Administrator's Guide

Face PSIM 1.0.1 (english)

Last update 03/02/2023

Table of Contents

1 List of terms

Population is a set of faces in the database where the search is performed.

Reference image is a "deny list" image all faces detected in the video are compared to.

Captured face is a face detected in the video.

Recognized face is a face similar enough to one of the reference images.

Vector is a mathematical representation of face that is created while its recognition in video frame.

Face search is a process of searching faces in the archive by the photo of the face. Use the **Face recognition and search** interface object to control face search.

Face recognition is a process of comparing captured faces with reference images in the online mode in order to find hit. If hit is found, the result is immediately displayed in the **Face recognition and search** interface object.

Face verification is a process of comparing captured face in the video with reference image by command. For this mode to operate the Event Manager (part of ACFA PSIM) module is to be installed.

> **Note**
>
> General scenario of use: when the user brings the access card to the reader, the reference image corresponding to this access card is displayed on the operator monitor and the process of comparing this reference image with captured face starts.

2 Administrator's Guide. Introduction

On this page:

2.1 Purpose and structure of the Guide

The Administrator's Guide is a reference and information handbook designed for system administrators, installation and configuration technicians and users with administrator rights to products based on *Face PSIM*.

2.2 Purpose of Face PSIM

Face PSIM is designed for automated identification of people by comparing a captured face displayed in a surveillance video frame with reference images for which the face recognition database contains information.

Face PSIM provides the following functional capabilities:

1. Captures human faces in a video frame.
2. Registers facial biometric parameters.
3. Compares a captured face displayed in a video frame with reference images stored in the "<*Face PSIM* installation directory\Bmp\person>" folder based on biometric parameters.
4. Maintains a reference face database used for face recognition.
5. Creates a photo- and video archive.
6. Searches for faces in the database using a photo.
7. Identifies gender and age of recognized faces.
8. Counts unique visitors by recognized faces (including reports creation in *Web Report System PSIM*).

2.3 Recommendations for using Face PSIM

Face PSIM is installed as an extension to *Axxon PSIM*.

The following is recommended for correct application of *Face PSIM*:

1. Follow the instructions carefully.
2. Use the software only for its intended purpose.
3. Do not use third party software on computers with installed *Face PSIM* unless that software is a component of *Face PSI*M.

3 Structure of the Face PSIM software package

The base version of Axxon PSIM serves as the software platform for installing *Face PSIM*. The following external face recognition modules are integrated into *Face PSIM* software package: *Cognitec* (vendor — Cognitec), *Tevian* (vendor — Recognition Technologies), *VisionLabs*, *STC*, and *VideoIntellect 1.1* (vendor — Raduga Technologies).

Recognition modules, supported by *Face PSIM*, operate on the following platforms:

Module	**x32**	**x64**
Cognitec	☐	☐
VisionLabs	☐	☐
Tevian	☐	☐
STC	☐	☐
VideoIntellect 1.1	☐	☐

Also the software package includes:

Object	**x32**	**x64**
Face Recognition Server	☐	☐
Face recognition and search	☐	☐

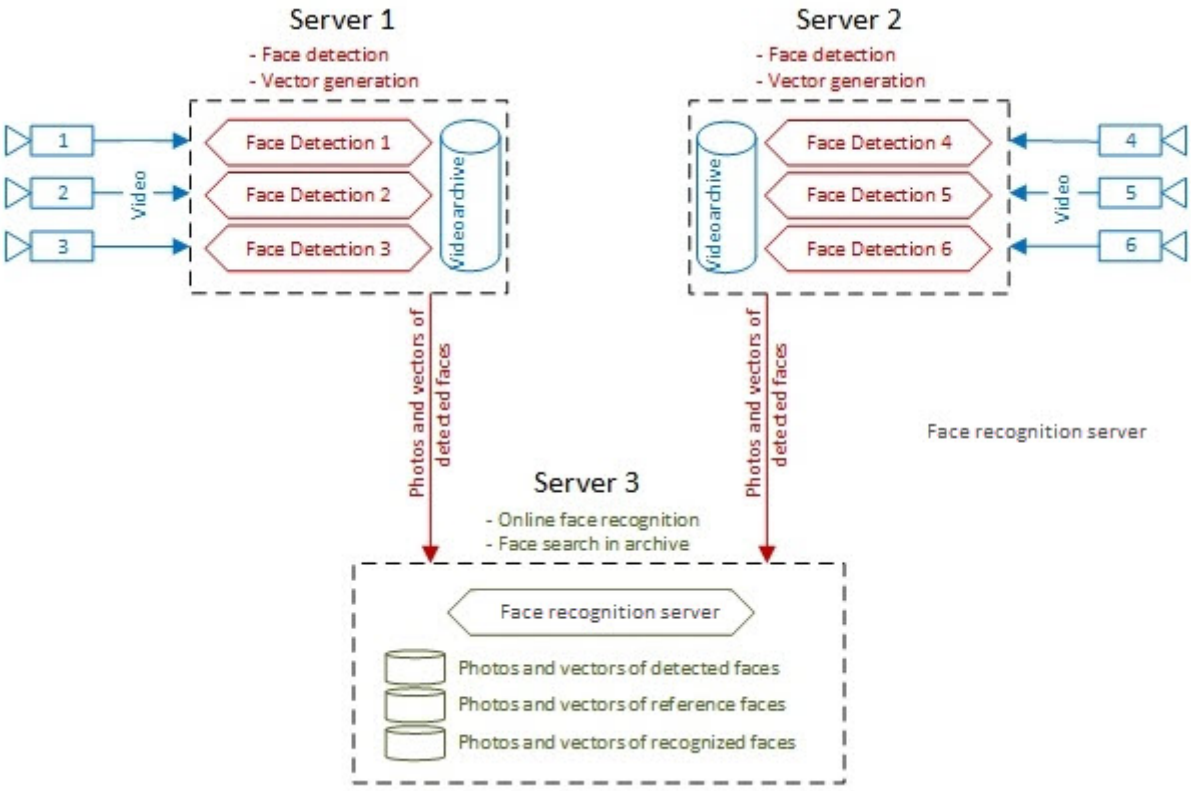
Attention!

Face recognition can only be performed on the x64 platform. For the face recognition modules to work, it is necessary to set the **Run x64 modules** checkbox in the settings of the **Computer** object (see Configuring of using 64-bits modules).

Face recognition modules operate through the interaction of the following *Face PSIM* objects:

- **Face detection** system object;
- **Face recognition server** system object;
- **Face recognition and search** system object.

Recommended scheme for the *Face PSIM*-based video surveillance system looks like this:



On this scheme **Face detection** is in use for face detection and vector generation on remote clients. **Face recognition server** is in use for online face recognition as well as face search in archive on the main client. The benefit of such division is that the more resource consuming process – vector generation – is performed on remote clients (their number can be increased). It allows creating a large system with common database of reference images and enlarging it at any moment.

All processes can be combined on the same computer for small systems (i.e. creation of **Face detection** and **Face recognition server)**.

Moreover, there is a scheme when face detection is possible on remote clients only, and vector generation is performed on the main client (see item 7 of Configuring the captured faces recognition parameters section).

It is also possible to create a corresponding **Face recognition server** object for each **Face detection** on one computer, which is selected as an external capture for the **Face detection** (see Configuring Face Detection module). In this case, the detection and generation of face vectors using the **Face detection** objects will be performed in separate processes for each camera.

> **Attention!**
>
> Only one **Face recognition server** object can be created on one computer, which performs online recognition and face search in the archive. All other created **Face recognition server** objects can only be used to parallelize the detection calculations and the face vectors generation using the **Face detection** objects.

4 Software and hardware requirements

4.1 Host computer requirements

Face PSIM has the same requirements as *Axxon PSIM (base)* (see Requirements for base PCs).

Recognition module	Requirements
Tevian and **VideoIntellect 1.1**	• CPU: supports AVX and SSE4.2 instruction set; • GPU: face recognition on discrete GPU requires NVIDIA GeForce GTX 10-series or higher; • RAM: 4 GB; • HDD: 1.5 GB free disk space. On an Intel Core i5-7260U@2.2GHz processor with computations in one thread, the modules provide the following performance: • Face selection - 50 ms (ALG1), 75 ms (ALG2) for a 1280x720 image; • Demographic classification - 18 ms; • Attribute classification - 18 ms; • Emotion classification - 18 ms, only smiles - 1 ms; • Calculation of the biometric template - 35 ms (ALG1), 150 ms (ALG2) per face; • Template matching speed - 2 million comparisons per second.
STC	• CPU: Intel Core x64 or Intel Xeon x64 with AVX2 instruction set support; • GPU: CUDA 9.2- or CUDA 10.1-compatible NVIDIA GPU if support for GPU computing is required; • RAM: 8 GB; • HDD: 10 GB free disk space.
Cognitec	• CPU: Intel® Core™ i5-760 or AMD FX™-8100; • GPU: NVIDIA® GeForce® GTX 560 2 GB; • RAM: 8 GB; • HDD: 500 GB.

4.2 Operating system requirements

The *Face PSIM* software operates with the same versions of operating systems as the *Axxon PSIM* software package.

Attention!

To ensure correct and stable operation of *Face PSIM* software package it's necessary to turn on a swap file in the operating system (size at system option).

Attention!

Face capture and face recognition using the *Tevian*, *VisionLabs*, and *VideoIntellect 1.1* modules are not supported in operating systems released before Windows 7, and in 32-bit operating systems.

4.3 Database server requirements

The internal video Server database is maintained in the MS SQL format.

Unlike the bas *Axxon PSIM* software package the *Face PSIM* module supports a limited number of versions of this database server. The list of MS SQL Server versions, supported by *Face PSIM*, is given in the table below.

MS SQL Server version	Supported edition
MS SQL Server 2014 or newer see http://www.microsoft.com	All

The list of database servers supported by the core *Axxon PSIM* package is available here: Internal video Server database.

4.4 Antivirus requirements

When face photographs are stored to the database, antivirus scans files so the performance of *Face PSIM* reduces.

To increase the performance it is recommended to add the **FirServer.run** process to the exception list or not to use the antivirus.

4.5 Requirements for images uploaded to the reference face database

To ensure the proper face recognition, the images uploaded to the reference face database (see Selecting a way to upload an image to the reference face database) should meet the following requirements:

1. There must be a full face image and the resolution is to be HD (1280×720 pixels) or Full HD (1920×1080 pixels).
2. The image is to be sharp, not blurred, steady illuminated and not exposed.
3. The distance between eyes is not to be less than 60 pixels.
4. A person in the image is to occupy the greater part of the frame - so as the person's head and shoulders are to be visible (it is not recommended to use waist height images).

Note

For **VisionLabs** recognition module the size of the photo added to the database is configured in the *CascadeDetector::SizeHint* settings section of the config.xml file located in the *<Axxon PSIM* installation directory>\Modules\FaceRecognition\VisionLabs\data.

If *Face PSIM* is configured properly and all requirements are met, including the video camera mounting and setup requirements for the face recognition modules (see Configuring the program modules), the face recognition accuracy rate can be more than 90%.

Attention!

If the above requirements are not met, high accuracy of face recognition is not guaranteed.

5 Face PSIM software package installation

5.1 General description of the Face PSIM distribution kit

Face PSIM is supplied as a software installation package (distribution kit). The current version of the distribution kit can be downloaded from the official AxxonSoft website.

The distribution kit contains all the necessary software components for installing the *Face PSIM* software package on a base computer.

The distribution kit allows you to install, restore and remove the *Face PSIM* software package.

Attention!

- Prior to installing, restoring or removing the *Face PSIM* software package, the *Axxon PSIM* operation should be shut down.
- Administrator rights are required for installing, restoring or removing *Face PSIM*.

5.2 Installation

Face PSIM is installed as an extension to *Axxon PSIM*.

Attention!

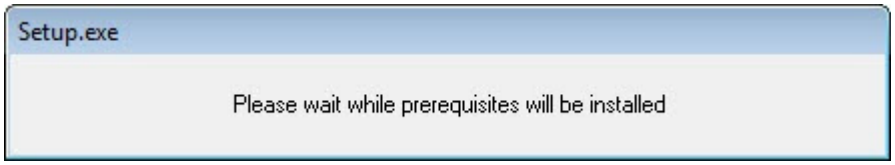
Face PSIM should be installed both on the **Server/Remote Administrator's workstation** and on the **Client** (for details, see Axxon PSIM software package. Administrator's Guide).

To install *Face PSIM*, do the following:

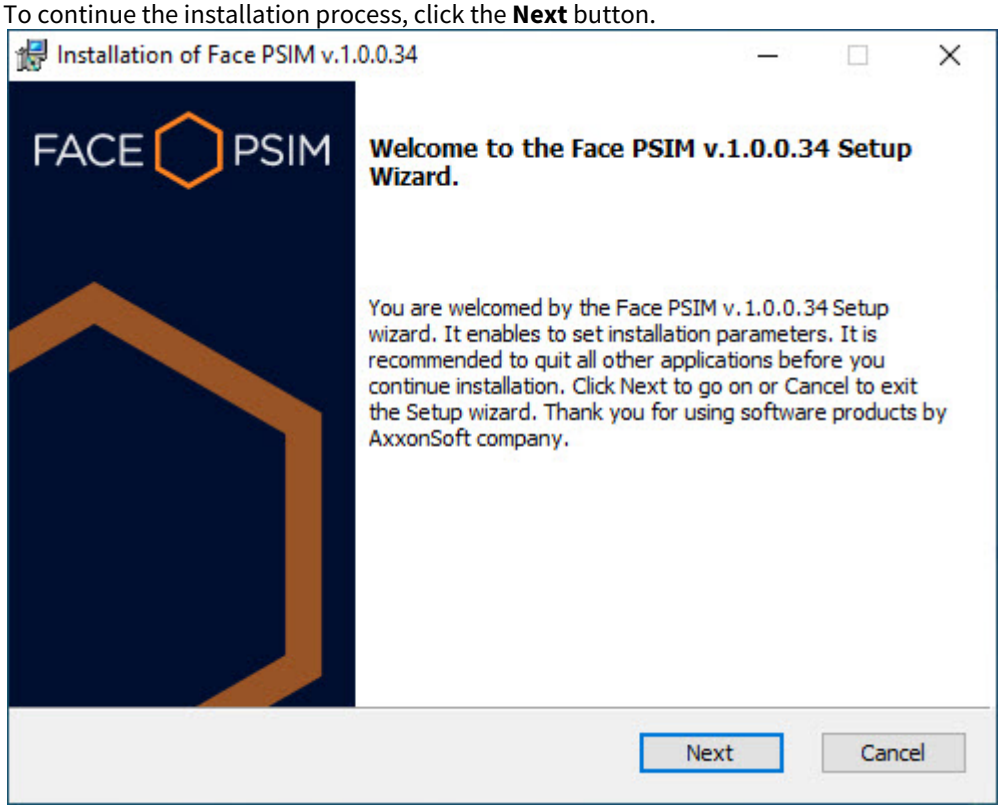
1. In the root directory of the distribution package, run the setup.exe executable file.

   Note

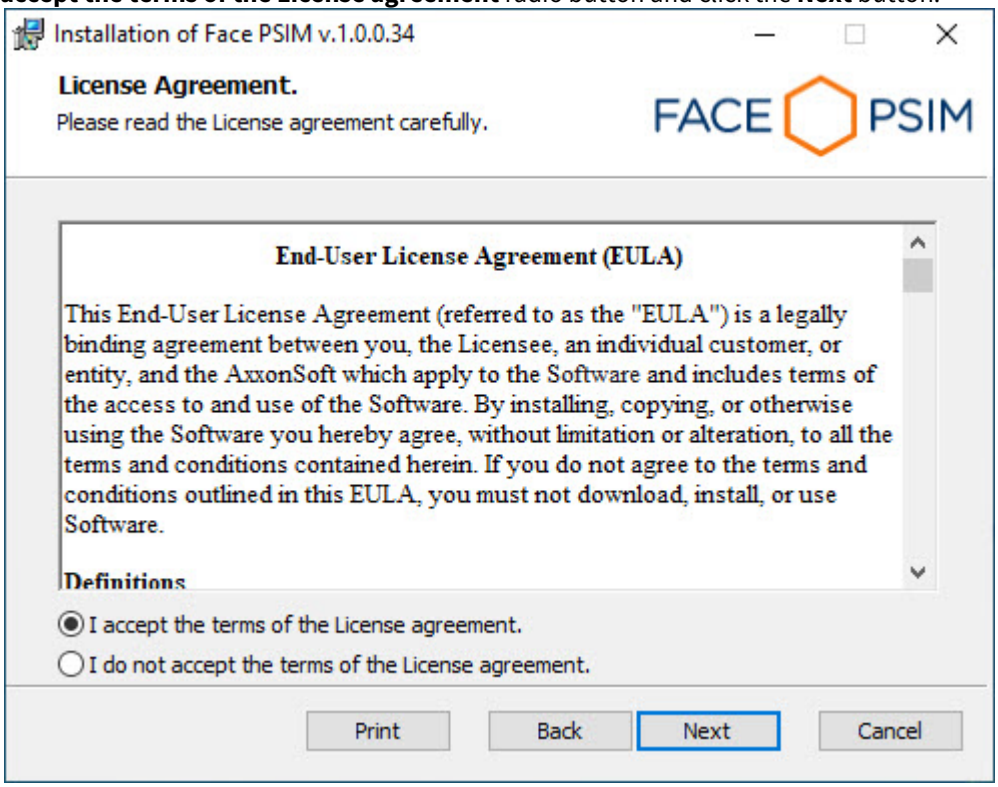
   If the Microsoft Visual C++ 2013 Redistributable Packages (x64) is not installed, this package will be installed in silent mode.

2. To continue the installation process, click the **Next** button.

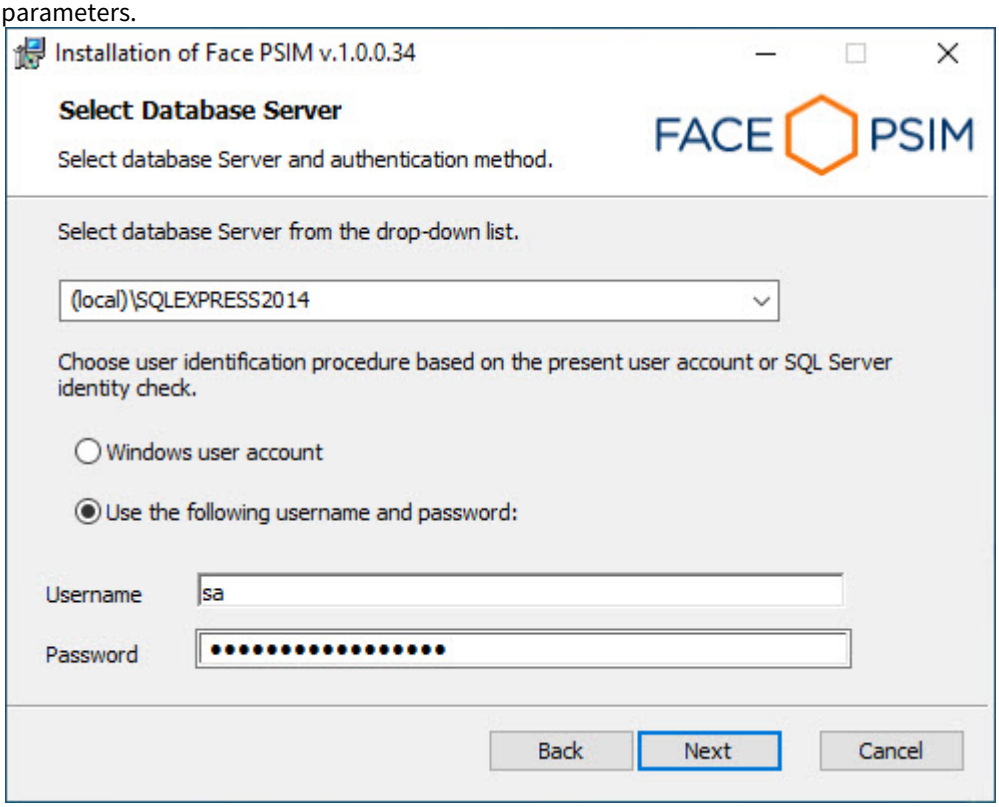


3. Carefully read the conditions of the license agreement, confirm that you agree with them by setting the **I accept the terms of the License agreement** radio button and click the **Next** button.



> **Note**
>
> If you want to print the license agreement, click the **Print** button.

4. A window will appear in which you need to select the MS SQL Server databases and set the connection parameters.



5. Select the MS SQL Server database using the **database Server** drop-down list.

> **Note**
>
> To use the SQL server installed on this (local) computer, select (local)\SQLEXPRESS (set as default).

6. Set the authentication parameters that will be used by *Face PSIM* when connecting to the SQL server. Authentication methods implemented in the dialog window:

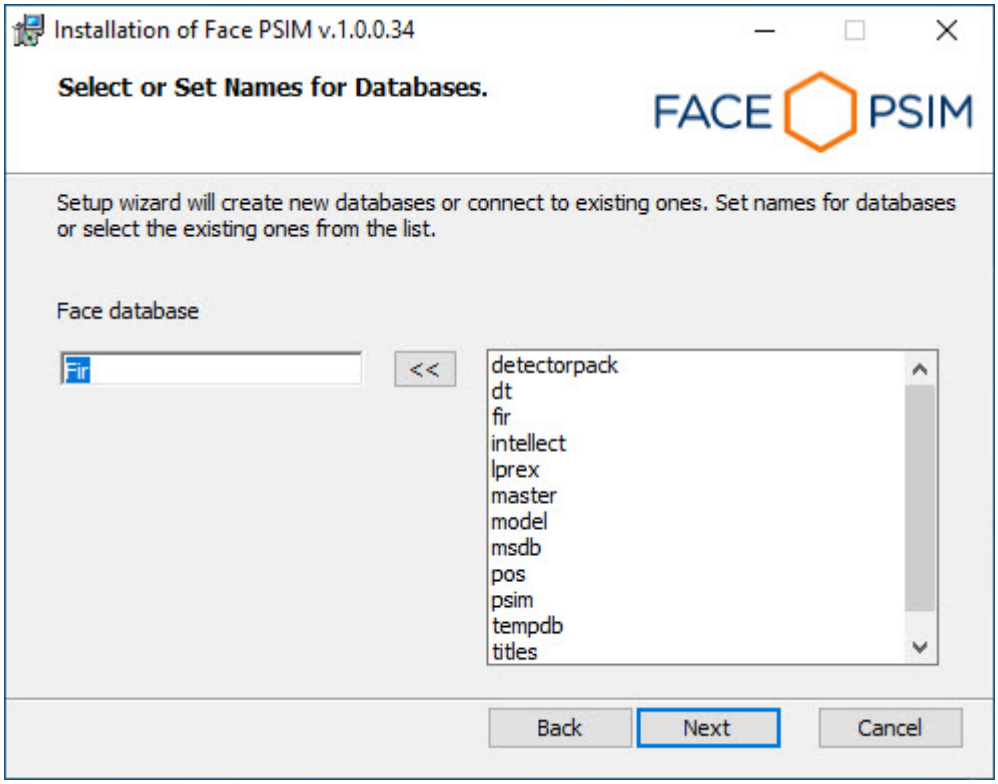
Authentication methods	**Windows credentials**	**SQL server authentication using the following username and password (Recommended)**
Use cases	The SQL server from *Face PSIM* distribution package (or from a third-party distribution package) and *Face PSIM* are installed on the same computer.	The SQL server from *Face PSIM* distribution package and *Face PSIM* are installed on the same computer. Connection to the SQL server with the specified username (login) and password can be made from any remote computer that is in the same TCP/IP network domain as the computer on which the SQL server is being installed.

Authentication methods	Windows credentials	SQL server authentication using the following username and password (Recommended)
	The SQL server and *Face PSIM* are installed on different computers that are connected via TCP/IP network and located in the same network domain. In Windows OS on the computer with installed MS SQL server, an account should be created for the user currently authorized in Windows OS on the computer on which *Face PSIM* is being installed.	The SQL server from *Face PSIM* distribution package and *Face PSIM* are installed on different computers that are connected via TCP/IP network and located in the same network domain. The username (login) and password should match the username (login) and password used to access the SQL Server.
	The full-featured SQL server (installed optionally) and *Face PSIM* are installed on different computers that are connected via TCP/IP network and located in the same network domain. An account should be created on the remote SQL server for the user currently authorized in Windows OS on the computer on which *Face PSIM* is being installed.	The full-featured SQL server (installed optionally) and *Face PSIM* are installed on the same or different computers that are connected via TCP/IP network and located in the same network domain. The username (login) and password should match the username (login) and password used to access the SQL Server.

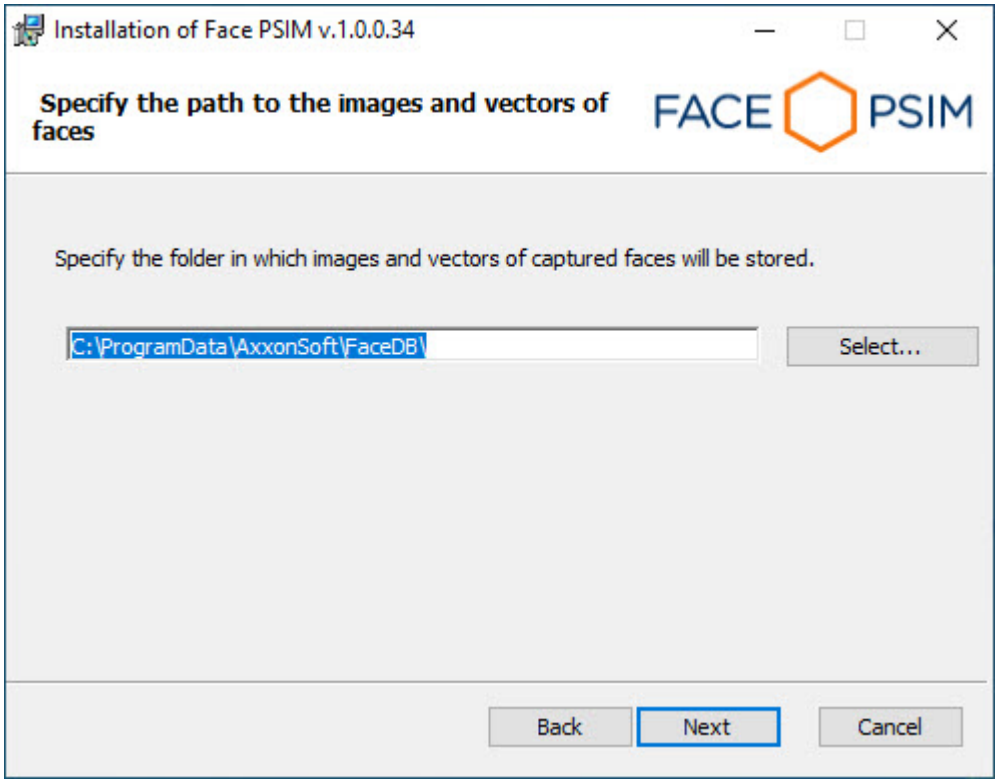
Attention!

If *Face PSIM* is installed by the computer Administrator and Windows credentials are used for the SQL server authentication, access to the database by any other user will not be possible without additional configuration of the idb.exe utility and knowledge of the Administrator login and password. It is strongly not recommended to use this method of the SQL server authentication.

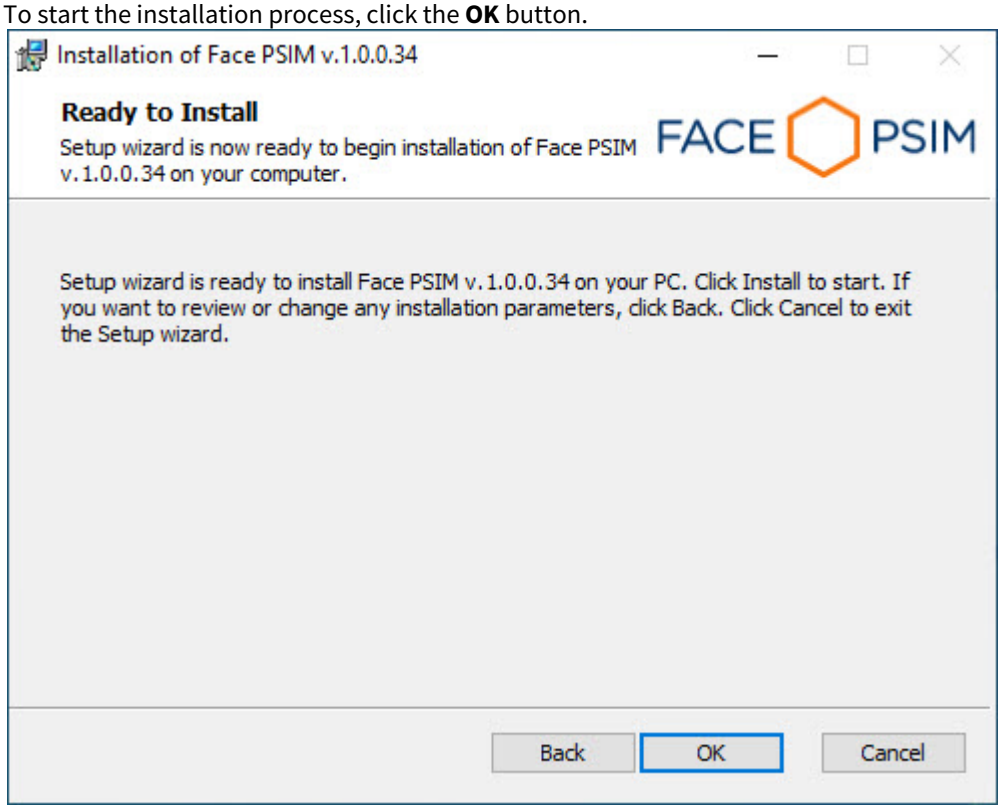
7. Click the **Next** button to continue the installation process.
8. A window will appear in which you should specify the name of the database to be created or select an existing database. By default, *Face PSIM* uses the Fir database as the face database. If you want to use a different database, select it in the list of existing databases (on the right) and click the << button next to the **Face database** field.



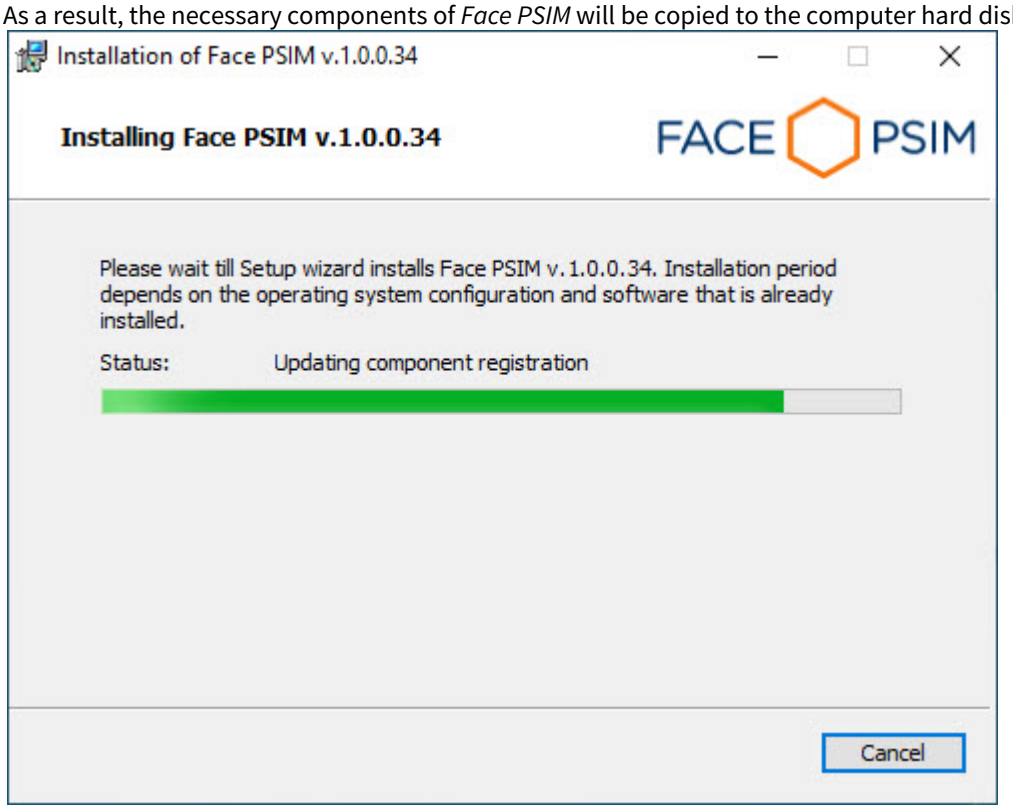
9. Click the **Next** button.
10. Specify the folder in which images and vectors of the captured and reference faces will be stored and click the **Next** button.



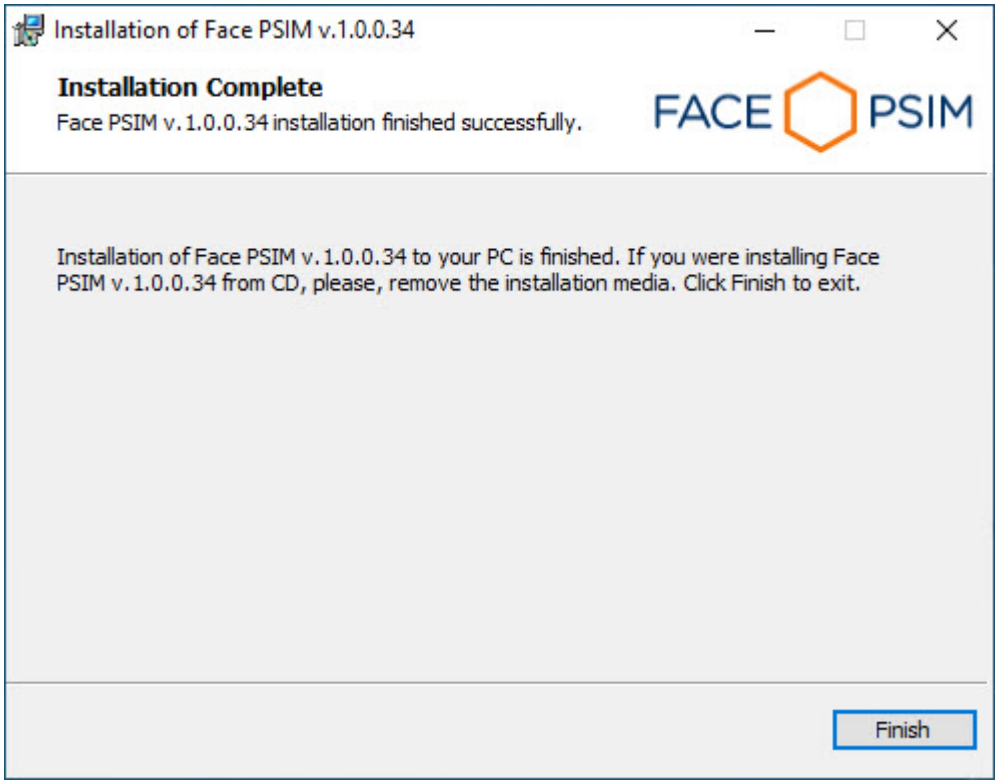
11. To start the installation process, click the **OK** button.



12. As a result, the necessary components of *Face PSIM* will be copied to the computer hard disk.



13. After *Face PSIM* components have been successfully copied, a message about the completion of the installation process will be displayed. Then click the **Finish** button.



Note

The TCP 10000 port will become open for all incoming connections in Windows firewall during *Face PSIM* installation. This port is important for the proper operation of *Face PSIM*.

Face PSIM installation is successfully completed.

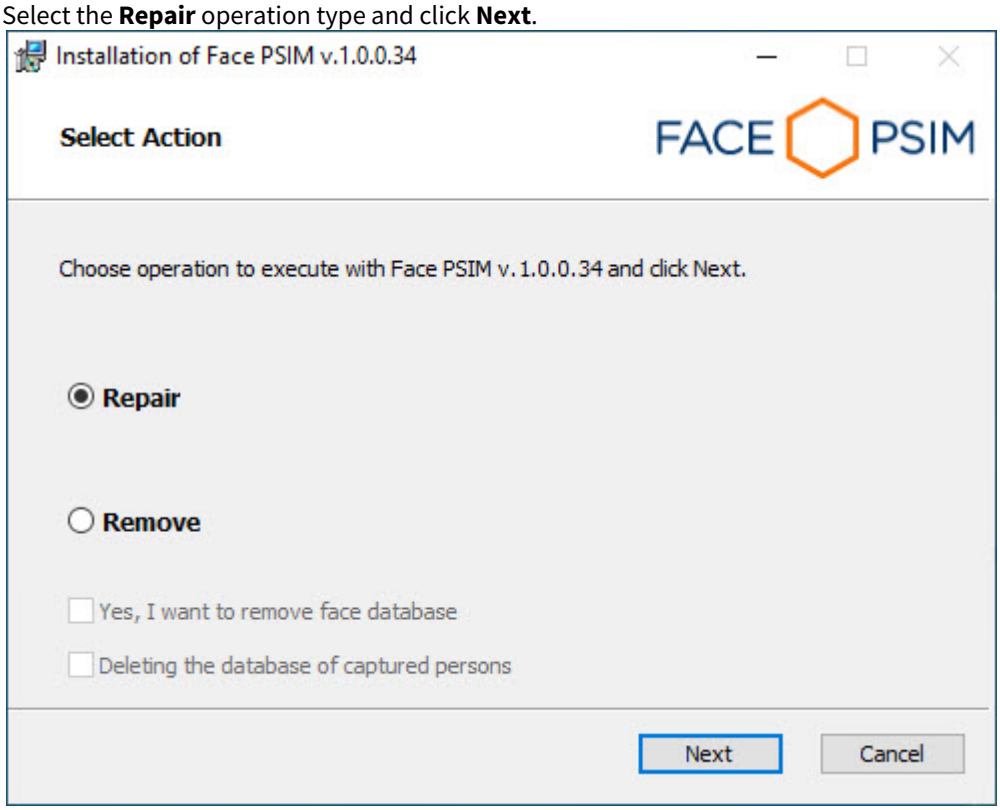
5.3 Repairing

The repair mode is used if *Face PSIM* software components need to be re-installed.

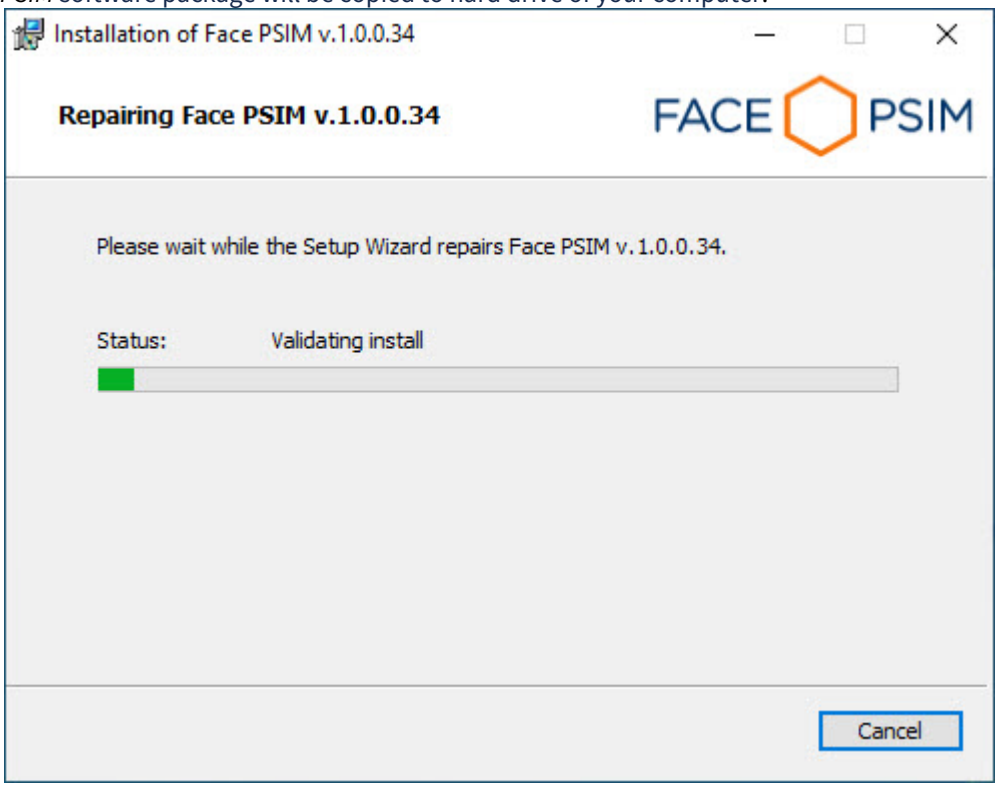
To repair the *Face PSIM* software, do the following:

1. In the root directory of the distribution kit, run the setup.exe file.

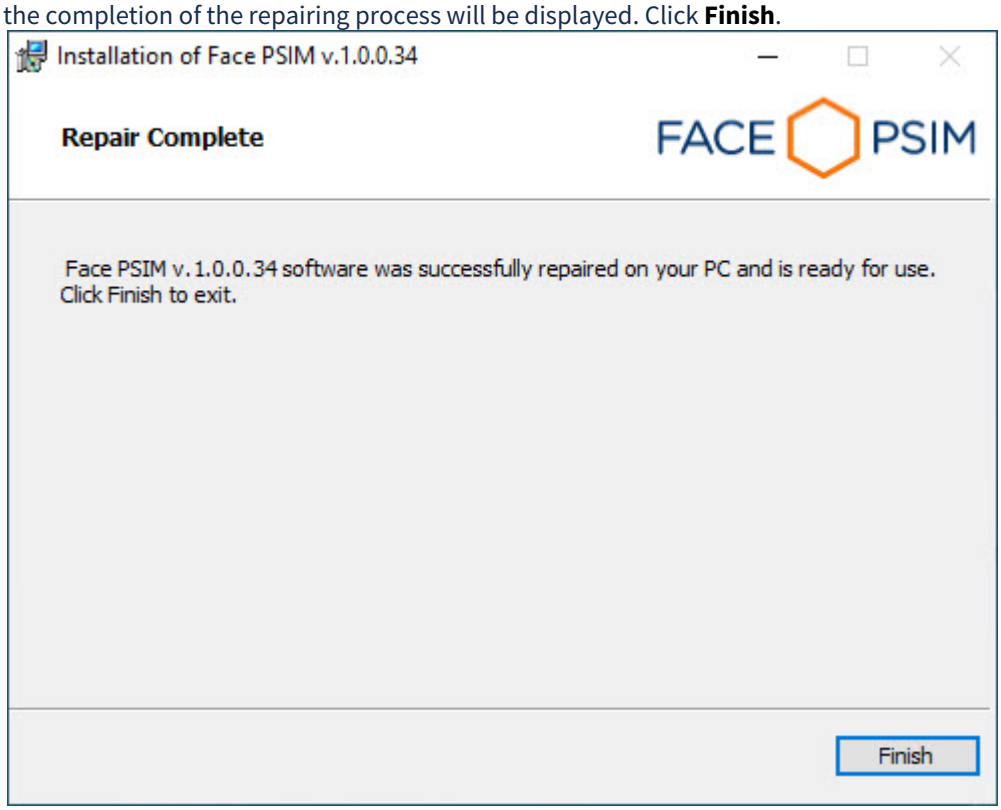
2. Select the **Repair** operation type and click **Next**.



3. As a result, the installed components will be checked and the necessary components of the *Face PSIM* software package will be copied to hard drive of your computer.



4. After all software components are successfully copied on your hard drive, the message about the completion of the repairing process will be displayed. Click **Finish**.



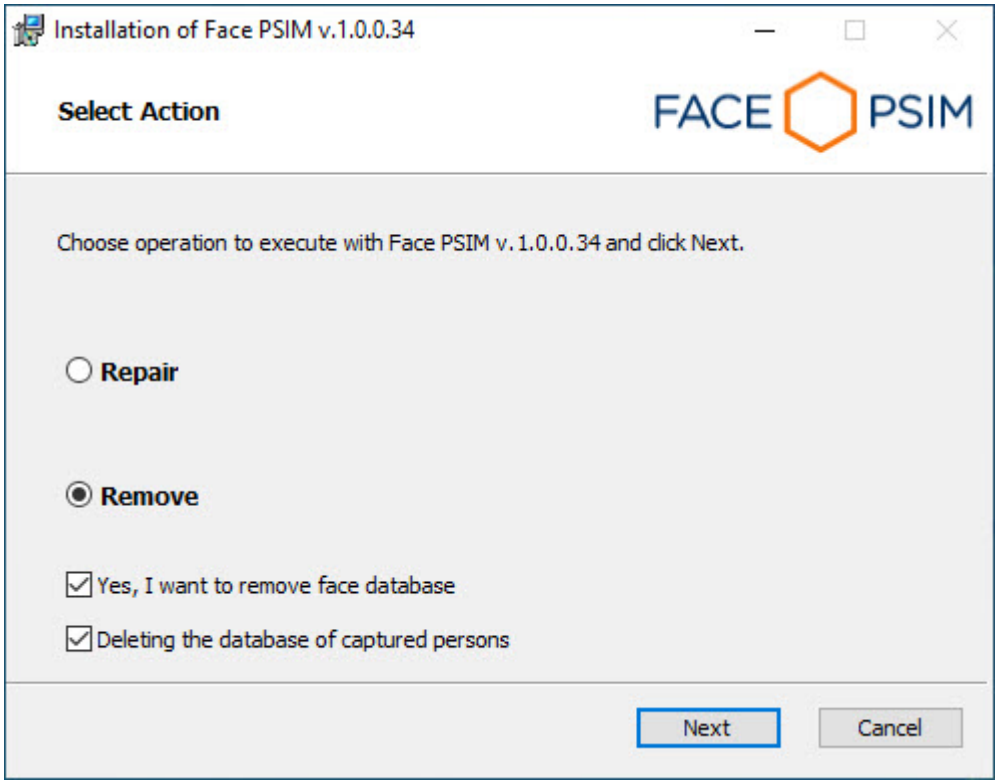
Repairing of *Face PSIM* software package is successfully completed.

5.4 Removal

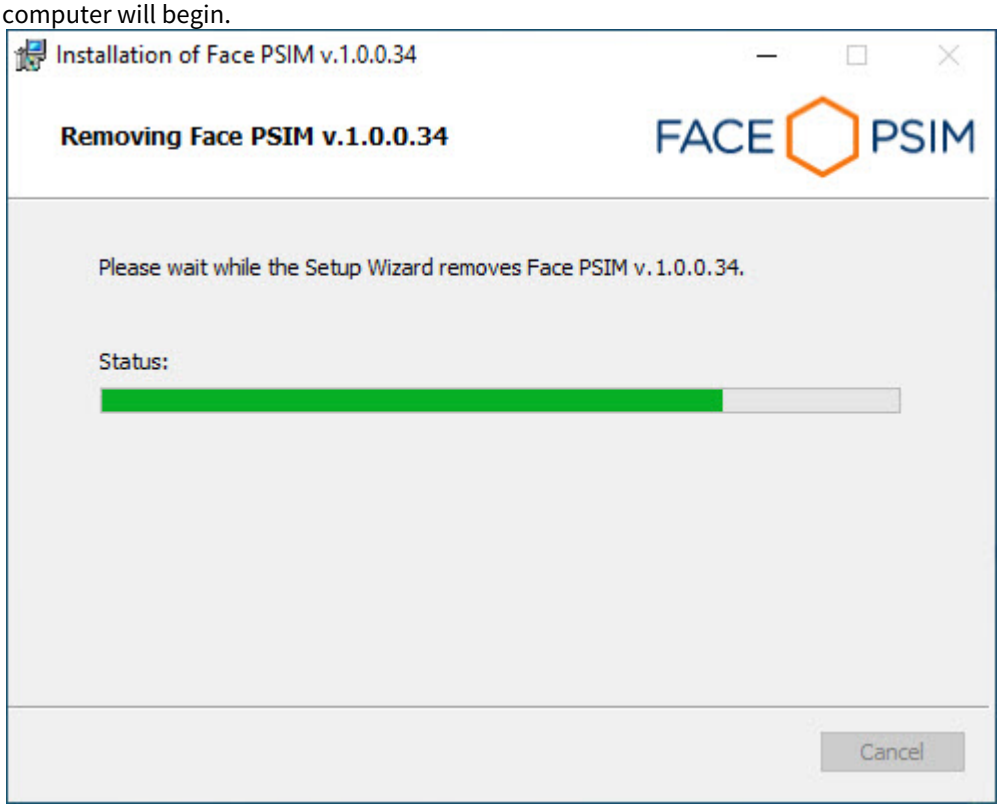
To remove *Face PSIM*, do the following:

1. In the root directory of the distribution kit, run the setup.exe file.
2. Select the **Remove** operation type and click the **Next** button.

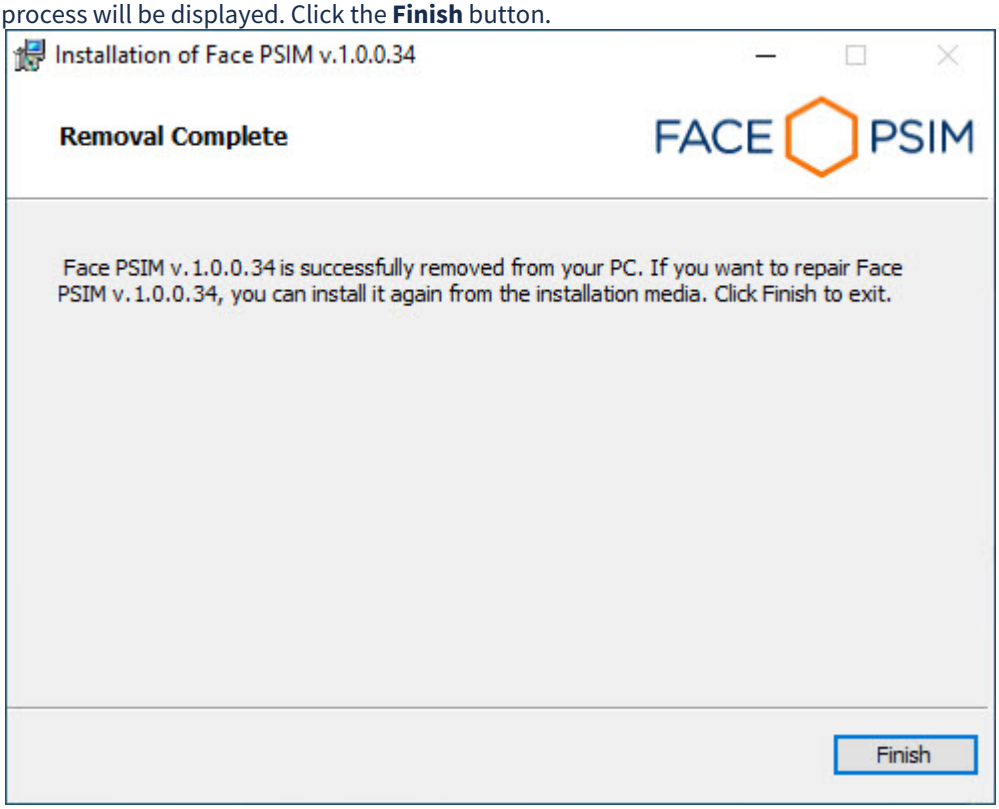
> **Note**
>
> - To remove the reference face database of *Face PSIM*, set the **Yes, I want to remove face database** checkbox.
> - To remove the database of captured faces of *Face PSIM*, set the **Deleting the database of captured persons** checkbox.



As a result, the process of removing the installed components of *Face PSIM* from the hard drive of the computer will begin.



3. After all software components are successfully removed, the message about the completion of the removing process will be displayed. Click the **Finish** button.



Removing of *Face PSIM* is successfully completed.

5.5 Remote installation and deinstallation of Face PSIM

You can remotely install and deinstall *Face PSIM* using the wmic.exe command line utility. This utility is a part of Windows OS. To run the utility, enter "wmic" without quotation marks in Windows command line.

Detailed information about this utility can be found on Microsoft technical documentation page https://docs.microsoft.com/en-us/. At the moment of creating this section, the description of the utility is available at https://docs.microsoft.com/en-us/windows/win32/wmisdk/wmic.

> **Note**
>
> The wmic.exe utility does not work correctly with VMware virtual machines. It is not guaranteed to work with other virtual machines.

To run wmic on a remote computer, you should disable UAC (for instructions on how to do this, see OS settings for correct operation of Remote Admin Workstation or Server).

The installation and deinstallation methods described in this section apply to domain and extra-domain computers.

It is necessary to copy *Face PSIM* distribution kit to the computer local disks where the installation will be performed in advance.

To do this, you can use the following command line script:

```
xcopy %Path_to_folder_with_distribution_kit% %Network_folder_on_the_target_PC% /e
```

where:

- *%Path_to_folder_with_distribution_kit%* is the path to the folder with the distribution kit on the local computer;
- *%Network_folder_on_the_target_PC%* is the path to the folder on the computer where you want to install the software. You should have the write access to it;
- The */e* attribute copies all subdirectories and their contents, including empty directories.

> **Note**
>
> The UNC path is in the format \\<server IP address>\<Shared folder on this server>\... . The ellipses here represent the path from the shared folder to the folder with the distribution kit. If you are installing on the computers in the domain, specify the address of the server that contains the distribution kit folder available to all computers.

Detailed information about the xcopy utility can be found on Microsoft technical documentation page. At the moment of creating this section, the description of the utility is available at https://docs.microsoft.com/en-us/previous-versions/windows/it-pro/windows-xp/bb491035(v=technet.10).

Note that the installation method described in this section allows you to install only the core product without any add-ons.

5.5.1 Remote installation of Face PSIM

In order to install *Face PSIM* on a remote computer, run the following command with the wmic.exe utility:

```
/NODE:"Computer_name" /USER:"User_name" /PASSWORD:"Password" product call
install true, "%installer parameters%", "%Path_to_folder_with_distribution_kit%
\Product.msi"
```

Here:

- /NODE — the name of the target computer on which *Face PSIM* is being installed;

> **Note**
>
> The NODE list can be a text file that specifies the names of the target computers in column.

- /USER and /PASSWORD — login and password of the user who has the rights to install the software on the remote computer.
- "%Path_to_folder_with_distribution_kit%\Product.msi" — path to the Product.msi installer file you need to run. It is the local path to the folder to which you copied the distribution kit.
- %installer parameters% — installer options. The following parameters can be applied to Product.msi:
    a. The parameters that can be applied to any msi file (for reference, run the msiexec.exe /? command in the command line from <WINDOWS>\system32\ directory).
    b. The parameters described in the setup.exe help article in the /CMD="[commands]" section (for reference, run the setup.exe /? command in the command line from the installer folder. These commands are also described in Installing Axxon PSIM™ software in a silent mode).
    c. The parameters that are set in setup.exe during installation:
        - CMD_INSTALLTYPE — Client, Server, Admin;
        - REMOVEALL (0, 1) — removal with/without saving the configuration;
        - NOOSCHECK=1 — disable the OS compatibility check.

Note

The operation of these parameters is not guaranteed if there is a branch in the registry:

- For x86 system: HKEY_LOCAL_MACHINE\SOFTWARE\AxxonSoft\PSIM\InstallPropertyInfo;
- For x64 system: HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\AxxonSoft\PSIM\InstallPropertyInfo.

The branch has the parameters of the previous installation.

Example

Example of an installer parameter string:
REBOOT=ReallySuppress LANGUAGE="en" TRANSFORMS="%Path_to_folder_with_distribution_kit% \languages\Setup\en\en.mst" CMD_INSTALLTYPE="Server".
In the example above:
REBOOT=ReallySuppress cancels computer reset at the end of installation.
LANGUAGE="en" selects the product language. The default product language is English.
TRANSFORMS="%Path_to_folder_with_distribution_kit%\languages\Setup\en\en.mst" specifies the path to the installer language mst-patch (specifies the installer language).
CMD_INSTALLTYPE="Server" specifies *Axxon PSIM* installation type − Server. It can also take the Admin value (if Remote Administrator's workplace installation type is required) and Client (if Remote Client installation type is required).

5.5.2 Remote deinstallation of Face PSIM

In order to deinstall *Face PSIM*, run the following command in the wmic.exe utility:

```
/NODE:"Computer_name" /USER:"User_name" /PASSWORD:"Password" product where
name="Product_name" call uninstall
```

where Product_name is the name under which *Face PSIM* is installed. In the English version, it is usually "Face PSIM v.Build_number". The name can be found in the registry in HKEY_LOCAL_ MACHINE\Software\Microsoft \Windows\CurrentVersion\Uninstall section.

6 Configuring Face PSIM software and its components

6.1 Face PSIM configuration and setup procedure

The *Face PSIM* software package is configured on the basis of *Axxon PSIM*. It is considered that the necessary system objects for the video subsystem operation are already configured (see Axxon PSIM Software Package. Operator's Guide. The most current version of this document can be found in the AxxonSoft documentation repository).

The second stage in configuring *Face PSIM* is the creation and configuration of the system objects necessary for processing the received video image in order to recognize the faces captured in the video camera FoV, as well as the creation of databases for storing the received information.

If you use the face recognition software modules, then it is necessary to create and configure the following objects in order to configure *Face PSIM*:

1. **Face recognition server** module (one object).
2. **Face detection** module (on each video camera where face recognition is required).
3. Face recognition module and necessary channels (see Activation of the recognition modules in Face PSIM).
4. **Face recognition and search** interface object (one object).

6.2 Configuring the program modules

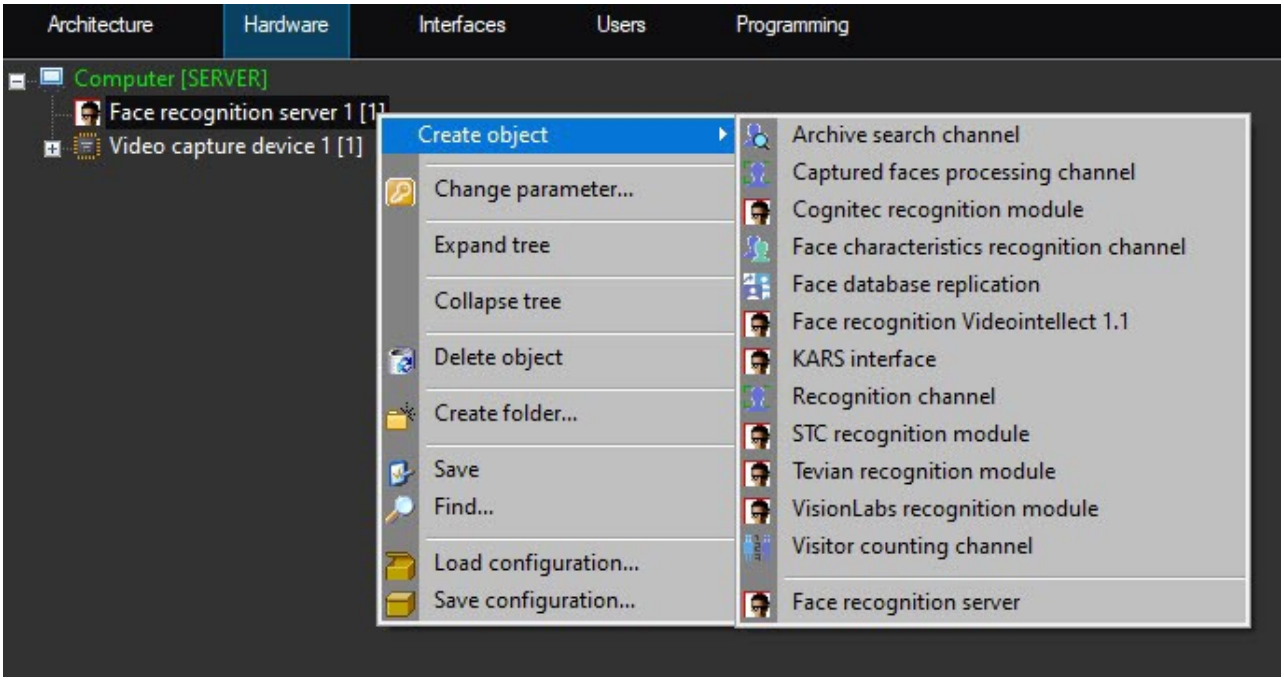
6.2.1 Activation of the recognition modules in Face PSIM

> **Note**
>
> Face recognition modules can operate in multi-threading mode. By default, all available processor cores are used. The number of processor cores actually used in the operation of the face recognition module is set using the **CpuCoreCount** registry key (see Registry keys reference guide).

To enable the face recognition, it is necessary to activate one of the software modules:

1. *Cognitec recognition module*.
2. *VisionLabs recognition module*. On the basis of the created object, it is also necessary to create an object representing the number of reference faces in the database.
3. *Tevian recognition module*. On the basis of the created object, it is also necessary to create an object representing the number of reference faces in the database.
4. *STC recognition module*.
5. *Face recognition VideoIntellect 1.1*.

To activate the software module, it is necessary to create an object on the basis of the **Face recognition server** with the same name as the required module.



The following objects can also be created on the basis of the **Face recognition server** object:

1. The *Archive search channel* module which is used for searching the captured face in the face database and viewing the video archive of the captured face.
2. The *Face characteristics recognition channel* module which is used for the facial characteristics recognition for a specified channel.

> **Attention!**
>
> The *Face characteristics recognition channel* module can only operate with the *Tevian* or *VideoIntellect 1.1* face recognition module.

> **Note**
>
> If the *Face characteristics recognition channel* is not activated, then the facial characteristics of all newly captured faces will be marked as **Undefined** in the **Face recognition and search** interface window. However, if this module is activated later, then as *Face PSIM* operates and accumulates data, the undefined facial characteristics of already captured persons will be changed to averaged values.

This module provides the recognition of the following facial characteristics:

- age;

  > **Note**
  >
  > If the age of the same person is determined with poor accuracy, then it is necessary to set the **1** or **5** value for the **Tevian.TrackBestFramesCount** key (for details, see Registry keys reference guide, for information about working with the registry, see Working with Windows OS registry).

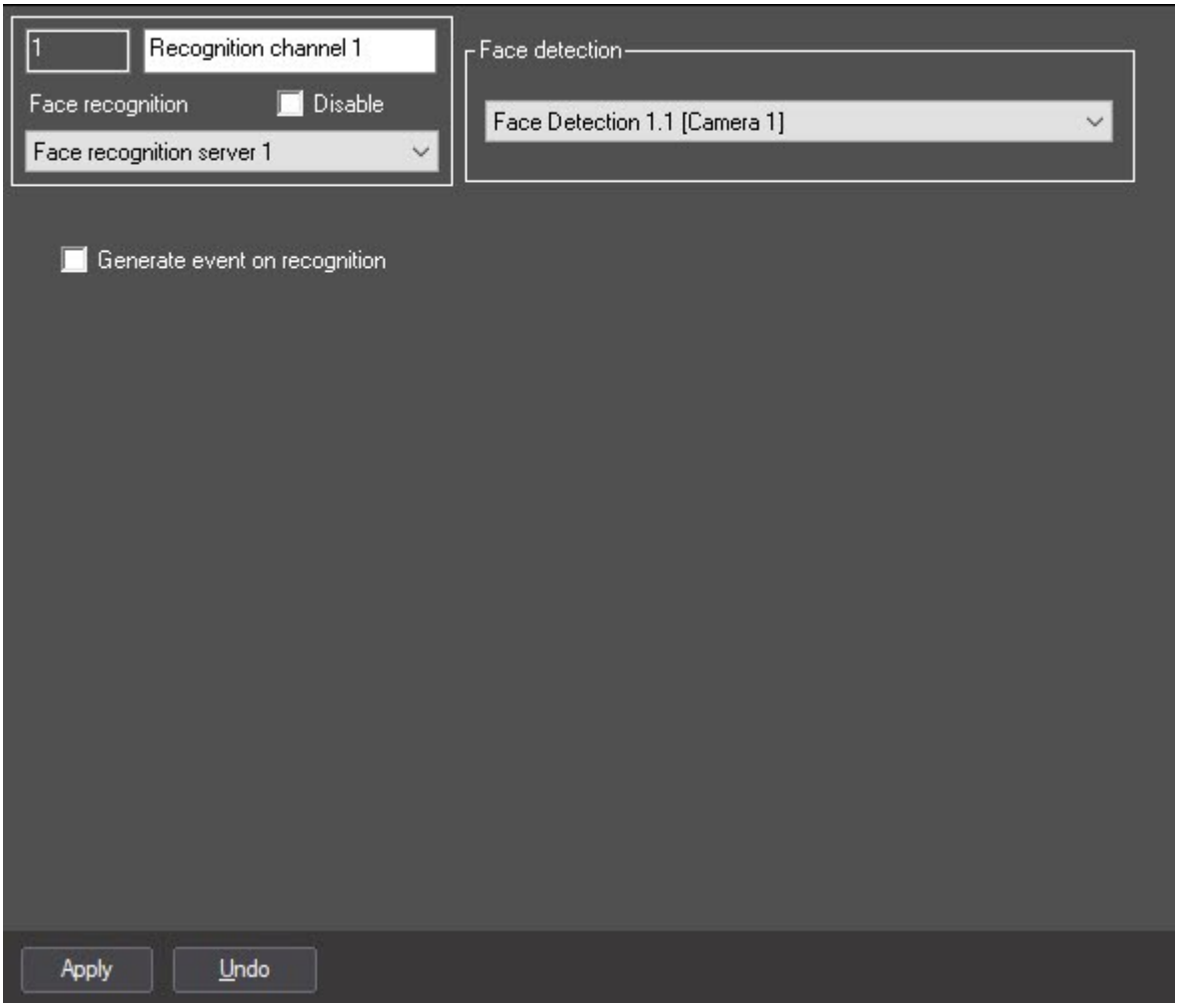
- gender;
- emotion;
- glasses;

- facial hair;
- hair color;
- type of bald head;
- headwear;
- artificial face;
- face concealment.

> **Note**
>
> If masked faces are not recognized, then it is necessary to set the **0** value for the **Tevian.GlobalTrackingDetectionFilter** registry key (for details, see Registry keys reference guide, for information about working with the registry, see Working with Windows OS registry).

3. The *Visitor counting channel* module which is used for counting visitors and repeated passes.
4. The *Face database replication* module which is used for the Server face database replication in a distributed configuration (see Face database replication).
5. The *Recognition channel* and *Tevian/Cognitec/VisionLabs/STC/VideoIntellect 1.1* recognition modules which are used for real-time face recognition for the specified channel.
6. The *Captured faces processing channels* module is used for capturing faces and determining their temperature in real time for the selected video channel. To use this channel, it is necessary to configure the **Face detection** to work with a thermal camera (see Configuring the Face Detection module combined work with thermal camera or external system).

> **Attention!**
>
> After the *Visitor counting channel*, *Archive search channel*, *Recognition channel*, *Face characteristics recognition channel* and *Captured faces processing channels* modules are activated, it is necessary to select the required **Face detection** object on the settings panel of the corresponding object (see Configuring the captured faces recognition parameters).



6.2.2 Face detection

Face Detection software module functionality

The *Face Detection* software module is designed to perform the following functions:

1. Detect captured faces in video frames.
2. Send photo of a captured face to the face recognition server.

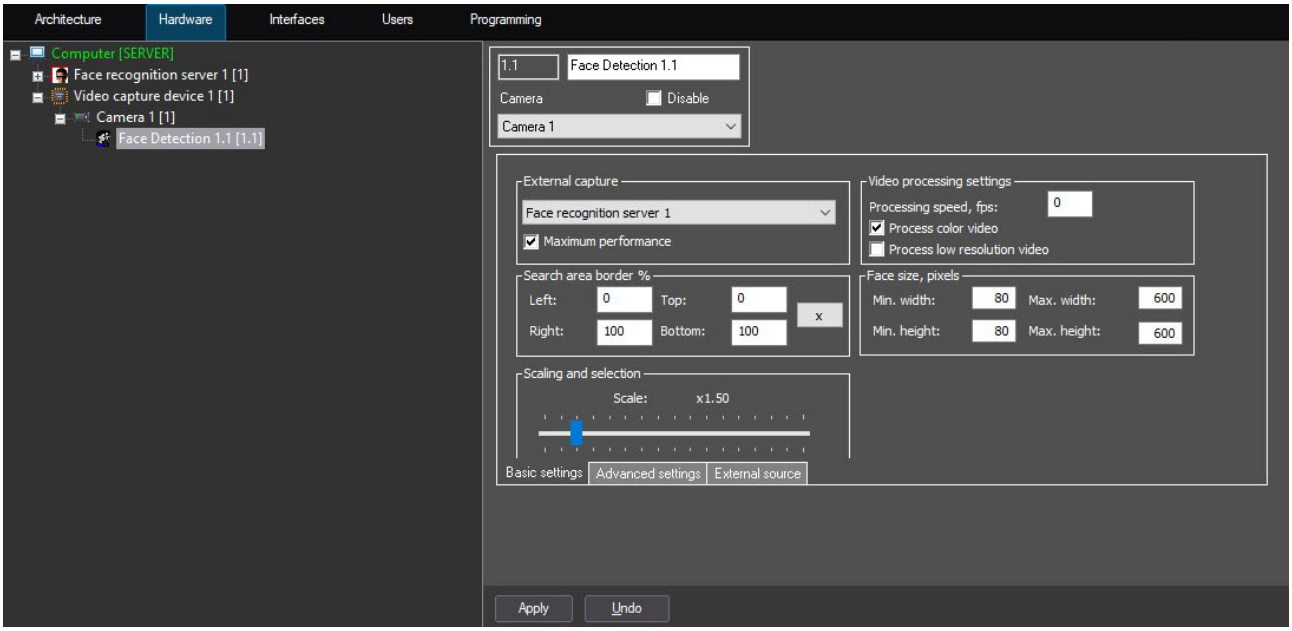
Requirements to video parameters while using face detection tool

When a face detection tool is in use, the following requirements must be met:

1. Minimum linear dimensions of a face to be detected are 24 pixels.
2. Maximum speed of a face to be detected is not to be more than a half of linear dimensions in pixels per frame (i.e. face overlapping between two adjacent frames must be not less than half-width and half-height of face).
3. A detection tool needs 8 frames to confirm face detection – otherwise, a face detection message won't be sent.

Configuring Face Detection module

The **Face Detection** object is created on the basis of the **Camera** object in the **Hardware** tab of **System settings** dialog box.

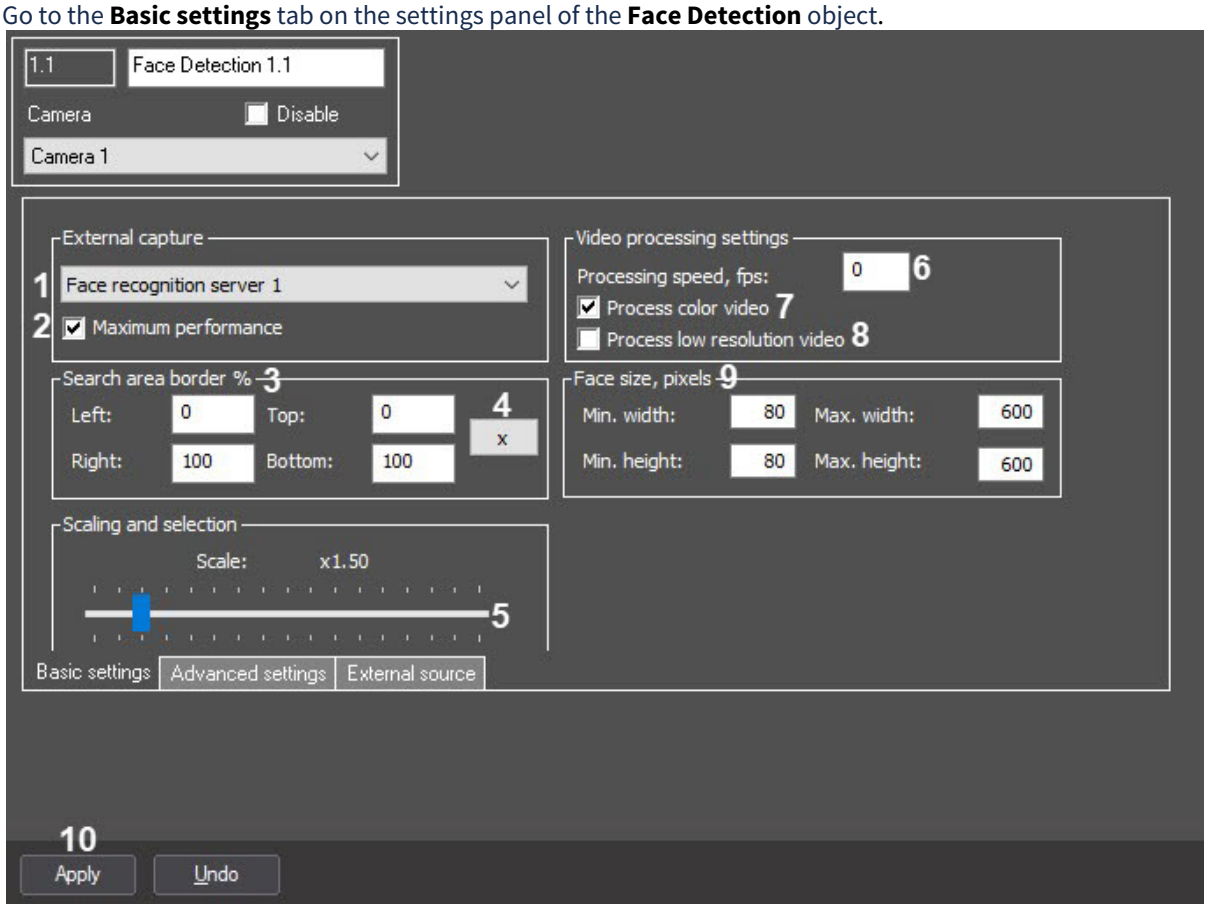


> **Note**
>
> The video image resolution received by the *Face Detection* from the camera can be changed using the **ResizeWidth** registry key (for details, see Registry keys reference guide).

Face Detection module basic settings

Configure the basic settings of the *Face Detection* module as follows:

1. Go to the **Basic settings** tab on the settings panel of the **Face Detection** object.

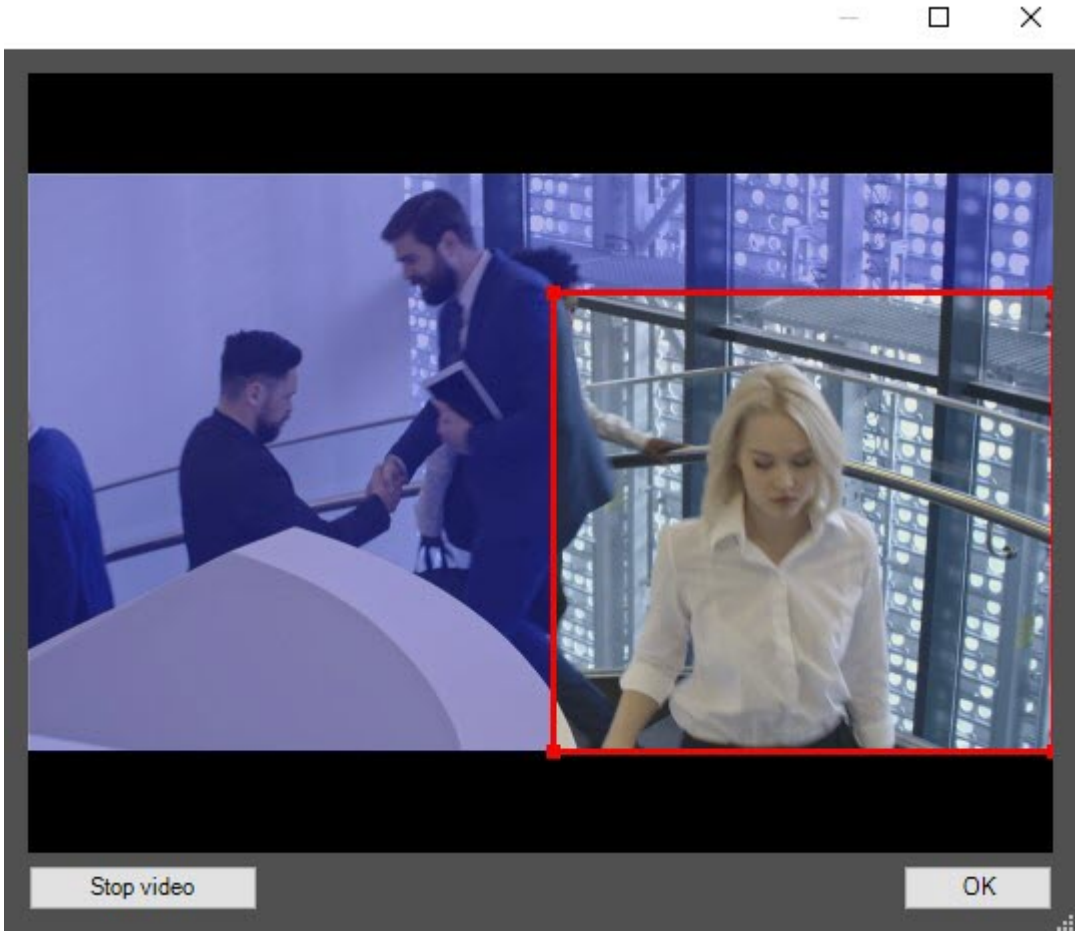


2. There are several variations of the face detection operation depending on the setting of the external capture and Face recognition server (**1**):
    a. External capture is NOT selected and the detection is NOT added to any of the Face recognition server channels. In this case, only capturing of faces detected by *Axxon PSIM* capturing is performed, and generation of vectors is not performed. This option is not for *Face PSIM*.
    b. External capture is NOT selected but the detection is added to any of the the Face recognition server channels. In this case, capturing and saving of photos of faces detected by *Axxon PSIM* capturing, generation of vectors and recording them to database are performed. This option does not allow face recognition (while search and visitor counting are available).
    c. External capture is selected but the detection is NOT added to any of the Face recognition server channels. In this case, the photos of faces captured by the face recognition modules (see Structure of the Face PSIM software package), are captured and saved, and the vectors are generated, but the vectors are not saved in the database. This option is only suitable for use in scripts.
    d. External capture is selected and the detection is added to any of the Face Recognition Server channels. In this case, the photos of faces captured by the face recognition modules (see Structure of the Face PSIM software package), are captured and saved, and the vectors are generated and recorded to the database.

    The external capture is recommended for use. From the **External capture** drop-down list select the Face recognition server with the help of which the face capturing with the subsequent generation of a vector (if the **Create FIR in detection unit** checkbox is set on the settings panel of the corresponding Face Recognition Server object – see Configuring the Face recognition server object) and saving of photos will be performed.

> **Note**
>
> Proper configuring of the face recognition server selected as external capture is performed with the help of the Cfgedit.exe utility (detailed information about this utility see in the Cfgedit.exe utility for configuring the Cognitec face recognizer section).

3. The **Maximum performance** mode is enabled by default (**2**). This mode allows improving the quality of face capture and recognition by using all available processor cores and increasing the RAM consumption. When this mode is disabled, the memory consumption will decrease, but faces can be missed at capturing.
4. Set the face search area border on the video image by specifying the required values in percent in the corresponding fields (**3**), or by clicking the button (**4**) and using the interactive interface. After you click the button, the window with the corresponding video camera image will open. To set the face search area border, click the **Stop video** button at the required time, select the required area using the left mouse button, and then click **OK**. The specified face search area border values will be automatically entered in the **Left**, **Right**, **Top** and **Bottom** fields of the **Search area border %** group.



> **Attention!**
>
> Setting the face search area border is available only if the *Tevian* or *VideoIntellect 1.1* face recognition modules are used.

5. Set the **Scaling and selection** slider (**5**) to the position corresponding to the required scale of the captured face in the frame for recording and highlighting the face with a dynamic frame. The current scale value is

displayed in the field above the slider and ranges from 1 (only the captured face is recorded) to 5 (the whole frame is recorded).

6. In the **Processing speed, fps** field (**6**), specify how many fps from the video stream are processed by the Face detection program module. This parameter is necessary for reducing the load on the Server.
7. If it is necessary to convert the color video image to black and white image to generate the vectors by the black-and-white frames, then uncheck the **Process color video** checkbox (**7**).

   Attention!

   Generation of vectors by black-and-white frames is supported by *Tevian* and *VideoIntellect 1.1* face recognition modules only. It reduces the CPU load, insignificantly affecting the face capture and recognition quality.

8. By default the Face detection tool processes a video with the resolution set for the **Camera** parent object. To process a video with 320x240 pixels resolution, set the **Process low resolution video** checkbox (**8**).

   Note

   Enabling this option reduces the load of the Server's processor, but the probability of face capture also reduces.

   Attention!

   The **Process low resolution video** setting is not relevant in case, when a high resolution is set for a **Camera** parent object. Also this settings is not in use if the *Tevian* or *VideoIntellect 1.1* module is applied for face capture.

9. Set the minimum and maximum width and height of the face on the video image in pixels in the corresponding fields of the **Face size, pixels** group (**9**).

   Note

   If the specified minimum dimensions differ significantly from the actual ones, then the faces will not be captured.
   For example, if the video contains large faces (15-30%), then if you set the minimum size to 5%, and the maximum size to 80%, then the faces will not be detected. However, if you specify a minimum size of 12% and a maximum size of 80%, the faces will be captured.
   Thus, if the detection tool is configured to capture small faces, then it cannot detect large ones, and vice versa.

   Note

   If all face sizes are set to **0**, the Face Detection tool uses similar parameters set on the **Face recognition server** object settings panel (see Configuring the captured face size for recognition).

   Note

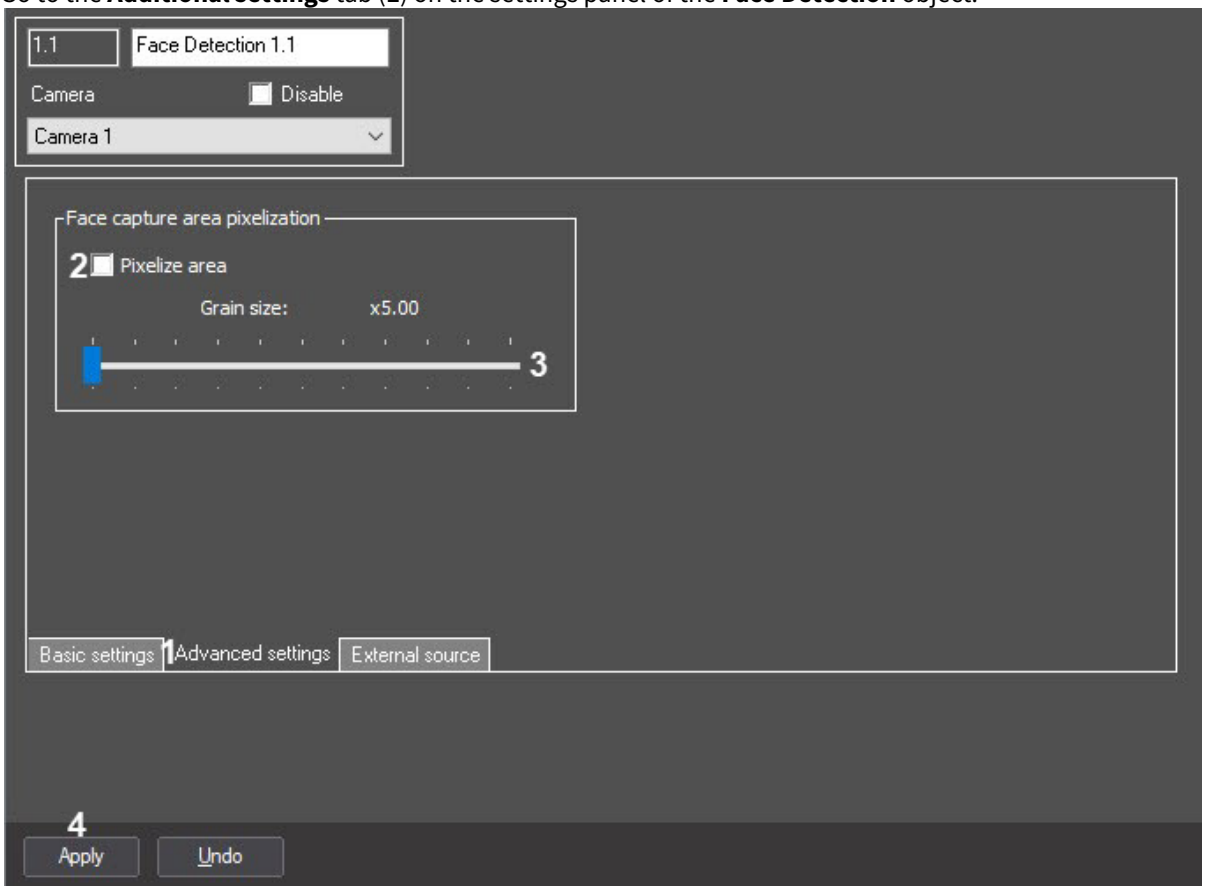
   When using *Visionlabs* face recognition module, the minimum and maximum values for all face detection tools should be the same, as the values are set for the entire software module.

10. To save the changes click the **Apply** button (**10**).

Face Detection module advanced settings

Configure the advanced settings of the *Face Detection* module as follows:

1. Go to the **Additional settings** tab (**1**) on the settings panel of the **Face Detection** object.

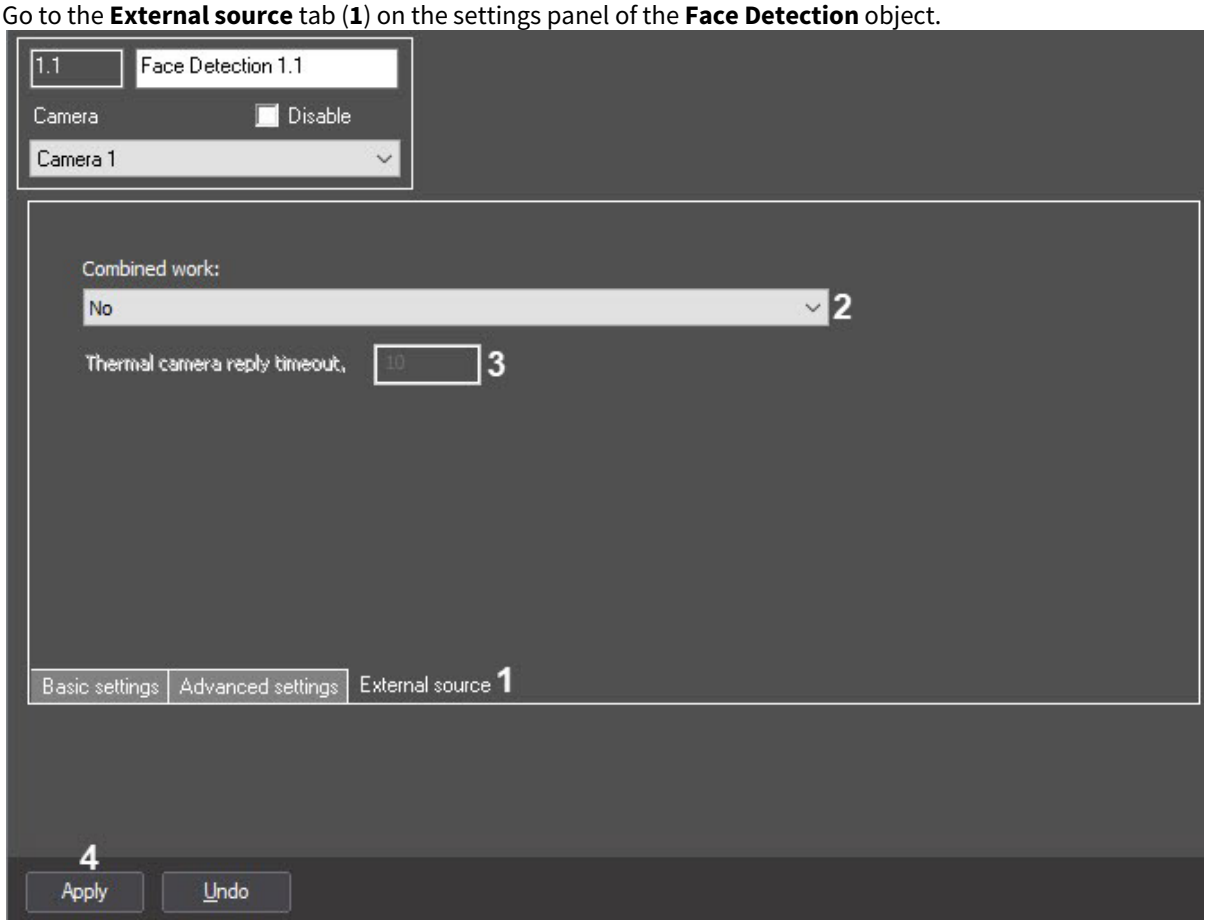


2. To pixelate the part of video image in which the face was recognized, set the **Pixelize area** checkbox (**2**).
3. Set the **Grain size** cursor in position corresponding to the pixelation grain size in pixels (**3**).
4. To save the changes click the **Apply** button (**4**).

Configuring the Face Detection module combined work with thermal camera or external system

Configure the *Face Detection* module operation with a thermal camera or an external system as follows:

1. Go to the **External source** tab (**1**) on the settings panel of the **Face Detection** object.



2. From the **Combined work** drop-down list (**2**) select the combined operation mode:
   - **No** – combined operation mode is not used;
   - **Combine with thermal camera temperature** – receiving the temperature and coordinates of a captured face frame from the thermal camera. A photograph of a captured face will be obtained from the capturing camera. If this mode is selected, the following setting become available.
3. **Thermal camera reply timeout** (**3**) – sets the timeout in seconds for receiving data from the thermal camera;

> **Note**
>
> The FIND_PERSON event will be generated only when the temperature is received from the thermal camera or after the time specified in the **Thermal camera reply timeout** parameter.

   - **Get photo from thermal camera** – receiving the temperature and photos of a captured face from the thermal camera;
   - **Get photo and metadata from external system** – receiving the temperature and photos of a captured face from a thermal camera or *Axxon One*.
5. Click **Apply** (**4**) to save the changes.

6.2.3 Face database replication

The face database replication is used in a distributed configuration with several Servers, so that when new faces are added from the face database of the selected Server (the replication source), the same faces are automatically added to the face database of other Servers in the distributed configuration. Also, when the face database

replication is activated, the changes on the selected Server (the replication source) of such data as photo, name, last name or comment are also synchronized with other Servers.

Note

- When you delete a replicated face from the Server's face database, this face will be deleted only from this Server.
- When you delete a face from the Server's face database (replication source), this face will also be deleted from all Servers that replicate this face database.

Attention!

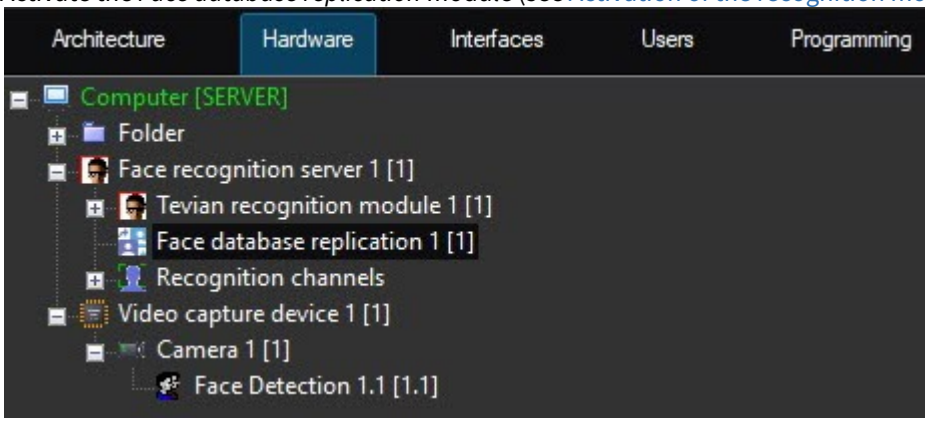
To ensure the proper operation of the face database replication, the following conditions should be met:

1. All Servers should use the same face recognition modules, and their SDK should be the same version.
2. All Servers should have the same value for the **Minimum quality for adding face to DB (0-100)** parameter (see Configuring the captured faces recognition parameters).

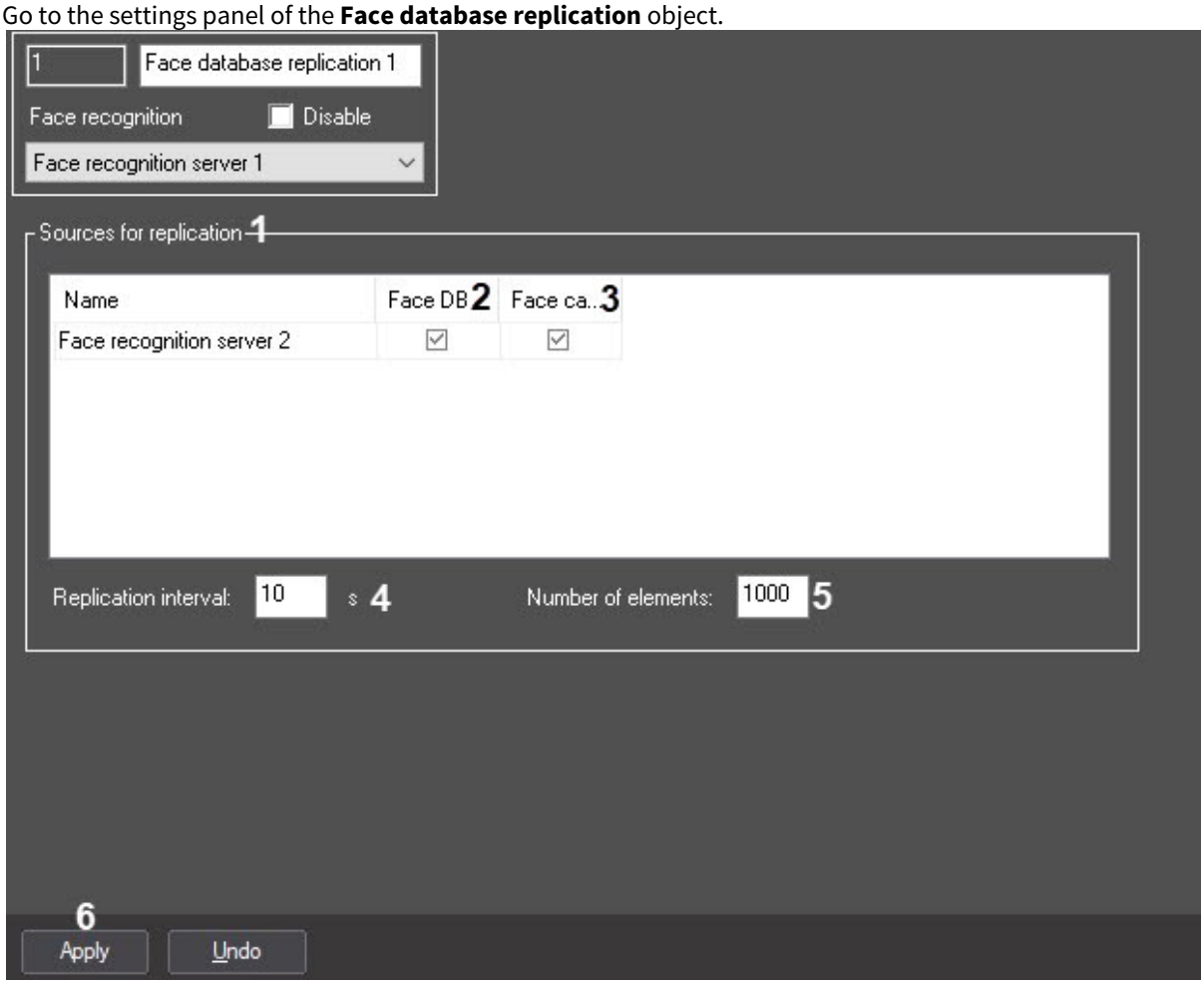
Otherwise, some photographs of faces from the main Server will not be added to other Servers, and there will be an increased load on the network and computing resources. Photos of faces that cannot be added to other Servers can be saved on the main Server in a folder. To do this, it is necessary to change the value of the **LogBadImages** parameter to **True** (see XML-file parameters reference guide).

Face database replication is configured as follows:

1. Activate the *Face database replication* module (see Activation of the recognition modules in Face PSIM).



2. Go to the settings panel of the **Face database replication** object.



3. In the **Sources for replication** list (**1**), set the checkboxes for the Face Recognition Servers, the following data from which will be replicated to the current Face Recognition Server:
    a. **Face DB** (**2**) — for replication of the reference face database;
    b. **Face captures** (**3**) — for replication of the captured faces database.
4. In the **Replication interval, s** field (**4**), specify in seconds how often the reference face database and/or captured faces database will be replicated (default is 10 sec).
5. In the **Number of elements** field (**5**), set the maximum number of reference face database and/or captured faces database records that can be replicated at a time (default is 1000).
6. Click the **Apply** button (**6**) to save the settings.

The face database replication is configured.

6.2.4 Tevian and VideoIntellect 1.1

Tevian and VideoIntellect 1.1 modules functionality

Tevian and *VideoIntellect 1.1* software modules are designed to implement the following functions:

- Face tracking;
- Face capture and recognition;
- Face biometric vectors creation and their comparison;

- Recognition of the various face characteristics when working together with the *Face characteristics recognition channel* module. For details see Configuring the additional face characteristics.

Tevian and VideoIntellect 1.1 modules licensing

Tevian and *VideoIntellect 1.1* software modules are licensed according to the following scheme:

Module in use	Face recognition module	Licensing scheme
Face characteristics recognition channel	*Tevian*, *VideoIntellect 1.1*	By the number of channels
Visitor counting channel		By the number of channels
Archive search channel		By the number of channels
Recognition channel	*Tevian*	By the number of faces in the database
	VideoIntellect 1.1	License for 1000000 faces in the database

Thus, the psim.sec key file is purchased for each camera in use and a certain number of faces stored in the database. Additional key files are not required.

Video camera mounting and setup requirements for Tevian and VideoIntellect 1.1 modules

The camera technical specifications which are necessary for the correct operation of the *Tevian* and *VideoIntellect 1.1* recognition modules are listed in the table below:

Camera specifications	• Color camera with resolution: 2 million pixels (1080p), minimum: 720p; • CCD / CMOS: 1/1.8 or higher; • H.264 and RTSP support; • The maximum encoding speed should be at least 4 Mbps; • Guaranteed image quality in low light conditions; • The frame rate should be not less than 12 fps, and not less than 6 fps for face recognition at turnstiles.
Video image	• The sharpness of the captured faces on the received photos should be not less than 64 grayscale. Deficient or exceeding illumination is not allowed; • There should be no back light and sharp gradients of light and shade; • The faces should be evenly illuminated with a diffused light of at least 200 lux. Directional side lighting is not allowed; • The photos of the captured faces received from video cameras should be clear. Image blurring caused by motion is not allowed; • The maximum deviation of the face in the camera FoV from the face-forward position should not exceed 15 degrees; • The distance between pupils on the received photos of the captured face should be not less than 32 pixels; • There should be minimum mutual overshadowing of the captured faces.

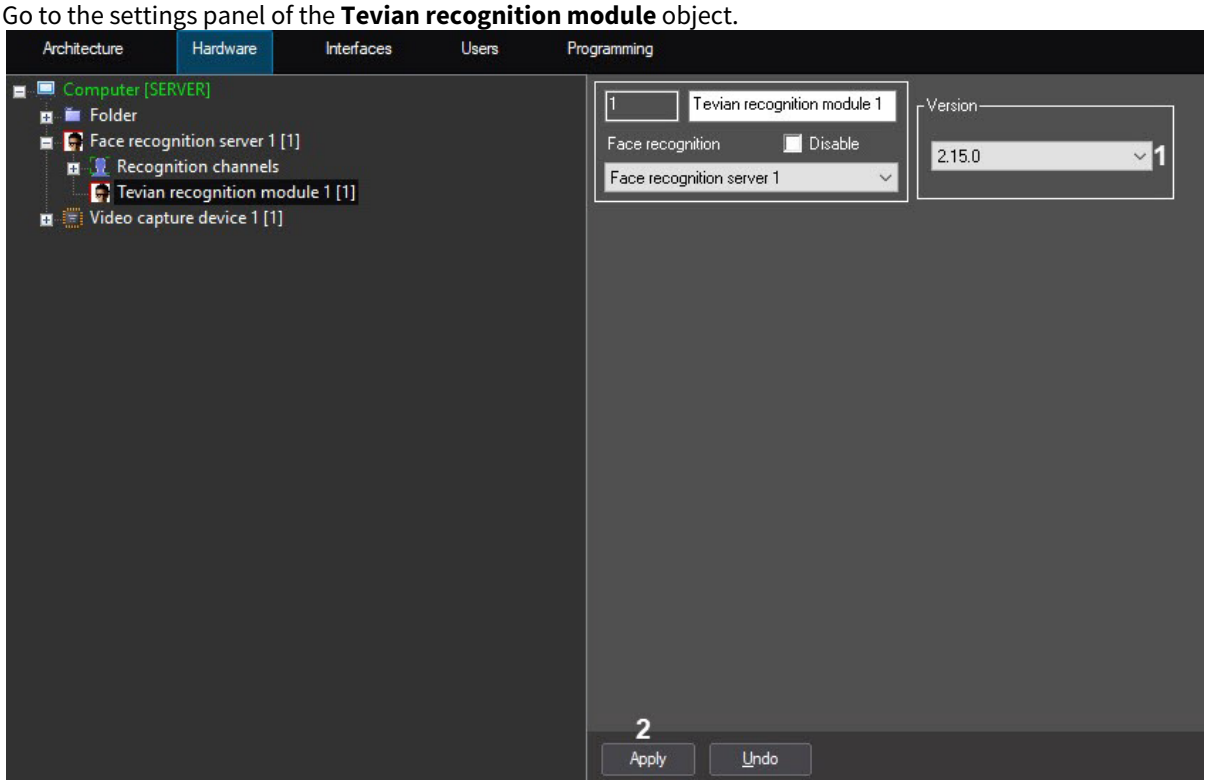
Camera positioning	• The required distance between the camera and the face can be set using a lens with required focal length.

Specifics of Tevian and VideoIntellect 1.1 modules

> **Note**
>
> *Tevian* and *VideoIntellect 1.1* modules have many settings that are set in the Windows registry (see Registry keys reference guide).

To select the *Tevian* SDK to be used, do the following:

1. Go to the settings panel of the **Tevian recognition module** object.



2. From the **Version** drop-down list (**1**), select the required *Tevian* SDK version.

> **Note**
>
> - When you change the SDK version, the re-generation of biometric vectors will automatically start (for details, see Switching between the face recognition modules and SDK versions).
> - In *Face PSIM*, when you select the SDK version, all possible versions will be displayed, even if they are not installed. To ensure the correct operation, it is necessary to select one of the installed SDK versions.

3. Click the **Apply** button (**2**).

You can see the current version of *Tevian* SDK in the **Version/Vector size (bytes)** field in the **Statistics** tab of the *Face recognition and search* interface module (see Displaying the statistics).

6.2.5 Cognitec

Cognitec module functionality

The *Cognitec* software module is designed to implement the following functions:

1. Face tracking.
2. Face capture and recognition.
3. Construction of biometric vectors of faces and their comparison.

Cognitec module licensing

Cognitec software module is licensed according to the following scheme:

Module in use	Licensing scheme
Visitor counting channel	By the number of channels
Archive search channel	By the number of channels
Recognition channel	By the number of faces in the database

Thus, the psim.sec key file is purchased for each camera in use and a certain number of faces stored in the database. Additional key files are not required.

To use the *Cognitec* software module in multi-threading mode, the number of faces in the database is determined as follows:

- If the number of face detectors used is greater than or equal to the value of the **CpuCoreCount** registry key, then the license is purchased for the number of faces in the database, which is defined as: the required number of reference faces + the value of the **CpuCoreCount** key;
- If the number of face detectors used is less than the value of the **CpuCoreCount** registry key, then the license is purchased for the number of faces in the database, which is defined as: the required number of reference faces + the number of face detectors used.

Note

For example:

- If **CpuCoreCount** = 4, and the configuration includes 4 or more face detectors, then a license for 104 reference faces should be purchased for a database with 100 reference faces;
- If **CpuCoreCount** = 4, and the configuration includes 1 face detector, then a license for 101 reference faces should be purchased for a database with 100 reference faces.

In both cases, the actual number of reference faces that can be contained in the database will be 100.

See Registry keys reference guide, for details about working with the registry, see Working with Windows OS registry.

It is also necessary to purchase a software key that is tied to the computer's operating system. To obtain a software key, do the following:

1. With administrator rights, in the command line run the **hwkey.bat** file, which is located in the <*Face PSIM* installation directory>\Modules64\Firserver\FaceRecognition\Cognitec8\bin folder.

> **Attention!**
>
> The **hwkey.bat** file should be run on the PC that will run the face recognition module.

2. As a result, the **Cognitec8lic.txt** file will be generated. Send it to AxxonSoft technical support. Technical support specialists will provide you with the **activationkey.cfg** file. Rename it to **Cognitec8License.cfg** and move to the <*Face PSIM* installation directory>\Modules64\Firserver\FaceRecognition\Cognitec8\bin folder.
3. With administrator rights, run the **CognitecLicenseUtil.exe** file, which is located in the <*Face PSIM* installation directory>\Modules64\Firserver\FaceRecognition.

> **Attention!**
>
> If you change the operating system on the PC that runs the face recognition module, you will need a new activation key.
> Changing the hardware configuration or the name of the PC that runs the recognition module does not affect the activation key.

Video camera mounting and setup requirements for Cognitec module

The camera technical specifications which are necessary for the correct operation of the *Cognitec recognition module* are listed in the table below:

Camera specifications	• Color camera with resolution: 2 million pixels (1080p), minimum: 720p; • CCD / CMOS: 1/1.8 or higher; • H.264 and RTSP support; • The maximum encoding speed should be at least 4 Mbps; • Guaranteed image quality in low light conditions; • The frame rate should be not less than 12 fps, and not less than 6 fps for face recognition at turnstiles.
Video image	• The sharpness of the captured faces on the received photos should be not less than 64 grayscale. Deficient or exceeding illumination is not allowed; • There should be no back light and sharp gradients of light and shade; • The faces should be evenly illuminated with a diffused light of at least 200 lux. Directional side lighting is not allowed; • The photos of the captured faces received from video cameras should be clear. Image blurring caused by motion is not allowed; • The maximum deviation of the face in the camera FoV from the face-forward position should not exceed 15 degrees; • The distance between pupils on the received photos of the captured face should be not less than 96 pixels; • There should be minimum mutual overshadowing of the captured faces.
Camera positioning	• The required distance between the camera and the face can be set using a lens with required focal length.

6.2.6 STC

STC module functionality

The *STC* software module is designed to implement the following functions:

1. Face tracking.
2. Face capture and recognition.
3. Construction of biometric vectors of faces and their comparison.

Licensing of the STC recognition module

On this page:

General information about the STC recognition module licensing

STC recognition module is licensed according to the following scheme:

Module in use	Licensing scheme
Visitor counting channel	By the number of channels
Archive search channel	By the number of channels
Recognition channel	By the number of faces in the database

Thus, the psim.sec key file is purchased for each camera in use and a certain number of faces stored in the database. Additional key files are not required.

You also need to install the **SDK STC** and purchase an additional license — the HASP SL software security key (program file). This key is assigned to the computer hardware. For install or update the HASP SL software security key use .v2c file.

The operation of the *STC recognition module* depends on the following software related to its license protection:

- Sentinel LDK (Sentinel Runtime) - the security key driver. It is required to ensure the performance of the *STC recognition module*.
- Sentinel RUS (Remote Update System) - the license update manager.

Installing the SDK of the STC recognition module

Before activating the security key, you need to install the **SDK STC**. To do this, download the **SDK STC 4.6.1** installer from the AxxonSoft website and extract the **SDK_data** folder from it to *C:\Program Files (x86)*.

Then make sure the Sentinel Admin Control Center web portal opens. For this, open the http://localhost:1947/_int_/devices.html page in your browser. If the site is not available, check that the **Sentinel LDK License Manager** service is present in the list of **Windows** services and has the **Running** status.

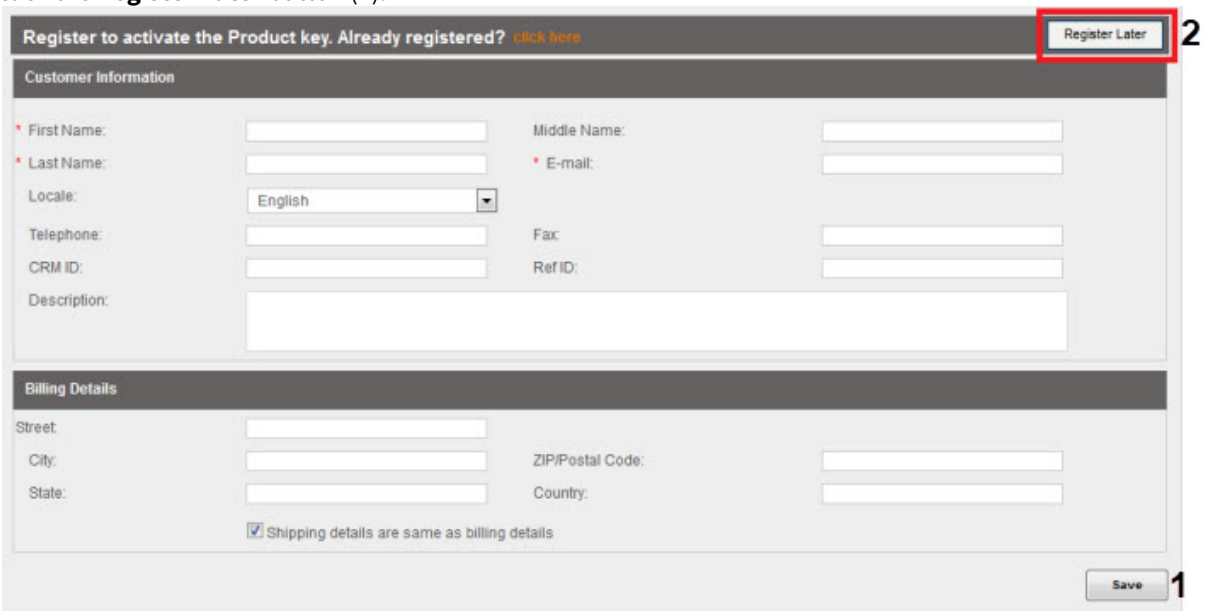
Activation of the STC recognition module security key

To activate the *STC recognition module* security key, do the following:

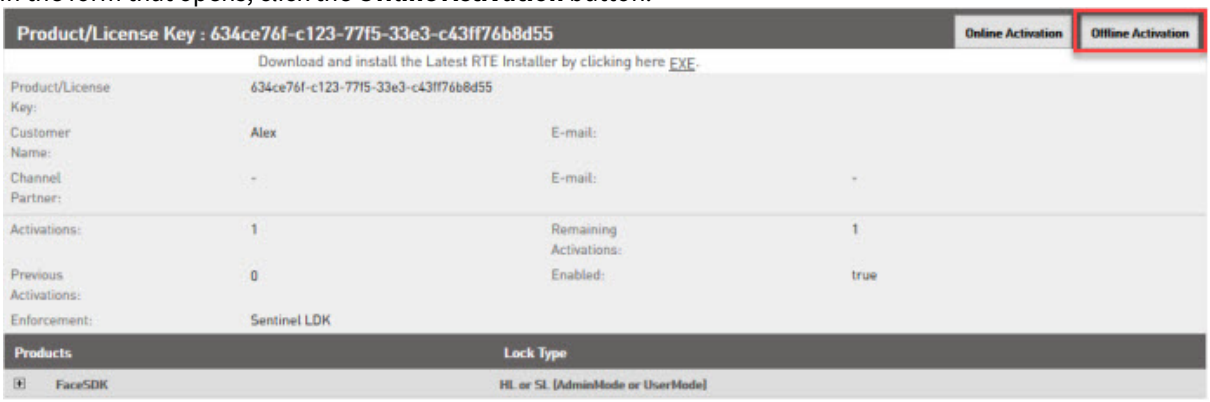
1. Go to http://activation.speechpro.com:8080/ems/customerLogin.html.
2. In the dialog box that opens, enter the received security key in the **Product/License Key** field (**1**) and click **Login** (**2**).

3. In the opened form for entering personal data, enter personal data (required fields are marked with an asterisk). To save the data, click the **Save** button (**1**). To go to the next step without entering personal data,

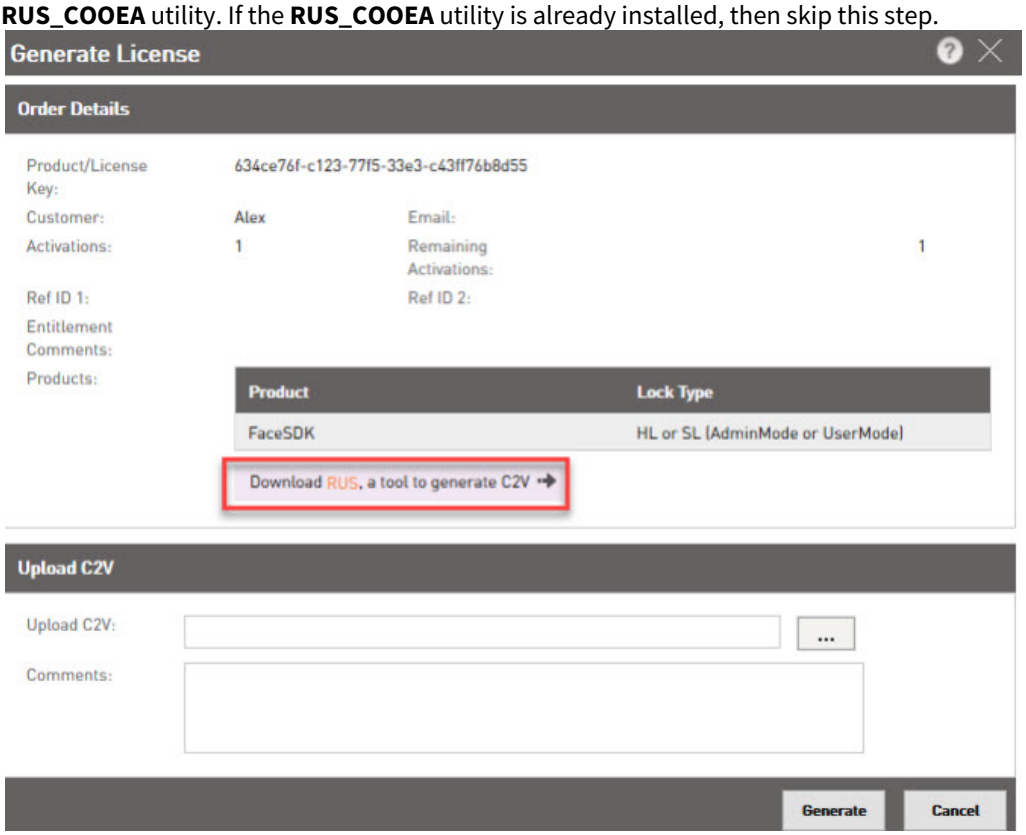
click the **Register Later** button (**2**).



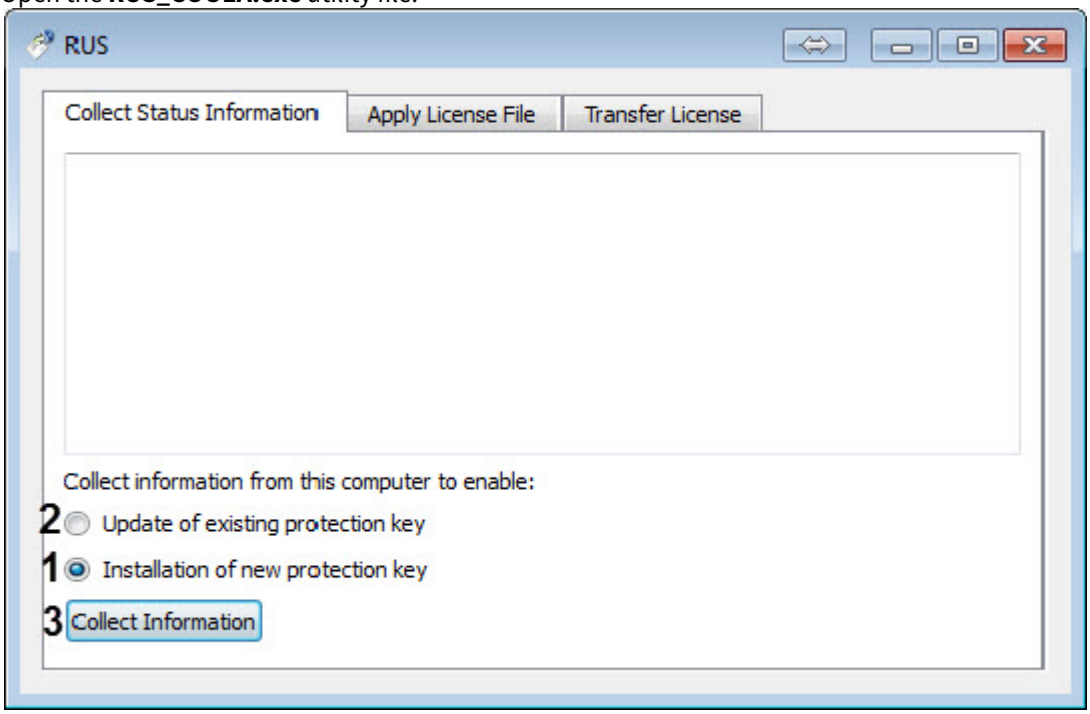
4. In the form that opens, click the **Offline Activation** button.



5. In the window that opens, click the **Download RUS, a tool to generate C2V** link to download the **RUS_COOEA** utility. If the **RUS_COOEA** utility is already installed, then skip this step.



6. Open the **RUS_COOEA.exe** utility file.



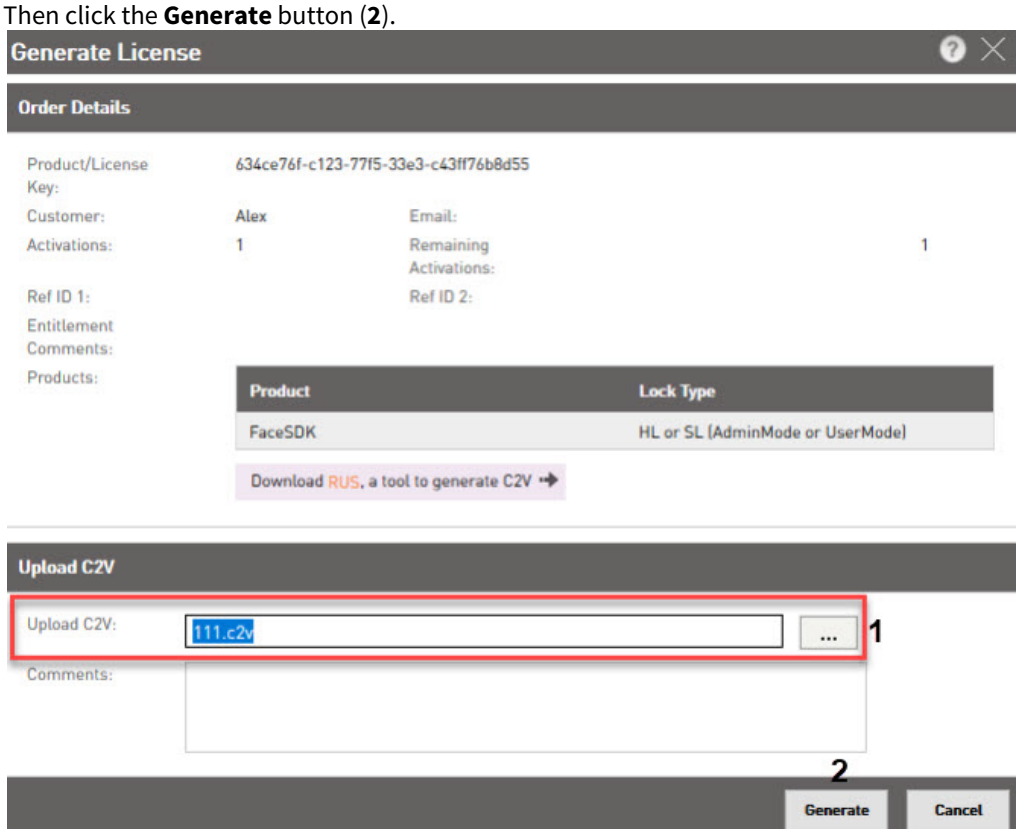
7. In the window that opens, set the **Collect information from this computer to enable** radio button to the **Installation of new protection key** position (**1**).
8. Click the **Collect Information** button (**3**).

9. In the window that opens, specify the name of the file with the **.c2v** extension, which will be created, and click the **Save** button.

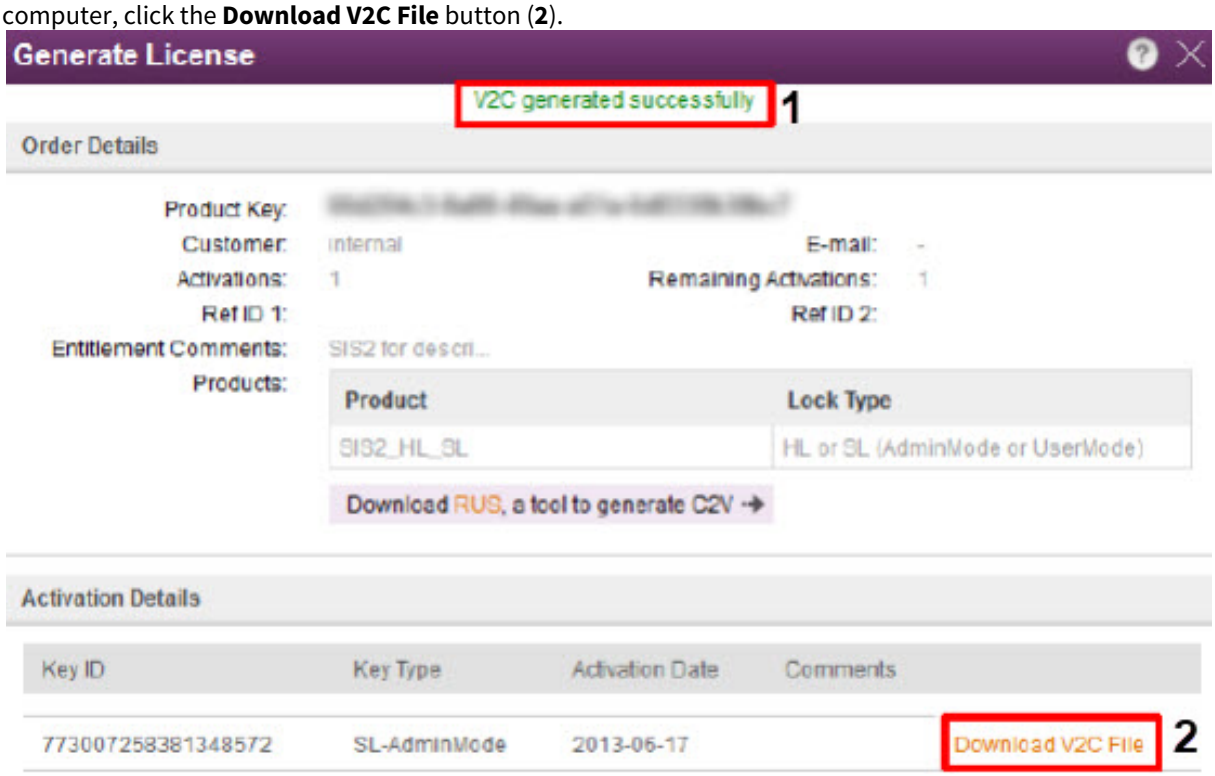
> **Note**
>
> It is recommended to specify the computer name on which the file was generated.

In the program window, the message about the snapshot generation is displayed.

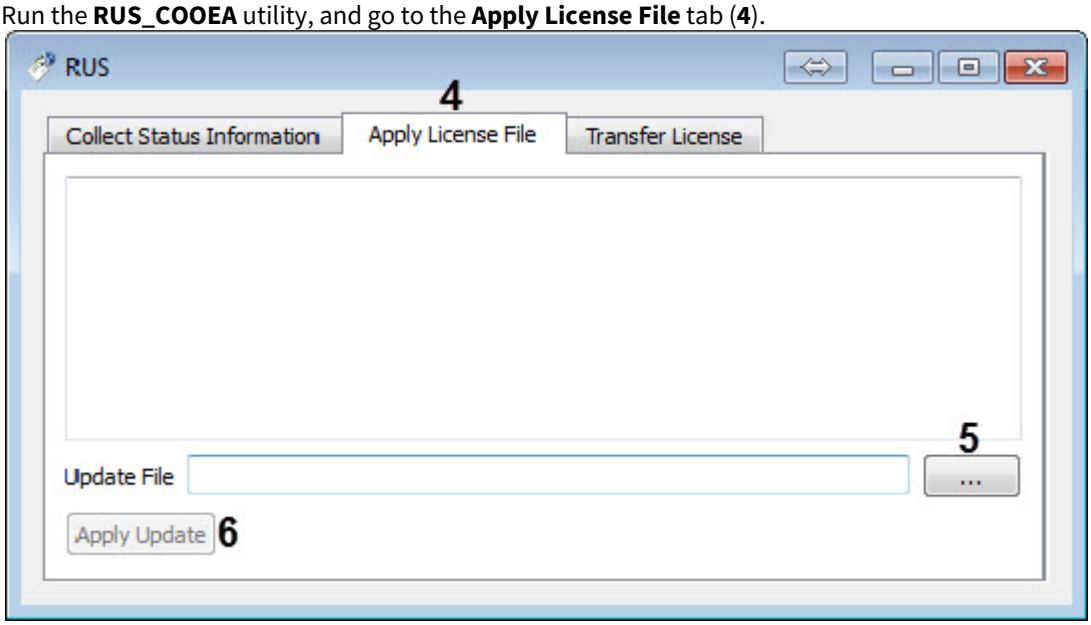
10. Return to the browser page (step 5) and upload the created **.c2v** file by clicking the ... button (**1**).
11. Then click the **Generate** button (**2**).



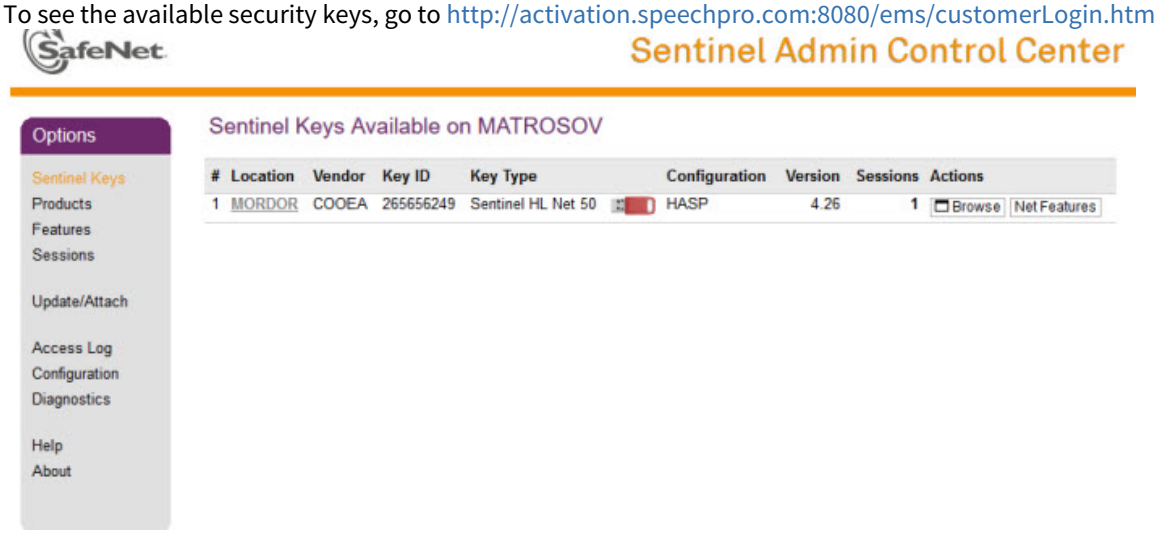
12. The **.v2c** file will be generated automatically and a message about it will appear (**1**). To save this file to your computer, click the **Download V2C File** button (**2**).



13. Run the **RUS_COOEA** utility, and go to the **Apply License File** tab (**4**).



14. Select the created **.v2c** file by clicking the ... button (**5**). Then click the **Apply Update** button (**6**).
To see the available security keys, go to http://activation.speechpro.com:8080/ems/customerLogin.html.



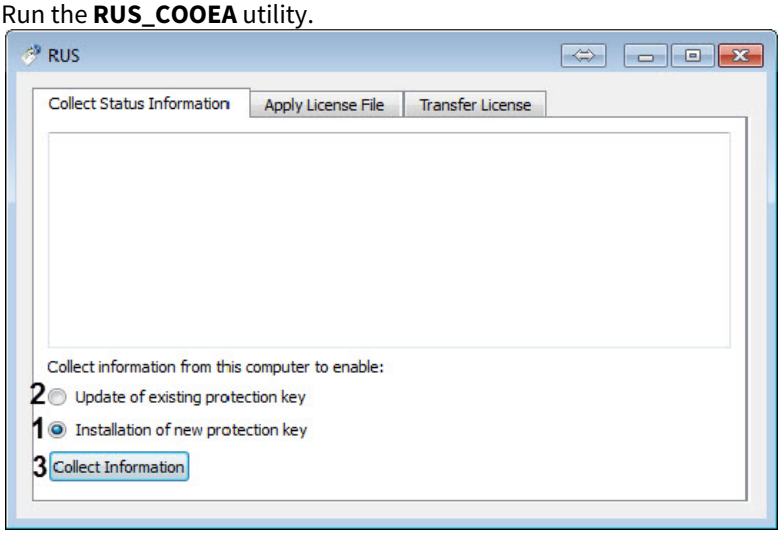
> **Note**
>
> After activating the security key, restart the computer.

The security key activation is now complete.

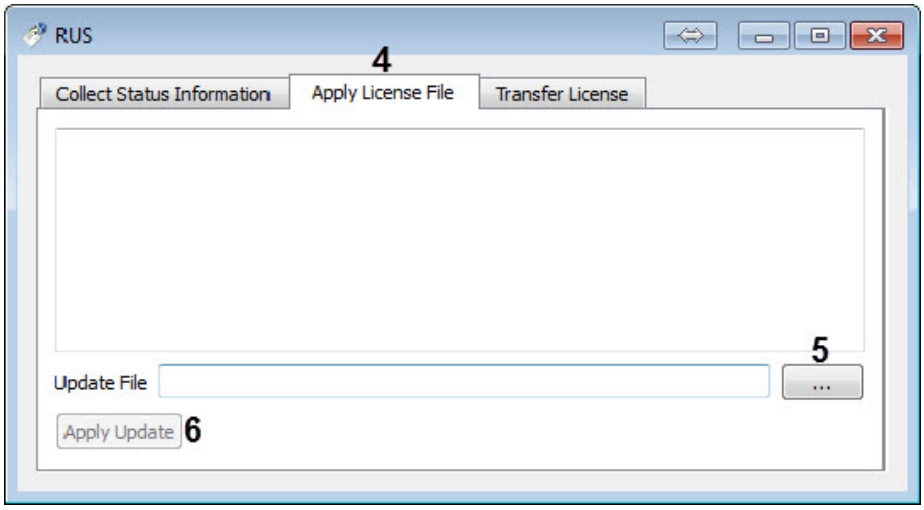
Updating the STC recognition module security key

To take a snapshot, do the following:

1. Run the **RUS_COOEA** utility.



2. In the window that opens, set the **Collect information from this computer to enable** radio button to the **Update of existing protection key** position (**2**).
3. Click the **Collect Information** button (**3**) to take a snapshot of the already installed HASP key. If several license keys are installed on the local computer, then it is necessary to select the key which snapshot is to be generated.
4. Run the **RUS_COOEA** utility, then go to the **Apply License File** tab (**4**).



5. In the **Update File** field, select a previously prepared **.v2c** file by clicking on the ... button (**5**).
6. Click the **Apply Update** button (**6**).

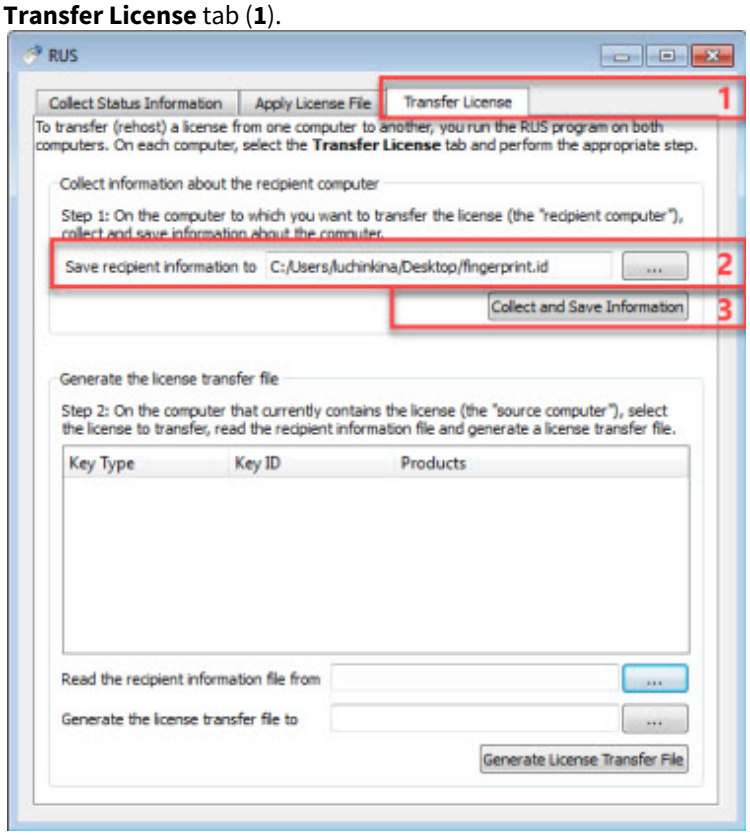
> **Attention!**
>
> It is not recommended to take a snapshot of the key more than once, because in this case, the license will not be applied and it will be necessary to format the key.

The security key update is now complete.

Transferring the STC recognition module security key to another computer

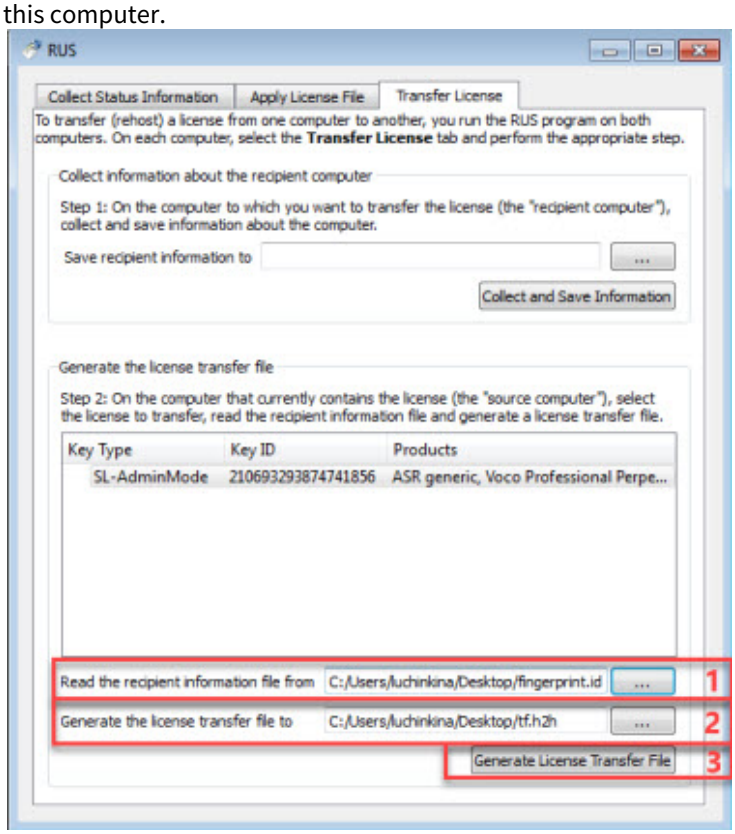
To transfer a license to another local computer, do the following:

1. On the computer to which you want to transfer the license, run the **RUS_COOEA** utility, and open the **Transfer License** tab (**1**).

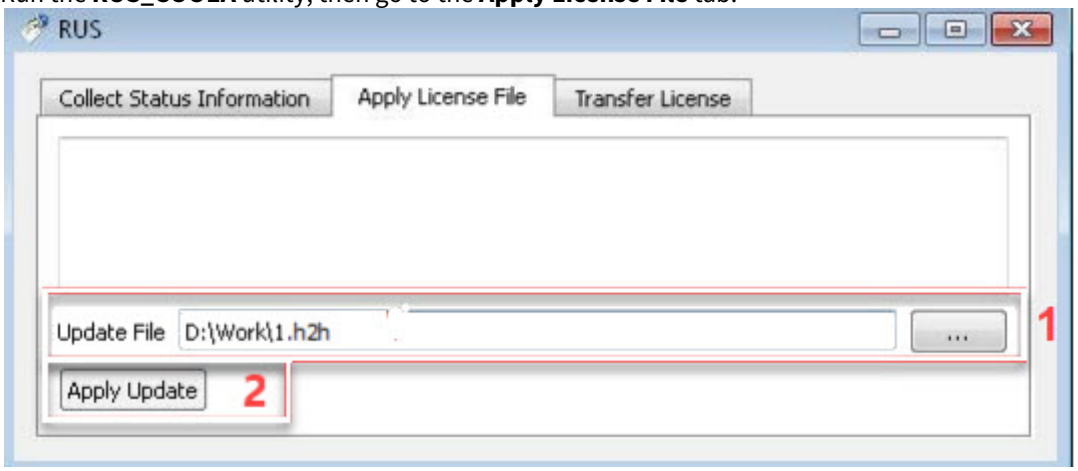


2. Click the ... button (**2**), and in the window that opens, specify the path where it is necessary to save the file with the system snapshot.
3. To confirm the action, click the **Collect and Save Information** button (**3**).

4. Transfer the saved file to a computer on which a valid license is installed, and run the **RUS_COOEA** utility on this computer.



5. Go to the **Transfer License** tab.
6. Click the ... button (**1**) to select the file with the system snapshot obtained in step 3.
7. To select the directory where the file with the license will be placed, click the ... button (**2**). In the window that opens, specify the path to save the file.
8. Click the **Generate License Transfer File** button (**3**) to generate a license file.
9. Copy the file created in the previous step to the computer to which the license is transferred.
10. Run the **RUS_COOEA** utility, then go to the **Apply License File** tab.



11. To upload the file, click the ... button (**1**).
12. To install the security key, click the **Apply Update** button (**2**).

> **Note**
>
> Before changing the hardware characteristics of the computer (hard disk, CPU, etc.), it is necessary to transfer the file with the license to another computer according to these instructions, and then return it back after the changes are applied.

Transfer of the security key to another computer is now complete.

Video camera mounting and setup requirements for STC recognition module

The camera technical specifications which are necessary for the correct operation of the *STC recognition module* are listed in the table below:

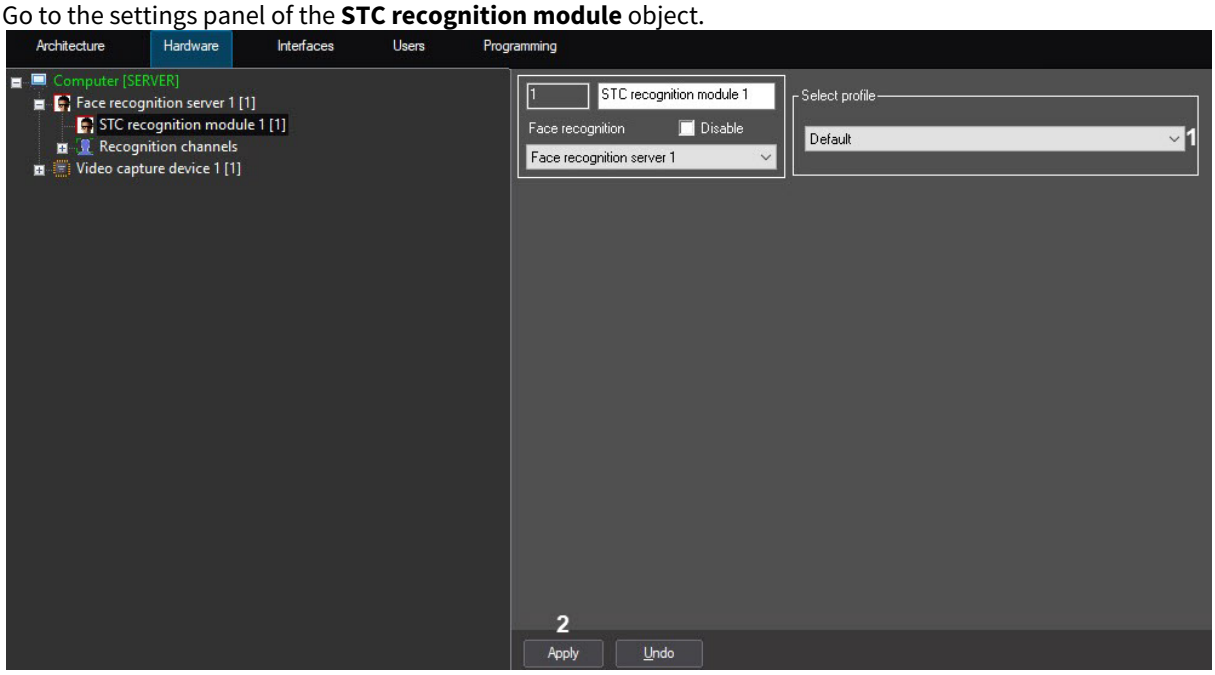
Camera specifications	• Color camera with resolution: 2 million pixels (1080p), minimum: 720p, maximum 4K. • CCD / CMOS: 1/1.8 or higher. • H.264 and RTSP support. • The maximum encoding speed should be at least 4 Mbps. • Guaranteed image quality in low light conditions. • The frame rate should be not less than 12 fps, and not less than 6 fps for face recognition at turnstiles.
Video image	• The sharpness of the captured faces on the received photos should be not less than 64 grayscale. Deficient or exceeding illumination is not allowed. • There should be no back light and sharp gradients of light and shade. • The faces should be evenly illuminated with a diffused light of at least 200 lux. Directional side lighting is not allowed. • The photos of the captured faces received from video cameras should be clear. Image blurring caused by motion is not allowed. • The maximum deviation of the face in the camera FoV from the face-forward position should not exceed 70 degrees. • The distance between pupils on the received photos of the captured face should be not less than 50 pixels. • There should be minimum mutual overshadowing of the captured faces. • The face width should be at least 1/16 of the image width, or the face height should be at least 1/16 of the image height.
Camera positioning	• The required distance between the camera and the face can be set using a lens with required focal length.

Configuring the STC recognition module

The *STC recognition module* is configured as follows:

1. Activate the *STC recognition module* (see Activation of the recognition modules in Face PSIM).

2. Go to the settings panel of the **STC recognition module** object.



3. From the **Select profile** drop-down list (**1**), select the face recognition profile:
   - **Dataset cleaner** – "heavy" profile, highest quality, but very slow.
   - **Default** – base profile. If you specify a profile other than **Default**, then the parameters of the basic profile are partially replaced by the parameters from the selected profile.
   - **Kamaz** – very fast profile, but low quality.
   - **Nist** – contains a limited set of available algorithms.
   - **Onepass** – profile that is commonly used for remote authentication tasks. It is a simple (cascading) face detector. The recognition algorithm is fast, but has a low recognition accuracy.
   - **Profile wiki** – not a profile, but a set of basic blocks for various algorithms.
   - **Progressive** – compromise profile, usually showing higher quality than others, but a little slower.
   - **Safe city** – profile for a safe city. Works with faces from 120 pixels. The recognition algorithm is not the fastest, but more accurate.
   - **Stadium ix** – profile for stadiums. Works with faces from 180 pixels. The recognition algorithm is not the fastest, but more accurate.
   - **Stadium xeon** – profile for stadiums. In version 4.2, it is similar to the **Stadium ix** profile.
   - **Transport safety** – profile for transport safety. Works with faces from 100 pixels. The recognition algorithm is faster, but has lower accuracy.
   - **Turnstile** – profile for turnstiles. Works with faces from 300 pixels. The recognition algorithm is not the fastest, but more accurate.
4. Click the **Apply** button (**2**).

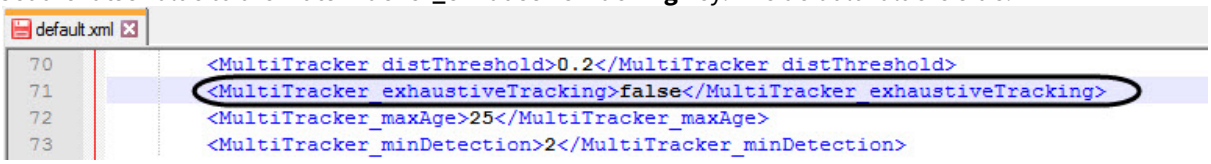
Configuring the *STC recognition module* is complete.

Configuring the frames skip of the STC recognition module

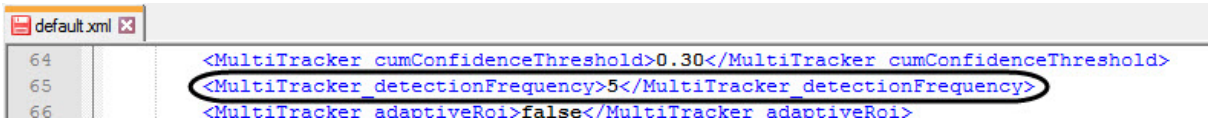
If it is necessary to skip the video frames, do the following:

1. Go to the C:\Program Files (x86)\SDK_data\profiles\ folder.
2. Open the default.xml configuration file for editing.

3. Set the **false** value to the **MultiTracker_exhaustiveTracking** key. The default value is **true**.



4. Set a larger value to the **MultiTracker_detectionFrequency** key (within the fps range). The default value is **2**.



5. Save changes to the default.xml configuration file.
6. Restart *Axxon PSIM*.

The frames skip of the *STC recognition module* is configured.

6.2.7 VisionLabs

VisionLabs recognition module functionality

The *VisionLabs recognition module* supports the following functionality:

1. Face tracking.
2. Face capture and recognition.
3. Face biometric vectors generation and their comparison.
4. Recognition of the various face characteristics. For details see Configuring the additional face characteristics.

VisionLabs module licensing

On this page:

General information about VisionLabs recognition module licensing

VisionLabs recognition module is licensed according to the following scheme:

Module in use	Licensing scheme
Visitor counting channel	By the number of channels
Archive search channel	By the number of channels
Recognition channel	By the number of faces in the database

To use the *VisionLabs recognition module* in multi-threading mode, the number of faces in the database is determined as follows:

- If the number of face detectors used is greater than or equal to the value of the **CpuCoreCount** registry key, then the license is purchased for the number of faces in the database, which is defined as: the required number of reference faces + the value of the **CpuCoreCount** key;
- If the number of face detectors used is less than the value of the **CpuCoreCount** registry key, then the license is purchased for the number of faces in the database, which is defined as: the required number of reference faces + the number of face detectors used.

Note

For example:
- If **CpuCoreCount** = 4, and the configuration includes 4 or more face detectors, then a license for 104 reference faces should be purchased for a database with 100 reference faces;
- If **CpuCoreCount** = 4, and the configuration includes 1 face detector, then a license for 101 reference faces should be purchased for a database with 100 reference faces.

In both cases, the actual number of reference faces that can be contained in the database will be 100.

See Registry keys reference guide, for details about working with the registry, see Working with Windows OS registry.

Thus, the psim.sec key file is purchased for each camera in use and a certain number of faces stored in the database.

You also need to install the **SDK VisionLabs** and purchase an additional license from VisionLabs, which is presented in the form of a software key.

Installing the SDK of the **VisionLabs** recognition module

Before activating the security key, you need to install the **SDK VisionLabs**. To do this, download the **SDK VisionLabs 5.4.1** installer from the AxxonSoft website and extract the **data** folder from it to *<Face PSIM* installation directory>\Modules64\Firserver\FaceRecognition\VisionLabs.

Note

Face PSIM uses **SDK VisionLabs 5.4.1**.

Activation of the **VisionLabs** recognition module security key

To activate the *VisionLabs recognition module* security key, purchase a software key from VisionLabs. The software key will contain activation data: EID and ProductID (Product key). Enter these data in the **license.conf** file located at *<Face PSIM* installation directory>\Modules64\Firserver\FaceRecognition\VisionLabs\data.

Video camera mounting and setup requirements for VisionLabs recognition module

The camera technical specifications which are necessary for the correct operation of the *VisionLabs recognition module* are listed in the table below:

Camera specifications	• Color camera with resolution: 2 million pixels (1080p), minimum: 720p. • CCD / CMOS: 1/1.8 or higher. • H.264 and RTSP support. • The maximum encoding speed should be at least 4 Mbps. • Guaranteed image quality in low light conditions. • The frame rate should be not less than 12 fps, and not less than 6 fps for face recognition at turnstiles.
Video image	• The sharpness of the captured faces on the received photos should be not less than 64 grayscale. Deficient or exceeding illumination is not allowed. • There should be no back light and sharp gradients of light and shade. • The faces should be evenly illuminated with a diffused light of at least 200 lux. Directional side lighting is not allowed. • The photos of the captured faces received from video cameras should be clear. Image blurring caused by motion is not allowed. • The maximum deviation of the face in the camera FoV from the face-forward position should not exceed 15 degrees. • The distance between pupils on the received photos of the captured face should be not less than 50 pixels. • There should be minimum mutual overshadowing of the captured faces.
Camera positioning	• The required distance between the camera and the face can be set using a lens with required focal length.

6.2.8 ISD Integration Server

General description of ISD paid access system integration

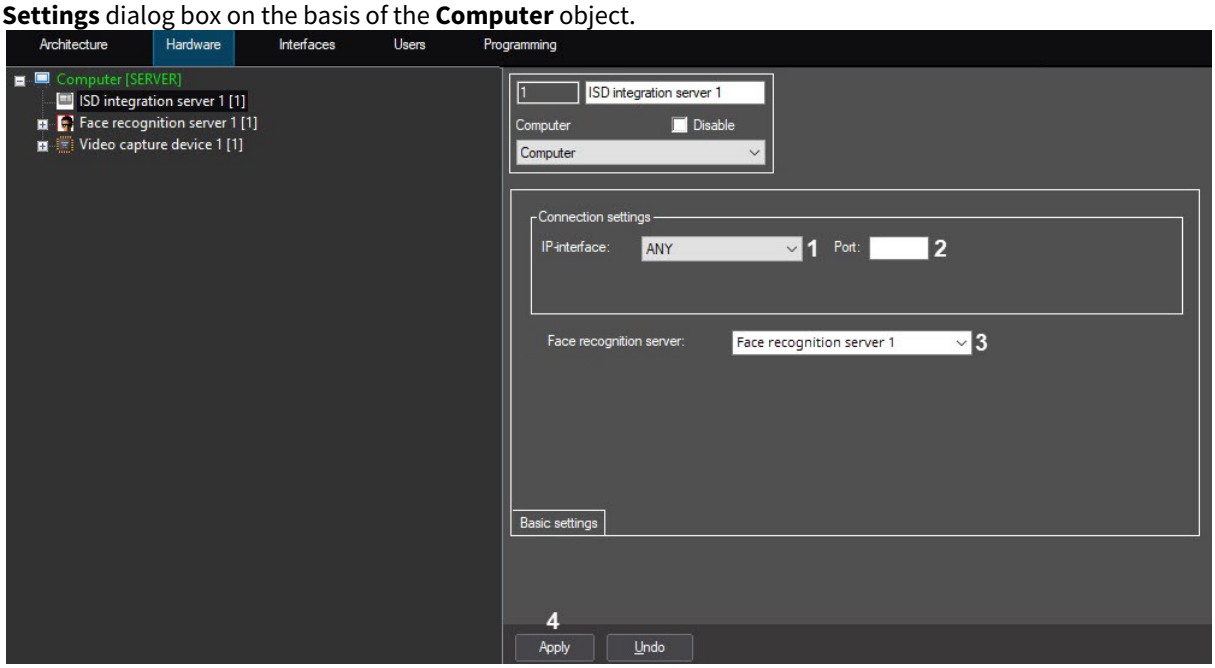
There are security systems that require the confirmation from both the access system and the *Face PSIM* to let the person pass through the access point. However, when approaching the turnstile, people usually look at the turnstile itself, and not at the video camera. To solve this problem, the **ISD Integration Server** was developed, which makes it possible to capture the face even before the person approaches the turnstile and uses a pass card. In this case, the video cameras are placed before the turnstile where they capture all the faces and store them in the memory buffer for some time. As a result, there is no need to capture the face directly in front of the turnstile.

Configuring the ISD paid access system integration module

> **Note**
>
> Prior to configuring the ISD paid access system integration module, it is necessary to configure the *Face PSIM* and its components (see Configuring Face PSIM software and its components).

To configure the ISD paid access system integration module, do the following:

1. Go to the **ISD integration server** object settings panel which is created on the **Hardware** tab of the **System Settings** dialog box on the basis of the **Computer** object.



2. Specify the **IP-interface** (**1**) and **Port** (**2**) of this Face recognition server integration point to which the paid access system components will be connected.
3. From the **Face recognition server** (**3**) drop-down list select the operating face recognition server.
4. Click the **Apply** button (**4**).

The ISD paid access system integration module is configured.

Events of the ISD paid access system integration module

The following events can occur in the ISD paid access system integration module:

Event name	Event description	Event example
integration caps	Displays the functionality of the integration point.	[192.168.10.9:8845] integration caps: admin_caps(), event_caps(), capture_caps(), ident_caps(), camera(1, "Camera 1")
cameras	Displays the video cameras list of the integration point.	[192.168.10.9:8845] cameras: camera(1, "Camera 1")
integration status	Displays the status of the integration point.	[192.168.10.9:8845] integration status: No errors (0)
There are 2 types of events that can occur during the face capture and face recognition: **capture** and **ident**. The **capture** event indicates that the face is captured. The **ident** event indicates that the captured face was verified with the database. There should always be a pair of these events for each face. If the face is in the database, then the **ident** event has the ident_match tag, which contains the information about the recognized face. If the face is not in the database, then there is no ident_match tag. The decision to open the turnstile should be made on the basis of the **ident** event. This decision should not be made on the basis of the **capture** event.		

Event name	Event description	Event example
capture	The face is captured. This event occurs in any case when the face is captured.	[192.168.10.9:8845] capture: capture_id=(105EDA86-7B48-E811-8AE7-54E6FC817BD7), camera_id=(1), capture_time=(2018-04-25 14:26:46.731), confidence=(0), face_rect=(0.4,0.1,0.3,0.4)
ident	The captured face did not match the face in the database. In this case, there is always a pair of the events: **capture** and **ident**.	[192.168.10.9:8845] ident: ident_id=(F8F8C393-7B48-E811-8AE7-54E6FC817BD7), ident_time= (2018-04-25 14:27:12.290), no matches, capture: capture_id=(F8F8C393-7B48-E811-8AE7-54E6FC817BD7), camera_id=(1), capture_time=(2018-04-25 14:27:11.983), confidence=(0.647499979), face_rect=(0,0,1,1) where: ident_id - is the identified face id. ident_time - is the face capture time. no matches - indicates that the face is not recognized. capture_id - is the captured face id. camera_id - is the id of the camera that captured the face. capture_time - is the timestamp of the captured face verification with the database.
ident	The captured face matched the face in the database. In this case, there is always a pair of the events: **capture** and **ident**.	[192.168.10.9:8845] ident: ident_id=(DC998399-7C48-E811-8AE7-54E6FC817BD7), ident_time= (2018-04-25 14:34:36.245), person_id1=(), similarity1=(65.8300018), lists1=(5), capture: capture_id= (DC998399-7C48-E811-8AE7-54E6FC817BD7), camera_id=(1), capture_time=(2018-04-25 14:34:33.352), confidence=(0), face_rect=(0,0,1,1) where: ident_id - is the identified face id. ident_time - is the face capture time. person_id1 - is the id of the face in the database. This id will be empty because the faces from the *Face PSIM* database are not related to the clients from the ISD database. similarity1 - is the similarity percent of the captured face and the face from the database. lists1 - is the id of the department to which the face is added. capture_id - is the captured face id. camera_id - is the id of the camera that captured the face. capture_time - is the timestamp of the captured face verification with the database.

6.3 Configuring the Face recognition server object

6.3.1 Face recognition server module functionality

The *Face recognition server* software module is designed to perform the following functions:

1. Record a frame displaying a captured face.
2. Register biometric parameters of a captured face.
3. Recognize captured faces.
4. Maintain a reference face database used for face recognition.
5. Provide analytical data (including special reports generation in the *WEB Report System PSIM*).
6. Count number of passes.

6.3.2 Setting up the faces storage

General information on stored face types and related data

The face recognition server stores three types of face images:

- **Reference faces** are face images compared with images of faces fixed on a video image.
  Reference faces database is filled manually in the **Face recognition and search** interface object (see Adding images to the reference face database).
- **Captured faces** are face images recorded on a video image.
  Photos of captured faces can be viewed in the **Face recognition and search** interface object (see Configuring the Face recognition and search interface object).
- **Recognized faces** are captured faces who have shown a sufficient degree of similarity to the reference faces.
  Photos of recognized faces can be viewed in the **Face recognition and search** interface object (see Configuring the Face recognition and search interface object).

In addition, during the recognition process, the following data is created and stored:

- **Vector** is the mathematical representation of the face, created when it is recognized in the frame of the video image.
- **Metadata** is the data that enables linking the reference, captured and recognized faces to each other, for example, their identifiers.

Attention!

With an increase in the number of faces in the database, the statistical error increases: the more faces in the database, the more often similar faces will be recognized. Accordingly, the degree of similarity when comparing the reference face with the captured face will decrease.
This statistical error is relevant if:

1. The Requirements for images uploaded to the reference face database and requirements for installing and configuring video cameras for the corresponding software module are met (see Configuring the program modules).
2. The database contains over a million faces.

An example of the results of calculating the error:

1. Tevian module, mugshot dataset (good quality photo), 12 million faces in database, and false matching probability is 0.003%. With these initial data, the researchers obtained an identification error of 0.76%.
2. VisionLabs module, the initial data are the same. The identification error is 0.81%.

The size of the face database can be adjusted by Configuring the face images, vectors and metadata storage depth.

Storage modes for face images, vectors and metadata

The images of captured and recognized faces and vectors are stored in a folder, the path to which is specified in the **FaceDB** registry key. This data storage mode corresponds to the **UseFaceDB = 2** mode and is set forcibly when *Face PSIM* starts (see Registry keys reference guide, for details about working with the registry, see Working with Windows OS registry).

> **Note**
>
> It is not recommended that the folder for storing face images and vectors be located on the same disk where the *Axxon PSIM* video archive is stored.

UseFaceDB = 2 mode provides maximum search speed and storage depth. The general algorithm of *Face PSIM* operation in this mode is as follows:

- at startup, the Server reads all data from the folder into RAM. Then the received images and vectors are written to the RAM and to the folder, and the metadata is written to the database. This ensures the fastest possible search process;
- all searches are carried out in RAM. However, this entails a high consumption of RAM and a longer start of the Server;
- metadata is stored in the **Fir** database in the **Hits** table. Since the images and vectors are stored in a folder on disk, the database will fill up much more slowly. This ensures maximum storage depth.

The reference faces are stored in the *<Axxon PSIM* installation directory>\Bmp\<Person> folder.

> **Note**
>
> The reference face images from the *<Axxon PSIM* installation directory>\Bmp\<Person> folder can be used for automatic face verification using a script (see Examples of frequently used scripts). Also, with the help of the *Event Manager* module, which is a part of the ACFA PSIM, the operator controlling the *Event Manager* interface window can decide whether the face looking at the camera is to be verified or not. In this case, the operator compares this face with the reference face from the **<Person>** folder, which is displayed in the **Event Manager** interface window (for details about *Event Manager*, see Event Manager Module Settings and Operation Guide).

Configuring the face images, vectors and metadata storage depth

Configuring the storage depth of images, vectors and metadata of captured faces enables the automatic archive cleanup. The archive is cleared when one of the conditions that came earlier occurs (see below).

Archive cleanup by remaining free space on the disk

To clear the archive by the remaining free space on the disk, set the size of the required remaining free space on the disk in megabytes in the **FaceDBFreeMB** registry key. Once the specified value is reached, the old images, vectors and metadata of captured faces will be deleted (see Registry keys reference guide, for details about working with the registry, see Working with Windows OS registry). By default, the size of the remaining free disk space is **1000** megabytes.

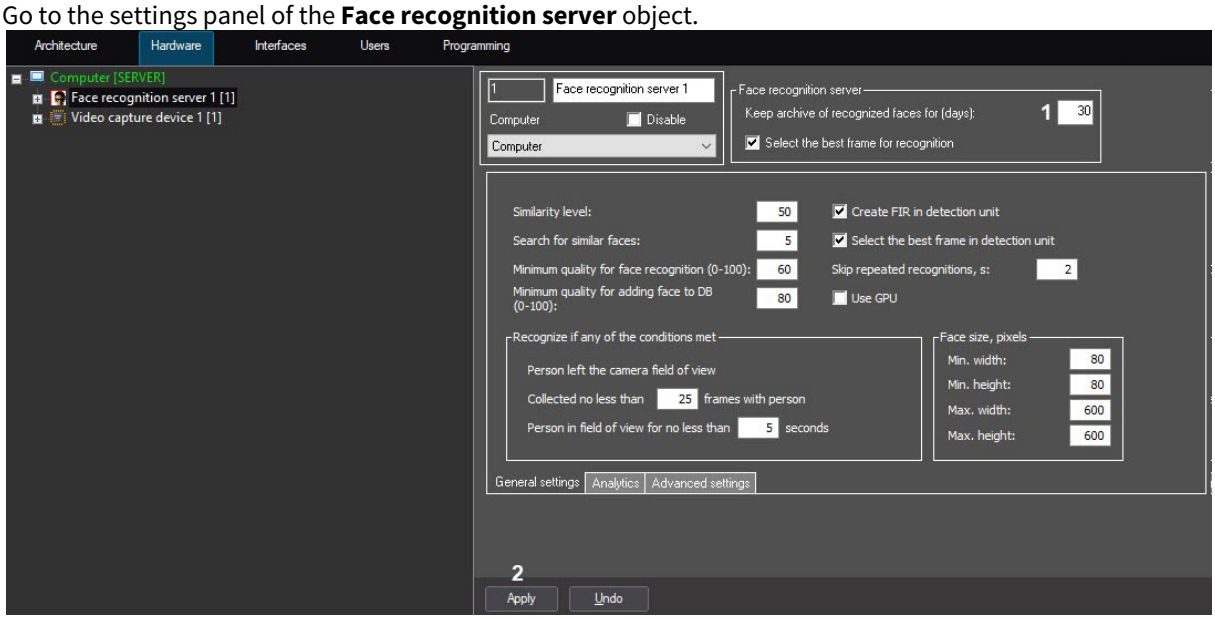
> **Note**

Once the specified size is reached, the **FaceDB** folders will be cleared and the corresponding metadata will be removed from the database. The cleanup is performed on a loop in portions equivalent to 1000 megabytes.

Archive cleanup by retention time

To clear the archive by the retention time, do the following:

1. Go to the settings panel of the **Face recognition server** object.



2. In the **Keep archive of recognized faces for (days)** field, enter the time period (in days) within which the recognized face images, vectors and metadata should be stored in the database (**1**). If **0** is specified, then the archive will be cleared every 3 minutes.

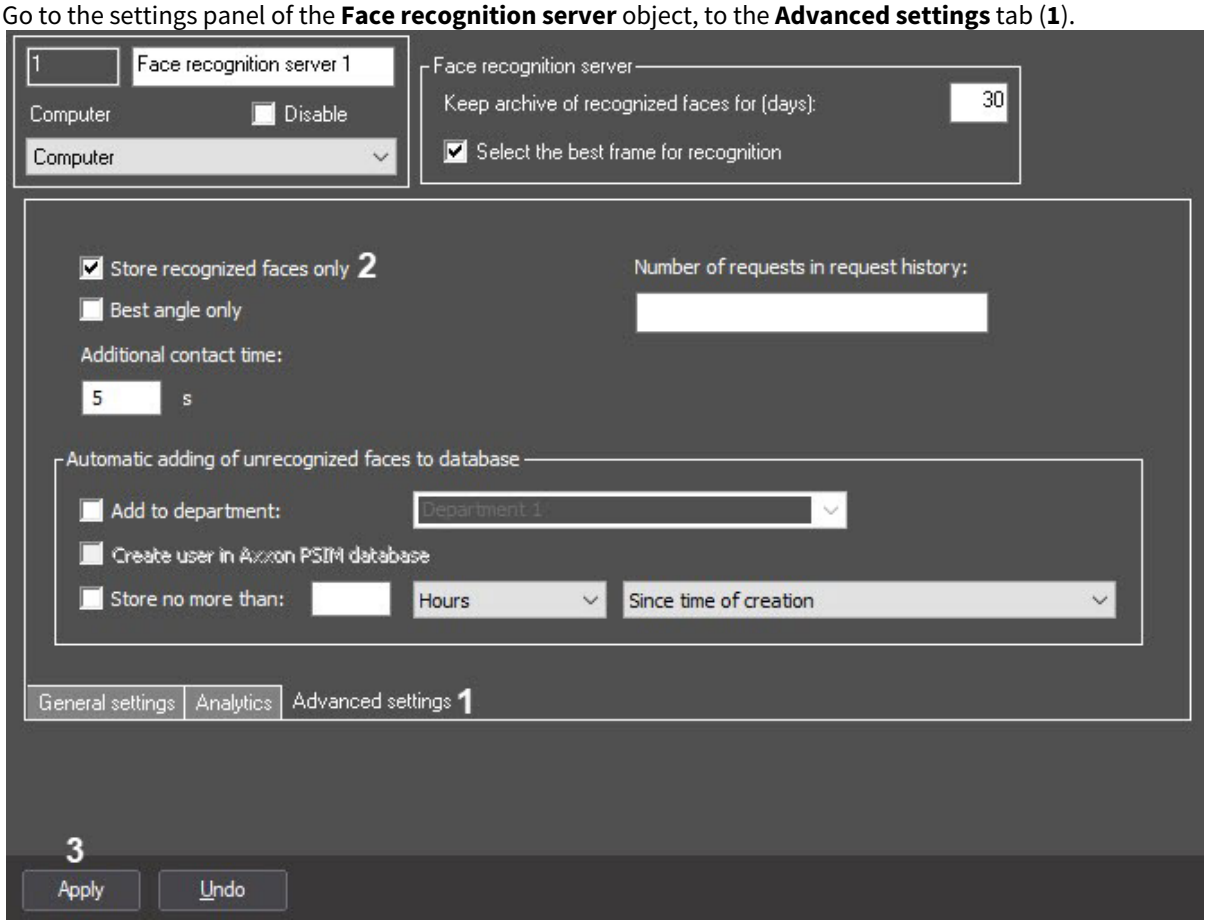
> **Note**
>
> Once the specified retention time has expired, the **FaceDB** folders will be cleared and the corresponding metadata will be removed from the database. The cleanup is performed on a loop every day at 00:00.

3. Click the **Apply** button to save the changes (**2**).

Storing only the recognized faces

By default, metadata, images and vectors are saved for all captured faces. In order for all data to be saved only for recognized faces, do the following:

1. Go to the settings panel of the **Face recognition server** object, to the **Advanced settings** tab (**1**).



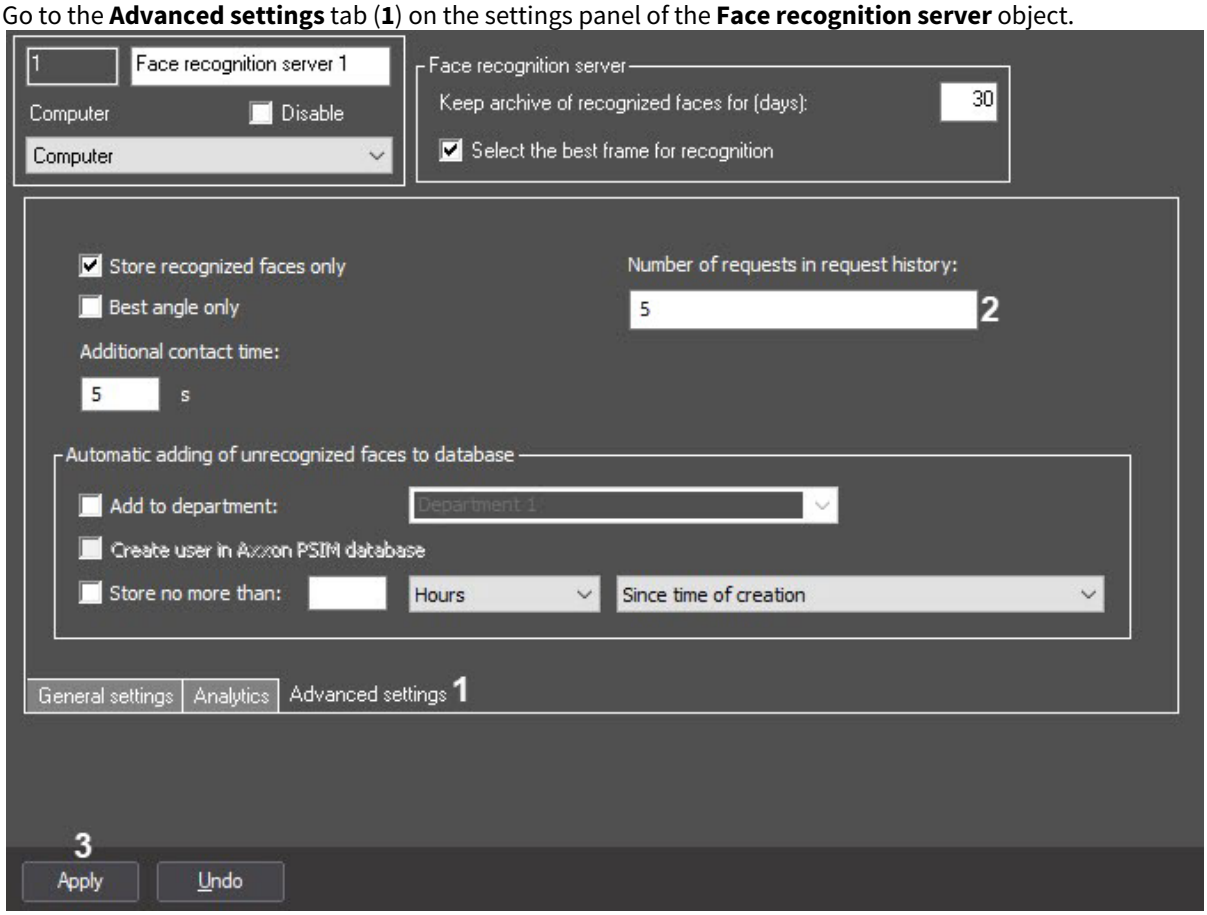
2. Set the **Store recognized faces only** checkbox (**2**).
3. Click the **Apply** button (**3**) to save the settings.

Only the recognized faces are now saved.

Configuring the number of the requests stored in the request history

If you actively use the search, but you don't need the old results or only want the latest results, you can configure the automatic deletion of the requests from the request history. For this, do the following:

1. Go to the **Advanced settings** tab (**1**) on the settings panel of the **Face recognition server** object.

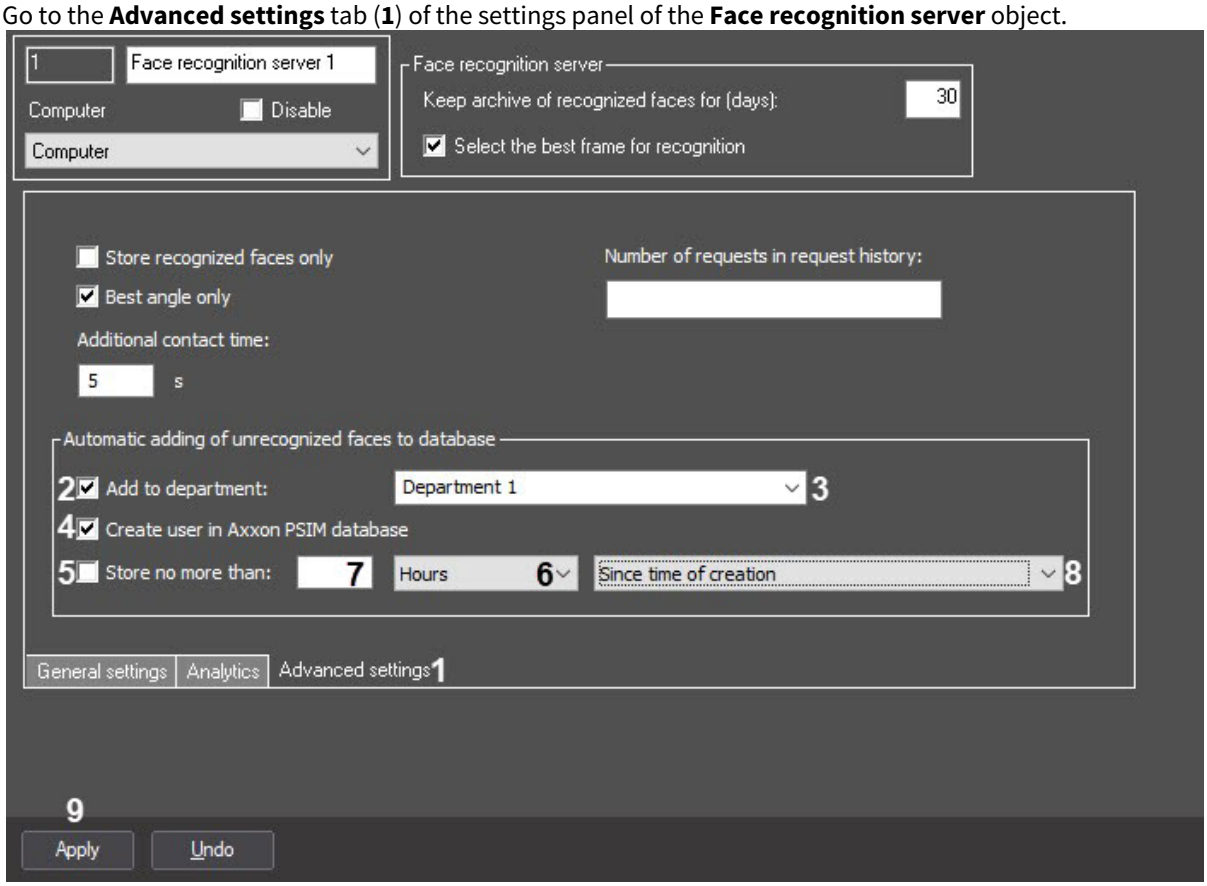


2. In the **Number of requests in request history** field (**2**), specify the number of requests that will be stored in the request history. Other requests will be deleted. If you leave the field blank, the requests won't be deleted.
3. Click the **Apply** button (**3**) to save the changes.

Automatic adding of unrecognized faces to database

In order for the unrecognized faces to be created in the face database as new users with a unique identifier, do the following:

1. Go to the **Advanced settings** tab (**1**) of the settings panel of the **Face recognition server** object.



2. Set the **Add to department** checkbox (**2**) and in the drop-down list (**3**) select the department to which new users will be saved.

> **Note**
>
> You can select the department from the existing ones or set a new one. If no department is selected, then a new department will be created automatically.

3. Set the **Create user in Axxon PSIM database** checkbox (**4**), if it is necessary to create a new *Axxon PSIM* user.
4. Set the **Store no more than** checkbox (**5**), if it is necessary to limit the time a user is stored in the face database, and set the required parameters:
   a. In the drop-down list (**6**), select the storage time unit and enter the required value in the field (**7**);
   b. In the drop-down list (**8**), select the start time of user storage.

> **Note**
>
> - After the specified time expires, the automatically created faces will be completely deleted and could not be restored.
> - The time limit of a user storage also applies to the *Axxon PSIM* user if the **Create user in Axxon PSIM database** checkbox is set.

5. Click the **Apply** button (**9**) to save the settings.

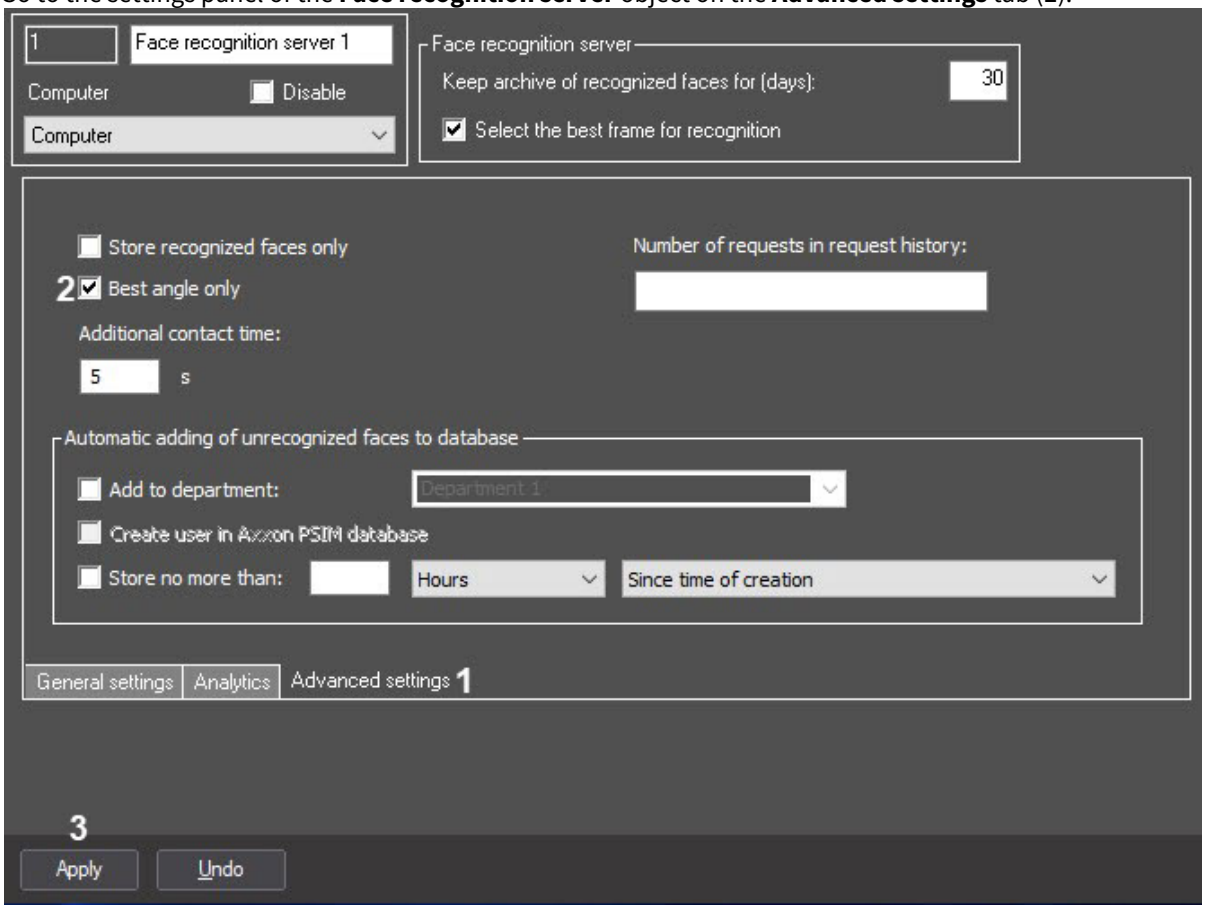
The configuration of automatic adding of unrecognized faces to database is now complete.

Configuring face saving based on quality level

By default, the frames of the captured face are saved based on the quality level: each subsequent face image is compared with the previous image. If the quality level is equal to or higher than the previous one, then the new frame is saved. If not, the frame is not saved.

To configure face saving based on the quality level, do the following:

1. Go to the settings panel of the **Face recognition server** object on the **Advanced settings** tab (**1**).

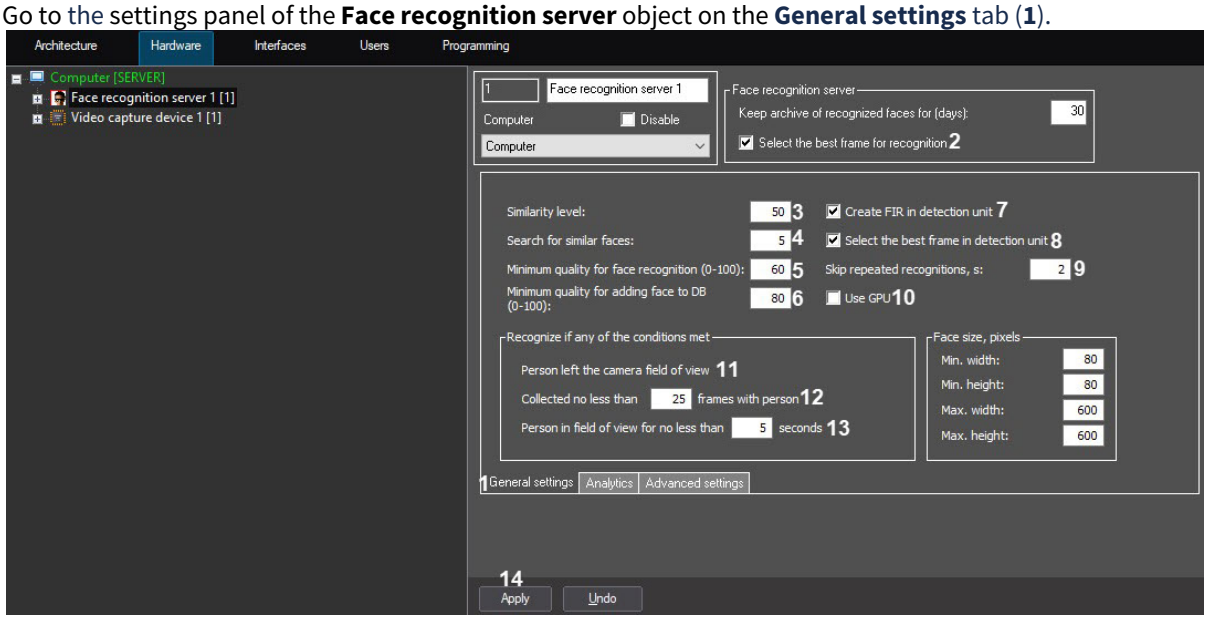


2. Set the **Best angle only** checkbox (**2**) to save the best frame. If the checkbox is clear, all frames of the captured faces regardless of the quality will be saved.
3. Click the **Apply** button (**3**) to save the settings.

6.3.3 Configuring the captured faces recognition parameters

To set the parameters for the captured faces recognition, do the following:

1. Go to the settings panel of the **Face recognition server** object on the **General settings** tab (**1**).



2. Set the **Select the best frame for recognition** checkbox (**2**) to select the best frame from all images of one person which came from the Face detection tool to the Face recognition server and create FIR only for it.
3. In the **Similarity level** field (**3**), enter the similarity level of the captured face and the reference image, above which the face is considered recognized. The **Similarity level** parameter is specified in percent.
4. In the **Search for similar faces** field (**4**), enter the maximum number of similar reference images, which identifiers and similarity level will be stored in database for one frame of a captured face.

> **Note**
>
> It is recommended to specify the **1** value for this field for more precise search of the recognized faces (see Filtering the recognized and unrecognized faces).

5. In the **Minimum quality for face recognition (0-100)** field (**5**), enter the minimum quality of the captured face in percent, at which the recognition should be performed. The default is **60%**.

> **Attention!**
>
> - If *Tevian* recognition module is used, it is recommended to set the **Minimum quality for face recognition (0-100)** value to 60% when updating from *Face PSIM* 7.0 to *Face PSIM* of later version.
> - If face concealment recognition is enabled, then in order to correctly detect the presence of a face mask, it may be necessary to set the **Minimum quality for face recognition (0-100)** value below the default value (see Configuring the permissions and additional settings).

6. In the **Minimum quality for adding face to DB (0-100)** field (**6**), enter in percent the minimum quality of face to be added to the database.
7. Set the **Create FIR in detection unit** checkbox (**7**), so that the face detection tool generates and attaches biometric parameters to the face image. If the checkbox is clear, the detection tool will only capture faces, and the Face recognition server will generate and attach the biometric parameters.
8. Set the **Select the best frame in detection unit** checkbox (**8**), so that only the best frame is sent to the Face recognition server. If the checkbox is clear, all frames will be sent to the Face recognition server.
9. In the **Skip repeated recognitions, s** field (**9**), set the time period in seconds during which a captured face won't be recognized repeatedly. The default value is 2. See also the **IgnoreSamePeople** registry key.

> **Note**
>
> Registry keys reference guide, for details about working with the registry, see Working with Windows OS registry.

10. Set the **Use GPU** checkbox (**10**) to select the discrete graphics card when using the **Tevian** and **VideoIntellect 1.1** face recognition modules. If the checkbox is clear, the the recognition will be performed on the CPU.

> **Attention!**
>
> If the **Use GPU** checkbox is set for the first time, then at the same moment the caching process will start in a new window to optimize the recognition on the current GPU. Do not interrupt this process. If for some reason the caching process was interrupted, it is necessary to delete the folder with the name "GPU-[video card UUID]" at *<Face PSIM installation directory>\Modules64\Firserver\FaceRecognition\Tevian_ [SDK version]*. Afterwards, when the **Use GPU** checkbox is set, the recognition using the GPU will be performed immediately without the caching process.
> If you replace the video card, the caching process will restart automatically.

11. In the **Collected no less than ... frames with person** field (**12**), enter the minimum number of frames to be collected for the face to be recognized.
12. In the **Person in field of view no less than ... seconds** field (**13**), enter the time in seconds upon reaching which the recognition will start.

> **Note**
>
> The **Person left the camera field of view** condition is always enabled (**11**).

> **Note**
>
> The face recognition starts if at least one of the three conditions (**11**-**13**) is met.

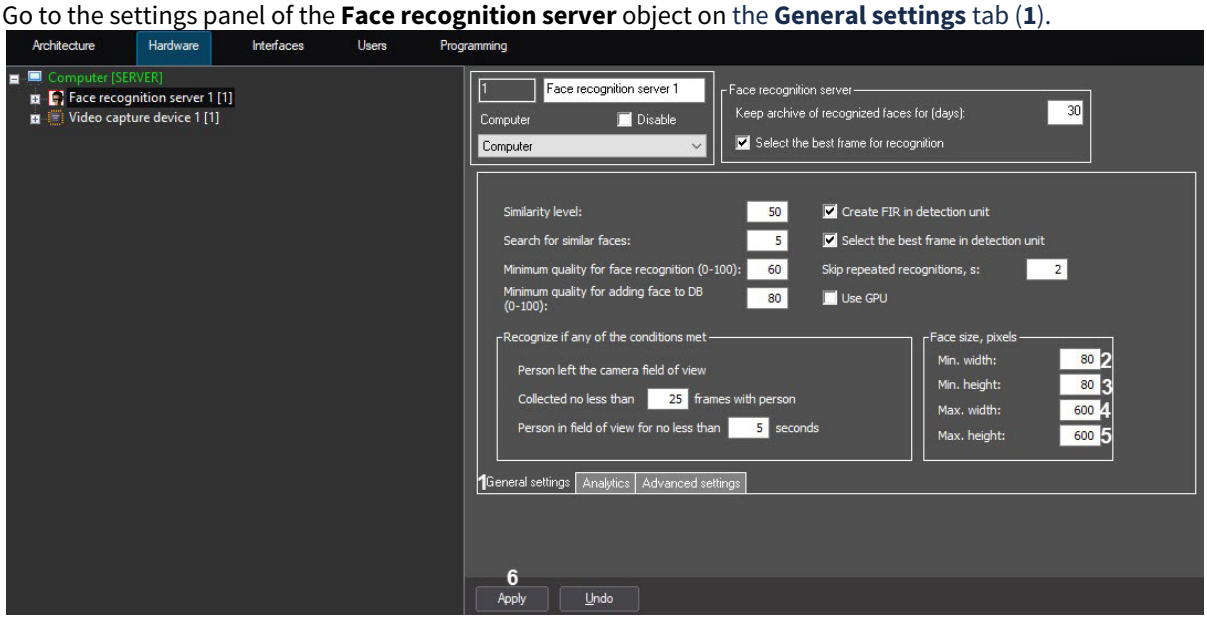
13. Click the **Apply** button (**14**) to save the changes.

Setting parameters for the captured faces recognition is complete.

6.3.4 Configuring the captured face size for recognition

To configure the face size for recognition, do the following:

1. Go to the settings panel of the **Face recognition server** object on the **General settings** tab (**1**).



2. Set the minimum width of the captured face in pixels in the **Min. width** field (**2**).
3. Set the minimum height of the captured face in pixels in the **Min. height** field (**3**).
4. Set the maximum width of the captured face in pixels in the **Max. width** field (**4**).
5. Set the maximum height of the captured face in pixels in the **Max. height** field (**5**).
6. Click the **Apply** button (**6**) to save the changes.

Configuring the captured face size for recognition is completed.

6.3.5 Configuring the events generation

FIRSERVER events

On this page:

Configuring the access event generation

Using the access event generation, *Face PSIM* allows obtaining real-time information on the number of passes of each person in the field of view of a given video camera.

Attention!

To use this function, you need to set the value of the registry key **UseFaceDB = 2** (see Registry keys reference guide).

If the **Access event generation** checkbox is set, the **Pass** event (RECOGNITION_PASS) is generated when the face is recognized.

Note

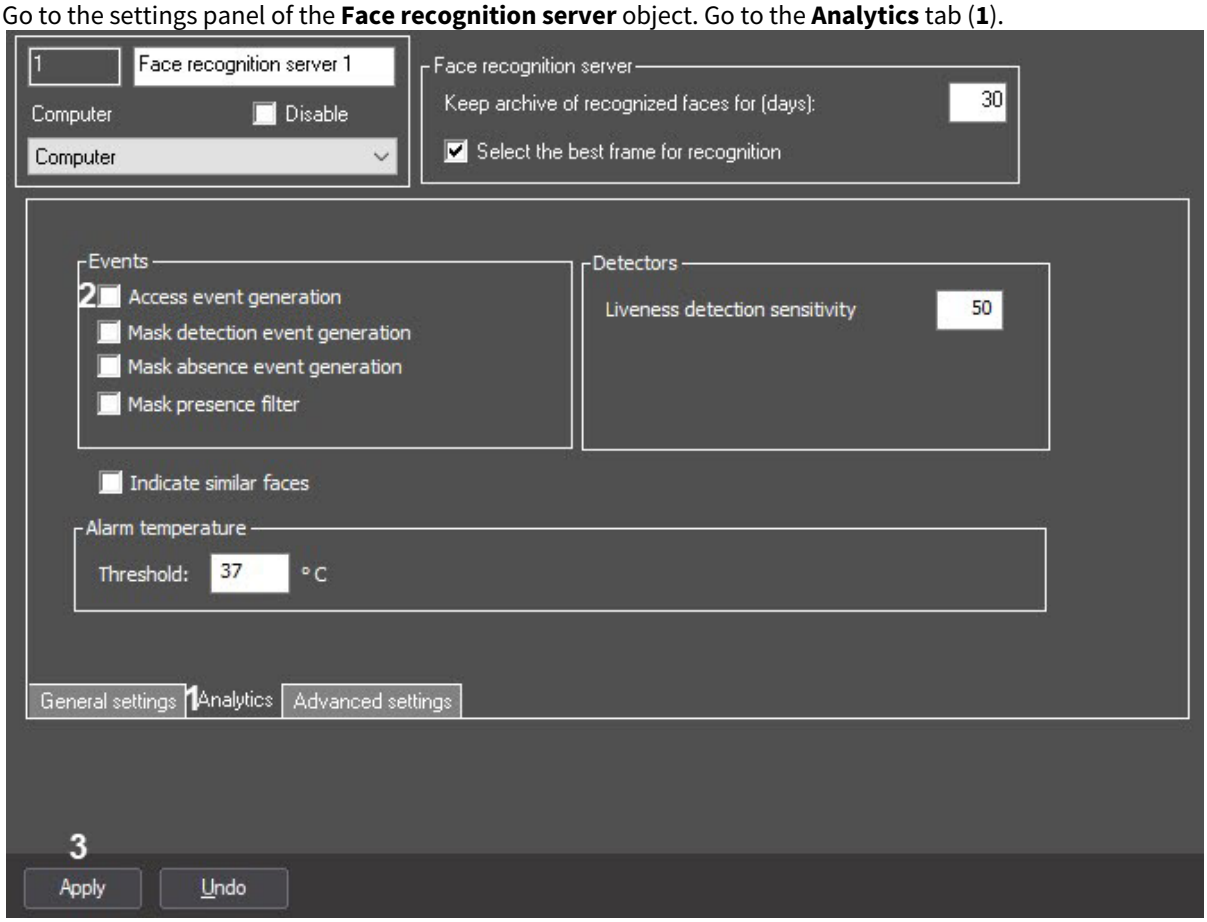
These parameters can be used in scripts in the *JScript* programming language (for more information on creating scripts, see Programming Guide (JScript)).

The following example shows the recording of a frame with a captured face image transmitted using the **imageBase64** parameter to a file on the disk:

```
if (Event.SourceType == "FIRSERVER" && Event.Action == "RECOGNITION_PASS" &&
Event.SourceId=="1")
{
    SaveToFile("c:\\Faces\\"+Event.GetParam("firstId")+".jpg",Event.GetParam("imageBa
se64"),true);
}
```

To enable the access event generation, do the following:

1. Go to the settings panel of the **Face recognition server** object. Go to the **Analytics** tab (**1**).

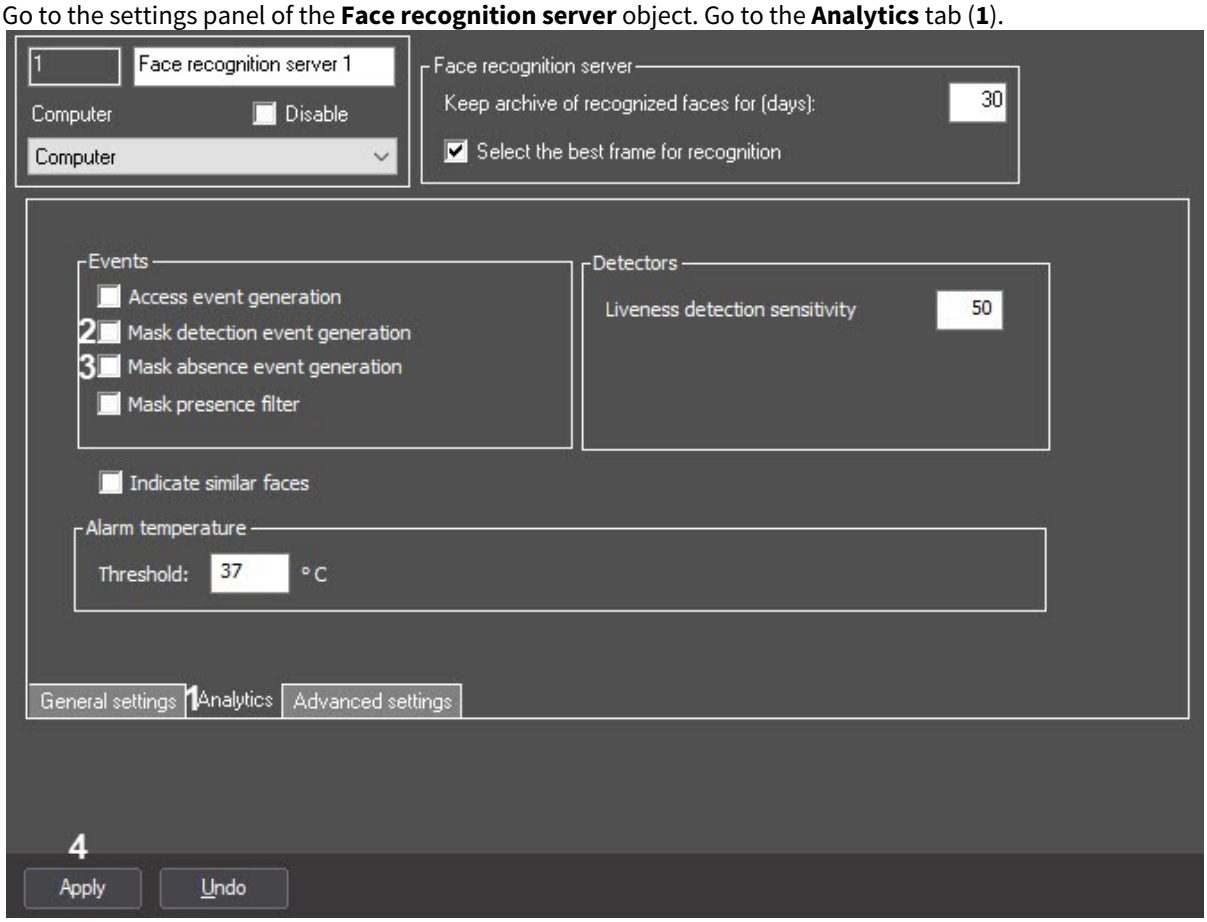


2. Set the **Access event generation** checkbox (**2**).
3. Click the **Apply** button (**3**) to save the settings.

Configuring the face mask detection or face mask absence event generation

To enable the face mask detection or face mask absence event generation, do the following:

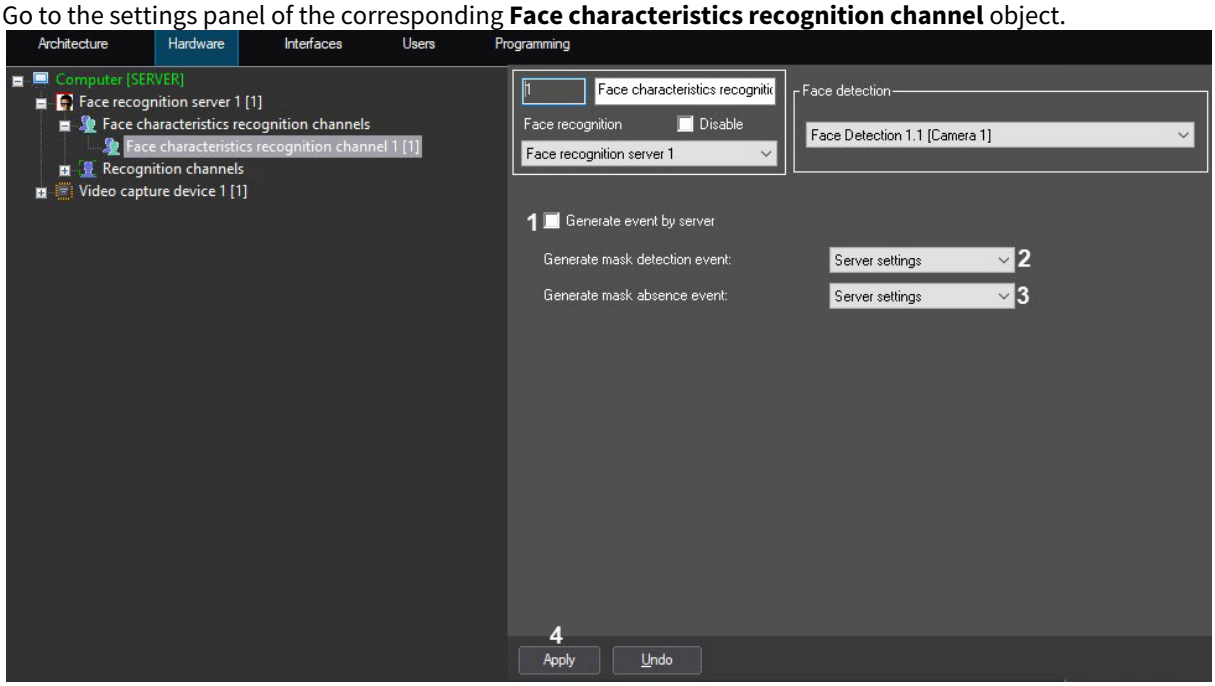
1. Go to the settings panel of the **Face recognition server** object. Go to the **Analytics** tab (**1**).



2. Set the **Mask detection event generation** checkbox (**2**) to enable the event generation in case the mask is detected on the face.
3. Set the **Mask absence event generation** checkbox (**3**) to enable the event generation in case the mask is absent on the face.
4. Click the **Apply** button (**4**) to save the settings.

If it is necessary to generate the events of mask detection or absence depending on the face characteristics recognition channel (see Activation of the recognition modules in Face PSIM), do the following:

1. Go to the settings panel of the corresponding **Face characteristics recognition channel** object.



2. Set the **Generate event by server** checkbox (**1**) for the events to be received from the **Face recognition server** object, otherwise the events will be received from the **Face characteristics recognition channel** object.
3. From the **Generate mask detection event** drop-down list (**2**), select the event generation condition:
   - **Server settings** — this event generation setting set on the **Face recognition server** object settings panel is taken into account (used by default).
   - **Yes** — the face mask detection event generation is enabled.
   - **No** — the face mask detection event generation is disabled.
4. From the **Generate mask absence event** drop-down list (**3**), select the event generation condition:
   - **Server settings** — this event generation setting set on the **Face recognition server** object settings panel is taken into account (used by default).
   - **Yes** — the face mask absence event generation is enabled.
   - **No** — the face mask absence event generation is disabled.
5. Click the **Apply** button (**4**) to save the settings.

> **Note**
>
> The parameters for enabling/disabling the event generation set on the settings panel of the **Face characteristics recognition channel** object are of higher priority than the ones set on the settings panel of the **Face recognition server** object. For example, if the **Mask detection event generation** checkbox is set on the settings panel of the **Face recognition server** object, and **No** is selected for the **Generate mask detection event** parameter on the settings panel of the **Face characteristics recognition channel** object, then the mask detection event will not be generated, but only for this particular face characteristics recognition channel.

Configuring the mask state change event generation

Face PSIM receives the information about face mask state changes in real time and generates the corresponding events:

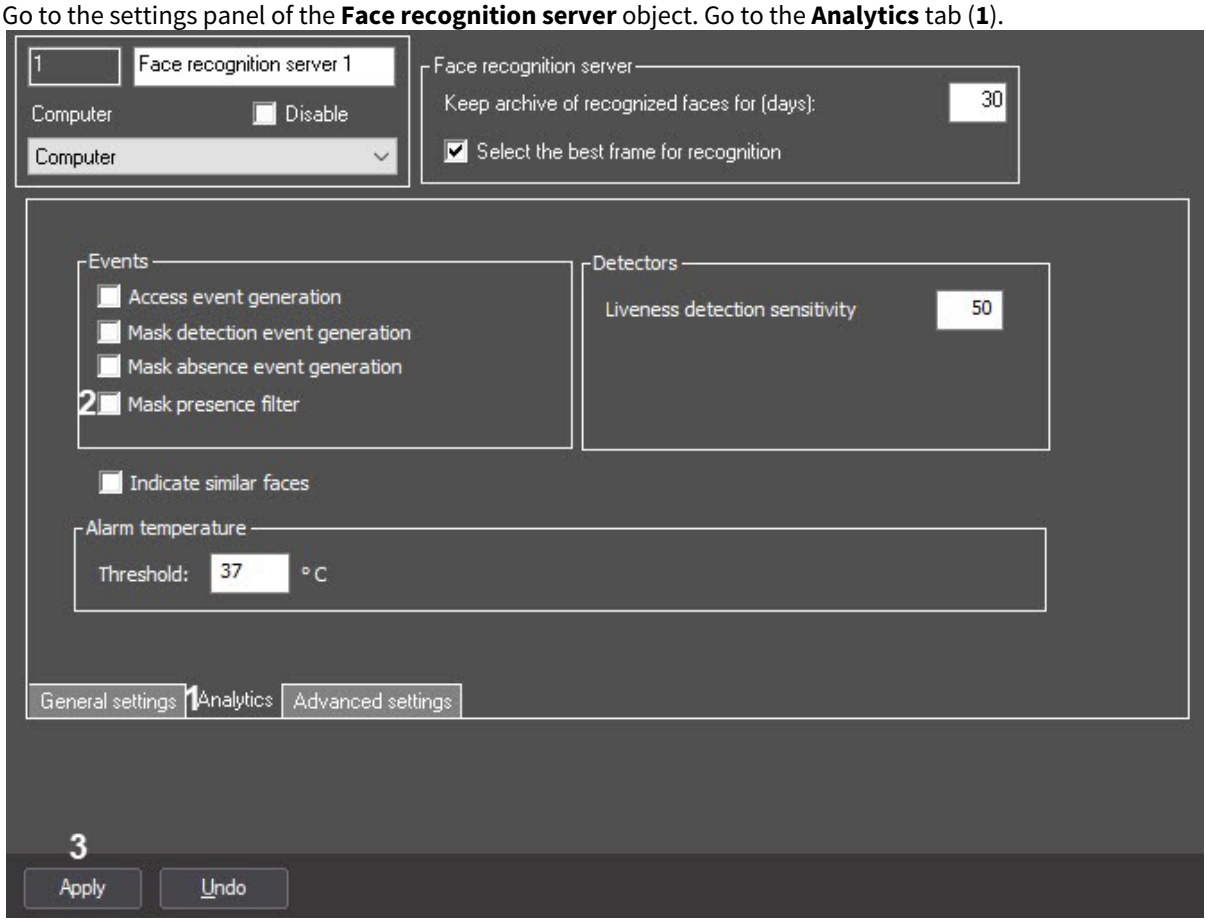
1. MASK_DETECTED (Mask is present).
2. MASK_NOT_DETECTED (Mask is not found).

3. MASK_NOT_RIGHT_PLACE (Mask is worn incorrectly).

Mask state change events are generated for faces that have been recognized since the server was started.

To enable the face mask state change event generation, do the following:

1. Go to the settings panel of the **Face recognition server** object. Go to the **Analytics** tab (**1**).



2. Set the **Mask presence filter** checkbox (**2**).
3. Click the **Apply** button (**3**) to save the settings.

6.3.6 Configuring the grouping of similar faces

By default, when viewing the analytical data, the similar faces are sorted at the moment of data generation. This increases the system load and can lead to an error if there are many unique faces within the specified time period.

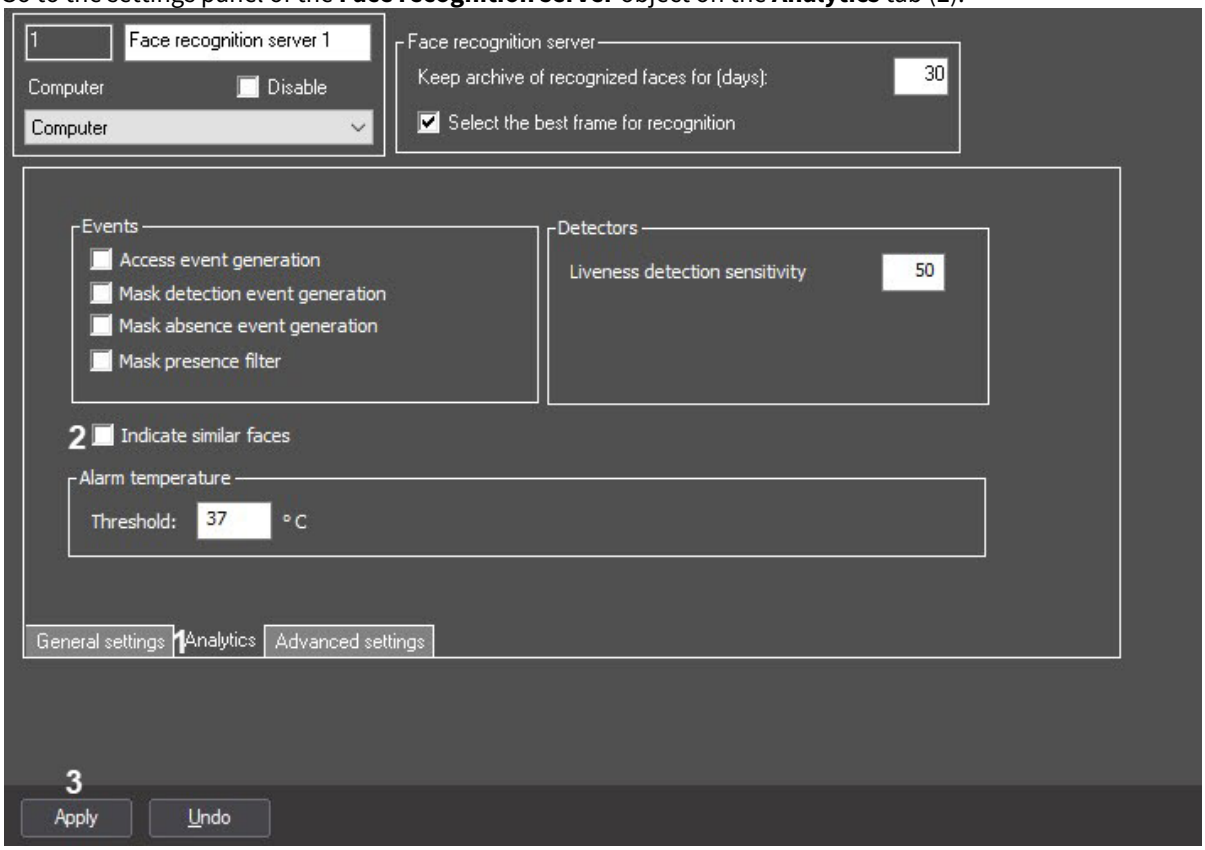
To work with analytical data, it is recommended to enable the grouping of similar faces.

> **Note**
>
> - If the grouping of similar faces is enabled, then during the face recognition server operation, each new captured face will be compared with a previously captured face that has the maximum level of similarity, but no less than the level specified in the settings (see Configuring the captured faces recognition parameters). If the detected face is not similar to any previous face, then this face will become a parent for all subsequent faces similar to it. If the parent face is excluded from the selection, for example, when cleaning the archive on a loop or narrowing the data request period,

the place of the common parent will be taken by the face which first referred to the common parent in an accessible time period.
- If the grouping of similar faces is enabled in the **Face recognition and search** interface object, the **Similarity** field on the **Analytics** tab will be hidden (see Viewing the analytics).

To configure the grouping of similar faces, do the following:

1. Go to the settings panel of the **Face recognition server** object on the **Analytics** tab (**1**).



2. Set the **Indicate similar faces** checkbox (**2**).
3. Click the **Apply** button (**3**) to save the changes.

The grouping of similar faces is now configured.

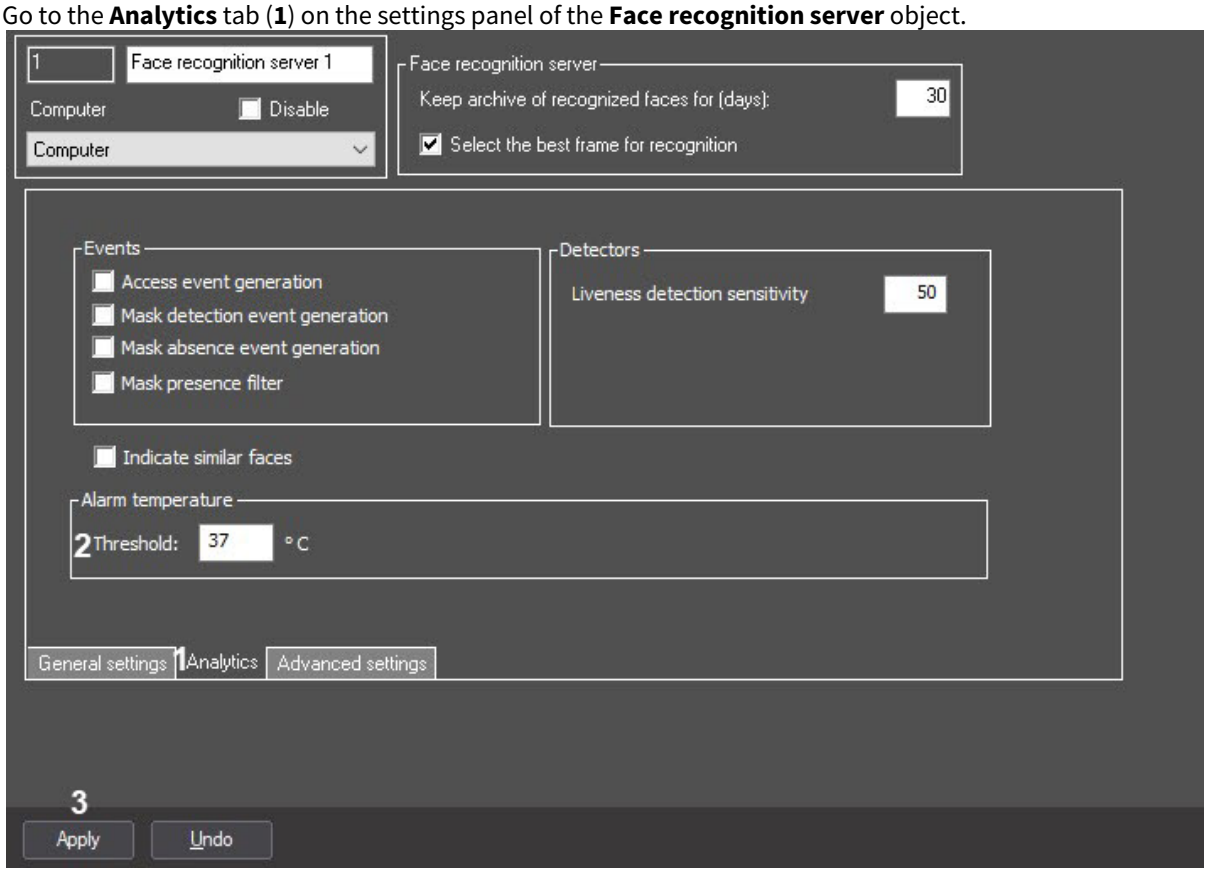
6.3.7 Configuring the Face recognition server operation with thermal camera

FIRSERVER events

To configure the *Face recognition serve*r operation with a thermal camera or an external system, do the following:

1. Create and configure an embedded detector in *Axxon PSIM* for the thermal camera, from which it is necessary to receive the temperature and photo of a captured face (see Embedded detectors).
2. Configure the *Face detection* module operation with a thermal camera (see Configuring the Face Detection module combined work with thermal camera or external system).

3. Go to the **Analytics** tab (**1**) on the settings panel of the **Face recognition server** object.



4. In the **Threshold** field (**2**), enter the temperature in degrees Celsius. When this value is exceeded, the **Temperature rise** (TEMPERATURE_ALARM) event will be generated.
5. Click the **Apply** button (**3**).

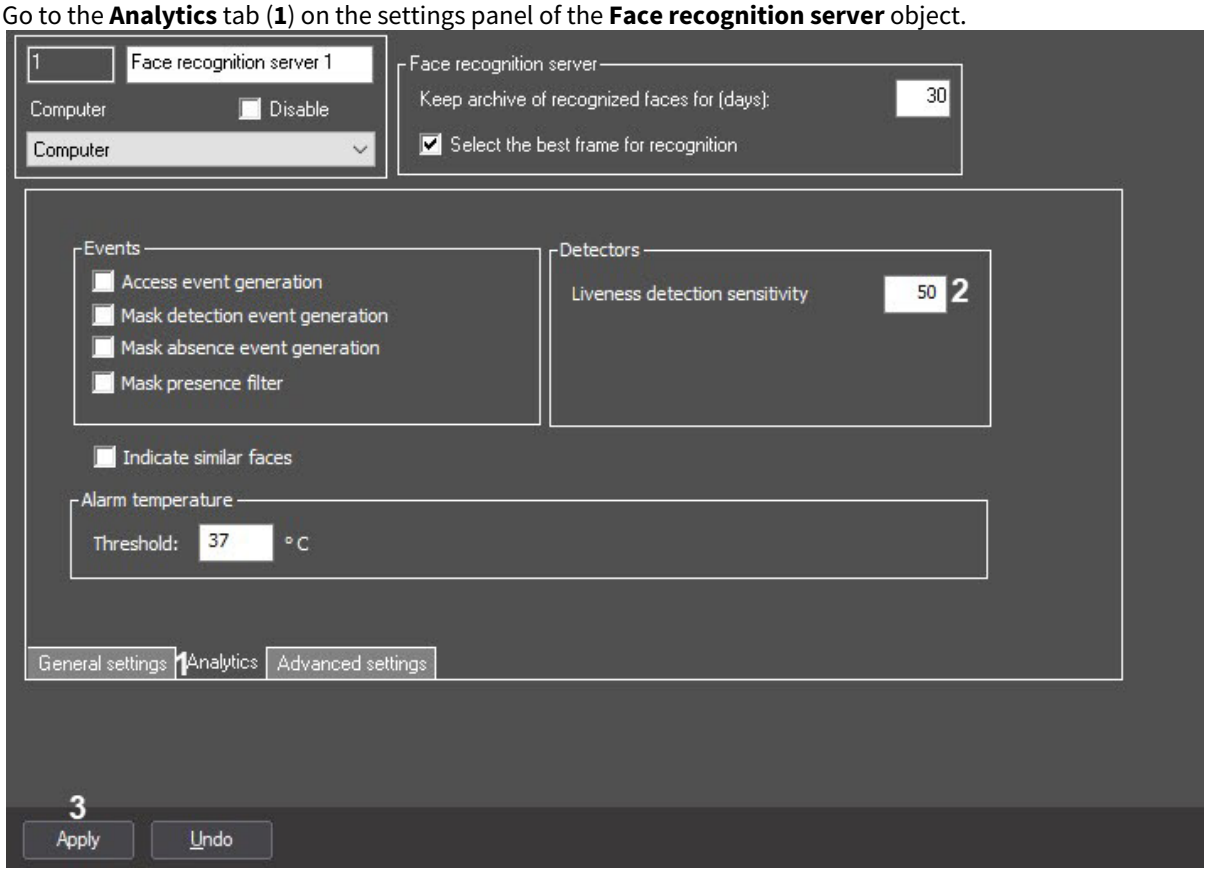
Configuring the *Face recognition server* operation with the thermal camera is now complete.

> **Note**
>
> When the debug mode is enabled (see Selecting and enabling the debug mode of Axxon PSIM software), a log file *firserver.thermal_imager.log* will be created in the *<Axxon PSIM* installation directory>\. All information received from the thermal camera is logged into this file.
> Also, you can enable saving JSON and images received from the thermal camera during face recognition to the folder using the **SaveThermalJson** registry key (for details, see Registry keys reference guide).

6.3.8 Configuring the artificial face detection

To configure the detection of artificial faces, do the following:

1. Go to the **Analytics** tab (**1**) on the settings panel of the **Face recognition server** object.



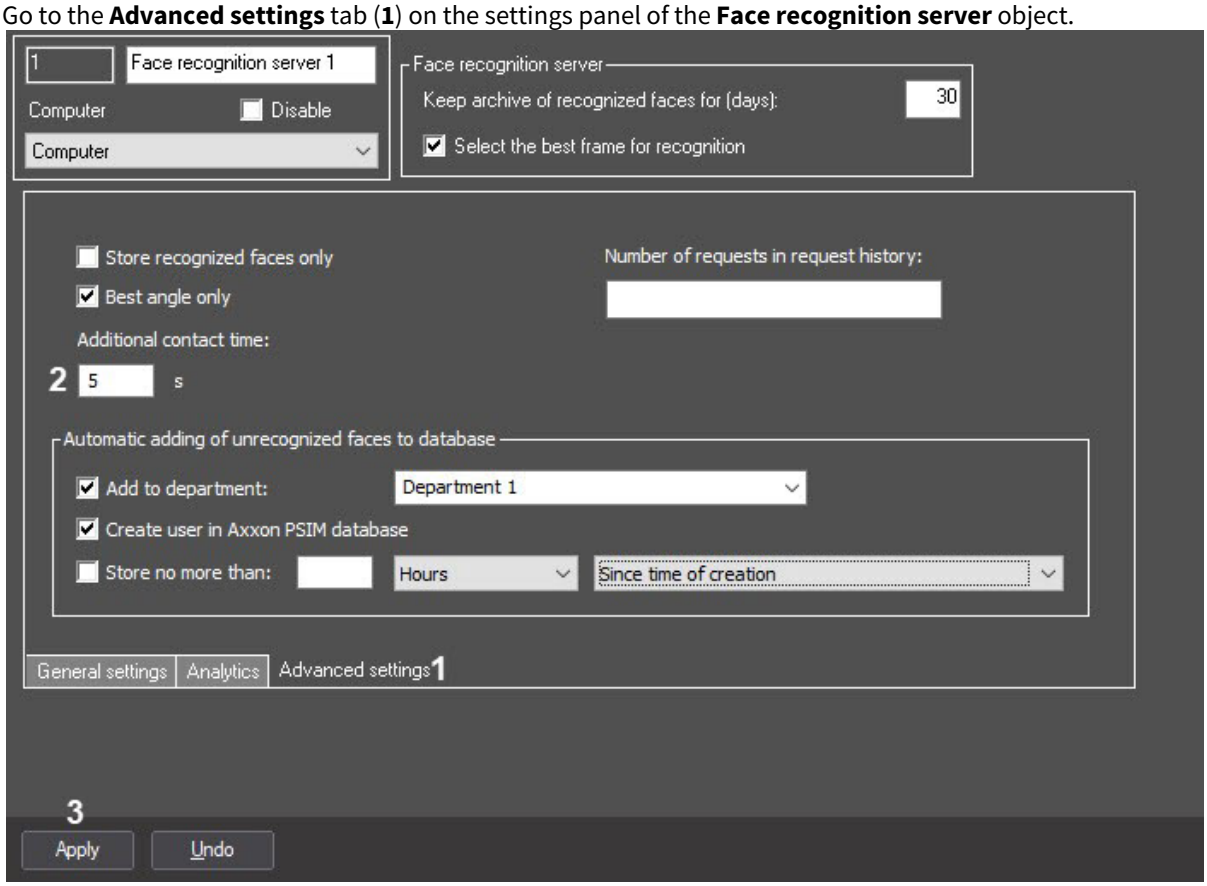
2. In the **Liveness detection sensitivity** field (**2**), specify the sensitivity of artificial faces recognition as a percentage (see Configuring the permissions and additional settings).
3. Click the **Apply** button (**3**) to save the settings.

The artificial faces detection is now configured.

6.3.9 Configuring the contact time with persons

The contact time with persons is used when searching for faces in the video archive (see Starting the face search process). It is configured as follows:

1. Go to the **Advanced settings** tab (**1**) on the settings panel of the **Face recognition server** object.



2. In the **Additional contact time** field (**2**), specify the time in seconds, within which it is necessary to search for persons.
3. Click the **Apply** button (**3**) to save the changes.

Configuring the contact time with persons is now complete.

6.4 Configuring the Face recognition and search interface object

6.4.1 Face recognition and search software module functionality

The *Face recognition and search* software module is designed to perform the following functions:

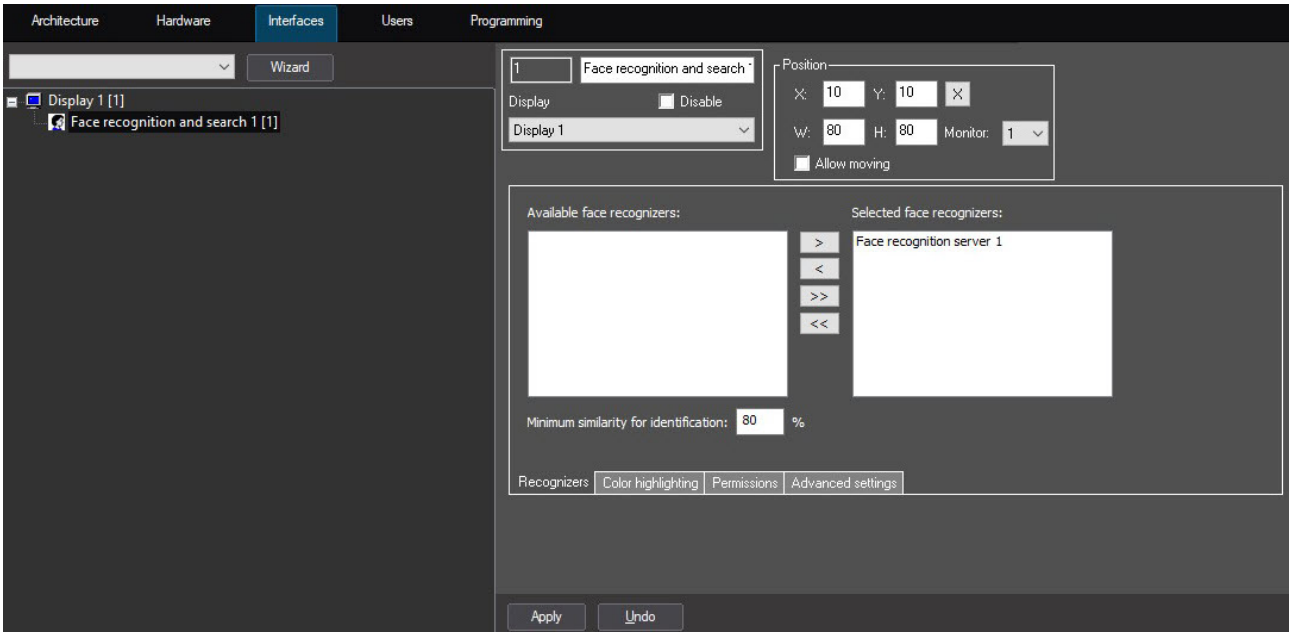
1. Search in video archive by image captured from video camera.
2. Search in video archive by image loaded from file.
3. Monitoring the captured faces in a real time mode.
4. Exporting the search results to the report file in PDF format.
5. Working with the face databases.
6. Counting number of visitors.
7. Displaying the additional face characteristics if their recognition is supported by the face recognition module being used (see Configuring the additional face characteristics).

6.4.2 Configuration procedure for the Face recognition and search interface object

To configure the **Face recognition and search** interface object, do the following:

1. Set parameters for the **Face recognition and search** interface object.
2. Select the **Face recognition server** objects that will interoperate with the **Face recognition and search** interface object.
3. If necessary, configure the color highlighting of recognized faces.
4. Configure the permissions and additional settings.
5. Configure the additional face characteristics.
6. If necessary, configure the images transfer to the external system.
7. If necessary, set a separator for file names when adding faces to the database.

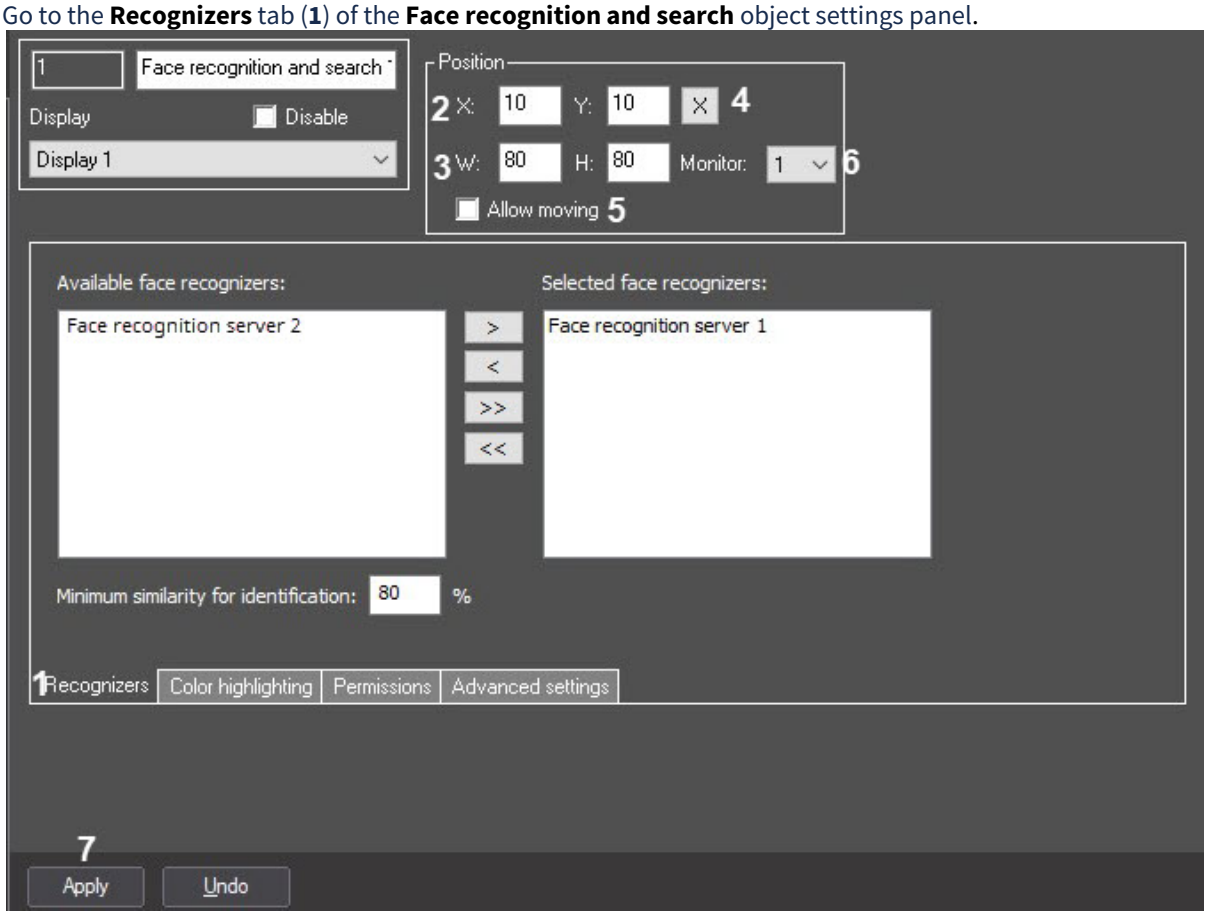
The **Face recognition and search** interface object is configured on the **Interfaces** tab of the **System settings** dialog box.



6.4.3 Setting up the parameters for the Face recognition and search interface object

The parameters for the **Face recognition and search** interface object are set up as follows:

1. Go to the **Recognizers** tab (**1**) of the **Face recognition and search** object settings panel.



2. Assign coordinates for the top-left corner of the **Face recognition and search** window: the **X** (the horizontal indent from the left border of the computer screen) and **Y** (the vertical indent from the upper border of the computer screen) fields (**2**). The coordinates are expressed as a percentage of the horizontal and vertical screen sizes, respectively.
3. Assign dimensions for the **Face recognition and search** window: the **W** (window width) and **H** (window height) fields (**3**). The dimensions are expressed as a percentage of the horizontal and vertical screen sizes, respectively.

> **Note**
>
> It is recommended to use the visual method of setting up the coordinates and sizes of the **Face recognition and search** window. Click the  (**4**) button and, using the mouse, set the required size and position of the test window and then click the **OK**. button Coordinates of the test window are automatically calculated and copied to the **X**, **Y**, **W** and **H** fields.

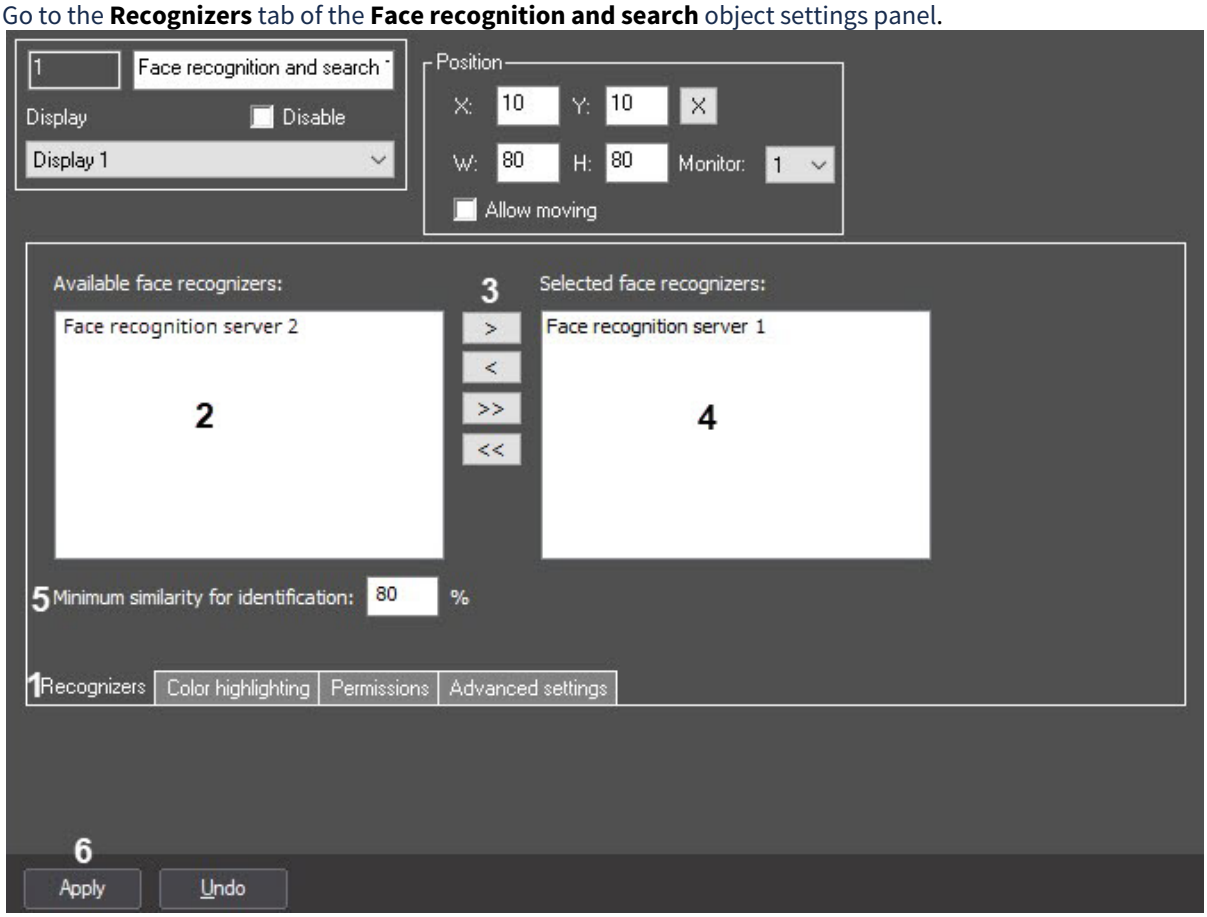
4. Set the **Allow moving** checkbox (**5**) to make it possible to move the **Face recognition and search** window.
5. From the **Display** drop-down list (**6**), select the physical monitor for the **Face recognition and search** window to be displayed on.
6. Click the **Apply** button to save the changes (**7**).

The parameters for the **Face recognition and search** interface object are now set up.

6.4.4 Selecting Face recognition server objects that will interoperate with the Face recognition and search interface object

The **Face recognition server** objects that will interoperate with the **Face recognition and search** interface object, are selected as follows:

1. Go to the **Recognizers** tab of the **Face recognition and search** object settings panel.



2. Select the required **Face recognition server** objects from the **Available face recognizers** list (**2**), the data from which will be displayed in the **Face recognition and search** interface object.
3. Move the selected face recognizers to the **Selected face recognizers** list, clicking the > button (or the >> button for moving all the face recognizers from the list (**3**).

> **Note**
>
> The < and << buttons are designed for handling the back actions, i.e. for moving the selected or all the *Face recognition server* objects from the **Selected face recognizers** list to the **Available face recognizers** list.

4. As a result, the selected **Face recognition server** objects will display in the **Selected face recognizers** list (**4**).
5. In the **Minimum similarity for identification**...**%** field (**5**), specify the level of minimum similarity of the captured face and the reference image for the selected face recognizers.
6. Click the **Apply** button (**6**) to save the changes.

Selection of the **Face recognition server** objects that will interoperate with the **Face recognition and search** object is now complete.

6.4.5 Configuring the color highlighting of recognized faces

Setting color highlighting of faces that belong to selected departments

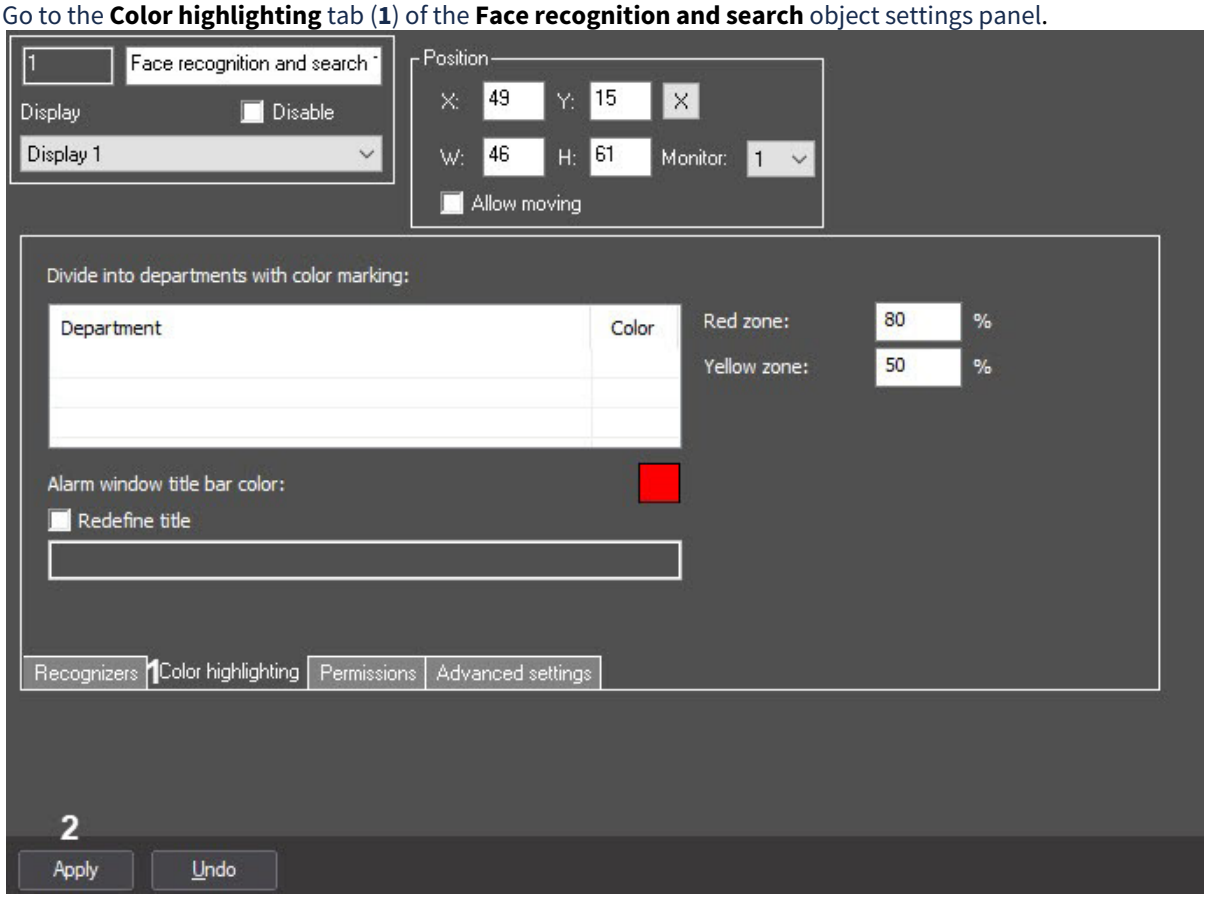
The color highlighting of faces that belong to selected departments is configured as follows:

- Adding a department for highlighting
- Color assignment for the added department
- Editing and deleting added departments

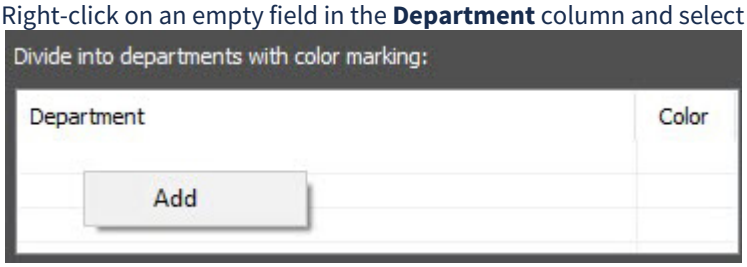
Adding a department for highlighting

Add a department for highlighting as follows:

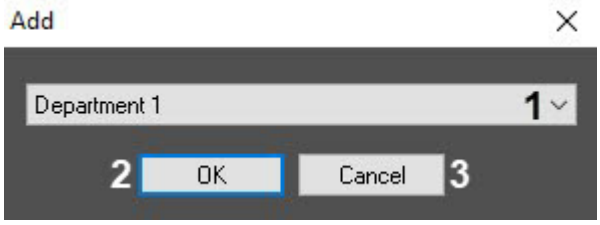
1. Go to the **Color highlighting** tab (**1**) of the **Face recognition and search** object settings panel.



2. Right-click on an empty field in the **Department** column and select the **Add** item from the function menu.

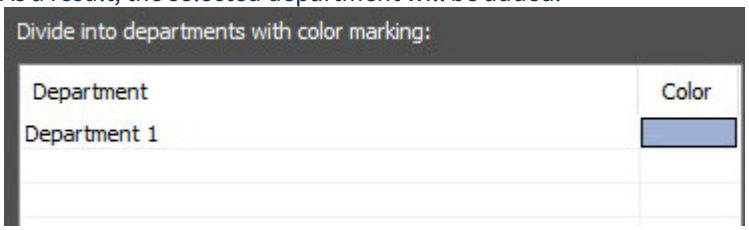


3. In the **Add** window that opens, from the drop-down list (**1**), select the required department, the faces from which should be highlighted, and click the **OK** button (**2**).



> **Note**
>
> To cancel adding a department, click the **Cancel** button (**3**).

As a result, the selected department will be added.



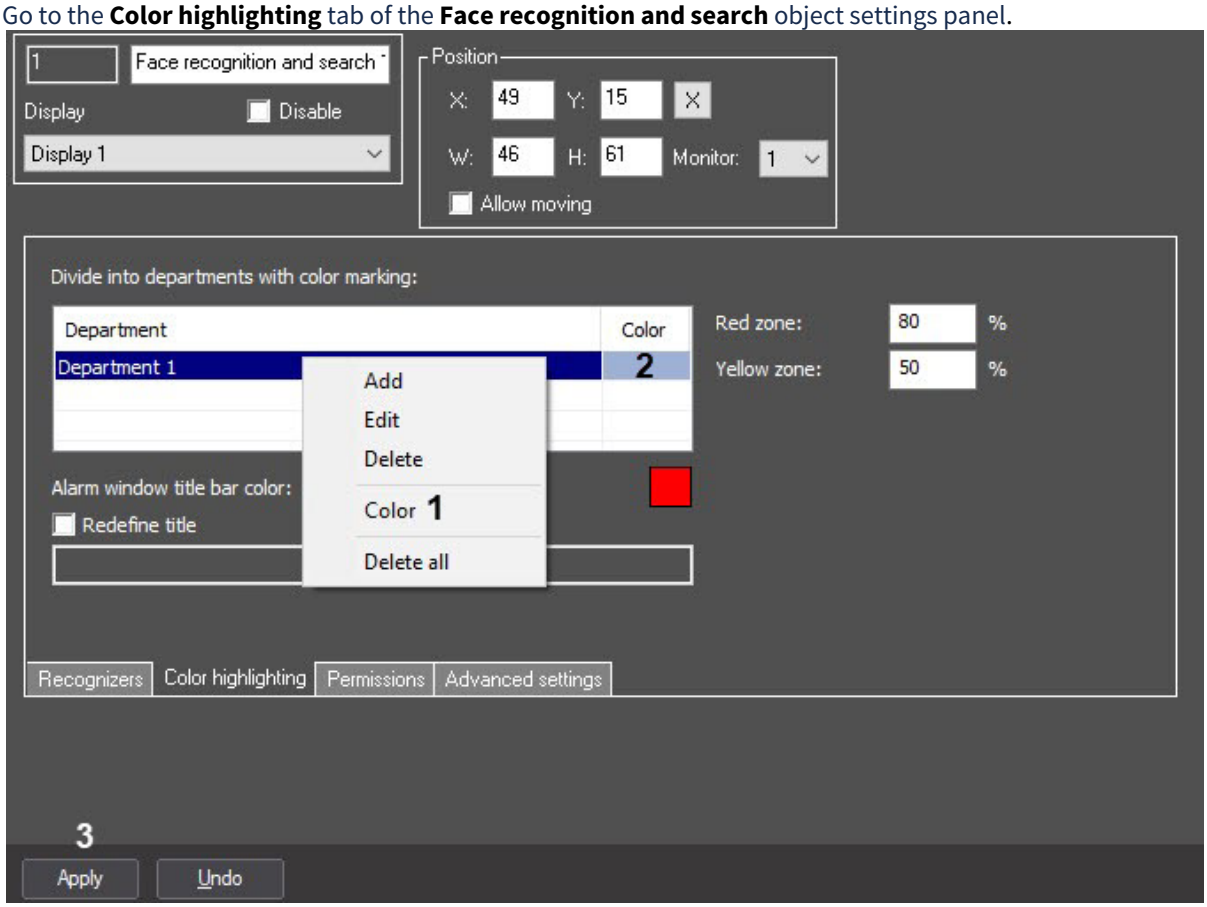
4. Click the **Apply** button (**2**) to save the changes.

A department for highlighting is now added.

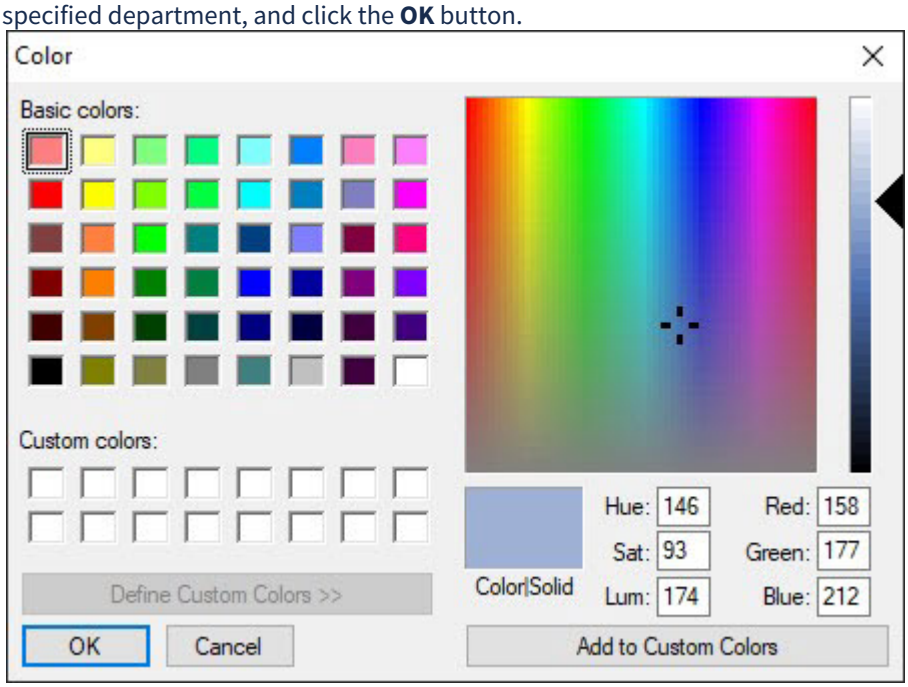
Color assignment for the added department

The color is assigned for the added department as follows:

1. Go to the **Color highlighting** tab of the **Face recognition and search** object settings panel.



2. Right-click on the corresponding department and select the **Color** item (**1**) from the functional menu.
3. In the **Color** window that opens, select the required color, which will highlight the faces belonging to the specified department, and click the **OK** button.



> **Note**
>
> You can also open the **Color** window by double-clicking on the fill color of the **Color** column (**2**).

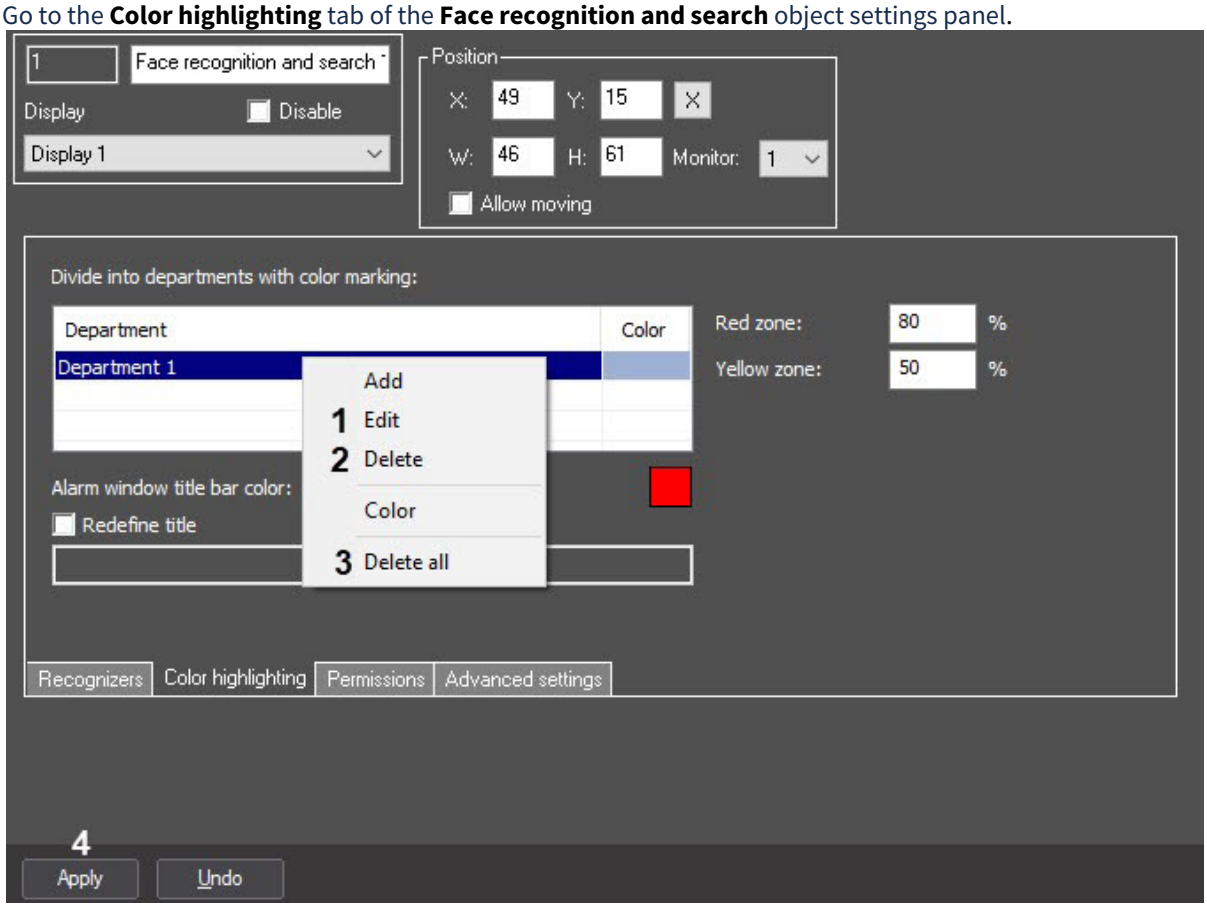
4. Click the **Apply** button (**3**) to save the changes.

Thr color assignment for the added department is now complete.

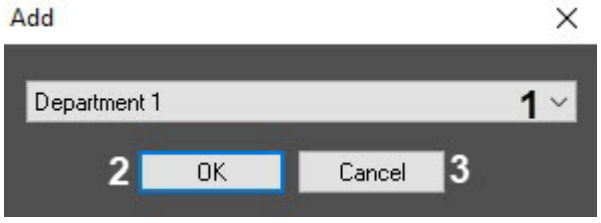
Editing and deleting added departments

The added departments can be edited and deleted as follows:

1. Go to the **Color highlighting** tab of the **Face recognition and search** object settings panel.



2. Right-click on the corresponding department and select the **Edit** item (**1**) from the function menu.
3. In the **Edit** window that opens, from the drop-down list (**1**), select the required department, the faces from which should be highlighted, and click the **OK** button (**2**).



> **Note**
>
> To cancel editing a department, click the **Cancel** button (**3**).

4. To delete one added department, right-click on the corresponding department and select the **Delete** item (**2**) from the function menu.
5. To delete all departments, right-click on any field in the **Department** column and select the **Delete all** item (**3**) from the function menu.
6. Click the **Apply** button (**4**) to save the changes.

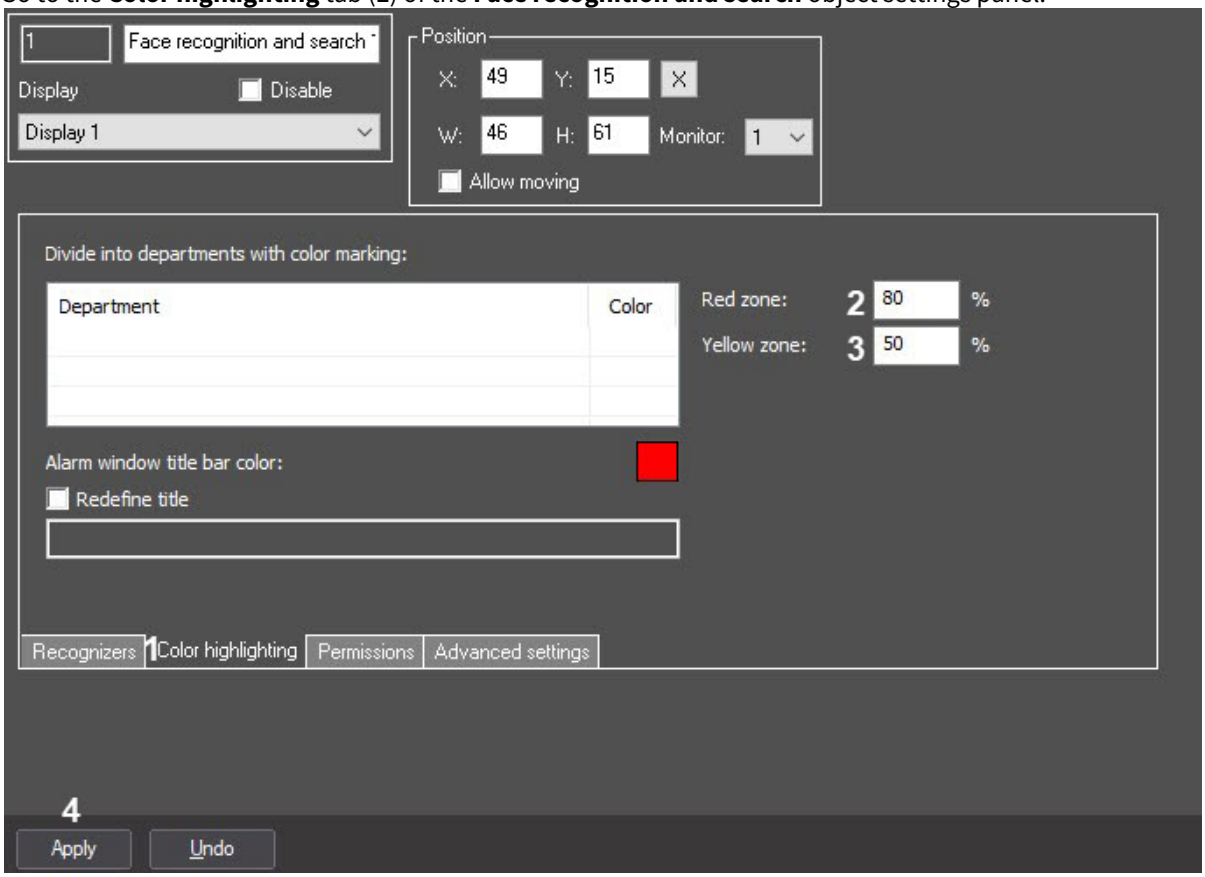
Editing and deleting of added departments is now complete.

Configuring the color highlighting by face similarity

> **Attention!**
>
> This setting applies only to those faces that do not belong to departments for which color highlighting is configured (see Setting color highlighting of faces that belong to selected departments).

The color highlighting by face similarity is configured as follows:

1. Go to the **Color highlighting** tab (**1**) of the **Face recognition and search** object settings panel.



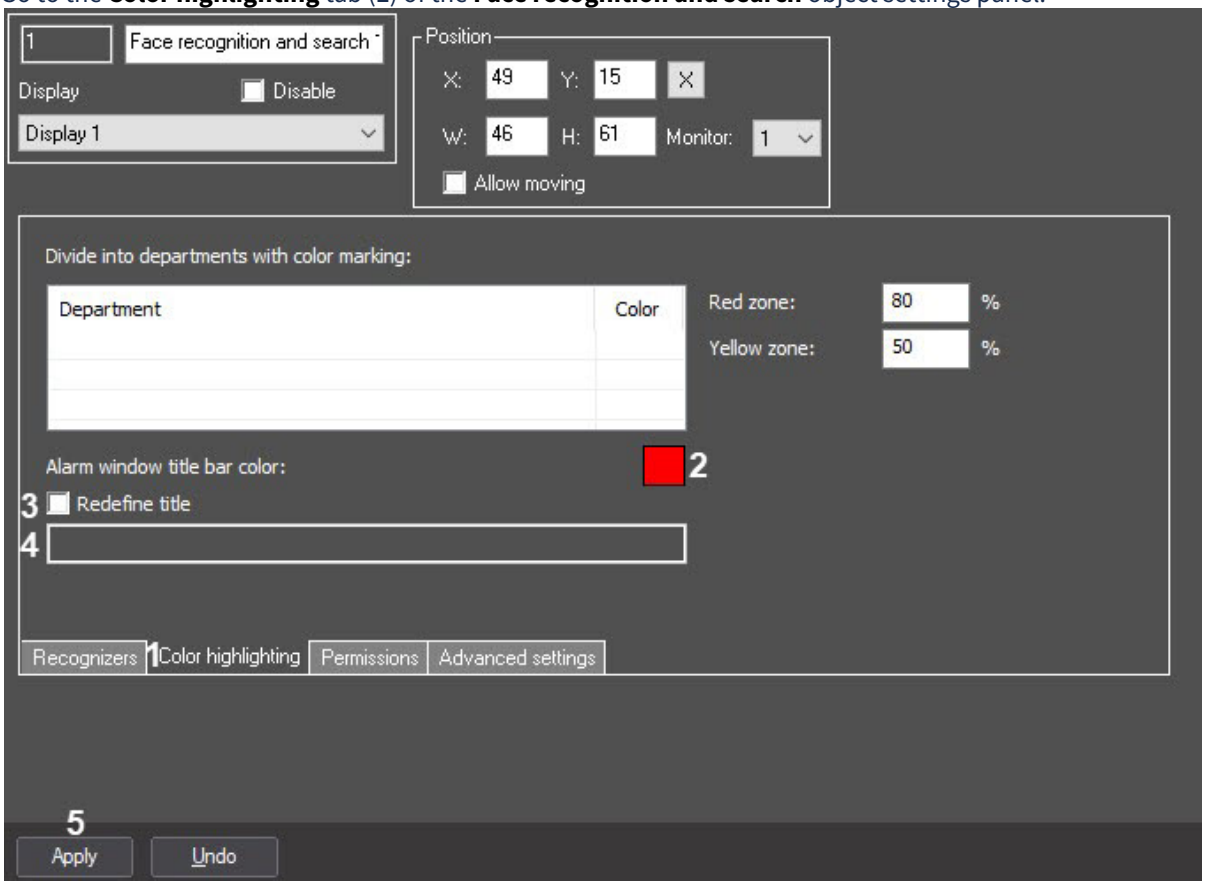
2. In the **Red zone** ...**%** field (**2**), enter the value of the similarity level. When this value is exceeded, the faces will be highlighted in red.
3. In the **Yellow zone** ...**%** field (**3**), enter the similarity level value from the interval between the **Similarity level** parameter value (see Configuring the captured faces recognition parameters for the **Face recognition server** object) and the **Red zone** parameter value. When this value is exceeded, the faces will be highlighted in yellow.
4. Click the **Apply** button to save the changes (**4**).

The color highlighting by face similarity is now configured.

Alarm window title setting

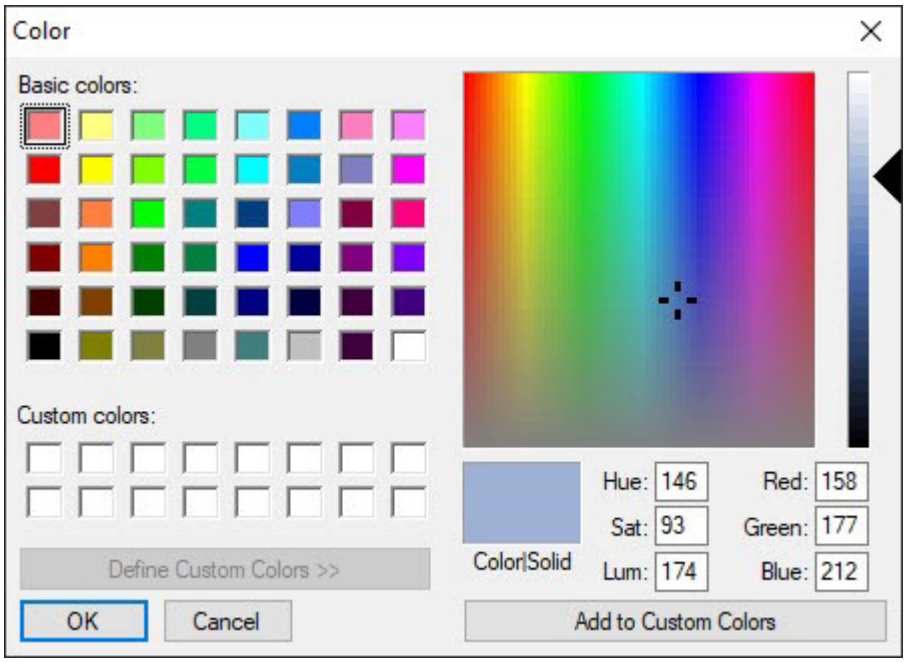
Set the title of the alarm window as follows:

1. Go to the **Color highlighting** tab (**1**) of the **Face recognition and search** object settings panel.



2. Set the title color of the alarm window by clicking on the colored square (**2**).

3. In the **Color** window that opens, select the required color, which will highlight the alarm window title, and click the **OK** button.



4. Set the **Redefine title** checkbox (**3**) if it is necessary to specify an arbitrary title for the alarm window.

> **Note**
>
> The default title is "Attention!"

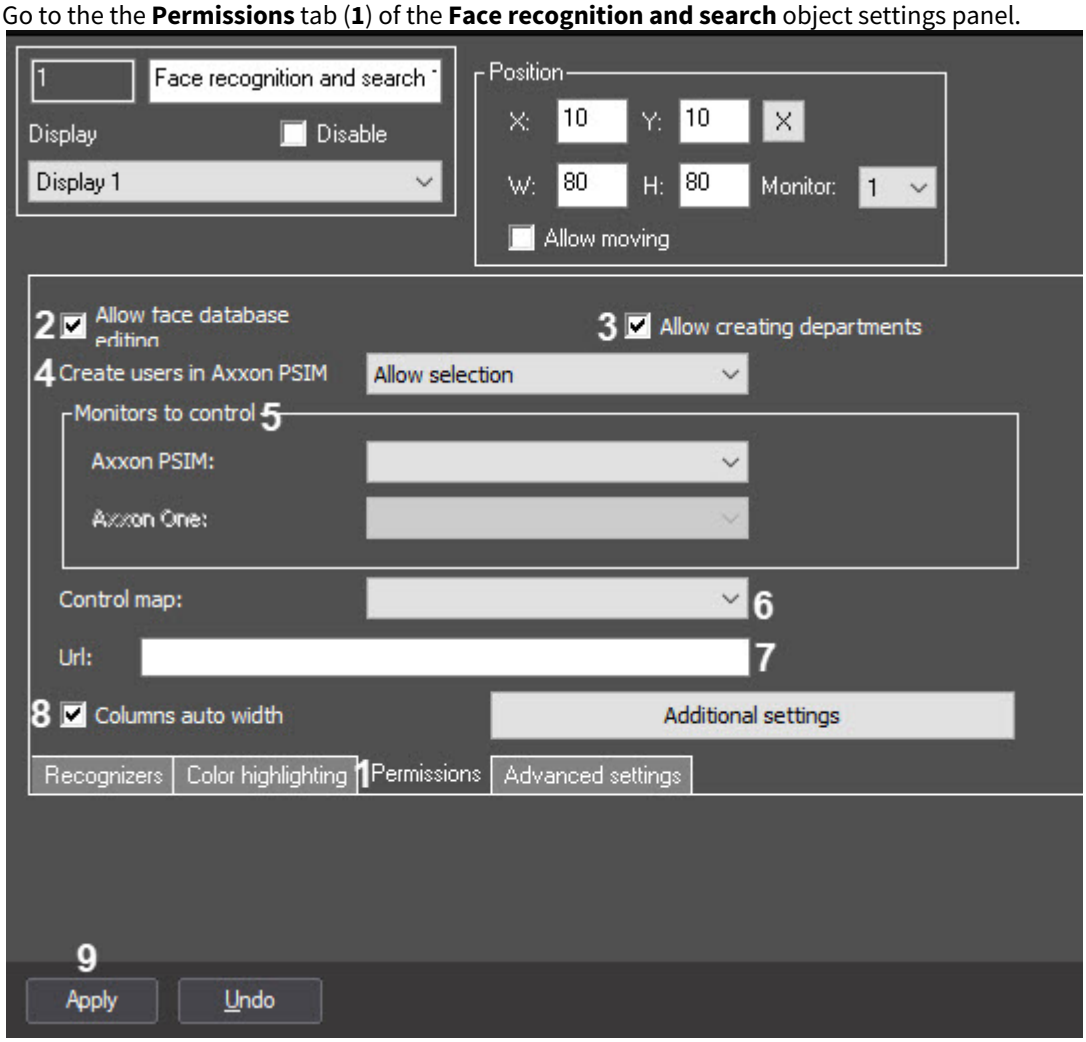
5. If the **Redefine title** checkbox is set, then enter the alarm window title in the field (**4**).
6. Click the **Apply** button (**5**) to save the changes.

The alarm window title is now set.

6.4.6 Configuring the permissions and additional settings

Permissions and additional settings are configured as follows:

1. Go to the the **Permissions** tab (**1**) of the **Face recognition and search** object settings panel.



2. Set the **Allow face database editing** checkbox (**2**) to make the **Face DB** tab available in the **Face recognition and search** interface and to enable adding reference faces to the reference face database.

> **Attention!**
>
> The Face Recognition Server uses the port **10000** for communication with the **Face recognition and search** interface object. If this port is occupied by a third-party program, errors may occur when editing the database from the client side. Make sure that the specified port is free and is not used by any third-party applications.
> If you can not disable the third-party application, you can change the port through which the communication is performed (the port **10001** below is selected as an example). To do this, you should perform the following actions:
> 1. For the **Face recognition server**: go to *HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\AxxonSoft\PSIM\FRS* branch of the Windows registry and set the **RestPort = 10001** string parameter.
> 2. For the **Face recognition and search** interface object: open the **C:\Program Files (x86)\Axxon PSIM\Modules\face_client.run.config** file and make the following changes:
>
> ```
> <setting name="Port" serializeAs="String">
>       <value>10001</value>
> </setting>
> ```

3. Set the **Allow creating departments** checkbox (**3**) to allow creating the departments in *Axxon PSIM* with the specified name in cases when a reference face is added to the reference face database and a non-existent department is specified.
4. From the **Create users in Axxon PSIM DB** drop-down list (**4**), select the option for creating users in *Axxon PSIM:*
    a. **Allow selection** — when the face is added to the reference face database, the **Create a user in the Axxon PSIM database** checkbox is available for the operator (see Adding images to the reference face database).
    b. **Create** — the **Create a user in the Axxon PSIM database** checkbox is absent in the operator's interface, and *Axxon PSIM* users are created automatically when the face is added to the reference face database.
    c. **Do not create** — the **Create a user in the Axxon PSIM database** checkbox is absent in the operator's interface, and *Axxon PSIM* users are not created when the face is added to the reference face database.
5. From the **Monitors to control** drop-down list (**5**), select the required **Monitor** object for the video archive playback.
6. From the **Control map** drop-down list (**6**), select the required **Map** object to enable the **Show on map** item display in the menu of the **Face recognition and search** interface object (see Displaying the camera that captured the face on the map).
7. In the **Url** field (**7**), enter the permanent part of the link for the web-page. After the image has been loaded to the face database, the name of the image file will be added to the web page address, and it will be possible to open the web page upon the face search request (see Web-page opening upon a face search request).
8. Set the **Columns auto width** checkbox (**8**) if it is necessary to automatically change the column size in the **Face recognition and search** interface window proportionally to the size of the interface window.
9. To save the changes, click the **Apply** button (**9**).

Configuring permissions and additional settings is complete.

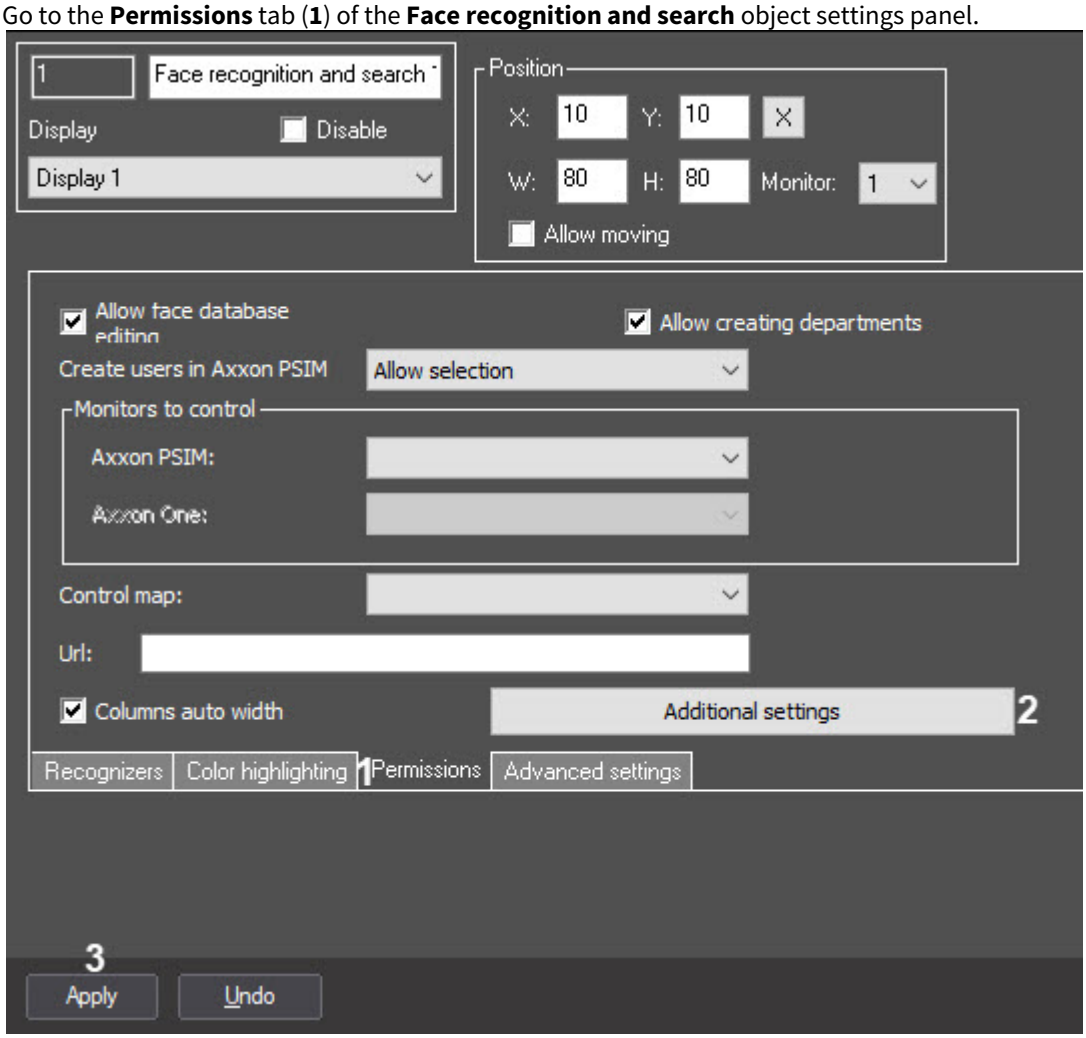
6.4.7 Configuring the additional face characteristics

Configuring the additional face characteristics consists in selecting those face characteristics that should be available in the **Face recognition and search** interface window (see Working with the Face recognition and search interface object). As a result, in the analytics viewing mode, and in the monitoring of captured and recognized faces mode, the columns of the corresponding face characteristics will be displayed. Filtering by selected face characteristics will also become available.

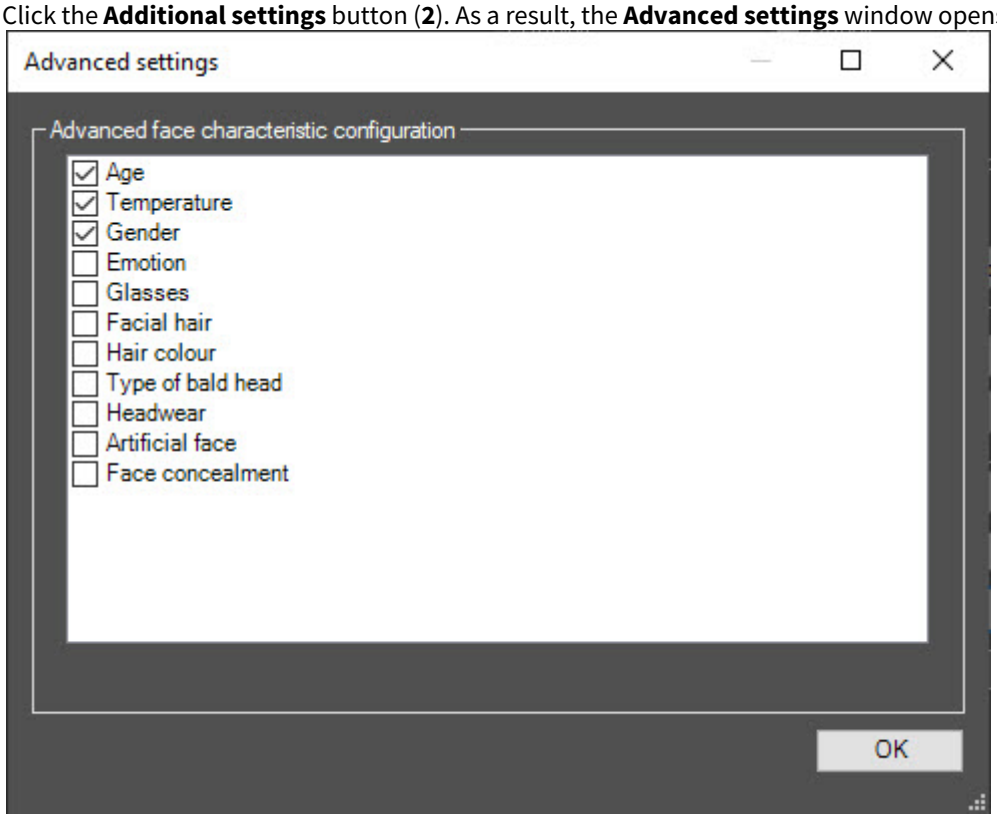
> **Attention!**
>
> The face recognition module should support the recognition of additional face characteristics. Currently, the *Tevian/VideoIntellect 1.1* (when working together with the *Face characteristics recognition channel* module) and *VisionLabs* modules support the recognition of additional facial characteristics.

Additional face characteristics are configured as follows:

1. Go to the **Permissions** tab (**1**) of the **Face recognition and search** object settings panel.



2. Click the **Additional settings** button (**2**). As a result, the **Advanced settings** window opens.



3. Set the checkboxes for the face characteristics, which should be available in the **Face recognition and search** interface window. All face characteristics and their possible values are shown in the table below:

Face characteristic	Value	Feature availability depending on the face recognition module used	
		Tevian/VideoIntellect 1.1	VisionLabs
Age	age of face	+	+
Temperature	face temperature in degrees Celsius from the thermal camera or external system	Receiving the temperature from the thermal camera or external system does not depend on the face recognition module used	
Gender	undefined	+	+
	male		
	female		
Emotion	undefined		
	rage		
	fear		

Face characteristic	Value	Feature availability depending on the face recognition module used	
		Tevian/VideoIntellect 1.1	VisionLabs
	happiness		
	without emotion		
	sadness		
	astonishment		
Glasses	undefined		
	tinted glasses		
	without glasses		
	glasses		
Facial hair	undefined		
	beard		
	bristle		
	imperial beard and mustache		
	imperial beard		
	mustache		
	absent		
Hair color	undefined		
	brunet		
	blonde		
	chestnut hair		
	ginger		
	gray		
Type of bald head	undefined		

Face characteristic	Value	Feature availability depending on the face recognition module used	
		Tevian/VideoIntellect 1.1	VisionLabs
	bald		
	with receding hairline		
	without bald head		
Headwear	undefined		
	cap		
	bandana		
	beret		
	beanie		
	trapper hat		
	fur hood		
	glasses on head hat		
	helmet		
	hood		
	kepi		
	headscarf		
	without headwear		
	peaky cap		
Artificial face	unknown		
	no		
	yes		
Face concealment	unknown		-
	face not covered		+

Face characteristic	Value	Feature availability depending on the face recognition module used	
		Tevian/VideoIntellect 1.1	VisionLabs
	mask is on		+
	tinted glasses		-
	face partially covered		+
	balaclava		-
	other mask		-
	mask is not on the right place		+

4. Click the **OK** button.
5. To save the changes, click the **Apply** button (**3**).

Configuring the additional face characteristics is complete.

6.4.8 Configuring the images transfer to an external system

To configure the transfer of images to an external system, do the following:

1. Go to the folder at *<Axxon PSIM* Installation Directory>\Modules\.
2. Open the **face_client.run.config** configuration file for editing.
3. Set the value for the **RemoteUrl** setting in the **value** string corresponding to the HTTP POST request sending address, for example http://localhost:8888/PushImage.

face_client.run.config

```
<applicationSettings>
    <FaceClient.Properties.Settings>
        <setting name="ProblemImages" serializeAs="String">
            <value>none</value>
        </setting>
        <setting name="Timeout" serializeAs="String">
            <value>60000</value>
        </setting>
        <setting name="Port" serializeAs="String">
            <value>10000</value>
        </setting>
        <setting name="RemoteUrl" serializeAs="String">
            <value>http://localhost:8888/PushImage</value>
        </setting>
    </FaceClient.Properties.Settings>
</applicationSettings>
</configuration>
```

4. Save the changes in the edited file **face_client.run.config**.
5. Restart the *Face PSIM* to apply the settings.

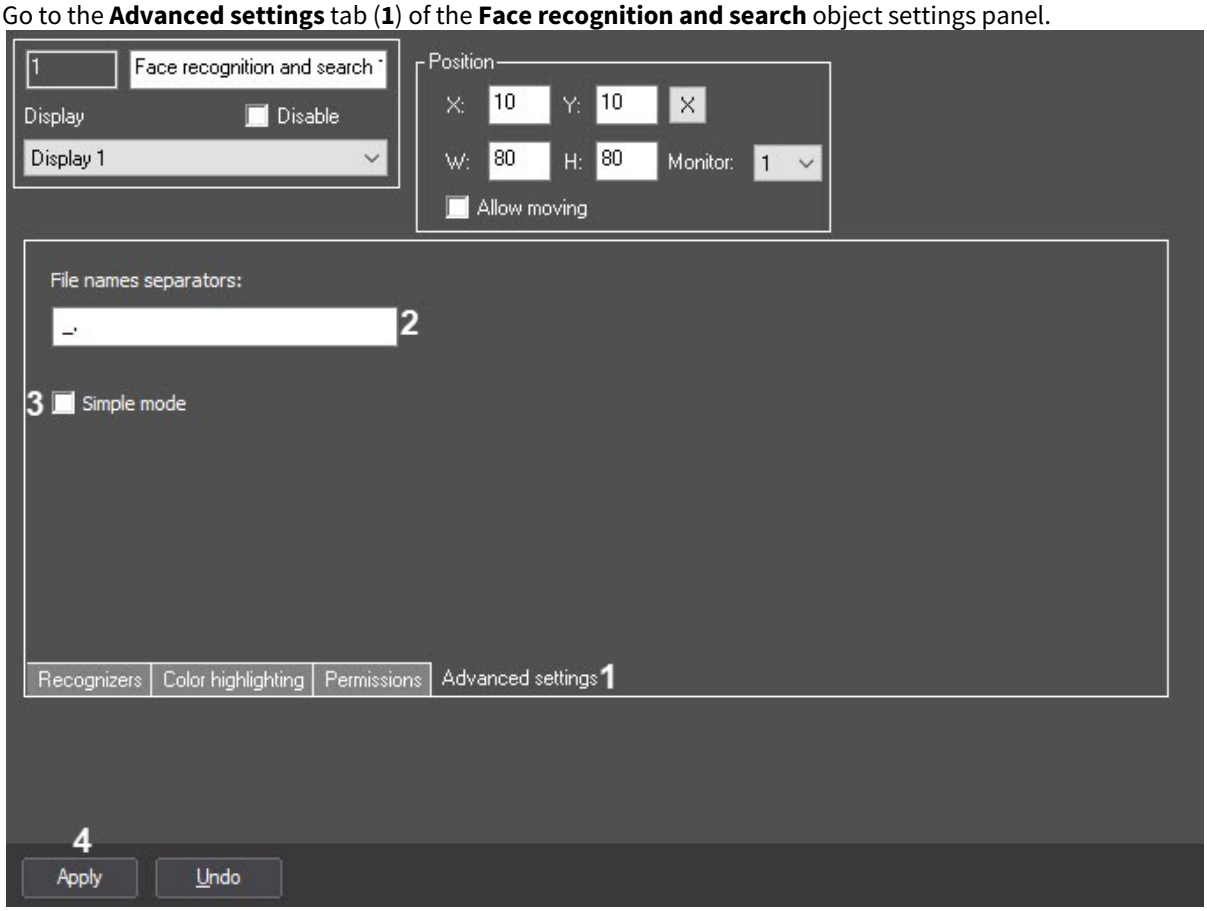
Note

By default, the HTTP POST request sending address is specified as **none**, which means that the images transfer to an external system in the **Face recognition and search** interface object is disabled (see Transferring images to an external system).

6.4.9 Advanced settings

The advanced settings are configured as follows:

1. Go to the **Advanced settings** tab (**1**) of the **Face recognition and search** object settings panel.



2. In the **File names separators** field (**2**) enter the characters that will be used as a separator when adding faces to the database. Any separator from the specified values of the field can be used: Cyrillic letters, Latin letters, numbers, alphabetic characters, additional symbols, white space.

   Note

   By default, the following separators are used: underscore, period and a white space "_. "

3. Set the **Simple mode** checkbox (**3**) to enable the simple mode of captured and recognized faces monitoring (see Enabling the Simple mode of captured and recognized faces monitoring).
4. Click the **Apply** button (**4**) to save the changes.

The advanced settings are configured.

6.5 Working with CPU cores used for generating vectors when adding reference faces to the database

It is possible to limit CPU cores used to generate the vectors. It is also possible to set the order of binding streams to these CPU cores (for details, see Registry keys reference guide, for information about working with the registry, see Working with Windows OS registry).

To limit the number of CPU cores used to generate the vectors, in the **CpuCoreCountAddPerson** registry key specify the number of fixed CPU cores (other than those specified in the **CpuCoreCount** key).

To determine the order of binding streams to these CPU cores, specify one of the following values in the **Face.HardwareCPU** registry key:

Value	Result
no value or 0	Streams are bound to CPU cores randomly
1	Streams are bound to CPU cores successively depending on their total number
2	Streams are bound to the first cores of each CPU

6.6 Switching between the face recognition modules and SDK versions

When you change the used face recognition module, for example, replace the *Cognitec* module with the *Tevian* module or vice versa, the biometric vectors are automatically re-generated. This is necessary because biometric vectors received by one face recognition module cannot be used by another.

The biometric vectors are also automatically re-generated when you switch the Tevian SDK version or the face recognition and search algorithm of *Tevian* and *VideoIntellect 1.1* face recognition modules.

> **Note**
>
> To switch between the used face recognition modules, use the **Tevian.IdentificationAlgorithm** registry key (see Registry keys reference guide, for details about working with the registry, see Working with Windows OS registry).

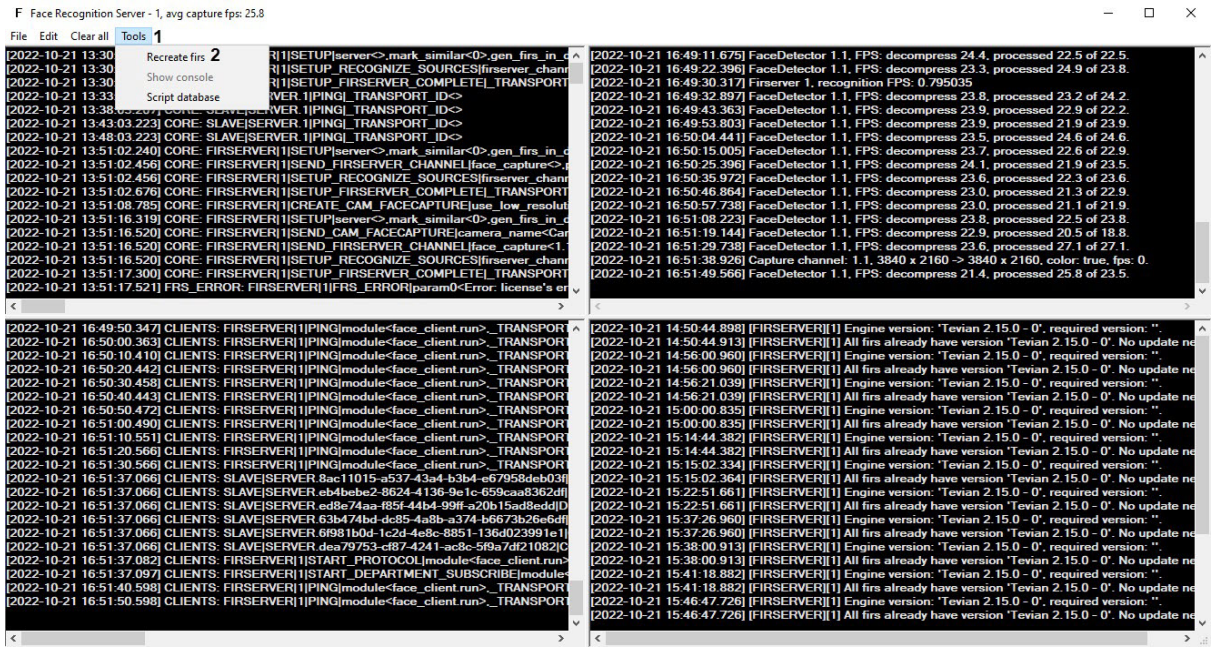
The re-generation of biometric vectors is performed in the background without disturbing the face recognition system operation. Firstly, the faces which are already entered in the database are re-generated. The current process of biometric vectors re-generation is displayed in the **Face recognition and search** interface module, on the **Statistics** tab, in the **Faces in RAM** field (see Displaying the statistics). If the Server is restarted, the process of re-generating the remaining faces will continue automatically.

> **Note**
>
> By default, the biometric vectors are re-generated on one CPU thread. Using the **Update.CpuCoreCount** registry key, you can set an arbitrary number of threads on which biometric vectors will be re-generated (see Registry keys reference guide).

You can also re-generate the biometric vectors manually. To do this:

1. Left click the  icon (**Face Recognition Server**) in the Windows taskbar (system tray) (for details about the **Face Recognition Server** debug window see Appendix 2. Debug window).

2. In the opened window select (**1**) **Tools -> Recreate firs** (**2**).



3. Wait for completion of biometric vectors re-generation.

Attention!

Errors may occur during the biometric vectors re-generation process.
For example, the error below may occur due to the fact that the new face recognition module SDK or the algorithm of the *Tevian* ALG2 face recognition module cannot recognize a face on a poor quality image and recreate a vector due to its better and more demanding recognition capabilities. Therefore, such image can be skipped.

```
[FIRSERVER][1] ERROR: Problem with regenerating fir for id 79656915-5BC1-E811-AA3F-1C1B0D34F0DF, skipping ...
```

If *Axxon PSIM* malfunctions after the vectors re-generation, do the following:

1. Shutdown *Axxon PSIM*.
2. Run FaceRecognitionTool.exe tool stored at: <*Axxon PSIM* installation folder>\Modules.
3. Specify required settings – in the **Path** field specify the path to the folder where the data will be uploaded to (e.g. **C:\Backup**).
4. Upload the data.

Note

Find more information on FaceRecognitionTool.exe in Face Recognition Tool utility for extracting captured and reference faces from the database section.

5. Execute the following script in the database manager (e.g. SQL Server Management Studio):

```
USE [Fir]
```

```
GO
DECLARE @return_value int
EXEC    @return_value = [dbo].[spReset]
SELECT  'Return Value' = @return_value
GO
```

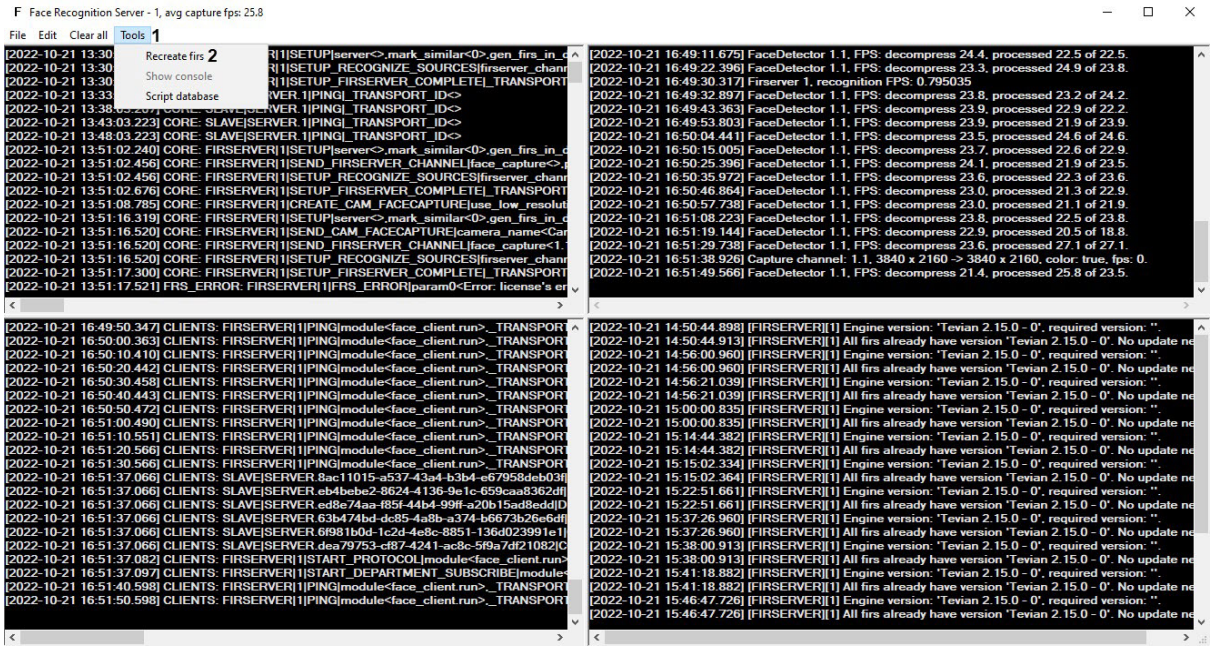
6. Start *Axxon PSIM* and upload images from the folder specified in the **Path** field to the reference face database (see Selecting a way to upload an image to the reference face database).

6.7 Restoring the history of passes if the Fir database is lost

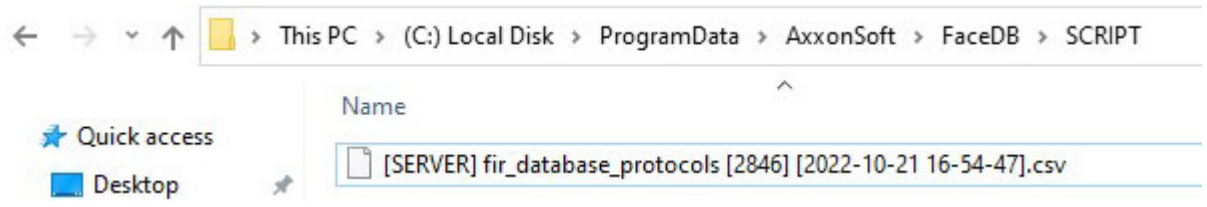
> **Note**
>
> The history of passes is restored using indexes stored in the INDEX folder, which is located in the **FaceDB** folder (see Storage modes for face images, vectors and metadata). If there are no indexes, the history of passes cannot be restored.

To restore the history of passes if the Fir database is lost, do the following:

1. Left-click the  icon (**Face Recognition Server**) in the Windows taskbar (system tray) (for more information about the **Face Recognition Server** debug window, see Appendix 2. Debug window).
2. In the window that opens, select (**1**) **Tools -> Script database** (**2**).



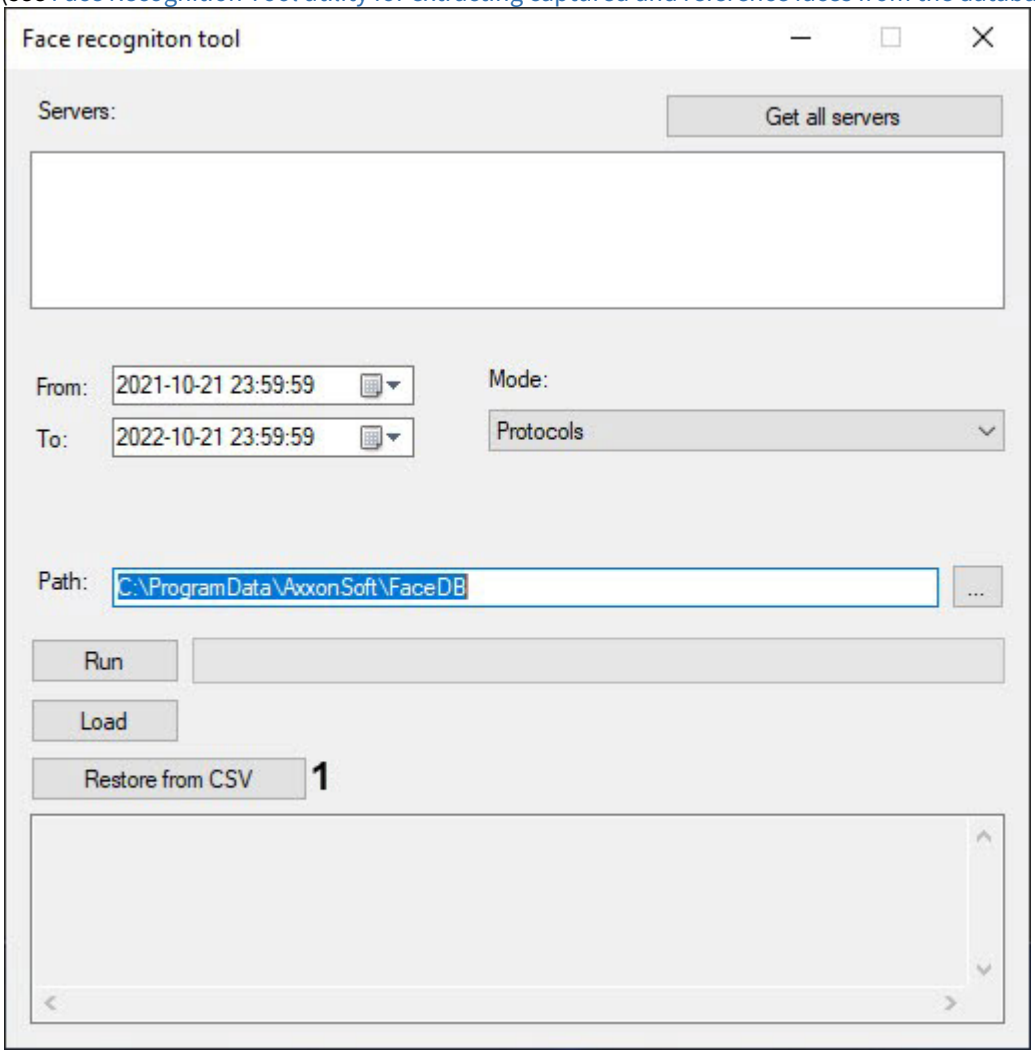
As a result, a SCRIPT folder will be created in the FaceDB folder with the file: [computer name] fir_database [date time].csv.



Note

While the csv file is being generated, the *Face PSIM* operation will be suspended for a very short period of time.

3. Go to the *<Axxon PSIM* installation directory>\Modules folder and run the FaceRecognitionTool.exe utility (see Face Recognition Tool utility for extracting captured and reference faces from the database).



4. Click the **Restore from CSV** button (**1**) and select the previously created CSV file. As a result, the process of restoring the history of passes will begin. The restoring time depends on the number of entries in the CSV file.
5. Restart *Face PSIM* to apply the changes.

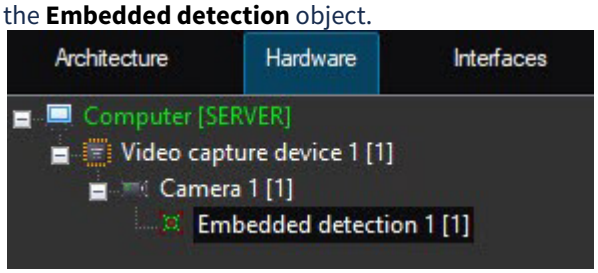
Restoring the history of passes if the Fir database is lost is completed.

6.8 Configuring Face PSIM to receive events from body temperature detection tools

The procedure for configuring *Face PSIM* is described using the body temperature detection tools as an example.

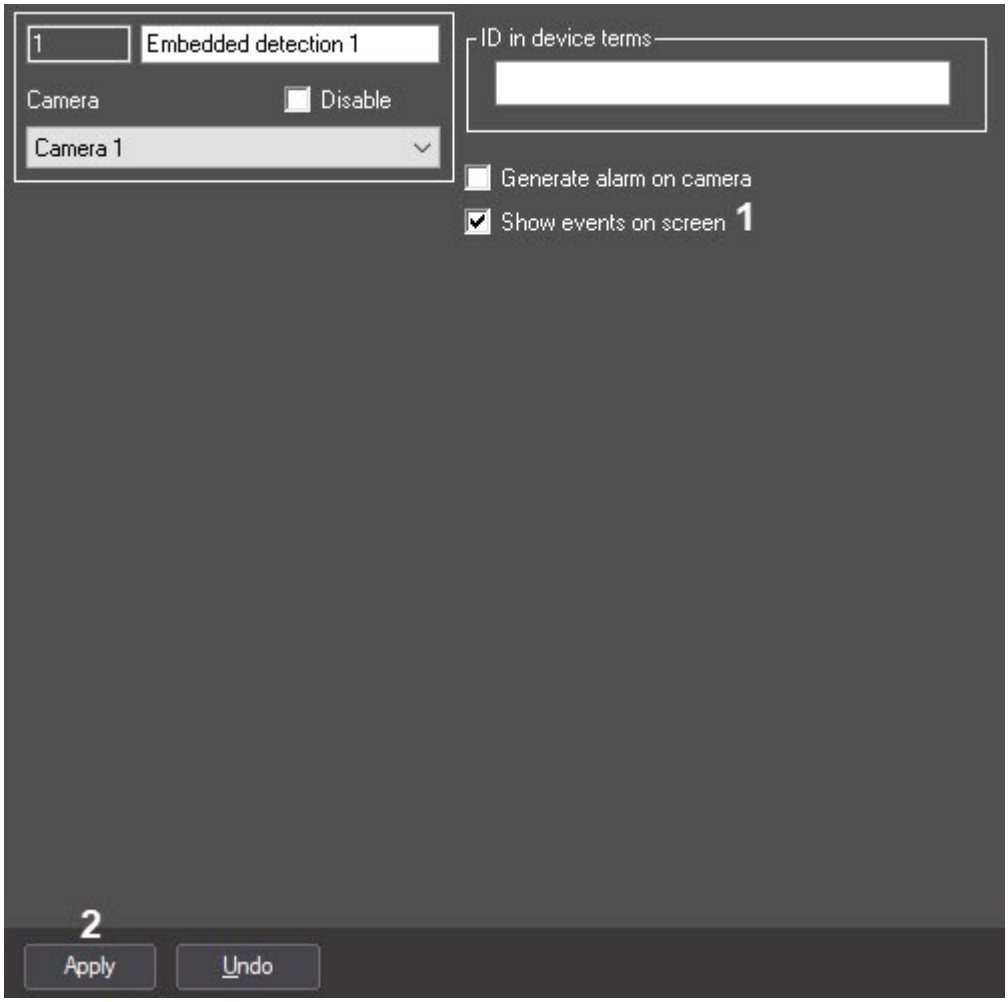
Do the following:

1. On the **Hardware** tab of the **System settings** dialog box, on the basis of the **Computer** object, create the **Video capture device** object.
2. On the basis of the **Video capture device** object, create the **Camera** object, and then, on its basis, the **Embedded detection** object.



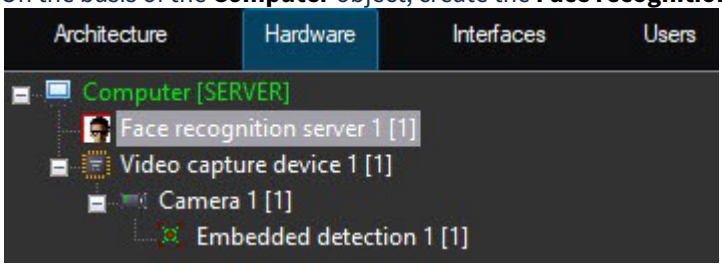
> **Note**
>
> The **Embedded detection** object is a body temperature detector.

3. Go to the settings tab of the **Embedded detection** object (for details, see Configuring the Face Detection module combined work with thermal camera or external system).

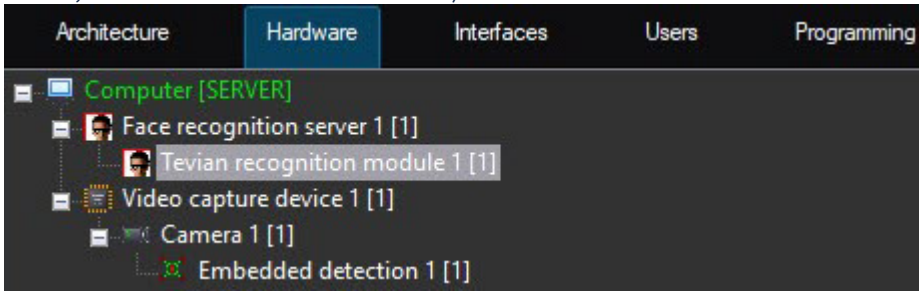


a. Set the **Show events on screen** checkbox (**1**).
b. To save the changes, click the **Apply** button (**2**).

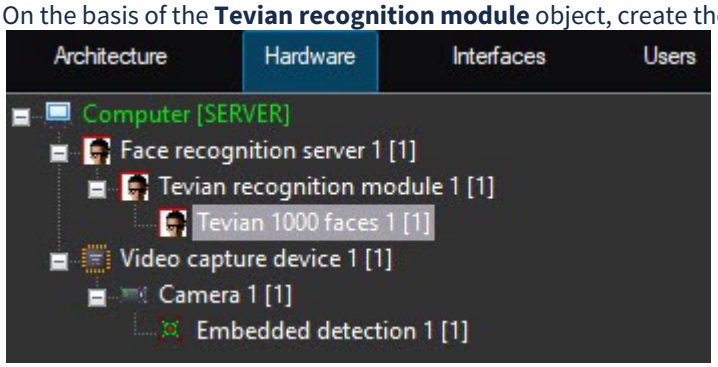
4. On the basis of the **Computer** object, create the **Face recognition server** object.



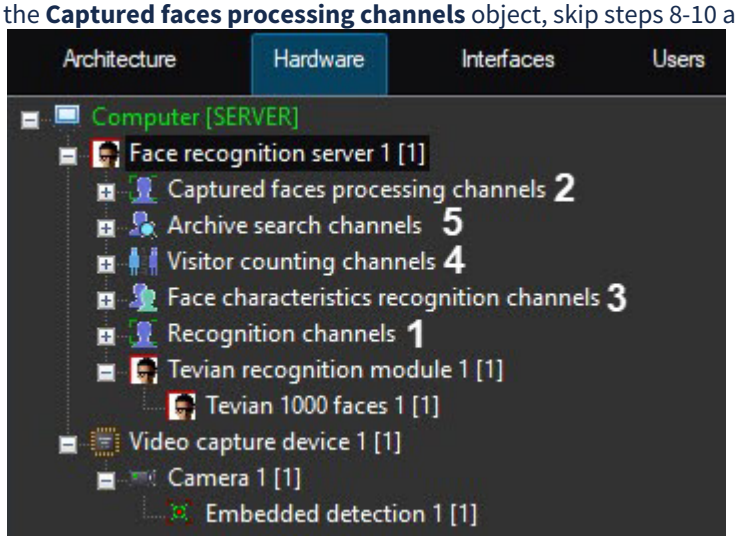
5. On the basis of the **Face recognition server** object, create the **Tevian recognition module** object (for details, see Tevian and VideoIntellect 1.1).



6. On the basis of the **Tevian recognition module** object, create the **Tevian 1000 faces** object.

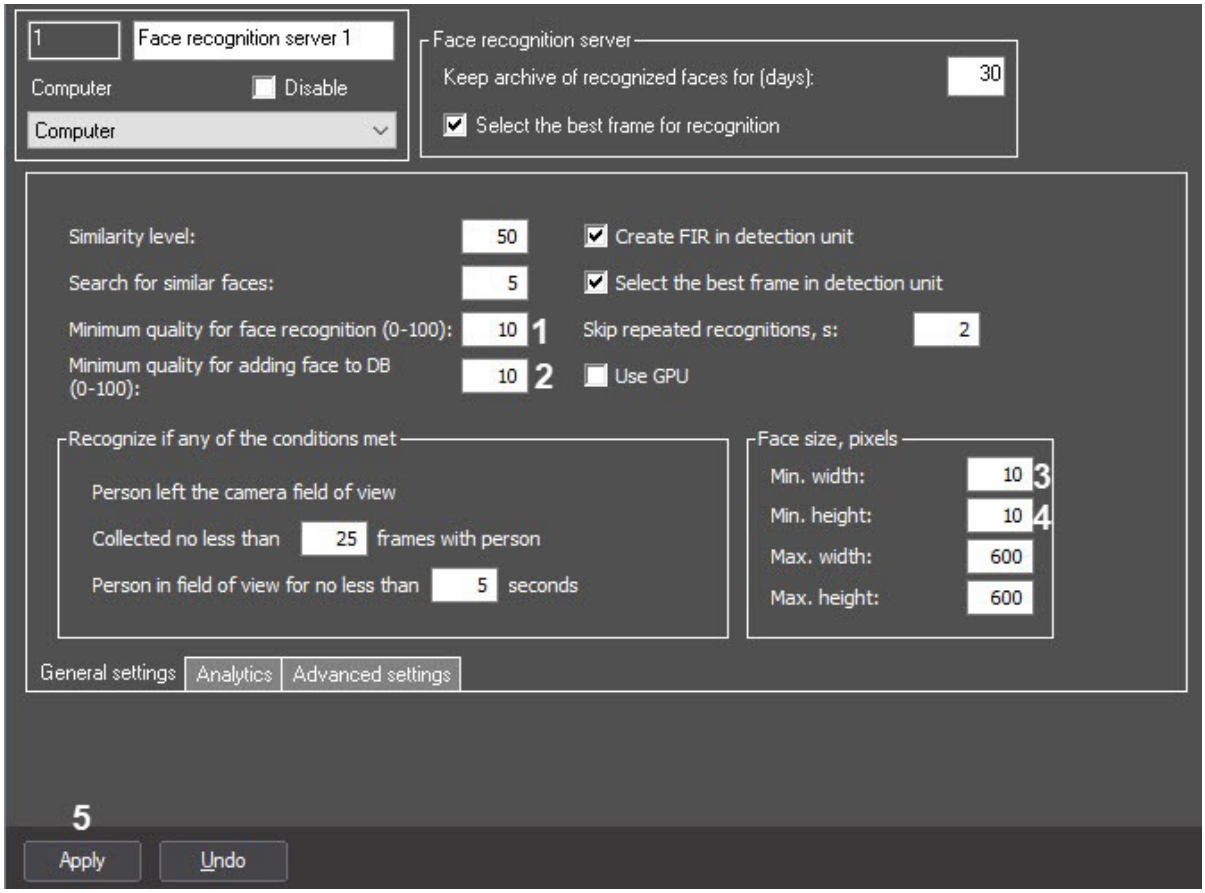


7. On the basis of the **Face recognition server** object, create the **Recognition channels** object (**1**) or the **Captured faces processing channels** object (**2**), if this particular object will be used. If you work with the **Captured faces processing channels** object, skip steps 8-10 and go to step 11.



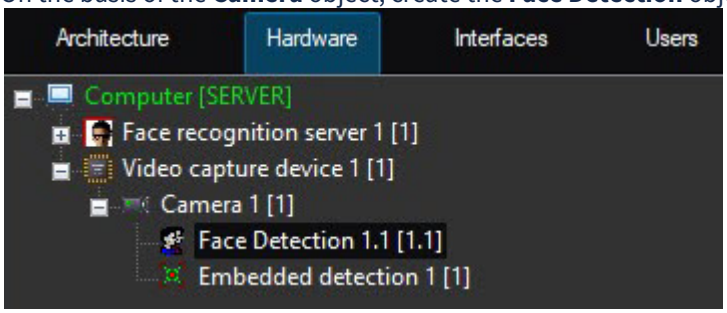
> **Note**
>
> The **Captured faces processing channels** provides information about the temperature of captured faces. It does not require additional channels.

8. On the basis of the **Face recognition server** object, create the **Face characteristics recognition channels** object (**3**).
9. On the basis of the **Face recognition server** object, create the **Visitor counting channels** object (**4**).
10. On the basis of the **Face recognition server** object, create the **Archive search channels** object (**5**).
11. Go to the settings tab of the **Face recognition server** object (for details, see Configuring the Face recognition server object).

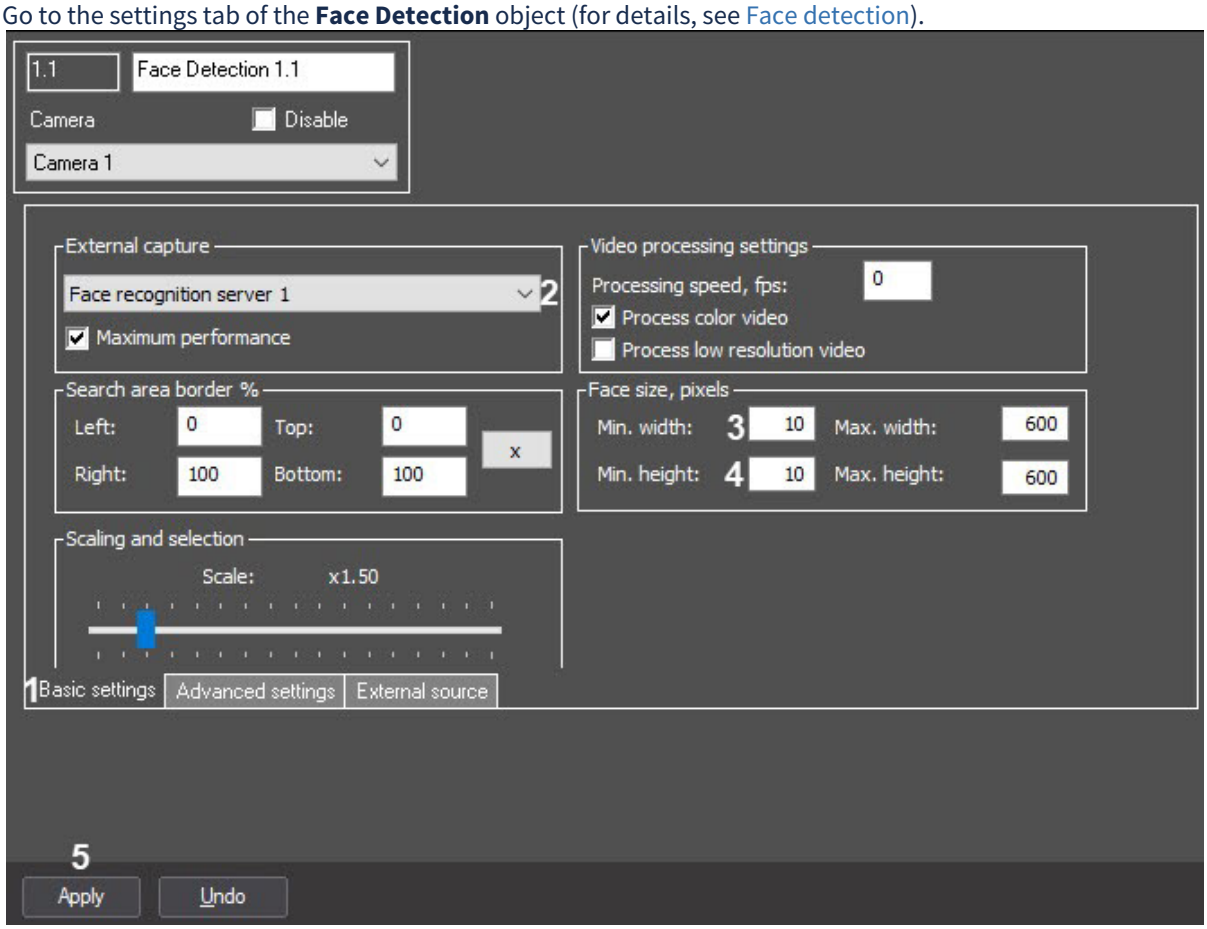


a. If it is necessary to capture low quality images, then enter the **10** value in the **Minimum quality for face recognition (0-100)** (**1**) and **Minimum quality for adding face to DB (0-100)** (**2**) fields. Also, enter the **10** value in the **Min. width** (**3**) and **Min. height** (**4**) fields of the **Face size, pixels** group.
b. To save the changes, click the **Apply** button (**5**).

12. On the basis of the **Camera** object, create the **Face Detection** object.

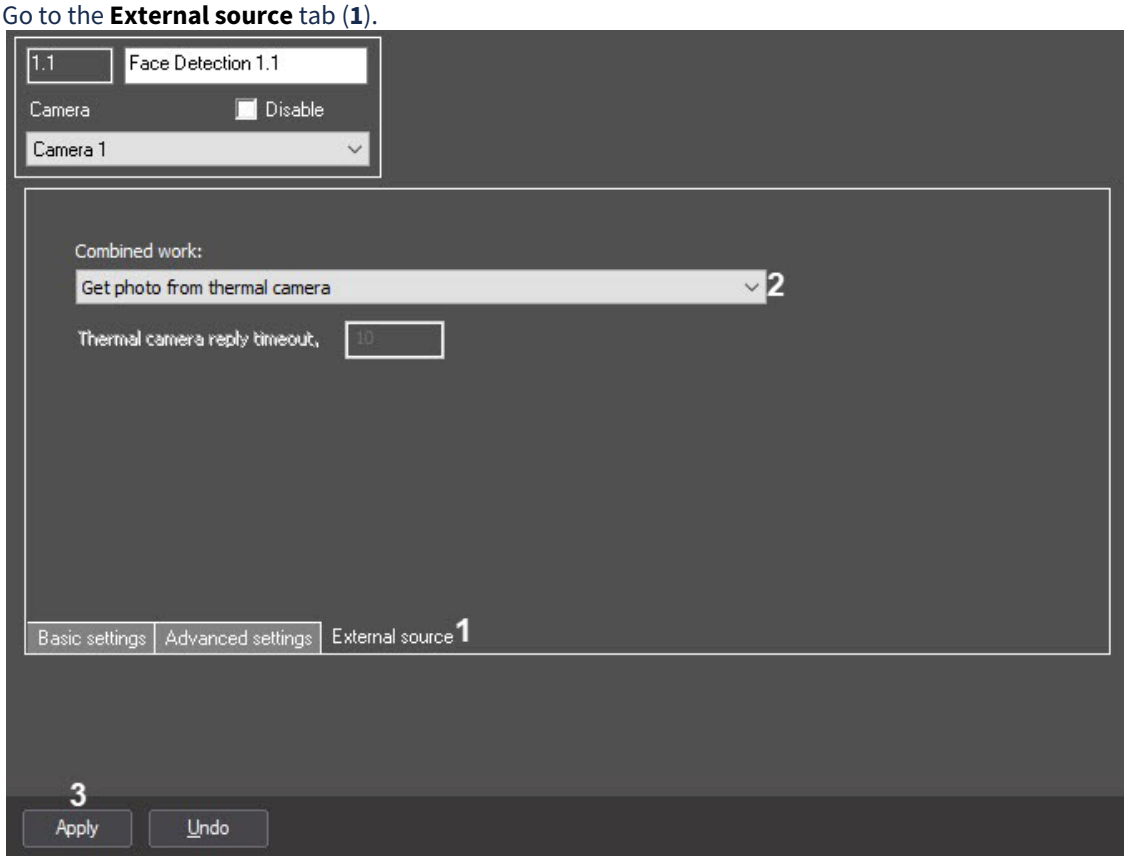


13. Go to the settings tab of the **Face Detection** object (for details, see Face detection).



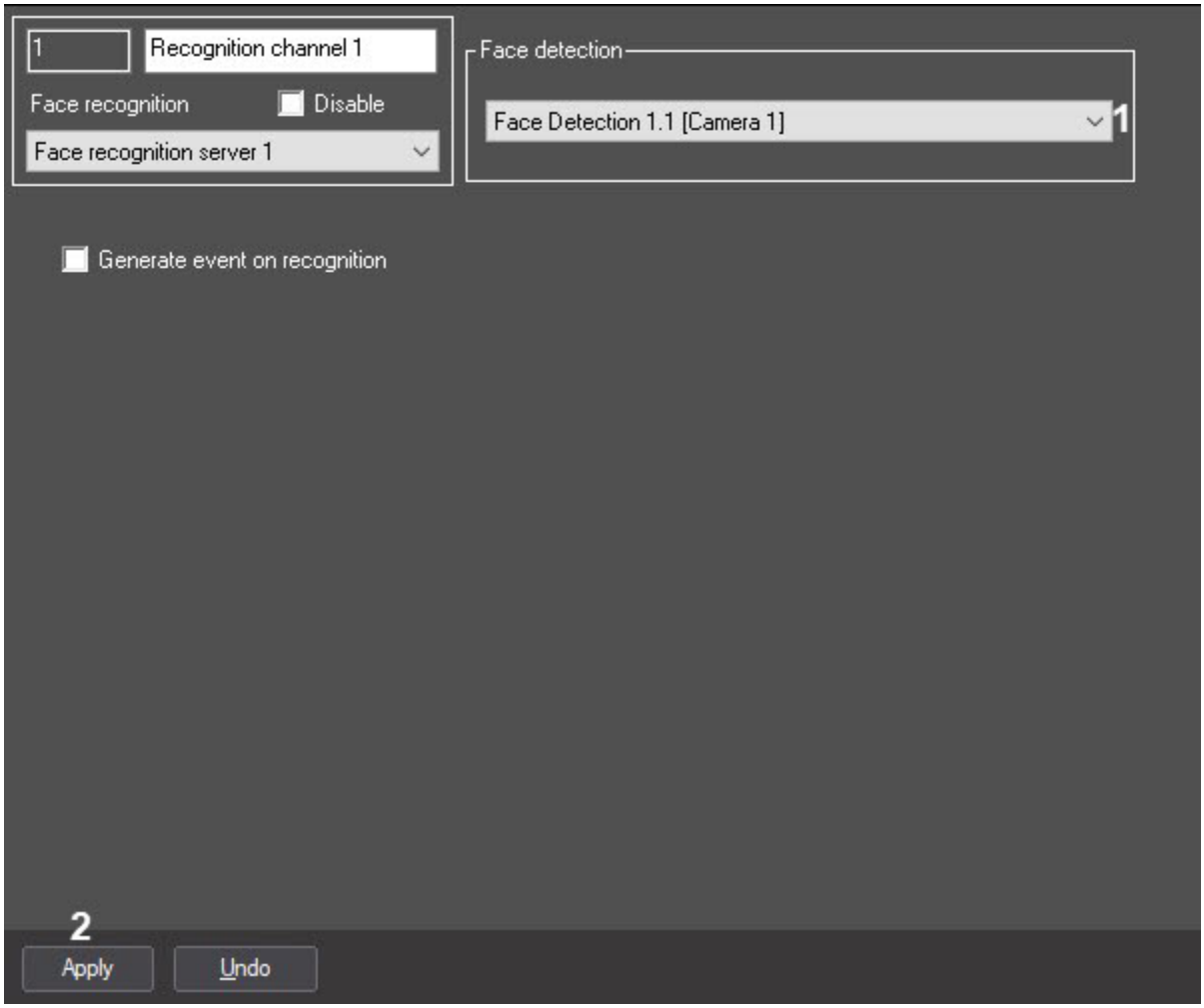
a. Make changes on the **Basic settings** tab (**1**):
   i. From the **External capture** drop-down list (**2**) select the previously created **Face recognition server**.
   ii. Enter the **10** value in the **Min. width** (**3**) and **Min. height** (**4**) fields of the **Face size, pixels** group.
   iii. To save the changes, click the **Apply** button (**5**).

b. Go to the **External source** tab (**1**).



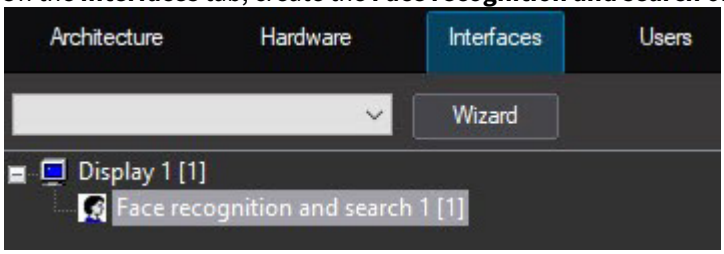
i. From the **Combined work** drop-down list, select **Get photo from thermal camera** (**2**).
ii. To save the changes, click the **Apply** button (**3**).

14. Go to the settings tab of the **Recognition channels** object or the **Captured faces processing channels** object, depending on which object was created at step 7. If you work with the **Captured faces processing channels** object, skip step 15 and go to step 16.

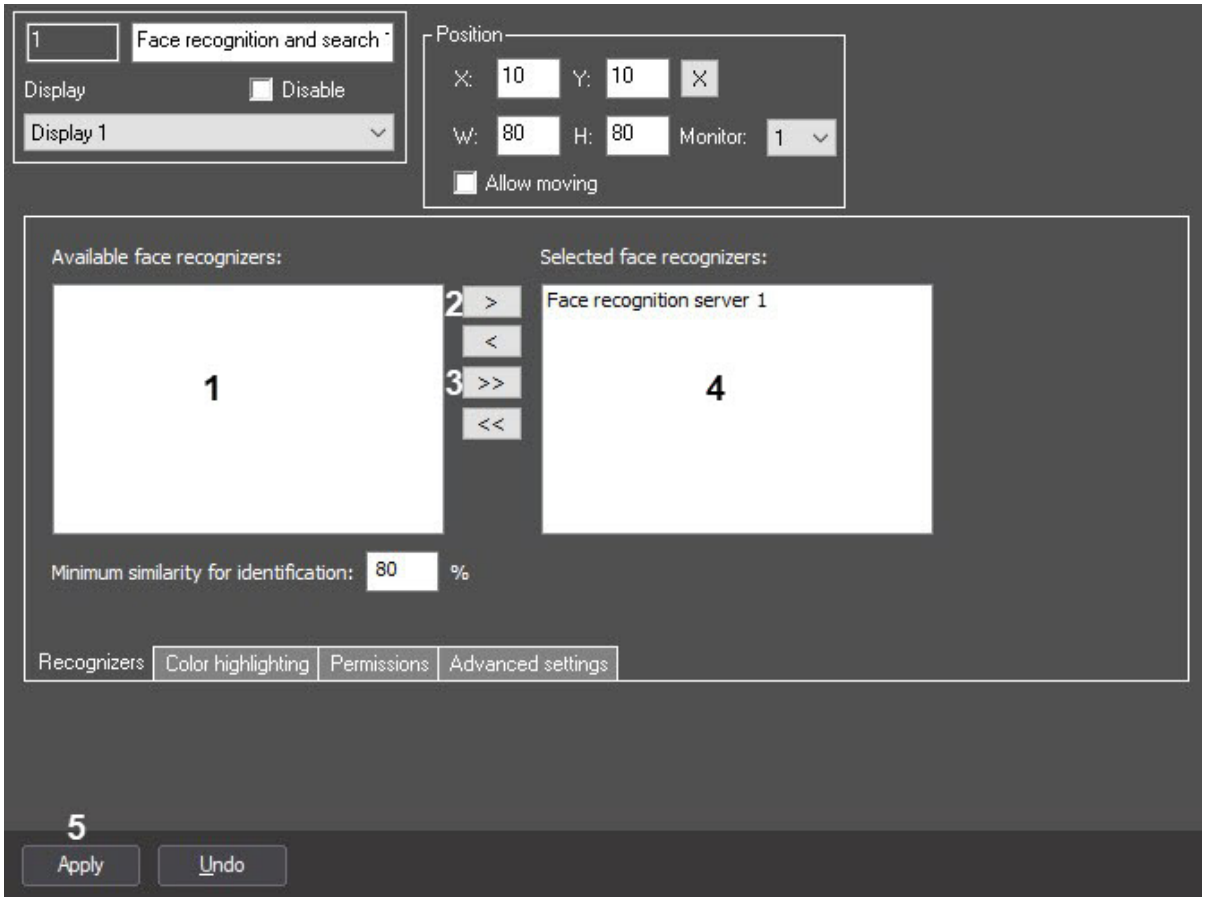


a. `From the **Face detection** drop-down list (**1**) select the previously created **Face Detection** object.
b. To save the changes, click the **Apply** button (**2**).

15. Repeat step 14 for the following objects: **Face characteristics recognition channels**, **Visitor counting channels**, **Archive search channels**.
16. On the **Interfaces** tab, create the **Face recognition and search** object on the basis of the **Display** object.



17. Go to the settings tab of the **Face recognition and search** object (for details, see Configuring the Face recognition and search interface object).



18. From the **Available face recognizers** list (**1**) select the required **Face recognition server** objects, the data from which will be displayed in the **Face recognition and search** interface object.
19. Move the selected objects from the **Available face recognizers** list to the **Selected face recognizers** list using the **>** button (**2**) (or the **>>** button (**3**) to move all objects from the list).
20. As a result, the selected **Face recognition server** objects will be displayed in the **Selected face recognizers** list (**4**).
21. To save the changes, click the **Apply** button (**5**).

Configuring *Face PSIM* to receive events from body temperature detection tools is now complete.

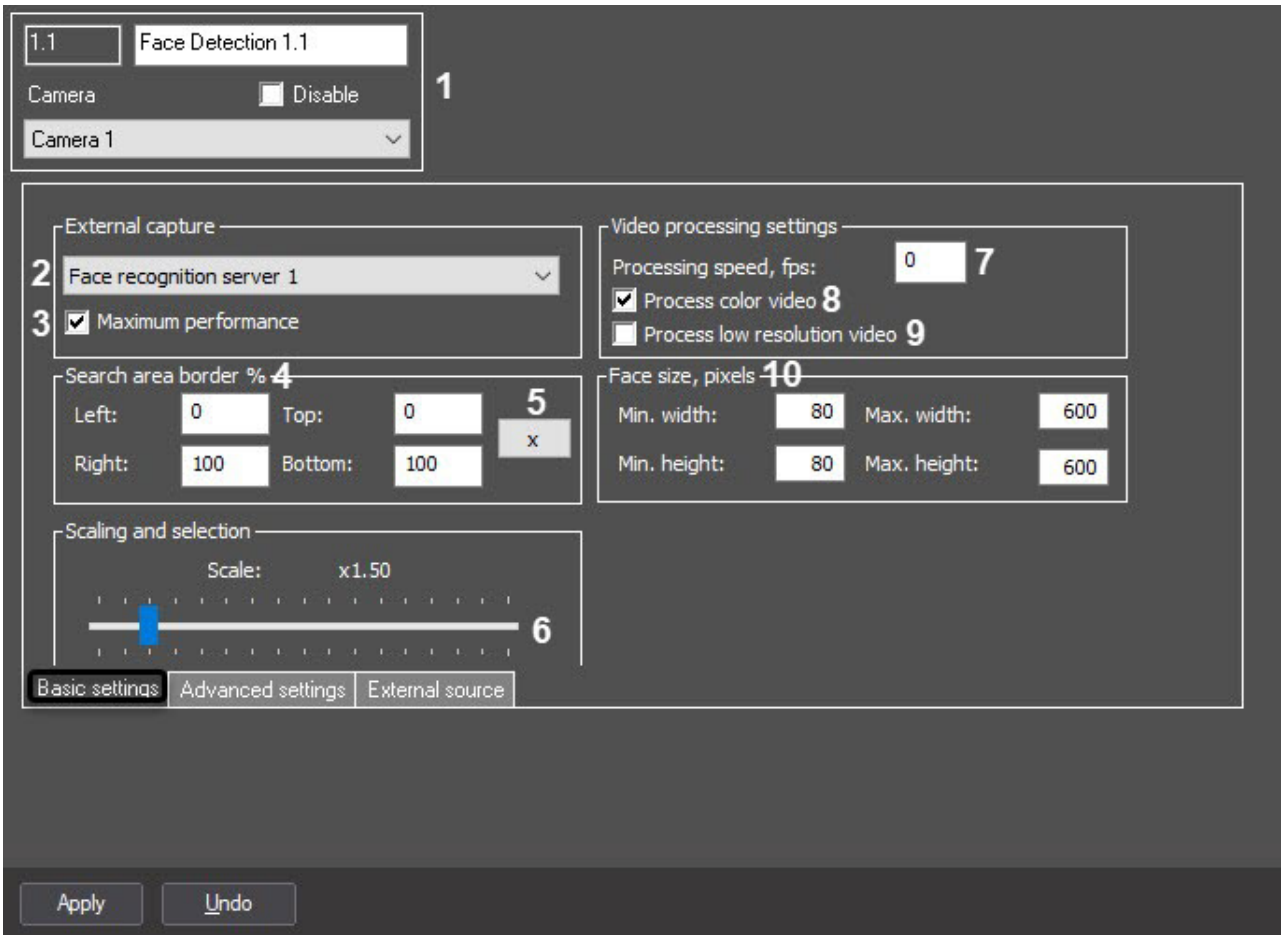
7 Appendixes

7.1 Appendix 1. Interfaces

7.1.1 Settings panel for a Face Detection object

The following figure shows the settings panel for the **Face Detection** object.

The **Basic settings** tab.



The following table provides descriptions of the parameters for configuring.

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
Settings group						

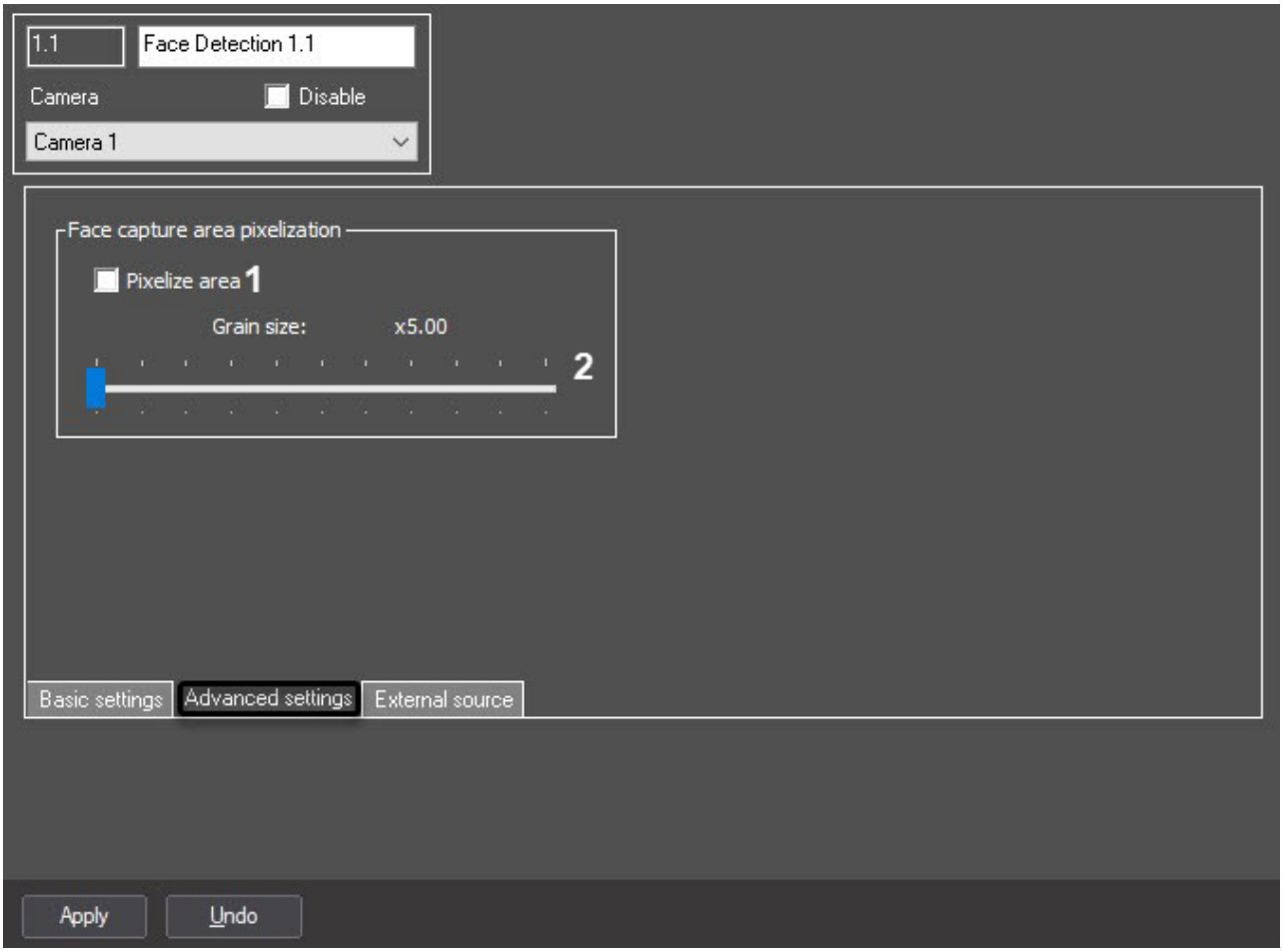
№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
1	**Number** * field	Automatic	Identification number of the **Face Detection** object in the system	Sequence of numbers	-	Depends on the number of **Face Detection** objects in the system
	Name * field	Enter the value into the field	Name of the **Face Detection** object in the system	Latin, Cyrillic and service characters	**Face Detection**	A line containing a sequence of any symbols (letters, digits, service characters), regardless of the register Number of symbols – from 1 to 60.
	Disable checkbox	Set the checkbox	Sets the status (on or off) of the **Face Detection** object in the system	Boolean type	No	Yes – the **Face Detection** object is disconnected and is not in use No – the **Face Detection** object is connected and is in use.
	Camera drop-down list	Select the value from the list	Assigns the parent **Camera** object to a particular **Face Detection** object	Name of the **Camera** objects registered in the system	Name of parent camera	Depends on the number of **Camera** objects in the system
External capture group						
2	**External capture** drop-down list	Select the value from the list	Selects the **Face recognition server** object	Name of the **Face recognition server** objects registered in the system	No	Depends on the number of **Face recognition server** objects in the system

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
3	**Maximum performance** checkbox	Set the checkbox	Enables maximum performance mode	Boolean type	Yes	Yes – the maximum quality of face capture and recognition is provided by using all available processor cores and increasing the consumed RAM. No – normal resources consumption, faces can be missed while capturing.
Search area border % group						
4	**Left**, **Right**, **Top** and **Bottom** fields	Enter the value into the field	Sets the face search area border on the video image by specifying the required values in percent of the corresponding frame sides *Note. Setting the face search area border is available only if Tevian or VideoIntellect 1.1 face recognition module is used.*	The percentage of the left, right, top and bottom sides of the frame	**Left** = 0 **Right** = 100 **Top** = 0 **Bottom** =100	0 to 100
5	**X** button	Click the button	Sets the face search area border on the video image using the interactive interface	-	-	-
Scaling and selection group						

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
6	**Scaling and selection** slider	Move slider bar to position	Sets the scale of the captured face in the frame for recording and highlighting the face with a dynamic frame	-	1.5	1 to 5 1 – only the captured face is recorded 5 – the whole frame is recorded
Video processing settings group						
7	**Processing speed, fps** field	Enter the value into the field	Enters the number of frames per second processed by the **Face Detection** module. This parameter is used to decrease the server load	Frames/sec	-	From 1 to the frequency of frames allocated for processing the video signal of each specific video camera
8	**Process color video** checkbox	Set the checkbox	Designed to enable/ disable the conversion of color video to black and white for generating vectors from black and white frames	Boolean type	Yes	Yes – vectors will be generated based on color frames No – color video will be converted to black and white to generate vectors from black and white frames
9	**Process low resolution video** checkbox	Set the checkbox	Activates the option to have the **Face Detection** module process video images in the 320x240 pixel resolution.	Boolean type	No	Yes – video image is processed in the 320x240 pixel resolution No – video image is processed in the resolution set by the parent **Camera** object
Face size, pixels group						

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
10	**Min.width**, **Min.height**, **Max.width** and **Max.height** fields	Enter the value into the field	Sets the minimum and maximum width and height of the face on the video image in pixels	Natural number series with zero included	**Min.width** =80 **Min.height** =80 **Max.width** = 600 **Max.height** =600	From 0 and more

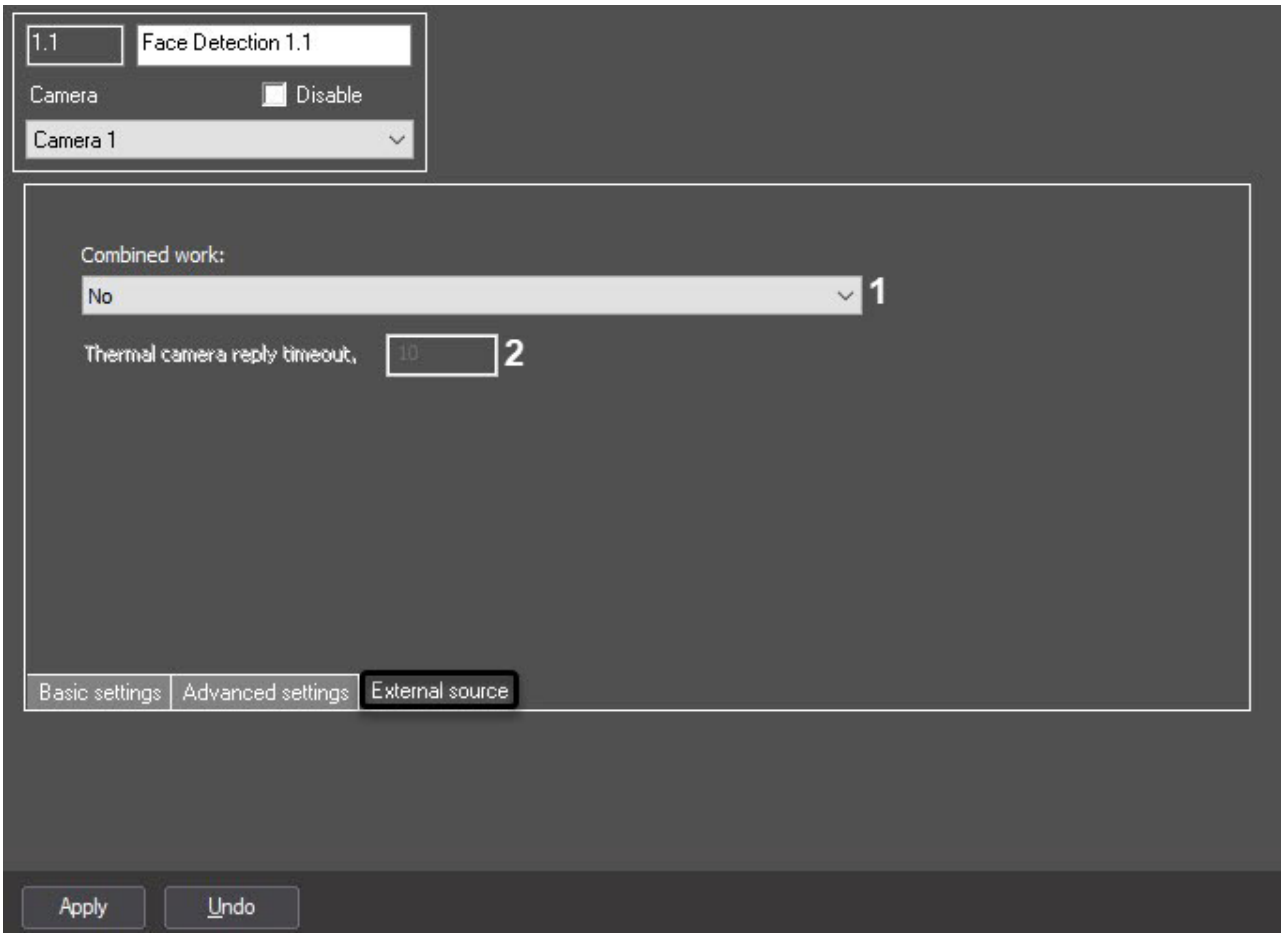
The **Advanced settings** tab.



The following table provides descriptions of the parameters for configuring.

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
Face capture area pixelization group						
1	**Pixelize area** checkbox	Set the checkbox	Enables the pixelation function for the area of video image in which the face was recognized	Boolean type	No	Yes – face capture area is pixelated. No – face capture area is not pixelated.
2	**Grain size** slider	Move slider bar to position	Sets the grain size of face capture area pixelation	Sequence of numbers	5	From 5 to 15

The **External source** tab.



The following table provides descriptions of the parameters for configuring.

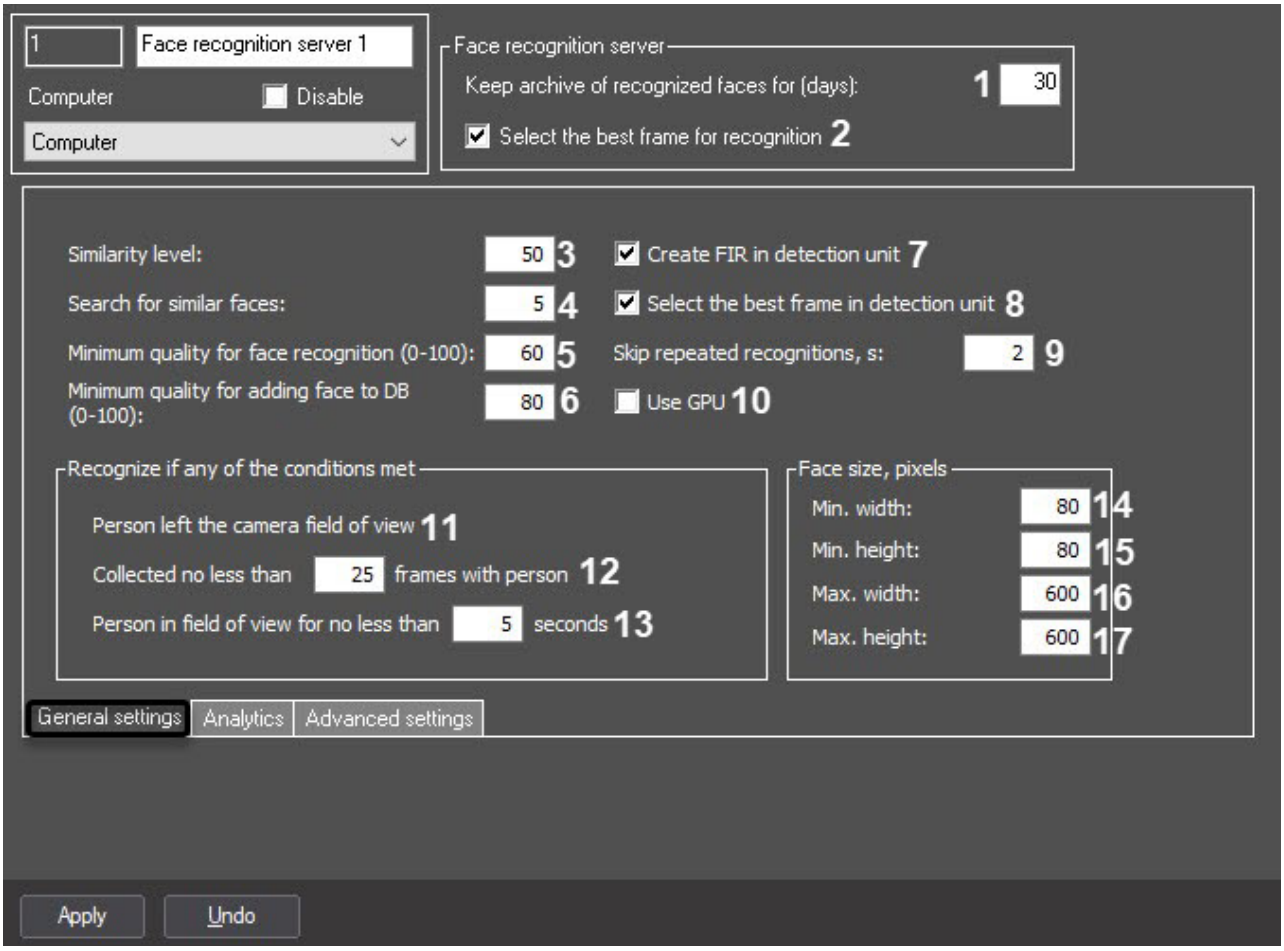
№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
1	**Combined work** drop-down list	Select the value from the list	Sets the combined operation mode with a thermal camera or an external system	List	No	**No** – combined operation mode is not used. **Combine with thermal camera temperature** – receiving the temperature and coordinates of a captured face frame from the thermal camera. A photograph of a captured face will be obtained from the capturing camera. **Get photo from thermal camera** – receiving the temperature and photos of a captured face from the thermal camera. **Get photo and metadata from external system** – receiving the temperature and photos of a captured face from a thermal camera or *Axxon One*.
2	**Thermal camera reply timeout** field	Enter the value into the field	Sets the timeout for receiving data from the thermal camera *Note. This setting is available only if the **Combine with thermal camera temperature** mode is selected*	Time in seconds	10	>=0

* The element's name is not displayed in the settings panel.

7.1.2 Face recognition server settings panel

The following figure shows the settings panel of the **Face recognition server**.

The **General settings** tab:



Description of settings is given in the following table.

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
The **Face recognition server** group						
1	**Keep archive of recognized faces (days)**	Enter the value into the field	Sets the storage period for the Recognized Faces Archive	days	30	From 1 to 9999

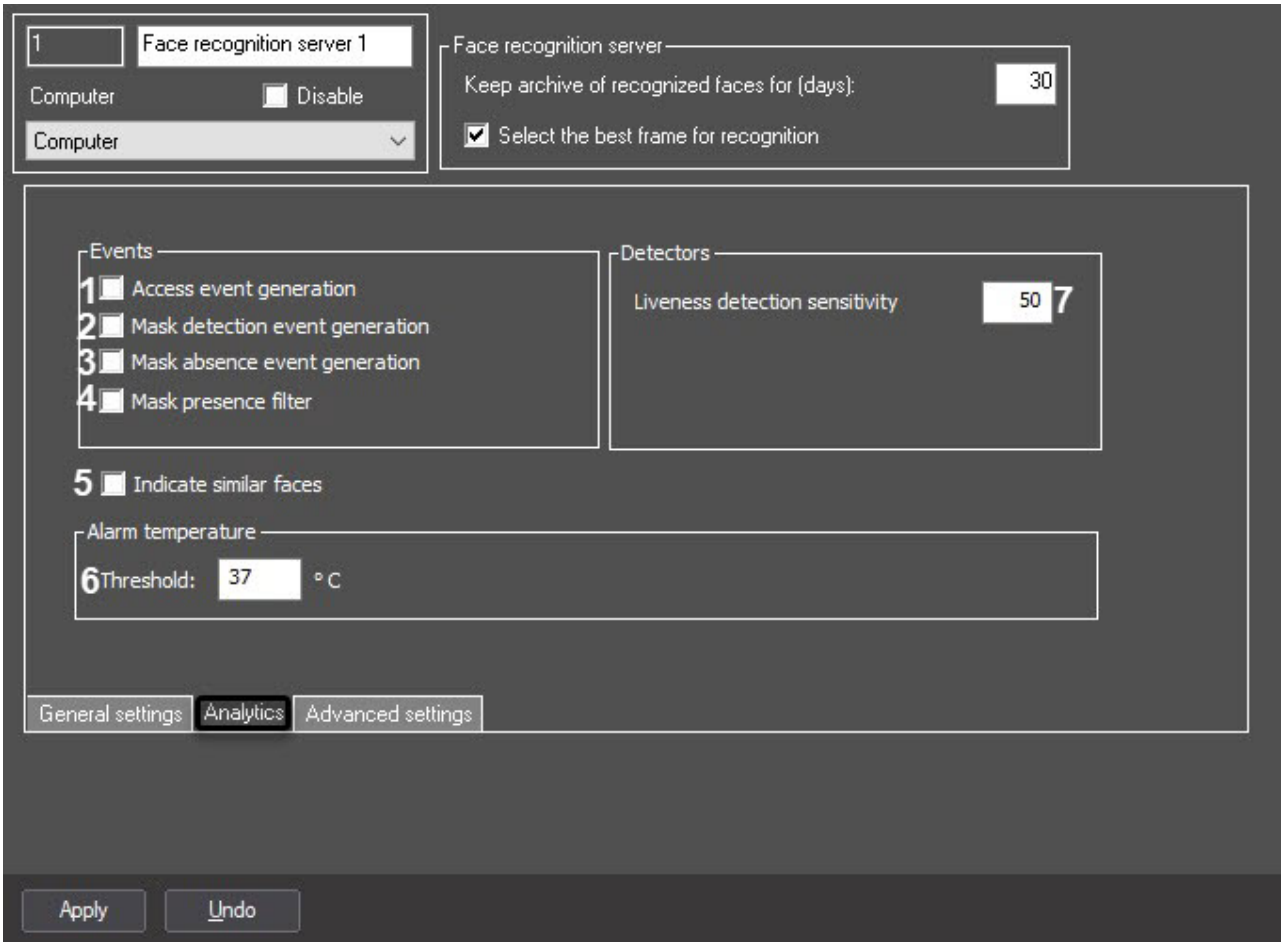
№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
2	**Select the best frame for recognition**	Set the checkbox	Enables/disables function of selection the best frame for recognition on the Face recognition server	Boolean type	Yes	Set — the **Face recognition server** selects the best image for one face from the received images and performs recognition using it Clear — the **Face recognition server** doesn't select the best frame for one face from the received images
The **Settings** group						
3	**Similarity level**	Enter the value into the field	Sets the similarity level of a captured face and a reference image above which the face is considered recognized	%	50	From 0 to 100
4	**Search for similar faces**	Enter the value into the field	Sets the maximum number of matching reference images the identifiers and similarity level for which will be stored in the database for one frame with a captured face	units	5	From 1 to 20
5	**Minimum quality for face recognition (0-100)**	Enter the value into the field	Sets minimum quality for face recognition in percent	%	60	From 0 to 100

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
6	**Minimum quality for adding face to DB (0-100)**	Enter the value into the field	Sets minimum quality for face to be added to the database in percent	%	80	From 0 to 100
7	**Create FIR in detection unit**	Set the checkbox	Enables/disables function of generation biometric face parameters in the Face detection at which the corresponding Face recognition server is selected as external capture	Boolean type	Yes	Set — a vector is created in the Face detection and it is sent to the Face recognition server Clear — a vector is created on the Face recognition server
8	**Select the best frame in detection unit**	Set the checkbox	Enables/disables function of selection the best frame for recognition on the Face detection site	Boolean type	Yes	Set — the Face detection selects the best frame for one captured face among the received images and sends it to the Face recognition server Clear — the Face detection sends all frames for one captured face to the Face recognition server
9	**Skip repeated recognitions, s**	Enter the value into the field	Sets time period in seconds during which repeated recognition will be ignored by the system	seconds	2	>2

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
10	**Use GPU**	Set the checkbox	Activates the recognition on a discrete graphics card when the **Tevian** face recognition module is used	Boolean type	No	Set — the recognition will be performed on a discrete GPU Clear — the recognition will be performed on a CPU
The **Recognize if any of the conditions met** group						
11	**Person left the camera field of view**	-	Displays the condition under which the face recognition starts	-	-	-
12	**Collected no less than ... frames with person**	Enter the value into the field	Sets the number of frames with a person, upon reaching which the face recognition starts	Sequence of numbers	25	>=1
13	**Person in field of view no less than ... seconds**	Enter the value into the field	Sets the time in the camera field of view, upon reaching which the face recognition starts	seconds	5	>=1
The **Face size, pixels** group						
14	**Min. width**	Enter the value into the field	Sets minimum width of a captured face for face recognition in pixels	Natural number	80	>=0
15	**Min. height**	Enter the value into the field	Sets minimum height of a captured face for face recognition in pixels	Natural number	80	>=0

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
16	**Max. width**	Enter the value into the field	Sets maximum width of a captured face for face recognition in pixels	Natural number	600	>=0
17	**Max. height**	Enter the value into the field	Sets maximum height of a captured face for face recognition in pixels	Natural number	600	>=0

The **Analytics** tab:

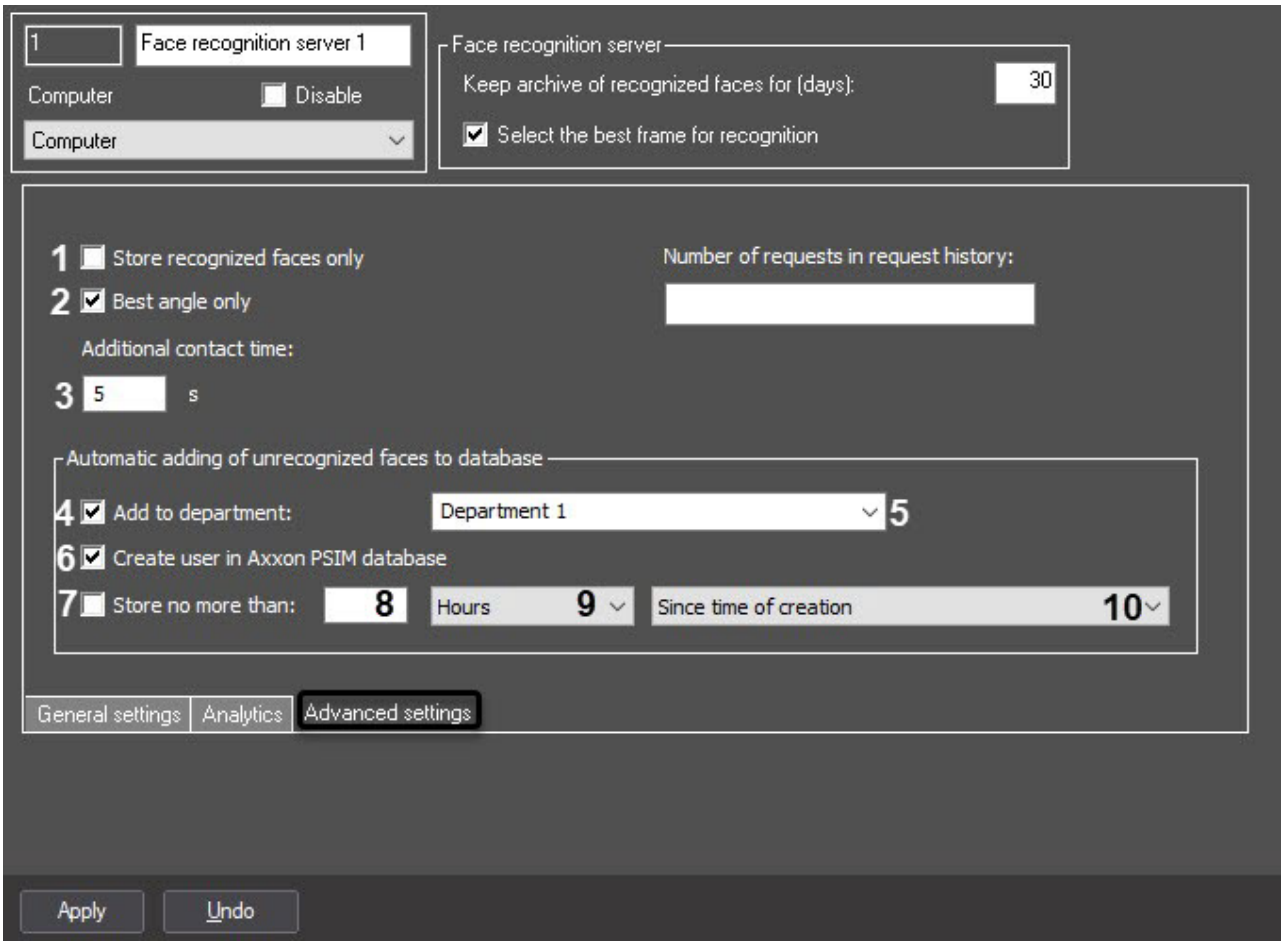


Description of settings is given in the following table.

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
1	**Access event generation**	Set the checkbox	Enables/disables the **Pass** event generation when the face is recognized	Boolean type	No	Set — the event generation is enabled Clear — the event generation is disabled
2	**Mask detection event generation**	Set the checkbox	Enables/disables the event generation in case the mask is detected on the face	Boolean type	No	Set — the event generation is enabled Clear — the event generation is disabled
3	**Mask absence event generation**	Set the checkbox	Enables/disables the event generation in case the mask is absent on the face	Boolean type	No	Set — the event generation is enabled Clear — the event generation is disabled
4	**Mask presence filter**	Set the checkbox	Enables/disables the event generation in case the mask state is changed	Boolean type	No	Set — the event generation is enabled Clear — the event generation is disabled
No group						
5	**Indicate similar faces**	Set the checkbox	Enables/disables the grouping of similar faces	Boolean type	No	Set — the grouping of similar faces is enabled Clear — the grouping of similar faces is disabled
The **Alarm temperature** group						
6	**Threshold**	Enter the value into the field	Sets the temperature in degrees Celsius. When this value is exceeded, the TEMPERATURE_ALARM event is generated.	°C	37	<>= 0
The **Detectors** group						

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
7	**Liveness detection sensitivity**	Enter the value into the field	Sets the sensitivity of artificial faces recognition in percent	%	50	0-100

The **Advanced settings** tab:



Description of settings is given in the following table.

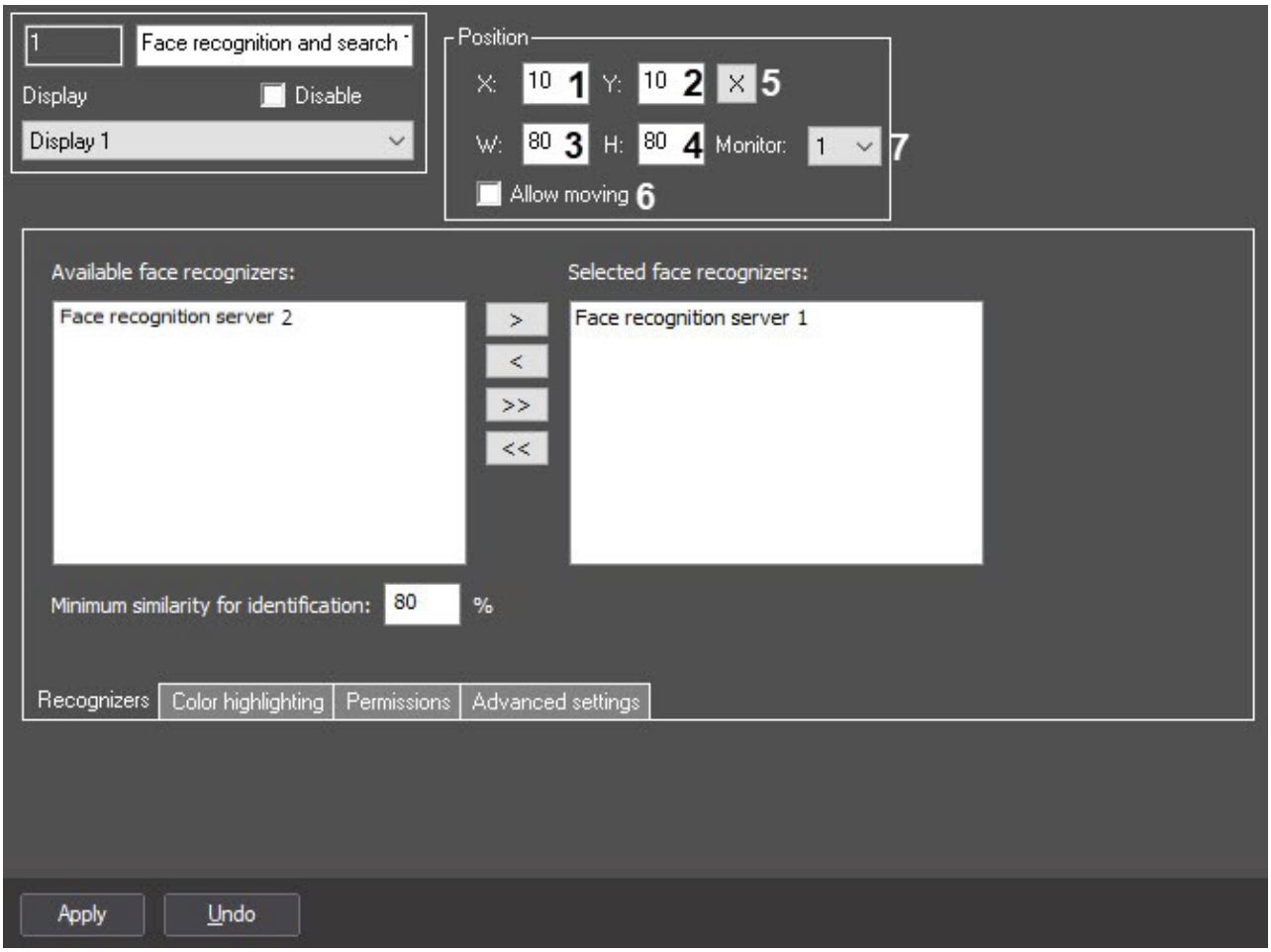
№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
1	**Store recognized faces only**	Set the checkbox	Enables/disables saving information only for recognized faces	Boolean type	No	Set — saving information only for recognized faces is enabled Clear — saving information only for recognized faces is disabled
2	**Best angle only**	Set the checkbox	Enables selective saving of face images based on quality level: each subsequent face image is compared with the previous image. If the quality level is equal to or higher than the previous one, then the image is saved. If not, the image is not saved	Boolean type	No	Set — only high quality face images are saved Clear — all face images are saved
3	**Additional contact time**	Enter the value into the field	Sets the time in seconds, within which it is necessary to search for contacts if the **Search for contacts** checkbox is set (see Starting the face search process)	seconds	5	>= 0
The **Automatic adding of unrecognized faces to database** group						
4	**Add to department**	Set the checkbox	Enables automatic adding of unrecognized faces to database	Boolean type	No	Set — automatic adding of unrecognized faces to database is enabled Clear — automatic adding of unrecognized faces to database is disabled

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
5	Department selection	Select the value from the list	Sets the **Department** object to which new users will be automatically saved	Names of the **Department** objects created in the system	-	Depends on the number of the **Department** objects created in the system
6	**Create user in Axxon PSIM database**	Set the checkbox	Enables automatic creation of a new *Axxon PSIM* user when an unrecognized face is added to faces database	Boolean type	No	Set — automatic creation of a new *Axxon PSIM* user is enabled Clear — automatic creation of a new *Axxon PSIM* user is disabled
7	**Store no more than**	Set the checkbox	Enables the limitation of time the automatically created user is stored in the face database	Boolean type	No	Set — the limitation of time the automatically created user is stored in the face database is enabled Clear — the limitation of time the automatically created user is stored in the face database is disabled
8	**Store no more than**	Enter the value into the field	Sets the maximum time the automatically created user is stored in the face database	Sequence of numbers	0	0 – 2147483648
9	Time unit selection	Select the value from the list	Sets the time unit for storing the automatically created user in the face database	List of available time units	Hours	Hours Days

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
10	Start time of user storage selection	Select the value from the list	Sets the start time for storing the automatically created user in the face database	List of available parameters	Since time of creation	Since time of creation Since time of last recognition

7.1.3 Settings panel for the Face recognition and search window

The **Face recognition and search** object settings panel includes the following interface elements.

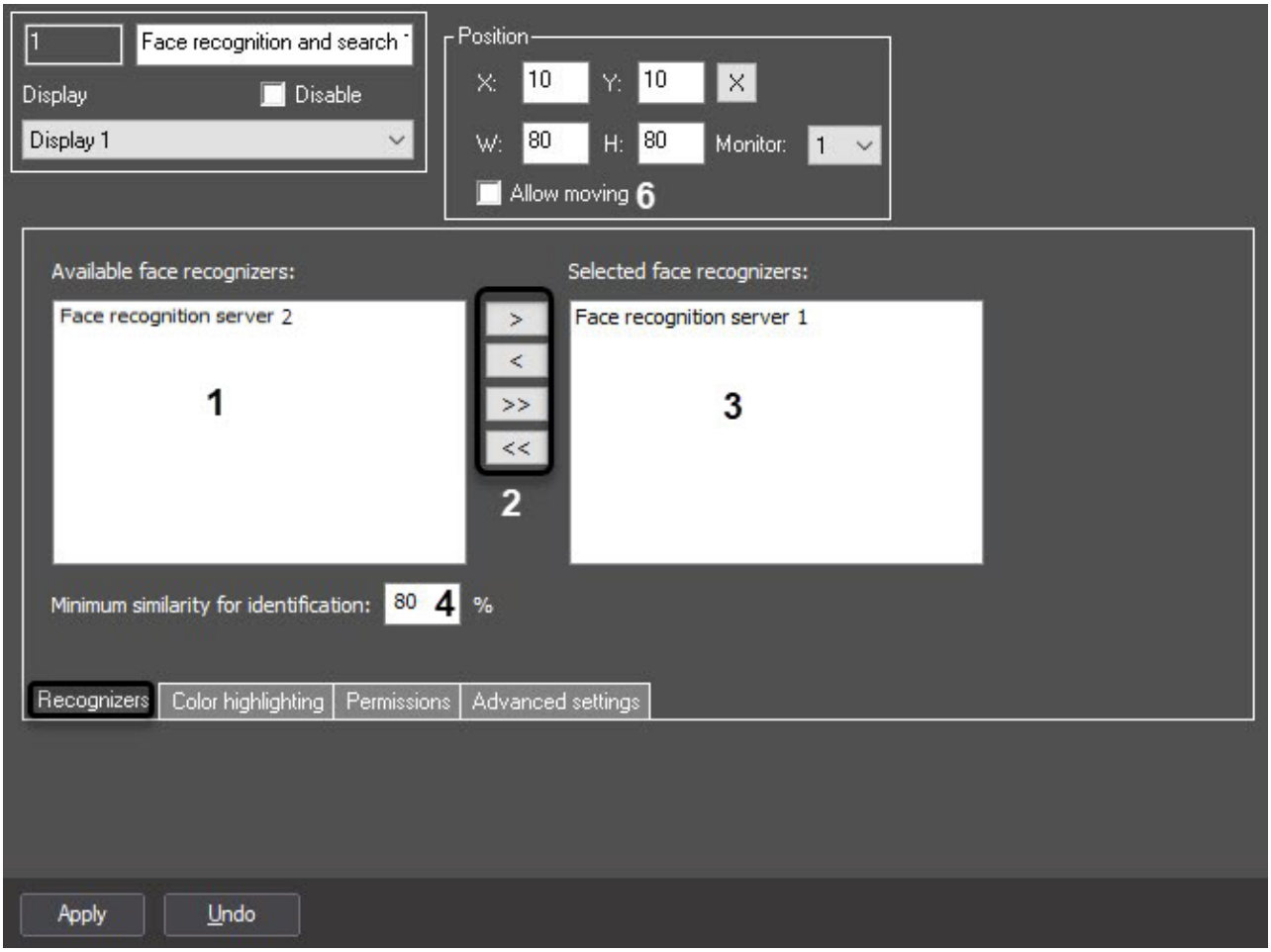


The description of the **Face recognition and search** interface object settings is given in the table.

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
The **Coordinates** group						
1	The **X** field	Enter the value into the field	Sets a coordinate in the horizontal X-axis for the upper left corner of the **Face recognition and search** window on the screen	% of the computer screen width	-	From 0 to M*100, where M — number of installed video surveillance monitors
2	The **Y** field	Enter the value into the field	Sets a coordinate in the vertical Y-axis for the upper left corner of the **Face recognition and search** window on the screen	% of the computer screen height	-	From 0 to M*100, where M — number of installed video surveillance monitors
3	The **W** field	Enter the value into the field	Sets the width of the **Face recognition and search** window	% of the computer screen width	-	From 0 to M*100, where M — the number of installed video surveillance monitors

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
4	The **H** field	Enter the value into the field	Sets the height of the **Face recognition and search** window	% of the computer screen height	-	From 0 to M*100, where M — number of installed video surveillance monitors
5	The **X** button	Click the button	Displays the text window for visual setting of the coordinates and sizes of the **Face recognition and search** window	-	-	-
6	The **Allow moving** checkbox	Set the checkbox	Enables moving the **Face recognition and search** window	Boolean type	No	Yes — moving is enabled No — moving is disabled
7	The **Display** drop-down list	Select the value from the list	Sets the physical monitor for displaying the **Face recognition and search** window	Sequence of numbers	1	From 1 to 16

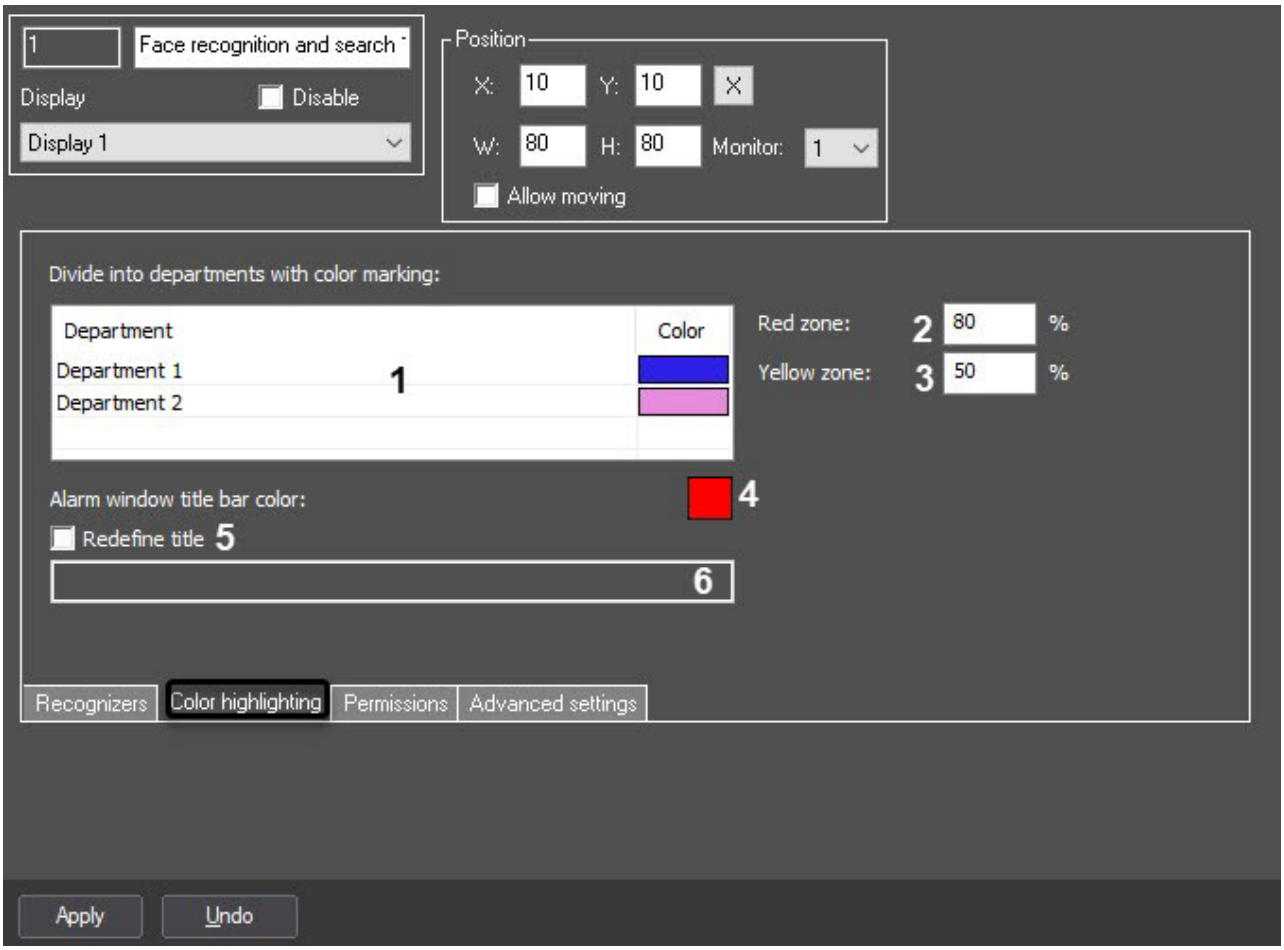
The **Recognizers** tab.



№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
1	The **Available face recognizers** list	Automatic	Displays the list of the available **Face recognition server** objects	-	-	-
2	The **>, <, >>, <<** buttons	Click the button	Select the **Face recognition server** objects for operation with the **Face recognition and search** object	-	-	-

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
3	The **Selected face recognizers** list	Automatic	Displays list of **Face recognition server** objects selected for operation with the **Face recognition and search** object	-	-	-
4	The **Minimum similarity for identification** field	Enter the value into the field	Sets the value of minimum similarity of the captured face image and the reference face image	%	80	From 0 to 100

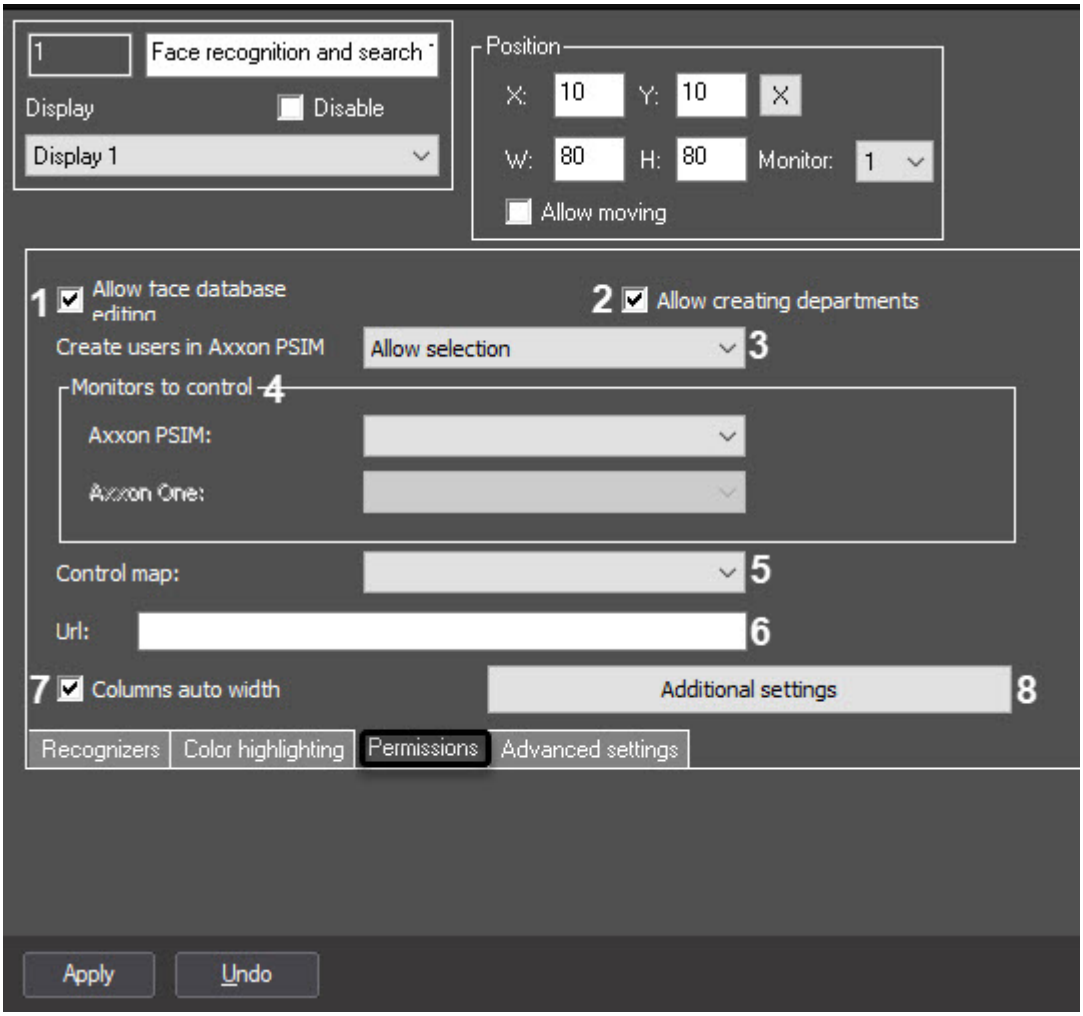
The **Color highlighting** tab.



№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
1	The **Divide into departments with color marking** table	Select a **Department** object and set a color from the Windows palette	Sets the highlight color of the recognized faces that belong to the selected departments	Names of the **Department** objects registered in the system and color from the Windows palette	-	-
2	The **Red zone** field	Enter the value into the field	Sets the lower value of the red zone. If the face recognition match percentage is equal to or higher than the specified value, then the information under the recognized face will be highlighted in red	%	80	From 0 to 100
3	The **Yellow zone** field	Enter the value into the field	Sets the lower value of the yellow zone. If the face recognition match percentage is equal to or higher than the specified value, but does not exceed the lower limit of the red zone, then the information under the recognized face will be highlighted in yellow	%	50	From 0 to 100

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
4	The **Alarm window title bar color**	Select a color from the Windows palette	Sets the color of the alarm window	The colors from the Windows palette	Red	-
5	The **Redefine title** checkbox	Set the checkbox	Enables specifying an arbitrary title name	Boolean type	No	Yes — specifying an arbitrary title name is enabled None — specifying an arbitrary title name is disabled
6	Text field for specifying an arbitrary title	Enter the value into the field	Sets the specified arbitrary title of the alarm window	String	-	-

The **Permissions** tab.



№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
1	The **Allow face database editing** checkbox	Set the checkbox	Enables the possibility to edit the reference face database	Boolean type	Yes	Yes — face database editing is enabled. No — face database editing is disabled

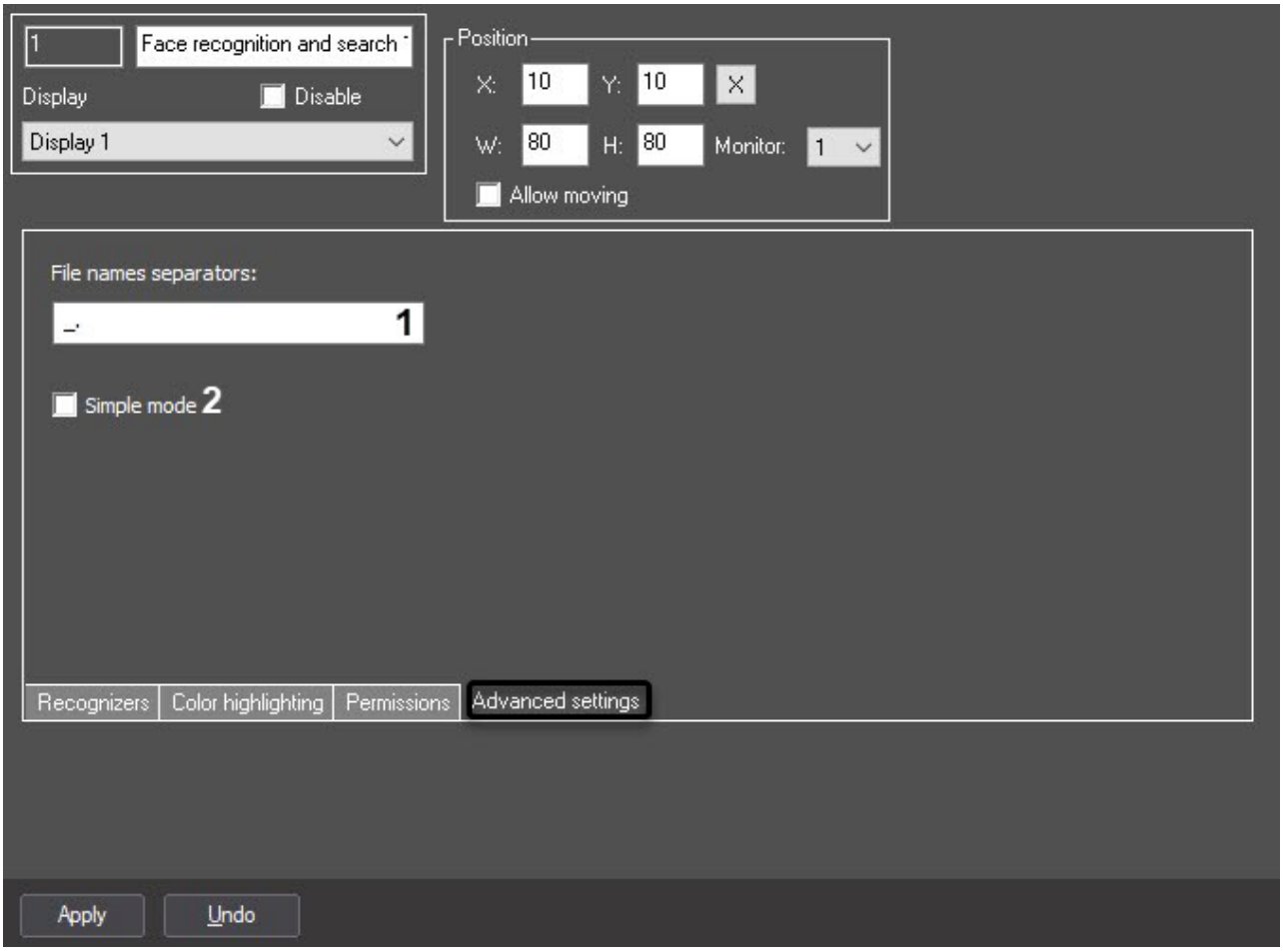
№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
2	The **Allow creating departments** checkbox	Set the checkbox	Enables/disables the automatic department creation in *Axxon PSIM* with the specified name for cases when a reference face is added to the reference face database, and a non-existent department is specified	Boolean type	Yes	Yes — the automatic department creation is enabled. No — the automatic department creation is disabled

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
3	The **Create users in Axxon PSIM DB** drop-down list	Select the value from the list	Sets the options for creating users in *Axxon PSIM* when the face is added to the reference face database	Options for creating users in *Axxon PSIM*	Allow selection	**Allow selection** — when the face is added to the reference face database, the **Create a user in the Axxon PSIM database** checkbox is available for the operator (see Adding images to the reference face database). **Create** — the **Create a user in the Axxon PSIM database** checkbox is absent in the operator's interface, and *Axxon PSIM* users are created automatically when the face is added to the reference face database.

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
						Do not create — the **Create a user in the Axxon PSIM database** checkbox is absent in the operator's interface, and *Axxon PSIM* users are not created when the face is added to the reference face database
4	The **Monitors to control** drop-down list	Select the value from the list	Sets the **Monitor** interface object for video archive control	Names of the **Monitor** objects registered in the system	-	Depends on the number of the **Monitor** objects in the system
5	The **Control map** drop-down list	Select the value from the list	Sets the **Map** interface object, on which the camera that captured the face is displayed	Names of the **Map** objects registered in the system	-	Depends on the number of the **Map** objects in the system
6	The **Url** field	Enter the value into the field	Sets the permanent part of the link for the called web-page by the result of the face search	-	-	-

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
7	The **Columns auto width** checkbox	Set the checkbox	Disables the automatic columns resizing in the **Face recognition and search** window in proportion to the interface window size	Boolean type	Yes	Yes — the automatic columns resizing is enabled. No — the automatic columns resizing is disabled
8	The **Additional settings** button	Click the button	Displays the **Advanced settings** window for selecting the advanced face characteristics that should be recognized	-	-	-

The **Advanced settings** tab.



№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
1	The **File names separators** field	Enter the value into the field	Sets the characters that will be used as a separator when adding faces to the database	Cyrillic letters, Latin letters, numbers, alphabetic characters, additional symbols, white space	_. (underscore, period and a white space)	-

№	Parameter	Method for entering the parameter value	Parameter description	Symbols used	Default value	Value range
2	The **Simple mode** checkbox	Set the checkbox	Enables/disables the simple mode of captured and recognized faces monitoring	Boolean type	No	Yes — the simple mode is enabled. No — the simple mode is disabled

7.2 Appendix 2. Debug window

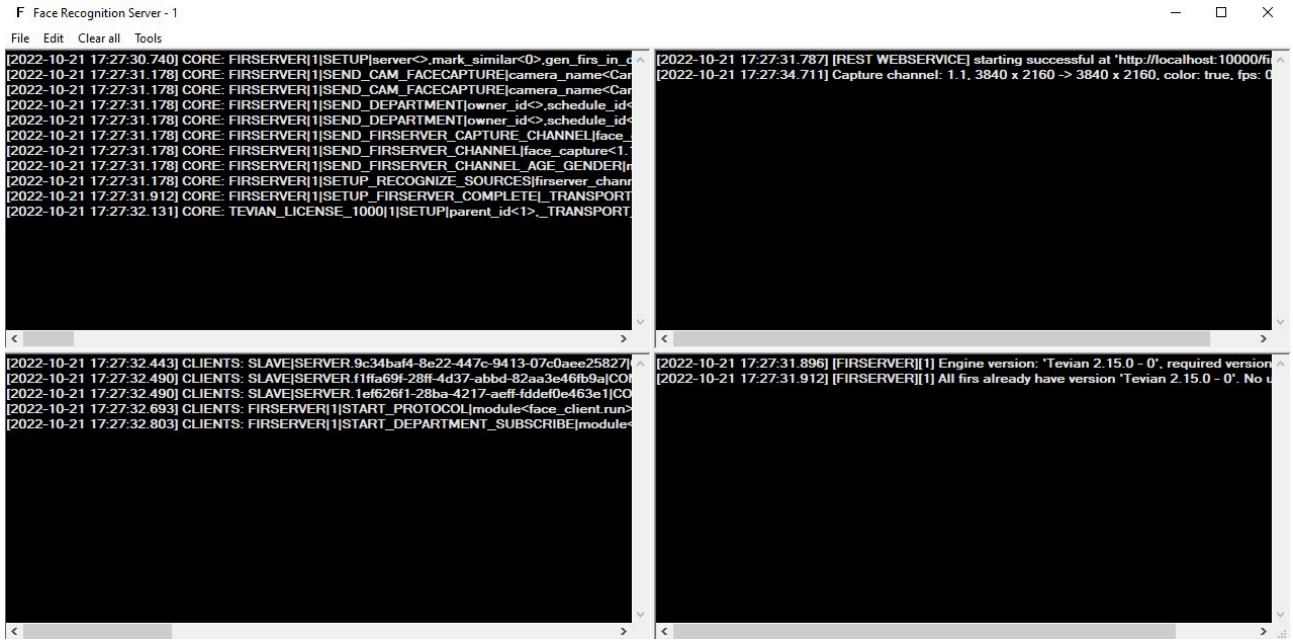
The **Debug window** allows you to monitor the events and reactions coming from the **Face recognition server** object registered in the system. Events and reactions with object properties are displayed in the **Face Recognition Server** debug window, where they can be copied to the *Windows* clipboard for later use in programs.

7.2.1 Debug window launch

> **Important!**
>
> The debug window can be launched only if the **Debug mode** is enabled (see Enabling the Debug window).

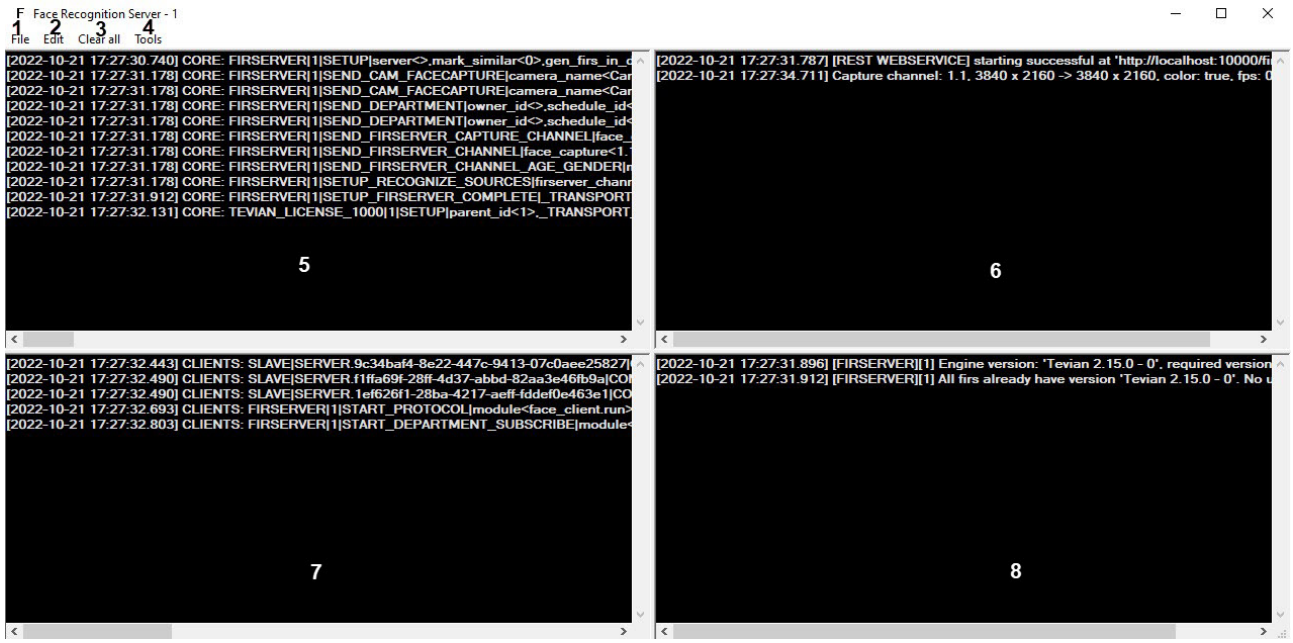
The debug window is launched from the notification area on the Windows taskbar. To launch the debug window, double left-click the  icon.

The **Face Recognition Server** debug window will be displayed.



7.2.2 Debug window interface

The **Face Recognition Server** debug window contains the interface components described in the table below.



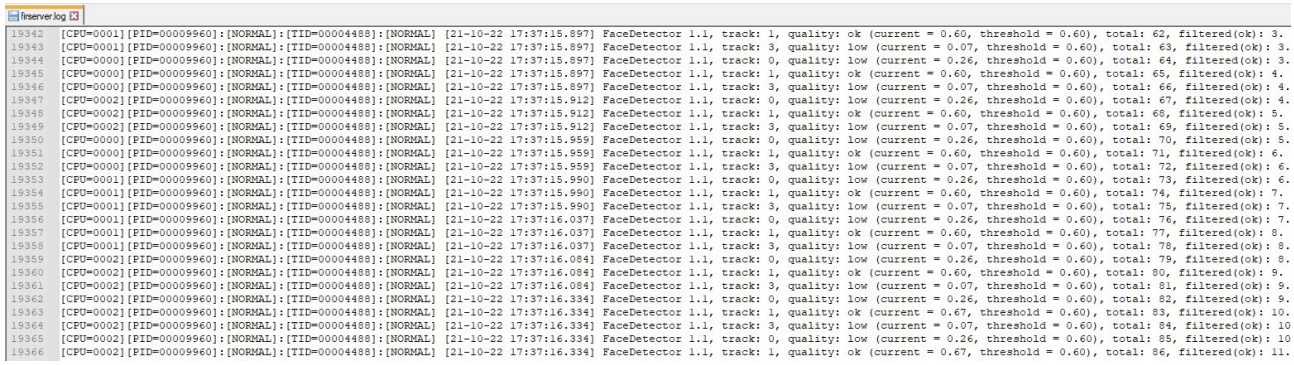
Number	Name	Description
1	The **File** menu	Access to the **Exit** option
2	The **Edit** menu	Access to the operations with text

Number	Name	Description
3	The **Clear all** button	Clearing all areas
4	The **Tools** menu	Access to the **Recreate firs** button for regenerating the face vectors (see Switching between the face recognition modules and SDK versions). Access to the **Script database** button for generating a CSV file, which is necessary to restore the history of passes if the Fir database is lost (see Restoring the history of passes if the Fir database is lost).
5	The core events field	Core events are displayed in this field
6	The video stream and resolution field	Video streams and video resolutions are displayed in this field
7	The client requests field	Client requests are displayed in this field
8	The terminal window	When you click the **Recreate firs** button from the **Tools** menu, the faces regeneration process is displayed in this field

7.2.3 Log file of the Face Recognition Server debug window

The firserver.log log file of the **Face Recognition Server** debug window is located at the following path: <*Face PSIM* installation directory>\Modules64\. This log file stores all events from the **Face recognition server** object.

An example of the firserver.log file contents:


firserver.log

```
19342  [CPU=0001][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.897] FaceDetector 1.1, track: 1, quality: ok (current = 0.60, threshold = 0.60), total: 62, filtered(ok): 3.
19343  [CPU=0001][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.897] FaceDetector 1.1, track: 3, quality: low (current = 0.07, threshold = 0.60), total: 63, filtered(ok): 3.
19344  [CPU=0000][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.897] FaceDetector 1.1, track: 0, quality: low (current = 0.26, threshold = 0.60), total: 64, filtered(ok): 3.
19345  [CPU=0000][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.897] FaceDetector 1.1, track: 1, quality: ok (current = 0.60, threshold = 0.60), total: 65, filtered(ok): 4.
19346  [CPU=0000][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.897] FaceDetector 1.1, track: 3, quality: low (current = 0.07, threshold = 0.60), total: 66, filtered(ok): 4.
19347  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.912] FaceDetector 1.1, track: 0, quality: low (current = 0.26, threshold = 0.60), total: 67, filtered(ok): 4.
19348  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.912] FaceDetector 1.1, track: 1, quality: ok (current = 0.60, threshold = 0.60), total: 68, filtered(ok): 5.
19349  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.912] FaceDetector 1.1, track: 3, quality: low (current = 0.07, threshold = 0.60), total: 69, filtered(ok): 5.
19350  [CPU=0000][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.959] FaceDetector 1.1, track: 0, quality: low (current = 0.26, threshold = 0.60), total: 70, filtered(ok): 5.
19351  [CPU=0000][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.959] FaceDetector 1.1, track: 1, quality: ok (current = 0.60, threshold = 0.60), total: 71, filtered(ok): 6.
19352  [CPU=0000][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.959] FaceDetector 1.1, track: 3, quality: low (current = 0.07, threshold = 0.60), total: 72, filtered(ok): 6.
19353  [CPU=0001][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.990] FaceDetector 1.1, track: 0, quality: low (current = 0.26, threshold = 0.60), total: 73, filtered(ok): 6.
19354  [CPU=0001][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.990] FaceDetector 1.1, track: 1, quality: ok (current = 0.60, threshold = 0.60), total: 74, filtered(ok): 7.
19355  [CPU=0001][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:15.990] FaceDetector 1.1, track: 3, quality: low (current = 0.07, threshold = 0.60), total: 75, filtered(ok): 7.
19356  [CPU=0001][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.037] FaceDetector 1.1, track: 0, quality: low (current = 0.26, threshold = 0.60), total: 76, filtered(ok): 7.
19357  [CPU=0001][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.037] FaceDetector 1.1, track: 1, quality: ok (current = 0.60, threshold = 0.60), total: 77, filtered(ok): 8.
19358  [CPU=0001][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.037] FaceDetector 1.1, track: 3, quality: low (current = 0.07, threshold = 0.60), total: 78, filtered(ok): 8.
19359  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.084] FaceDetector 1.1, track: 0, quality: low (current = 0.26, threshold = 0.60), total: 79, filtered(ok): 8.
19360  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.084] FaceDetector 1.1, track: 1, quality: ok (current = 0.60, threshold = 0.60), total: 80, filtered(ok): 9.
19361  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.084] FaceDetector 1.1, track: 3, quality: low (current = 0.07, threshold = 0.60), total: 81, filtered(ok): 9.
19362  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.334] FaceDetector 1.1, track: 0, quality: low (current = 0.26, threshold = 0.60), total: 82, filtered(ok): 9.
19363  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.334] FaceDetector 1.1, track: 1, quality: ok (current = 0.67, threshold = 0.60), total: 83, filtered(ok): 10.
19364  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.334] FaceDetector 1.1, track: 3, quality: low (current = 0.07, threshold = 0.60), total: 84, filtered(ok): 10
19365  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.334] FaceDetector 1.1, track: 0, quality: low (current = 0.26, threshold = 0.60), total: 85, filtered(ok): 10
19366  [CPU=0002][PID=00009960]:[NORMAL]:[TID=00004488]:[NORMAL] [21-10-22 17:37:16.334] FaceDetector 1.1, track: 1, quality: ok (current = 0.67, threshold = 0.60), total: 86, filtered(ok): 11.
```

To enable logging of each face capture event, it is necessary to change the value of the **FaceTracker.LogTrackerQuality** key to **1** (for details, see the Registry keys reference guide, for more information about working with the registry, see Working with Windows OS registry). As a result, the events of each face capture will be recorded in the log file firserver.log.

An example of a face capture event:

```
FaceDetector 1.1, track: 27, quality: ok(current = 0.73, threshold = 0.23), total:
645, filtered(ok): 455.
```

The event parameters are described in the table below:

Parameter	Description
track	Current track number
quality	Captured face quality: **ok** for good quality, **low** for bad quality (current < threshold)
current	Captured face quality determined by the math calculation
threshold	Minimum face quality set in the **Face recognition server** object settings panel
total	Number of all captured faces
filtered(ok)	Number of all good quality faces that passed the filter (current >= threshold)

Note

The total and filtered(ok) numbers are calculated anew each time after applying the settings in *Face PSIM*.

7.3 Appendix 3. Commands, requests and events of Face PSIM objects

7.3.1 FIRSERVER

The **FIRSERVER** object corresponds to the **Face recognition server** system object.

FIRSERVER commands

Commands can be used in *Axxon PSIM* scripts (see Examples of frequently used scripts and Programming Guide) or sent directly to the core using the *IIDK* (see Axxon PSIM Integration Developer Kit (IIDK)).

The description of the **FIRSERVER** object commands:

Command	Description
GET_IMAGE	Getting the image by its ID

Command	Description
SET_SOURCES	Rearranging the **Recognition channel** objects in the *Axxon PSIM* objects tree. The existing **Recognition channel** objects will be deleted, the new ones will be created and configured for the face detection objects whose IDs are specified in the sources<> parameter. *Note. If the sources<> parameter contains non-existing IDs of face detection objects, the **Recognition channel** objects will be created with the default settings (as configured in Axxon PSIM)*
VERIFY_START	User verification. It compares the face captured in the frame with the user photo, which is stored on the disk at the path: *<Axxon PSIM* installation directory>\Bmp\<Person>
ADD_PERSON_FROM_FILE	Adding of a reference face from a file to the reference face database
PHOTO_ADDED	Updating a photo for an existing face in the reference face database
START_CAM_FACECAPTURE	Starting the face detection
STOP_CAM_FACECAPTURE	Stopping the face detection
CHECK_QUALITY_START	Checking the quality of the saved user photo. Compares the quality of the user photo to the specified minimum quality of the face on the *Face Recognition Server*. Determines the quality of the photo or its absence

The list of the commands parameters:

Parameter	Parameter description
requestId<>	The request ID (is required to uniquely associate the request with the response on the client side)
id<>	The image ID
sources<>	The list of existing **Face detection** objects IDs
biggestFace<1>	If there are several faces in the added photo, then the reference face with the biggest size in the frame will be added to the database
person_id<>	The face identifier in the reference face database
image<>	The image in the "base64" format
delay<>	The command execution delay in seconds

Parameter	Parameter description
cam_id<>	The camera ID
p_id<>	The name of the photo file in the <*Axxon PSIM* installation directory>\Bmp\<Person> folder without permission
wait<>	Timeout in seconds
filename<>	The full name of the photo file. Files with the JPG, BMP, GIF, PNG extensions are allowed
name<>	First name of the added user
surname<>	Last name of the added user
department<>	The department to which the user will be added
comment<>	Commentary
cam_facecapture<>	Face detection
p_id<>	The ID of the user whose photo quality is checked

The command example for getting the image by its ID:

```
DoReact(FIRSERVER|1|GET_IMAGE|id<052B723D-5C29-
E811-88D3-005056C00008>,requestId<76C5B293-FD2F-4F25-B1D7-7B62442D2E89>);
```

In response to this request, a message will be received, where the "image" parameter will contain an image in the "base64" format (for the details on the event generated by the request, see FIRSERVER events).

The command example for rearranging the **Recognition channel** objects in the *Axxon PSIM* objects tree:

```
DoReact(FIRSERVER|1|SET_SOURCES|sources<2.1,3.1>);
```

The command example for updating a user's photo by his identifier:

```
DoReactStr("FIRSERVER",1,"PHOTO_ADDED",
"person_id<1>,biggestFace<1>,image<base64>,delay<1>");
```

The command example for the user verification:

```
DoReactStr("FIRSERVER","1","VERIFY_START","cam_id<1>,p_id<15>,wait<10>");
```

The command example for adding a face from a file to the reference face database:

```
DoReactStr("FIRSERVER","1","ADD_PERSON_FROM_FILE","filename<c:\
\iso_small.jpg>,name<Jane>,surname<Kramer>,department<Department 1>,comment<>");
```

The command example for stopping the face detection:

```
FIRSERVER|1|STOP_CAM_FACECAPTURE|cam_facecapture<3.1>
```

The command example for starting the face detection:

```
FIRSERVER|1|START_CAM_FACECAPTURE|cam_facecapture<3.1>
```

The command example for checking the quality of a saved user photo:

```
DoReactStr("FIRSERVER","1","CHECK_QUALITY_START","p_id<1>");
```

FIRSERVER requests

The requests are used to send commands and receive the data from the **FIRSERVER** object using the HTTP requests (for details, see Face PSIM. REST API).

FIRSERVER events

Events received from the **FIRSERVER** object can be used in *Axxon PSIM* scripts to run the procedures when the corresponding event occurs (see Programming Guide).
The description of the events from the **FIRSERVER** object:

Event	Description
PERSON_NOT_FOUND	The face was captured but not recognized (cannot be found in the *Face PSIM* database)
FIND_PERSON	The face is recognized
ADD_PERSON_FROM_FILE_OK	The reference face file is added to the *Face PSIM* database
ADD_PERSON_FROM_FILE_ERROR	There is an error when adding the reference face file to the *Face PSIM* database
IDENTIFY_ACCEPT	The verification is accepted
IDENTIFY_DECLINE	The verification is declined
RECOGNITION_PASS	The face is recognized and the **Access event generation** checkbox is set (see Configuring the events generation)
TEMPERATURE_ALARM	Temperature rise (when the temperature threshold specified for the thermal camera is exceeded, see Configuring the Face recognition server operation with thermal camera)

Event	Description
FACE_TEMPERATURE_SYNC_PROBLEM	The Server time and thermal camera time differ by more than 10 minutes
MASK_DETECTED	The mask is found on the face (see Configuring the events generation)
MASK_NOT_DETECTED	There is no mask on the face (see Configuring the events generation)
MASK_NOT_IN_PLACE	The mask is placed incorrectly
DATABASE_ERROR	Database error (lost connection with the **Fir** database)
REGENERATE_START	Biometric vectors re-generation in progress
REGENERATE_STOP	Biometric vectors re-generation complete
REGENERATE_CANCEL	Biometric vectors re-generation cancelled

The parameters of the events of the **FIRSERVER** object:

Parameters	Description
requestId<>	The ID of the request
fraction<>	The millisecond when the face was captured
owner<>	The server name. It is used for the PERSON_NOT_FOUND event
protocol_id<>	The captured face ID (the link to the image)
date<>	The date of the recognition completion
face_id<>	The unique ID of the face in *Axxon PSIM*
imageBase64<>	The face vector image in the "base64" format
guid_pk<>	The event ID (is generated randomly for every event)
confidence<>	The quality percentage of the added face image, it has the double type and the 0.0-1.0 range of values
capture_fraction<>	The millisecond when the face was added to the *Face PSIM* database
capture_date<>	The date of the image capture

Parameters	Description
sim<>	The similarity percentage
surname<>	The last name of the person who looks similar to the recognized face
comment<>	The comment on adding the user (the face)
capture_time<>	The time of the image capture
cam_name<>	The name of the camera that captured the face
patronymic<>	The middle name of the person
filename<>	The full name of the image file
department<>	The department the user (the face) is added to
name<>	The name of the added user (face)
obj_id<>	The face ID. The value is empty if there was no face match
error<>	The explanation of why the error occurred
gender<>	The gender of the recognized or unrecognized face (unknown, male, female)
age<>	The age of the recognized or unrecognized face
param0<>	The following can be specified: • similarity percentage during the verification; • temperature in the TEMPERATURE_ALARM event; • "Timeout"—if the IDENTIFY_DECLINE event occurred due to the expiration of the temperature timeout from the thermal camera
total_passes<>	The general number of passes of the currently recognized face
firstId<>	The unique identifier of the captured face
camera_id<>	The identifier of the camera that captured a face
camera_name<>	The name of the camera that captured a face
person_id<>	The user ID in the *Axxon PSIM* objects tree, if the recognized face was created with the **Create user in *Axxon PSIM* database** mark. It is used for the FIND_PERSON event

Parameters	Description
person_guid<>	The recognized face ID that is assigned to the user when a face is added to the reference face database. It is used for the FIND_PERSON event
eye_closeness <>	The result of the closed eyes recognition by the detector when using the *Tevian* recognition module: • unknown—not recognized (if a recognition module other than *Tevian* is used); • eye_closed—eyes are closed; • eye_not_closed—eyes are not closed
temperature <>	Face temperature in degrees Celsius from the thermal camera
temperature_ alarm<>	Temperature threshold from the thermal camera; when this value is exceeded, the TEMPERATURE_ALARM event is generated
info<>	Contains the following information separated by a semicolon (;): the names and identifiers of the cameras, that has ever captured the faces, and the number of passes
emotion<>	Emotion
glasses<>	Glasses
headwear<>	Headwear
evasion<>	Concealment of the face
facialHair<>	Facial hair
frame_type<>	Used for internal development
hairColor<>	Hair color
hairType<>	Type of bald head
liveness<>	Fake face
`timeout<>`	The waiting time in seconds for the temperature from the thermal camera if the IDENTIFY_DECLINE event occurred due to a timeout
noImage<>	The user doesn't have a saved photo: 1—there is no photo; 0—there is a photo

Parameters	Description
quality<>	The quality of the saved user photo in the *Access Manager* as a percentage. If quality<0>, the user doesn't have a photo in the *Access Manager*

Examples of frequently used scripts

On the page:

General information about scripts

Custom scripts are used for partial automation of processes while configuring *Face PSIM*. In the Programming Guide document there is the description of programming objects and methods which are in use for scripts creation in *Axxon PSIM*.

Script for faces verification

The verification mode compares the face captured in the frame with the user photo stored on the disk at *<Axxon PSIM* installation folder>\Bmp\<Person>. It also determines the face parameters: emotions, temperature, face concealment (mask), gender, facial hair.

To perform face verification, do the following:

1. Create the script:

```
if(Event.SourceType == "MACRO" && Event.Action == "RUN" && Event.SourceID ==
"1")
{
   DoReactStr("FIRSERVER","1","VERIFY_START","cam_id<1>,p_id<15>,wait<10>");
}
```

Parameters:

- 1—the identifier of the **Face recognition server** object;
- VERIFY_START—user verification command;
- cam_id<1>—camera identifier. If you use the *VisionLabs* face recognition module, instead of the camera identifier, specify the identifier of the **Face detection** object;
- p_id<15>—the name of the file with a photo in the *<Axxon PSIM installation folder>\Bmp\<Person>* folder without resolution (for example, 15 for the 15.bmp file);

- wait<10>—the waiting time in seconds for the face to appear.

2. Run the first macro. If the user from the photo does not appear in front of the camera in 10 seconds, the **Verification declined** event will be displayed. In case the user appears, the **Successful verification** event will be displayed immediately showing the similarity percentage of the captured face with the user photo stored on the disk.
   Example of an event when a photo doesn't match the face being verified:

```
Event : FIRSERVER|1|IDENTIFY_DECLINE|temperature_alarm<>,fraction<371>,int_obj_
id<1>,owner<PC>,noImage<0>,date<10-02-22>,from_script<1>,
guid_pk<{51A469CC-438A-EC11-94E5-D8BBC1166DF4}>,timeout<1>,core_global<1>,p_id<1>
,quality<83.864>,wait<10>,cam_id<2>,time<10:34:01>,param0<Timeout>
```

   Example of an event when a user doesn't have a photo:

```
Event : FIRSERVER|1|IDENTIFY_DECLINE|temperature_alarm<>,fraction<367>,int_obj_
id<1>,owner<PC>,noImage<1>,date<10-02-22>,from_script<1>,
guid_pk<{B314D117-458A-EC11-94E5-D8BBC1166DF4}>,timeout<1>,core_global<1>,p_id<4>
,quality<0>,wait<10>,cam_id<2>,time<10:43:14>,param0<Timeout>
```

The face verification is completed.

> **Attention!**
>
> File with photo must have the .bmp extension. But the file format can be one from the list: JPG, BMP, or PNG.

Script for adding a reference face to the database from a file

A reference face can be added to the database from a file with photo using the **ADD_PERSON_FROM_FILE** reaction of the **FIRSERVER** object.

> **Note**
>
> When you add a reference face to the *Face PSIM* database, a new user is automatically created and assigned a photo from the specified file.

Parameters:

- **filename**—full name of the file with the photo. Files with the JPG, BMP, GIF, PNG extension are acceptable;
- **name**—the name of the added user;
- **surname**—the surname of the added user;
- **department**—the department to which the user will be added;
- **comment**—any text commentary.

Example of the script usage:

```
if(Event.SourceType == "MACRO" && Event.Action == "RUN" && Event.SourceID == "1")
{
   DoReactStr("FIRSERVER","1","ADD_PERSON_FROM_FILE","filename<c:\
\iso_small.jpg>,name<Jane>,surname<Kramer>,department<Department 1>,comment<>");
}
```

If the face was successfully added to the reference face database, the **ADD_PERSON_FROM_FILE_OK** event will be displayed in the Debug window. If there are any errors when adding the reference face, the **ADD_PERSON_FROM_FILE_ERROR** event will be displayed (see FIRSERVER events).

Script for checking the quality of a saved user photo

You can check the quality of a saved user photo using the CHECK_QUALITY_START command:

1. Create the script:

```
if(Event.SourceType == "MACRO" && Event.Action == "RUN" && Event.SourceID ==
"1")
{
DoReactStr("FIRSERVER","1","CHECK_QUALITY_START","p_id<1>");
}
```

   Parameters:
   - 1—the identifier of the **Face recognition server** object;
   - CHECK_QUALITY_START—the command for checking the quality of a saved user photo;
   - p_id<1>—the identifier of the user whose photo should be checked.

2. Run the first macro.
   If the quality of the photo is higher than the minimum quality of the face on the face recognition server, the following event is generated:

```
Event : FIRSERVER|1|QUALITY_OK|fraction<413>,int_obj_id<1>,owner<PC>,date<08-02-2
2>,guid_pk<{11DB55C9-F188-EC11-94E4-D8BBC1166DF4}>,
core_global<1>,p_id<3>,time<18:14:24>,param0<92.4644>
```

   If the quality of the photo is lower than the minimum quality of the face on the face recognition server, the following event is generated:

```
Event : FIRSERVER|1|QUALITY_BAD|fraction<281>,int_obj_id<1>,owner<PC>,date<08-0
2-22>,guid_pk<{0742EBE0-F288-EC11-94E4-D8BBC1166DF4}>,
core_global<1>,p_id<3>,time<18:22:12>,param0<92.4644>
```

   If there is no photo, the following event is generated:

```
Event : FIRSERVER|1|QUALITY_BAD|fraction<517>,int_obj_id<1>,owner<PC>,date<24-0
2-22>,guid_pk<{1C9609E4-7795-EC11-A50D-74D435D0E19B}>,
core_global<1>,p_id<3>,time<17:44:34>,param0<0>
```

3. If the photo quality is successfully checked, the user can also be verified (see the script for user verification above). If a photo of a low quality is detected, the user will be marked to find them in the Access Manager and replace the photo.

   Note

   If the photo quality is higher than the quality of the face, set on the **Face recognition server** object, it doesn't guarantee that the verification will be performed correctly 100% of the time. The verification result depends on the position and settings of the camera, on the lighting of the face,

the camera angle and other derivatives. It is recommended to set the **Similarity level** on the **Face recognition server** settings panel to no higher than 50% and adjust it on a trial basis to get the required result.

7.4 Appendix 4. Description of the utilities for working with Face PSIM software

7.4.1 Cfgedit.exe utility for configuring the Cognitec face recognizer

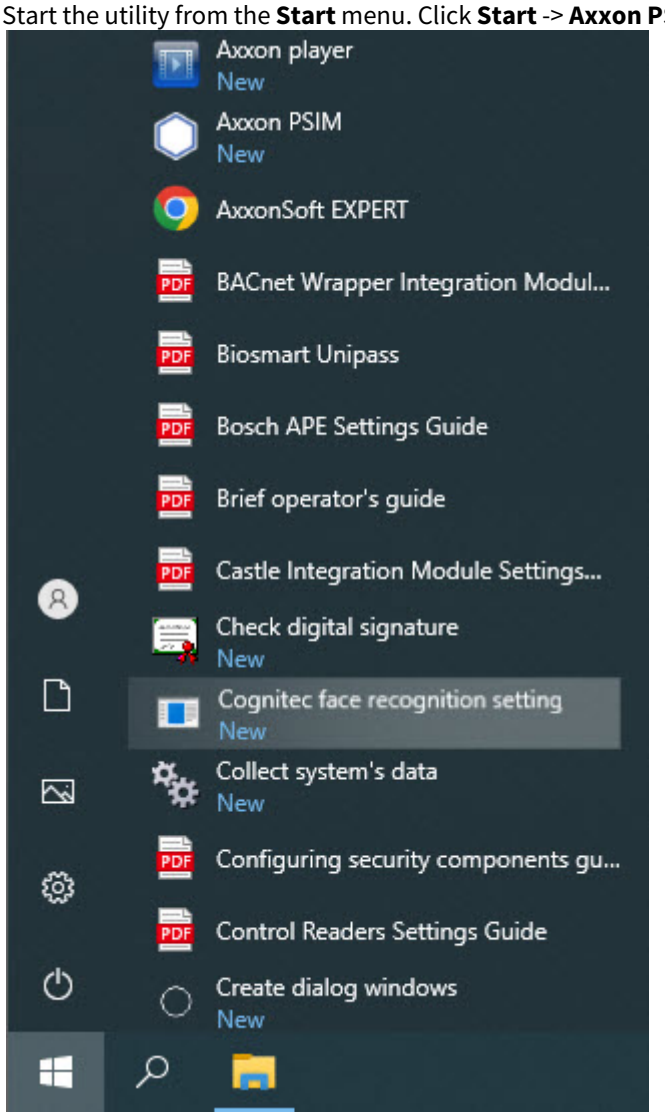
General information about the Cfgedit.exe utility

The Cfgedit.exe utility is designed for configuring the *Cognitec* face recognizer.

Starting and closing the utility

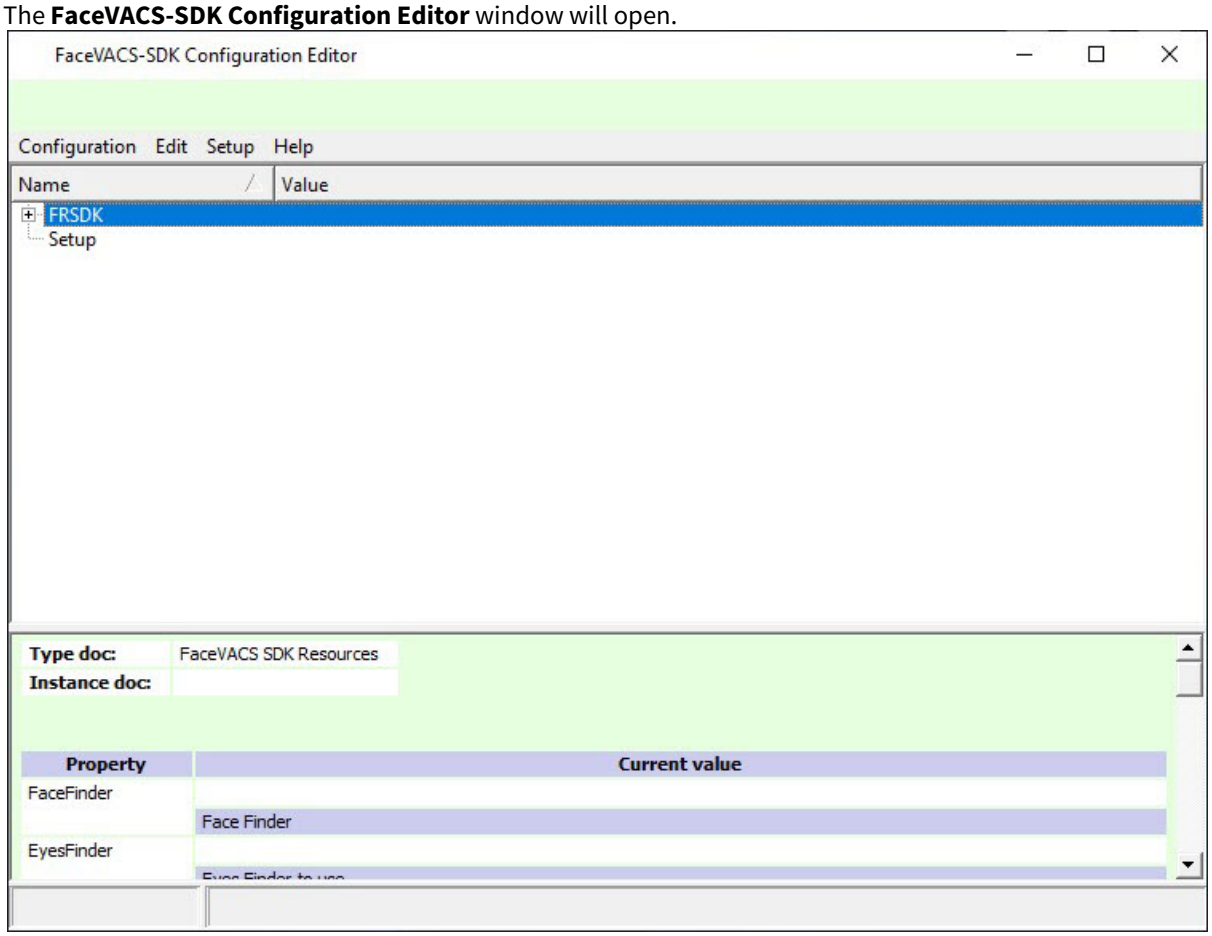
To start the Cfgedit.exe utility, do one of the following:

1. Start the utility from the **Start** menu. Click **Start** -> **Axxon PSIM** -> **Cognitec face recognition setting**.

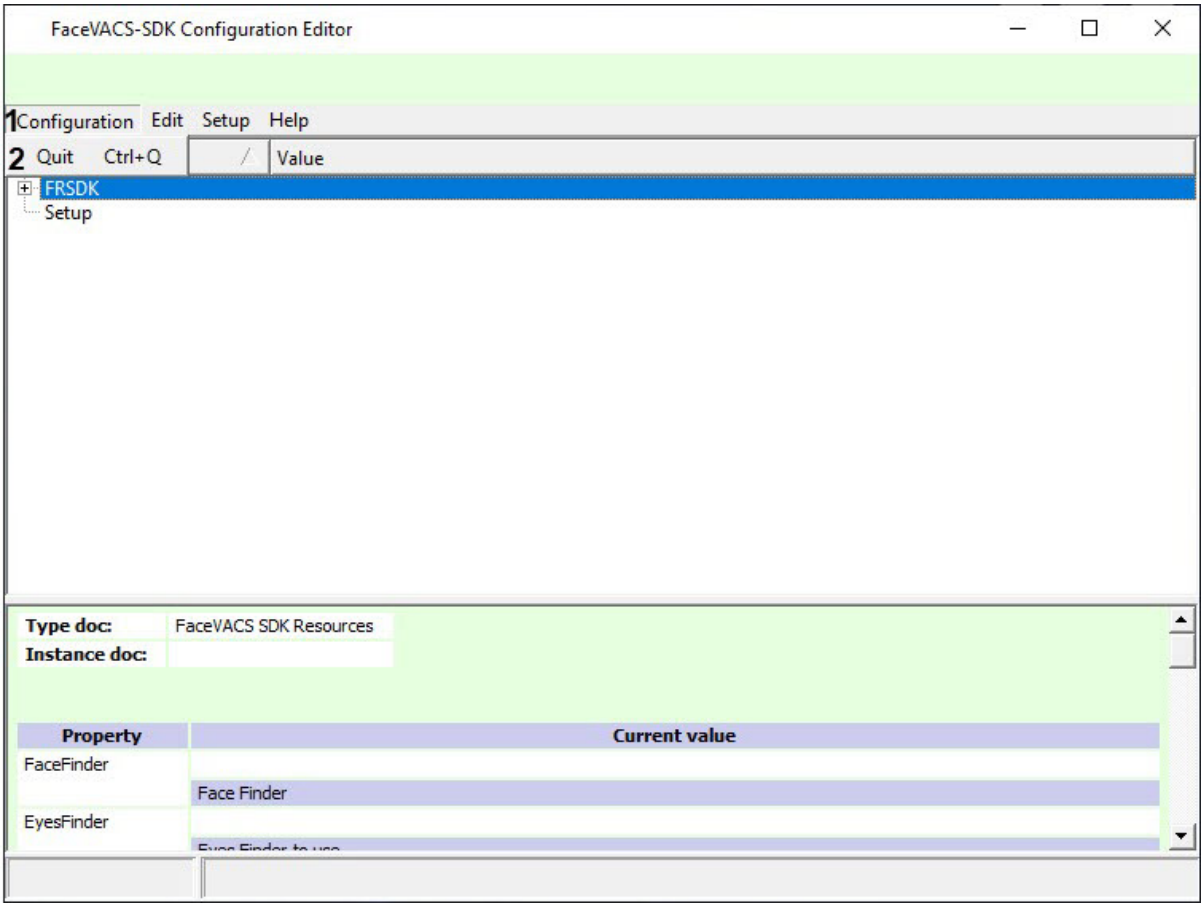


2. Start the config.bat executive file which is located in the *Face PSIM* software installation directory in the **Modules\FaceRecognition\Cognitec8\bin** catalogue.

The **FaceVACS-SDK Configuration Editor** window will open.



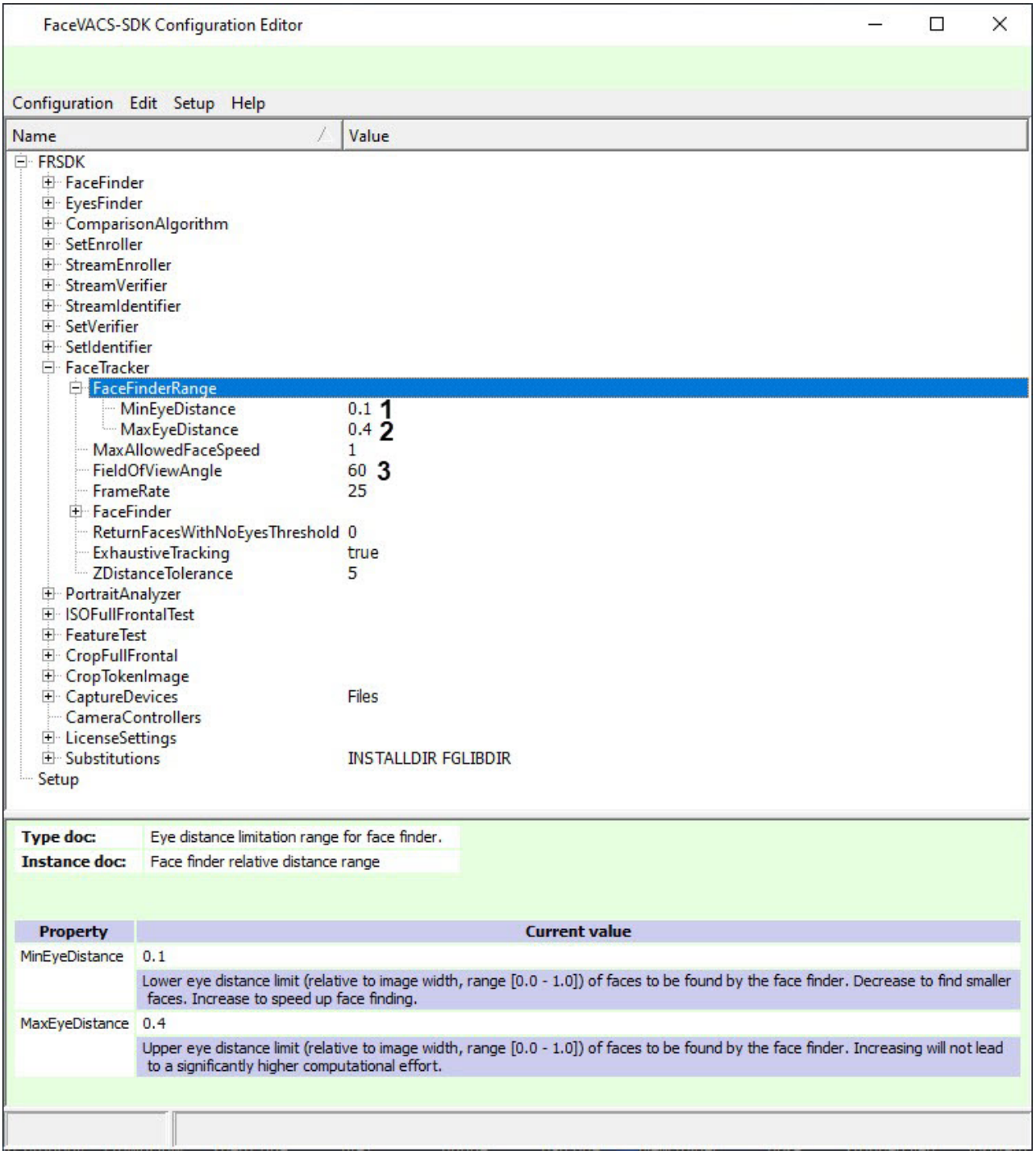
To close the utility click the ✕ button or select the **Configuration** (**1**) -> **Quit** (**2**) menu item.



Using the Cfgedit.exe utility

The Cfgedit.exe utility allows configuring the *Cognitec* face recognizer.

To configure the *Cognitec* face recognizer the following parameters are in use: **MinEyeDistance**, **MaxEyeDistance** and **FieldOfViewAngle**. To find them open the objects tree as it shown in the figure.

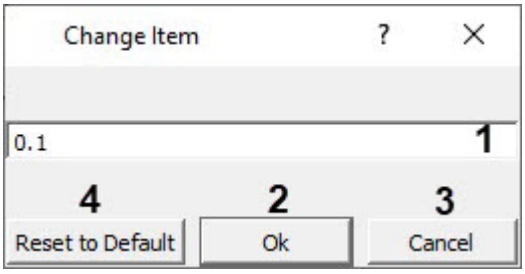


The **MinEyeDistance** parameter (**1**) defines the minimal distance between eyes which is to be recognized. The range of values is [0.000-1.000]. The value on default is 0.1. The distance is measured in fractions of video image width.

The **MaxEyeDistance** parameter (**2**) defines the maximal distance between eyes which is to be recognized. The range of values is [0.000-1.000]. The value on default is 0.4. The distance is measured in fractions of video image width.

The **FieldOfViewAngle** parameter (**3**) defines the camera view angle. The range of values is [0.1-179.9]. The value on default is 60. This parameter is measured in degrees.

To change the value of corresponding parameter double click the left mouse button on it. The **Change item** window will open.



In the field (**1**) enter the required value for corresponding parameter. To save the entered value, click **Ok** (**2**). To set the default value, click **Reset to Default** button (**4**).

> **Note.**
>
> To cancel the entered value click the **Cancel** button (**3**).

To reset all settings to default select the **Edit** -> **Deep Reset To Default** menu item. Parameter values will change to default values only after closing and opening the object tree.

Configuration of the Cfgedit.exe utility wll be applied after the *Axxon PSIM* software restart. Stopping the utility is not required.

7.4.2 Face Recognition Tool utility for extracting captured and reference faces from the database

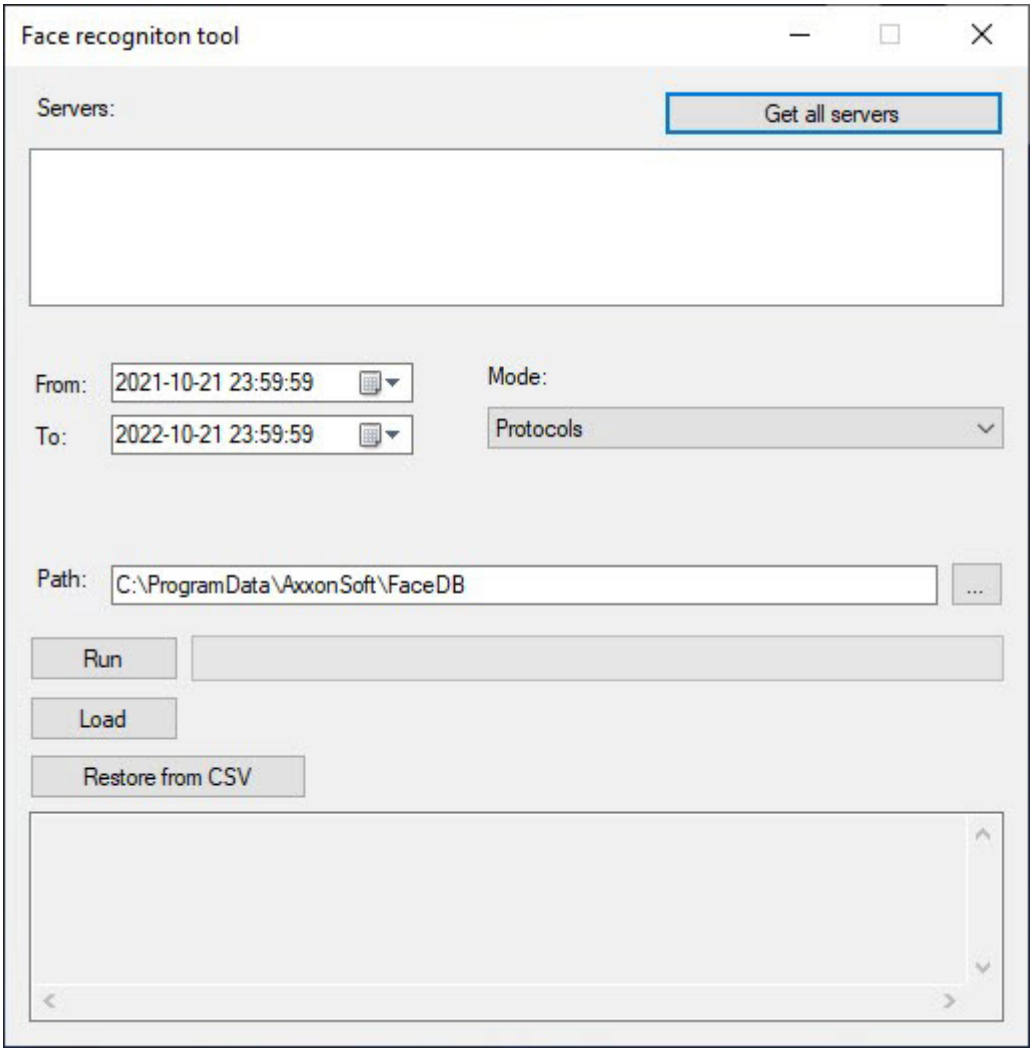
General information about the Face Recognition Tool utility

The Face Recognition Tool utility is designed for extracting captured or reference faces.

Starting and closing the Face Recognition Tool utility

To start the Face Recognition Tool utility launch the FaceRecognitionTool.exe executive file located in the <*Face PSIM* software installation package>\Modules folder.

As a result the **Face recognition tool** window will open.

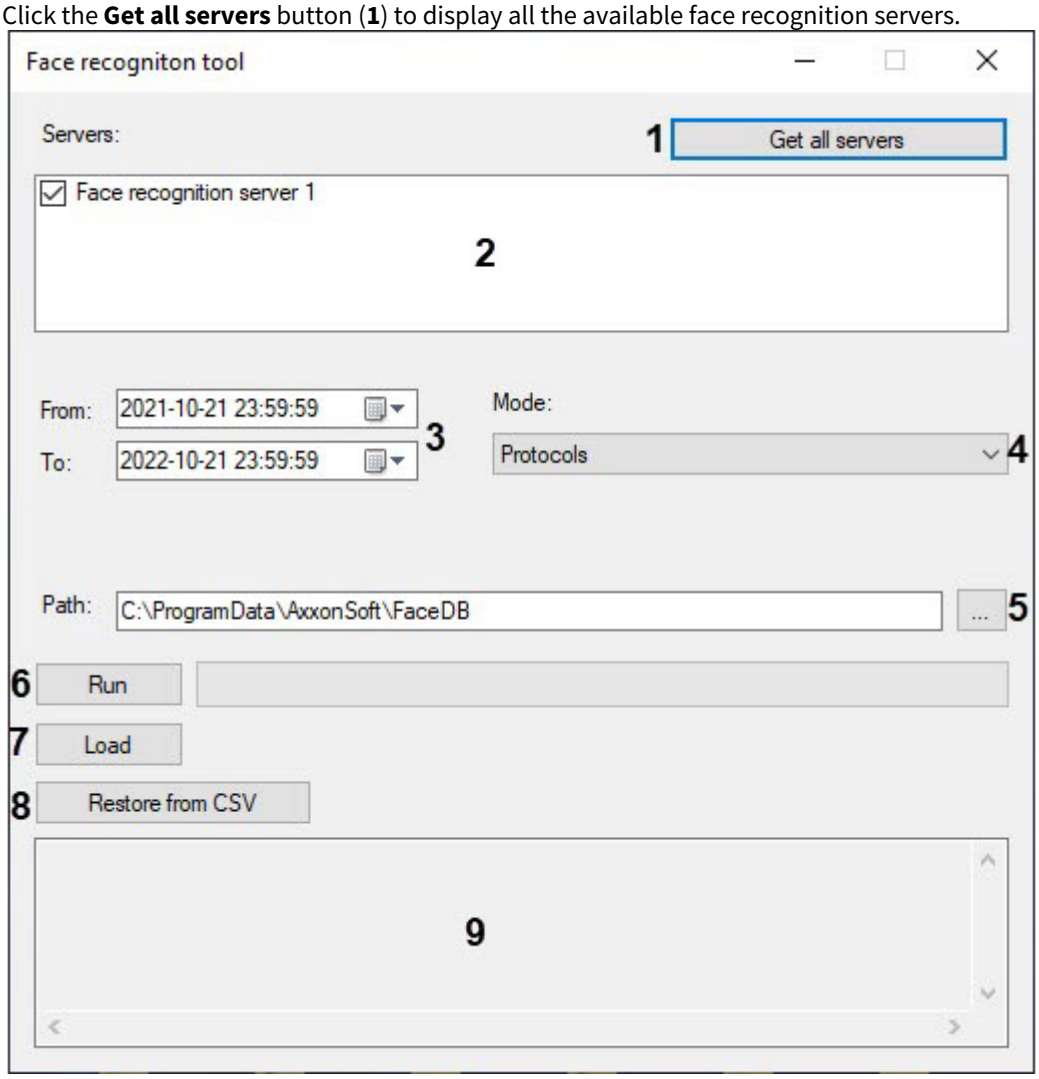


To close the utility click the ✕ button.

Using the Face Recognition Tool utility

To load captured or reference faces from the database, do the following:

1. Click the **Get all servers** button (**1**) to display all the available face recognition servers.



2. In the **Servers** (**2**) field set the checkboxes next to the face recognition servers that will supply the data.
3. Specify the date and time of the start and the end of time interval for which data is to be loaded (**3**).
4. In the **Mode** (**4**) drop-down list select the loaded data mode:
   a. **Protocols** – load the faces captured by the *Face recognition server*.
   b. **Protocols with engine info** – similar to **Protocols**, with adding the name of recognition module in the end of each file.
   c. **Big filesystem** – load a large amount of data from the database. In this case data will be loaded according to special algorithm.
   d. **Persons** – load the reference faces added to the *Face recognition server* database.
5. Specify a path to the folder to which the data will be loaded in the **Path** field (**5**).
6. Click the **Run** button to load the data to the folder (**6**). The total number of faces loaded from the database will be displayed.

> **Note**
>
> - If the **Protocols** or **Protocols with engine info** mode is selected, then the data will be loaded to folders corresponding to the names of video cameras by which the faces were captured. Two files will be loaded for each captured face – the image of the detected face in .jpg format and the corresponding vector in .bin format. If the **Protocols with engine**

info mode is selected, then the name of each file will have the following structure: [*date and time*] - [*ID*] - [*recognition module*].

- If the **Persons** mode is selected, then the faces added to the folders corresponding to the names of departments to which persons belong. Two files will be uploaded for each face - a face image in .jpg format, and a .json file containing such parameters as the user's full name, department, comment. If a user was created in *Axxon PSIM* when adding a person to the person's database, then the Antipassback and the job title parameters will also be taken into account while loading images from the folder to the face database (see Selecting a way to upload an image to the reference face database section).
- If there are forbidden characters (**\/:*?"<>|**) in the name of the reference face file added to the Face Recognition Server database, then during the export these characters will be replaced with the _ character (underscore).

7. Click the **Load** button (**7**) to display the loading time and the total size of the loaded vectors.
   Load 9198 firs during 0,27 seconds. Total size 8,98 MB.
8. Click the **Restore from CSV** button (**8**) to restore the history of passes if the Fir database is lost. As a result, a window will be displayed, where it is necessary to open the .csv file (for details, see Restoring the history of passes if the Fir database is lost).
9. The log of the operations performed in the utility is displayed in the field (**9**).

Using the Face Recognition Tool utility is complete.

Using the Face Recognition Tool utility via command line

The following commands are used to work with the Face Recognition Tool via the Windows command line:

Parameter	Description
-h	Commands help
-m	Mode. The following modes are available: • protocols • protocols with fir engine • big filesystem • persons • "restore from csv"
-p	The path to the folder in case of loading, or the path to the .csv file in case of recovery
-s	Start time (not used for the Persons mode)
-e	End time (not used for the Persons mode)

Command example to get help about commands:

```
FaceRecognitionTool.exe -h
```

Command example for loading the data on the reference faces added to the Face Recognition Server database:

```
FaceRecognitionTool.exe -m persons -p d:\data
```

Command example for loading the data on faces captured within a certain time period, adding the name of the recognition module at the end of the name of the downloaded file:

```
FaceRecognitionTool.exe -m "protocols with fir engine" -p d:\data -s "02.09.2018
23:59:59" -e "03.09.2018 23:59:59"
```

Command example to restore the history of passes:

```
FaceRecognitionTool.exe -m "restore from csv" -p "C:
\ProgramData\AxxonSoft\FaceDB\SCRIPT[RV] fir_database_protocols [72][2020-01-01
10-00-00].csv"
```