client(see page 1356)).
2. Specify time period to build the Heat Map for (**1**).
3. From the **Select** drop-down list select **Heat Map** (**2**).



4. Select the source of metadata (**3**).
5. Click the **SEARCH** button.

The Heat Map appears in the search results window.



Use the dedicated slider to adjust the transparency of the heat map.

Click  to download the heat map.

You can build a report based on the received data (see Reporting the search results(see page 1362)).

20.11.12.7 Simultaneous search in the archive of multiple cameras in the web client

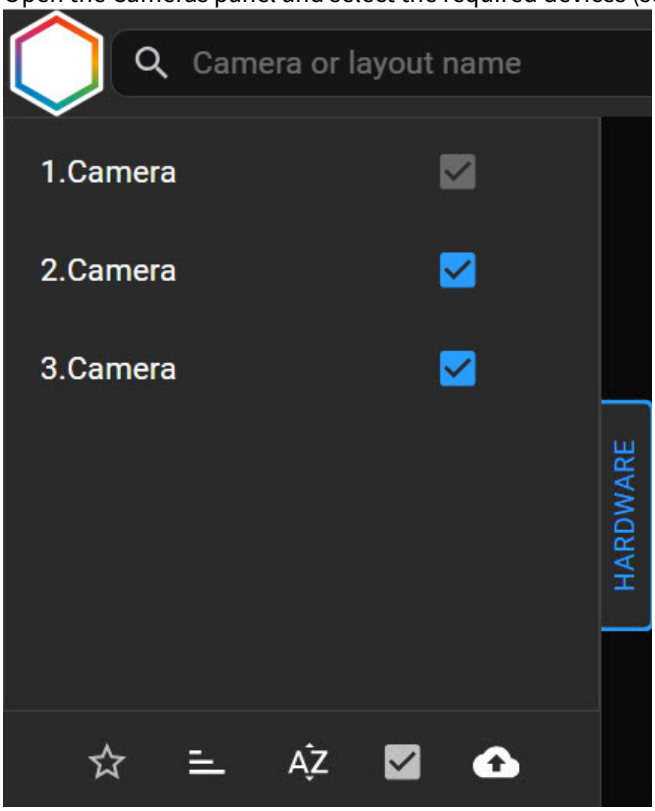
You can use the Web-Client to search in the archive of multiple cameras for:

- faces;
- license plates;
- detection tool events;
- TimeSlice.

To simultaneously search in the archive of multiple cameras, do the following:

1. Go to search in the archive (see Archive search in the Web-Client(see page 1356)).
2. Specify the search criteria.

3. Open the Cameras panel and select the required devices (see Searching for video cameras in the Web-Client(see page 1334)).



> **Note**
>
> To select all cameras, set the appropriate checkbox at the bottom of the page.

4. Click the **Search** button.

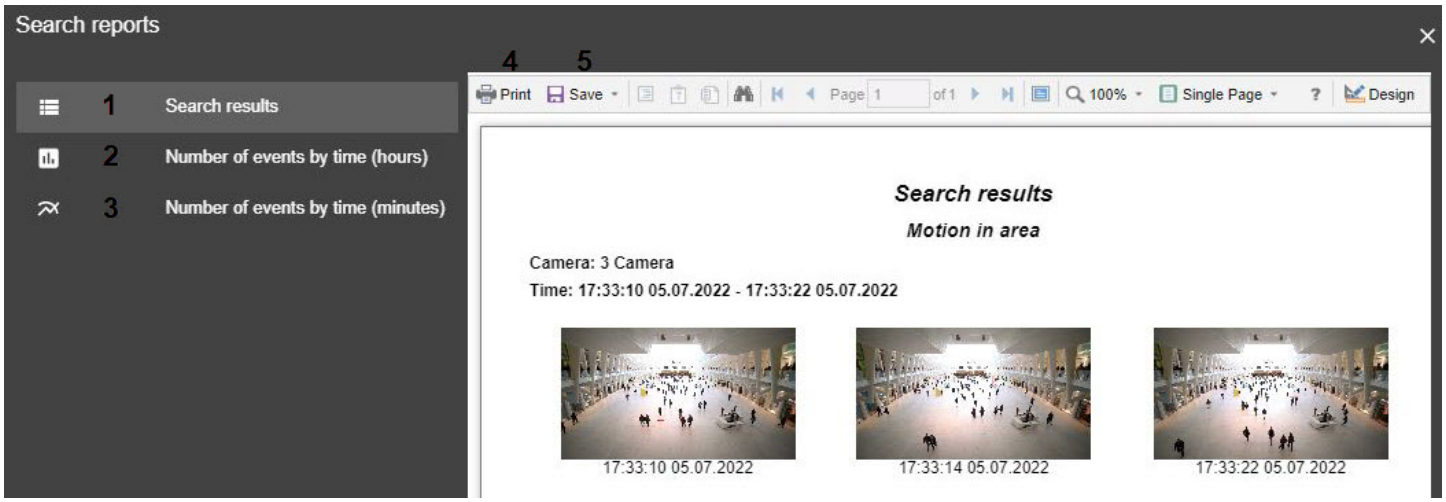
20.11.12.8 Reporting the search results

The Web-Client also includes the Stimulsoft[407] report editor for building reports on retrieved video fragments.

To build a report after you finished searching, click  in the bottom part of the screen.

> **Attention!**
>
> The report is limited to first 60 retrieved videos.

407 https://www.stimulsoft.com/en/documentation/online/user-manual/



There are 3 types of reports available:

1. Retrieved fragments (**1**).
2. Retrieved fragments (number/per hours) (**2**).
3. Retrieved fragments (number/per minutes) (**3**).

Click Print (**4**) to hardcopy a report, or **Save** (**5**) to export into an appropriate format.

20.11.13 Viewing events from camera detection tools in the Web-Client

You can view events from the detection tools of the selected camera on any layout. To do this:

1. Select a video camera on the layout.

2. On the right edge of the screen, click the **Events** button.
   The event panel opens, which displays only events of the detection tools that were created for the selected camera.



> **Note**
>
> If no camera is selected on the layout, then when you click the **Events** button, the panel displays events of the detection tools from all cameras.

If you click an event of the detection tool, you are switched to the archive mode at the time the detection tool generated an even

To close the panel, click the **Events** button again.

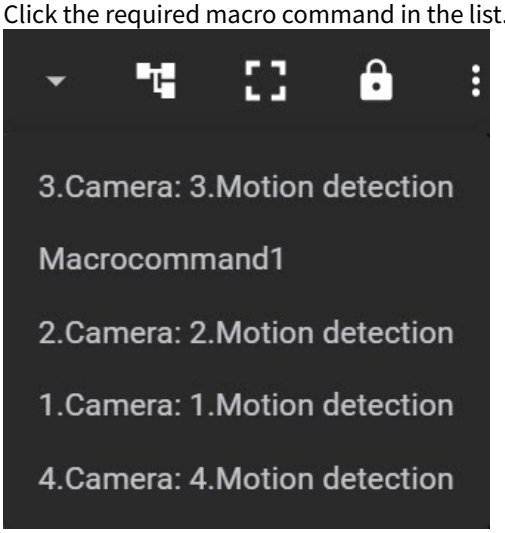
20.11.14 Running macros in Web-Client

In Web-Client, you can run macro commands that were previously created in the regular *Axxon One* Client (see Configuring macros(see page 830)).

To run a macro in Web-Client, do the following:

1. Click on the  button on the top panel.

2. Click the required macro command in the list.



As a result, the selected macro will be launched in Web-Client.

20.11.15 Viewing and processing alarms in the Web-Client

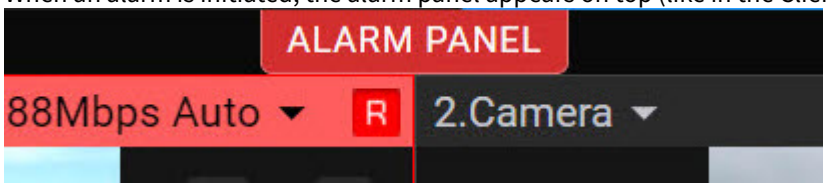
You can use the Web-Client to view active alarms across the entire Axxon-domain.

To make the Web-Client display active alarms, select any camera or a layout (see Searching for video cameras in the Web-Client(see page 1334), Web-Client GUI(see page 1329)).

Note

The alarms that are initiated before selecting a camera or a layout are only displayed if the user is in the workspace. After you reload the page, go to the open statistics or bookmarks sections, the panel with the current alarms will disappear.

When an alarm is initiated, the alarm panel appears on top (like in the Client, see Alert panel(see page 1131)).

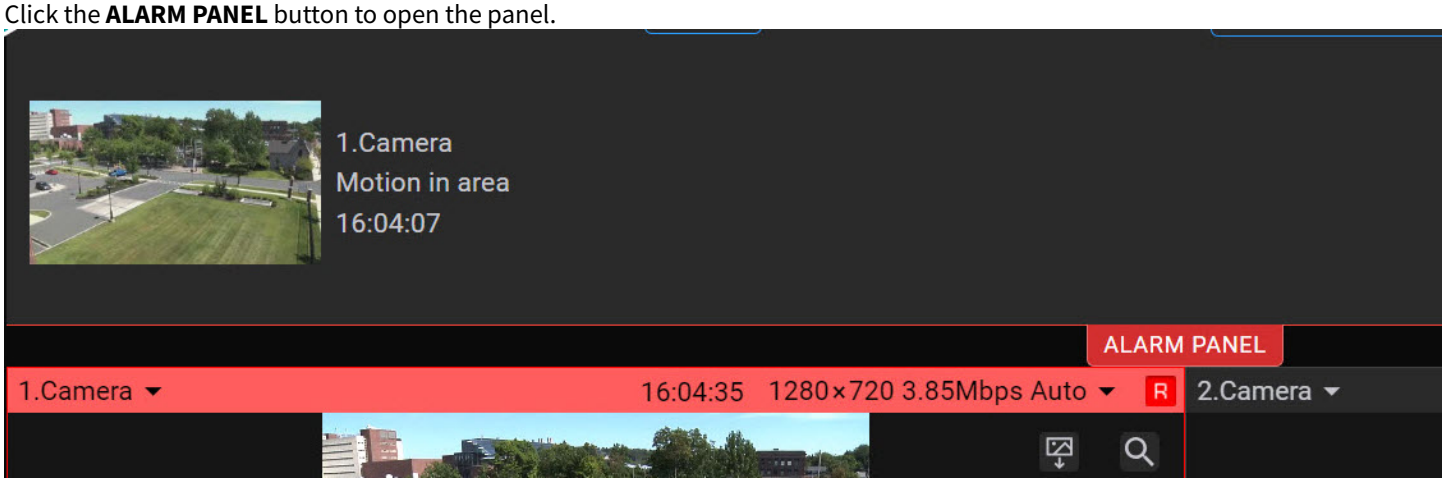


Note

The browser tab will indicate the number of current alarms in the Web-Client.



Click the **ALARM PANEL** button to open the panel.

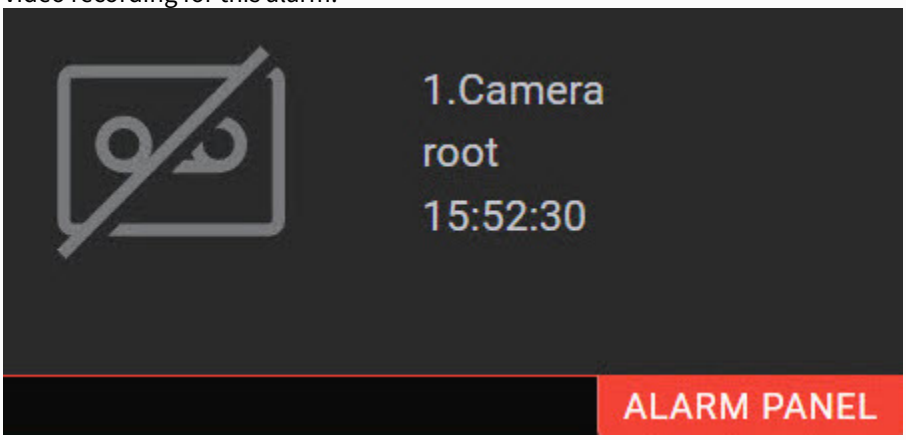


The panel will display the alarm thumbnails with the name of the camera in which the alarm occurred, the initiator of the alarm and the time of the alarm.

If you click the alarm thumbnail on the panel, you will go to the archive mode to view the event.

Note

If the first frame of an alarm is not received within 15 seconds, then an icon will be displayed indicating that there is no video recording for this alarm.



You can change the size of the alarm panel in the Web-Client. To do this, hover the mouse cursor over the panel and expand it with the cursor.



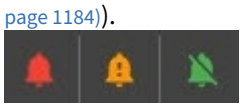
20.11.15.1 Alarm processing in the Web-Client

In the Web-Client, it is possible to manage and take into processing the active alarms of the entire Axxon-domain.

To go into the Alarm management mode and take the alarm into processing, do the following:

1. Initiate an alarm by clicking the  button (like in the Client, see Switching to the Alarm management mode(see page 1181)).
2. Click the  button to go into the Alarm management mode.

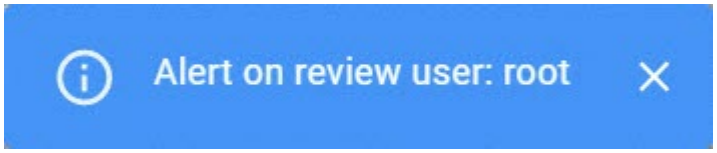
As a result, the archive mode will open, and the panel for managing an alarm event will appear (see Assessing an alarm event(see page 1184)).



Note

Only one operator can take an alarm into processing (like in the Client, see Limitations when working with alarm events in case of multi-user processing(see page 1186)).

If another operator took an alarm into processing, the current operator won't be able to take the alarm into processing and will see the notification:



20.11.16 Listening to a camera's microphone via the Web-Client

Attention!

You can play back audio in mp4 format only.

To listen to a camera's microphone, click the  button in the camera window.

Note

Audio playback in Web browsers is supported in Windows 8 and higher OS versions.

After you complete this action, a volume slider appears.



Note

You cannot play back audio from multiple cameras simultaneously.

The higher is the slider position, the higher is the volume.

To mute audio, click the  button.

20.11.17 Digital video zoom in the Web-Client

Digital zoom of video occurs in a viewing tile during viewing of live video as well as when viewing archive video. To increase the zoom level, use the mouse scroll wheel.

The image cannot be made smaller than the source size. The maximum video zoom is 8x.

To select the viewed portion of the frame at a changed scale, drag the mouse outside of the video viewing area.

> **Note**
>
> For PTZ units, you can zoom in by using the buttons in the **ZOOM** group.

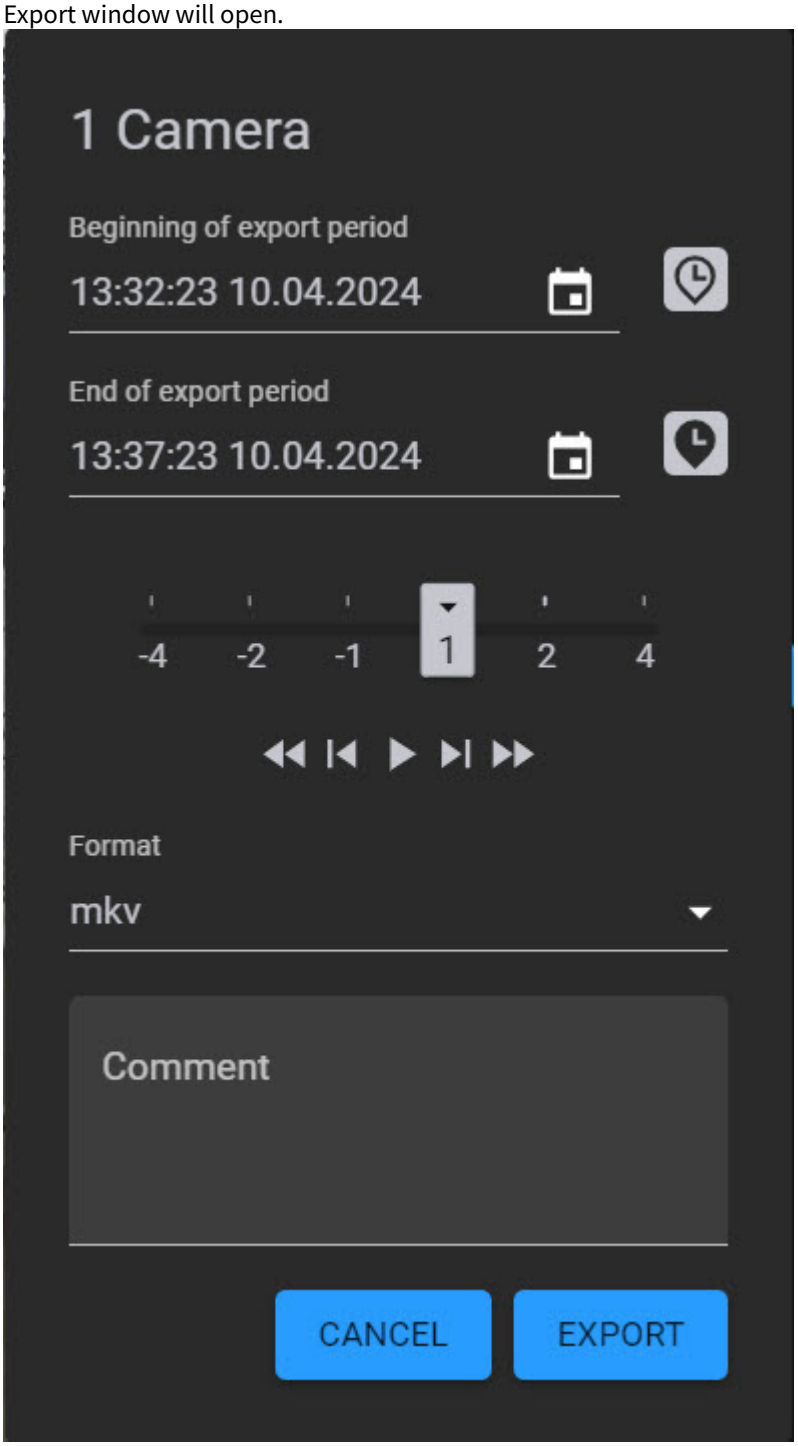
20.11.18 Export in the Web-Client

> **Note**
>
> Users without export permissions won't have the access to the  icon, as well as to the possibility of selecting the export period on the timeline (see Roles(see page 920)).

To export a video, do the following:

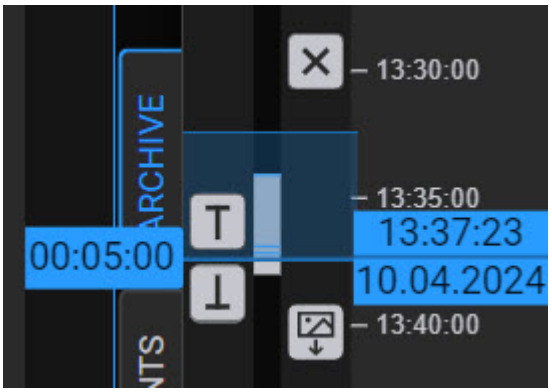
1. In the live mode (see Real-time video surveillance in the Web-Client(see page 1346)) or in the archive mode (see Viewing video archives through the Web-Client(see page 1350)), click the  icon in the **Surveillance window** of a camera.

2. Export window will open.

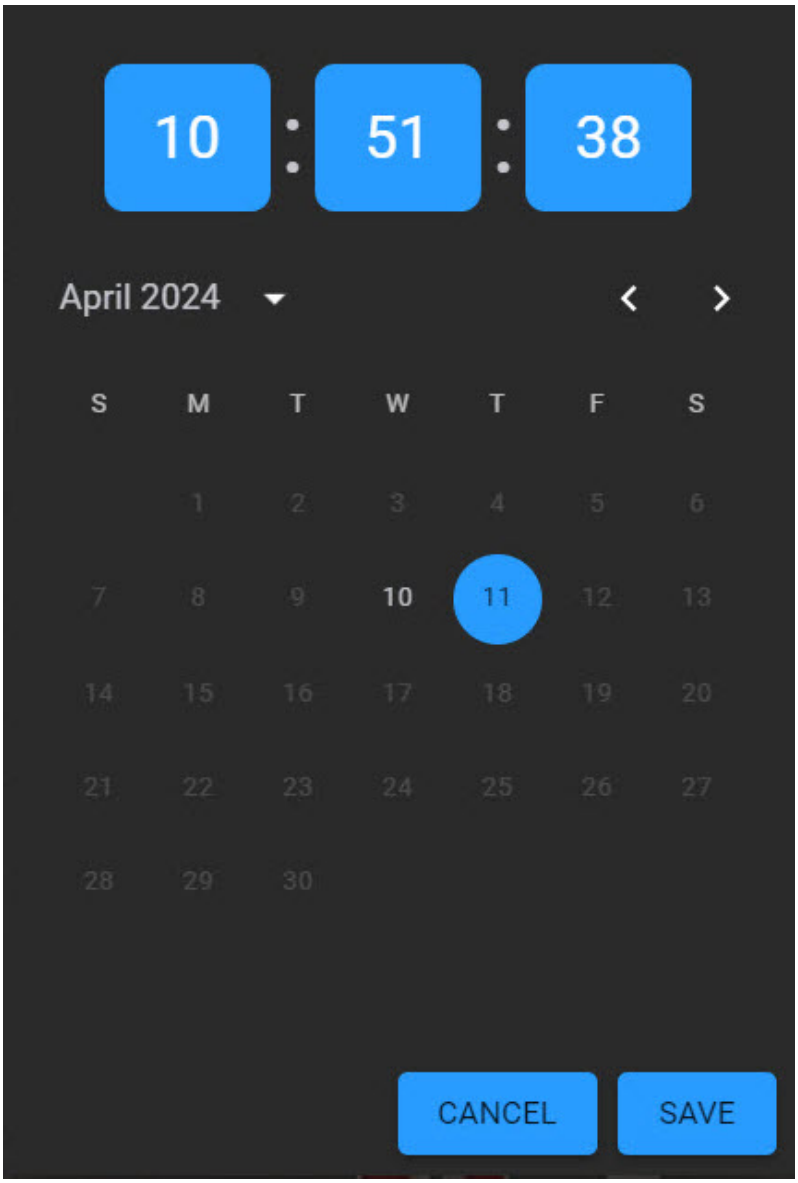


3. By default, the export period is the last five minutes of the archive. To specify the export period, you can use:
   a. The timeline:
      i. Set the pointer to the position corresponding to the beginning of the export period and click the T button.
      ii. Set the pointer to the position corresponding to the end of the export period and click the ⊥ button.

> **Note**
>
> To delete a period, click the ✕ button.



b. Export window:
   i. Specify the beginning and end of export period by entering the time and date in the **Beginning of export period** and **End of export period** fields. If you want the video to start from the moment where the pointer is set on the timeline, click the button next to the **Beginning of export period** field. As a result, the moment of video start will move to the pointer position. Click the button next to the **End of export period** field to set the end of video at the pointer position.
   ii. Or click the button and in the window that will open, specify the time and date of the beginning and end of export period.



Note

You can select only the days on which the archive was recorded. The days on which the archive wasn't recorded aren't available for selection.

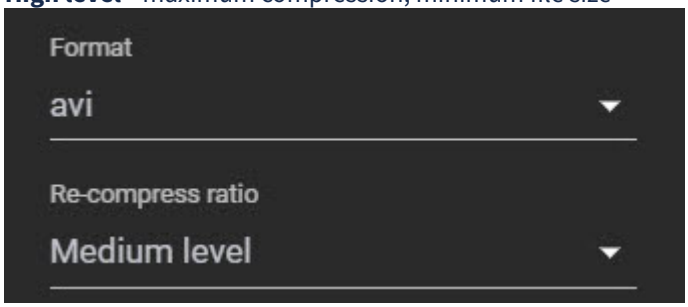
4. Select the speed and direction of video playback for export.
5. From the **Format** drop-down list, select a video export format. If necessary, enter a comment for the export. The comment will be displayed as captions when you playback the exported video.

Note

- In Windows OS and Linux OS, you can export to **AVI**, **MKV**, **MP4**, **JPG**, and **EXE** formats.
- In macOS, you can export to **AVI**, **MKV**, **MP4**, and **JPG** formats. **EXE** files are not supported in this OS.

6. If you export to **AVI** or **MP4** format, select the **Re-compression ratio** of a video:
   - **Low level**—minimum compression, maximum file size;
   - **Medium level** (default)—medium compression, medium file size;

- **High level**—maximum compression, minimum file size



7. To export a frame, select **JPG** format. On the timeline or in the export window, select the time to export the frame similar to specifying an export period for a video.
8. Click the **EXPORT** button. Click the **CANCEL** button to cancel export.

The export progress is displayed on the drop-down panel as in the Client (see Viewing export progress(see page 1316)).



When the export is complete, the panel color changes to green. To download an exported file, click its name on the panel.



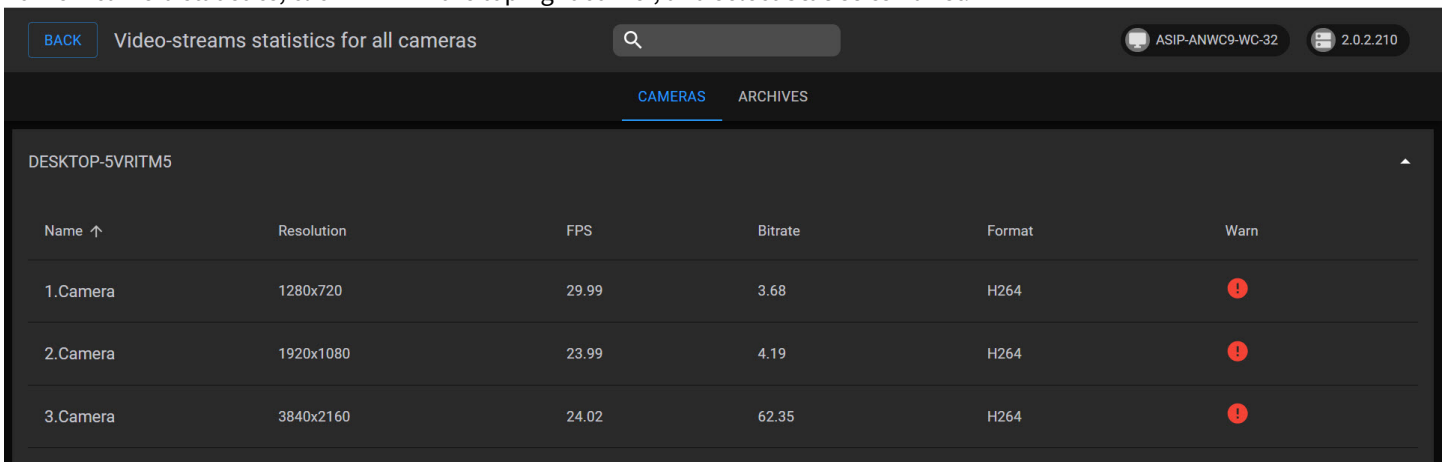
Note

The text of the timestamp in the exported video will depend on the language selected in the browser.



20.11.19 Viewing Camera and Archive Statistics

To view camera statistics, click  in the top right corner, and select **Statistics Panel**.



On the **CAMERAS** tab, the following parameters are displayed for each video stream of each camera:

- resolution;
- frame rate;
- bit rate;
- compression format.

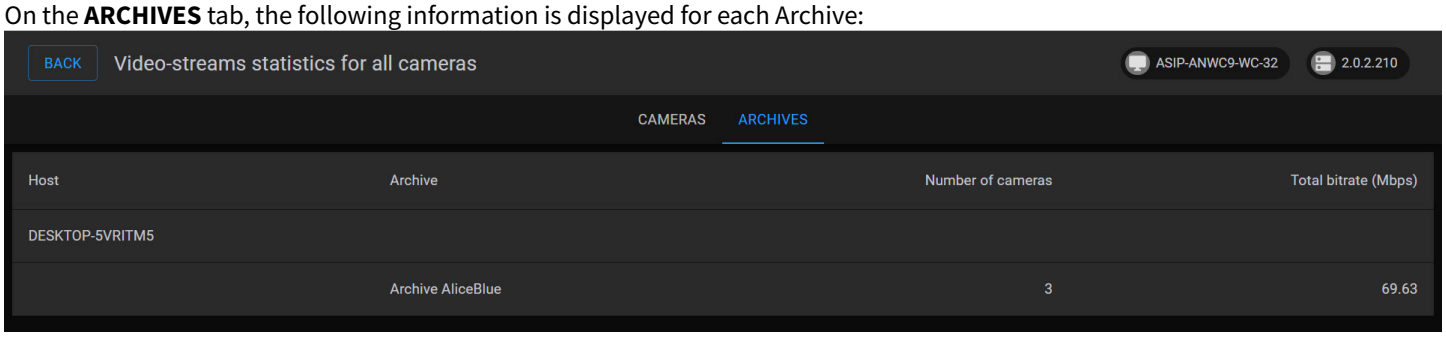
If the bit rate exceeds the expected value, and there is more than 1 Mbit per megapixel, the stream is marked with  .

If the bit rate exceeds the expected value, and there is more than 2 Mbit per megapixel, the stream is marked with  .

By default, the cameras on the **CAMERAS** tab are sorted by name, but you can also sort them by resolution, frame rate, bit rate, format, or warning in ascending or descending order. To sort cameras by a certain parameter, hover over the name of the parameter and click the up arrow  . If the cameras are sorted in ascending order, an up arrow  is displayed; in descending order—a down arrow is displayed  .

> **Note**
>
> The indicator in the upper right corner displays the *Axxon One* Web-Client and Server version numbers.

On the **ARCHIVES** tab, the following information is displayed for each Archive:



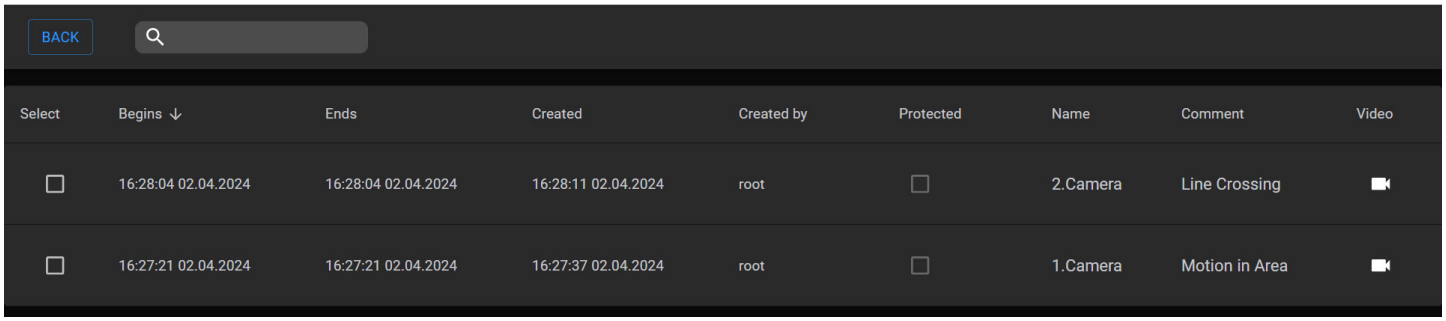
- name;
- number of linked cameras;
- cumulative bit rate of linked cameras.

To return to the previous page, click **BACK** in the left upper corner of the screen.

20.11.20 Working with bookmarks in the Web-Client

A bookmark represents either a comment in the archive (see Operator comments(see page 1153)), or a protected video recording (see Protecting video recordings from FIFO overwriting(see page 303)).

To work with bookmarks, click the  button in the top right corner of the Web-Client window, and select the **Archive Bookmarks** option.



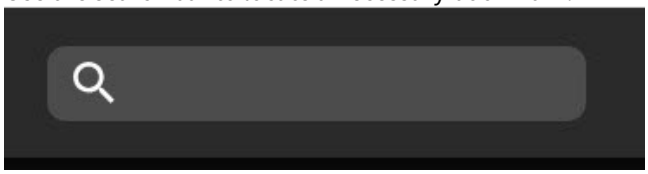
Attention!

- You can access only the bookmarks on the visible part of the archive (see Configuring access restrictions to an archive(see page 298)).
- The bookmarks belonging to the archive fragment that was overwritten in a loop will not be displayed.

You can:

1. Edit a bookmark.
2. Delete a bookmark.
3. Un-protect a protected video.
4. Delete a protected video.

Use the search bar to locate a necessary bookmark.



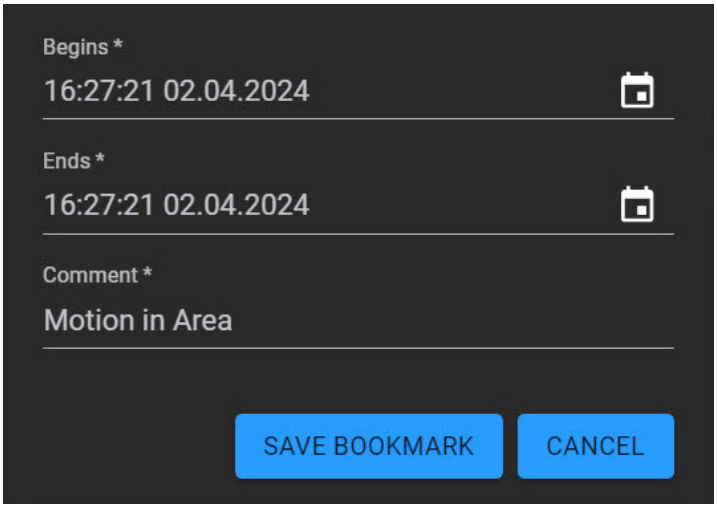
To proceed to a particular video, click the  button in the **Video** column. To return to a main page, click the **BACK** button.

20.11.20.1 Editing a bookmark

To edit a bookmark, do the following:

1. Select the required bookmark in the table.

2. Click the **EDIT BOOKMARK** button.



3. If necessary, you can change the time interval and/or a text comment.
4. Click the **SAVE BOOKMARK** button.

20.11.20.2 Deleting a bookmark

To delete a bookmark, select it in the table and click the **DELETE BOOKMARK** button.

You can delete several bookmarks. To do this, set the checkboxes next to the required bookmarks and click the **DELETE BOOKMARK** button.

20.11.20.3 Un-protecting a video

To un-protect a video, clear the **Protected** checkbox next the bookmark.

20.11.20.4 Deleting a protected video

To delete a protected video, select a protected bookmark and click the **DELETE RECORD** button.

20.11.21 Working with interactive map via the Web-Client

You can create and configure an interactive map using the regular *Axxon One* Client (see Configuring the interactive map(see page 983), Working with the interactive map(see page 1291)). In the Web-Client, you can only view the created maps.

There are three modes of viewing an interactive map in the Web-Client:

1. Both map and layout.
2. Map only.
3. Layout only.

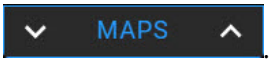
The markers displayed in the Web-Client indicate video cameras and transitions to other maps that were previously added in the regular *Axxon One* Client (see Adding video cameras(see page 985), Adding switches to another map(see page 988)).



In the Web-Client, You can disable the display of the names of video cameras and transitions to other maps that are displayed near the markers. To do this, you need to disable the **Show marker names** option in the user preferences (see Web-Client configuration(see page 1330)).

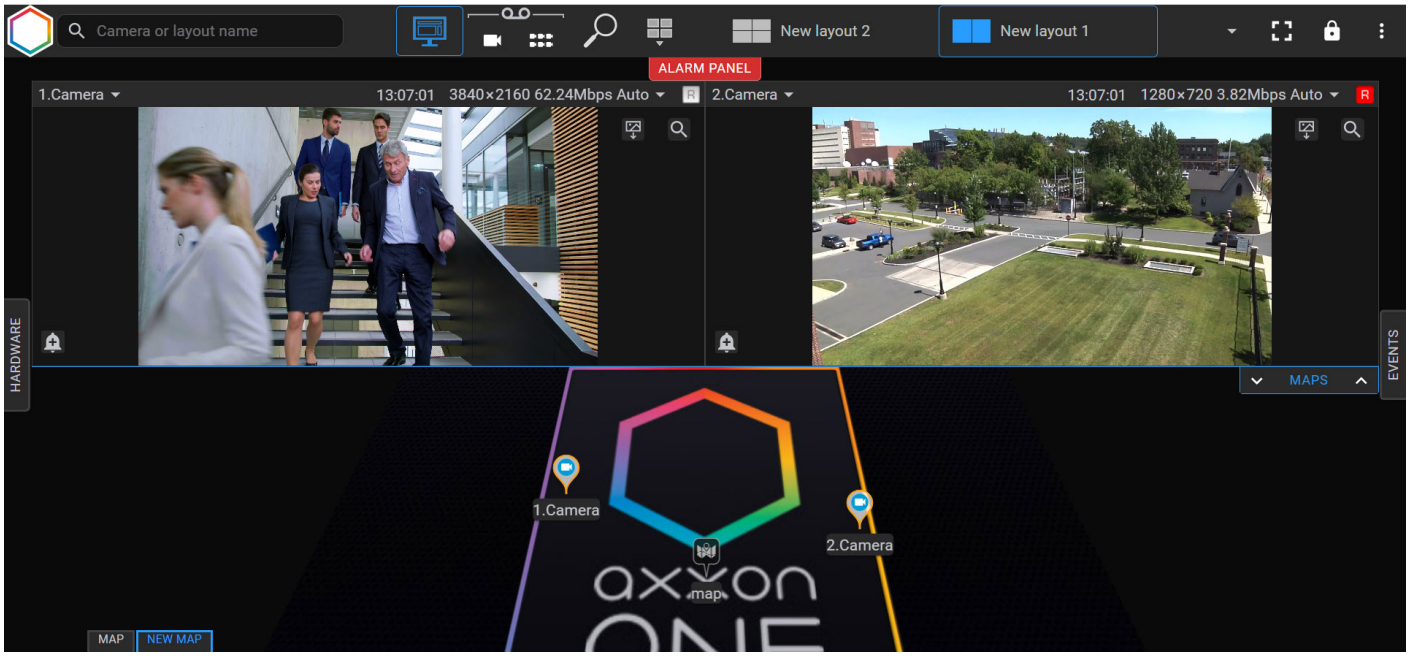
20.11.21.1 Displaying an interactive map in the Web-Client

You can switch to the map viewing mode from any video surveillance mode, except the archive search mode.

To switch to the map viewing mode, click the **Maps** button in the lower right corner of the screen 

.

The map will be displayed in a 3D projection, and the layout will move to the top of the screen, decreasing in size.



To switch to full screen mode, click on the  button to the right of the **Maps** button. To exit the map viewing mode, click the  button to the left of the **Maps** button.

When using the full-screen map display mode, after clicking on the video camera marker, a window with a video image from this camera will appear. When you click on the video window, the map will be minimized to half the screen and a layout will open containing the selected video camera. In order to open only the cell with the selected video camera, you need to disable the **Open selected camera on layout** option in the user preferences (see Web-Client configuration(see page 1330)).

If the map is open in half the screen, then when you click on the camera marker, if this camera is already present in the current viewing layout, this camera will either be activated or opened in single view mode, depending on the **Open selected camera on layout** setting. If the selected camera is not on the current layout, a window with a player will appear in the place of the marker.

20.11.21.2 Changing the display of the map on a layout via the Web-Client

By default, maps are displayed as they were attached to layouts in the Client (see Attaching a map to a layout(see page 992)).

To change the display of the map on a layout via the Web-Client, do the following:

1. Click the  button and select **Edit layout**.
2. Using the 

buttons, change the display of the map to one of three options:
   a. both map and layout are displayed.
   b. only map is displayed.
   c. only layout is displayed.
3. Click the **Save** 

button.

As a result, when you switch to this layout, the map will always be displayed in the way that you selected when editing the layout.

20.11.21.3 Zooming and moving the map in the Web-Client

You can manually zoom the map by scrolling the mouse wheel (the mouse cursor should be hovered over the map).



After zooming in, you can drag the map (while pressing and holding the left mouse button) in any direction.

20.12 Working with Axxon One Through the Mobile Clients

Axxon One clients are available on the iOS, and Android operating systems.

For more information on configuring and using the mobile client apps, refer to the corresponding documentation[408].

408 https://docs.axxonsoft.com/confluence/display/mobile/AxxonSoft+mobile+Clients.+Documentation

21 Axxon One utilities

21.1 Tray Tool utility

21.2 Network settings utility

21.3 Watermark checker utility

21.4 Backup and restore utility

- Migrating a configuration from one operating system to another(see page 1406)
  - Migrating a configuration from Linux OS to Linux OS(see page 1406)
  - Migrating a configuration from Linux OS to Windows OS(see page 1407)
  - Migrating a configuration from Windows OS to Linux OS(see page 1407)
  - Migrating a configuration from Windows OS to Windows OS(see page 1408)

21.5 Gathering system information utility

21.6 Log management utility

- Configuring the logging of the Client memory usage(see page 1420)

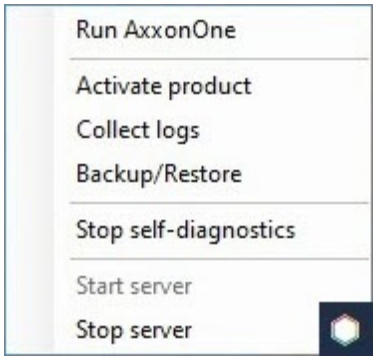
21.7 POS terminal data collection utility

21.8 Console utility for working with archives (vfs_format.exe)

21.9 Tray Tool utility

The **Tray Tool** utility is used for quick control of *Axxon One* from the notification area. The utility starts automatically at system startup and is placed in the notification area.

> **Note**
>
> The **TrayTool.exe** executable file is located in the **<*Axxon One* installation folder>\AxxonSoft\AxxonOne\bin** folder.



With the **Tray Tool** utility, you can:

- **Run *Axxon One*** (see Starting the client(see page 138)),

- **Activate product** (see Activation utility[409]),
- **Collect logs** (see Gathering system information utility(see page 1408)),
- **Backup/Restore** (see Backup and restore utility(see page 1384)),
- **Start/Stop self-diagnostics** (see Self-diagnostics service(see page 1097)),
- **Start server** (see Starting the server(see page 137)),
- **Stop server** (see Stop the server(see page 146)).

The **Tray Tool** utility displays the state of the server:

Icon type	State of the server
	Server is on
	Starting/stopping the server
	Server is stopped
	Server is inactive

21.10 Network settings utility

You can use the **Network settings** utility to specify:

- IP address or DNS name of the router if the server is behind NAT[410],
- port range for operation of the *Axxon One* server,
- a mask/masks of available servers in the list of *Axxon One* servers.

To configure network settings, do the following:

1. Start the **Network settings** utility from the Windows Start menu: **Start** → **All Programs** → **Axxon One** → **Utilities** → **Network settings**.

   Note

   The **NTServiceOpts.exe** executable file of the **Network settings** utility is located in the **<*Axxon One* installation folder>\AxxonSoft\Axxon One\bin** folder.

409 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486821/Activation+utility
410 https://en.wikipedia.org/wiki/Network_address_translation

As a result, the **NTServiceOpts registry setting** window opens:



Note

In Linux OS, you can perfom actions in this utility using the command (see Changing the configuration of the Axxon One Server in Linux OS[411]):

```
sudo dpkg-reconfigure axxon-one
```

2. In the **External IP address of router** field, enter the external IP address or DNS name of the router if the Server is located behind NAT[412].

Note

You can specify multiple interfaces in the following format: "IP Address1 or DNS Name1, IP address2 or DNS Name2".
For example: 88.78.12.33, ExampleAxxon.ddns.net.

3. Specify the port range for operation of the *Axxon One* server:
   a. In the **Base port** field, enter the start port of the range.
   b. In the **Number of ports** field, enter the number of ports in the range. The minimum possible number of ports in the range is **20**.

Attention!

- The port ranges of domain servers must not overlap.
- The number of ports that you select determines the maximum operating configuration of the system. When specifying the number of ports, refer to the following information:

Number of ports	Purpose
6	Used for *Axxon One* operation (see Ports used by Axxon One(see page 95))
6	Used for any number of cameras in 64-bit configuration (see Camera(see page 171))
2	Used to record to the archive (see Configuring recording to an archive(see page 295))
1	Used to use the metadata database (see Metadata database(see page 333))

411 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486777/Changing+the+configuration+of+the+Axxon+One+Server+in+Linux+OS
412 https://en.wikipedia.org/wiki/Network_address_translation

Number of ports	Purpose
2	Used to use the **Service** detectors (see Category: Service(see page 788))
2	Used to use the standard sub-detectors (see Standard sub-detectors(see page 359))
1	Used to use E-mail notification (via the SMTP service, see Email notifier(see page 231)) or server audio notification (see The Speaker object(see page 228))

4. In the **Interface mask** field, enter a mask/masks of available servers in the list of *Axxon One* servers (see The Server object(see page 164)). Possible values:
   - **0.0.0.0/0**—servers from all networks are available.
   - **10.0.1.23/32,192.168.0.7/32**—only servers from the specified networks are available.
   - **127.0.0.1**—only servers from the local network are available.
5. Click the **Save** button.

> **Note**
>
> To close the **NTServiceOpts registry setting** window, click the ✕ button.

Configuration of the network settings is complete. The *Axxon One* server restarts automatically (see Starting and stopping Axxon One software(see page 137)).

21.11 Watermark checker utility

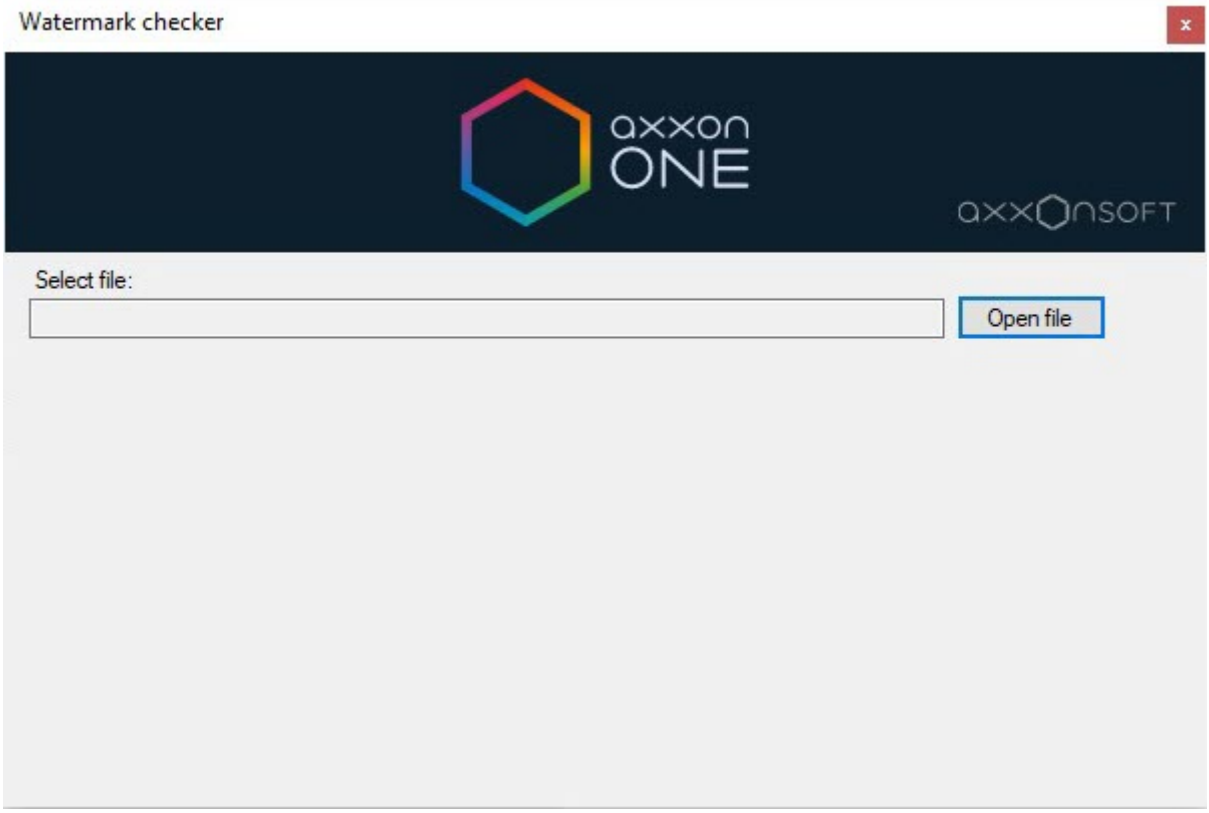
The **Watermark checker** utility is used to verify a watermark that is added during the export of videos and frames from *Axxon One*.

To verify a watermark, do the following:

1. Start the **Watermark checker** utility from the **Start** menu in Windows OS: **Start** → **Programs** → **Axxon One** → **Utilities** → **Watermark checker**.

> **Note**
>
> The **WatermarkCheck.exe** executable file is located in the ***<Axxon One* installation folder>\AxxonSoft\Axxon One\bin*** folder.

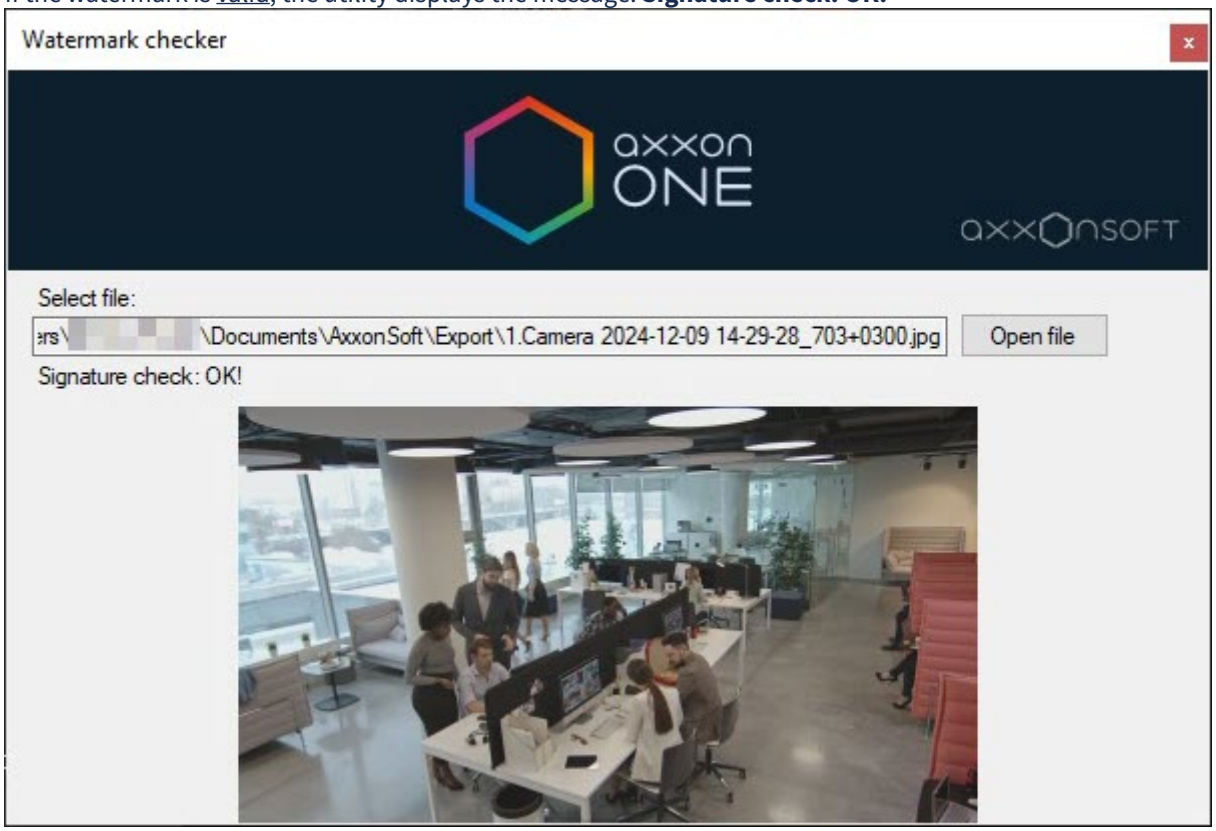
As a result, the **Watermark checker** window opens:



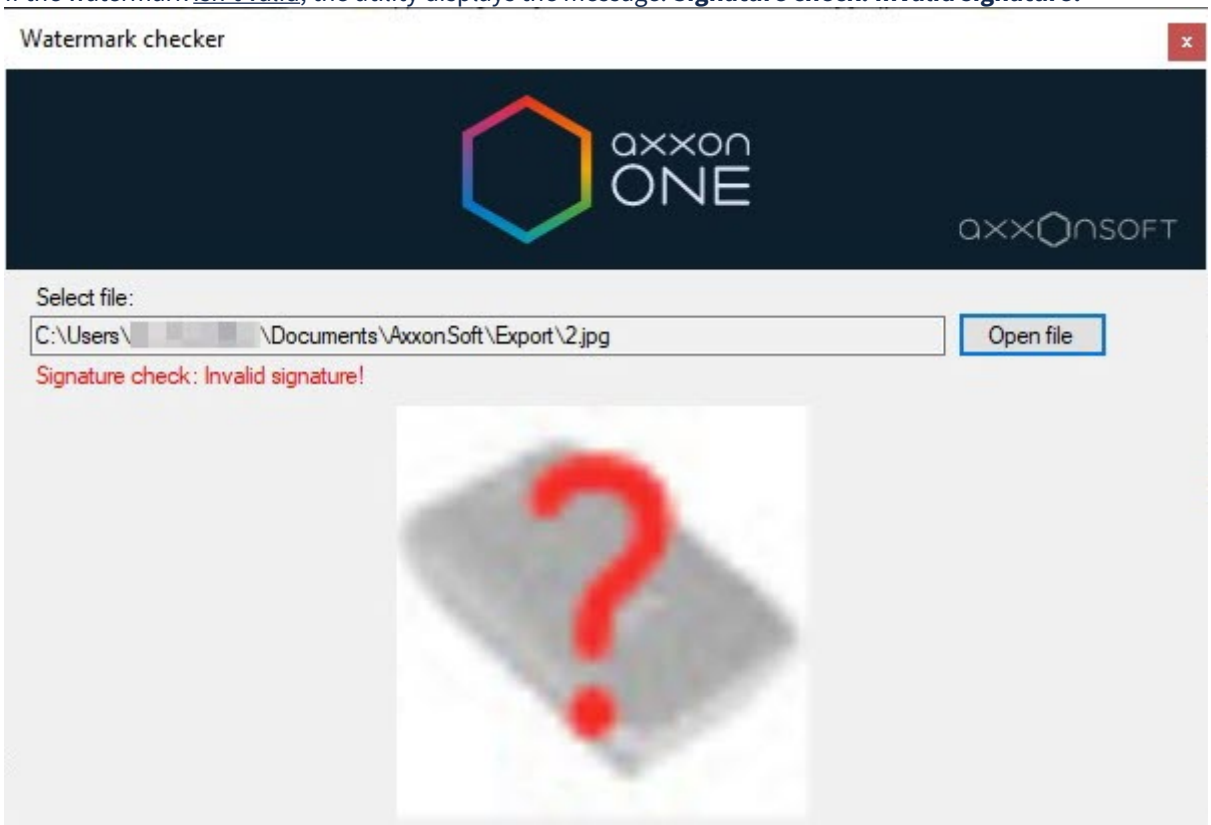
2. Click the **Open file** button.
3. In the **Select file** field, enter the full path to the exported frame or video.

> **Note**
>
> During verification of a watermark on a frame or video, the thumbnail is displayed in the **Watermark checker** utility window. You cannot preview a frame or video during the verification process.

- If the watermark is valid, the utility displays the message: **Signature check: OK!**



- If the watermark isn't valid, the utility displays the message: **Signature check: Invalid signature!**



4. To exit the **Watermark checker** utility, click the button.

Watermark verification is complete.

21.12 Backup and restore utility

On the page:

- General information(see page 1384)
- Starting the utility(see page 1384)
- Stopping the utility(see page 1387)
- Reverting to the original server configuration(see page 1387)
- Reverting to the original domain configuration(see page 1391)
- Creating a configuration backup(see page 1395)
- Restoring the configuration backup(see page 1399)
- Renaming the local server(see page 1402)
- Migrating a configuration from one operating system to another(see page 1406)

21.12.1 General information

The **Backup and restore** utility is used to:

- revert to the original server configuration (see Reverting to the original server configuration(see page 1387)),
- revert to the original domain configuration (see Reverting to the original domain configuration(see page 1391)),
- back up the configuration (see Creating a configuration backup(see page 1395)),
- restore the configuration backup (see Restoring the configuration backup(see page 1399)),
- rename the local server (see Renaming the local server(see page 1402)),
- migrate a configuration from one operating system to another (see Migrating a configuration from one operating system to another(see page 1406)).

Attention!

The **Backup and restore** utility works both with the local configuration of the selected server (cameras, archives, detectors, event sources, logging levels) and with the general configuration of the domain (users, maps, layouts, and so on).

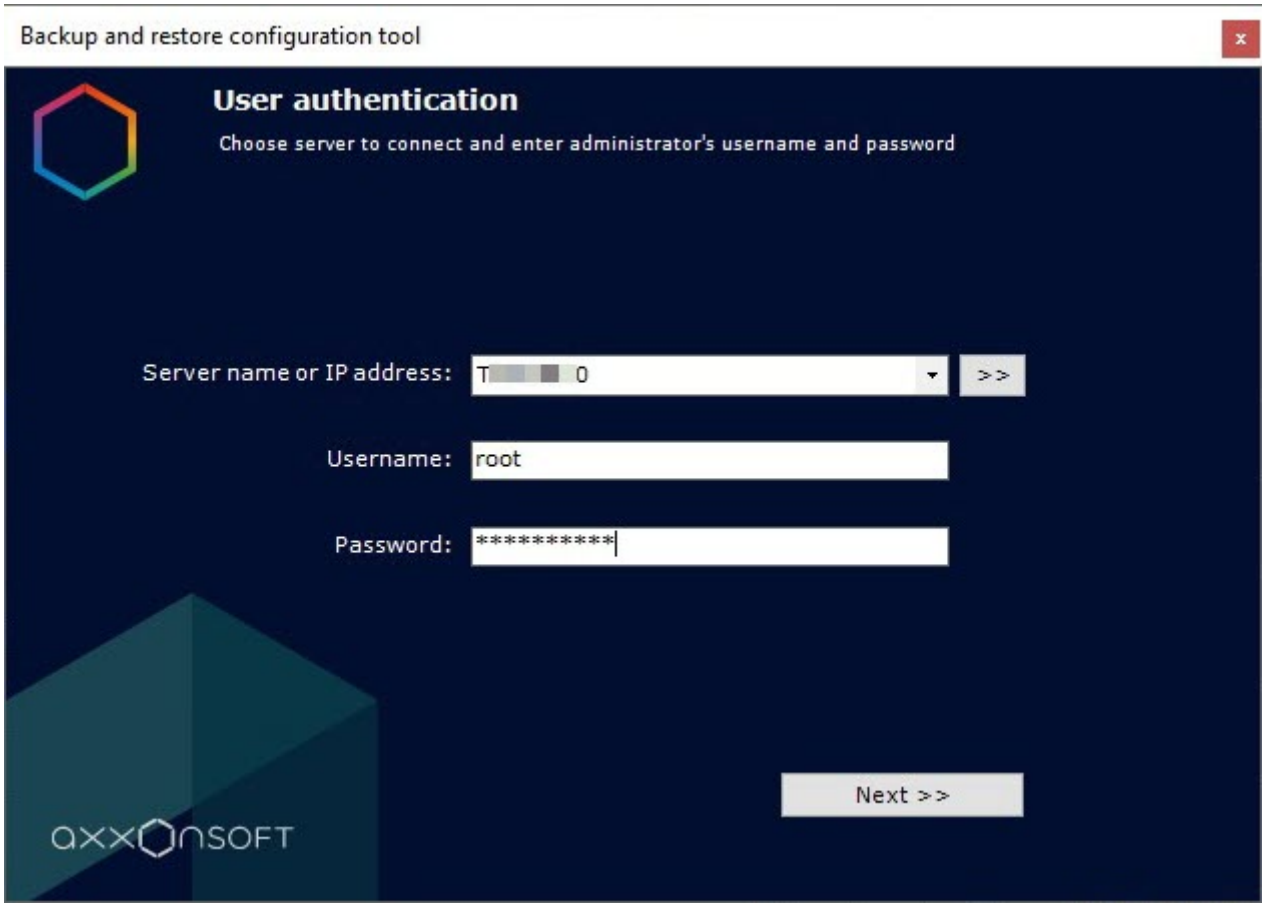
21.12.2 Starting the utility

You can start the **Backup and restore** utility from the **Start** menu in Windows OS: **Start** → **Programs** → **Axxon One** → **Utilities** → **Backup and restore** or from the notification area **Copy/Restore** (see Tray Tool utility(see page 1378)).

Note

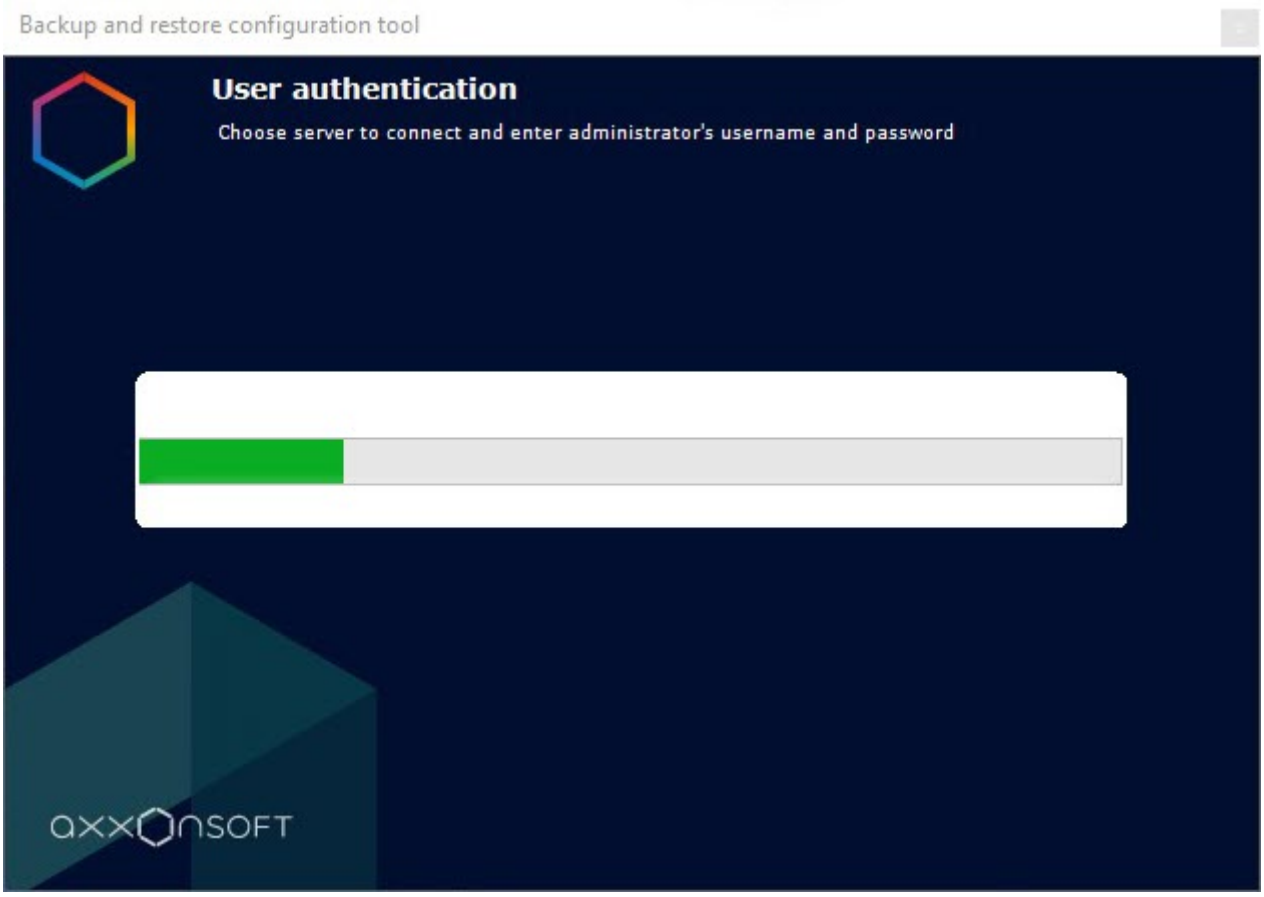
The **BackupTool.exe** executable file of the **Backup and restore** utility is located in the ***<Axxon One* installation folder>\AxxonSoft\Axxon One\bin** folder.

As a result, the **Back up and restore configuration tool** window opens:



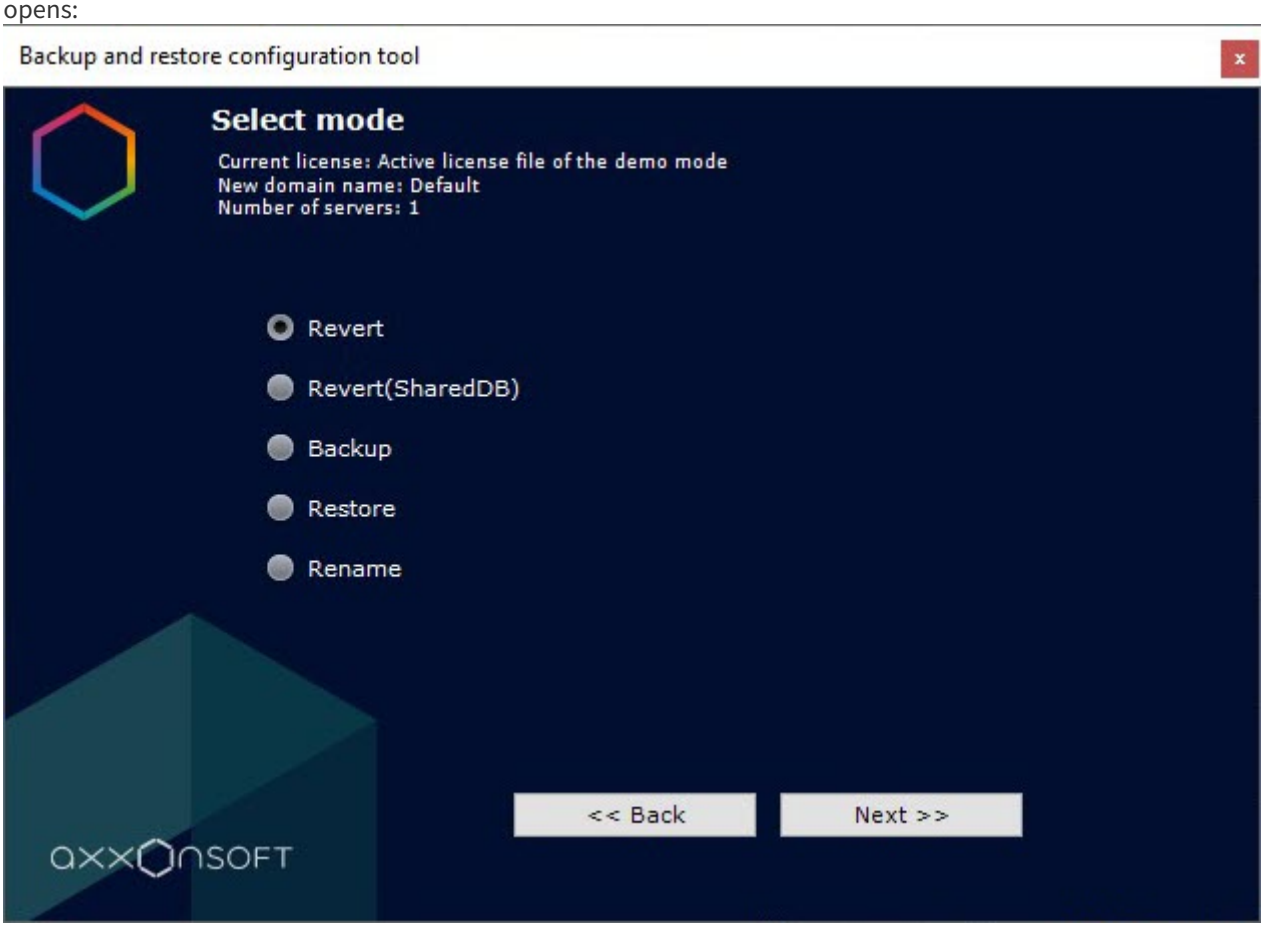
1. In the **Server name or IP address** field, select one of the domain servers from the drop-down list.
2. In the **Username** field, enter the username of the server user.
3. In the **Password** field, enter the password of the server user.

4. Click the **Next >>** button. The user authentication process starts:



After the user authentication process is complete, the main page of the **Back up and restore configuration tool** window

opens:



Start of the **Back up and restore configuration tool** utility is complete.

21.12.3 Stopping the utility

To stop the **Back up and restore configuration tool** utility, click the button.

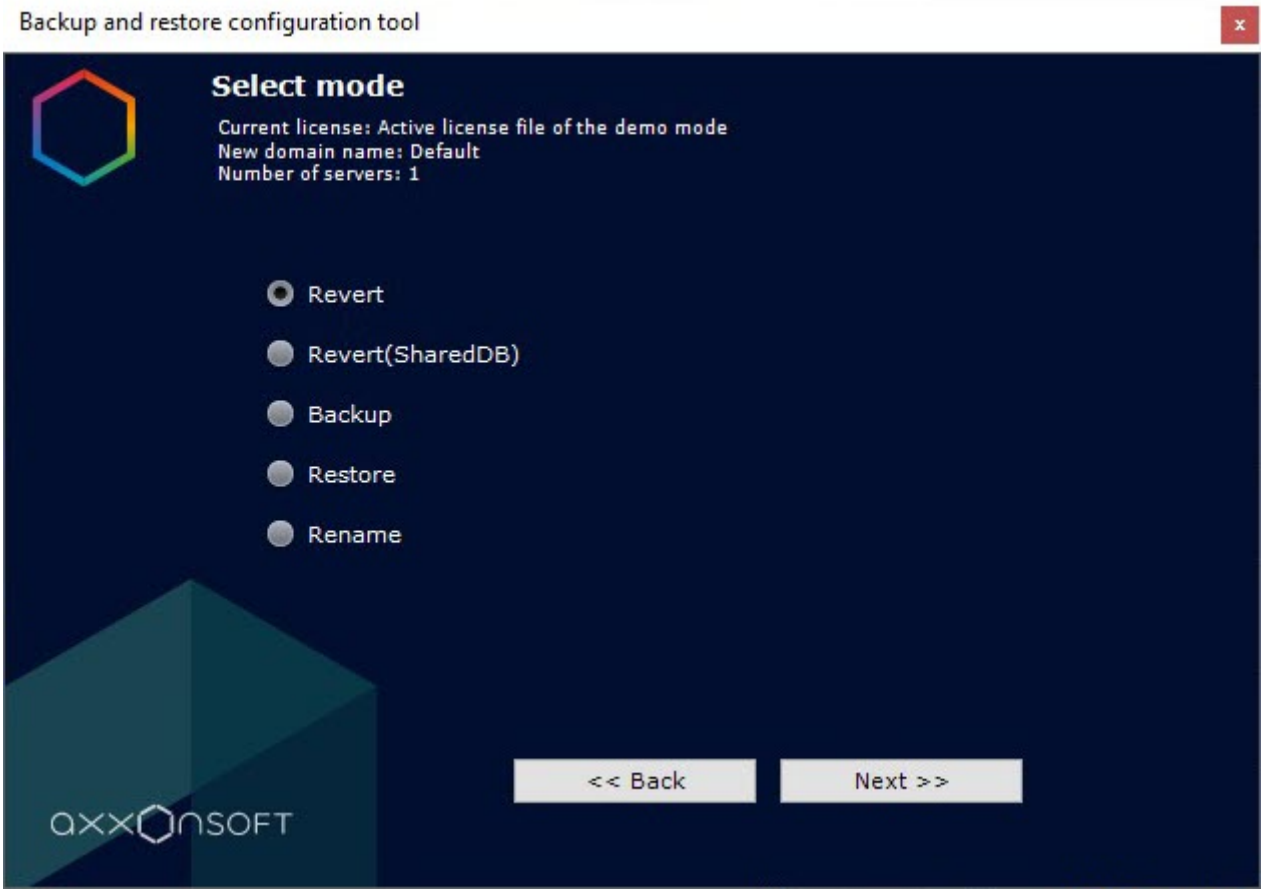
21.12.4 Reverting to the original server configuration

If you make any change to the local server configuration (create/delete any objects, change cameras binding to archives, change settings of any objects), a revision for backup is created.

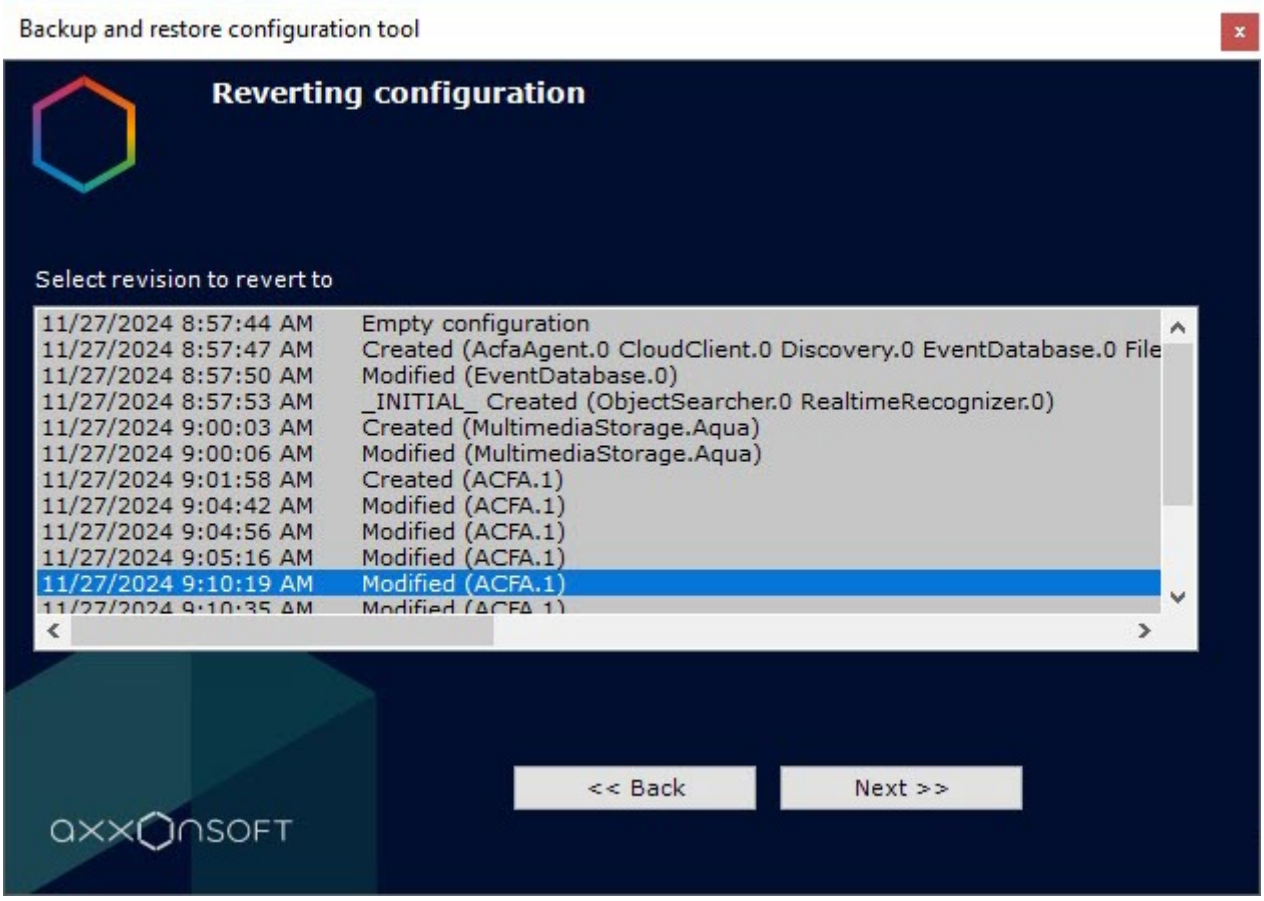
To revert the server configuration to one of the backup revisions, do the following:

1. Start the **Backup and restore** utility (see Starting the utility(see page 1384)).

2. Select **Revert**.



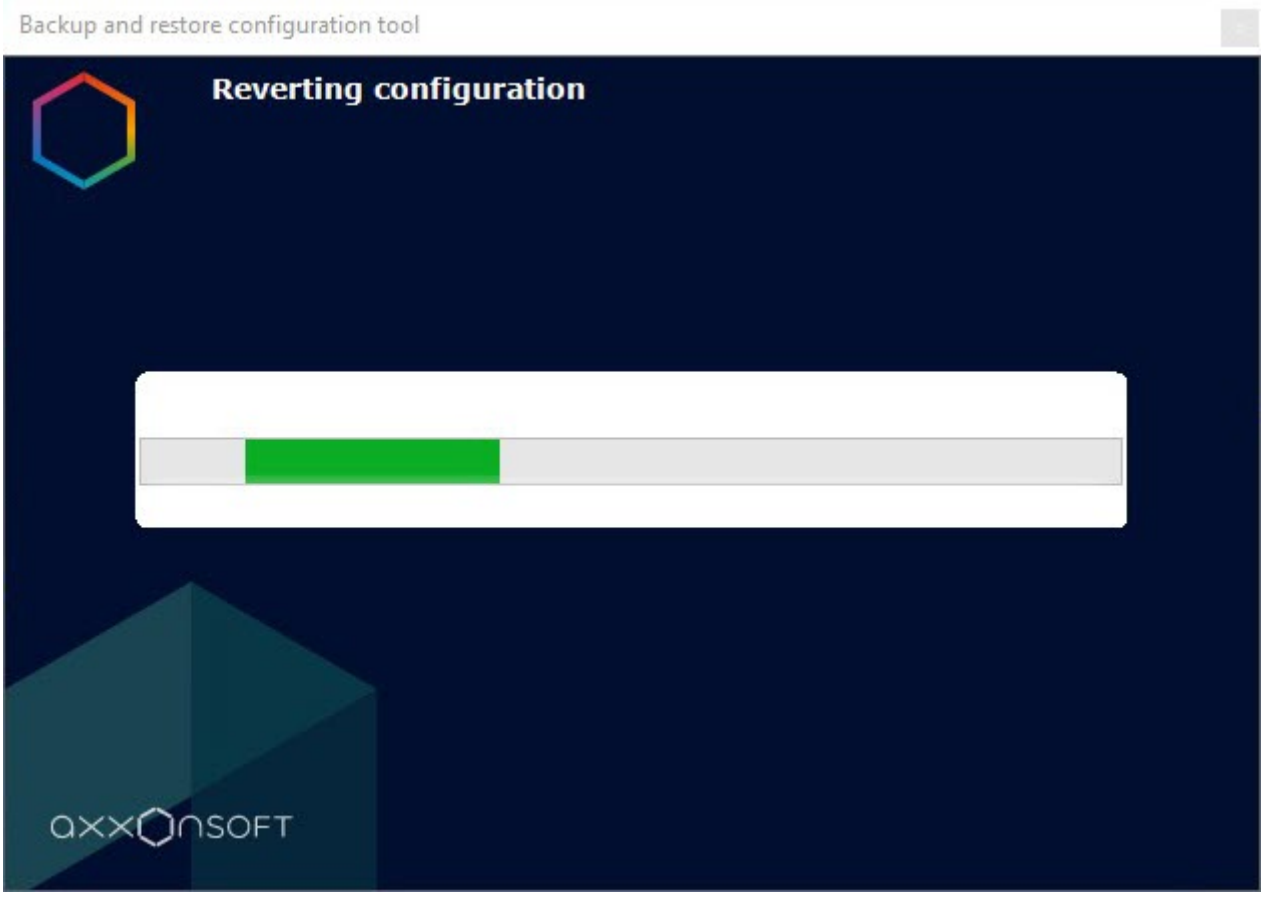
3. Click the **Next >>** button. A window opens. This window contains a list of available revisions for restoring the server configuration with the time they were created and a description of what exactly was changed:



4. Select a revision to restore the server from the list.

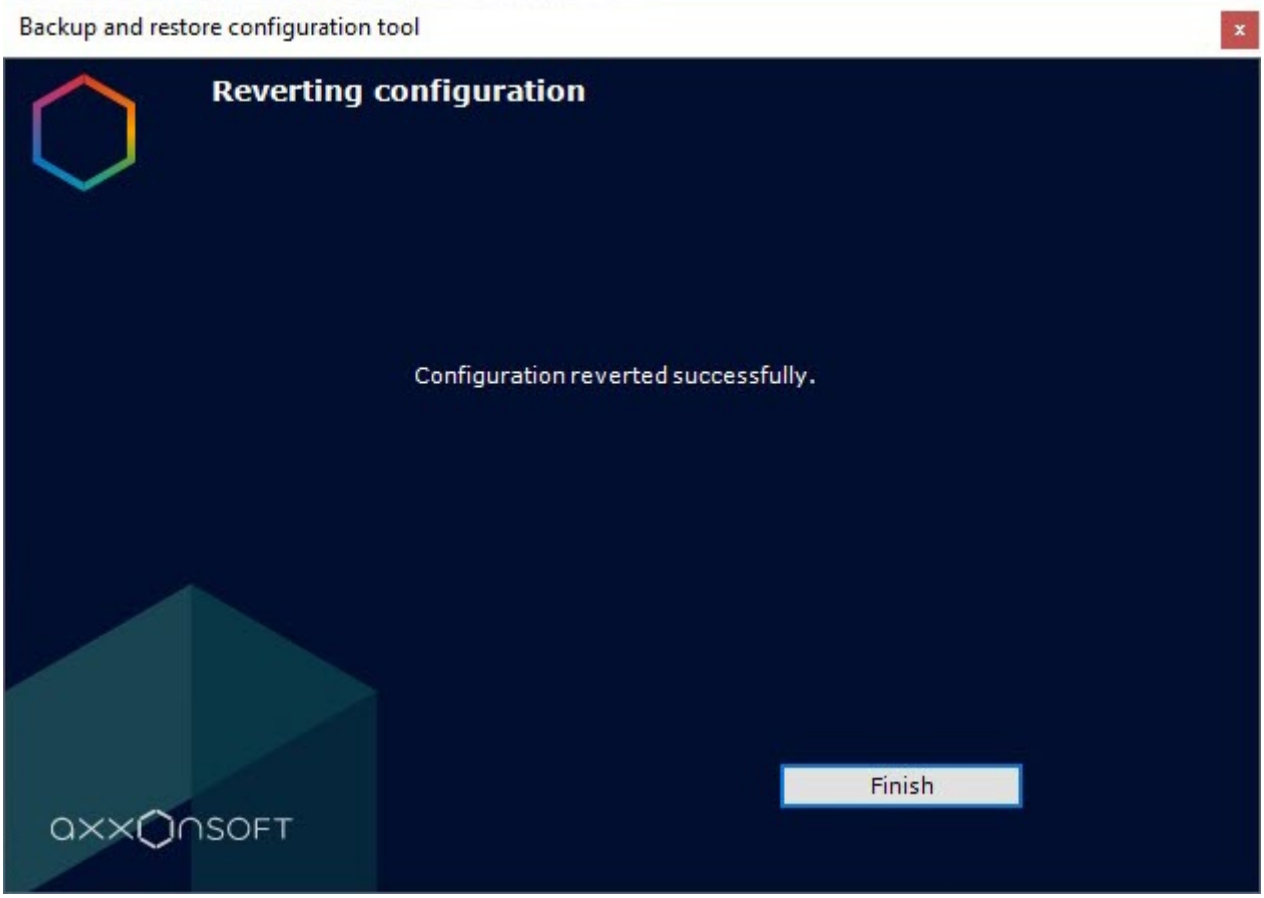
> **Note**
>
> - If you make several changes to the server configuration, but click the **Apply** button once, only one revision is created in the list to restore the configuration.
> - The **Empty configuration** position corresponds to the initial configuration.

5. Click the **Next >>** button. The process of reverting the server configuration before the selected revision starts:



When the process of reverting the server configuration is complete, a window is displayed with a message that the

operation was successful:



6. Click the **Finish** button.

Reverting the server configuration to the selected revision is complete.

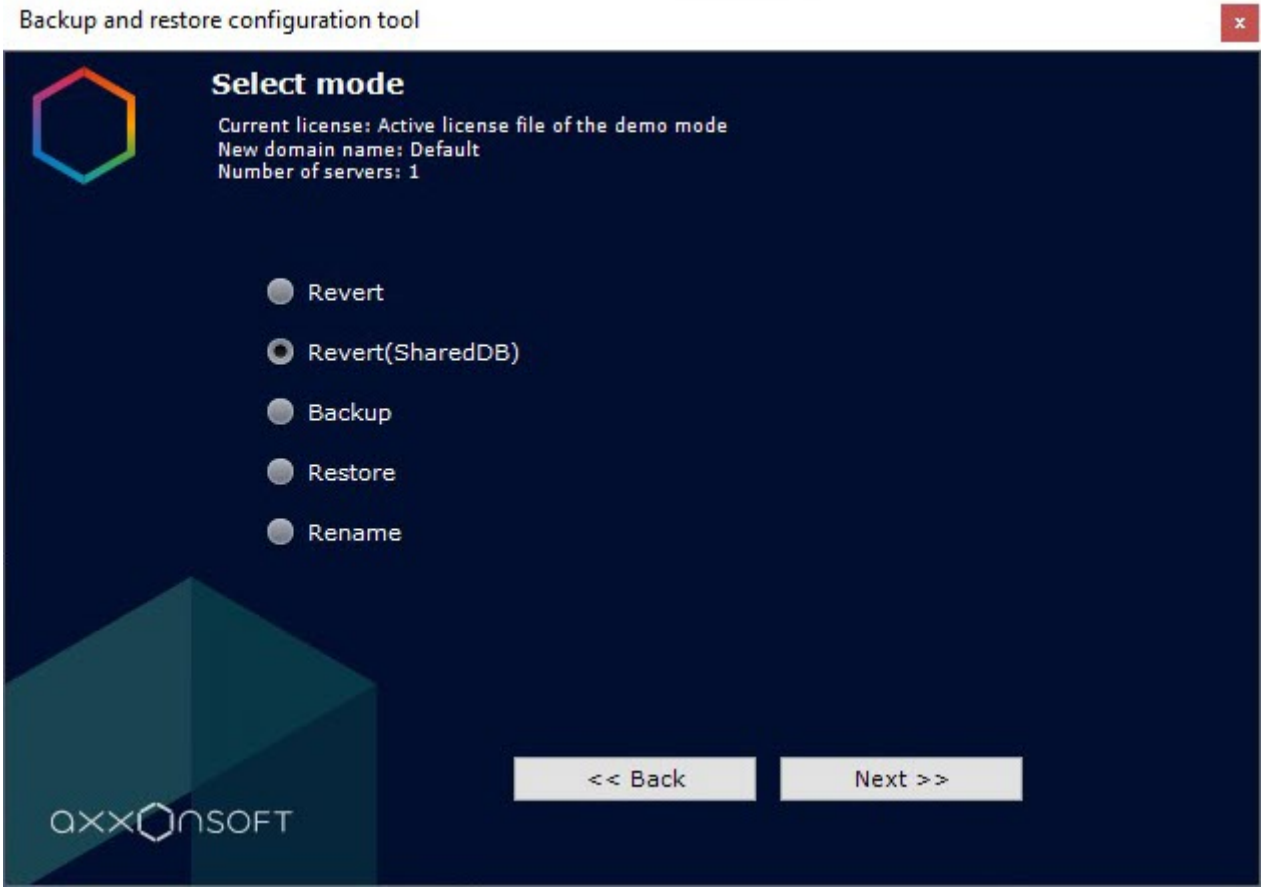
21.12.5 Reverting to the original domain configuration

If you make any change to the general configuration of the domain (create/delete roles, users, maps, layouts, and so on), a revision for backup is created.

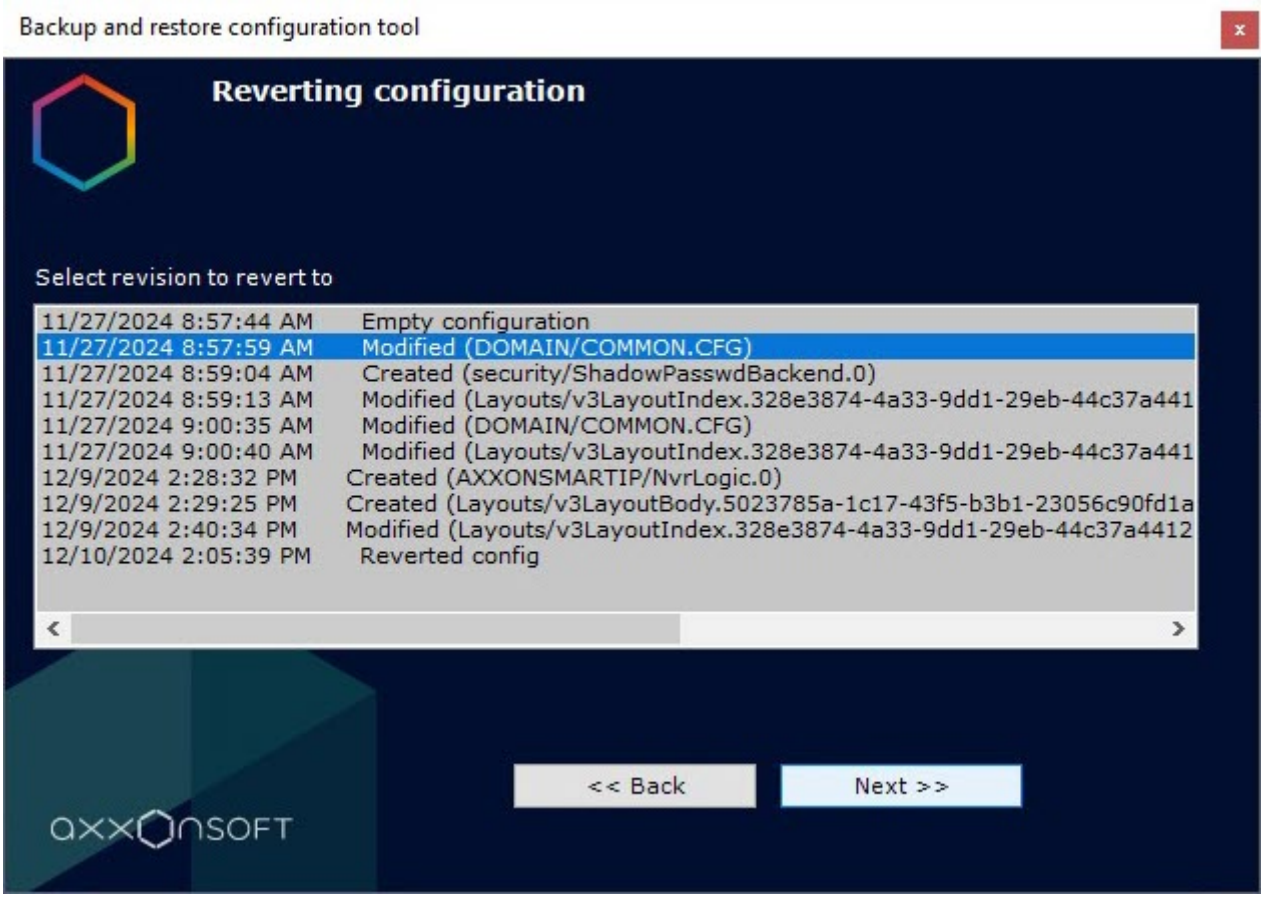
To revert the domain configuration to one of the backup revisions, do the following:

1. Start the **Backup and restore** utility (see Starting the utility(see page 1384)).

2. Select **Revert (SharedDB)**.

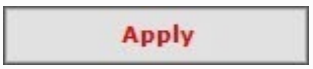


3. Click the **Next >>** button. A window opens. This window contains a list of available revisions for restoring the domain configuration with the time they were created and a description of what exactly was changed:



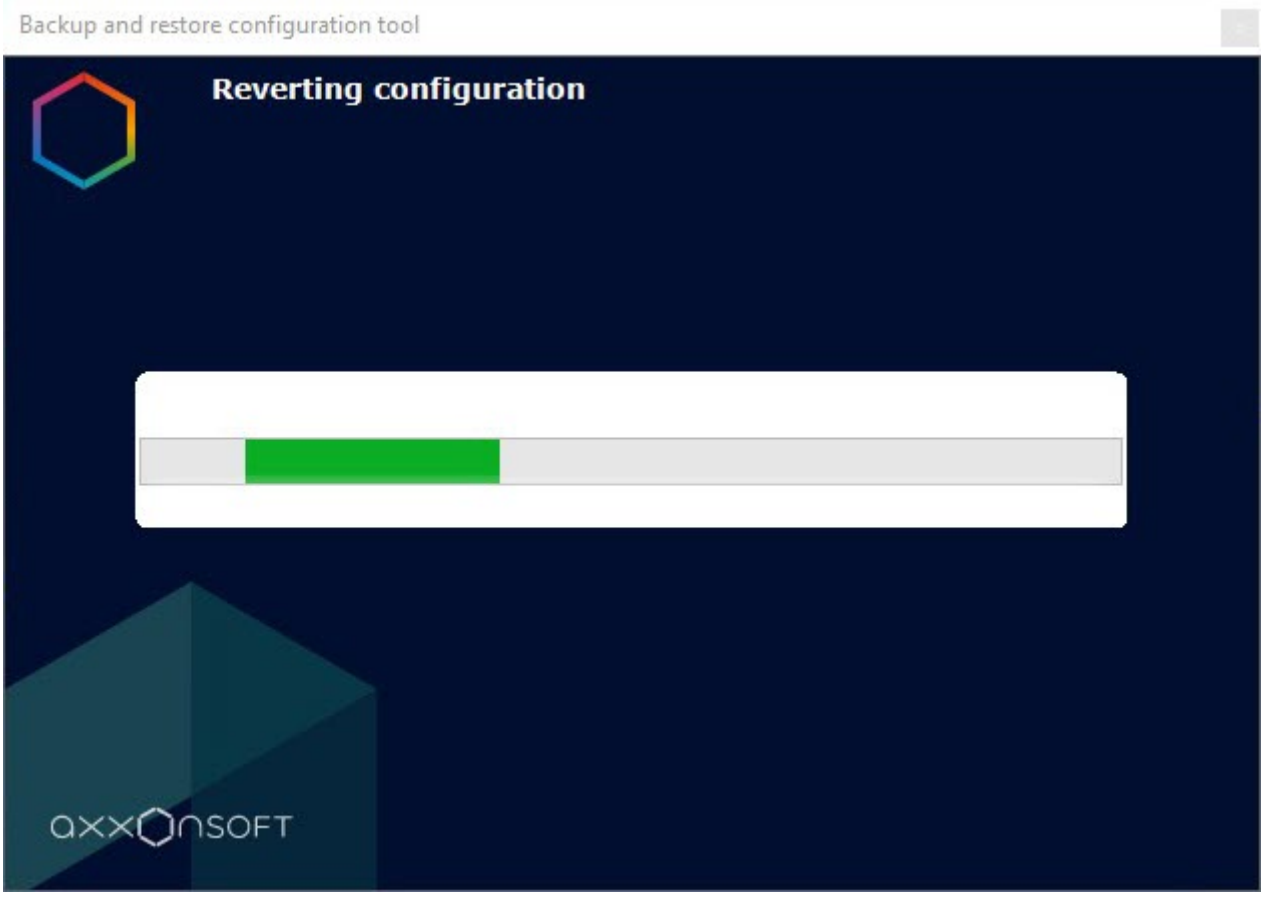
4. Select a revision to restore the domain from the list.

Note

- If you make several changes to the domain configuration, but click the **Apply** 

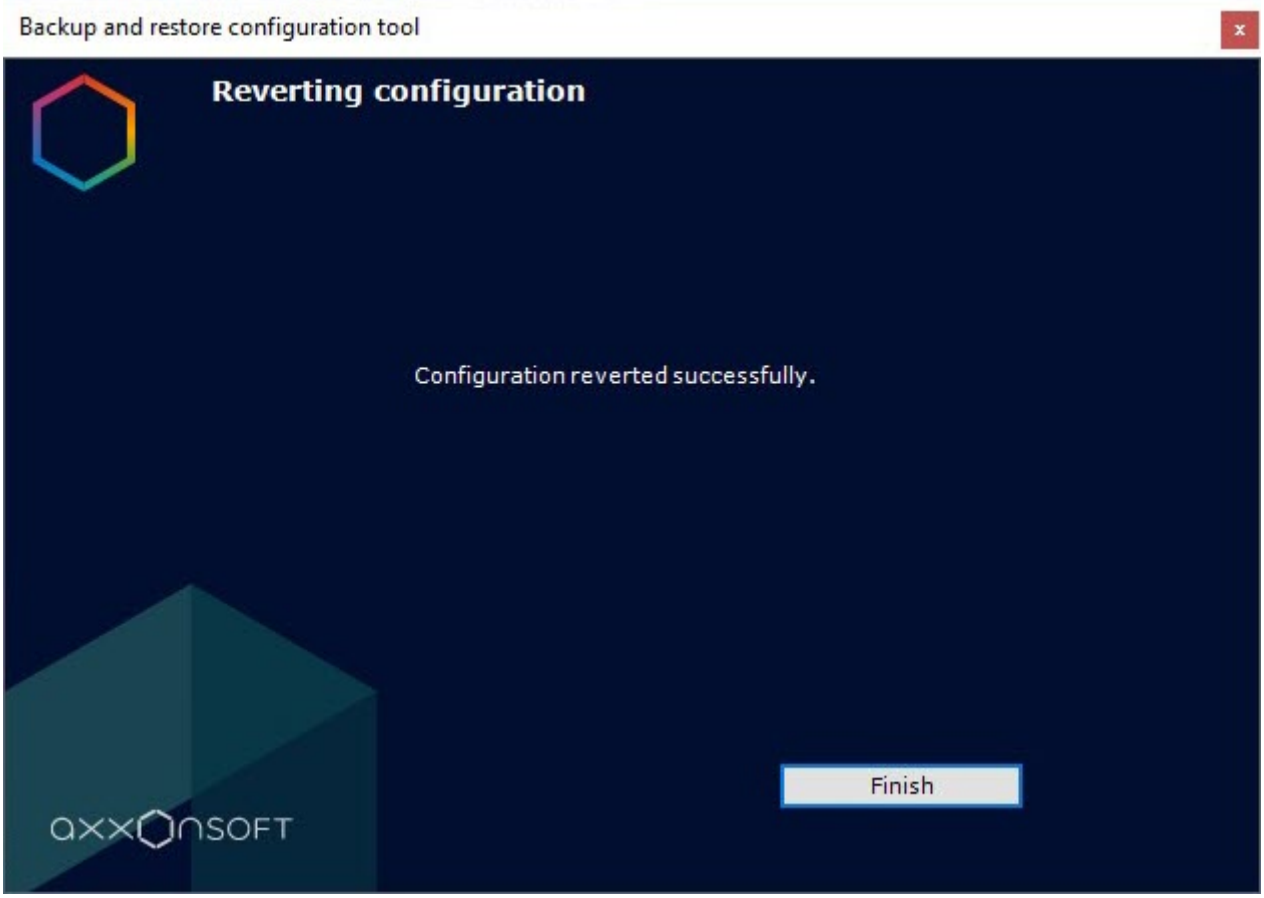
button once, only one revision is created in the list to restore the configuration.
- The **Empty configuration** position corresponds to the initial configuration.

5. Click the **Next >>** button. The process of reverting the domain configuration before the selected revision starts:



When the process of reverting the domain configuration is complete, a window is displayed with a message that the

operation was successful:



6. Click the **Finish** button.

Reverting the domain configuration to the selected revision is complete.

21.12.6 Creating a configuration backup

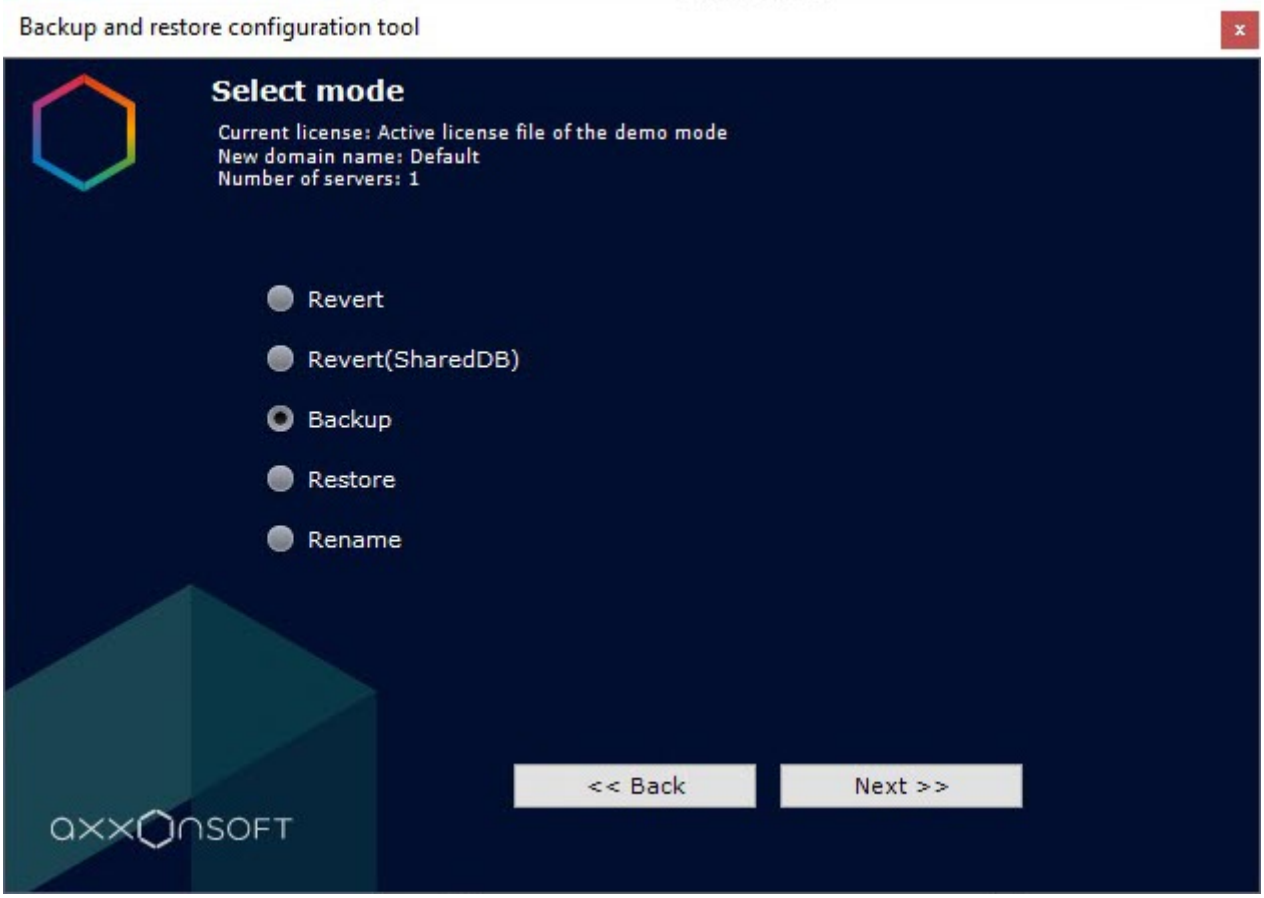
> **Attention!**
>
> We recommend backing up the configuration after any significant configuration change.

Backing up the configuration involves creating and saving copies of the license key, domain structure, all created objects, their parameters and connections with change history, as well as the database containing users, groups, passwords and layouts.

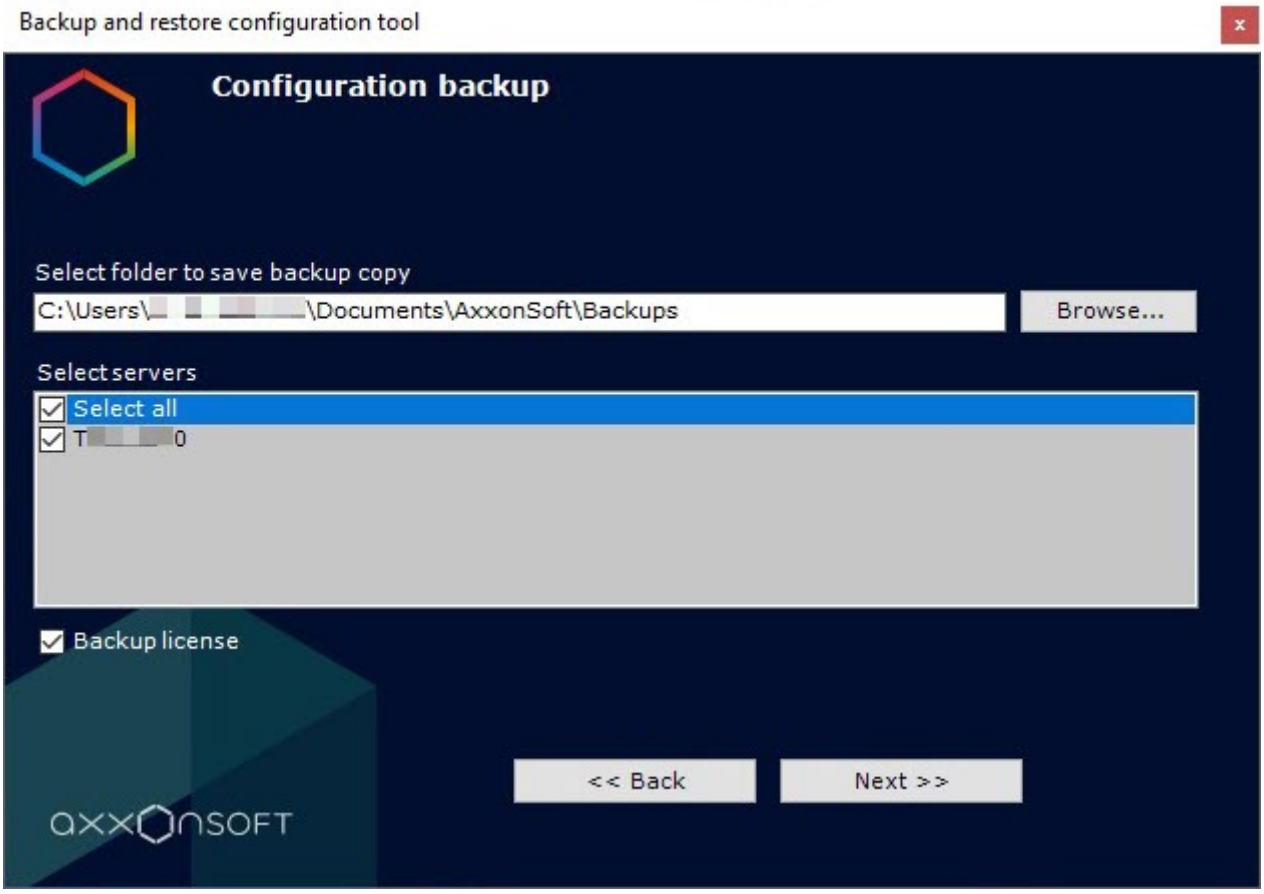
To back up the configuration, do the following:

1. Start the **Backup and restore** utility (see Starting the utility(see page 1384)).

2. Select **Backup**.

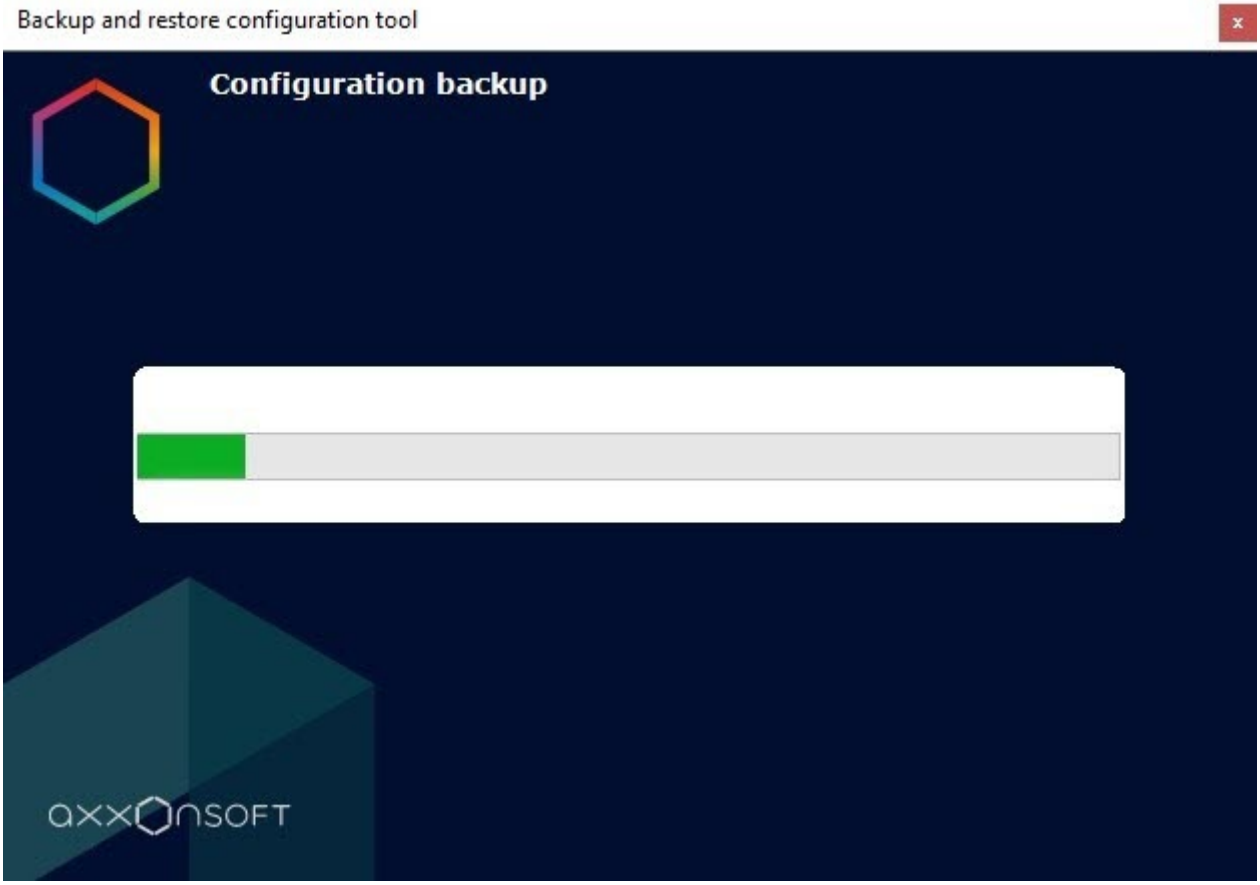


3. Click the **Next >>** button. A window for configuring backup settings opens:

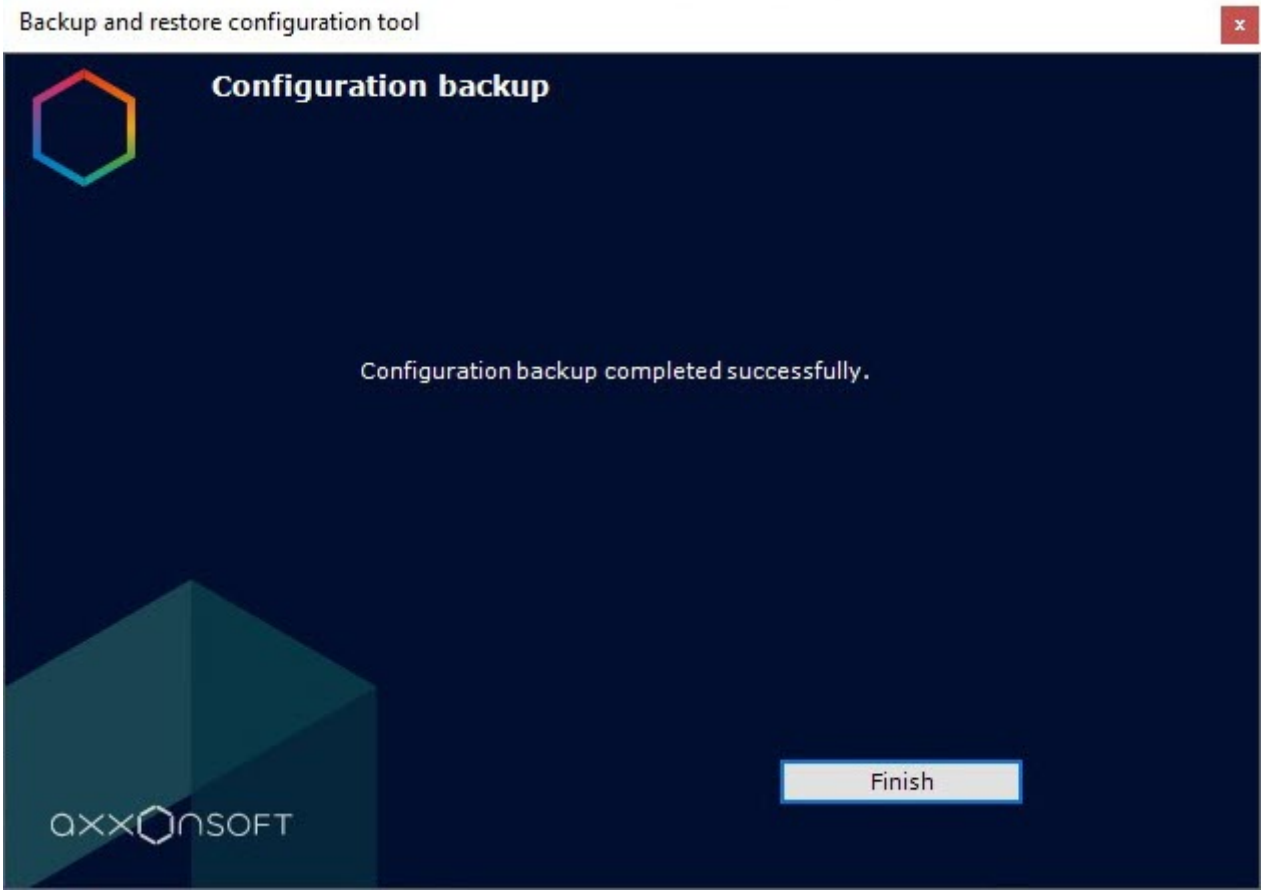


4. In the **Select folder to save backup copy** field, enter the full path to the directory where the configuration backup will be saved. The default directory is **<System disk>:\Users\<Current Windows user>\documents\AxxonSoft\Backups**. To specify the path using standard Windows tools, click the **Browse** button.
5. In the **Select servers** section, set the checkbox next to the name of the server to back up. You can select several servers. To select all servers, set the **Select all** checkbox.
6. Set the **Backup license** checkbox to save the license key to a configuration backup. When restoring a copy of the configuration, it is possible to restore the configuration with the license key. If you don't restore the configuration with the license key, the system will work in the demo mode.

7. Click the **Next >>** button. The configuration backup process starts:



When configuration backup is complete, a window is displayed with a message that the operation was successful:



8. Click the **Finish** button.

Creating a configuration backup is complete.

21.12.7 Restoring the configuration backup

Attention!

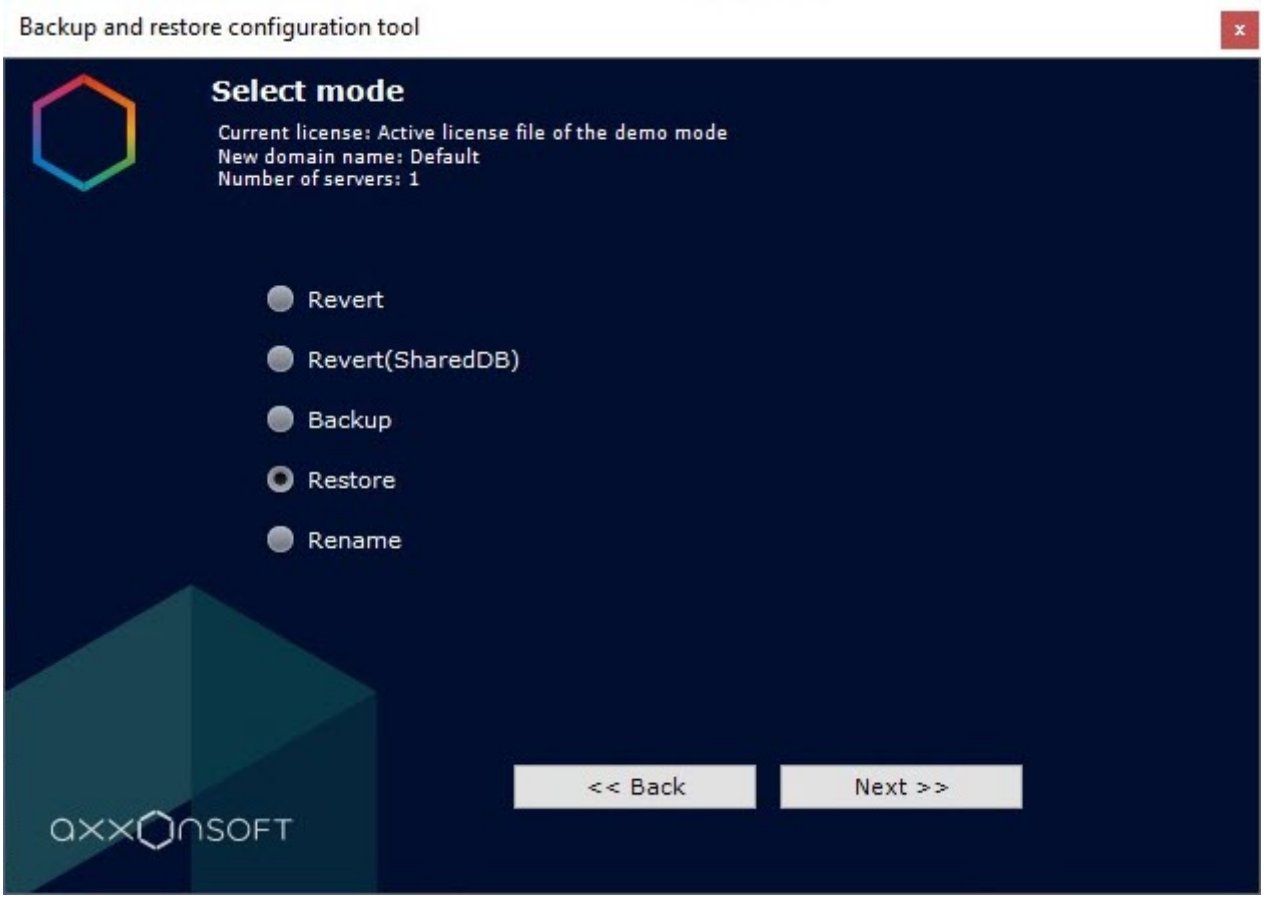
If the backup copy doesn't match the current version of the product (including the build number), critical errors can occur in the system during the configuration restore, and the configuration restore process will be completed incorrectly. We can guarantee that your configuration will be fully recovered if:

- the backup was created on the same software version (including the build number),
- the backup was created on the same computer, if licensing without the Guardant key was used (see Licensing methods(see page 133)),
- the name of the current server matches the name of the server in the configuration backup (see Renaming the local server(see page 1402)).

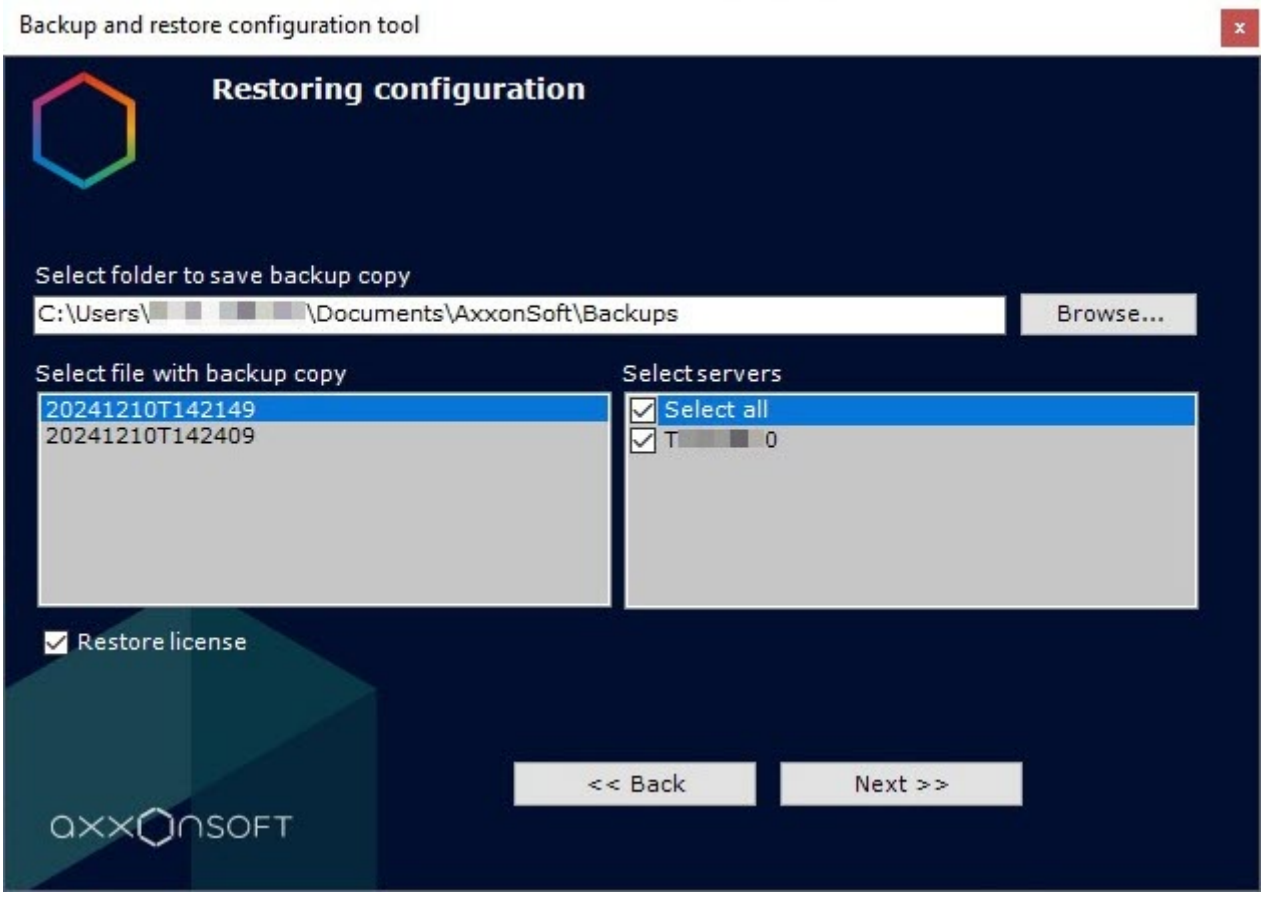
You can find the information about the product version and computer HID in a JSON file in the saved configuration folder.

To restore a configuration backup, do the following:

1. Start the **Backup and restore** utility (see Starting the utility(see page 1384)).
2. Select **Restore**.

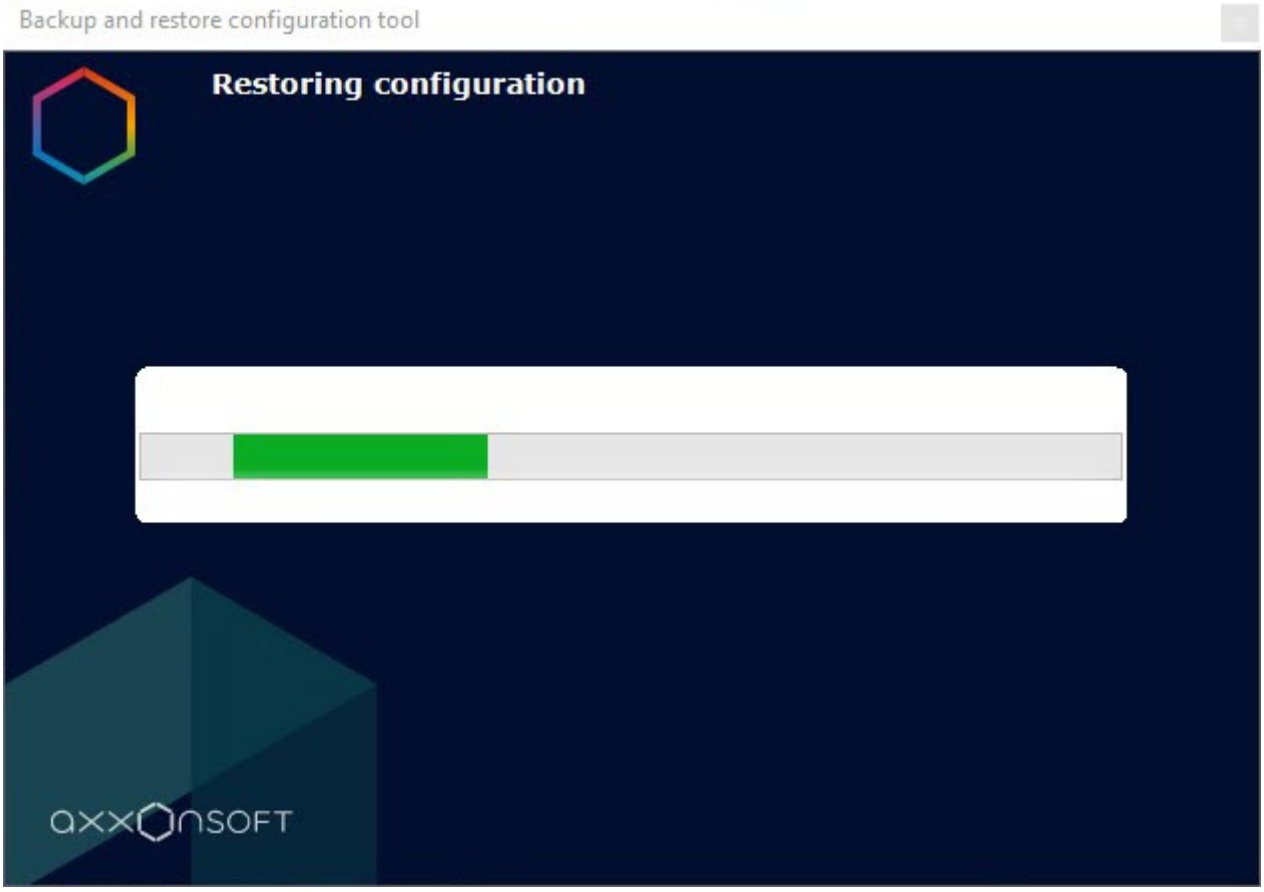


3. Click the **Next >>** button. The configuration restore settings window opens:

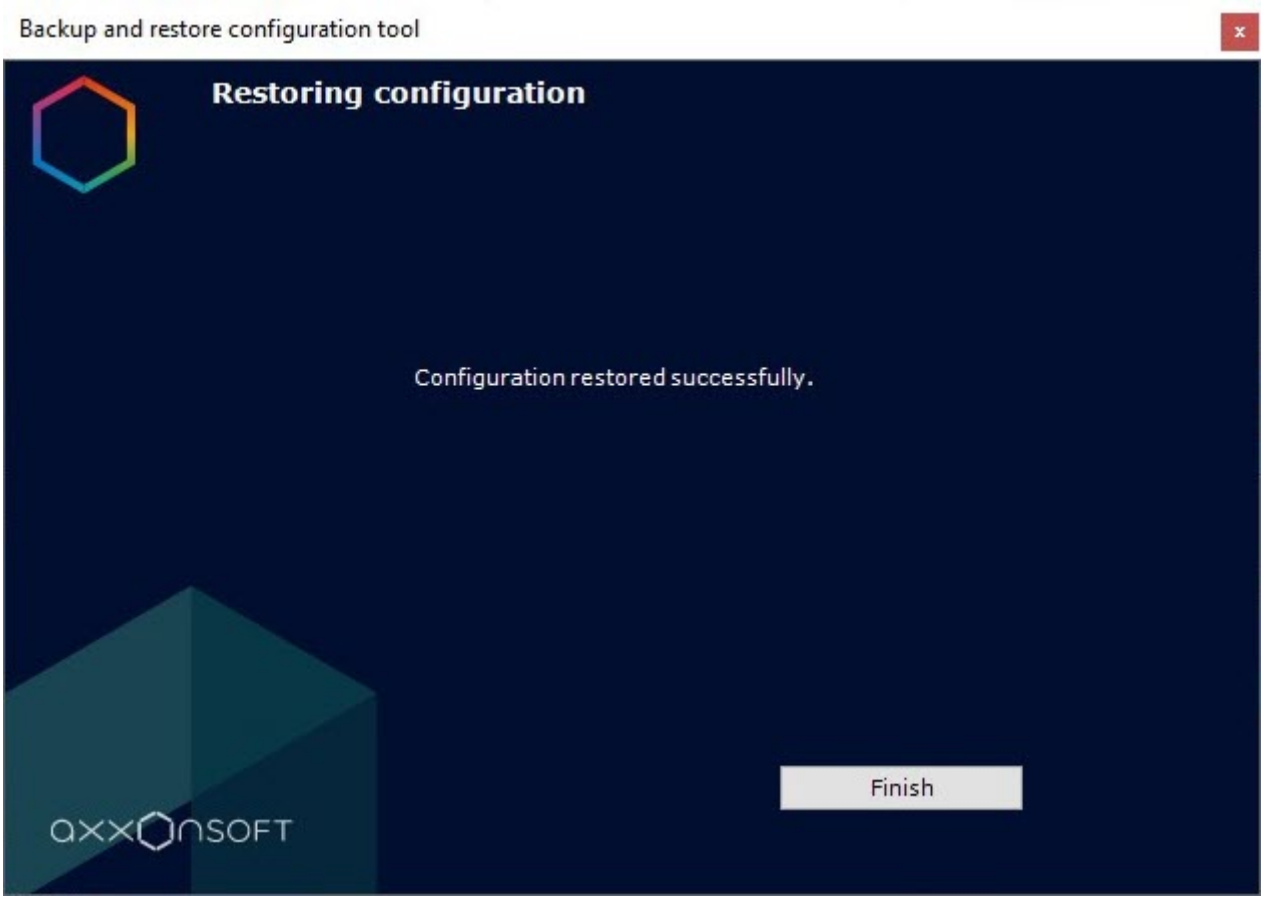


4. In the **Select folder to save backup copy** field, enter the full path to the directory where the configuration backup is saved. The default directory is **<System disk>:\Users\<Current Windows user>\documents\AxxonSoft\Backups**. To specify the path using standard Windows tools, click the **Browse** button.
5. In the **Select file with backup copy** section, select the file with the configuration backup.
6. In the **Select servers** section, select the required server/servers in the current domain. You can select a server in the list only if it is present in the domain and its corresponding backup is present in the open file.
7. Set the **Restore license** checkbox to restore the license key that was stored at the time you backed up the configuration (see Creating a configuration backup(see page 1395)). If you don't restore the license, *Axxon One* will work in the demo mode.

8. Click the **Next >>** button. The process of restoring the configuration backup starts:



When configuration restore is complete, a window is displayed with a message that the operation was successful:



9. Click the **Finish** button.
10. Restart the *Axxon One* server (see Starting and stopping Axxon One software(see page 137)).

Restoring the configuration backup is complete.

21.12.8 Renaming the local server

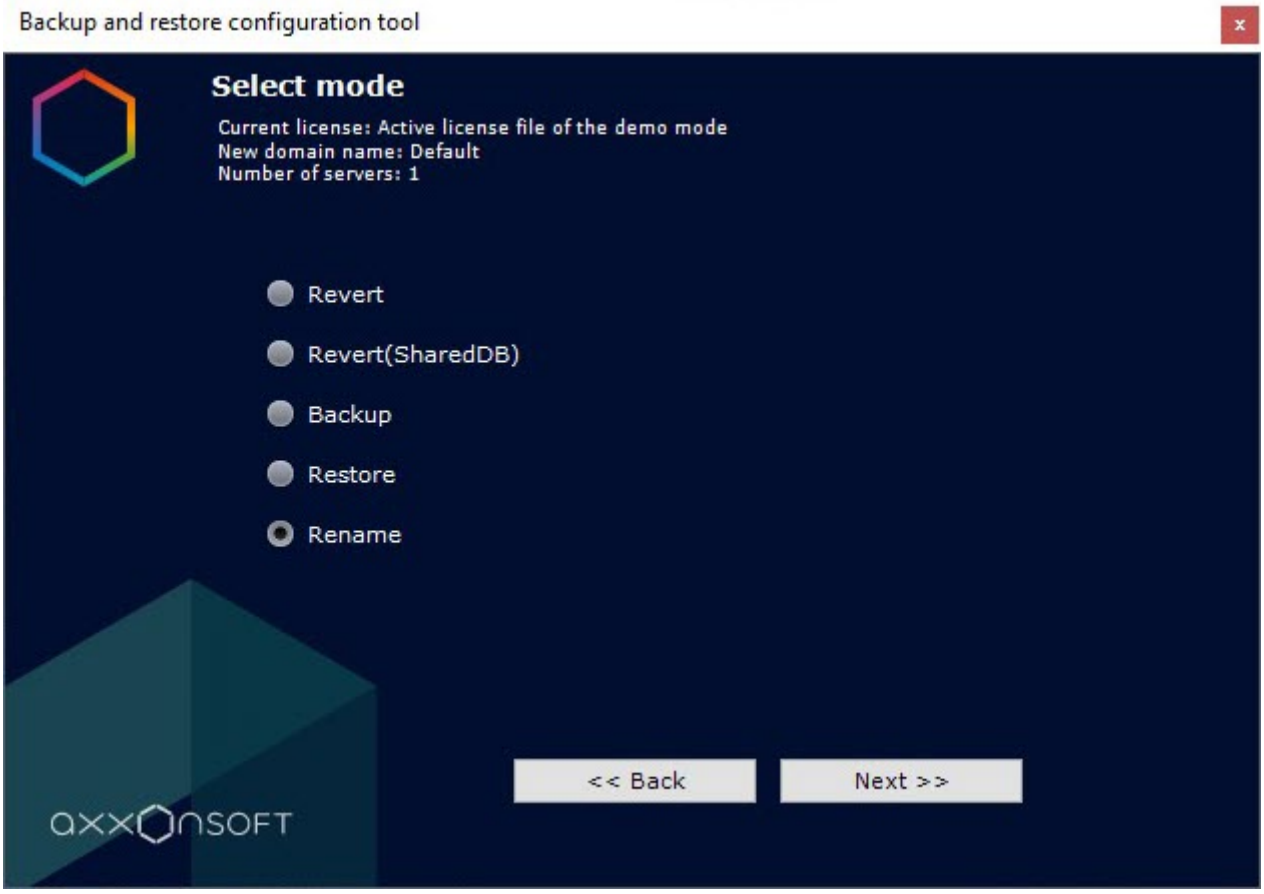
Attention!

- Before you rename the server, we strongly recommend that you read the restrictions on names of servers and computers in *Axxon One* (see Limitations of Axxon One).
- After you rename the server, the server is excluded from the domain. As a result, access to the archive will be lost, maps, automatic rules, and macros will be deleted, and cameras of the renamed server will be removed from the layouts.

To rename the local server, do the following:

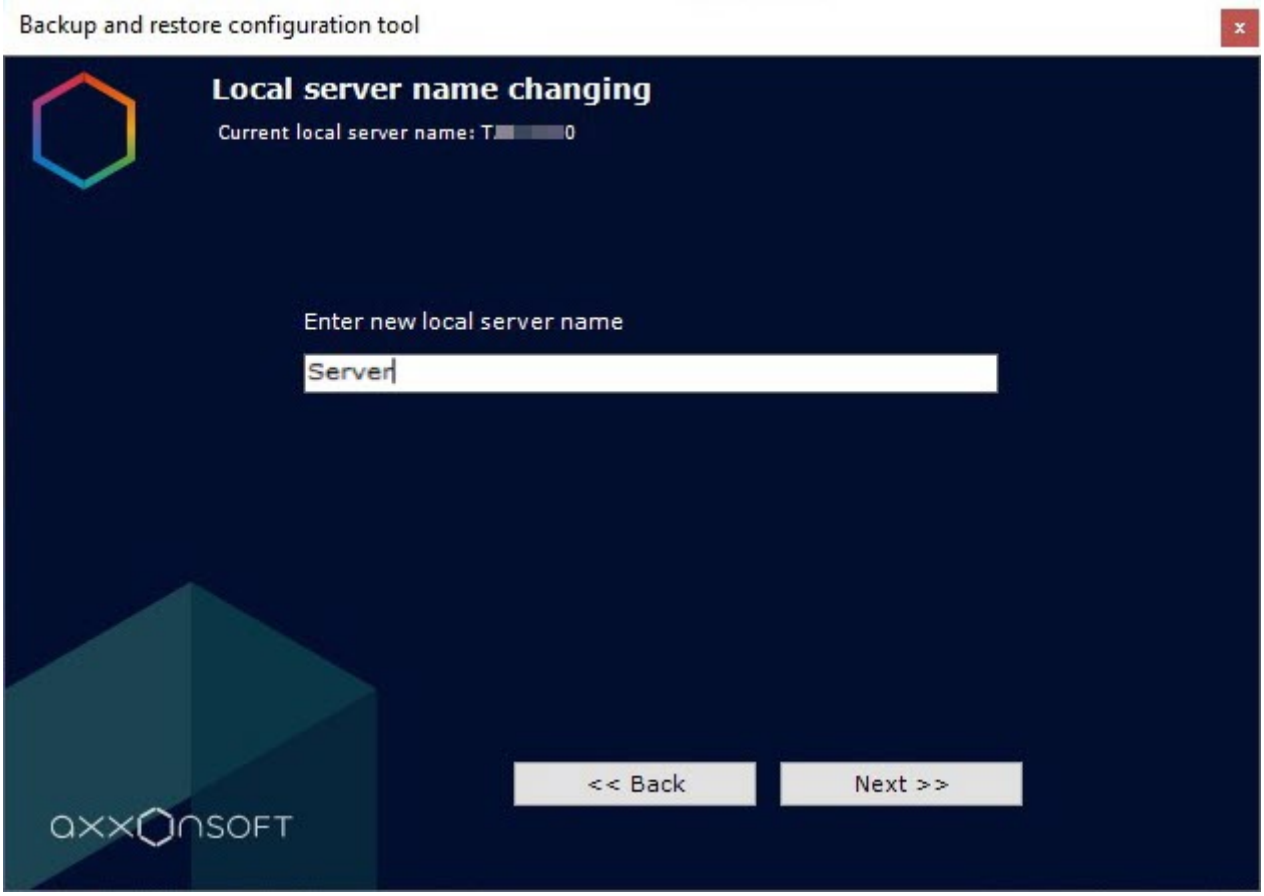
1. Start the **Backup and restore** utility (see Starting the utility(see page 1384)).

2. Select **Rename**.

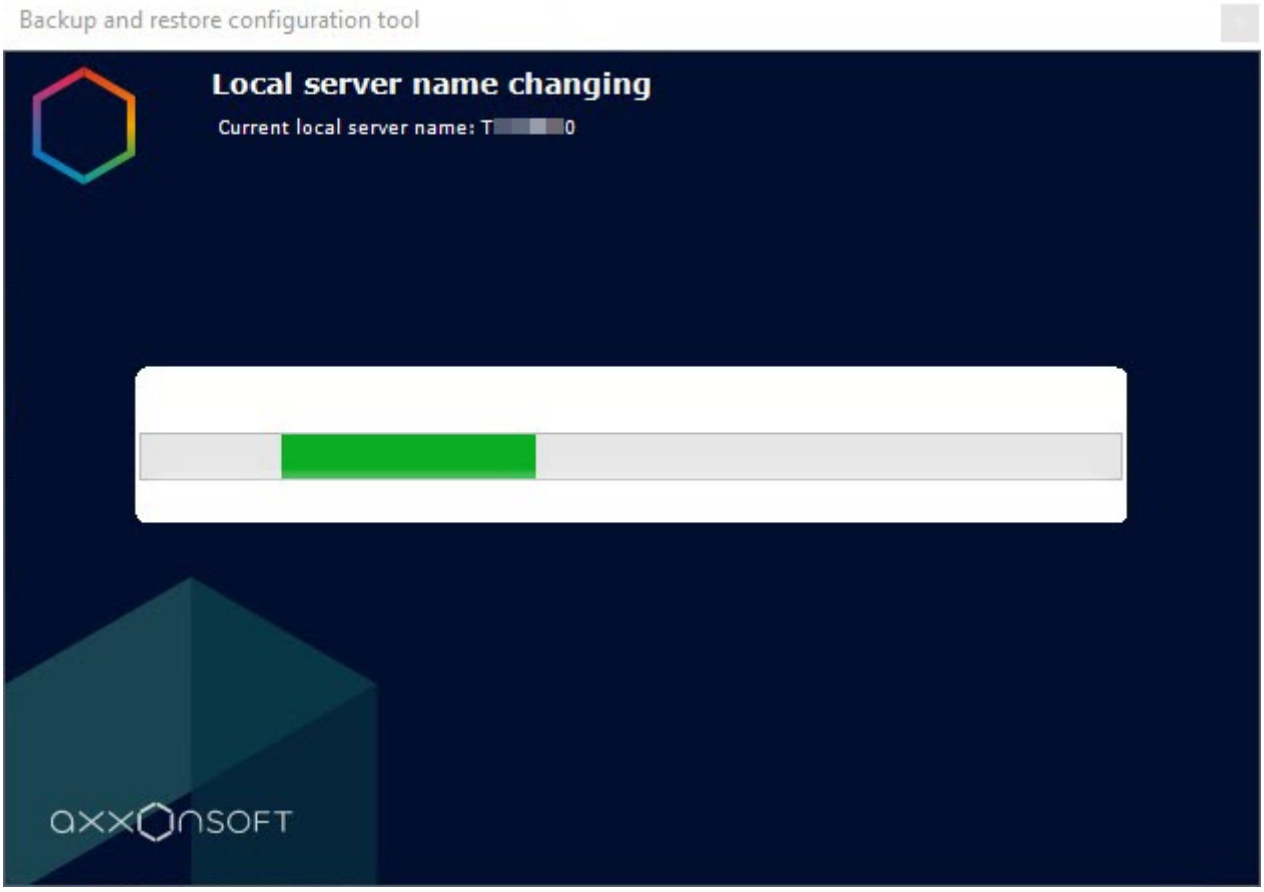


3. Click the **Next >>** button.

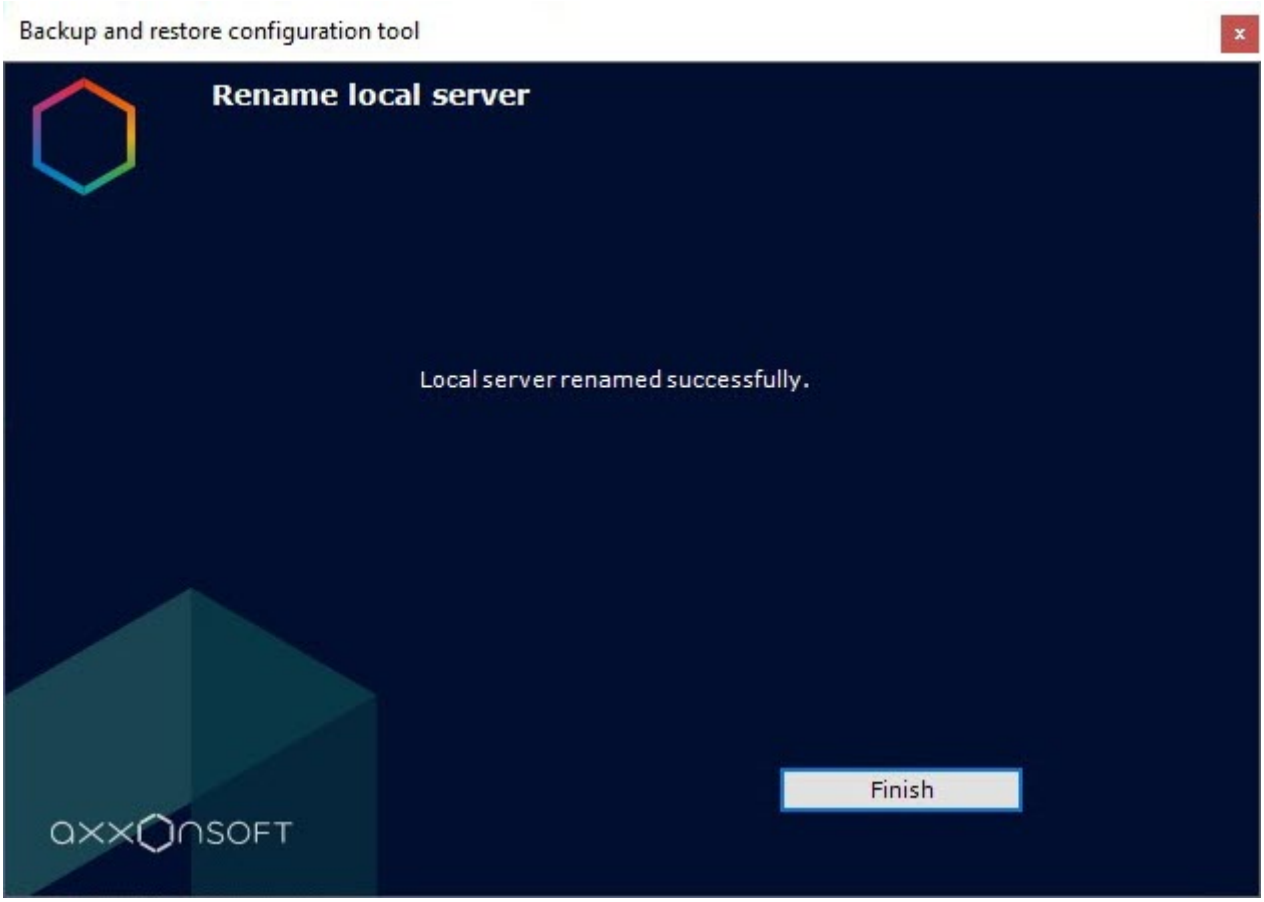
4. In the **Enter new local server name** field, enter a new name of the local server.



5. Click the **Next >>** button. The process of renaming the server starts:



When the process of renaming the server is complete, a window is displayed with a message that the operation was successful:



6. Click the **Finish** button.

Renaming the local server is complete.

21.12.9 Migrating a configuration from one operating system to another

You can also migrate the *Axxon One* configuration from one operating system to another (see Migrating a configuration from one operating system to another(see page 1406)).

21.12.10 Migrating a configuration from one operating system to another

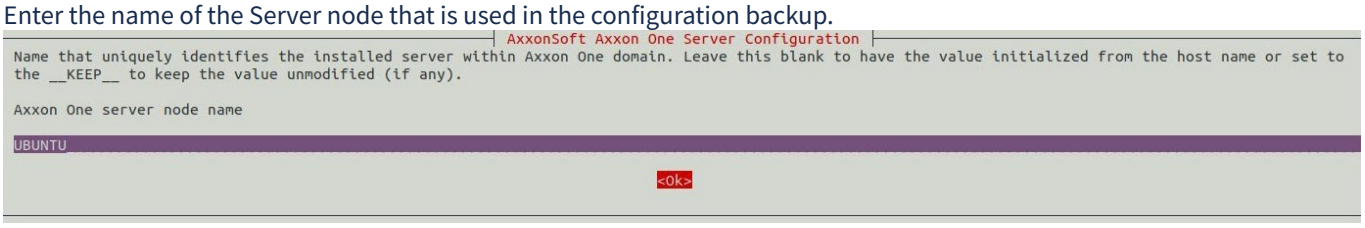
21.12.10.1 Migrating a configuration from Linux OS to Linux OS

To migrate the *Axxon One* configuration from Linux OS to Linux OS, do the following:

1. Install the *Axxon One* Client on Windows OS, or use an already installed Client (see Installation(see page 98)).
2. Connect to the Backup and restore utility as a remote user and back up the configuration (see Backup and restore utility(see page 1384)).
3. In Linux OS, run the command:

```
sudo dpkg-reconfigure axxon-one
```

4. Enter the name of the Server node that is used in the configuration backup.



5. Run the Backup and restore utility (see Backup and restore utility(see page 1384)) from a remote Windows OS Client.
6. Restore the configuration by selecting the saved backup (see Backup and restore utility(see page 1384)).

Attention!

- When you migrate a configuration, archive as a file is migrated together with the hard disks. You must restore the paths to the archive volumes using the Linux OS administration tools. If you cannot restore the original paths to the logical archive volumes, you must configure the archive volume with a new path and then delete the inactive archive volume from the configuration.
- You can migrate archive as a partition in the same way as archive as a file.
- After you restore the archive, you must check the permission level of the archive file. The archive must belong to the **ngp** user.

21.12.10.2 Migrating a configuration from Linux OS to Windows OS

To migrate the *Axxon One* configuration from Linux OS to Windows OS, do the following:

1. Install the *Axxon One* Client on Windows OS, or use an already installed Client (see Installation(see page 98)).
2. Connect to the Backup and restore utility as a remote user and back up the configuration (see Backup and restore utility(see page 1384)).
3. Run the Backup and restore utility (see Backup and restore utility(see page 1384)) in Windows OS and select the specified Server at startup.

   Attention!

   The name of the local Server in Windows OS must match the name of the Server from the configuration backup.
4. Restore the configuration by selecting a saved backup (see Backup and restore utility(see page 1384)).
5. Deactivate the license (see Deactivating a license[413]) and reapply the license file (see Activation by applying license file[414]).

Attention!

If you used the disk in Linux OS entirely as an archive, you must add it again in Windows OS through the administration panel. After adding the disk, add a new archive volume without deleting the old archive. This is necessary to keep the cameras bound to the archive. Next, restart *Axxon One*. After that, the indexing process starts and the old data appears in the archive.

21.12.10.3 Migrating a configuration from Windows OS to Linux OS

To migrate the *Axxon One* configuration from Windows OS to Linux OS, do the following:

1. Back up the configuration in Windows OS (see Backup and restore utility(see page 1384)).
2. In Linux OS, run the command:

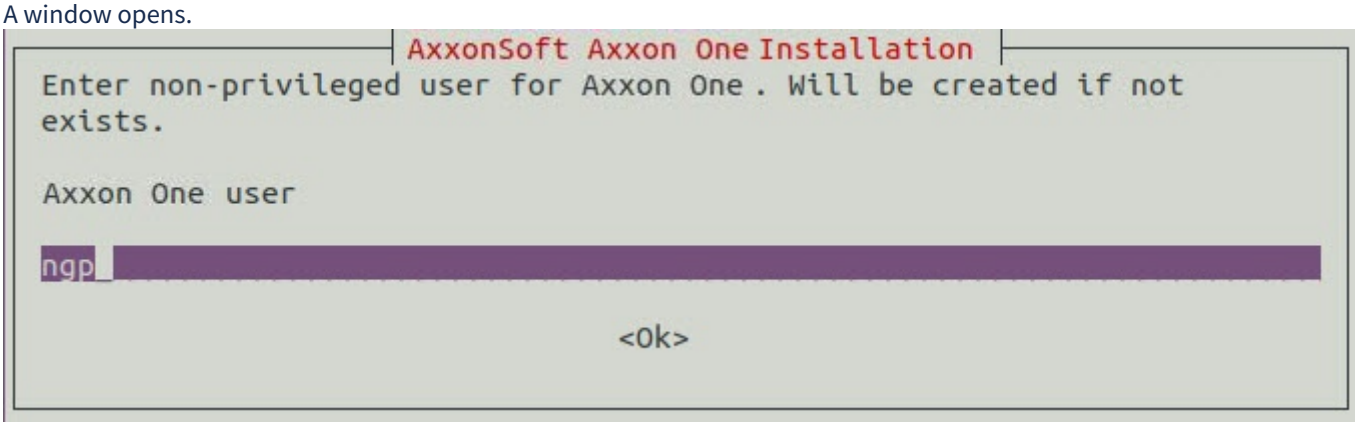
```
sudo dpkg-reconfigure axxon-one
```

Attention!

Server in Linux OS must belong to some domain.

413 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486863/Deactivating+a+license
414 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486847/Activation+by+applying+license+file

A window opens.



3. Press Enter and perform this action until the window of name change of the Server node is displayed.



4. Enter the Server node name that is used in Windows OS.
5. Run the Backup and restore utility (see Backup and restore utility(see page 1384)) and select the specified Server at startup.
6. Restore the configuration by selecting a saved backup (see Backup and restore utility(see page 1384)).
7. Deactivate the license (see Deactivating a license[415]) and reapply the license file (see Activation by applying license file[416]).

21.12.10.4 Migrating a configuration from Windows OS to Windows OS

To migrate the *Axxon One* configuration from Windows OS to Windows OS, do the following:

1. Back up the configuration in Windows OS (see Backup and restore utility(see page 1384)).
2. Run the Backup and restore utility (see Backup and restore utility(see page 1384)) on another Windows OS Client and select the specified Server at startup.

   Attention!

   The name of the local Server in Windows OS must match the name of the Server from the configuration backup.

3. Restore the configuration by selecting a saved backup (see Backup and restore utility(see page 1384)).

Attention!

- When you migrate a configuration, archive as a file is migrated together with the hard disks. You must restore the paths to the archive volumes using the Windows OS administration tools. If you cannot restore the original paths to the logical archive volumes, you must configure the archive volume with a new path and then delete the inactive archive volume from the configuration.
- You can migrate archive as a partition in the same way as archive as a file.

21.13 Gathering system information utility

The **Gathering system information** utility is used to:

- collect information about configuration,
- collect information about status of hardware,
- collect information about operation of the Windows OS security system,

415 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486863/Deactivating+a+license
416 https://docs.axxonsoft.com/confluence/spaces/one20en/pages/246486847/Activation+by+applying+license+file

- backup event database,
- collect dumps of running *Axxon One* processes.

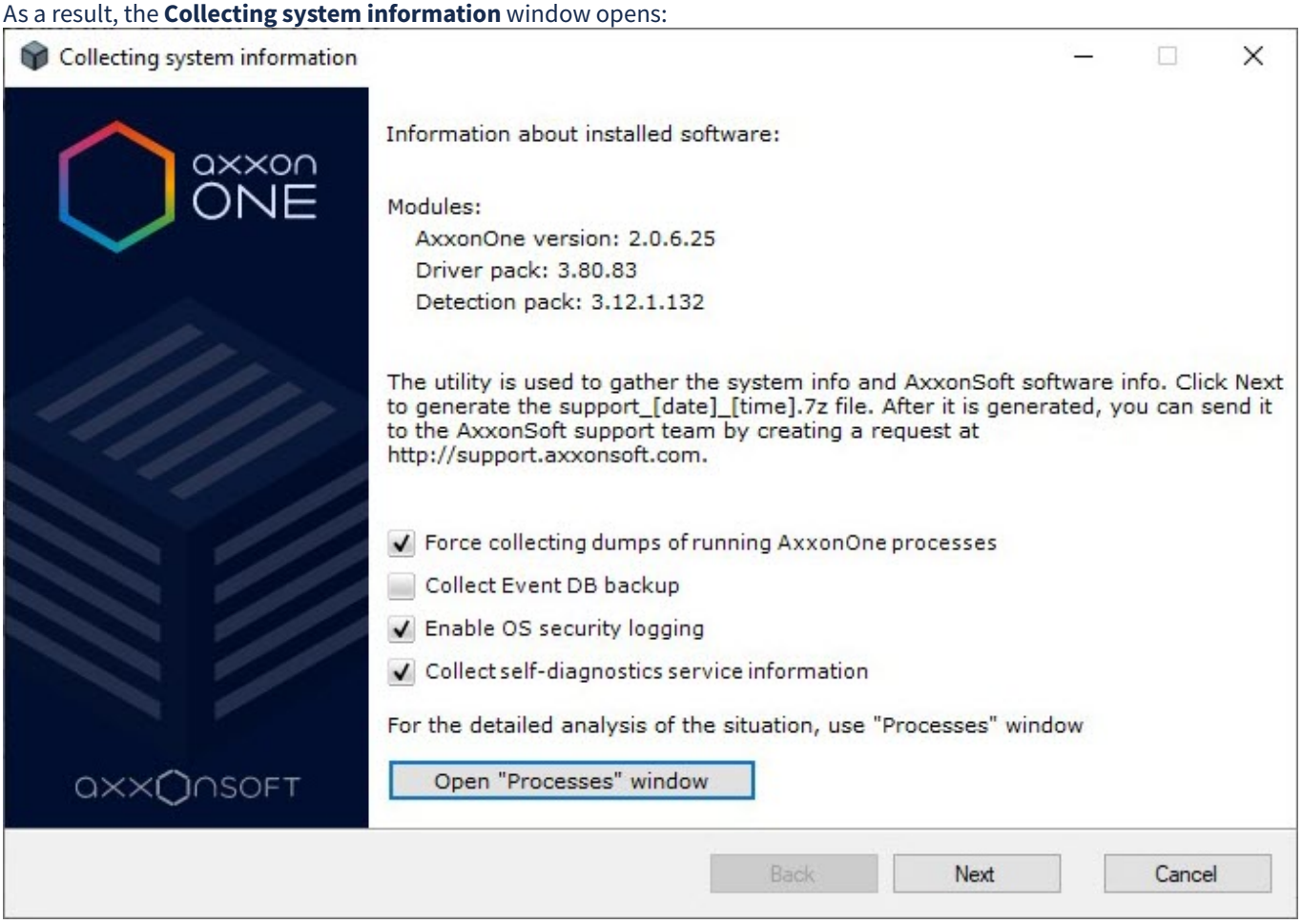
To collect system information, do the following:

1. Start the **Gathering system information** utility from the **Start** menu in Windows OS: **Start** → **Programs** → **Axxon One** → **Utilities** → **Gathering system information** or from the notification area **Collect logs** (see Tray Tool utility(see page 1378)).

   Note

   - The **Support.exe** executable file of the **Gathering system information** utility is located in the ***<Axxon One* installation folder>\AxxonSoft\Axxon One\bin*** folder.
   - You must run the **Gathering system information** utility as administrator.

   As a result, the **Collecting system information** window opens:



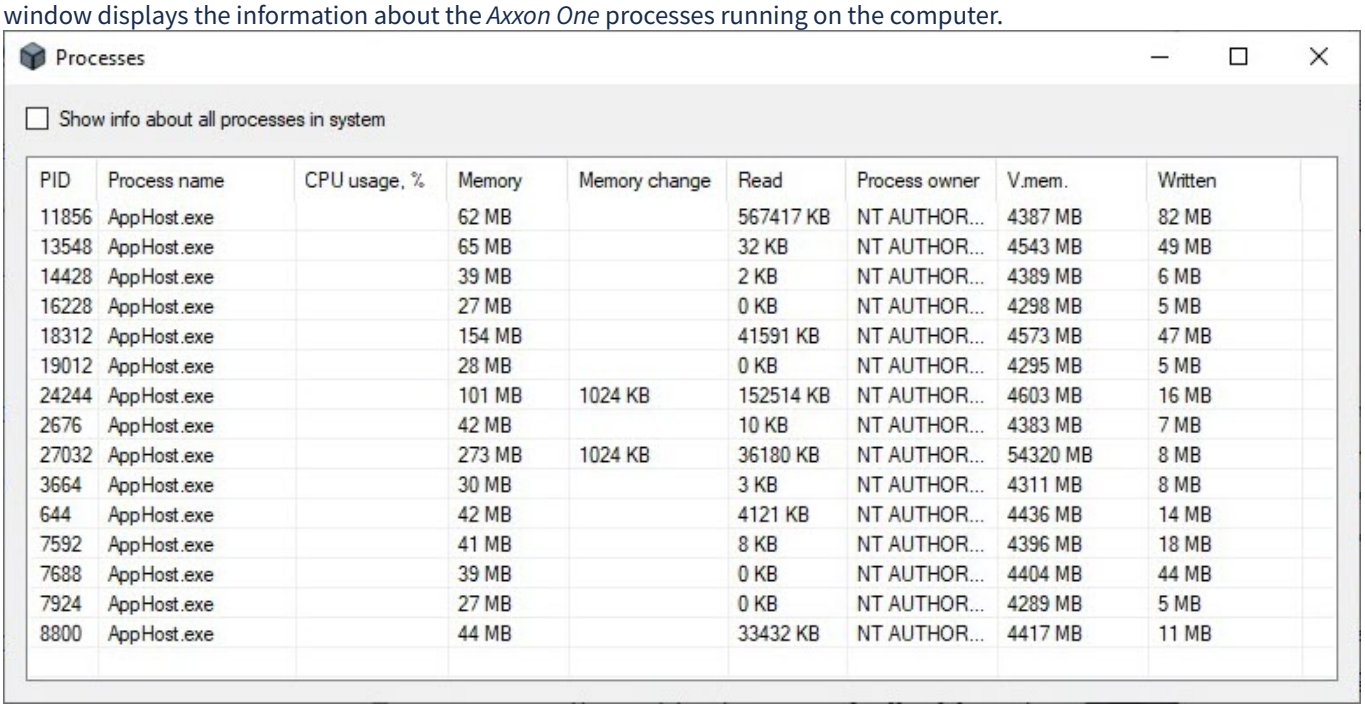
   Note

   Information about installed software can vary depending on the installed versions. Example:
   Modules:
   Axxon One version: 2.0.6.25
   Driver pack: 3.80.83
   Detection pack: 3.12.1.132

2. Clear/set the checkboxes next to the settings of system information collection:
   a. **Force collecting dumps of running AxxonOne processes**. By default, a report includes data about already launched *Axxon One* processes. To exclude this data from a report, clear the checkbox.
   b. **Collect Event DB backup**. Set the checkbox to include a backup copy of events database in a report.
   c. **Enable OS security logging**. By default, a report includes information about operation of the Windows OS security system. To exclude this data from a report, clear the checkbox.

d. **Collect self-diagnostics service information**. By default, a report includes information from the self-diagnostics service (see Self-diagnostics service(see page 1097)). To exclude this data from a report, clear the checkbox.

3. For a detailed analysis of a situation, click the **Open "Processes" window** button. The **Processes** window opens. The window displays the information about the *Axxon One* processes running on the computer.

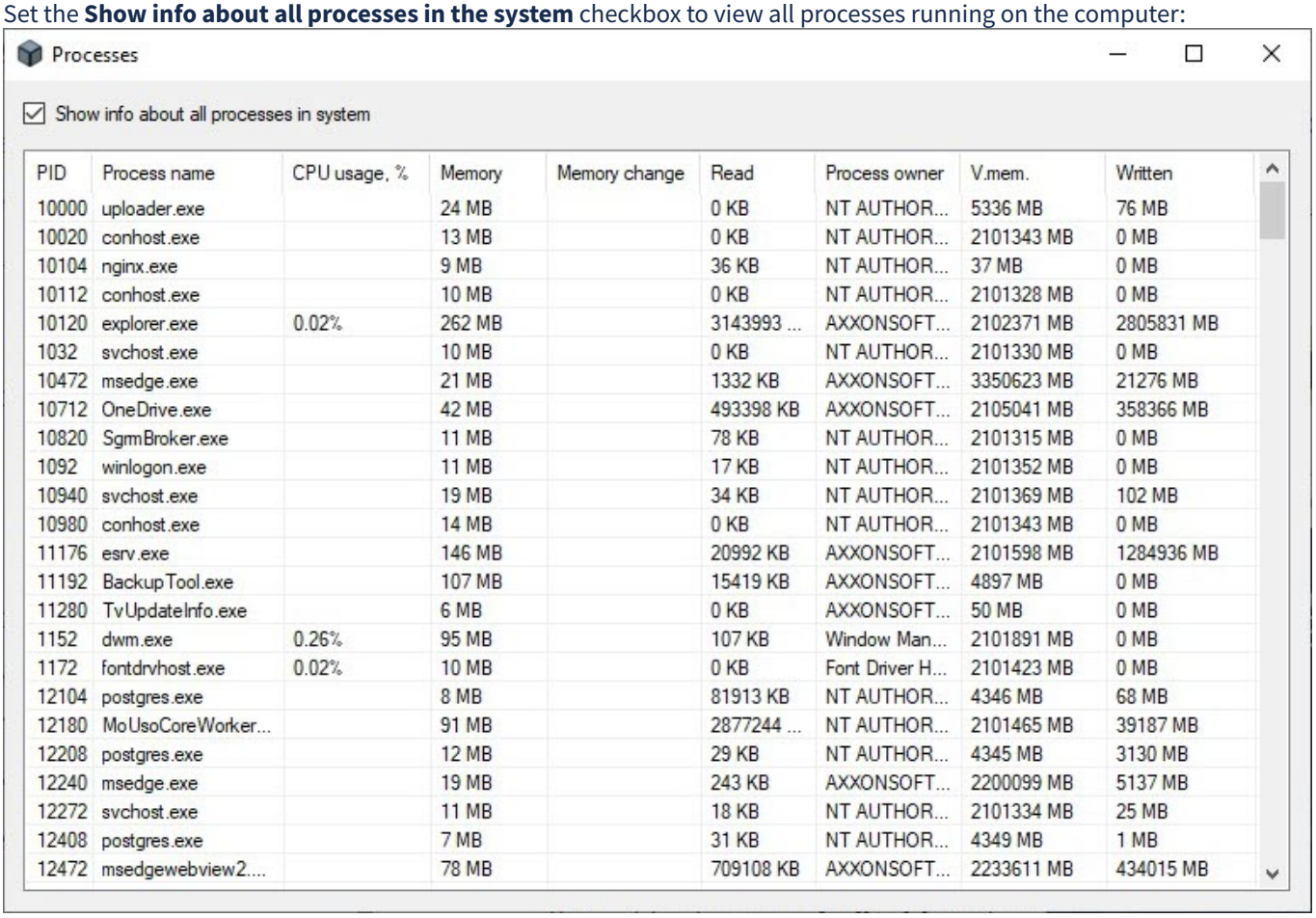


List of all possible *Axxon One* processes is given in the table:

Process	Description
Axxon.Discovery	Process that searches for peripheral devices (cameras, analog video cards, devices connected to a serial port, and so on)
Axxon.VMDA	Process responsible for the metadata database, writes metadata and searches in the archive
Axxon.MMSS	Web-Server process
Axxon.Notification	Process for managing events in the system and creating a database of these events
Axxon.Axxon One	GUI process
Axxon.Bootstrap	Main process responsible for configuration, licensing, storing settings, and starting other processes
Axxon.FileBrowser	Process that provides access to the file system and information about server files
Axxon.NVR	Logic module responsible for alarms and automatic rules
Axxon.InfraServer	Process responsible for interaction between *Axxon One* modules
Axxon.Decoder	Process that performs decoding of multimedia streams
Axxon.Detector	Process that performs detection
Axxon.Proxy	Process that performs buffering and decimation of multimedia streams

Process	Description
Axxon.NVR_Archive	Process that writes multimedia data to the archive
Axxon.Ipint	Process that interacts with the *DriversPack*
Axxon.MiscMMSS	Process that plays back audio on the server audio card

Set the **Show info about all processes in the system** checkbox to view all processes running on the computer:

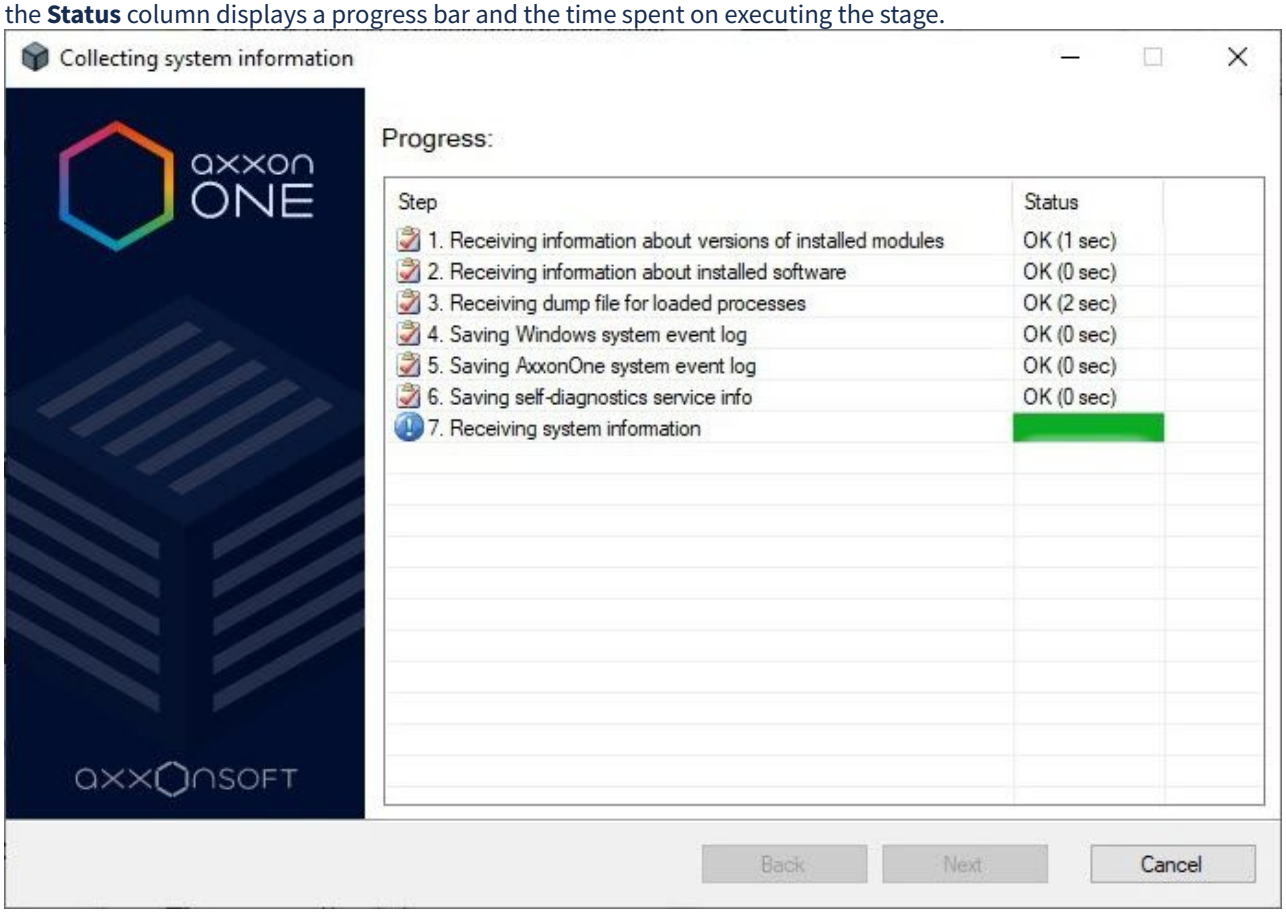


Note

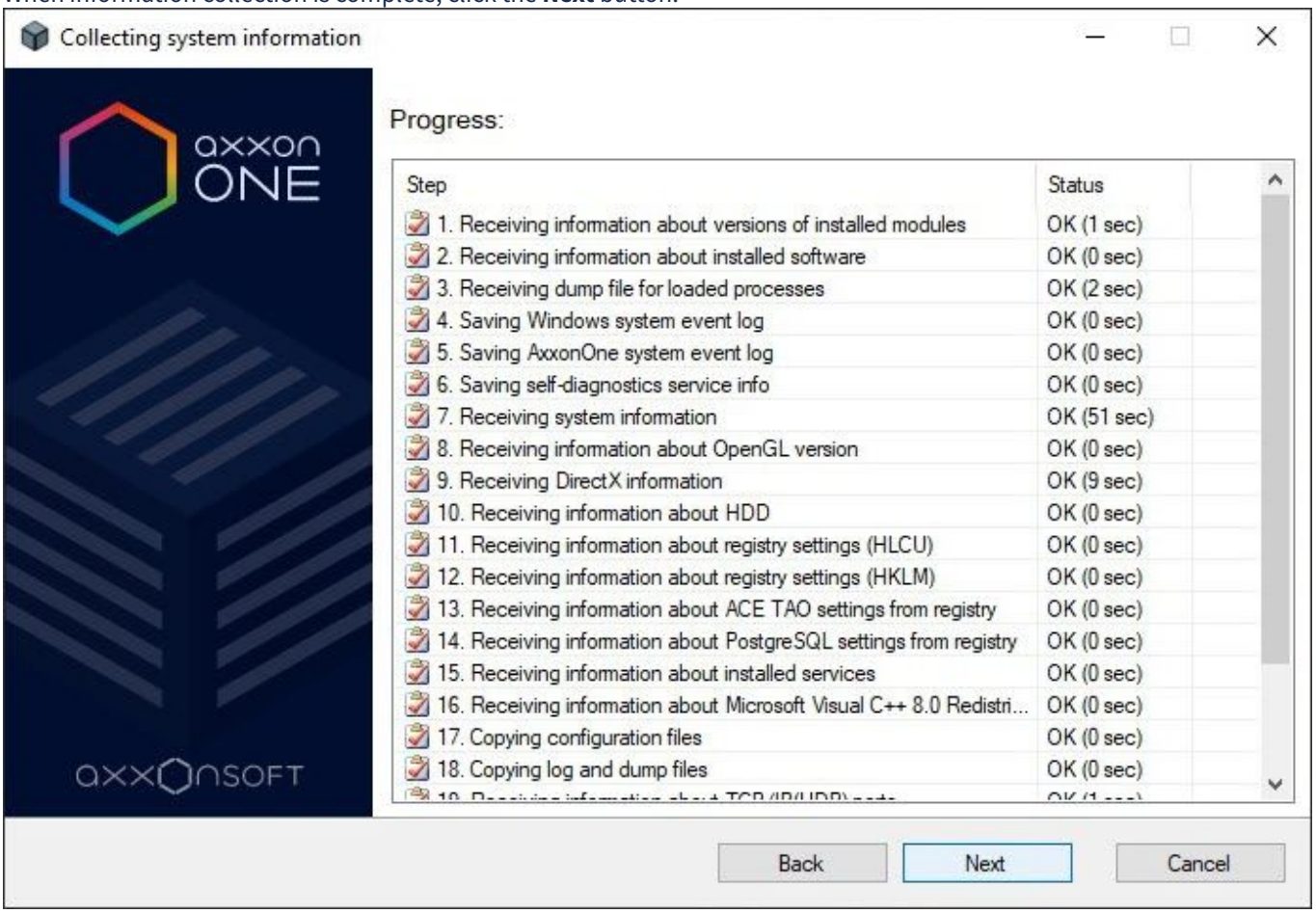
To close the **Processes** window, click the ✕ button.

4. Click the **Next** button to start the data collection process. The table that displays the progress of data collection includes two columns:
   a. the **Step** column displays a brief description of the stage of information collection.

b. the **Status** column displays a progress bar and the time spent on executing the stage.

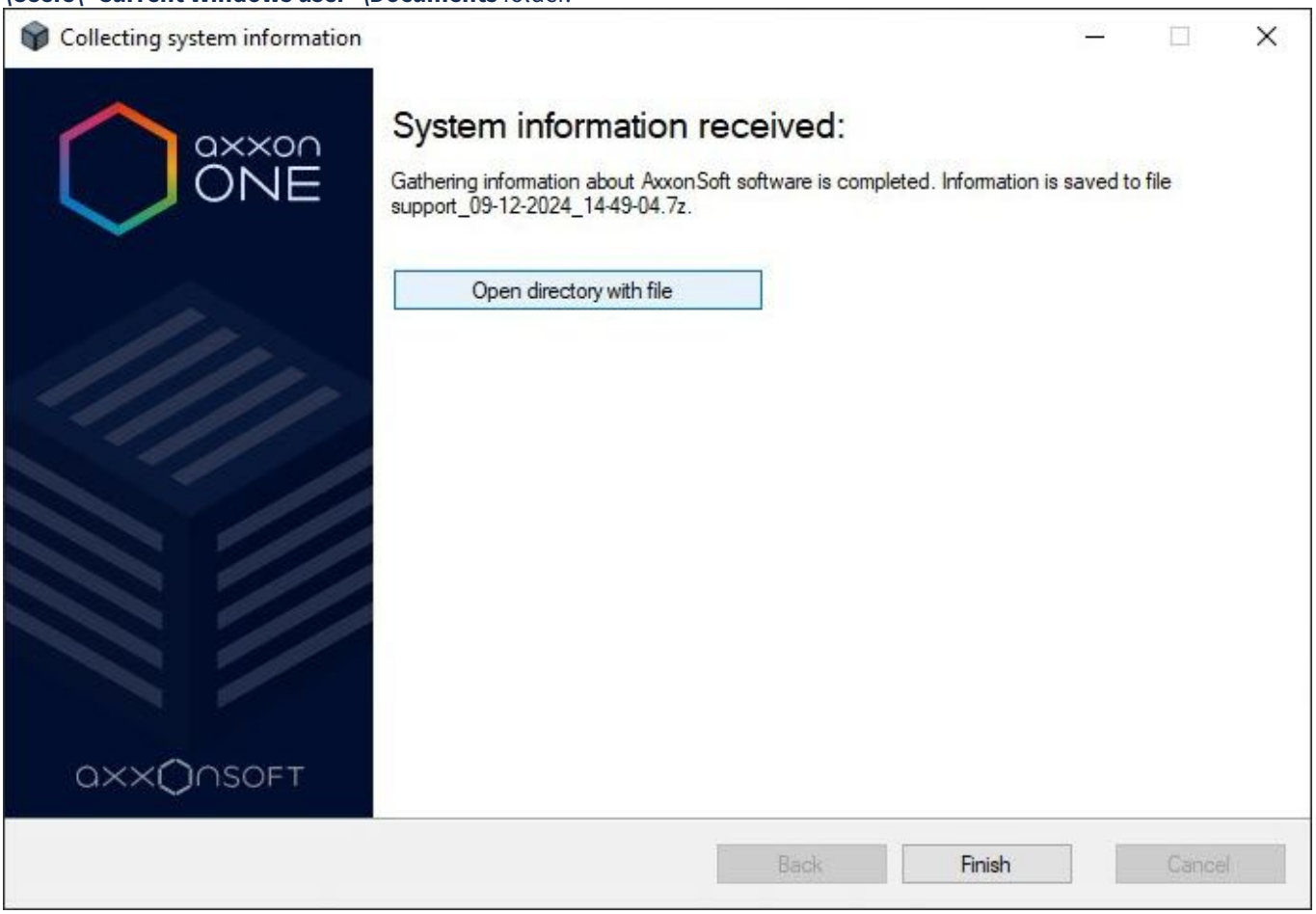


5. When information collection is complete, click the **Next** button.



A window containing information about the generated archive **support_[date]_[time].7z** opens. You can access the folder containing this archive by clicking the **Open directory with file** button. Archive is located in the **<System disk>:**

\Users\<Current Windows user>\Documents folder.



3. To close the **Gathering system information** utility, click the **Finish** button or click the ✕ button.

Collecting system information is complete. To solve the required tasks, submit a request at https://support.axxonsoft.com/ with the problem description and attach the **support_[date]_[time].7z** archve.

21.14 Log management utility

On the page:

- General information(see page 1415)
- Starting the utility(see page 1415)
- Stopping the utility(see page 1416)
- Configuring the server log storage and archiving options(see page 1416)
- Configuring the client log storage options(see page 1417)
- Configuring logging levels(see page 1418)

21.14.1 General information

The **Log management utility** is used to:

- configure the server log storage and archiving options (see Configuring the Server log storage and archiving options),
- configure the client log storage options (see Configuring the Client log storage options),
- configure logging levels of the *Axxon One* server and client (see Configuring logging levels(see page 1418)).

By default, information about all system events is recorded in the *Axxon One* system log that is stored in a local database of the server (see System log(see page 1318)). It is possible to record information about required events in log files stored in local directories of the server. Log data is archived at set intervals. You can configure these features using the **Log management utility**.

Axxon One component	Log storage directory
Server	**<*Axxon One* installation folder>\Logs**
Client	**<System disk>:\Users\<Current Windows user>\Appdata\Local\AxxonSoft\Axxon One\Logs**

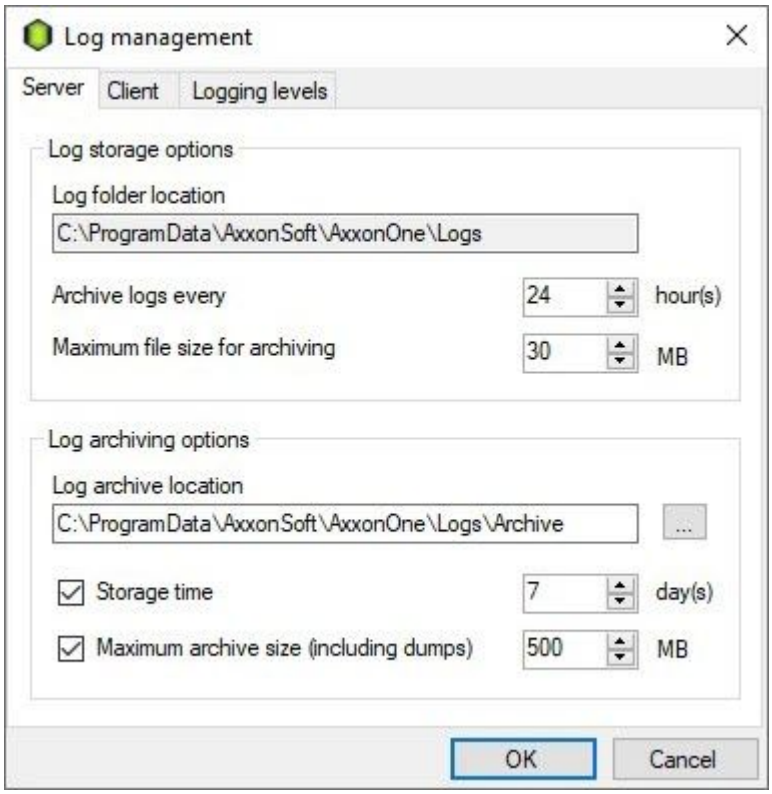
21.14.2 Starting the utility

You can start the utility from the **Start** menu: **Start** → **All Programs** → **Axxon One** → **Utilities** → **Log management utility**.

Note

The **LogRotateUtility.exe** executable file of the **Log management utility** is located in the **<*Axxon One* installation folder>\AxxonSoft\Axxon One\bin** folder.

The **Log management** window opens:



21.14.3 Stopping the utility

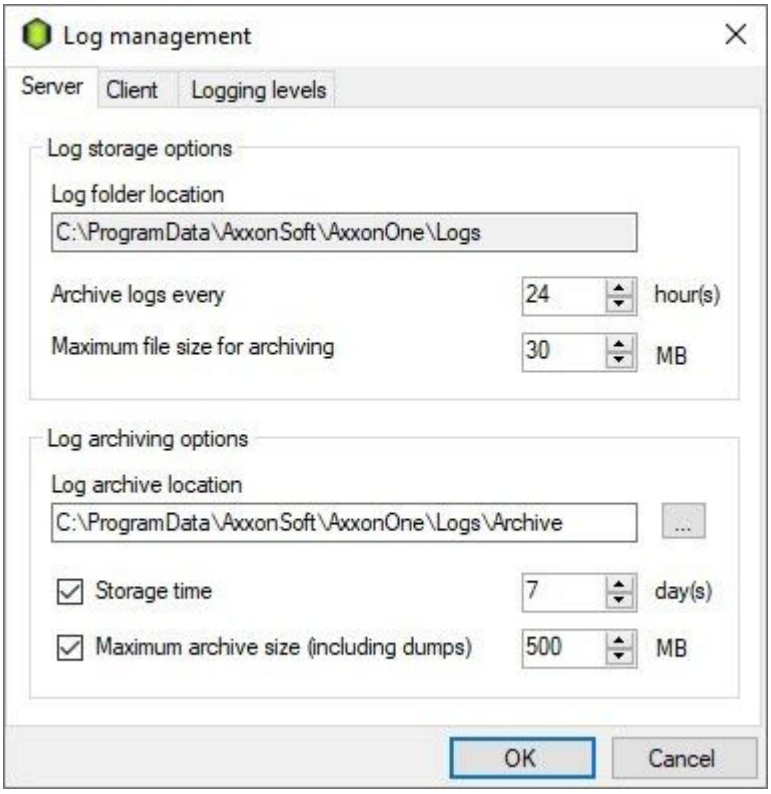
To exit the **Log management utility**, click the ✕ button or the **Cancel** button.

21.14.4 Configuring the server log storage and archiving options

To configure the server log storage and archiving options, do the following:

1. Run the **Log management utility** (see Starting the utility(see page 1415)).

2. Go to the **Server** tab.



3. In the **Log storage options** section:
   a. In the **Log folder location** field, enter the full path to the directory where you want to store the server logs. The default value is <***Axxon One*** **installation directory>\Logs**.
   b. In the **Archive logs every** field, enter the interval for system log archiving in hours. The default value is **24**.
   c. In the **Maximum file size for archiving** field, enter the size of the log file in megabytes. When the specified size is reached, the logs are archived. The default value is **30**.
4. In the **Log archiving options** section:
   a. In the **Log archive location** field, enter the full path to the directory where you want to place the log archives. To set the path using standard Windows methods, click the ... button. The default value is <***Axxon One*** **installation directory>\Logs\Archive**.
   b. In the **Storage time** field, enter the maximum time of storing a log in the archive in days after which the log is deleted. The default value is **7**.
   c. In the **Maximum archive size (including dumps)** field, enter the maximum size of the archive above which the earliest logs are deleted from the archive. The default value is **500**.

   Note

   - **Maximum archive size (including dumps)** takes priority over **Storage time**. The earliest logs, the storage time of which hasn't yet expired, are automatically deleted if the archive size exceeds the maximum value.
   - If you don't want to limit the logs storage time and/or archive size, clear the checkboxes in the **Log archiving options** section.

5. Click the **OK** button.

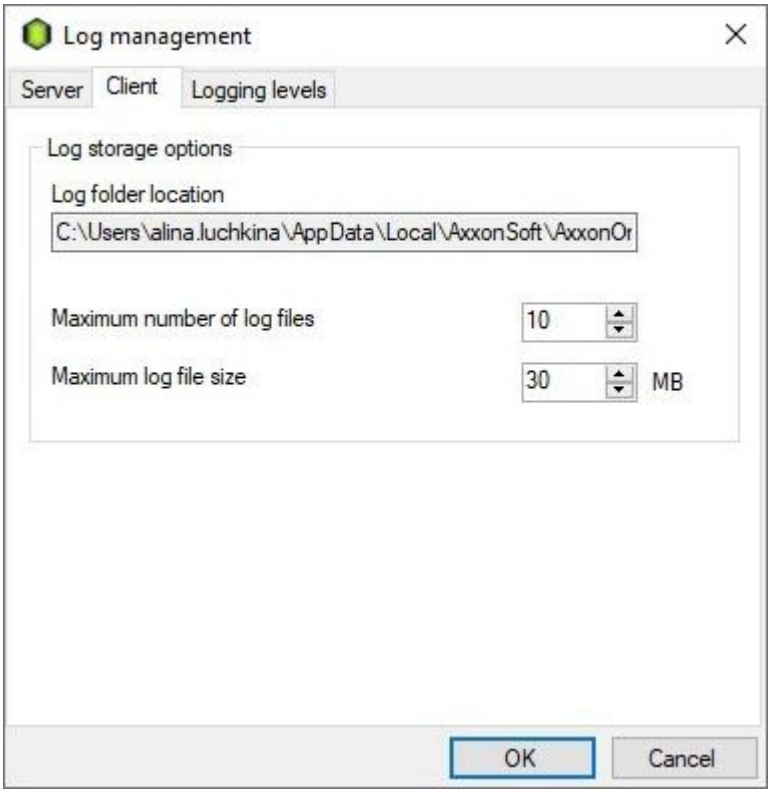
Configuring the server log storage and archiving options is complete.

21.14.5 Configuring the client log storage options

To configure the client log storage options, do the following:

1. Run the **Log management utility** (see Starting the utility(see page 1415)).

2. Go to the **Client** tab.



3. In the **Log storage options** section:
   a. In the **Log folder location** field, enter the full path to the directory where you want to store the client logs. The default value is **<System disk>:\Users\<Current Windows user>\Appdata\Local\AxxonSoft\Axxon One\Logs**.
   b. In the **Maximum number of log files** field, enter the maximum number of log files. The default value is **10**.
   c. In the **Maximum log file size** field, enter the maximum log size in megabytes. When the specified size is reached, a new log file is created. The default value is **30**.
4. Click the **OK** button.

Configuring the client log storage options is complete. You can also specify the period of adding information to the client log (see Configuring the logging of the Client memory usage(see page 1420)).

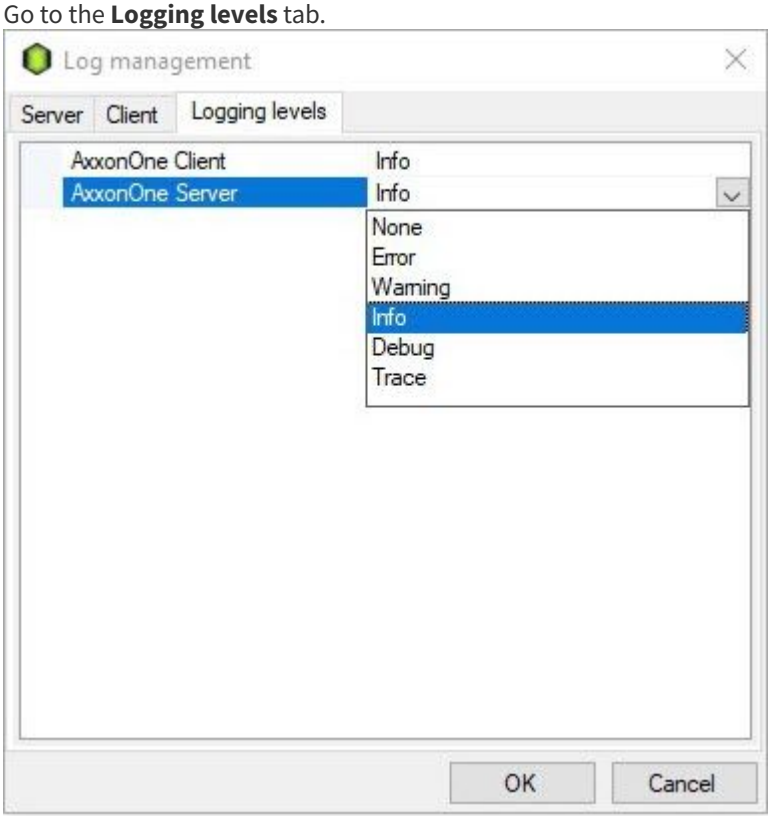
21.14.6 Configuring logging levels

Logging levels are distinguished from each other by the list of events to be recorded in external logs, as well as the level of event detail (low, medium, high).

To configure the logging level, do the following:

1. Run the **Log management utility** (see Starting the utility(see page 1415)).

2. Go to the **Logging levels** tab.



3. In the **AxxonOne Client** field, select the required client logging level from the drop-down list. The default value is **Info**. Logging levels are described in the table.
4. In the **AxxonOne Server** field, select the required server logging level from the drop-down list. The default value is **Info**. Logging levels are described in the table.

Logging level	Level of event detail	Description
None	**No**	Event logging disabled
Error	**Low**	Only system errors are logged
Warning	**Low**	Only system warnings and system errors are logged
Info	**Low**	Informational messages, system warnings, and system errors are logged
Debug	**Medium**	Debug events, informational messages, system warnings, and system errors are logged
Trace	**High**	All system events are logged

Attention!

- If you change the server logging level, the server is restarted (see Starting and stopping Axxon One software(see page 137)).
- If you installed *Axxon One* in the **Failover server and client** mode (see Installation(see page 98)), the Client and Supervisor logging levels are selected (see Configuring Failover VMS(see page 1064)).
- You can change the client logging level when:
  - the client is completely stopped;
  - you restart the client after making changes to the logging level.

5. Click the **OK** button.

Configuring logging levels is complete.

21.14.7 Configuring the logging of the Client memory usage

You can log the Client memory usage at specified intervals (**AxxonOne.exe** process). To do this:

1. Stop the *Axxon One* Client (see Stop the client(see page 145)).
2. Open the **AxxonOne.exe.config** configuration file, located in the **<*Axxon One* installation folder>\bin**, in a text editor.
3. Find the **MemoryUsageDumpIntervalSeconds** parameter and set a value for it, corresponding to the period of adding the information to the log in seconds.



> **Note**
>
> The **0** value—no information is logged.

4. Save the changes to the file.
5. Start the *Axxon One* Client (see Starting the client(see page 138)).

Here is an example of the Client memory usage information in the log:

```
*** Memory usage: ***
    Private size   425 MB
    Working set    404 MB
```

where:

- **Private size** is the amount of reserved memory.
- **Working set** is memory usage.

21.15 POS terminal data collection utility

The **POS terminal data collection utility** is used to collect information from the POS terminal.

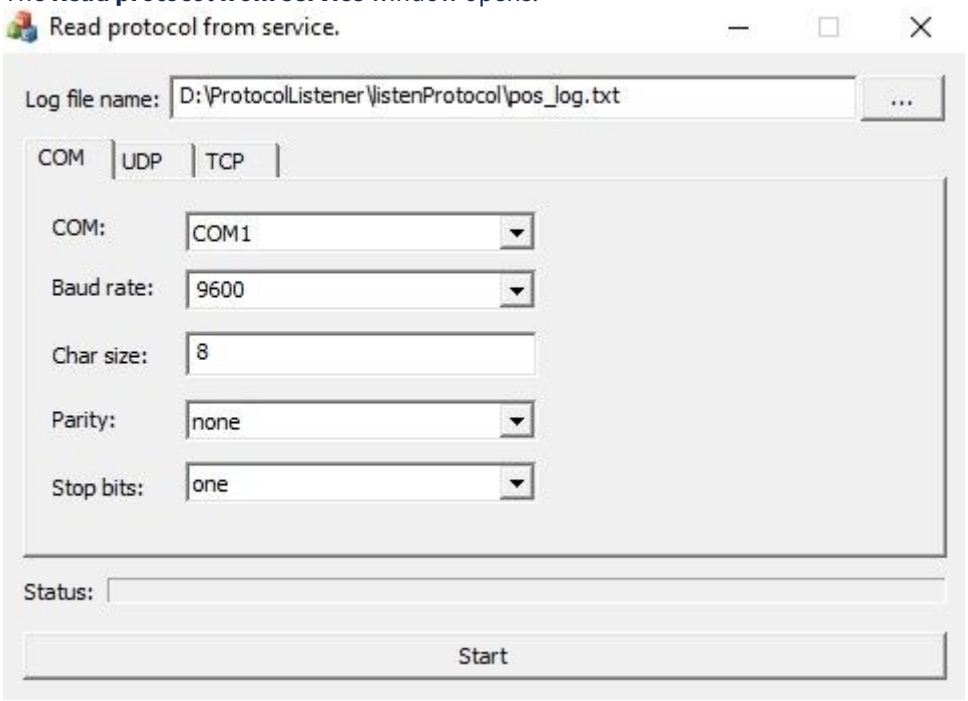
> **Attention!**
>
> To collect information from the POS terminal using the **POS terminal data collection utility**, the POS terminal must support data transfer via network or COM port.

To collect information from the POS terminal, do the following:

1. Disable the Event Source object (see Configuring POS devices(see page 257)) and stop the server (see Stop the server(see page 146)).
2. Download the POS Terminal Data Collection Utility at the AxxonSoft website[417].
3. Unzip the archive.

417 https://www.axxonsoft.com/support/downloads/utilities

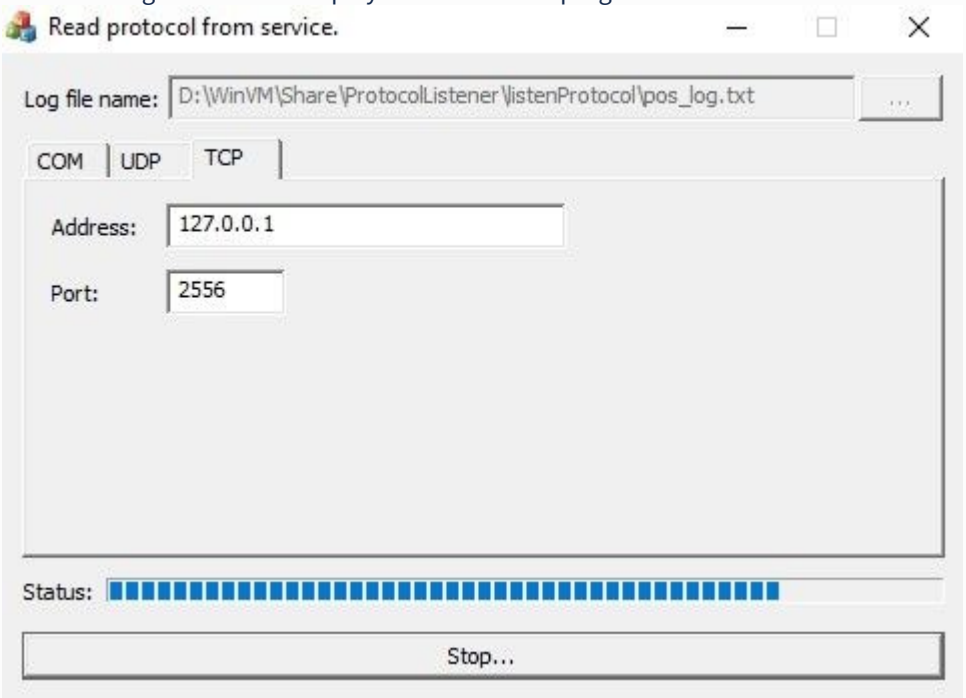
4. Connect the POS terminal to the computer.
5. Run the **ProtocolLicenser.exe** utility executable file.
   The **Read protocol from service** window opens.



6. In the **Log file name** field, specify the path to the folder where the file with the required information will be saved. By default, the file is saved in the same folder where the archive with the utility was unzipped.
7. Specify the connection parameters if the POS terminal is connected to the computer via:
   a. COM port—in the **COM** tab.
   b. **UDP** protocol—in the **UPD** tab.
   c. **TCP** protocol—in the **TCP** tab.
8. Click the **Start** button to start log collection.
9. Start using the POS terminal, that is, issue receipts. Perform all possible operations, including cancelation, return, and so on.

Note

- Process of log collection is displayed in the **Status** progress bar.



- To finish log collection, click the **Stop** button.

After performing all possible operations on the POS terminal, submit a request to https://support.axxonsoft.com[418] with the following information:

- problem description,
- a collected LOG file,
- copies of receipts,
- protocol description if the POS terminal log requires software processing. You can get protocol description from the POS terminal manufacturer.

21.16 Console utility for working with archives (vfs_format.exe)

The **vfs_format.exe** console test utility is used to work with *Axxon One* archives.

> **Note**
>
> The **vfs_format.exe** utility executable file is located in the ***<Axxon One* installation folder>\AxxonSoft\Axxon One\bin** folder.

For the correct operation of the utility, do the following:

1. Remove the corresponding archive volume in *Axxon One* without removing the archive files (see Removing archive volumes(see page 307)).
2. Open **vfs_format.exe** as administrator.

> **Note**
>
> - To run the utility in Linux OS, run the following command:
>
> ```
> ngprun start_app vfs_tools + arguments
> ```
>
> - To open the argument list, run the following command:

418 https://support.axxonsoft.com/

```
vfs_tools --help
```

3. Enter the required query using the parameters:

> **Attention!**
>
> To log error messages, you must add the path for the log file at the end of each query.
> For example, **vfs_format.exe --volume S:\FILEONE.afs --fill G:\ --log-level=100 > S:\log.txt**.

Parameter	Description
--help	Help window
--volume	Path to an archive volume. The basic parameter, it must always be present in the query. For example: **vfs_format.exe --volume D:\archiveAntiqueWhite.afs** (for an archive volume as a file) or **vfs_format.exe --volume D:** (for an archive volume as a disk)
--fill	Multiple filling of an archive with data from another archive. The system fills up a destination archive or a volume with multiple copies of a source archive or a volume in a loop. For easier timeline handling, each new copy is written with one minute offset. For example: **vfs_format.exe --volume S:\FILEONE.afs --fill G:**
--cache-to-memory	Copy an archive to RAM and further copy to a destination archive. Used together with the **--fill** parameter. This parameter is valid only for archives that can fit to RAM. For example: **vfs_format.exe --volume S:\FILEONE.afs --fill G:\ --cache-to-memory**
--dump	Collect service information about an archive volume in a TXT or XML file. For example: **vfs_format.exe --volume D:\archiveAntiqueWhite.afs --dump C:\DumpArc.txt**
--dump-meta	Collect service information about metadata of an archive volume in a TXT file. For example: **vfs_format.exe --volume D:\archiveAntiqueWhite.afs --dump-meta C:\DumpMetaArc.txt**
--dump-fullness	Collect service information about fullness of an archive in a TXT file. For example: **vfs_format.exe --volume C:\archiveAliceBlue.afs --dump-fullness C:\DumpFullnessArc.txt**
--expand	Specify a new size of an archive volume in blocks. By default, the size of one block is 4MB if the **--format** parameter was not applied. This parameter is relevant only for an archive volume as a file. For example: **vfs_format.exe --volume D:\archiveAntiqueWhite.afs --expand 128**
--size	Specify a new size of an archive volume in megabytes. This parameter is relevant only for an archive volume as a file. For example: **vfs_format.exe --volume D:\archiveAntiqueWhite.afs --size 4096** **Attention!** • The value of the **--size** parameter must be a positive integer. • The value of the parameter must not contain spaces, characters, or punctuation marks.
--format	Split an archive volume into blocks of the specified size (in megabytes). For example: **vfs_format.exe --volume D:\archiveAntiqueWhite.afs --format 16**

Parameter	Description
--copy	Copy an archive volume. Specify the path and name of a new archive file. If an archive volume is copied as a disk, create a partition without formatting, larger than the copied volume. If you have a smaller partition, then only the most recent entries are copied. For example: **vfs_format.exe --volume D:\archiveAntiqueWhite.afs --copy C:\NewArc.afs**
--skip-bad-block	Skip the bad blocks when copying an archive volume. This parameter is only used together with the **--copy** parameter. For example: **vfs_format.exe --volume D:\archiveAliceBlue.afs --copy C:\NewArc.afs --skip-bad-block**
--modify-corrupted-flag	Enable/disable reindexing of an archive volume. **1**—enable reindexing, **0**—disable. For example: **vfs_format.exe --volume D:\archiveAliceBlue.afs --modify-corrupted-flag 1**
--build-meta	Launch the process of metadata generation of an archive volume (including timeline markers and video footage size per channel). For example: **vfs-format.exe --volume D:\ --build-meta** ⚠ **Attention!** Processing large archives can take significant amount of time.
--clear-meta	Delete metadata of an archive volume. For example: **vfs-format.exe --volume D:\ --clear-meta**
--clear-data	Delete service information of an archive volume (does not operate without the **--from** and **--to** arguments). **--from** and **--to** are used to set the UTC time intervals in the ISO YYYYMMDDThhmmss format. Then you must confirm the deletion. For example: **vfs_format.exe --volume C:\archiveAliceBlue.afs --clear-data --from 20220210T110000 --to 20220210T114000**
--log-level	Specify the logging level of the operation being performed. Available values: • **0**—**OFF**, • **10**—**ERROR**, • **20**—**WARN**, • **40**—**INFO** (recommended), • **50**—**DEBUG**, • **60**—**TRACE**, • **100**—**ALL**
--channel	Specify the archive channel. For example: vfs_format.exe --volume=Q:/archiveAliceBlue.afs --channel=E7C79FA3-E0D4-B6CD-9307-6C24E96C305E You can perform forced block masking for certain archive channels. ⚠ **Attention!** Block masking is available only if the archive volume is disabled. For example: **vfs_format.exe --volume=Q:/archiveAliceBlue.afs --channel=E7C79FA3-E0D4-B6CD-9307-6C24E96C305E --clear-from=20350101T000000 --clear-to=20370101T000000**, where • **--clear-from**—start interval in the YYYYMMDDThhmmss format, • **--clear-to**—end interval in the YYYYMMDDThhmmss format
--recover	Recover the last recording layer after formatting the archive. This parameter is relevant only if there were records after the last formatting. For example: **vfs_format.exe --volume E:\ --recover**

Parameter	Description
--recover=2	Recover the last recording layer after formatting the archive. For example: **vfs_format.exe --volume E:\ --recover=2** after the archive formatting, or **vfs_format.exe --volume E:\archiveAliceBlue.afs --recover=2** after the disk formatting

22 Appendices

22.1 Appendix 1. Glossary

Active Surveillance window is a Surveillance window currently used by the user.

AWS (automated workstation) is a workstation of the security system user, minimally equipped with a computer with *Axxon One* installed.

Archive is all audio/video files stored on a hard disk that can be played back and exported to supported formats.

Default archive of a camera is the archive to which video from a given camera is recorded during user-initiated alarms.

Audio detector is a detector used to analyze the audio signal from a microphone.

Audio recording—1. process of recording a digitized audio signal on a hard disk; 2. audio data stored in a specific format on a hard disk.

Audio subsystem encompasses all tools that provide for the collection of audio data, its processing, and its storage on media.

Video detector is a detector used to analyze the video image from a camera.

Video recording—1. the process of recording a digitized video signal on a hard disk; 2. video information stored in a specific format on a hard disk.

Video camera—1. source of a video signal; 2. a system object, which displays the properties of an installed camera and controls its operation.

Video subsystem encompasses all tools that provide for the acquisition of video data, its processing, and its storage on media.

Timeline is an interface object used to search for video recordings and navigate in the archive.

Input—1. a physical device intended for receiving information about the status of an object; 2. a system object that displays the properties of an installed input.

Signal detector is a detector that generates an event when the signal-to-noise ratio increases above a set level.

Loss of quality detector is a detector that generates an event when the quality of the video image received from the camera degrades.

Camera position change detector is a detector that generates an event when the background of a video image changes, indicating a change in the position of the camera in space.

Exit from area detector is a detector that generates an event when an object disappears from a specified area in the camera FOV.

Abandoned object is a detector that generates an event when an object remains motionless in a detection area for a prolonged period.

Audio loss detector is a detector that generates an event when there is no signal from an audio device.

Line crossing detector is a detector that generates an event when an object track crosses a virtual line in the camera FOV.

Entrance in area detector is a detector that generates an event when an object appears in a specified area in the camera FOV.

Stop in area detector is a detector that generates an event when an object stops in a specified area in the camera FOV.

Noise detector is a detector that generates an event when the signal-to-noise ratio decreases below a set level.

Axxon Domain is a selected group of computers, on which the server configuration of *Axxon One* is installed. Linking the servers in a group makes it possible to set up interaction between them, thus organizing a distributed system.

Detection area is an area of a video image processed by a detector.

Interface cable is a cable used to connect two or more devices together for data transfer.

Interface object is an interface element used for interaction between the user and software (data input/output).

Client is a designation for a computer on which *Axxon One* is installed (or will be installed) as a **client.** Designation for the graphical shell of *Axxon One*.

Slideshow is an automatic switching of user layouts or Surveillance windows on a single layout when you work with standard layouts.

Licensing is regulating and setting the terms for usage of AxxonSoft software modules.

Detection mask—1. an area of a video image that isn't processed by a detector; 2. a tool that allows the user to outline an area of the video image that must not be processed by a detector.

Microphone—1. a source of audio signals; 2. a system object used to manage the parameters of audio signal reception.

Video surveillance monitor is an interface object used to manage the user interfaces of *Axxon One*, for example, layouts, Surveillance windows, various panels and context menus, and so on.

Surveillance window is an interface object displaying the video stream coming from a certain camera and enabling control of that camera.

Dial panel is a panel (part of the PTZ control panel) used to dial a preset number.

Archive navigation panel is all interface objects used to work with an archive, such as timeline, list of alarm events, and so on.

Control panel is a panel made up of tabs available to the user, used to navigate from one group of interface objects to another.

Playback control panel is a panel containing buttons to control playback of video recordings: Play, Pause, Go to next video recording, and so on.

PTZ control panel is all interface objects used to control a certain PTZ device.

Layout control panel is a panel containing tools to create, edit, and manage layouts.

PTZ device is a system object displaying the properties of an installed PTZ camera device.

> **Note**
>
> Also used to designate a physical device

PTZ subsystem encompasses all tools that provide for remote control of a PTZ device and the lens of a camera.

Analytics subsystem encompasses all tools that provide for automatic analysis of incoming video and audio data.

Search in archive subsystem is a set of tools for searching for video recordings in the archive by using video image metadata.

Output subsystem encompasses all tools that provide for an event from an execution device connected to the embedded Output port of a camera or IP server when a detector generates an event (including the one that processes the embedded Input of a camera or IP server).

Notification subsystem encompasses all tools that provide for notification of the user about events that have occurred in the system.

Event registration subsystem is all tools that provide for the collection of data about system events, processing, and its storage on media.

Pre-alarm recording is a period of pre-event recording that is added to the beginning of an alarm event recording.

Preset is a pre-programmed positioning of a PTZ device.

Software package is all software and hardware tools used together to build a security system.

Software module is a program or a functionally complete component of a program used to perform a specific functional task (perform a user function).

Layout is a preserved positioning of Surveillance windows relative to each other.

Distributed system is a group consisting of several interacting *Axxon One* servers (up to four) and clients (unlimited number). The *Axxon One* servers are linked within an Axxon-domain.

Output—1. a physical device/electromechanical switch; 2. a system object that displays the properties of an installed Output.

Server is a designation for a computer on which the **Server** configuration of *Axxon One* is installed (or will be installed).

Security system is a set of devices used for video surveillance, audio surveillance, and object recognition, all controlled by *Axxon One*.

System log is a log containing system information about events, including system error entries.

Object tracking is a function that allows an operator to visually track the movement of objects in the camera FOV.

Alarm flag is a flag icon designating either the moment of an alarm event beginning or a certain moment before the beginning of an alarm event.

Color coding is a software-based graphical notification to a security system operator about the current status or operating mode of system objects (hardware, software modules).

Face vector is a mathematical representation of a face image created upon face capture.

Captured faces are face images captured on a video by the Face detector.

Recognized faces are captured faces that reach a pre-defined degree of similarity against reference face images.

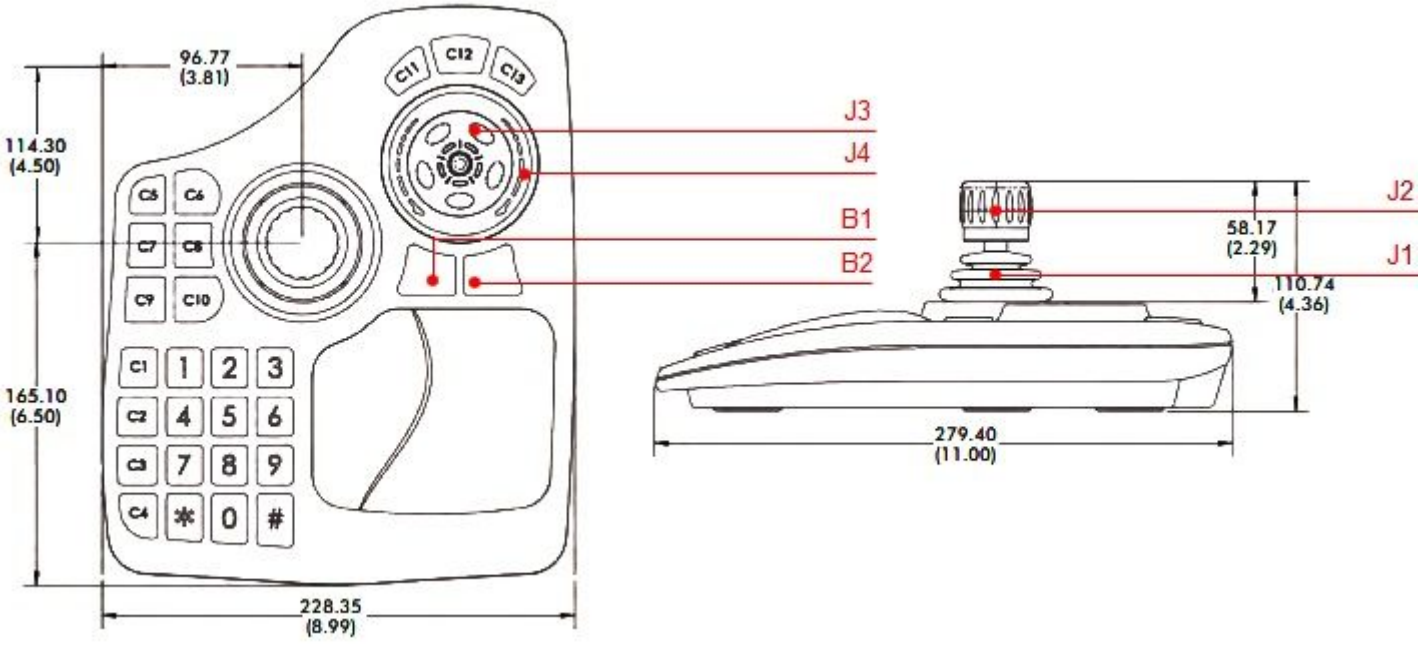
Reference faces are pre-defined face images to compare captured faces to.

22.2 Appendix 2. Using CH VM-Desktop USB multifunction controllers with Axxon One

CH VM-Desktop USB multifunction controllers offer a range of input controls:

- Three-axis joystick for PTZ and digital zoom control (**J1** and **J2**)
- Jog/shuttle dial (**J3** and **J4**)
- 27 keys:

- 10 number keys
- * key
- # key
- Programmable keys **C1** to **C13** (keys cannot be remapped in *Axxon One*)
- Two additional keys (**B1** and **B2**)



The multifunction controller can be used to operate *Axxon One* on the active monitor.

Note

The active monitor is either the main one (if all additional monitors are inactive or not connected) or an additional one, if the additional monitor is active (see Managing monitors on a local Client(see page 1285)).

The active monitor can be selected only by using the mouse. If no mouse is present, the multifunction controller will work on the main monitor only.

A description of key functions is given in the table.

Key	When available	Function
J1	Always	PTZ control for the selected camera. If the selected camera does not support PTZ control, the action is ignored.
J2	Always	Optical zoom control for the selected camera. If the selected camera does not support PTZ control, the action is ignored.
J3 (rotate counterclockwise)	Archive mode	Go to previous frame. If playback is active, the action is ignored.
J3 (rotate clockwise)	Archive mode	Go to next frame. If playback is active, the action is ignored.
J4 (rotate counterclockwise)	Archive mode	Go to previous video fragment.
J4 (rotate clockwise)	Archive mode	Go to next video fragment.
J4	Live Video mode	Iris control for the selected camera.
1	Live Video mode	Start/stop patrol mode.
2.3	Live Video mode	Focus control for the selected camera.
*** n #**	Always	Select a camera in a layout. **n** is the number of the camera to be activated via the number keys. If the camera with the relevant number is not in the current layout, a search is performed for the minimum layout containing the camera; the minimum layout is then displayed. If no such layout exists, a layout with one camera is created.
# n #	Always	Go to layout. n is the layout to be activated via the number keys; the number corresponds to the order in which the layout appears in the list.
C10	Always	Clear number. If the operator did not finish typing the number of a camera or layout (the # key was not pressed), pressing the C10 key clears the previously entered number.
C1	Alarm Management mode	Accept alarm with **False Alarm** resolution.
C2	Alarm Management mode	Accept alarm with **Non-Critical Alarm** resolution.
C3	Alarm Management mode	Accept alarm with **Critical Alarm** resolution.

C4	Always	Manually initiate an alarm and go to Alarm Management mode. Go to Alarm Management mode if an alarm has been previously initiated.
C5	Always	Increase size of layout cell.
C6	Always	Reduce size of layout cell.
C7	Always	Go to previous layout in the list.
C8	Always	Go to next layout in the list.
C11	Archive mode	Slow down playback.
C12	Archive mode	Start/pause video playback.
C13	Archive mode	Speed up playback.
B2	Archive mode, Alarm Management mode	Go to Live Video mode (without alarm classification).
B2	Live Video mode	Go to Archive Mode.
C9	Archive mode	Open/hide calendar.
B1, B2	Open calendar	Cycle through calendar elements (equivalent to pressing the tab key). **days of month - hours - minutes - seconds - am/pm** (**B2** key) and in reverse (by pressing the **B1** key).
J3	Open calendar	Navigate by days and set hours, minutes, seconds, and AM/PM.
J4	Open calendar	Navigate by months.

22.3 Appendix 3. Hotkeys in Axxon One

Axxon One comes with the following default hotkeys:

Function	**Hotkey**
Global General	
Activate panel of cameras	F4
Activate panel of configuration	F5
Activate panel of layouts	F2
Activate panel of video walls	F3

Select item of menu and panels, click Save, Apply, OK	Enter
Navigation. Down	Down
Navigation. Left	Left
Navigation. Right	Right
Navigation. Up	Up
Open comment panel	
Open menu of current layout	F1
Open panel with list of devices	F7
Open alarm panel	F6
Hide menu/panel, click Cancel	Esc
Lock application	Ctrl + Alt + L
Remove current value	Delete
Digit 1	D1
Digit 9	D9
Layouts	
Camera selection in current layout	Ctrl + N
Select monitor by number	Shift + N
Select layout by number	Alt + N
Select the previous* camera in current layout cell	
Select the next* camera in current layout cell	
Navigation the cameras, upward shift	Alt + Up
Navigation the cameras, left shift	Alt + Left
Navigation the cameras, downward shift	Alt + Down
Navigation the cameras, right shift	Alt + Right
Move to the previous layout	Shift + Left

Move to the next layout	Shift + Right
Increase layout cell	Ctrl + Add (+)
Decrease layout cell	Ctrl + Subtract (-)
*** by short name**	
Live Video display mode Videocamera	
Open menu of selected camera and select item	F9
Switch to archive mode	Ctrl + Tab
Switch to alarm classification mode	Ctrl + R
Switch to search in archive mode	Ctrl + F
Arm	Ctrl + A
Disarm	Ctrl + D
PTZ	
Move up	NumPad8
Move left	NumPad4
Move down	NumPad2
Move right	NumPad6
Close iris	Next
Focus far	End
Open iris	PageUp
Patrolling	Multiply (*)
Focus near	Home
Zoom in	NumPad9
Zoom out	NumPad3
Archive	

Open menu of selected camera and select item	Ctrl + E
Pause/Play	Ctrl + Space
Switch to Time Compressor mode	Ctrl + T
Go to the previous video clip	Ctrl + Shift + Left
Go to the previous frame	Ctrl + Left
Go to the next video clip	Ctrl + Shift + Right
Go to the next frame	Ctrl + Right
Show calendar	F8
Increase playback speed	Ctrl + Up
Reduce playback speed	Ctrl + Down
TimeCompressor	
Pause/Play	Ctrl + Space
Move home	Ctrl + B
Increase number of objects	Ctrl + Up
Decrease number of objects	Ctrl + Down
Alarms	
Go to the previous frame	Ctrl + Left
Go to the next frame	Ctrl + Right
Resolution False alarm	Ctrl + D3
Resolution Non-critical alarm	Ctrl + D2
Resolution Critical alarm	Ctrl + D1
Increase playback speed	Ctrl + Up
Reduce playback speed	Ctrl + Down

22.4 Appendix 4. Automated configuration backup and restore

On the page:

- General information(see page 1434)
- Automated creation of configuration backup(see page 1434)
- Automated restoration of configuration backup(see page 1435)

22.4.1 General information

You can use the **ngpsh.exe** utility and JSON commands for automated creation and restoration of configuration backup. This method is designed for automation of administration tasks and integration into scripts.

Attention!

Backups created using the **ngpsh.exe** command-line utility aren't displayed in the Backup and restore utility(see page 1384) and cannot be restored using the Backup and restore utility(see page 1384).

22.4.2 Automated creation of configuration backup

To create an automated backup of the configuration, do the following:

1. Run the command prompt as administrator.
2. Go to the utility directory by running the command:

```
cd <Axxon One installation directory>\AxxonOne\bin
```

3. Run the command to create a backup:

```
ngpsh.exe backup backupJson [path_to_backup_folder] [node_name] [local] [shared] [license] [tickets]
```

Parameters of the **backupJson** command:

Parameter	Required	Description
path_to_backup_folder	**Yes**	The path to the folder where the backup is saved. Use double backslashes (\\) in the path
node_name	**Yes**	The name of the server whose configuration you want to save
local	**No**	This parameter saves the local configuration of the server (objects, their parameters, connections, and change history)

Parameter	Required	Description
shared	**No**	This parameter saves the general configuration of the domain (users, layouts, and so on)
license	**No**	This parameter saves the license
tickets	**No**	This parameter saves the structure of the domain

Example of a command:

```
ngpsh.exe backup backupJson c:\\backups Server1 local
```

Result:
A file named **Server1.json** is created in the **c:\backups** folder, containing the backup copy.

22.4.3 Automated restoration of configuration backup

> **Attention!**
>
> Before performing any restore operations, make sure that you have a current backup in case you need to roll back.

To automatically restore a configuration backup, do the following:

1. Run the command prompt as administrator.
2. Go to the utility directory by running the command:

```
cd <Axxon One installation directory>\AxxonOne\bin
```

3. Run the command to restore a backup:

```
ngpsh.exe backup restoreJson [path_to_backup_file] [node_name] [local] [shared] [license]
[tickets] [deleteLocal] [deleteShared]
```

Parameters of the **restoreJson** command:

Parameter	Required	Description
path_to_backup_file	**Yes**	The full path to the backup file (in **JSON** format). Use double backslashes (\\) in the path
node_name	**Yes**	The name of the server whose configuration you want to restore
local	**No**	This parameter restores the local configuration of the server
shared	**No**	This parameter restores the general configuration of the domain
license	**No**	This parameter restores the license
tickets	**No**	This parameter restores the structure of the domain

Parameter	Required	Description
deleteLocal	**No**	This parameter removes objects from the current local configuration that are not present in the backup (clean up before restoration)
deleteShared	**No**	This parameter removes objects from the current general configuration that are not present in the backup

Example of a command:

```
ngpsh.exe backup restoreJson c:\\backups\Server1.json Server1 local
```

Result:
The local configuration of **Server1** is restored from the **Server1.json** file. Objects not present in the backup are removed from the current configuration.

22.5 Appendix 5. Using Axxon One with NAT

22.5.1 Consolidating the Servers from different networks into Axxon domain

To consolidate the Servers from different networks separated by routers into Axxon domain, do the following:

1. Set the port range for operation and the router's public IP address on each Server that is to be included in the Axxon domain (see Network settings utility(see page 1379)).

   Attention!

   The Server port ranges of Axxon Domain should not overlap within the same network.
   By default, the base port is 20111, and the port range is 20111-20210. Hence, it is necessary to set and forward the port range 20211-20310 for the second Server, the port range 20311-20410 for the third Server, and so on (see Ports used by Axxon One(see page 95)).

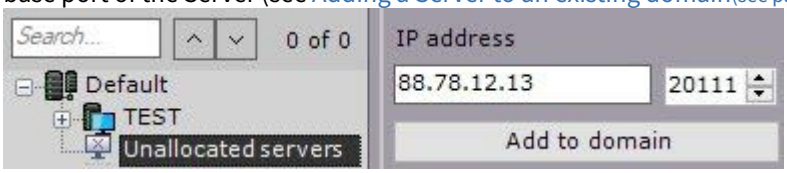
   Attention!

   The router's public IP address should be static.

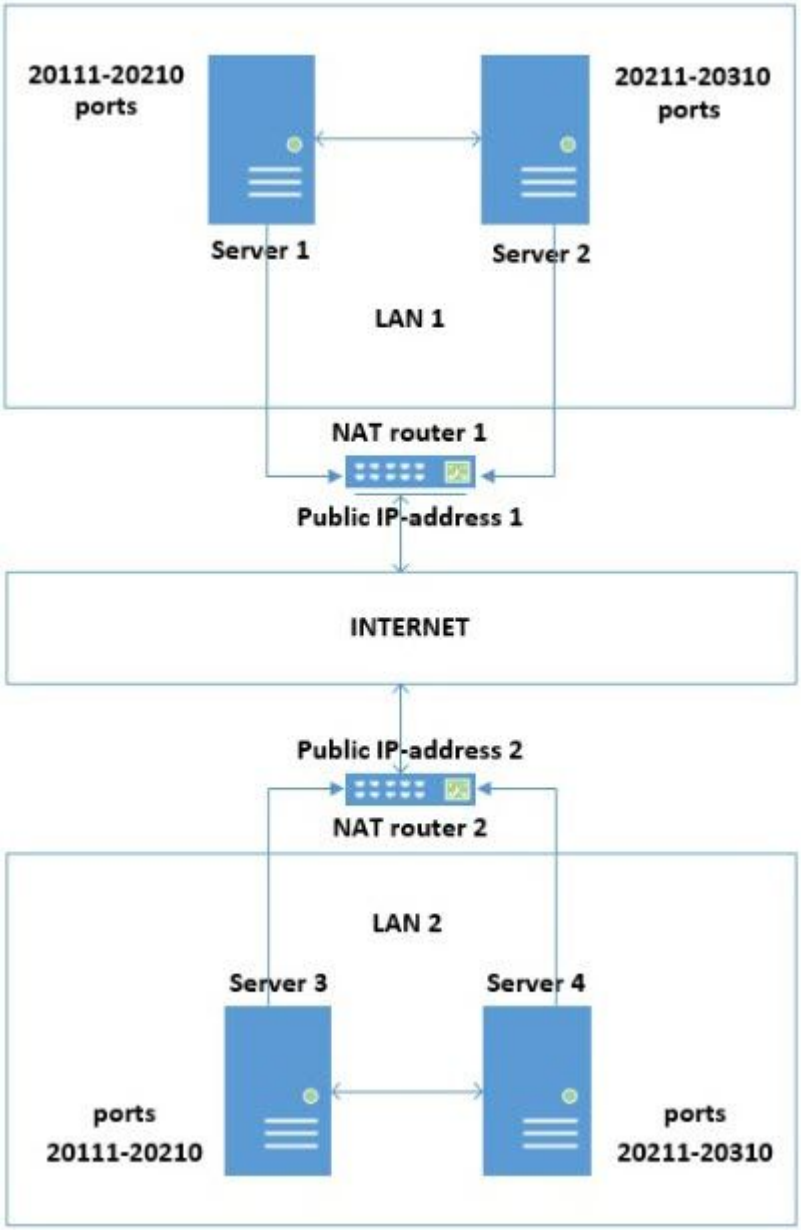


2. For each router, forward the specified ports of the Server, which is located behind this switch, and the gRPC API 20109 port.
3. Connect the Client to the Server from any network (see Starting the client(see page 138), Connecting the Client to the Server behind NAT(see page 1438)).

4. Manually add other Servers to the Axxon domain using the public IP address of the corresponding router and the external base port of the Server (see Adding a Server to an existing domain(see page 153)).



Example:



To combine Servers into one Axxon domain in this configuration, do the following:

1. On Server 1, set the port range 20111-20210 and the public IP address of router 1.
2. On Server 2, set the port range 20211-20310 and the public IP address of router 1.
3. On Server 3, set the port range 20111-20210 and the public IP address of router 2.
4. On Server 4, set the port range 20211-20310 and the public IP address of router 2.
5. On router 1, configure the forwarding of:
    a. the router ports 20111-20210 to the internal IP address of Server 1 and ports 20111-20210;
    b. the router ports 20211-20310 to the internal IP address of Server 2 and ports 20211-20310;
    c. the gRPC API 20109 port (always static) to the internal IP address of Server 1 and the internal IP address of Server 2.

6. On router 2, configure the forwarding of:
    a. the router ports 20111-20210 to the internal IP address of Server 3 and ports 20111-20210;
    b. the router ports 20211-20310 to the internal IP address of Server 4 and ports 20211-20310;
    c. the gRPC API 20109 port (always static) to the internal IP address of Server 3 and the internal IP address of Server 4.
7. Connect to Server 1.
8. Manually add Server 2 to the Axxon domain using the local IP address of Server 2 and port 20211.
9. Manually add Server 3 to the Axxon domain using the public IP address of router 2 and port 20111.
10. Manually add Server 4 to the Axxon domain using the public IP address of router 2 and port 20211.

22.5.2 Connecting the Client to the Server behind NAT

To connect the Client to the Server behind NAT, do the following:

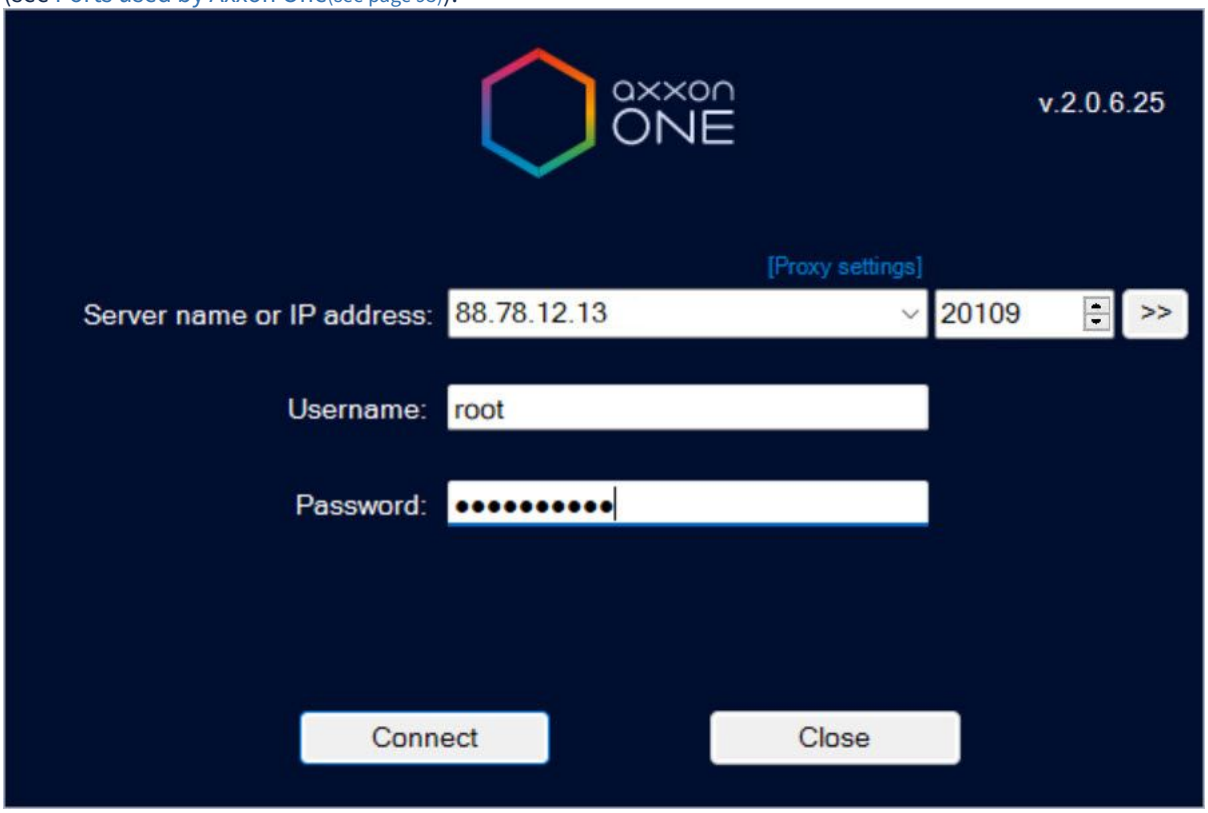
1. Set the router public IP address (see Network settings utility(see page 1379)).

> **Attention!**
>
> The router public IP address must be static.



2. On the router, forward the gRPC API 20109 port to the internal IP address of the Server port 20109.

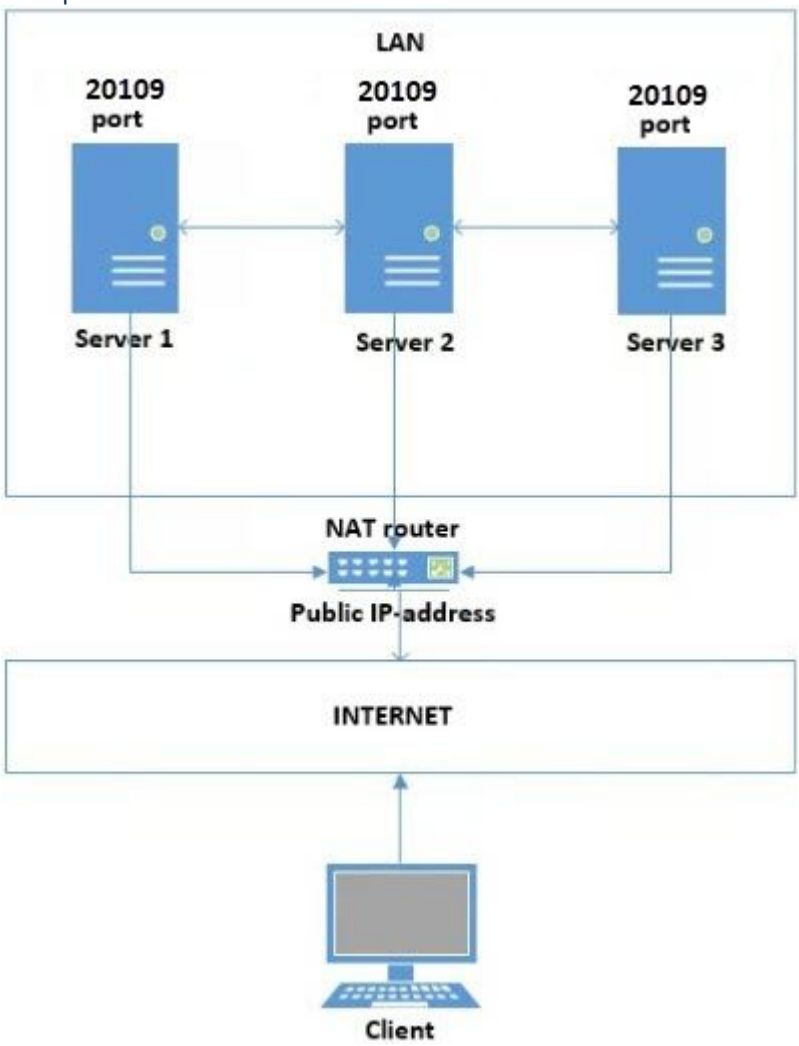
3. Start the Client and specify the router external IP address and the gRPC API 20109 Server port in the connection settings (see Ports used by Axxon One(see page 95)).



Attention!

- When connecting the Client from an external network, only those Servers that have access to the external network will be available in the Axxon-domain configuration (see Consolidating the Servers from different networks into Axxon domain(see page 1436)).
- If several Servers belonging to different domains are located behind NAT on the same LAN, you must assign a unique gRPC API port to each domain and forward it.
- To change the port, you must create the NGP_NATIVE_BL_PORT system variable and assign it a value corresponding to the required port (see Creating system variable(see page 126), Configuring the Server ports(see page 1014)).

Example.



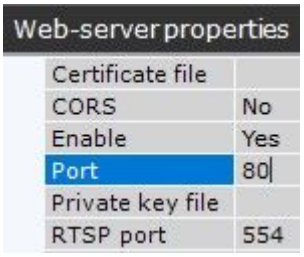
To connect the Client to the Servers behind NAT, do the following:

1. From one of the Servers, forward port 20109 to the router public IP address.
2. On the router, configure the forwarding of:
    a. The router port 20109 to the internal IP address of the Server port 20109.
3. When connecting the Client, enter the router public IP address and port 20109.

22.5.3 Connecting the Web and Mobile Clients to the Server behind NAT

To connect Web and Mobile Clients to the Server behind NAT, do the following:

1. On the router, forward the specified port of the Web server (see Configuring the Web-Server(see page 165)). The default port is 80.

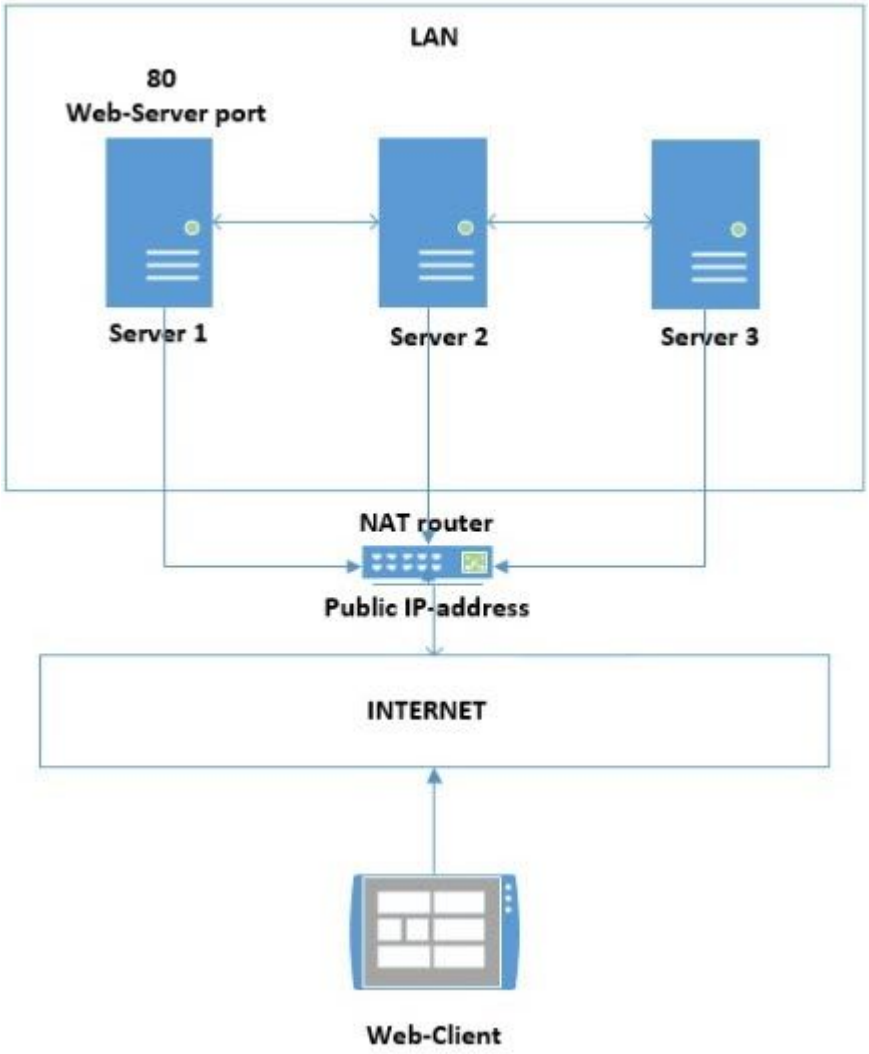


Note

To access all Servers of the Axxon domain, it is enough to forward any single port of the Web server.

2. When connecting using a Web browser or Mobile Client, use the Server's public IP address and the forwarded port of the Web server (see Starting and logging in to the Web-Client(see page 1326)).

Example:



To connect the Web Client to the Axxon domain in this configuration, do the following:

1. On the router, forward the port 80 to the internal IP address of Server 1 and port 80.
2. When starting the Web Client, use the router's public IP address and port 80.

22.5.4 Audio transmission from the Client's microphone behind NAT to the Server's or camera's loudspeaker

Playing back sound from Client microphone on camera speakers(see page 1290)

To transmit audio from the Client's microphone behind NAT to the Server's or camera's loudspeaker, do the following:

1. On the Client, specify a unique port range and an external router's public IP address. Follow the steps below:
   a. Add an NGP_CLIENT_PORT_BASE environmental variable and set its value to the first port number in the range (see Creating system variable(see page 126)).
   b. Add an NGP_CLIENT_PORT_SPAN environmental variable and set its value to the number of ports in the range.

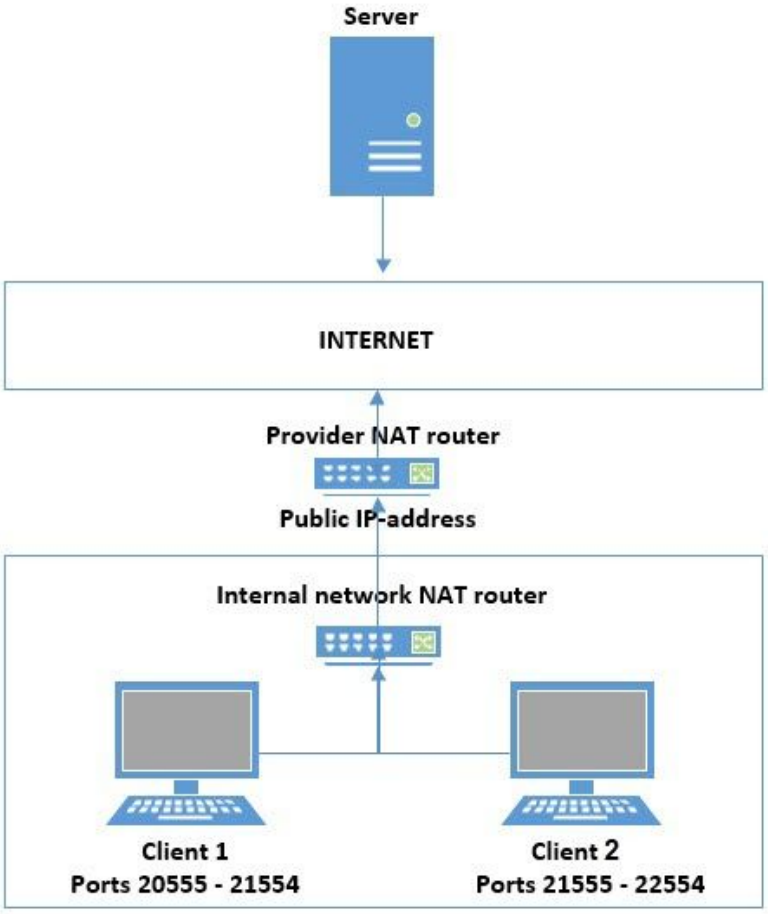
> **Attention!**
>
> We recommend you to use no less than 100 ports.

> **Attention!**
>
> If you have multiple Clients within your network, their port ranges must not overlap.

c. Add an NGP_ALT_ADDR environmental variable and set its value to the public IP address of the externa router.

2. Configure forwarding of the specified ports on both external and internal router.

Example:



To transmit audio from microphones connected to Client 1 and Client 2 to the Server's or camera's loudspeaker, do the following:

1. On Client 1, set port range to 20555-21554, and the public IP address of your Internet provider's router.
2. On Client 2, set port range to 21555-22554, and the public IP address of your Internet provider's router.
3. Configure port forwarding on the internal router:
   a. ports 20555-21554 to the internal IP address of Client 1 and ports 20555-21554;
   b. ports 21555-22554 to the internal IP address of Client 2 and ports 21555-22554.
4. Configure port forwarding on the provider's router:
   a. router ports 20555-21554 to the IP address of the internal router and ports 20555-21554;
   b. router ports 21555-22554 to the IP address of the internal router and ports 21555-22554.