AxxonSoft

# INTELLECT™ Software Package

## Installing and configuring security system components guide

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ИНТЕЛЛЕКТ. ТЕХНОЛОГИИ. ВИДЕО.

Video Surveillance and Security Solutions

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# 1 INTRODUCTION

## 1.1 Purpose and structure of the guide

*The INTELLECT™ software package. Installing and configuring security system components guide* is a reference and information guide that is designed for system administrators, installation and configuration engineers, users with the rights to administrate INTELLECT™-based digital video surveillance and audio surveillance systems.

This guide contains the following information:

1. Installation of security system components.
2. Configuration of security system components in the INTELLECT™ software.
3. Appendixes that contain supplemental information on security system components and features of their configuration.

## 1.2 Purpose of the INTELLECT™ software package

The INTELLECT™ software is designed for the deployment of industrial scalable, flexible (adjustable) integrated security systems, based on the digital video surveillance and audio monitoring systems.

The INTELLECT™ software possesses the following basic features:

1. Integration of digital video surveillance and audio monitoring systems with the existing data systems, various security equipment, auxiliary software of other developers, using integrated open interfaces of the data exchange.
2. Compatibility with diverse security devices and data systems, in particular, with the fire and security alarm and access control systems, video cameras, data analysis systems and systems for recognition of objects (events) and identification by their images.
3. Single-source registration and processing of events, generation of notifications and controlling response in accordance with the flexibly modified logics.

Ultimately unlimited capabilities for scaling, solution—specific adjustments, re-distribution of resources with changes in the number or quality of tasks in monitoring guarded locations and operating various equipment.

# 2 Installation of security system components

A security system based on the INTELLECT™ software consists of a hardware kit that fit the functionality of the basic software kit. This section outlines the procedures for configuring basic hardware components of the security system.

## 2.1 Assembly and installation of video surveillance subsystem hardware

The video surveillance subsystem of the INTELLECT™ software can include the following hardware components:

1. FS/WS/FX/VRC video capture cards and analogue video cameras connected to them. The installation procedure of video capture cards is described in the following chapter.

2. Network video cameras and network video servers connected to the Server via the TCP/IP telecommunication protocols. Installation and configuration procedures for this hardware are outlined in the documentation supplied with the network device.

3. Expansion cards for analogue video signal output that are installed in the video capture cards in order to transmit a video signal to analogue monitors.

### 2.1.1 Installing video capture cards into computer case

FS-5B, FS-6B, FS-6C, FS-8, WS-7, FS15 and FS115 video capture cards are connected to the PCI interface version 2.1 and higher; FS-16, WS16, WS216, WS-17, FX8, FX4, FX116, VRC6004, VRC6008 and VRC7008L video capture cards are connected to the PCI-express (PCI-E X1) intrface, FX416, FX16, FX HD4, VRC6416 and VRC6404HD video capture cards are connected to the PCI-express (PCI-E X4) interface. Installation procedure of video capture cards resembles the installation procedure of standard PCI or PCI-express (sound, network, etc.) cards.

One or more video capture card is included into the kit of digital video surveillance system based on the INTELLECT™ software.

*Note. Standard precautions should be observed while installing the video capture cards into a computer case.*

To install video capture cards, do the following:

1. Turn the computer off, and disconnect the plug from the mains.
2. Remove the computer case cover (Figure 2.1—1).

**Figure 2.1—1 Removal of the case cover**

3. Install the video capture card in a free PCI-E X1 slot of the motherboard. Secure the video capture card with a screw (Figure 2.1—2, Figure 2.1—3).

*Note. Before encasing video capture cards, make sure that your hands are free from static electricity, which can damage computer cards and video capture cards. To prevent damage to the cards, various special antistatic tools may be used (for instance, an antistatic wristband).*

**Figure 2.1—2 Example of FS-6C video capture card installation into a PCI slot**

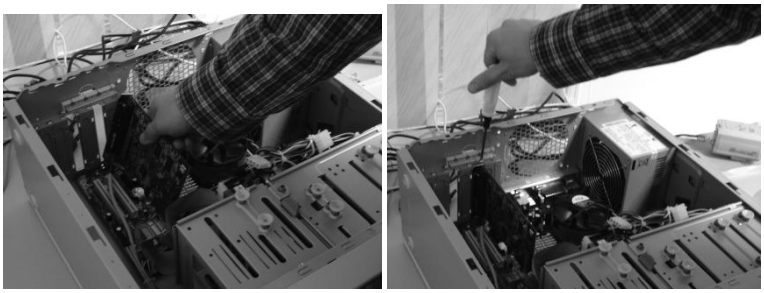


**Figure 2.1—3 Example of FS-16 video capture card installation into a PCI-E X1 slot**

4. Set the computer case cover (Figure 2.1—4).

**Figure 2.1—4 Setting the case cover**

5. Connect the interface cable with the numbered BNC-pins to the video capture card (Figure 2.1—5).

**Figure 2.1—5 Connection of the interface cable**

6. Connect video cameras to the interface cable (Figure 2.1—6).

Figure 2.1—6 Connection of video cameras to the interface cable

7. Connect the power cord of the computer case to the mains and turn the computer on.
8. While the operating system is loading, new hardware (video capture card) is found and the monitor displays the **Found New Hardware Wizard** dialog box.

If INTELLECT™ is to be installed on the given computer, then click **Cancel** in the **Found New Hardware Wizard** dialog box. In this case, the driver of the video capture card is installed automatically during the INTELLECT™ software installation.

If INTELLECT™ has already been installed and a new video capture card needs to be installed, then install the driver of the video capture card(s) using the **Found New Hardware Wizard** application (see *Installing drivers for video capture cards* section).

Installation of video capture cards is completed.

### 2.1.2 Installing drivers for video capture cards

When the video capture card is installed in the computer, the monitor displays the **Found New Hardware** message while the operating system is loading (Figure 2.1—7).

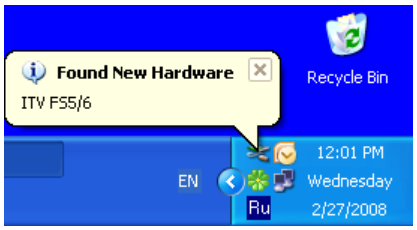



Figure 2.1—7 Displaying the Found New Hardware message

As a result the monitor automatically displays the **Found New Hardware Wizard** dialog box (Figure 2.1—8).

Figure 2.1—8 The Found New Hardware Wizard dialog box

*Note. If* **INTELLECT™** *is to be installed on the given computer, then click Cancel in the* ***Found New Hardware Wizard*** *dialog box. In this case, the driver of the video capture card is installed automatically during the INTELLECT™ software installation.*

If **INTELLECT™** has already been installed and a new video capture card needs to be installed or a driver needs to be reinstalled, do the following:

***Attention! It is recommended to shutdown antivirus software while installing the driver.***

1. Select **No, not this time** and click **Next** in the **Found New Hardware Wizard** dialog box (Figure 2.1—8).
2. Select one of the following actions:
    - Install the software automatically (recommended) – driver search and follow-up installation.
    - Install from a list or specific location (advanced) – enables to select the necessary driver or a folder for manual driver search.

If the **Install the software automatically (recommended)** item is selected, then the description of installation continues with item 6.

3. Select **Install from a list or specific location** and click **Next** (Figure 2.1—9).

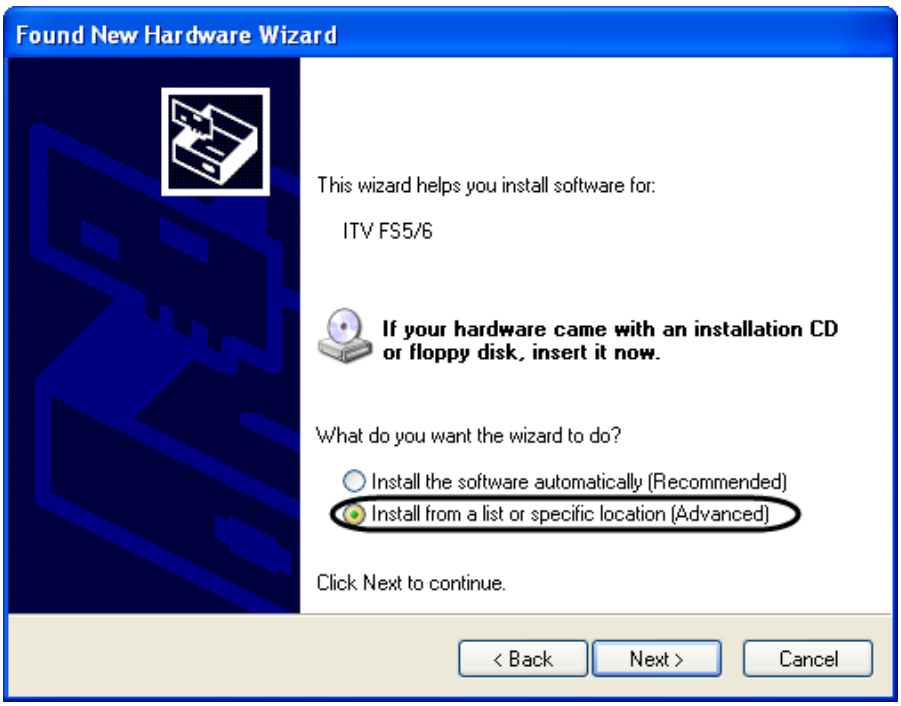



Figure 2.1—9 Selection of the Installation from a list of specific location item

4. Set the **Include this location in the search** checkbox in the search options dialog box and click **Bowse.** In the **Browse for folders** specify the path to the folder that contains drivers for a video capture card and click **OK** (Figure 2.1—10).

*Note. Drivers for video capture cards are stored in the **Drivers** folder on the installation CD or in the* **INTELLECT™** *software installation directory. To install drivers for video capture cards select the folder, where the drivers for video capture cards are stored (see Drivers for video capture cards integrated into the INTELLECT™ software section).*

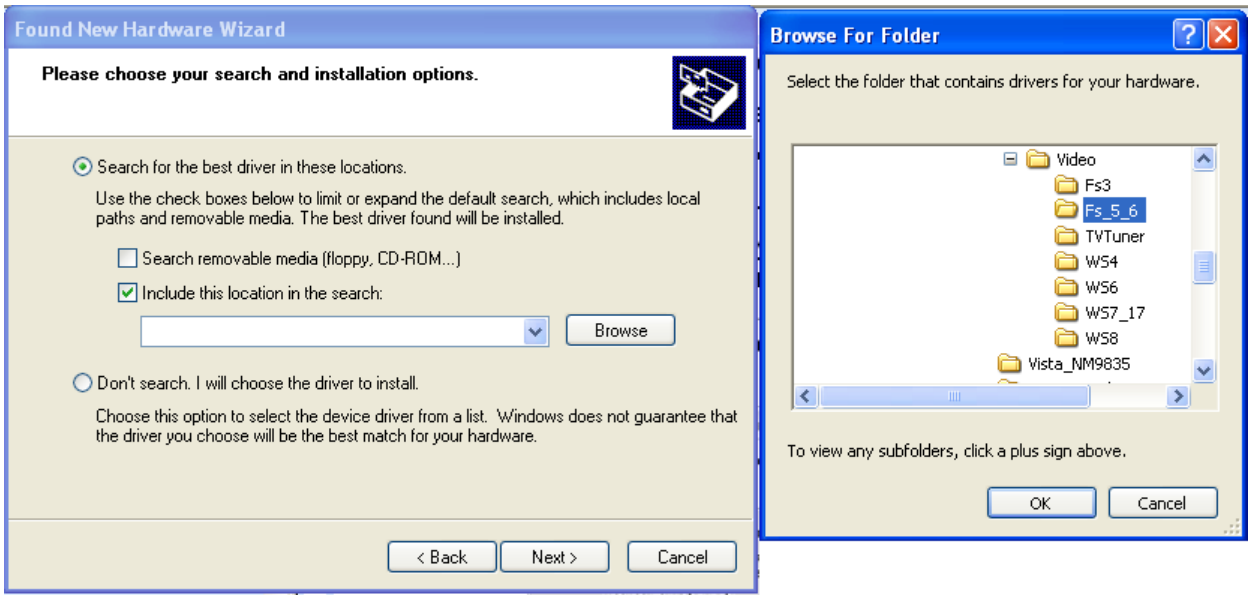



Figure 2.1—10 Example of selecting a folder that contains drivers for the hardware

5. After specifying the path to the folder click **Next** to start installation process (Figure 2.1—11).

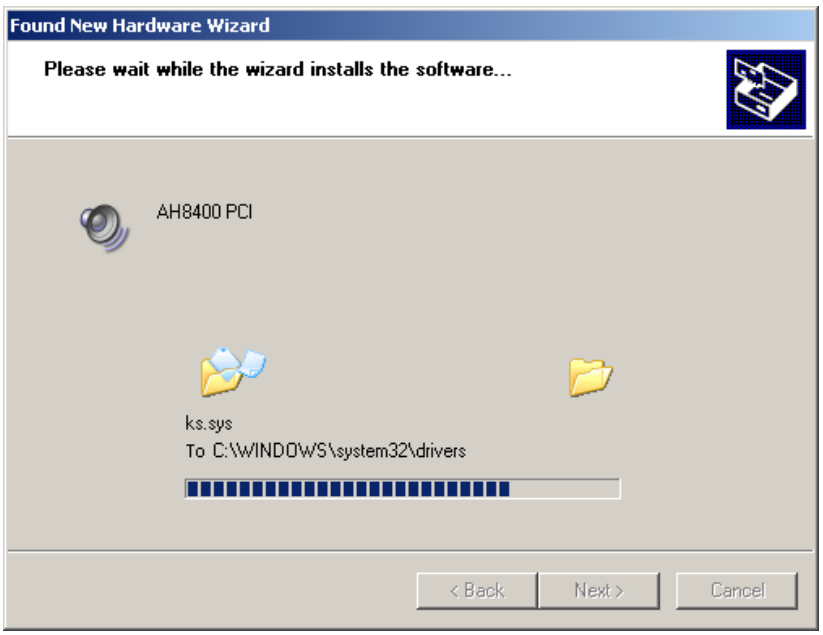



Figure 2.1—11 Driver installation

6. Ignore Microsoft notification by clicking **Continue anyway** (Figure 2.1—12).

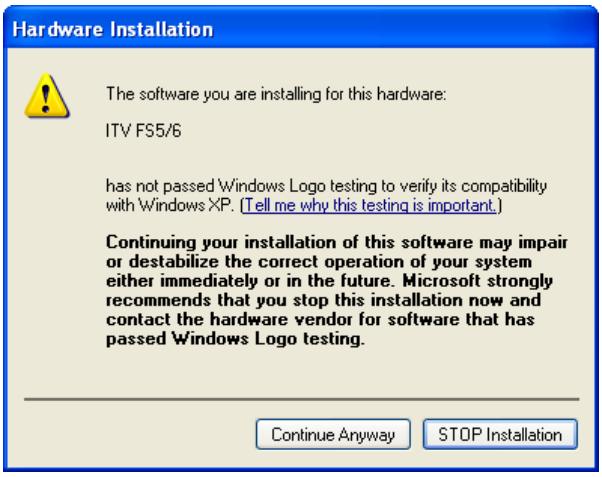



Figure 2.1—12 Installation process continues upon the Windows query

7. To complete installation click **Finish** (Figure 2.1—13).

Figure 2.1—13 Completing installation process for drivers of video capture cards

As a result the message (**Your new hardware is installed and ready to use)** is displayed on the Windows taskbar (Figure 2.1—14).

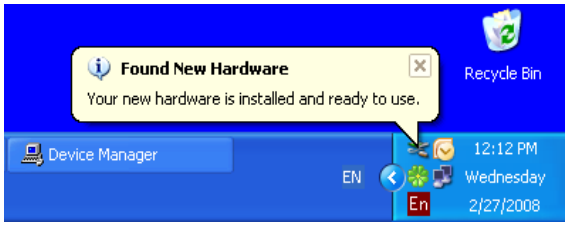



Figure 2.1—14 Displaying the Found New Hardware message

Installation of a driver for video capture card is completed.

Driver installation procedure for one video capture card is repeated in turn required number of times depending on number of ADCs on the video capture card (e.g., 1 time for FS-5 video capture card, 4 times for FS-6, FS-16, WS-7 video capture cards, 8 times for FS-8 video capture card).

### 2.1.3 Testing installation of drivers for video capture cards

When installation of the drivers for video capture cards is finished, driver availability in the Windows operating system should be tested with the help of the Device Manager. For this do the following:

1. Open the **System Properties** window by right-clicking on **My computer** icon on the desktop and select **Properties** in the contextual menu (Figure 2.1—15).

*Note. The **System Properties** window can be open by clicking **Start=> Control Panel=> System**.*

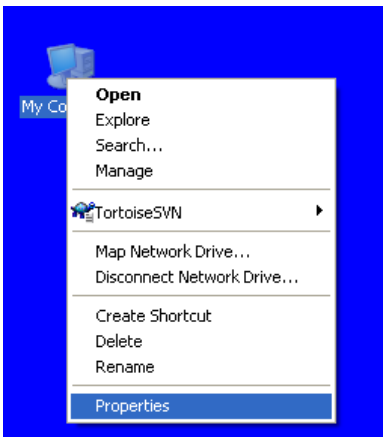



Figure 2.1—15 Launching the System Properties dialog box in the My computer context menu

2. In the **System properties** dialog box go to the **Hardware** tab and click **Device Manager** (Figure 2.1—16).

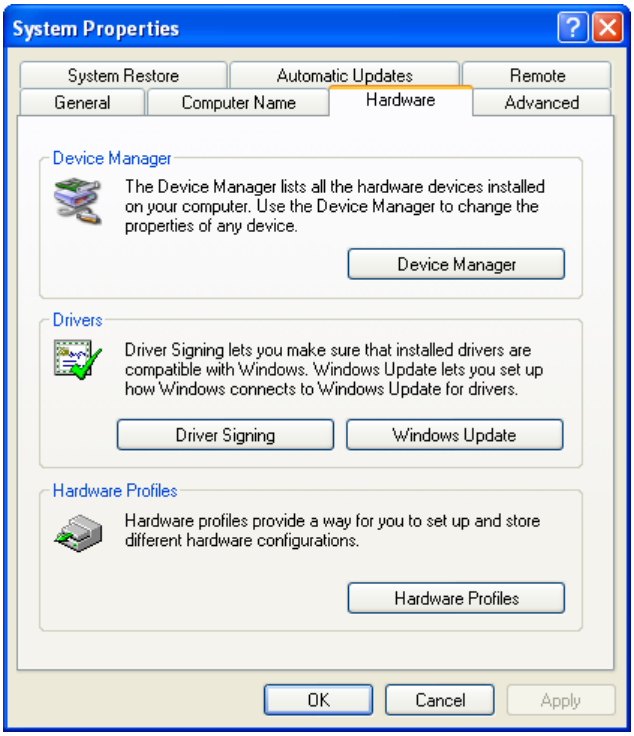



Figure 2.1—16 Running the Device Manager application

3. Go to **Sound, video and game controllers** in the Windows hardware tree and check if the displayed list of devices agrees with the types of installed video capture cards (Figure 2.1—17).

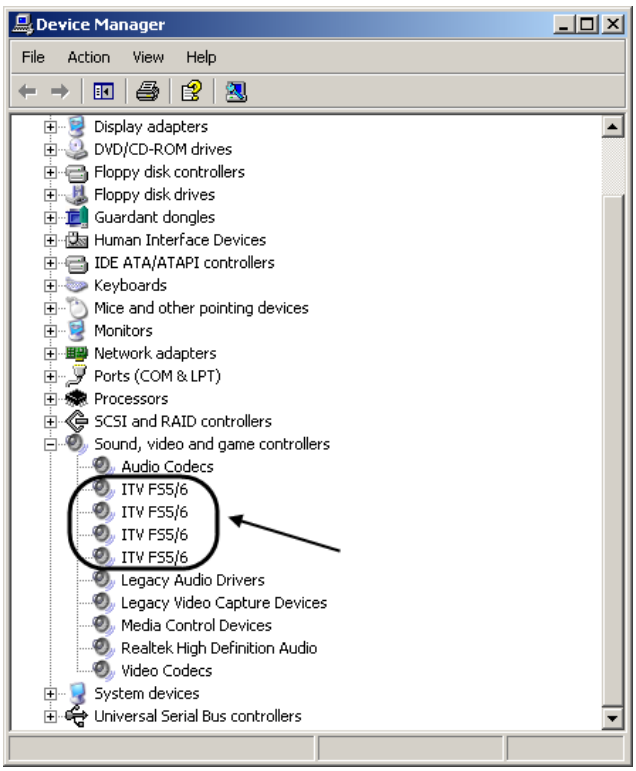



**Figure 2.1—17 Example of Windows hardware tree in the Device Manager window if drivers for FS-6 video capture card are installed successfully**

### 2.1.4 Testing installation of drivers for video capture cards using the Codereader.exe utility

To test installation of drivers for video capture cards use the Codereader.exe utility that is designed to read the codes of video cpture cards and that is supplied together with the INTELLECT™ software.

*Note. Some video capture cards (e.g., FX116 and FX416) are not equipped with a cryptochip. It is impossible to test installation of drivers for these video capture cards.*

The utility is launched from the **Tools** folder of the INTELLECT™ software installation package. E.g., C:\Program Files\Intellect\Tools\codereader.exe.

The Codereader.exe utility can also be launched by selecting **Start** ⇒ **All programs** ⇒ **INTELLECT** ⇒ **Utilities** ⇒ **Code Reader**.

As soon as the utility is launched the monitor displays a window with the codes of video capture cards.

If the drivers for video capture cards are installed correctly, the utility window will display the codes of video capture cards (Figure 2.1—18). If there are several embedded ADCs in the video capture card, then the codes will be repeated as many times as there are ADCs in the video capture card.

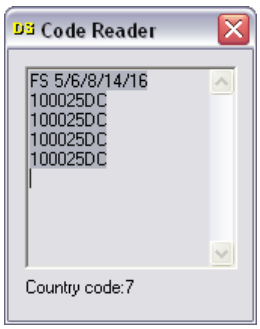



Figure 2.1—18 Example of code reading of one FS-6 video capture card

If the Codereader.exe window does not display any code or displays it as “0000” (Figure 2.1—19), it means that:

1. A video capture card is not installed in the computer.
2. A video capture card is defective.
3. A driver for a video capture card is not installed.
4. Installed driver does not correspond to a video capture card in use.
5. Installed driver for a video capture card fails to perform.
6. A video capture card has no cryptochip (FX116/FX416).

Check if the video capture card is installed in the computer and re-install drivers for all ADCs of the video capture card. If after re-installation ADC codes still cannot be read by the Codereader.exe utility, then contact your distributor to check the video capture card.

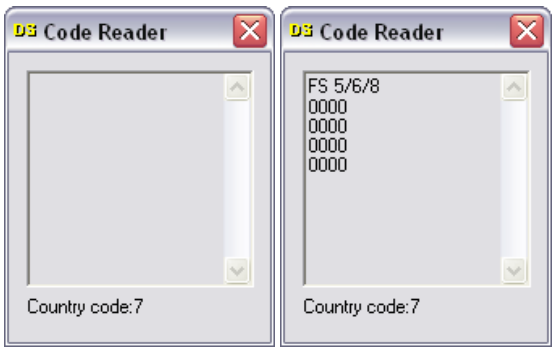



Figure 2.1—19 Example of incorrect installation of a driver for a video capture card

## 2.2 Installing the expansion card for analog video out

For viewing video sequences from surveillance cameras with the analog monitors a special option – analog video output - is used. To activate this option with FS-5, FS-6 and FS-16 video capture cards, the supplementary card is used – analog video out card.

The analog video out card is used for direct video signal output from one of the cameras connected to the Server to the analog monitor (with no digitization).

The analog video out card has three connectors compatible with FS-5, FS-6 and FS-16 video capture cards (Figure 2.2—1).

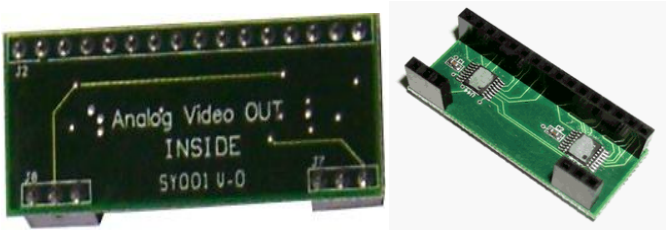



Figure 2.2—1 The analogue video out card (front and back views)

To install the analog video out card, do the following:

1. Make sure that the video capture card power supply is off (either the computer with installed video capture card is off, or the video capture card is not installed).
2. Install the analog video out card on the video capture card, using special connectors on the video capture card (Figure 2.2—2 and Figure 2.2—3).

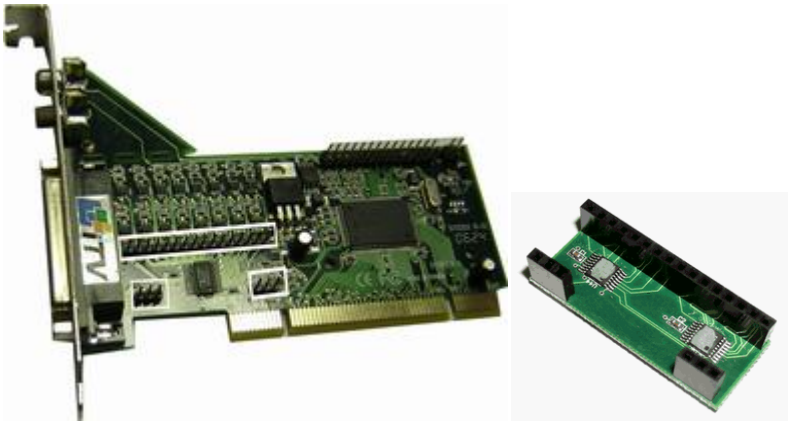


Figure 2.2—2 Connectors on the analog video out card and corresponding connectors on the video capture card

Figure 2.2—3 Connecting the analog video out card to corresponding connectors on the video capture card

3. Connect the interface cable of the analog monitor to the red BNC connector of the video-in cable connected to the video capture card (Figure 2.2—4).

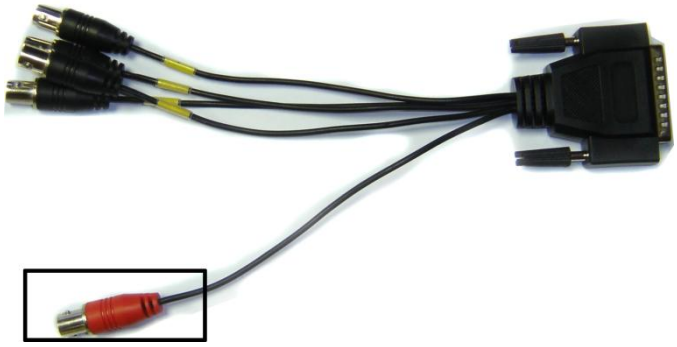


Figure 2.2—4 Connector of the analog video-out

## 2.3 Connecting the hardware performance tester

Hardware performance tester is designed to automatically restart the computer whenever any failure in the Windows OS or basic modules of INTELLECT™ software occurs.

Hardware performance testing is done in one of two ways:

1. With the help of Watchdog used on servers with installed video capture cards that support the Watchdog hardware testing (see Appendix 4. Technical specifications of video capture cards ).
2. With the help of USB-Watchdog used on servers and clients without installed video capture cards.

### 2.3.1 Connecting the Watchdog hardware performance tester

In case of the Watchdog hardware performance testing the Reset button is connected to the computer mother board through the video capture card with the help of special Watchdog cable (Figure 2.3—1).

*Note. The Watchdog cable is included to the delivery package of video capture card optionally. If several video capture cards are installed on the Server then Watchdog is connected to only one card.*

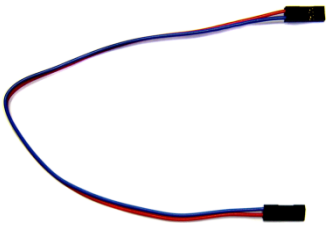


Figure 2.3—1 Cable for connecting the Watchdog hardware performance tester

A special four-pin connector (Figure 2.3—2) or two two-pin connectors (Figure 2.3—3) are installed on the video capture card to connect the Watchdog cable.

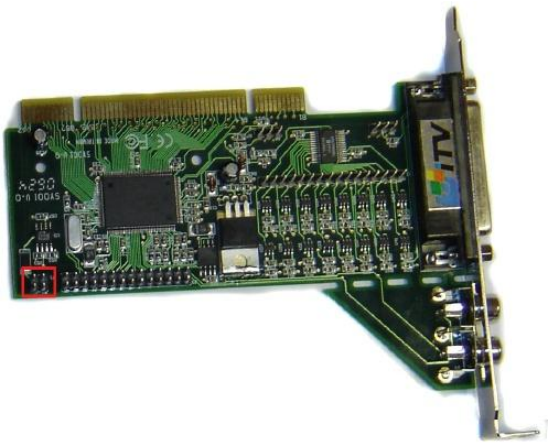


**Figure 2.3—2 Four-pin connector for connecting the hardware tester of Watchdog pending (by the example FS-5 video capture card)**

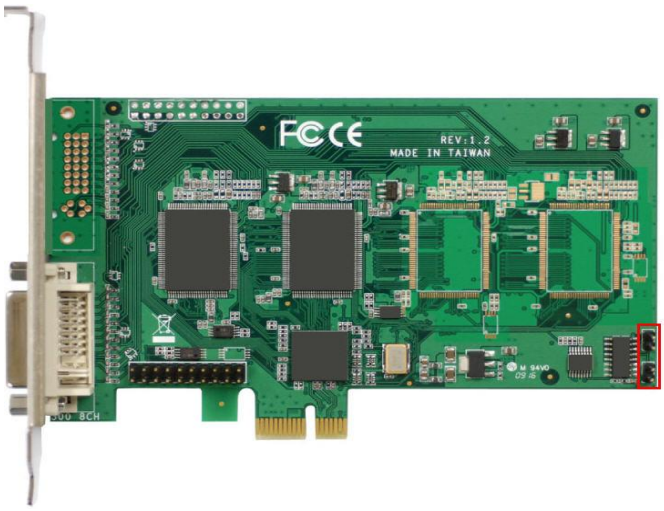



**Figure 2.3—3 Two two-pin connectors for connecting the hardware tester of Watchdog pending (by the example FX-4 video capture card)**

To connect the Watchdog hardware performance tester, do the following:

1. Make sure that mother board and video capture card are disconnected.
2. Connect the cable of the Reset button to the two-pin or four-pin connector of video capture card with the help of a pair of 1/0 or 2/0 connections (Figure 2.3—4). Connection of the Reset button cable to FS-5 video capture card is displayed in Figure 2.3—5.

***Attention! Cables connection to the video capture card should be done taking into account the positioning of the main wire of four-pin connector (Figure 2.3—4). You can connect the Watchdog cable to two-pin connector of FX video capture cards any way without taking into account the positioning of the main wire.***

*Note. To specify the positioning of the main wire (earth conditioned «–/–») the multimeter may be used in the resistance test mode. In this case the main wire is determined by 0 resistance value between contacts.*

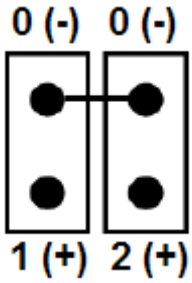



**Figure 2.3—4 Appearance and pinout of four-pin connector of video capture card: 0/0-main wire (earth conditioned «–/–»), 1/0 and 2/0- pairs of contacts for cables connections («+/–», «+/–»)**

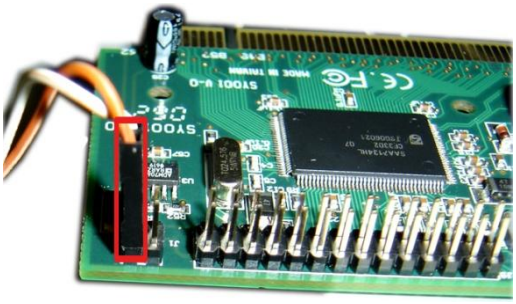


**Figure 2.3—5 The Reset button cable connection to the four-pin connector of FS-5 video capture card**

3. Connect the Watchdog cable to the vacant two-pin or four-pin connector of video capture card with the help of vacant pair of contacts (1/0 or 2/0) – Figure 2.3—4. The Watchdog cable connection to FS-5 video capture card is exemplified in Figure 2.3—6.

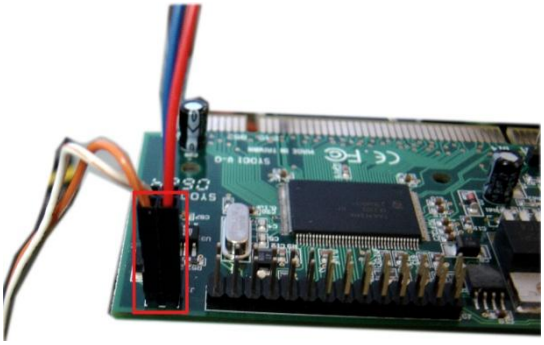


**Figure 2.3—6 Connection of the Watchdog cable to four-pin connector of FS-5 video capture card**

4. Connect the vacant end of the Watchdog cable to the connector on the mother board for the Reset button cable.

Connecting the Watchdog hardware performance tester is completed.

*Note 1. Connecting the Watchdog hardware performance tester is not correct if there is no reboot after pressing the Reset button.*

*If all the steps of connecting are correct then the Watchdog inoperativeness can be connected with inobservance of polarity while connecting the Watchdog cable to the mother board. Interchange the cables and reconnect the Watchdog cable to the mother board.*

*Note 2. Program setting of the Watchdog function is necessary to activate the hardware performance tester (see Configuring the Watchdog hardware performance tester section).*

### 2.3.2 Connecting the USB Watchdog hardware performance tester

In case of the USB Watchdog hardware performance testing the Reset button is connected to the computer mother board through the USB Watchdog device with the help of special Watchdog cable. The appearance of the USB Watchdog device is displayed in Figure 2.3—7

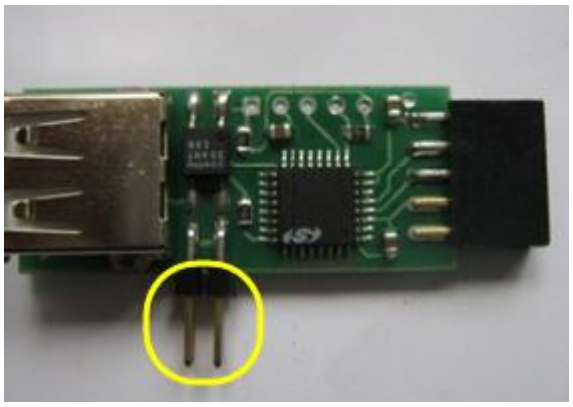


Figure 2.3—7 Appearance of the USB Watchdog hardware performance tester

Special four-pin connector is installed on the USB Watchdog device to connect the Watchdog cable (Figure 2.3—7).

To connect the USB Watchdog hardware performance tester, do the following:

1. Make sure that mother board is disconnected.
2. Connect the USB Watchdog device to USB connector on the mother board (Figure 2.3—8).

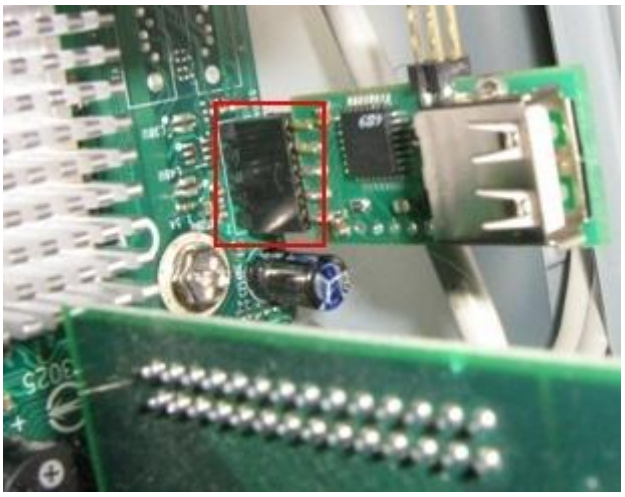


Figure 2.3—8 Connecting the USB Watchdog device to the mother board

3. Connect the Reset button cable to the four –pin connector of the USB Watchdog device with the help of a pair of contacts (1/0 or 2/0) (Figure 2.3—9). Connecting the Reset button cable to the USB Watchdog device is exemplified in Figure 2.3—10.

***Attention! Cables should be connected taking into account the layout of the main wire of four-pin connector on the USB Watchdog device (Figure 2.3—9).***

*Note. To specify the positioning of the main wire (earth conditioned «–/–») the multimeter may be used in the resistance test mode. In this case the main wire is determined by 0 resistance value between contacts.*

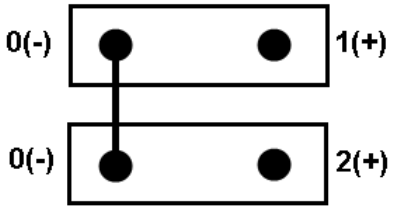



**Figure 2.3—9 Appearance and pinout of four-pin connector of the USB Watchdog: 0/0-main wire (earth conditioned «–/–»), 1/0 and 2/0- pairs of contacts for cables connections («+/–», «+/–»)**

**Figure 2.3—10 Connection of the cables to four-pin connector of the USB Watchdog device**

4. Connect the Watchdog cable to four-pin connector of the USB Watchdog device with the help of vacant pair of contacts (1/0, or 2/0) – Figure 2.3—10.
5. Connect the vacant end of the Watchdog cable to the connector on the mother board for the Reset button cable.

Connecting the USB Watchdog hardware performance tester is completed.

***Attention! The USB Watchdog hardware performance tester is activated with the help of reboot system (see INTELLECT™ software . Administrator's Guide).***

*Note 1. Connecting the USB Watchdog hardware performance tester is not correct if there is no reboot after pressing the Reset button.*

*If all the steps of connecting are correct then the USB Watchdog inoperativeness can be connected with inobservance of polarity while connecting the Watchdog cable to the mother board. Interchange the cables and reconnect the Watchdog cable to the mother board.*

*Note 2. USB connector on the USB Watchdog may be used for connecting any external USB devices to the computer. Connected USB devices do not influence on the USB Watchdog hardware performance tester.*

## 2.4 Connecting DI/DO cards

DI/DO card is connected to the video capture card and is used for connecting guard loops (DI) and DO to the control system - the server with installed INTELLECT™ software. General information about DI and DO is given in Table 2.4—1:

**Table 2.4—1 General information on DI/DO**

| Type of device | Description | Functions | Operation conditions | Changes in operation condition | Examples of devices |
|---|---|---|---|---|---|
| DI (digital in) | Interface line of external sensor and control system | Informs the control system about changes in sensor status | Closed– logical one<br>Open – logical zero | Opening/closing – when sensor detects the alarm | Annunciators (smoke, heat, window, etc), button |
| DO (digital out) | Interface line of control system and executive device | Changes operation condition of executive device on command from the control system | Closed – logical one<br>Open – logical zero | Opening/closing – on command from the control system. | Annunciators (light, sound, etc.), mechanized gates |

Electrical and technical specifications of DI/DO cards are given in *Appendix 6. Electrical and technical specifications of DI/DO cards* section.

### 2.4.1 Connecting 4/4 and 16/4 DI/DO cards

Multichannel digital-analogue converting 4/4 and 16/4 DI/DO cards may be installed on the server depending on security system requirements (Figure 2.4—1).

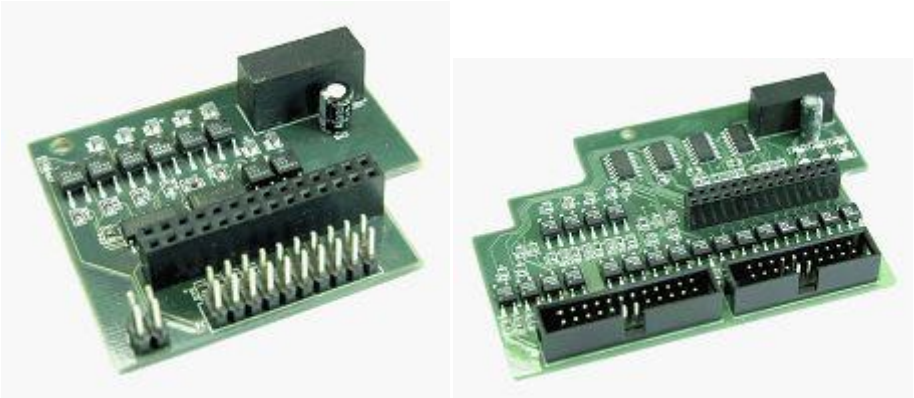


**Figure 2.4—1 The 4/4 and 16/4 DI/DO cards**

The 4/4 DI/DO cards enable to process the signals from 4 digital in, and the 16/4 cards - from 16 digital in. Simultaneously with the DI signals processing, these cards perform digital-analogue converting and delivering up to 4 control signals to executive devices (DO).

The 4/4 and 16/4 DI/DO cards have power (24V) and grounding leads and are installed on the FS-5, FS-6, FS-16, FS-8 video capture cards.

To connect DI/DO cards, do the following:

1. Make sure that power supply of the video capture card is off.
2. Install the DI/DO card on the video capture card with the help of special connectors. (Figure 2.4—2, Figure 2.4—3, Figure 2.4—4).

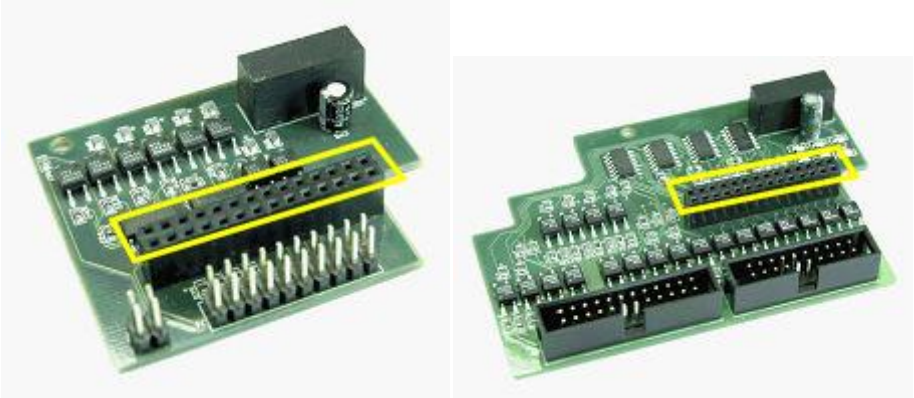


**Figure 2.4—2 Connector on the DI/DO card for connecting to the video capture card (is exemplified in 4/4 and 16/4 DI/DO cards)**

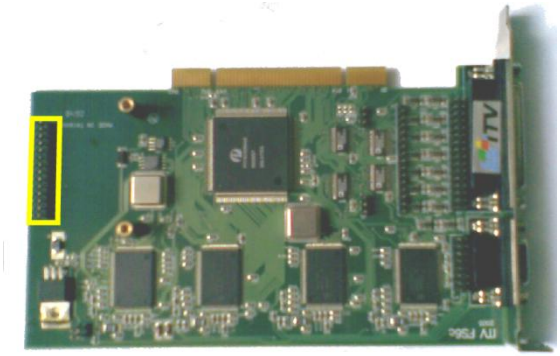


**Figure 2.4—3 Connector on the video capture card for connecting the DI/DO card (is exemplified in FS6 video capture card)**

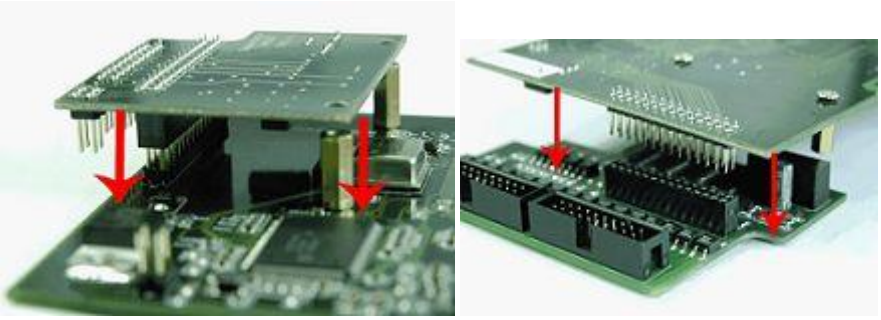


**Figure 2.4—4 Installation of the DI/DO card on the video capture card (is exemplified in 4/4 and 16/4 DI/DO cards and FS6 video capture card)**

3. Fix the DI/DO card on the video capture card with the help of screws included in the distribution kit of the DI/DO card.
4. Connect the interface cable included in the distribution kit of the DI/DO card, to the DI/DO card with the help of special connector (Figure 2.4—5, Figure 2.4—6, Figure 2.4—7, Figure 2.4—8)

*Note. For interface cable connection the 4/4 DI/DO card has J6 connector, 16/4 DI/DO card has J6 and J7 connectors (Figure 2.4—6, Figure 2.4—7).*

***Attention! The first wire of the interface cable (marked red) should match the first pin of corresponding connector of the DI/DO card (Figure 2.4—6, Figure 2.4—7, Figure 2.4—8).***

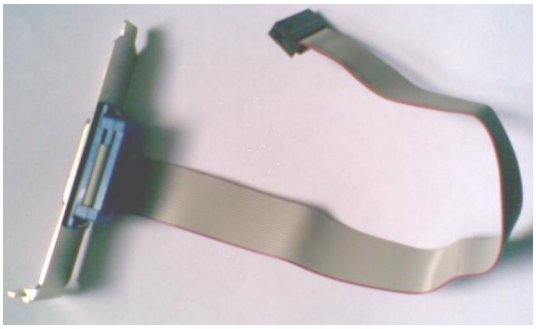


Figure 2.4—5 DI/DO interface cable

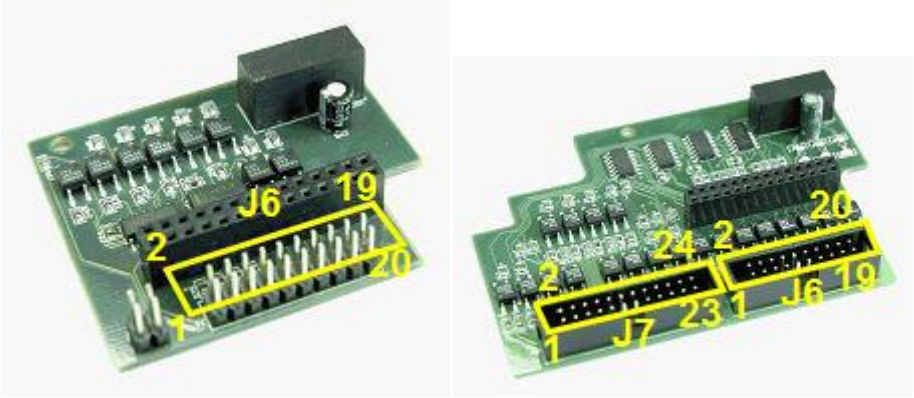



Figure 2.4—6 Connectors on the DI/DO card for the interface cable connection (is exemplified in 4/4 and 16/4 DI/DO cards)

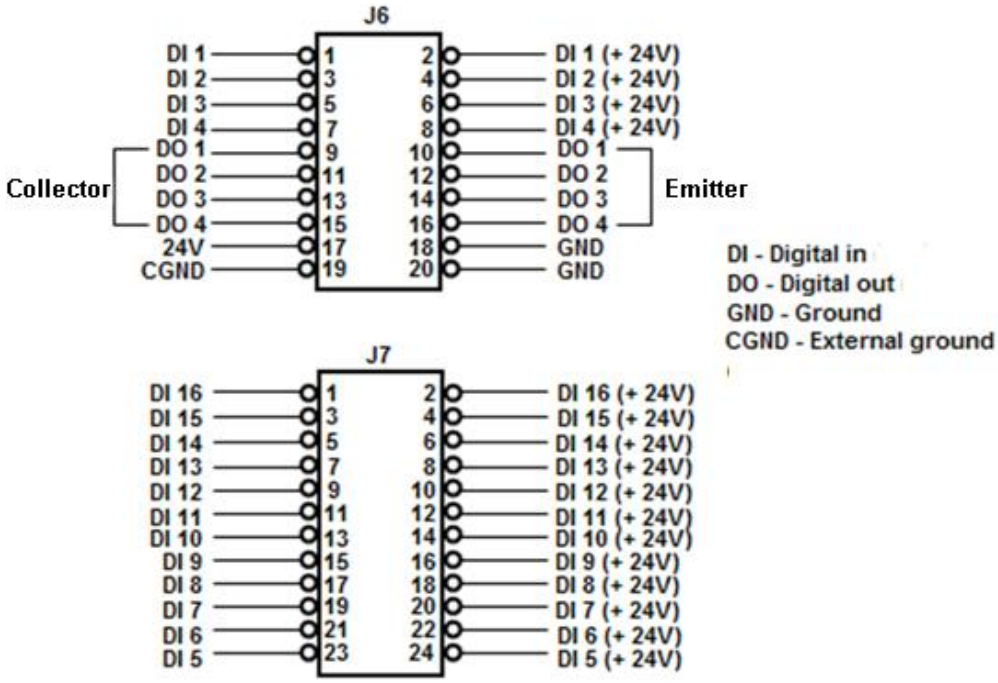



Figure 2.4—7 J6 and J7 connector pinout

Figure 2.4—8 Example of the interface cable connection to the 4/4 DI/DO card

5. To connect DI/DO, unsolder the connector included in the distribution kit of the DI/DO card. Unsoldering is made in accordance with the external connector pinout of the DI/DO interface cable, taking into account power circuit of connected devices (Figure 2.4—9, Figure 2.4—10, Figure 2.4—11, Figure 2.4—12).

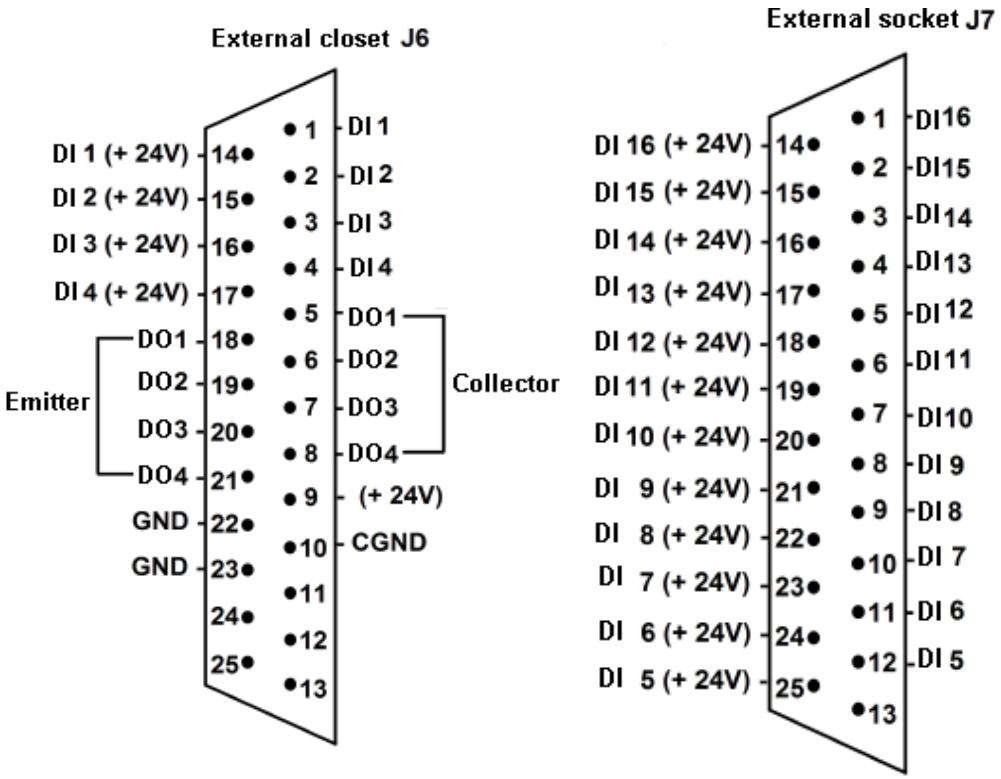



Figure 2.4—9 External connector pinout of the DI/DO interface cable

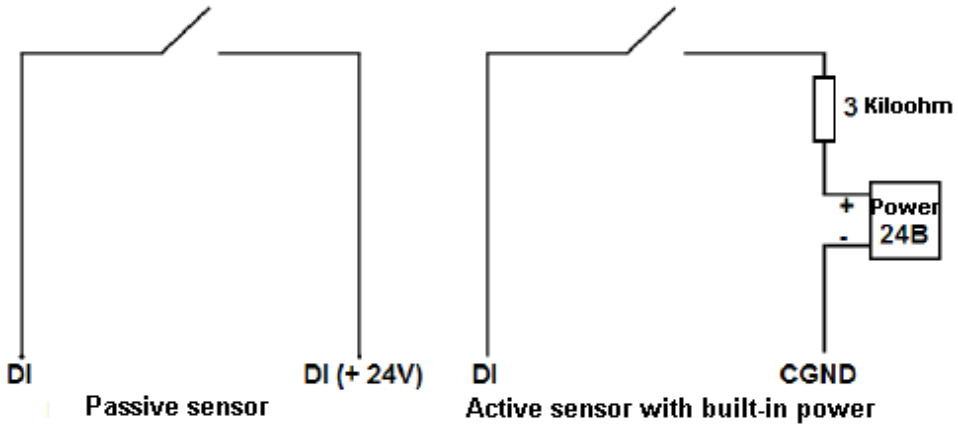



Figure 2.4—10 DI types and features of their connection

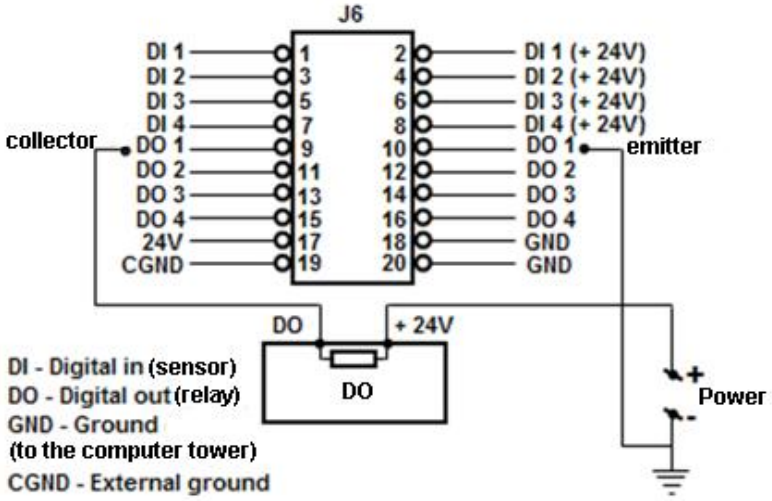



Figure 2.4—11 Example of power DO connection (with external power supply)

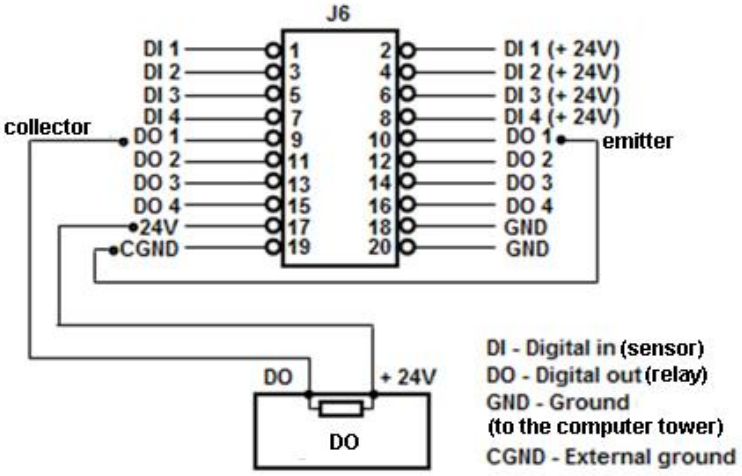



Figure 2.4—12 Example of low-power DO (power supply on the card)

6. Fix the unsoldered connector in the casing included in the distribution kit of the DI/DO card.
7. Connect ready-for-use connector to external connector of the DI/DO interface cable in order to connect DI/DO to the Server.

The DI/DO cards connection is completed.

### 2.4.2 Connecting 4/4 DI/DO (low profile) cards

Building security video subsystem with the use of FS115/FX4/FX8/FX16 video capture cards one can install 4/4 DI/DO cards (low profile) in order to connect external sensors (DI) and executive devices (DO) to the Server.

To connect the 4/4 DI/DO (low profile) card, do the following:

1. Make sure that the computer is turned off.
2. Connect the 4/4 DI/DO (low profile) card to the video capture card with the help of loop included in the distribution kit. The loop is connected to J2 and J3 connectors (Figure 2.4—13, Figure 2.4—14 and *Appendix 5. Video capture cards pins* section).

*Note. The loop is to be connected to the second row of the J2 connector. In diagrams a black wire is marked red.*

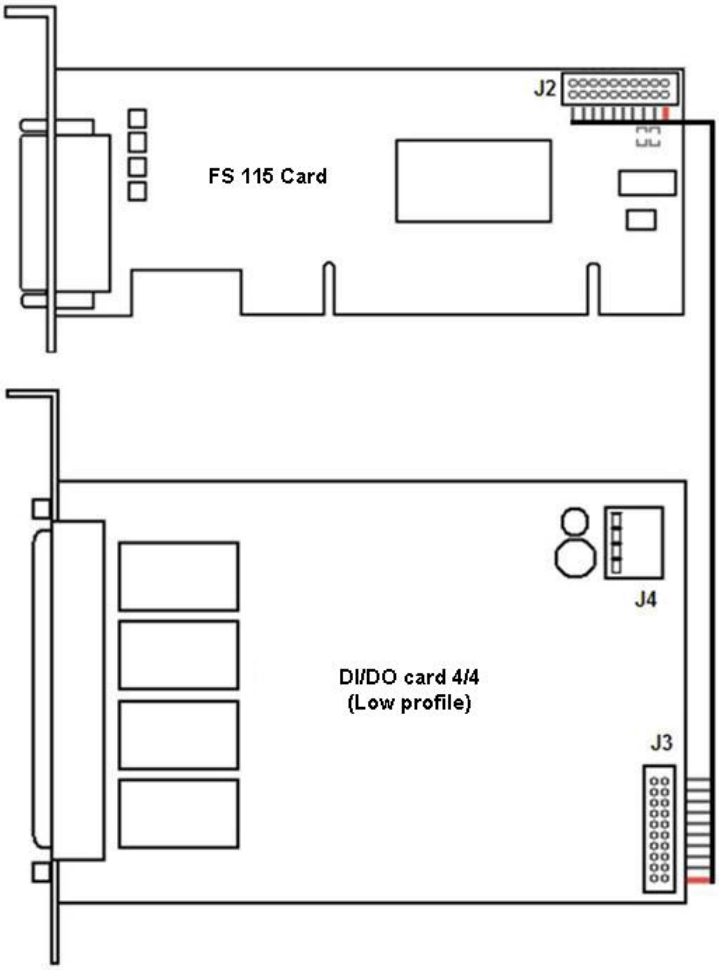



Figure 2.4—13 Diagram of the 4/4 DI/DO (low profile) card connection to FS115 card

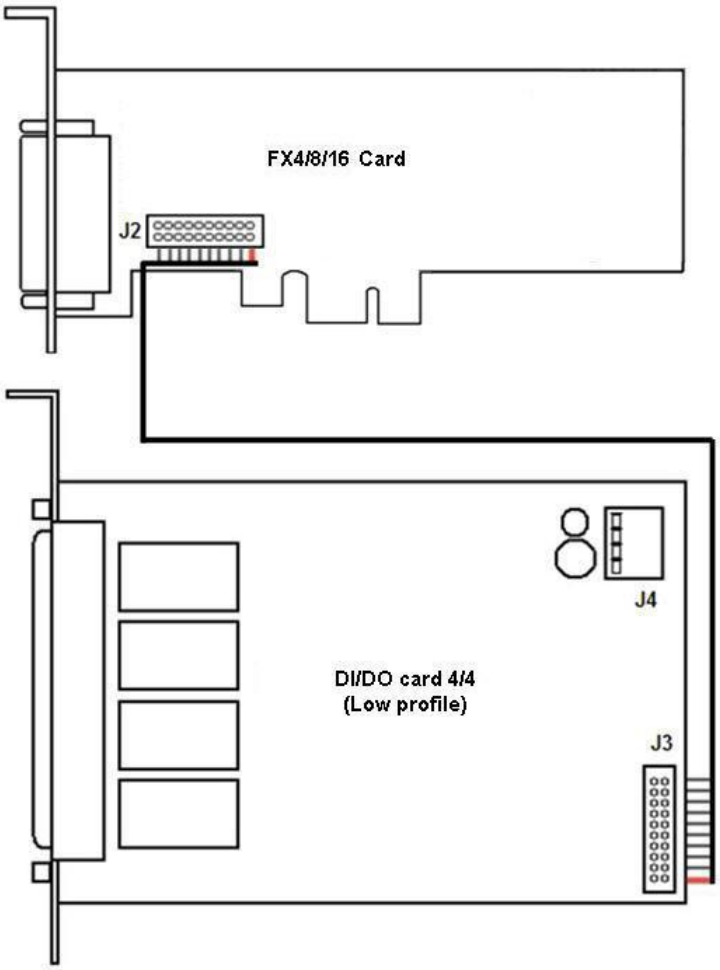



Figure 2.4—14 Diagram of the 4/4 DI/DO (low profile) card connection to FX4/8/16 cards

3. Connect the cable of computer PSU (disk drive power supply) to J4 connector (Figure 2.4—13) of the 4/4 DI/DO (low profile) card.
4. Install the card into vacant computer slot and fix it in the casing with the help of screw.
5. To connect DI/DO, unsolder the connector. Unsoldering is made in accordance with the external connector pinout of the 4/4 DI/DO (low profile) card (Figure 2.4—15).

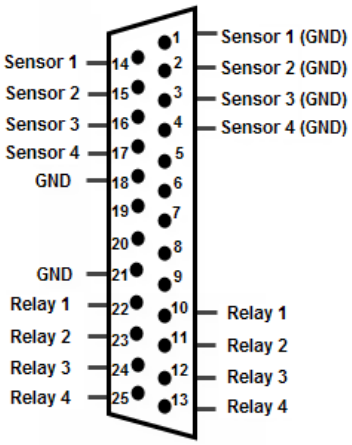



Figure 2.4—15 External connector pinout of the 4/4 DI/DO (low profile) card

6. Connect ready-for-use connector to external connector of the 4/4 DI/DO (low profile) card in order to connect DI/DO to the Server.

The 4/4 DI/DO (low profile) card connection is completed.

### 2.4.3 Connecting SL USBIO («4x4», «16x8», «24x4») cards

The SL USBIO card is an interface of external sensors (DI) and external executive devices (DO) as a part of video surveillance and fire and security alarm systems.

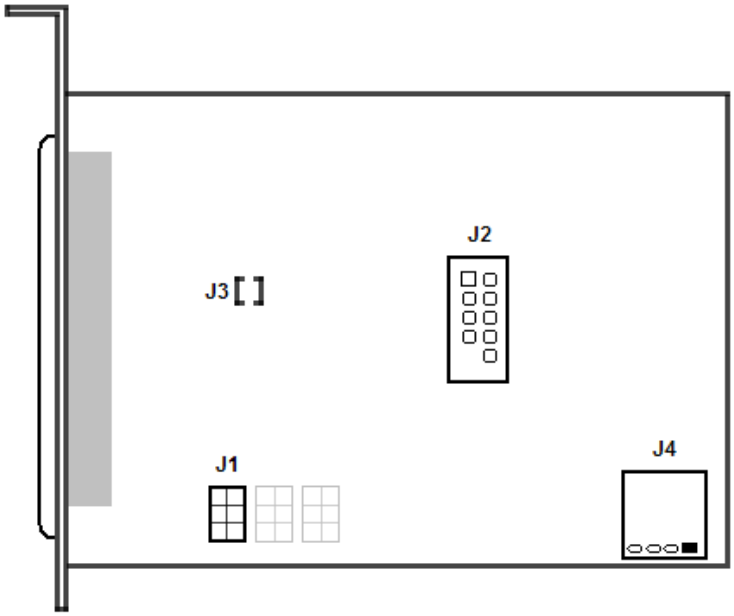
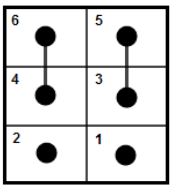


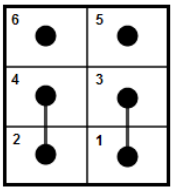

Figure 2.4—16 Connector layout of the SL USBIO card

To connect the SL USBIO card to the Server, do the following:

1. For each DI (sensor) setup a power supply by shifting the J1 jumper in corresponding contact set (Figure 2.4—16 and Figure 2.4—17).




Sensor functioning from power supply in device




Sensor functioning from external power supply (polarity of external voltage is not important)

Figure 2.4—17 Setting sensor power supply

2. Switch the computer power supply off. Remove the system cover.
3. Install the SL USBIO card into vacant motherboard slot and fix it in the casing.
4. Connect the loop (included in the distribution kit) to the J2 connector and to vacant USB connector on computer motherboard (Figure 2.4—16).
5. To activate the hardware tester of pending, connect wires to the J3 connector (Figure 2.4—16) (see *Connecting the hardware performance tester* section).

*Note. The SL USBIO 4x4 card does not have the **J3** connector.*

6. If it is necessary to connect via the USB port (USB cable of A-A type) or connect the USB device then use the J4 port (Figure 2.4—16).

*Note. The SL USBIO 4x4 card does not have **J4** port.*

7. To connect DI/DO, unsolder the connector and fix it in the casing included in the distribution kit. Unsoldering is made in accordance with the external connector layout (see *Appendix 6. Electrical and technical specifications of DI/DO cards* ).
8. Connect the ready-for-use connector to external connector of the SL USBIO card.

The SL USBIO card connection is completed.

### 2.4.4 Connecting MO USBIO 4x4 cards

The MO USBIO 4x4 card is an interface of external sensors (DI) and external executive devices (DO) as a part of video surveillance and fire and security alarm systems (Figure 2.4—18).

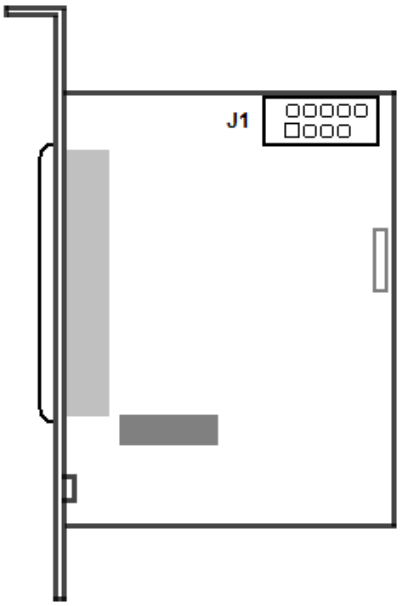



**Figure 2.4—18 Connector layout of the MO USBIO 4x4 card**

Device is controlled via the USB interface. Electrical and technical specifications of the card are given in *Electrical and technical specifications of MO USBIO 4x4* section.

To connect the MO USBIO 4x4 card to the Server, do the following:

1. Switch the computer power supply off. Remove the system cover.
2. Install the MO USBIO 4x4 card into vacant motherboard slot and fix it in the casing.
3. Connect the loop (included in the distribution kit) to the J1 pin and to vacant USB connector on computer motherboard (Figure 2.4—18).
4. To connect DI/DO, unsolder the connector included in the distribution kit. Unsoldering is made in accordance with the external connector pinout of the MO USBIO 4x4 card (Figure 2.4—19).

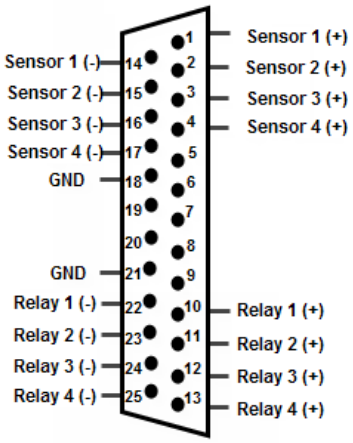



Figure 2.4—19 External connector pinout of the MO USBIO 4x4 card

5. Fix the unsoldered connector in the casing included in the distribution kit.
6. Connect ready-for-use connector to external connector of the card in order to connect DI/DO to the Server.

The MO USBIO 4x4 card connection is completed.

### 2.4.5 Connecting DI/DO (Stretch)

#### *2.4.5.1 Connecting DI/DO cards to Stretch (VRC6004, VRC6008, VRC6416) cards*

Building security video subsystem with the use of Stretch (VRC6004, VRC6008, VRC6416) video capture cards one can install DI/DO cards in order to connect external sensors (DI) and executive devices (DO) to the Server.

To connect DI/DO card, do the following:

1. Change the SW1 switch on DI/DO card (Figure 2.4—20) in accordance with Table 2.4—2.

Table 2.4—2 Changing the SW1 switch

| DI/DO card | SW1 (1) | SW1 (2) |
|---|---|---|
| DI/DO card 1 | OFF | OFF |
| DI/DO card 2 | ON | OFF |

2. If DI needs a power supply (active sensors), then put the J6 jumper on 2 and 3 contacts, otherwise – on 1 and 2 contacts (passive sensors) (Figure 2.4—20).

*Note. The SW2 switch is used for the RS485 interface configuration.*

3. Make sure that the computer is turned off.
4. Connect the DI/DO card to the vodeo capture card with the help of a loop included in the distribution kit. The loop is connected to the J1 and J2 pins (see Figure 2.4—20 and *Appendix 5. Video capture cards pins* section).

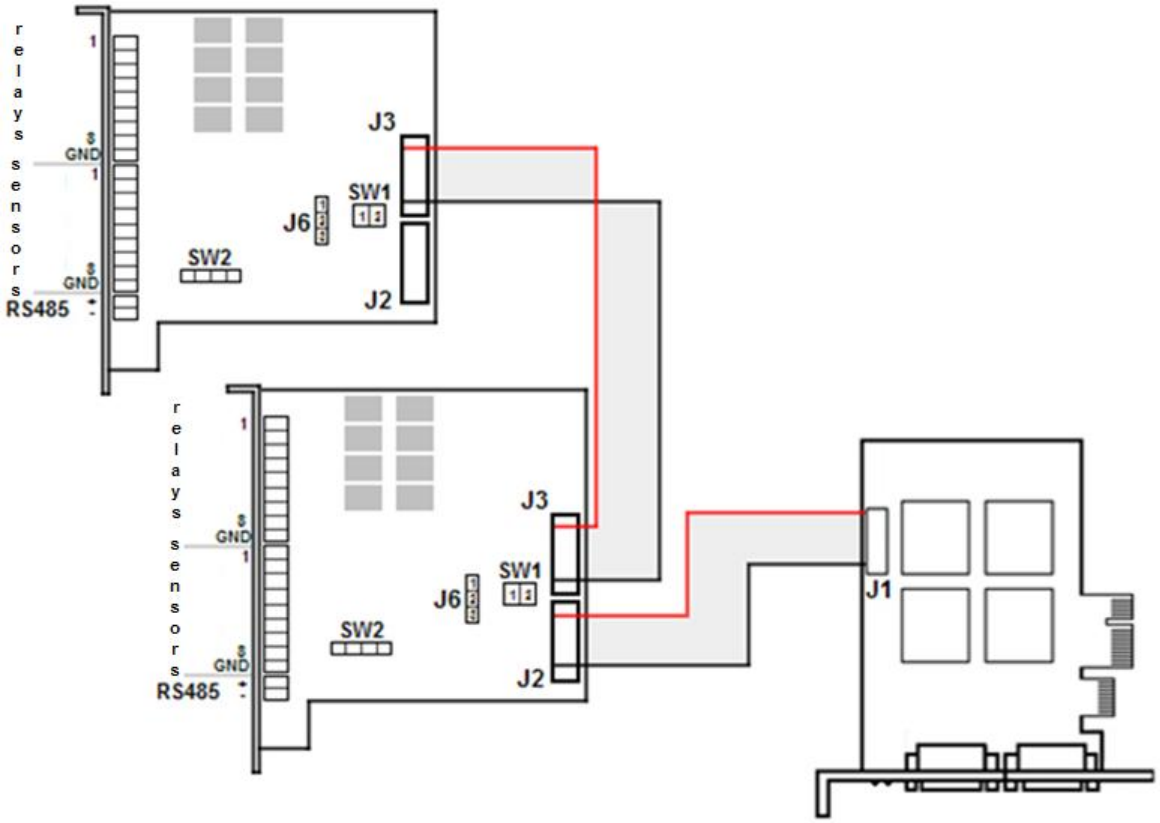



Figure 2.4—20 Connection of DI/DO card to Stretch VRC6416 card

5. If it is necessary connect one more DI/DO card. Connect the loop to the J3 pin on the first and second DI/DO card (Figure 2.4—20).
6. Install the DI/DO card into vacant motherboard slot and fix it in the casing.
7. Connect DI and DO in accordance with the pinout of external pin of the DI/DO card (Figure 2.4—20).

Connection of the DI/DO card is completed.

### *2.4.5.2 Connecting DI/DO cards to Stretch VRC7008L card*

Building security video subsystem with the use of Stratch VRC7008L video capture card one can install DI/DO cards in order to connect external sensors (DI) and executive devices (DO) to the Server.
To connect the DI/DO card, do the following:

1. If DI needs a power supply (active sensors), then put the SW1 jumper on 2 and 3 contacts, otherwise – on 1 and 2 contacts (passive sensors) (Figure 2.4—21).

*Note. The SW2 switch is used for the RS485 interface configuration. If two DI/DO cards are in use, then the RS485 interface is disabled on the second card.*

2. Make sure that the computer is turned off.
3. Connect the DI/DO card to the vodeo capture card with the help of a loop included in the distribution kit. The loop is connected to the J1 and J2 pins (Figure 2.4—21).

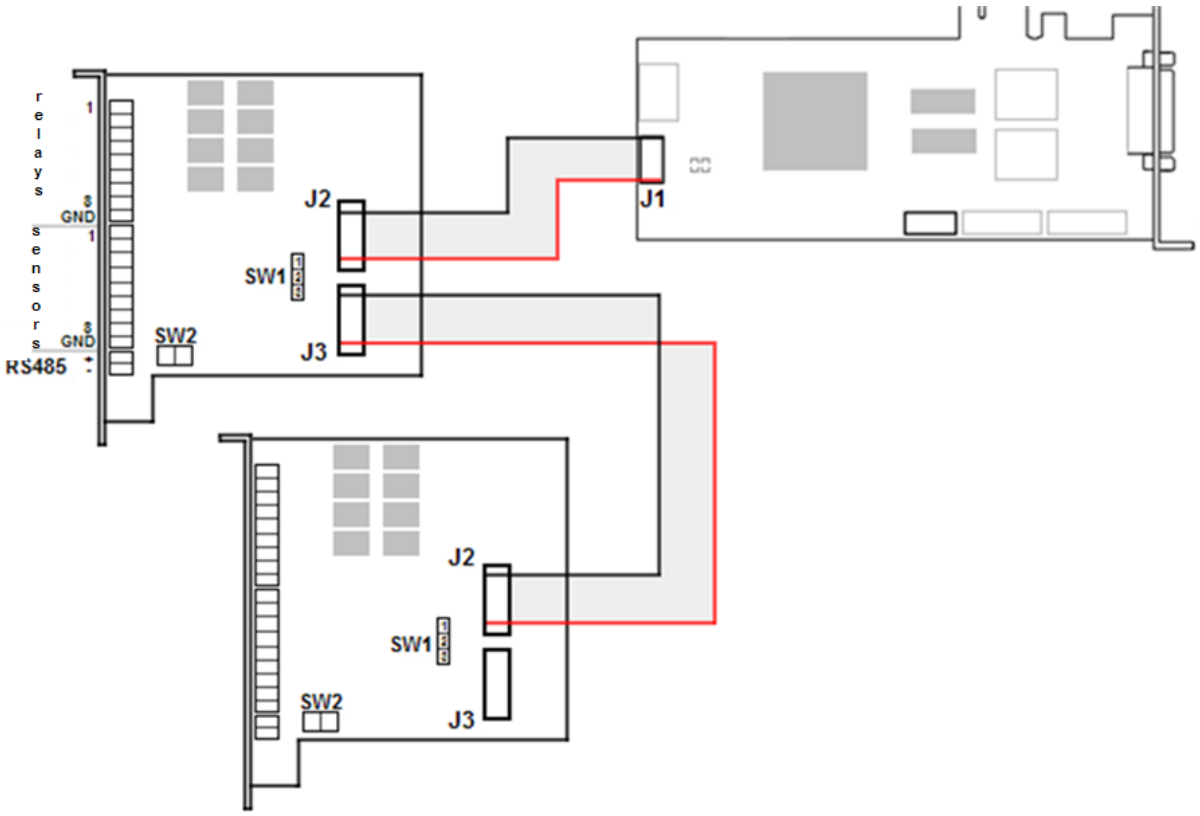



Figure 2.4—21 Connection of DI/DO card to Stretch VRC7008L card

4. If it is necessary connect one more DI/DO card. Connect the loop to the J3 pin on the first and to the J2 pin on the second DI/DO card (Figure 2.4—21).
5. Install the DI/DO card into vacant motherboard slot and fix it in the casing.
6. Connect DI and DO in accordance with the pinout of external pin of the DI/DO card (Figure 2.4—21).

Connection of the DI/DO card is completed.

## 2.5 Connecting MO USBIO 4x4 external module

The MO USBIO 4x4 module is an interface for external sensors (DI) and external executive devices (DO) as a part of video surveillance and fire and security alarm systems (Figure 2.5—1).

Figure 2.5—1 «MO USBIO 4x4» module

External module is controlled via the USB interface. Electrical and technical specifications of the module are given in *Electrical and technical specifications of MO USBIO 4x4* section.

To configure the MO USBIO 4x4 external module, do the following:

1. Connect the MO USBIO 4x4 module to the server via the USB cable included in the distribution kit.
2. To connect DI/DO, unsolder the connector included in the distribution kit. Unsoldering is made in accordance with the external connector pinout of the MO USBIO 4x4 module. Depending on module modification one of jack pinout shown in Figure 2.5—2 can be in use.

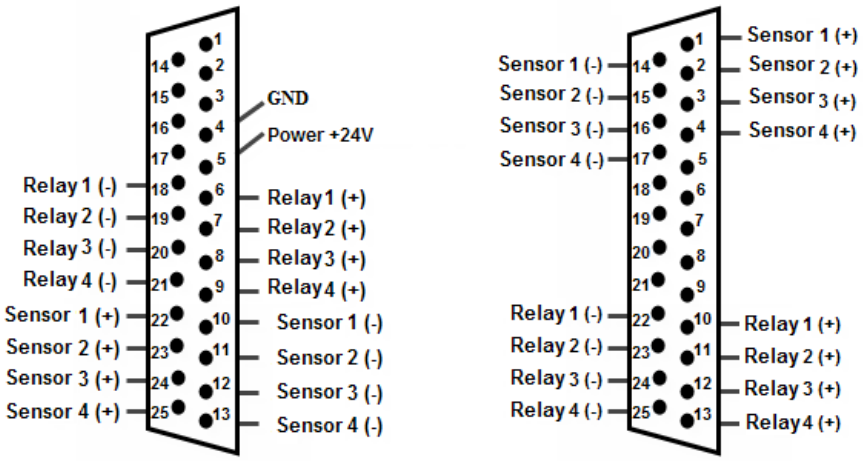



Figure 2.5—2 Jack pinouts of the MO USBIO 4x4 module

3. Fix the unsoldered connector in the casing included in the distribution kit.
4. Connect ready-for-use connector to external connector of the card in order to connect DI/DO to the Server.

The MO USBIO 4x4 external module configuration is completed.

## 2.6 Assembly and installation of audio subsystem hardware components

INTELLECT™ software supports synchro video and audio recording and remote audio monitoring.

To enable operation of the audio subsystem, the Operator Workstation should be equipped with auxiliary hardware, such as sound cards, microphones, loud speakers and earphones.

### 2.6.1 Supported sound cards and other audio input devices

The following audio input devices can be used in the audio subsystem:

1. Standard sound cards installed in a computer or motherboards integrated in a computer.
2. Multi-channel sound cards such as Comart Hera, MidiMan Delta and Olkha 9P.
3. Ekholot USB-32, an external module for multi-channel audio signal input (32 channels).
4. Audio input channels of the network devices.
5. Audio input channels of FS/WS cards. As these cards do not have audio output channels for playing back the audio signal, a sound card is to be installed.

### 2.6.2 Options for increasing the number of audio input channels when standard sound cards are used

INTELLECT™-based server can process as many analog audio signals as specified in the key file.

As a rule a standard sound card has only one stereo audio input channel. To increase the number of audio input channels, the following options are offered:

1. Use a stereo audio input channel of a standard sound card as two separate mono-channels.
2. Use audio input channels of video capture cards.
3. Install several standard sound cards on the server.

*Note. Several sound cards of the same type installed within the system may cause conflicts in Windows OS.*

4. Use multi-channel audio input cards (special sound cards support up to 16 separate audio input channels).
5. Use Ekholot USB-32, an external module for multi-channel audio signal input (32 channels).

### 2.6.3 Installing audio input devices

Manuals for installing sound cards of other manufacturers and the drivers for these cards, as well as any other devices are given in the documentation supplied with the hardware.

Sound channels of the network devices do not require any additional installation. The only requirement is that the device supports communication with the Server via the TCP/IP protocol.

### 2.6.4 Installing microphones and loud speakers

Microphones are to be installed in inaccessible places, ensuring unobstructed receipt of audio signals. Each microphone is connected to a sound card installed in a computer or to an audio plug on a videocapture card.

Loud speakers or earphones designed for audio signal receipt are installed in the Operator Workstation. Loud speakers or earphones are connected to the audio output plug of the sound card.

The layouts of pins for connecting microphones and earphones or loud speakers are given in the documentation for the sound cards.

Pins supplied with a video capture card are used to connect microphones to these video capture cards.

## 2.7 Connecting PTZ units and control panels

***Attention! Before one starts working with a control panel or a PTZ unit it is necessary to read the list of integrated devices and protocols at AxxonSoft's official website. If the connected device is not in the list, then its operation is not guaranteed.***

The PTZ unit and control panel are connected to the server via a free serial port (COM) (RS-232 interface) (Figure 2.7—1).

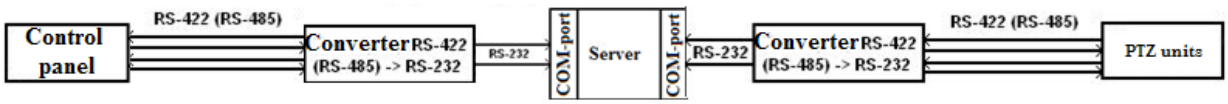



Figure 2.7—1 Connecting PTZ units and control panels

As a rule, PTZ units use RS-422 or RS-485 interfaces. The PTZ unit is connected to a COM port of a server with RS-232 interface via RS-422 converter (RS-485) ⇒ RS-232.

The PTZ unit uses RS-422/RS-485 based on a 4-wires diagram (2 wires for receipt and 2 wires for transmission). To control PTZ units from INTELLECT™, only 2 wires are used (transmitting data from the Server to the PTZ). The “T+” and “T-” contacts of the converter are connected to the “R+” and “R-” contacts of the PTZ.

The control panel is connected via converter RS-422 (RS-485) → RS-232. Only two wires, connected to the Server, are used to control PTZ units via control panel from INTELLECT™.

The PTZ unit and control panel controlling this PTZ unit are to be connected to one Server.

Detailed information about connecting PTZ units and control panels is given in the documentation accompanying the corresponding devices and converters. An example of controlling PTZ units with the help of control panel is described in the *Telemetry configuration* section.

## 2.8 Connecting and configuring network devices

Network devices allow remote video surveillance and audio monitoring using the TCP/IP telecommunication environment.

Network devices can be defined as separate hardware and software units integrated in the digital video surveillance system using the TCP/IP telecommunication environment. To work with network devices, the system requires connection to the telecommunication network using TCP/IP to interact with other components of the digital video surveillance system.

Network devices for video surveillance and audio monitoring are:

1. network cameras (IP-cameras);
2. various types of network videoservers.

Network cameras are designed for video surveillance and transmission of the digital video signal to the users via the TCP/IP telecommunication environment.

*Note. Ifa network camera is equipped with an analog camera instead of a digital one, then a video signal is first digitized by an AD converter embedded in the camera and then transmitted to the users via the TCP/IP telecommunication environment.*

Network videoservers are connected directly to the analog cameras; they digitize analog video signal and transmit it to the users via the TCP/IP telecommunication environment. The users operating analog cameras connected to the network servers can use the same functionality range for the video stream playback and transmission, as the functionality of network cameras.

Network devices are connected via a standard network pin RJ-45.

Detailed information on connecting network devices to Server is given in the documentation for corresponding network devices.

# 3 Configuring security system components in INTELLECT™ software

## 3.1 Configuring video capture cards in INTELLECT™ software

### 3.1.1 Video subsystem configuration

To set up a video subsystem in the INTELLECT™ software create the **Video capture card** objects under which the **Camera** objects are created.

#### *3.1.1.1 Creating and configuring the Video capture card object*

To create the **Video capture card** object, do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box (Figure 3.1—1, 1).
2. Select **Create object** -> **Video capture card** in the context menu of the **Computer** object (Figure 3.1—1, 2).

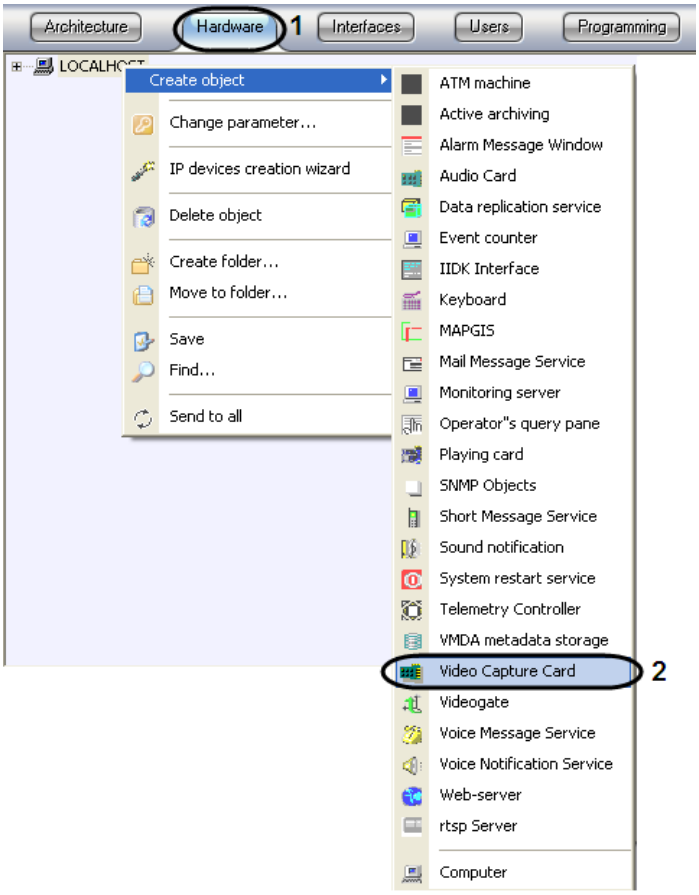



Figure 3.1—1 Context menu of the Computer object

As a result the basic settings toolbar is displayed (Figure 3.1—2).

*Note. Basic settings are specified automatically. It is possible to change an ID, object name and parent object.*

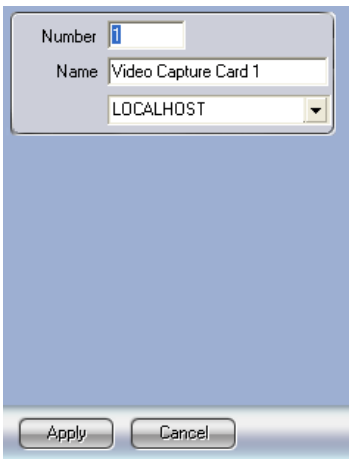



Figure 3.1—2 Basic settings of the object

3. To create the object, click Apply.
4. Select the created object in the object tree (Figure 3.1—3, 1).

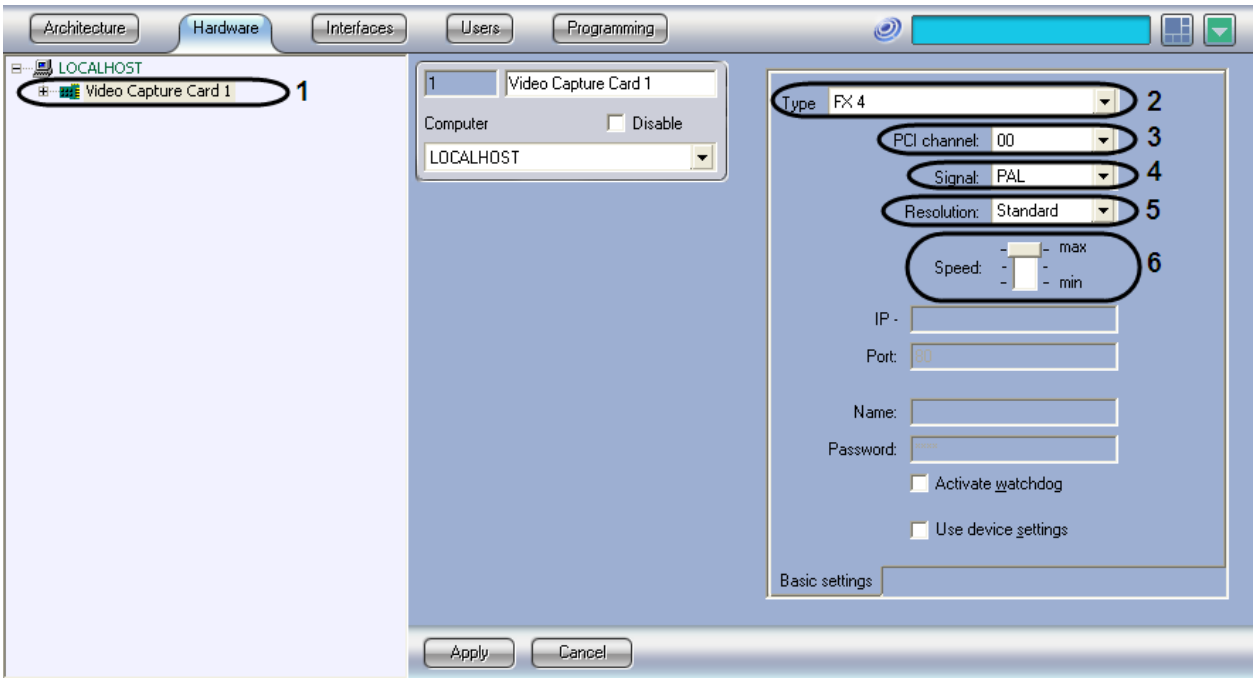
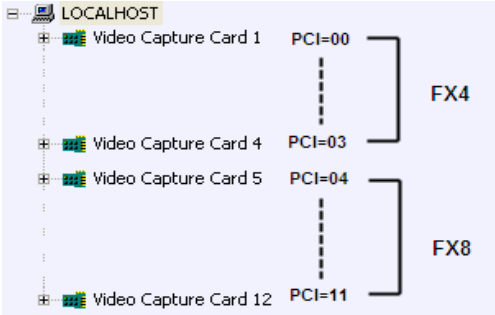
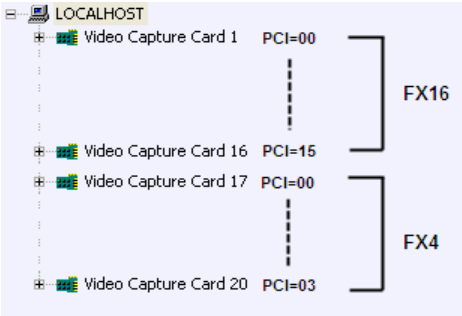



Figure 3.1—3 Configuring the Video capture card object

5. Configure the created object.
   5.1. From the **Type** list select type of the video capture card installed on the Server (Figure 3.1—3, 2).
   5.2. Specify the PCI channel by selecting value from the **PCI channel** list (Figure 3.1—3, 3). For cards based on one chip model (ADC) and one driver (see *Drivers for video capture cards integrated into the INTELLECT™* software section) there is end-to-end distribution of PCI channels that starts with '00' (Figure 3.1—4).




PCI channels distribution for cards based on one chip model (ADC)




PCI channels distribution for cards based on different chip models (ADC)

Figure 3.1—4 Examples of PCI channels distribution

*Note. Configuring FX4 or FX8 video capture cards, take into account the correlation between the color of BNC video input interface cable and PCI channel specified by INTELLECT™ software (see Features of video subsystem configuration section).*

5.3. From the **Signal** list select the type of video input (PAL or NTSC) (Figure 3.1—3, 4).

*Note 1. When Stretch VRC 6004, VRC 6008, VRC 6416, VRC 7008L cards are used, the video input (PAL or NTSC) is selected automatically depending on the camera connected to the card. Change of this parameter does not influence the card operation.*

*Note 2. When FX 116/416 cards are used, INTELLECT™ software should be restarted after changing the video input format. Otherwise the previous settings are active.*

5.4. In the **Resolution** list (Figure 3.1—3, 5) select the **Standard**, **High** or **Full** resolution with which the video signal is captured. This action should be carried out when network video hubs are configurated (e.g. WaveHub), otherwise this step can be skipped.

5.5. Specify allowable frame rate for the card by setting the **Speed** slider into the corresponding position (Figure 3.1—3, 6).

Table 3.1—1 Value of the Speed parameter

| Value | Description |
|---|---|
| Max | Maximum allowable sum of video frame rate |
| Mean | Half of allowable sum of video frame rate |
| Min | One third of allowable sum of video frame rate |

5.6. Click **Apply** to save the changes.

Setting the Video capture card object is completed.

***Attention! Configuration of one physical video capture card requires creation of several Video capture card objects (see Features of video subsystem configuration section).***

### *3.1.1.2 Creating and configuring the Camera object*

To create and configure the **Camera** object, do the following:

1. Select **Create object** -> **Camera** in the context menu of the **Video capture card** object (Figure 3.1—5).

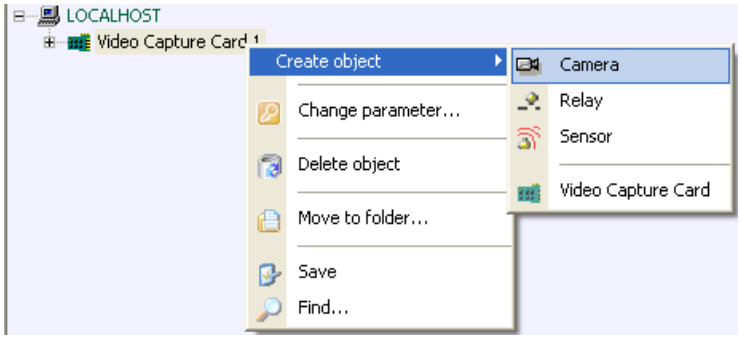



Figure 3.1—5 Context menu of the Video capture card object

As a result the basic settings toolbar is displayed (Figure 3.1—6).

*Note. Basic settings are specified automatically. It is possible to change an ID, object name and parent object.*

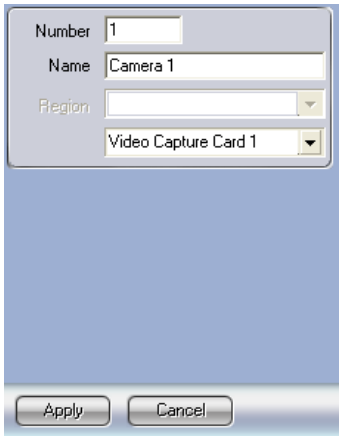



Figure 3.1—6 Basic settings of the object

2. To create the object, click Apply.
3. Select the created **Camera** object in the object tree (Figure 3.1—7, 1).

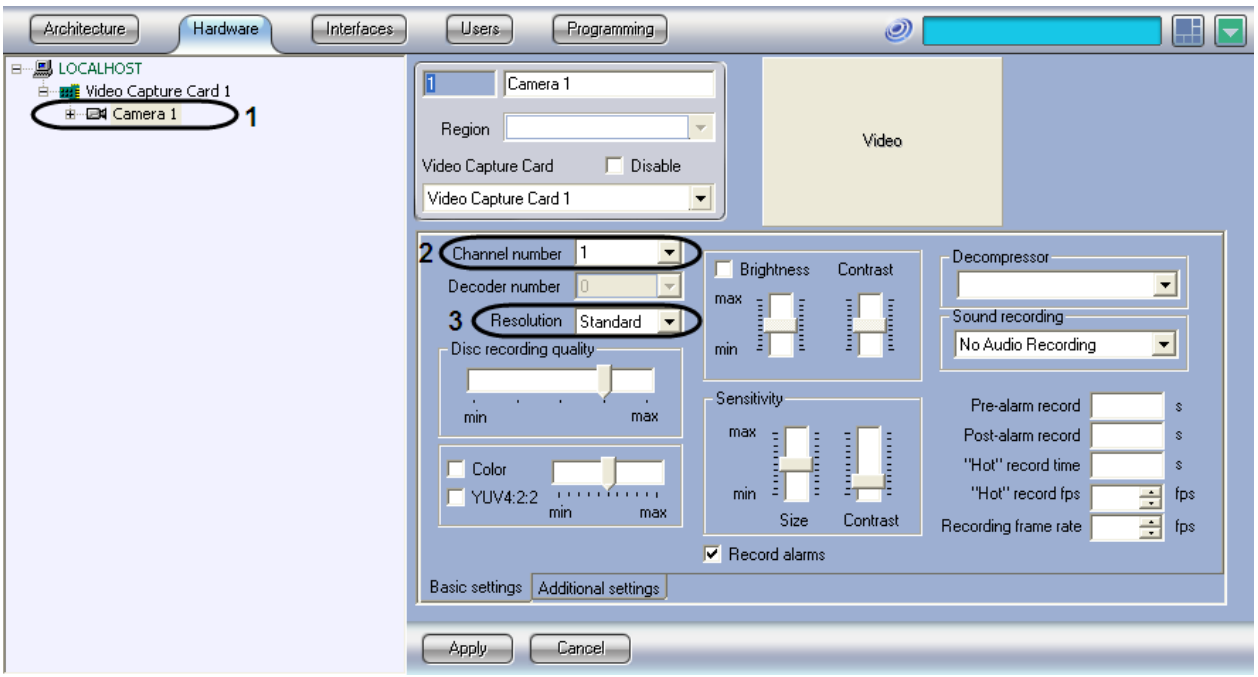



Figure 3.1—7 Configuring the Camera object

4. Configure the created object

4.1. From the **Channel number** list (Figure 3.1—7, 2) select a physical video output of the card to which the camera is connected (see *Features of video subsystem configuration* section).

*Note. Channel numbers within one Video capture card must not be repeated.*

4.2. In the **Resolution** list (Figure 3.1—7, 3) select the resolution: **Standard** – minimum accepted value for the card, High – mean value, Full – maximum accepted value with which a video signal is captured.

*Note. Resolutions supported by video capture cards are given in Appendix 4. Technical specifications of video capture cards .*

4.3. Click **Apply** to save the changes.

Configuring the **Camera** object is completed.

Repeat these actions for all cameras connected to the card.

*Note 1. Number of the Camera objects that can be created under Video capture card object is specified in Features of video subsystem configuration section.*

*Note 2. Detailed description of all settings of the Camera object is given in INTELLECT™ software . Administrator's guide.*

### *3.1.1.3 Configuring the analog video output*

Expansion cards are used optionally and they bring out this functionality and installed directly on video capture cards. Intellect software brings out functionality of analog (decompressed and unprocessed) video output to external devices via corresponding BNC connector on video capture card (TV-out) (see *Installing the expansion card for analog video out* section).

Video outputting to analog monitor is made directly (without digitization) from on of the video cameras connected to Server.

*Note. Configuring Intellect take into account that outputting of analog video to analog monitor is possible only from one camera.*

For video outputting to analog monitor a video capture card must have an analog video output. An analog video output is integrated into FS-8 video capture cards. An extra analog video output card should be installed for FS-5, FS-6, FS-16 cards.

A video from any Server camera can be output to an analog monitor. By default, a video from the camera connected to the same video capture card as a monitor can be output to an analog monitor. To output a video from any camera connected to any video capture card on the Server, solder analog outputs (interface cables) on all Server video capture cards.

*Note. When an analog video out card is connected to a video capture card and analog monitor connector to the corresponding BNC-connector on the video capture card, analog video outputting to analog monitor is activated automatically.*

To output the video from all cameras installed on the Server and connected to different video capture cards, to one analog monitor (perhaps when analog video outputs of cards installed on the Server are soldered) in tweaki.exe utility (Extended Intellect configuration) do the following:

1. Start **tweaki.exe** utility in the **Tools** folder of Intellect installation directory.
2. Select the **Video subsystem** section (Figure 3.1—8, 1).

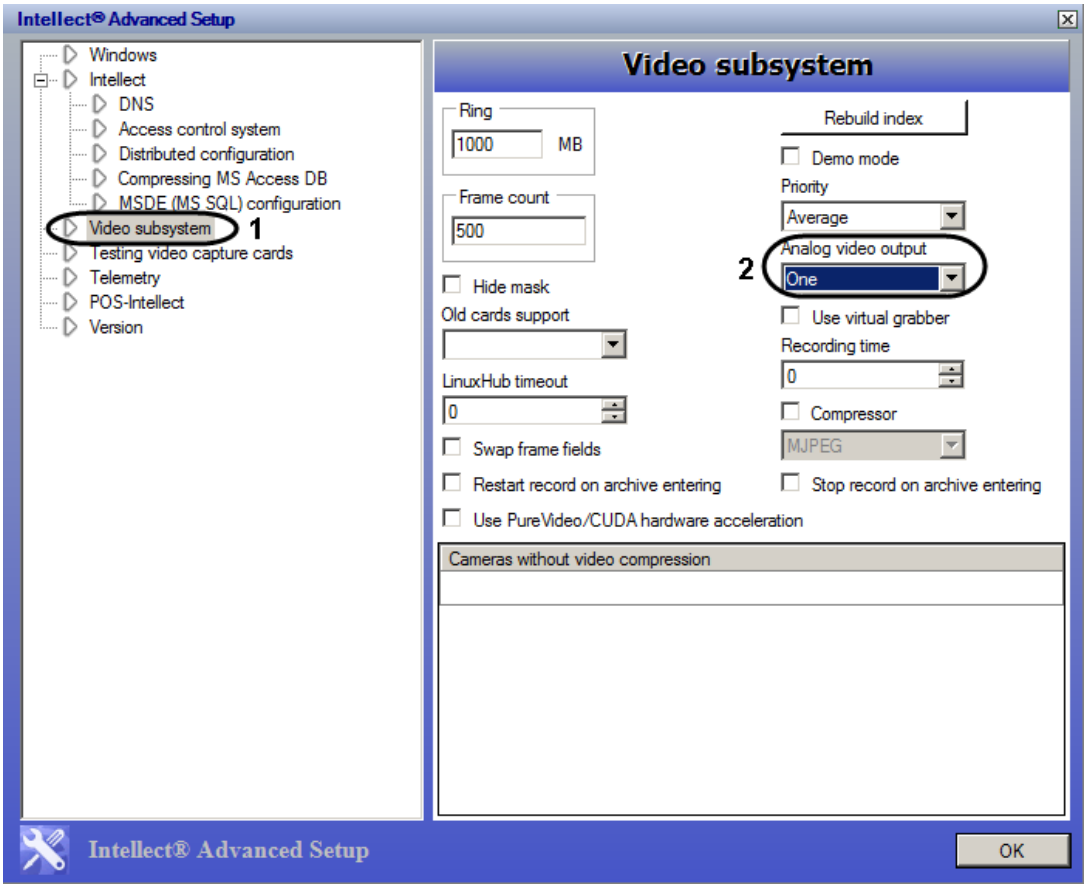



Figure 3.1—8 Extended Intellect configuration. Changig the value of the Analog video out parameter

3. In the **Analog video out** list select the **One** item to activate outputting video from cameras connected to different video capture cards to one analog monitor (Figure 3.1—8, 2).

Video commutation (switching) while outputting them to analog monitor is performed only within cameras connected to one video capture. Changing the Analog video out parameter allows to switch an extra program video commutator (switch) from all Server cameras connected to different video capture cards.

4. To save changes click **OK** (Figure 3.1—8).

If several analog cards are used, then the switch between cameras video from which is output to one analog monitor is made via macros and scripts (programs). For example for switching between two cameras one can create macros given in Table 3.1—2.

**Table 3.1—2 Macros for switching between cameras video from which is output to one analog monitor**

| Macro | Operations | | | |
|---|---|---|---|---|
| | **Type** | **Number** | **Name** | **Operation** |
| Macro 1 | Video capture card | | | Switch analog video out off 1 |
| | Camera | 1 | Camera 1 | Switch camera to output |
| Macro 2 | Video capture card | | | Switch analog video out off 1 |
| | Camera | 2 | Camera 2 | Switch camera to output |

*Note. Detailed description of making macros is given in INTELLECT™ software . Administrator's Guide.*

#### *3.1.1.4 Configuring Stretch video capture card*

To configure Stretch video capture card do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box.
2. Create the **Video capture card** object under the **Localhost** object.
3. Select **Stretch (<compressor>)** in the **Type** list on the setting panel of the object. As a result the setting panel is refreshed (Figure 3.1—9, 1).

*Note. When the **Stretch(H264SVC)** type is selected:*

1. *The number of available channels and speed of data input via them decreased (see Table 7.4—6 Technical specifications of VRC6004, VRC6008, VRC6416, VRC7008L and VRC6404HD video* capture cards*).*
2. *Some video artifacts appear when the resolution is maximum.*
3. *It is recommended to use the 'h264ffmpegdecoder' decompressor. Preffered decompressor is selected on the setting panel of the **Camera** object (see INTELLECT™ software . Administrator's Guide).*

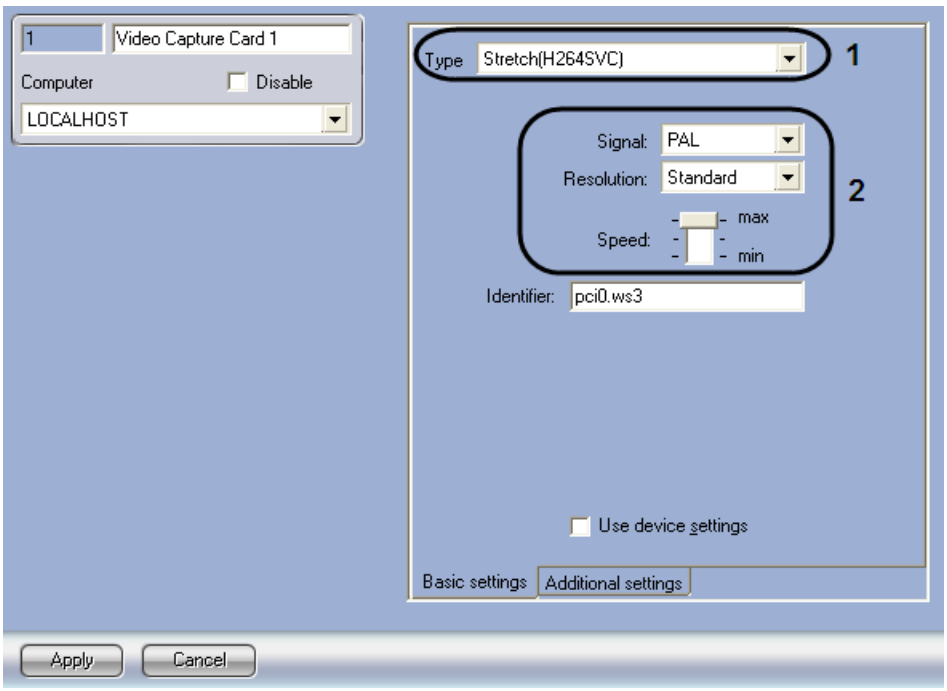



Figure 3.1—9 Setting panel of the Stretch video capture card. Basic settings tab

4. Set the values to the basic parameters of the card (Figure 3.1—9, 2). Detailed description of parameters is given in *Creating and configuring the Video capture card object* section (see 5.3 – 5.5 steps).
5. Go to the **Additional settings** tab (Figure 3.1—10, 1).

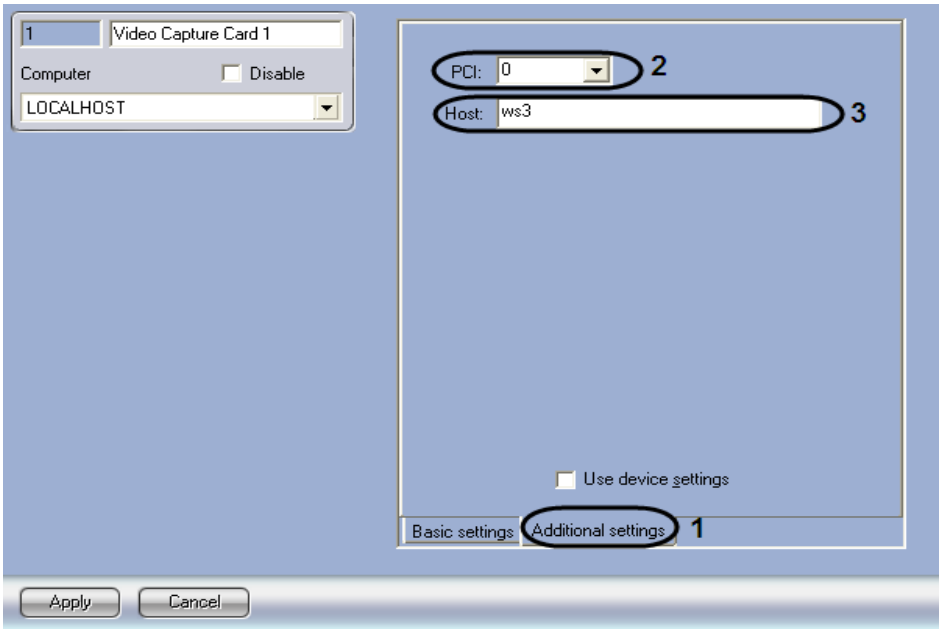



Figure 3.1—10 Setting panel of the Stretch video capture card. Additional settings tab

5.1. From the **PCI** list select number of a PCI channel (Figure 3.1—10, 2). Features of PCI channel distribution are given in *Creating and configuring the Video capture card object* section (see 5.2 step).

5.2. In the **Host** field enter the network name of computer (Figure 3.1—10, 3).

As a result the **Identifier** field is filled automatically on the **Basic settings** tab (Figure 3.1—11).

Figure 3.1—11 The Identifier field. Basic settings tab

6. To save changes click **Apply**.
7. Configure cameras connected to Stretch video capture card (see *Creating and configuring the Camera object* ).

Configuring Stretch video capture card is completed.

*Note. IP Wizard can be used to configure Stretch video capture cards in INTELLECT™ software (see IP Wizard section).*

#### *3.1.1.5 Configuring HikVision video capture card*

To configure HikVision video capture card do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box.
2. Create the **Video capture card** object under the **Localhost** object.
3. Select **HikVision(<compressor>)** in the **Type** list on the setting panel of the object.

*Note. IP Wizard can be used to configure HikVision video capture cards in INTELLECT™ software (see IP Wizard section).*

### 3.1.2 Audio subsystem configuration

In INTELLECT™ software the audio subsystem is configured with the help of the **Audio card** objects under which the **Microphone** objects (corresponding to connected audio devices) are created.

#### *3.1.2.1 Creating and configuring the Audio card object*

To create and configure the **Audio card** object, do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box (Figure 3.1—12, 1).
2. Select **Create object** -> **Audio card** in the context menu of the **Computer** object (Figure 3.1—12, 2).

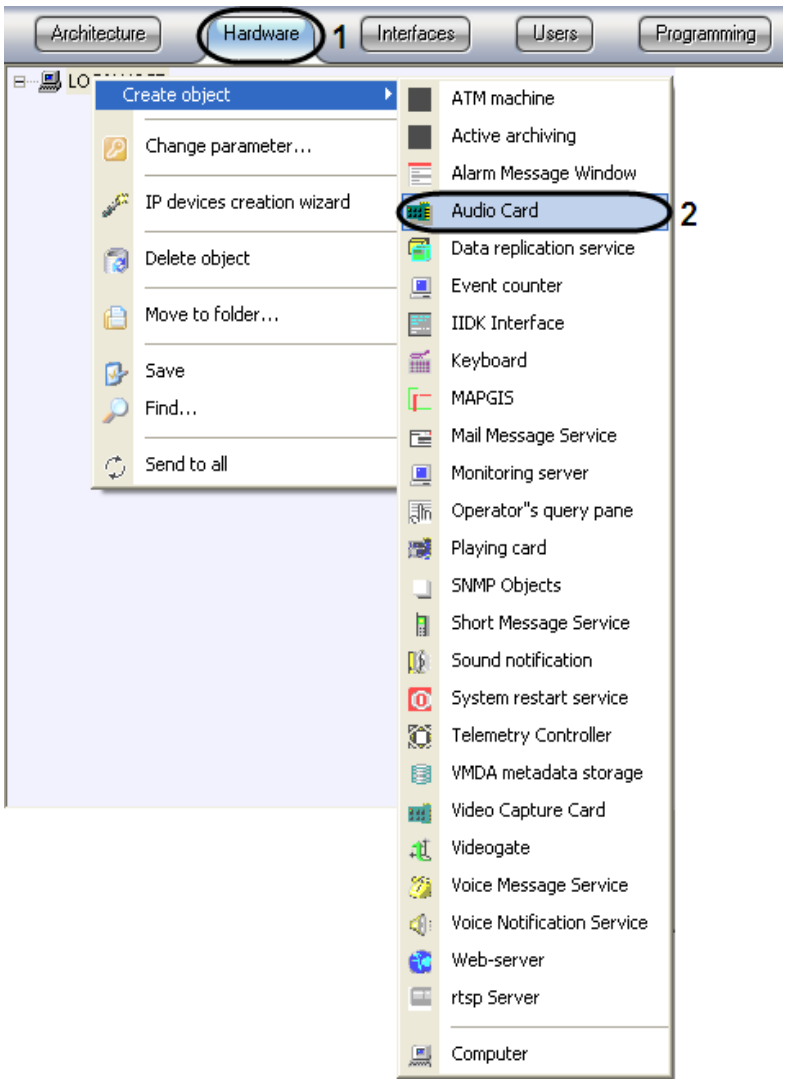



Figure 3.1—12 Context menu of the Computer object

As a result the basic settings toolbar is displayed (Figure 3.1—13).

*Note. Basic settings are specified automatically. It is possible to change an ID, object name and parent object.*

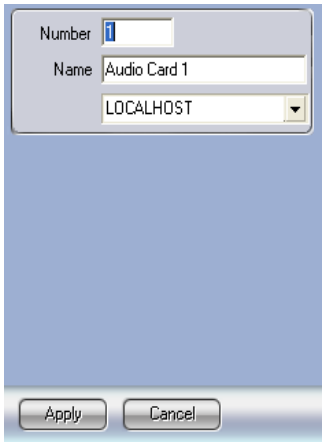



Figure 3.1—13 Basic settings of the object

3. To create the object, click **Apply**.

4. Select the created **Audio card** object in the object tree (Figure 3.1—14, 1).

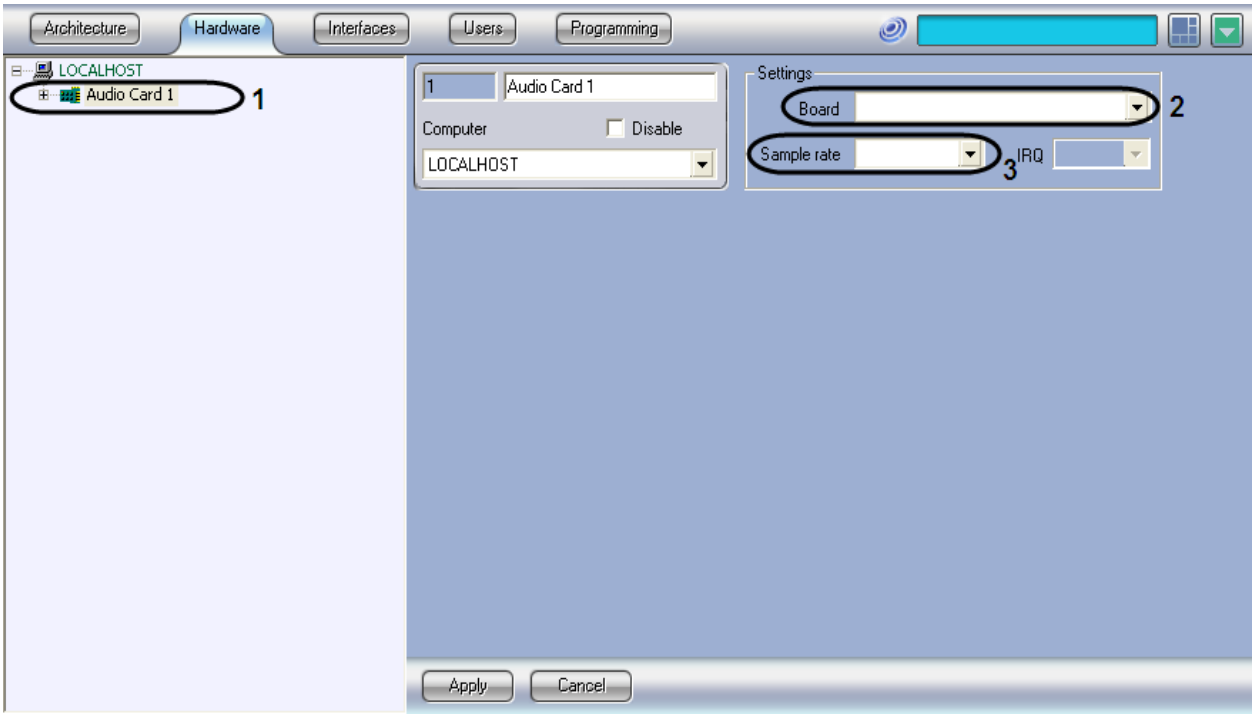



Figure 3.1—14 Configuring the Audio card object

5. Configure the created object.

5.1. In the **Board** list (Figure 3.1—7, 2) specify the type and PCI channel of the card (Figure 3.1—14, 2). Between the **Audio cards** objects there is end-to-end distribution of PCI channels that starts with '0'.

5.2. In the **Sample rate** list select the audio sample rate (Figure 3.1—14, 3).

*Note 1. Using channels from FS 5\6\16 cards set 8000, 16000 or 32000 sample rates while configuring the LinuxHub audio card. Otherwise there is no guarantee of receiving audio from FS5\6\16 cards. Set another sample rate if audo is received only from the embedded audio card.*

*Note 2. Sample rate for FX HD4 (SA 7160PCI) card (specified in the **Sample rate** list) is to be the same as the sample rate on the video camera. If rate values are not the same then slow-/fast- motion is possible.*

5.3. Click **Apply** to save the changes.

Configuring the **Audio card** object is completed.

***Attention! To configure one physical video capture card the creation of several Audio card objects is required (see Features of audio subsystem configuration section).***

### *3.1.2.2 Creating and configuring the Microphone object*

To create and configure the **Microphone** object, do the following:

1. Select **Create object** -> **Microphone** in the context menu of the **Audio card** object (Figure 3.1—15).

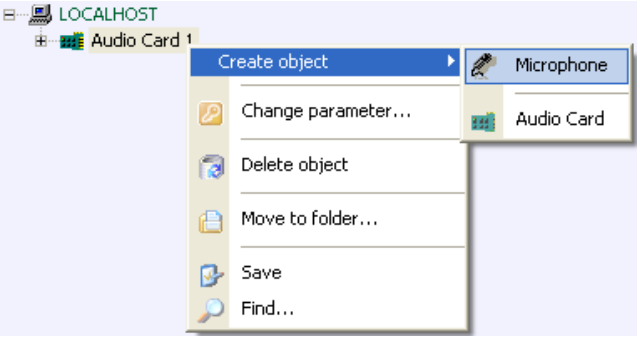



Figure 3.1—15 Context menu of the Microphone object

As a result the basic settings toolbar is displayed (Figure 3.1—16).

*Note. Basic settings are specified automatically. It is possible to change an ID, object name and parent object.*

Figure 3.1—16 Basic settings of the object

2. To create the object, click **Apply**.
3. Select the created **Microphone** object in the object tree (Figure 3.1—17, 1).

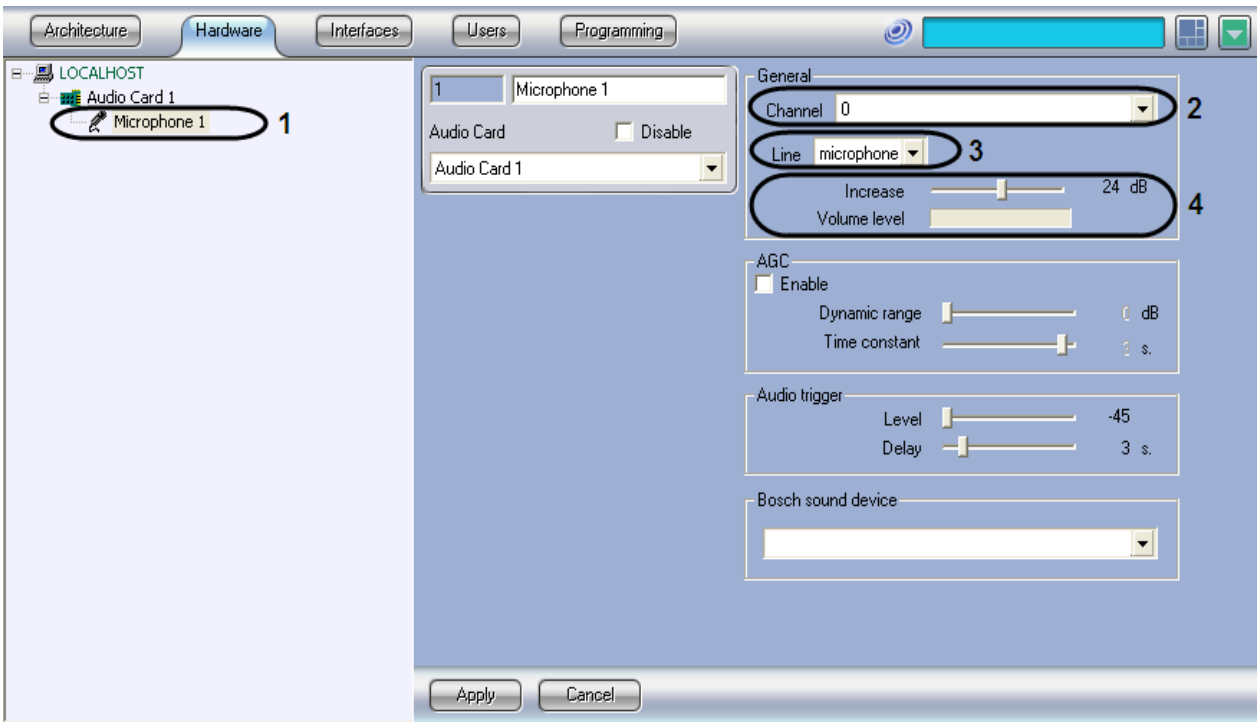



Figure 3.1—17 Configuring the Microphone object

4. Configure the created object.

4.2. In the **Channel** list (Figure 3.1—17, 2) select the channel to which the audio device is connected (see *Features of audio subsystem configuration* section).

4.3. In the **Line** list (Figure 3.1—17, 3) select the device type (microphone, by default).

4.4. Configure the level of sound volume using the **Increase** slider. Sound availability in the specific microphone and the increase value are in the **Volume level** graphic scale (Figure 3.1—17, 4).

4.5. Click **Apply** to save the changes.

Configuring the **Microphone** object is completed.

*Note 1. Number of the Microphone objects that can be created under one Audio card object is specified in Features of audio subsystem configuration section.*

*Note 2. Detailed description of all settings of the Microphone object is given in INTELLECT™ software . Administrator's guide*

### 3.1.3 Initial configuration wizard

One can configure video subsystem automatically in INTELLECT™ software using the initial configuration wizard.

*Note. This opportunity is not provided for demo version of INTELLECT™ software .*

***Attention! If the Video capture card or Audio card has already been created in INTELLECT™ software then the initial configuration wizard does not work.***

To configure the video subsystem automatically, do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box (Figure 3.1—18, 1).
2. Select the **Localhost** object related to the required Server in the object tree on the **Hardware** tab (Figure 3.1—18, 2).

3. Click **Initial configuration wizard** on the settings panel of selected object (Figure 3.1—18, 3).

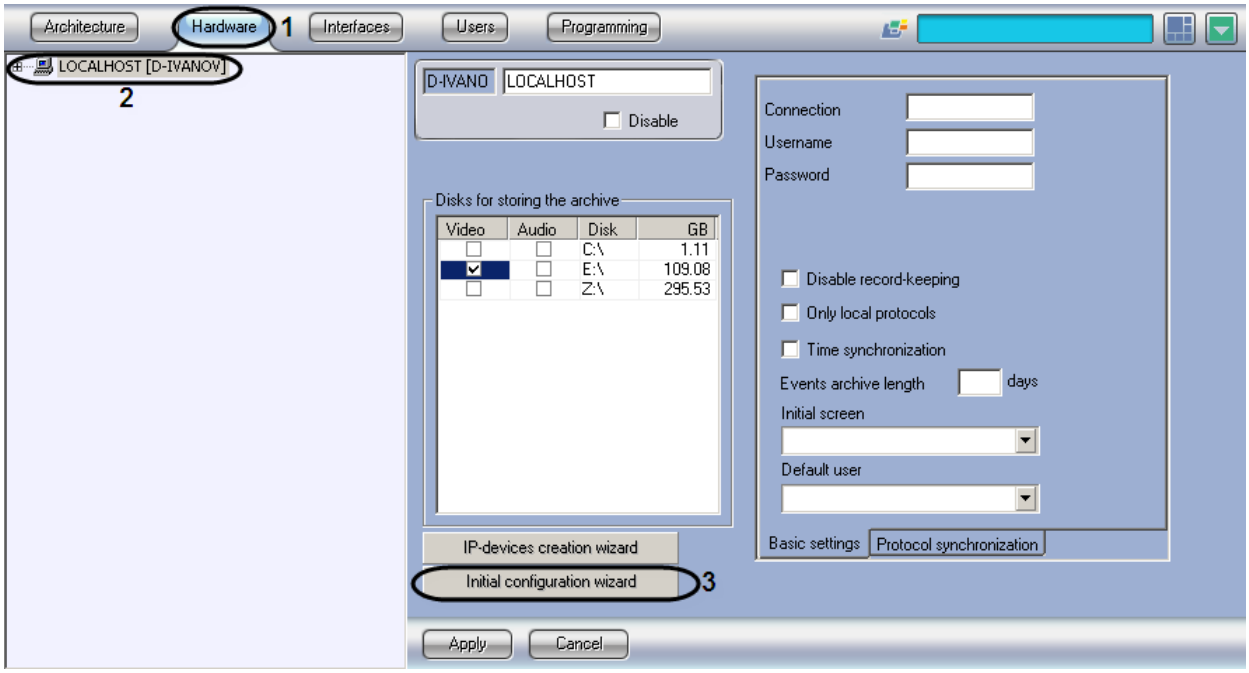



Figure 3.1—18 Initial configuration wizard

The **Creating initial configuration of the video subsystem** window is displayed (Figure 3.1—19).

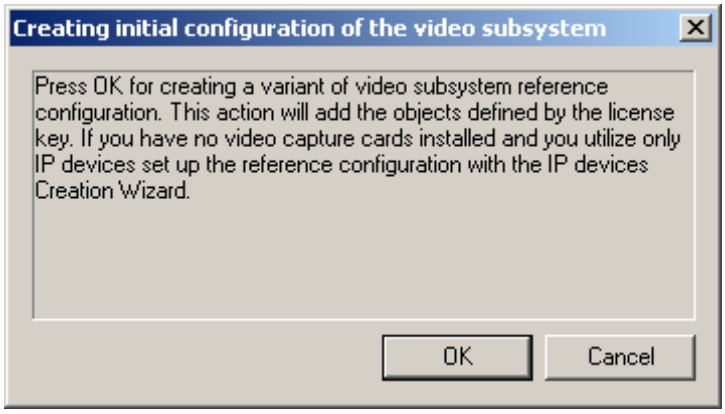



Figure 3.1—19 Initial configuration wizard

4. To create initial configuration of the video subsystem, click **OK** (Figure 3.1—19). This action will add objects under Intellect software key.
   As a result the created objects are displayed in the object tree (Figure 3.1—20).

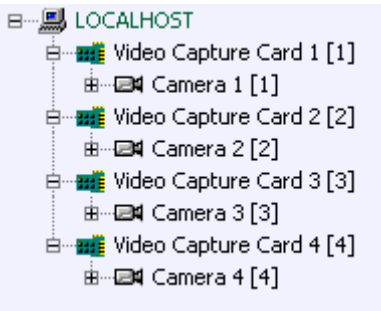



Figure 3.1—20 Created objects

*Note. The following objects are created as a result of initial configuration wizard working:*

1. *The **Video capture card** objects (specified in the key) that correspond to the physical video capture cards (for example, 4 **Video capture card** objects are created for one FS6/16 video capture card);*
2. *The **Camera** objects - one for each **Video capture card** object;*
3. *The **Audio card** object configurated for working with a local audio card;*
4. *The **Microphone** objects under the **Audio card** object (the number of the **Microphone** objects is equal to the number of audio channels in the key).*

*Initial configuration wizard does not create other objects that are given in the key.*

The automatic configuration of video subsystem is completed.

### 3.1.4 Configuring the Watchdog hardware performance tester

Hardware performance tester is for computer autoreboot in case of the Windows OS or main Intellect software modules failure.

INTELLECT™ software allows configuring the Watchdog hardware performance tester when operating with video capture cards that support this functionality (see Appendix 4. Technical specifications of video capture cards ).

The Watchdog hardware performance tester on the Server with installed video capture cards is configured in 3 stages:

1. Make sure that the Watchdog hardware performance tester is connected correctly (see *Connecting the Watchdog hardware performance tester* section).
2. Activate the function of the Watchdog hardware performance tester on the setting panel of the **Video capture card** object.
3. Verify the Watchdog hardware performance tester.

To activate and verify the Watchdog hardware performance tester, do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box.
2. Set the **Activate watchdog** checkbox on the setting panel of the **Video capture card** object corresponding to one ADC on the card to which the Watchdog is connected (Figure 3.1—21, 1).

*Note 1. When FX4, FX8 and FX16 video capture cards are used set the **Activate watchdog** checkbox in the settings of every **Video capture card** object created for the card to which the Watchdog is connected.*

*Note 2. The **07** PCI channel should be selected for one of the **Video capture card** objects corresponding to the ADC of FS8 card for correct operation of the Watchdog hardware performance tester on FS8 video capture card. At the same time the Watchdog hardware performance tester can be activated on the setting panel of any **Video capture card** object of FS8 card.*

3. To save changes click **Apply** (Figure 3.1—21, 2).
4. End the **video.run** process using the Windows task manager (Figure 3.1—22).

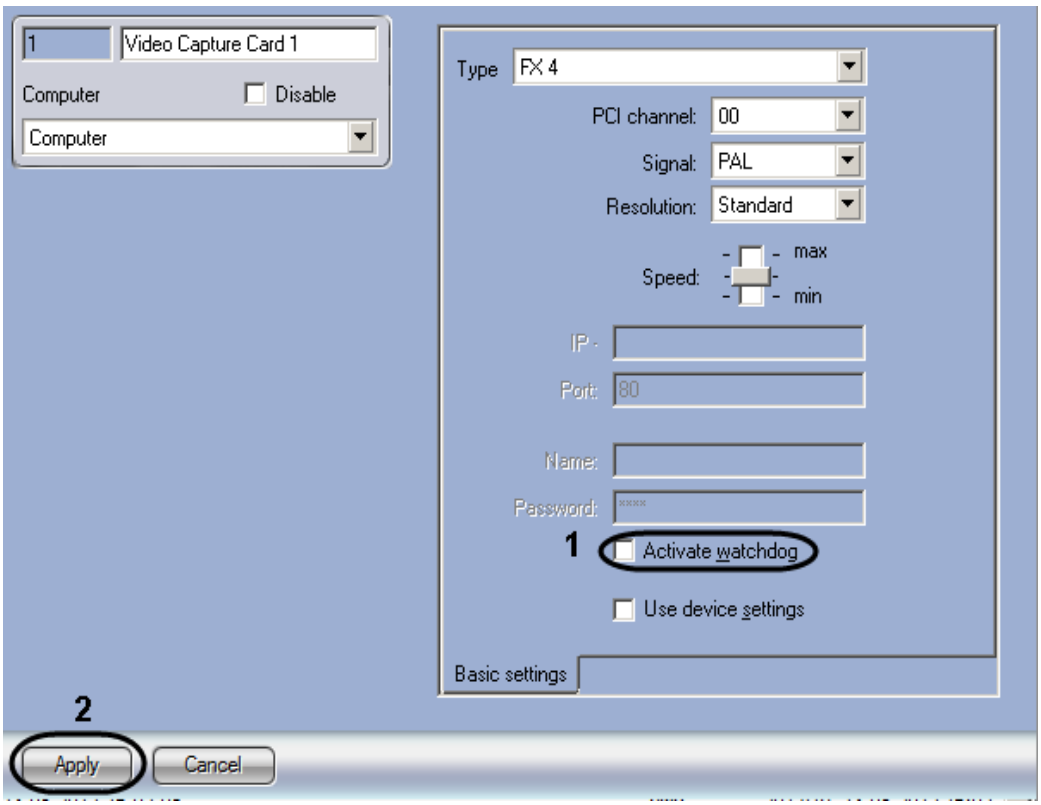



Figure 3.1—21 Activation of the Watchdog hardware performance tester on the Server with installed video capture cards

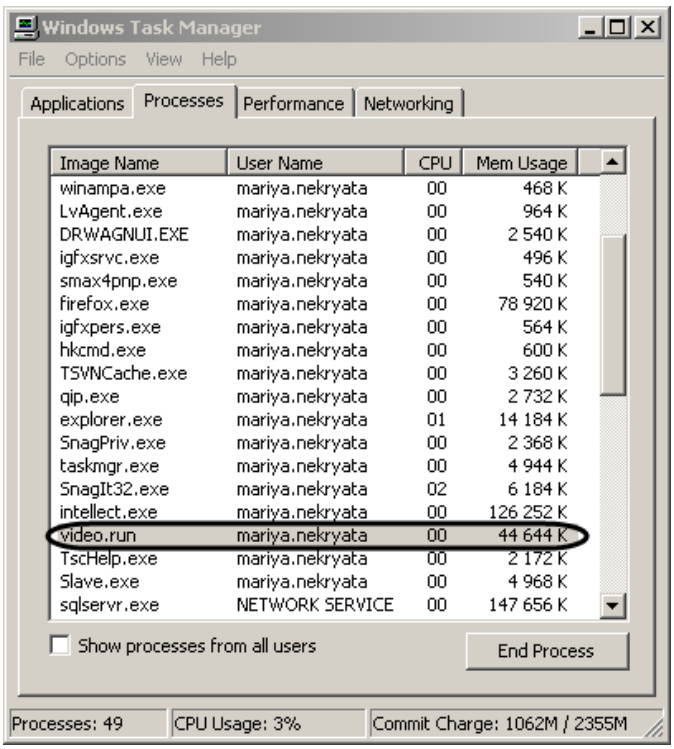



Figure 3.1—22 Ending of the video.run process using the Windows task manager

5. If the Watchdog hardware performance tester is connected and configured, then there is Windows reboot.

*Note. On FS15 and FX video capture cards Windows reboots in several minutes after ending of the* ***video.run*** *process.*

Activation and verification of the Watchdog hardware performance tester is completed.

## 3.2 Configuring IP devices

### 3.2.1 General information about IP devices

INTELLECT™ software allows receiving, digitizing, processing and playing back the audio and video with the help of IP devices. IP cameras and IP servers can be used as IP devices for receiving, digitizing, processing and playing back the video.

IP device is configured with the help of Web server or another software delivered with this device and Intellect configuration.

Process parameters (size, frame rate, frame resolution, brightness, contrast, color saturation, color format) and parameters of video compression are set with the help of Web server or another software delivered with this device.

INTELLECT™ software receives and processes video vith the help of detectors, records and transmits video from IP devices to remote workplaces.

Before using IP devices in the INTELLECT™ software make sure that process and digitizationparameters (codecs) of IP devices installed with the help of Web server are supported by Intellect software packge. The list of IP devices compatible with the INTELLECT™ software and relevant information about the compatibility is shown on the website of Axxonsoft company in the 'Integration' section: http://www.itv.ru/ products / integration /.

### 3.2.2 Configuring video acquisition from IP devices

As a rule IP devices allow processing one or more video depending on the type of device in use.

Every IP device used for video input is registered in INTELLECT™ software by creating and configuring the **Video capture card** object. The **Video capture card** objects are created on the **Hardware** tab under the **Localhost** object. When the **Video capture card** objects are created the following parameters should be set for every IP device:

1. In the **Type** list select IP device and codec used by this device.

*Note. Codec is specified in brackets. If the codec is not specified then MJPEG is by default.*

2. In the **IP address** field enter the specified network address of IP device. IP address assigning is described in *Assigning network addresses to IP devices* section.
3. In the **Port** field enter the port number (TCP/IP) used for video transmission.
4. Enter corresponding data into the **Name** and **Password** fields for logging into Web server of IP device.
5. If the parameters set with the help of Web server or another software of IP device should be used, then set the **Use device settings** checkbox.

*Note. If video camera settings specified with the help of IP device software are not used in INTELLECT™ software or used partially, then set the **Use device settings checkbox** unchecked and configure a video camera on the setting panel of the **Camera** object.*

After logging into INTELLECT™ software the values corresponding to numbers of connection channels of video cameras to IP device should be given to the **Chanel number** parameters of the **Camera** object.

*Note. Set the **1** value for the **Chanel number** parameter when IP camera is configured. Otherwise IP camera is nonworking.*

### 3.2.3 Configuring audio acquisition from IP devices

Every IP device used for audio input is registered in the INTELLECT™ software by creating and configuring the **Audio card** object. The **Audio card** objects are created on the **Hardware** tab under the **Localhost** object. When the **Audio card** objects are created the values of short names of IP devices should be set to the **Card** parameter for every IP device. Hover the cursor over the end of the **Card** line and specify the IP address of the device, username and password for access to device (if specified). Examples of configuring the **Card** parameter of the **Audio card** object for Axis video camera are given in Figure 3.2—1.

A. when there is no username or password

B. when there is a username and password

Figure 3.2—1 Examples of configuring the Card parameter for Axis IP camera

When the **Audio card** is configured restart the INTELLECT™ software. Otherwise the audio subsystem (particularly, microphones) can not be configured.

Microphones built into or connected to IP devices are registered in the INTELLECT™ software by creating the **Microphone** objects under the **Audio card** object. Under one **Audio card** object there are the **Microphone** objects in amount corresponding to the amount of audio input channels and restrictions applied by a license key. Corresponding segment of hardware branch when IP device and one microphone are registered is given in Figure 3.2—2.

Figure 3.2—2 Hardware branch when IP device and microphone are registered

When the Microphone object is created, select the channel number of connecting the microphone to audio input device from the **Channel** dropdown list (Figure 3.2—2).

### 3.2.4 IP Wizard

To create IP devices in the INTELLECT™ software, do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box (Figure 3.2—3, 1).
2. In the object tree select the **Camera** object corresponding to the configured Server (Figure 3.2—3, 2).
3. Click **IP devices creation wizard** on the setting panel of the selected object (Figure 3.2—3, 3).

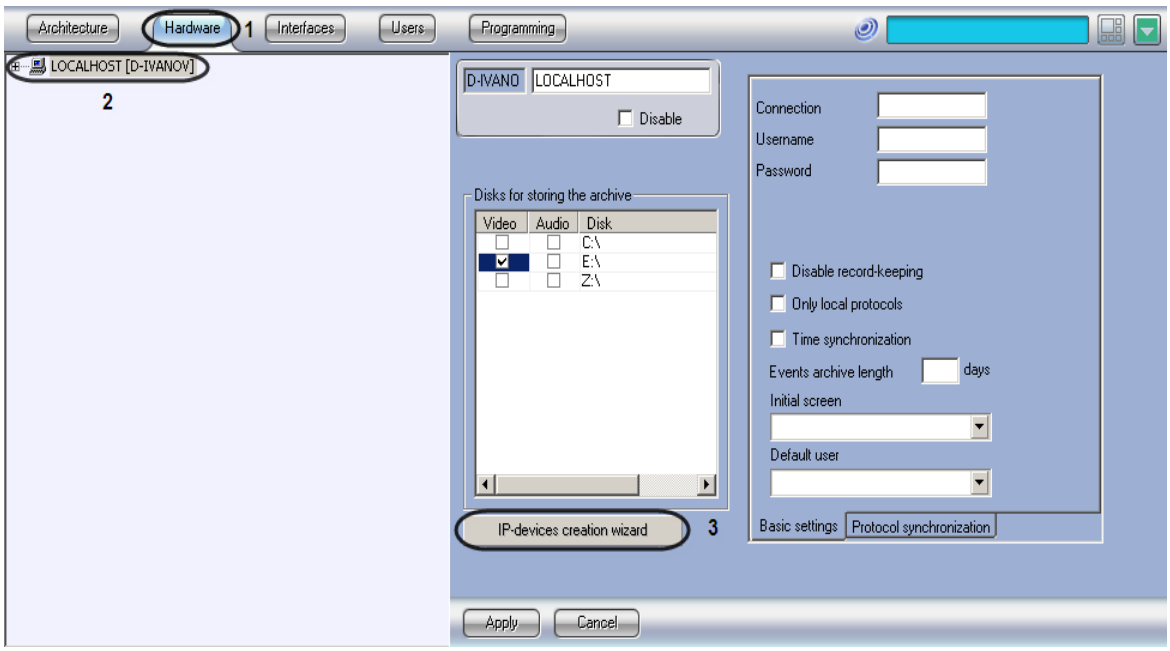



Figure 3.2—3 The IP devices creation wizard window

As a result the **IP Wizard** window is displayed. Found IP devices are displayed on the top of the window (Figure 3.2—5).

*Note. The **IP Wizard** window can also be displayed by selecting the **IP Wizard** item in the context menu of the **Localhost** object (Figure 3.2—4).*

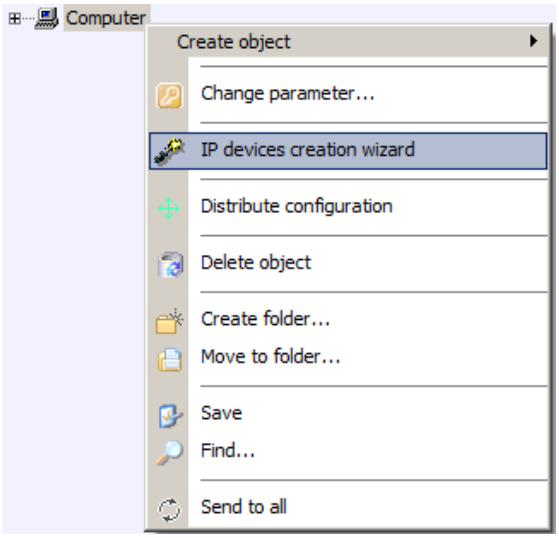



Figure 3.2—4 The IP Wizard item in the context menu of the Localhost object

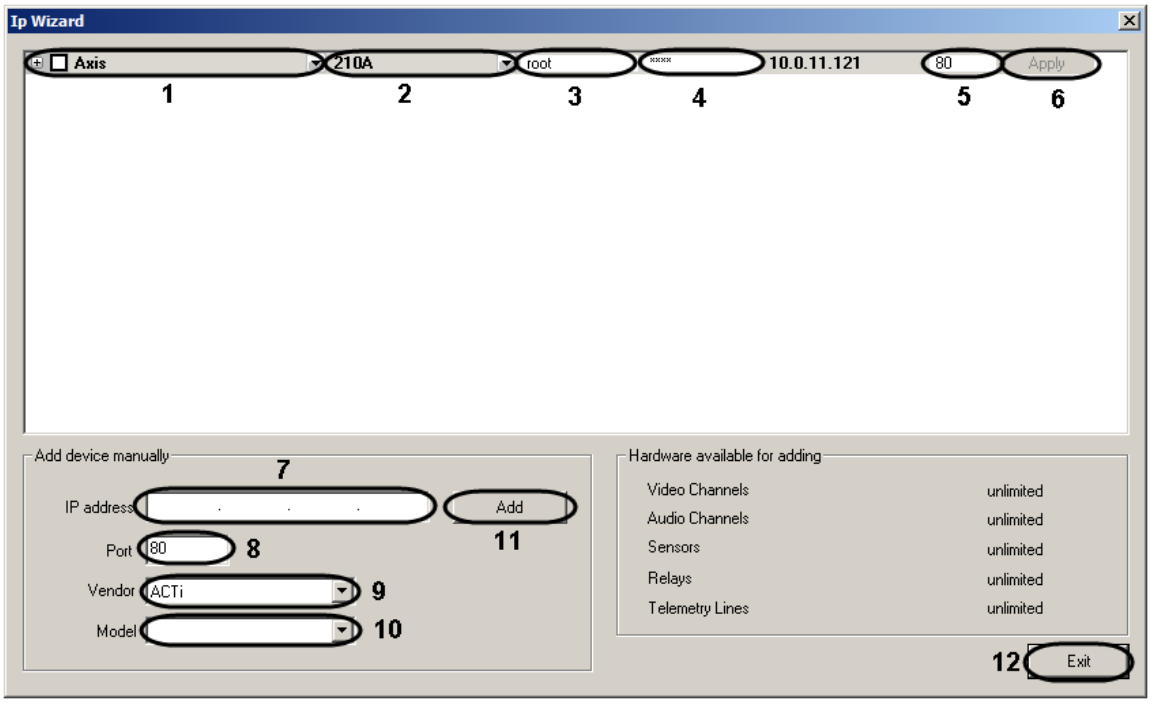



Figure 3.2—5 The IP Wizard window

4. Check up the vendor (Figure 3.2—5, 1) and model (Figure 3.2—5, 2) for found IP device. Make changes if necessary by opening corresponding dropdown list (use button) and changing required value.
5. Check up the TCP/IP port (Figure 3.2—5, 5). Enter the required value in the field.
6. Enter login (Figure 3.2—5, 3) and password (Figure 3.2—5, 4) to connect IP device. Login and password are given in the documentation for connected network device.
7. Select the objects that should be created under IP device.

*Note. The number of objects that can be created under IP device is displayed automatically in the **Hardware available for adding** table.*

7.1. Open the dropdown list of supported IP device by clicking the button (Figure 3.2—6).

Figure 3.2—6 The list of objects supported by IP devices

Correspondence of object names in IP Wizard to the branches of object tree is in Table 3.2—1.

Table 3.2—1 Correspondence of object names in IP Wizard to the branches of object tree

| Name of object in IP Wizard | Branch of object tree in the INTELLECT™ software |
|---|---|
| Video channel | The **Video capture card** object -> The **Camera** object |
| Audio input | The **Audio card** object -> The **Microphone** object |
| Contact | The **Video capture card** object - > The **DI** object |

| Name of object in IP Wizard | Branch of object tree in the INTELLECT™ software |
|---|---|
| Executive device | The **Video capture card** object -> The **DO** object |
| Telemetry line | The **Telemetry controller** object -> The **PTZ device** object |
| Audio output | The **Playback card** object -> The **Loud speaker** object |

7.2. Set checkboxes for objects that should be created.

*Note. To create/delete all objects set the checkboxes checked/unchecked for vendor of IP device.*

8. Click **Apply** (Figure 3.2—5, 6).

The selected objects are created automatically in the **Hardware** object tree.

9. Repeat steps 4-8 for each IP device that should be created in the system.

*Note. To delete the device from the **IP Wizard** window right – click the corresponding line in the table and select the **Delete camera <IP address> from the list** item.*

10. If the IP device is not found, then add it manually.
    10.1. Enter the IP address of device in the **IP address** field (Figure 3.2—5, 7).
    10.2. Enter the number of TCP/IP port in the **Port** field (Figure 3.2—5, 8).
    10.3. Select the vendor of IP device in the **Vendor** dropdown list (Figure 3.2—5, 9).
    10.4. Select the model of IP device in the **Model** dropdown list (Figure 3.2—5, 10).
    10.5. Click **Add** (Figure 3.2—5, 11).

As a result The IP device with specified parameters is displayed in on the top of the window.

11. To complete the IP device creation step 6-8.
12. Click **Exit** to close the IP Wizard window (Figure 3.2—5, 12).

IP device creation is completed.

### 3.2.5 Features of IP device configuration

#### *3.2.5.1 Features of Beward IP cameras configuration*

By default port 80 is set for connecting to IP devices on the settings panel of the **Video capture card** object. Enter the **5000** value in the **Port** field to connect to IP device of Beward B-9xx series and B-10xx series (B-975W, B-970, B-915, B2.920, B-1070, B-1014 models and others).

#### *3.2.5.2 Features of Panasonic IP devices (i-Pro series) configuration*

When Panasonic IP-device (i-Pro series) is configured to compess in MPEG4 format, the **Speed** slider controls videodata bitrate on the settings panel of the **Video capture card** object. When this parameter is changed, both the speed of video stream and image quality are changed.

*Note. WV-NP1000\1004, WV-F284, WV-NP240\244, WV-NS202 models and others are IP-devices (i-Pro series).*

Image from Panasonic IP device (i-Pro series) is displayed in the **Monitor** interface window with delay from 15 sec to 1 min, depending on the model of the camera.

#### 3.2.5.3 Features of TrendNet IP device configuration

TrendNet IP device is restarted when one of the following settings is changed on the settings panel of the **Video capture card** object and/or **Camera** object:

1. Speed parameter(Video capture card);
2. Quality parameter (Camera);
3. Resolution parameter (Video capture card, Camera).

When the changes are saved, video disappears for about 1 min (time depends on the model of the camera) and then it is restored with new parameters.

*Note. TrendNet TV-IP312W, TV-IP212W, TV-IP110, TV-IP410 IP devices are restarted.*

#### 3.2.5.4 Features of Pelco Spectra IV IP device configuration

If Pelco Spectra IV IP device is configured to compress in MPEG4 format, then the **Resolution** dropdown list on the settings panel of the **Camera** object is used for simultaneous configuration of three video signal parameters:

1. Resolution;
2. Speed;
3. Compression quality.

At the same time the Speed (**Video capture card** object) and Quality (**Camera** object) parameters do not interfere with the corresponding parameters of a video signal.

To set maximum quality, resolution and speed select the **Full** or **High** value from the **Resolution** dropdown on the settings panel of the **Camera** object. The **Standard** value should be selected to set the lowered compression quality of resolution and speed of video signal.

#### 3.2.5.5 Features of AEBELL IP device configuration

By default port 80 is set for connecting to IP devices on the settings panel of the **Video capture card** object. Enter the **36688** value in the **Port** field to connect to AEBELL BL-E704F IP server.

#### 3.2.5.6 Features of Dynacolor IP device configuration

Dynacolor DynaHawk ZH-801+ IP device is restarted when one of the following settings is changed on the settings panel of the **Video capture card** object and/or **Camera** object:

1. The **Type** parameter (Video capture card) – selection of Dynacolor (mjpeg) or Dynacolor (mpeg-4) video stream compression format;
2. The **Speed** parameter (Video capture card);
3. The **Quality** parameter (Camera);
4. The **Resolution** parameter (Camera);

When the changes are saved, video disappears for about 1 min and then it is restored with new parameters.

There can also be no video for about one minute when Intellect is started.

#### *3.2.5.7 Features of Stream Labs IP device configuration*

*Note. Detailed description of the given devices can be found at http://www.ipstreamlabs.ru/products-index.html*

##### 3.2.5.7.1 Features of Wave Cam M5 camera

1. Automatic brightness control. In this mode Intellect automatically uses internal algorithm of image's brightness control. This mode is enabled when the **Brightness** slider is set to a minimum position. When there are no special requirements to the image, then this mode of brightness control is recommended.

   *Note. Brightness can be controlled manually, moving the Brightness slider.*

2. Video stream frame rate. Wave Cam M5 camera supports two channels of video displaying. When only one video channel is engaged in Intellect, the video stream frame rate is 25 fps. When both channels are engaged, frame rate of video stream for each channel is 12fps.

3. Telemetry. Wave Cam M5 camera is not a PTZ device. One can control some area of an image with the help of video surveillance monitor. While configuring the Telemetry on a Wave Cam M5 camera, do the following:

   3.1. Select the protocol of data exchange with a camera - IP-Camera (on the settings panel of the **Telemetry control** object).
   3.2. Apply PTZ device to the first video input channel (is set in the **Channel number** list on the settings panel of the **Camera** object).
   3.3. Apply telemetry control panel to the first video input channel (is set in the **Channel number** list on the settings panel of the **Camera** object).

*Note. The image will move through the second video input channel.*

##### 3.2.5.7.2 Features of Wave Server Enterprise hardware internetwork

1. Video stream frame rate. When only one camera is connected to Wave Server Enterprise hardware internetwork, the video stream frame rate is 25 fps. When two or more cameras are connected, total frame rate of processed video is 16 fps.

*Note. If two video input channels are used, then frame rate of processed video* is *16/2=8 fps. If there are four video input channels, then 16/4=4 fps.*

2. Telemetry. Telemetry is performed on a separate card with its own network interface. To configure it, do the following:
   2.1. Select the protocol of data exchange with camera with the help of which an analog camera connected to the video server is controlled on the settings panel of the **Telemetry control** object (for example, Pelco-D, Pelco-P, Panasonic-850).
   2.2. Create two **Video capture card** objetcs.

*Note. For every analog camera connected to Wave Server Enterprise, two **Camera** objects are necessary to be created on the base of different **Video capture card** objects for video viewing and telemetry configuration correspondingly.*

#### 3.2.5.7.3 Features of Wave Server WH1501 video server

Telemetry. When telemetry for Wave Server WH1501 video server is configured, it is necessary to select protocol with the help of which the analog camera connected to the video server is controlled, on the settings panel of the **Telemetry control** object (for example, Pelco-D, Pelco-P, Panasonic-850).

### *3.2.5.8 Features of Cisco IP device configuration*

Cisco 4500 IP-device supports the following formats of video signal compression:

1. H.264;
2. MJPEG.

While setting the resolution the H.264 format has a higher priority than MJPEG: a possibility to set the resolution for MJPEG exceeding the given for H.264, is not provided.

Priority difference leads to the following effects:

1. After changing the video capture card of the **Cisco(h264)** type for **Cisco(mjpeg)** with standard video resolution,MJPEG video resolution can not be increased;
2. When the video capture cad of the **Cisco(mjpeg)** type is changed for **Cisco(h264)** with full video resolution, the resolution will be changed from 704*576 to 1280*720. Resolution 720*576 will be set after return to the **Cisco(mjpeg)** type.

*Note. The type of a video capture card is selelcted from the **Type** dropdown list on the settings panel of the **Video capture card** object. Video resolution is set with the use of analoguos parameter on the settings panel of the **Camera** child object.*

### *3.2.5.9 Features of Mobotix IP device configuration*

Mobotix IP camera supports the following formats of video compression in Intellect:

1. MJPEG;
2. MxPEG.

Audio subsystem of Mobotix IP devices may be used when video is encoded in MxPEG.To choose this format, select the **Mobotix MxPEG** value from the **Type** list on the settings panel of the **Video capture card** object.

*Note 1.When the **Mobotix** value is selected, video is received in MJPEG format and audio subsystem functionality of IP device is not performed.*

*Note 2. Mobotix IP cameras that support sound are Q24M, D12, M22 and others. Detailed description of these devices can be found at http://www.mobotix.ru/default.aspx*

## 3.3 Configuring DI/DO devices in INTELLECT™ software

### 3.3.1 Creating and configuring the Relay system object

The **Relay** system object is created under the **Video capture card** object.

The **Relay** object is created and main parameters are set in the following order:

1. Go to the **Hardware** tab in the setting panel of INTELLECT™ (Figure 3.3—1, 1).
2. Create the **Relay** system object under the **Video capture card** object or select the corresponding object in the object tree in the **Hardware** tab of the setting panel of INTELLECT™ (Figure 3.3—1, 2).

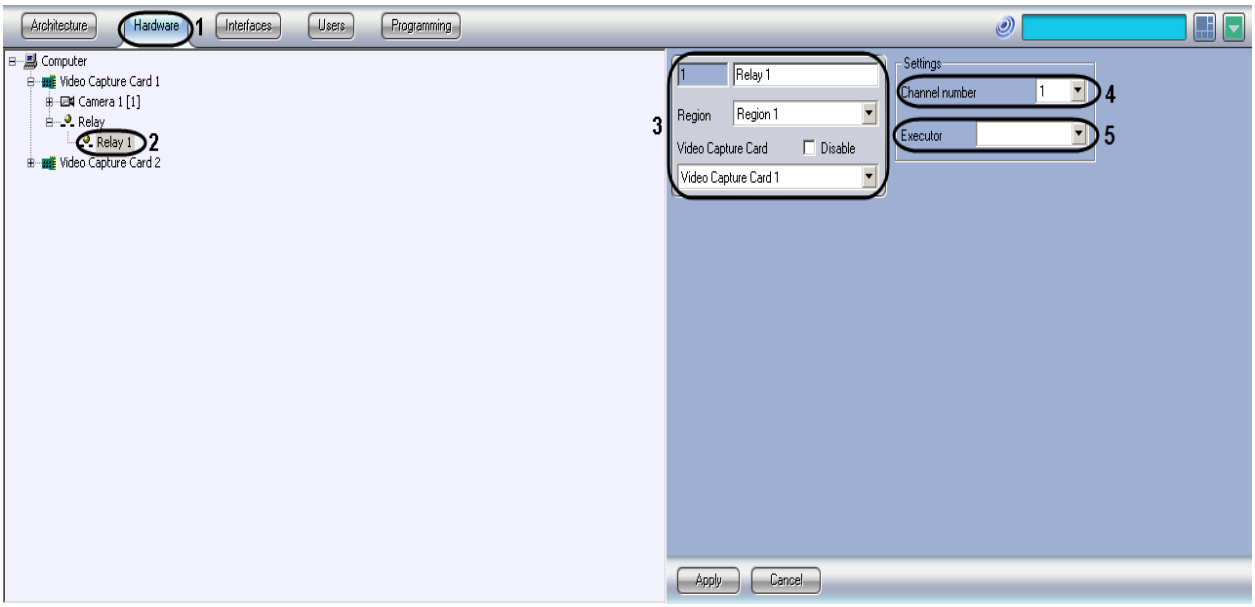



Figure 3.3—1 The setting panel of the Relay object

3. Specify the ID and name of the **Relay** object and select the **Video capture card** object to become the parent of the **Relay** object (Figure 3.3—1, 3).

*Note. If the DI/DO card is used, then specify that video capture card with ADC to which the DI/DO card is connected.*

4. Select the **Channel number** matching the number of DO pin to which the relay is connected (Figure 3.3—1, 4).
5. In the **Executor** dropdown list select the type of executive device used as the relay in the guarded area (Figure 3.3—1, 5).

The **Executor** parameter is used for selecting the icon on the interactive map. This parameter is essential for better perception of information (displayed on the map as object icons) by Operator and for real-time intercepting by Operator if required.

The types of executive devices available for the **Relay** system object are given in Table 3.3—1.

Table 3.3—1 Types of executive devices

| Executive device | Description |
|---|---|
| Light | Icon of the interactive map for the device responding to changes in the illumination in the guarded area |

| | |
|---|---|
| Signal | Icon of the interactive map for the device responding to sound changes in the guarded area |
| Lock | Icon of the interactive map for the device responding to opening/closing of a window, door, etc. |

6. Click **Apply** to save the changes.

Creating and configuring the **Relay** system object is completed.

### 3.3.2 Creating and configuring the Sensor system object

The **Sensor** system object is created under the **Video capture card** object.

The **Sensor** object is created and main parameters are set in the following order:

1. Go to the **Hardware** tab in the setting panel of INTELLECT™ (Figure 3.3—2, 1).
2. Create the **Sensor** system object under the **Video capture card** object or select the corresponding object in the object tree in the **Hardware** tab of the setting panel of INTELLECT™ (Figure 3.3—2, 2).

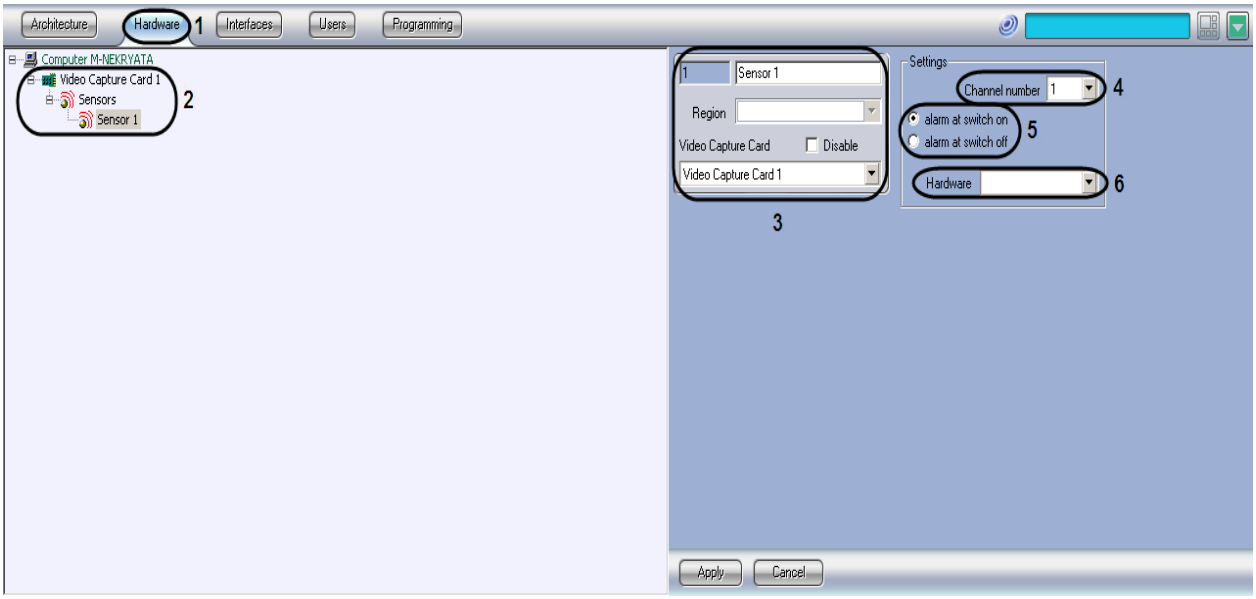



Figure 3.3—2 The setting panel of the Sensor object

3. Specify the ID and name of the **Sensor** object and select the **Video capture card** object to become the parent of the **Sensor** object (Figure 3.3—2, 3).

*Note. If the DI/DO card is used, then specify that video capture card with ADC to which the DI/DO card is connected.*

4. Select the **Channel number** matching the number of DO pin to which the sensor is connected (Figure 3.3—2, 4).
5. In the group of switches select the alarm mode: at switch on or at switch off. By default the **alarm at switch on** mode is selected (Figure 3.3—2, 5).

The executive device corresponding to the Sensor system object operates at one of modes: alarm at switch on or alarm at switch off.

*Note. Sensors connected to Panasonic IP-devices (i-Pro series) trigger only at switch off.*

When the **alarm at switch off** mode is selected, the normal state of the sensor is open. When the sensor closes, it triggers and the corresponding actions are carried out in INTELLECT™.

6. In the **Hardware** dropdown list select the type of executive device used as the detector in the guarded area (Figure 3.3—2, 6).

The **Detector** parameter is used for selecting the icon on the interactive map. This parameter is essential for better perception of information (displayed on the map as object icons) by Operator and for real-time intercepting by Operator if required.

Types of detectors available for the **Sensor** system object are given in Table 3.3—2.

Table 3.3—2 Types of detectors

| Detector | Description |
|---|---|
| Infrared | Icon of the interactive map for the motion detectors |
| PIR | Icon of the interactive map for the device on the ceiling of the guarded area |
| Glass | Icon of the interactive map for the device on the window of the guarded area responding when the window is broken |
| Fire | Icon of the interactive map for the device responding to changes of heat conditions in the guarded area |
| Window | Icon of the interactive map for the device installed some distance away the window and responding when the window is broken |
| Smoke | Icon of the interactive map for the device responding to smoke in the guarded area |
| Reed switch | Icon of the interactive map for the device responding to opening/closing of a window, door, etc. |

7. Click **Apply** to save the changes.

Creating and configuring the **Sensor** system object is completed.

### 3.3.3 Configuring DI/DO expansion cards

#### *3.3.3.1 Connecting relays*

If relays are connected to the DI/DO card, then up to 4 **Relay** objects can be created under the **Video capture card** parent object.

All the **Relay** objects corresponding to relays connected to one DI/DO card are to be created in the **Hardware** object tree under the **Video capture card** object corresponding to the video capture card where the DI/DO card is installed.

If the DI/DO card is installed on FS-5, FS-6 or FS-16 video capture card, then the **Relay** objects are to be created under any **Video capture card** object within the hardware card.

If the DI/DO card is installed on WS216 video capture card, then the **Relay** objects are to be created under the **Video capture card** object with **04** value of the PCI-channel.

If the DI/DO card is installed on FS-8 video capture card, then the **Relay** objects are to be created under the **Video capture card** object with **07** value of the PCI-channel (Figure 3.3—3).

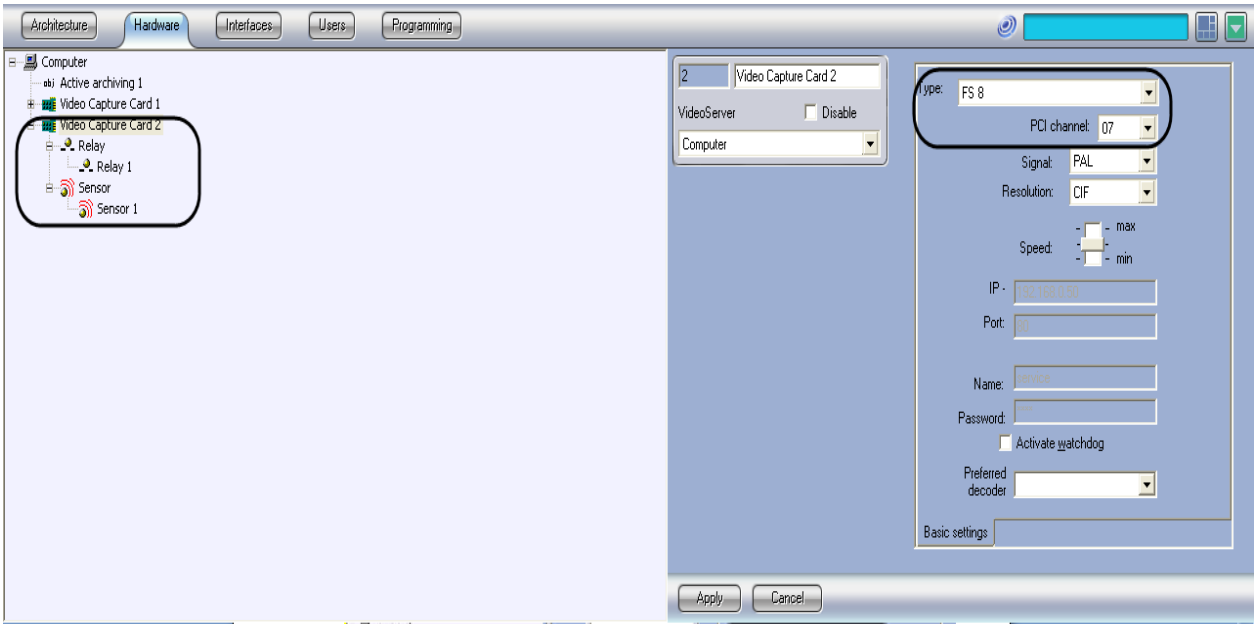



Figure 3.3—3 Connecting relays on FS-8 card

One can relocate the **Relay** objects in the object tree.

To change the parent **Video capture card** object of the **Relay** objects, change the value of the **Video capture card** object on the settings panel of the **Relay** object. The value of this parameter is to correspond to the number of the **Video capture card** object (in the object tree) under which the **Relay** object is to be located. If the value of the **Video capture card** parameter is changed on the settings panel of the **Relay** object, then the object is moved to the branch of child objects of the corresponding **Video capture card** object.

*Note. All **Relay** objects related to one D I/DO card are to be located in child branches under the same **Video capture card** object for proper operation of INTELLECT™. The **Relay** objects are not to be located under different **Video capture card** objects even if these objects represent the same video capture card with the adjustable DI/DO card.*

Figure 3.3—4 shows an example of locating the **Relay** objects in the object tree when two FS-6 (FS-16 ) video capture cards are used, with 4 relays connected to the first 4/4 (or 16/4) DI/DO card and 2 relays connected to the second one.

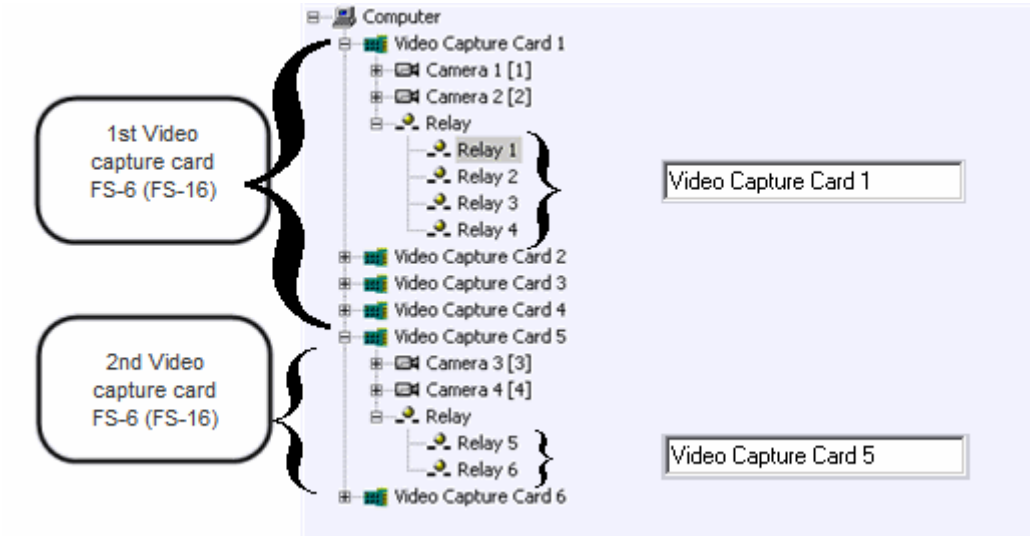



Figure 3.3—4 Example of the Video capture card parameters when two FS-6 (FS-16) video capture cards with two 4/4 or 16/4 DI/DO cards with 6 relays are used

Configuring the **Relay** objects one is to specify the channel numbers of sensor connection to the DI/DO card according to the numbers of the DO pins.

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Relay** object.

The 4/4 and 16/4 DI/DO cards allow connecting up to 4 relay channels according to the license key file.

Figure 3.3—5 shows an example of the channel numbers configuration of 4 relays connected to one 4/4 DI/DO card installed on FS-6 (FS-16) video capture card.

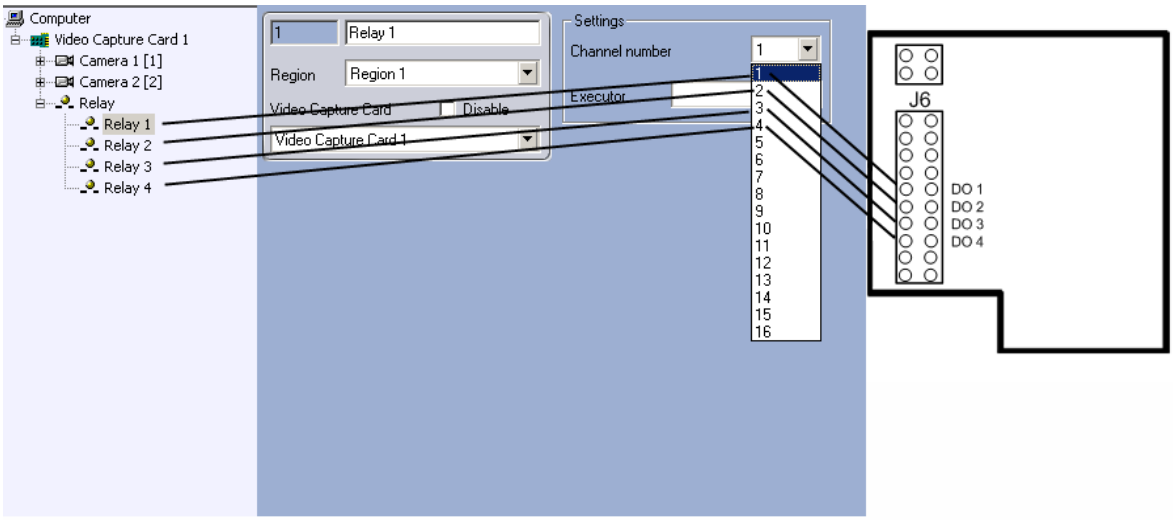



Figure 3.3—5 Example of the of the channel numbers configuration of relays connected on 4/4 DI/DO card installed on FS-6 (FS-16) video capture card (4 ADCs for 4 Video capture card objects)

The channels of the second (next) 16/4 DI/DO card are numbered from 1 to 4 according to the DI pins (Figure 3.3—6).

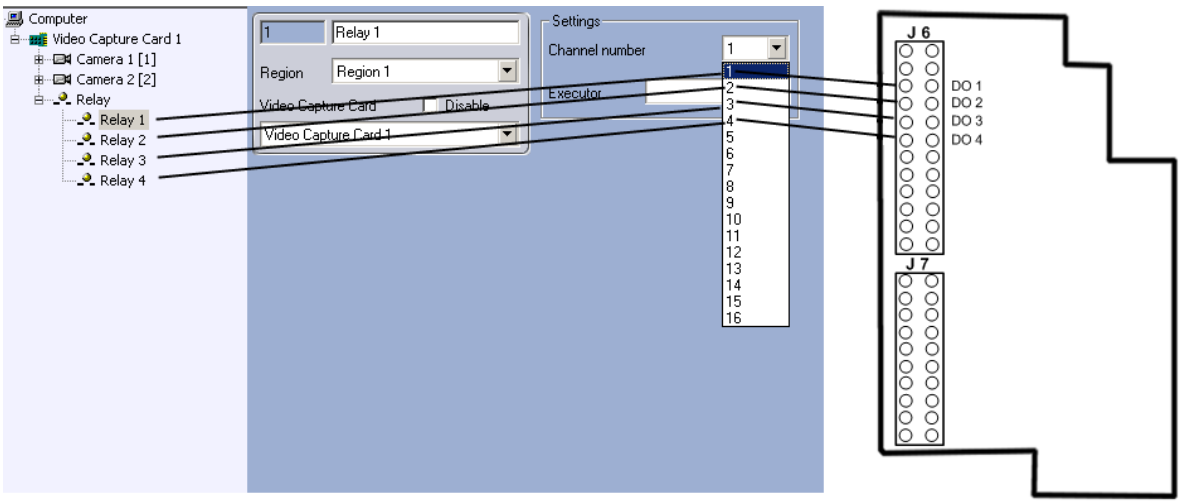



Figure 3.3—6 Example of the of the channel numbers configuration of relays connected on the second (next) 16/4 DI/DO card installed on FS-6 (FS-16) video capture card (4 ADCs for 4 Video capture card objects)

### *3.3.3.2 Connecting sensors via 4/4 DI/DO card*

One can create up to 4 **Sensor** objects under the **Video capture card** object when 4/4 DI/DO card is installed.

All the **Sensor** objects corresponding to sensors connected to one 4/4 DI/DO card are to be created in the **Hardware** object tree under the **Video capture card** object corresponding to the video capture card where the DI/DO card is installed.

If the DI/DO card is installed on FS-5, FS-6 or FS-16 video capture card, then the **Sensor** objects are to be created under any **Video capture card** object within the hardware card.

If the DI/DO card is installed on WS216 video capture card, then the **Sensor** objects are to be created under the **Video capture card** object with **00** value of the PCI-channel.

If the DI/DO card is installed on FS-8 video capture card, then the **Sensor** objects are to be created under the **Video capture card** object with **07** value of the PCI-channel (Figure 3.3—7).

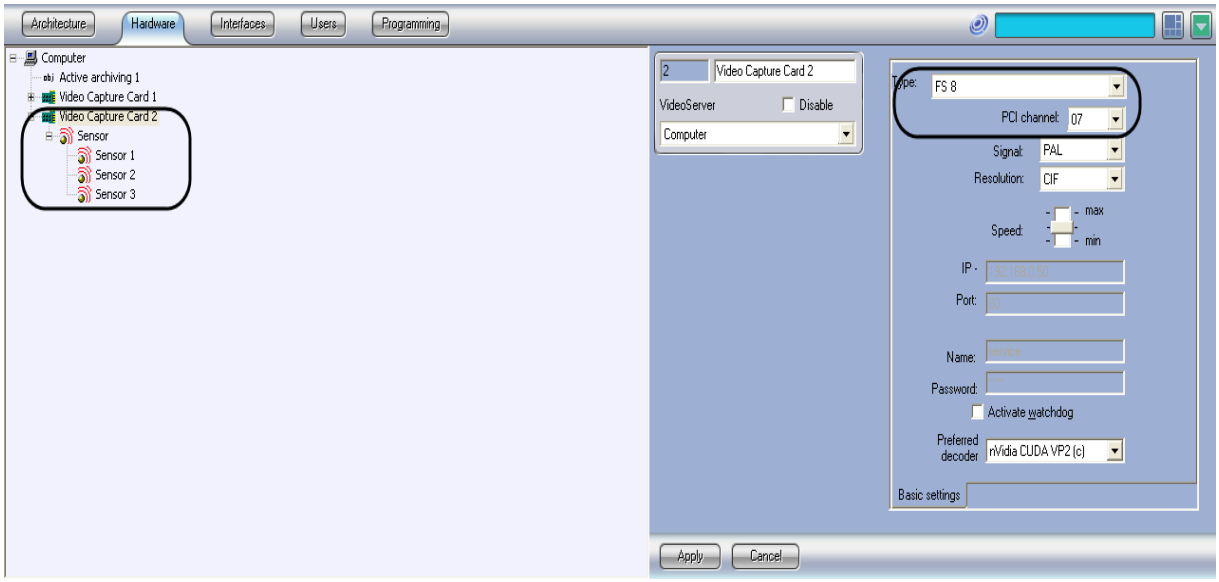



Figure 3.3—7 Connecting sensors on FS-8 card

One can relocate the **Sensor** objects in the object tree. To change the parent **Video capture card** object of the **Sensor** objects, change the value of the **Video capture card** object on the settings panel of the **Sensor** object. The value of this parameter is to correspond to the number of the **Video capture card** object (in the object tree) under which the **Sensor** object is to be located. If the value of the **Video capture card** parameter is changed on the settings panel of the **Sensor** object, then the object is moved to the branch of child objects of the corresponding **Video capture card** object.

*Note. All **Sensor** objects related to one D I/DO card are to be located in child branches under the same **Video capture card** object for proper operation of INTELLECT™. The **Sensor** objects are not to be located under different **Video capture card** objects even if these objects represent the same video capture card with the adjustable DI/DO card.*

Figure 3.3—8 shows an example of locating the **Sensor** objects in the object tree when two FS-6 (FS-16 ) video capture cards are used, with 4 sensors connected to the first 4/4 DI/DO card and 2 sensors connected to the second one.

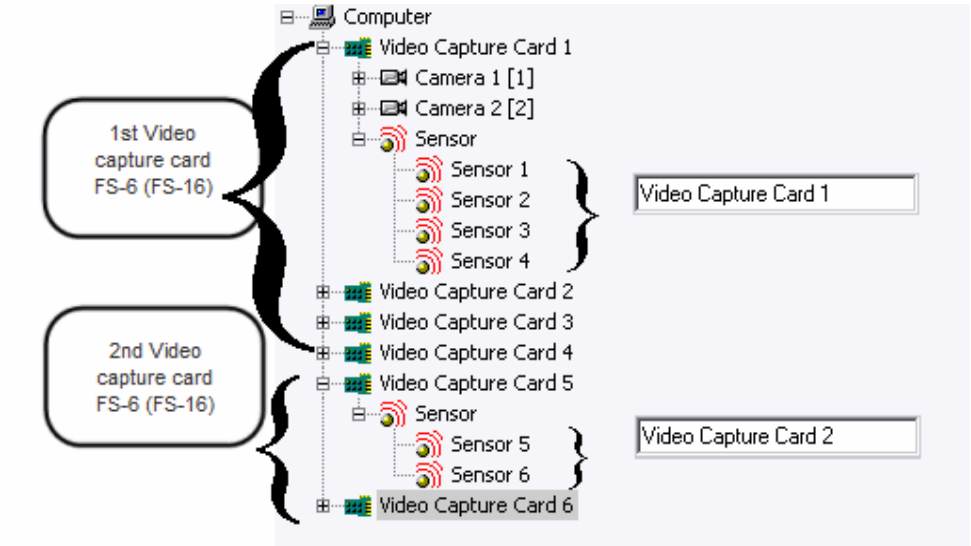



**Figure 3.3—8 Example of the Video capture card parameters when two FS-6 (FS-16) video capture cards with two 4/4 or 16/4 DI/DO cards with 6 sensors are used**

Configuring the **Sensor** objects one is to specify the channel numbers of sensor connection to the DI/DO card according to the numbers of the DO pins.

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Sensor** object.

4/4 DI/DO card allows connecting up to 4 sensor channels according to the license key file.

Figure 3.3—9 shows an example of the channel numbers configuration of 4 sensors connected to one 4/4 DI/DO card installed on FS-6 (FS-16) video capture card.

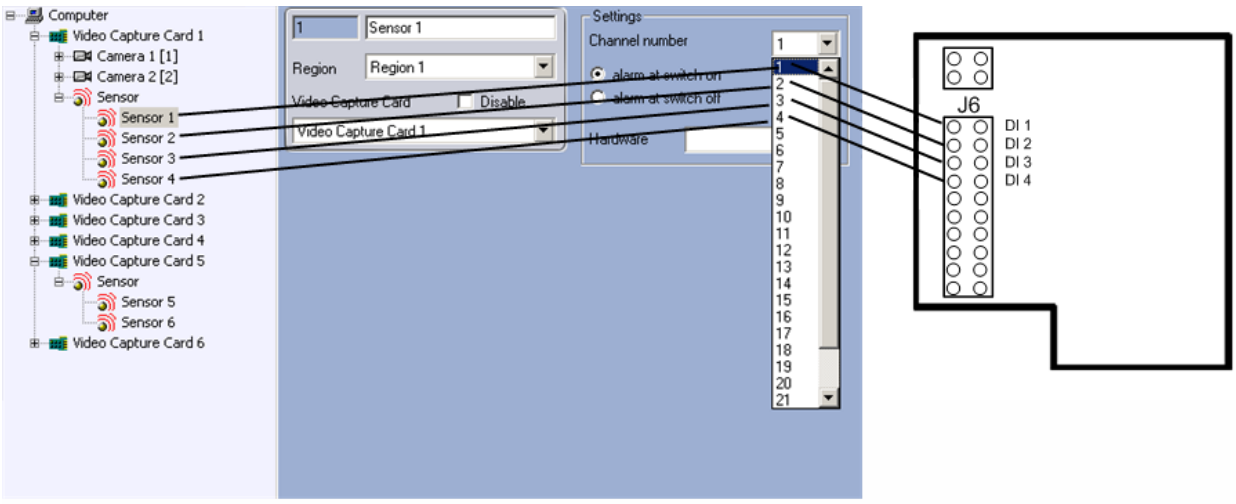



**Figure 3.3—9 Example of the of the channel numbers configuration of sensors connected on 4/4 DI/DO card installed on FS-6 (FS-16) video capture card (4 ADCs for 4 Video capture card objects)**

The channels of the second (next) 4/4 DI/DO card are numbered from 1 to 4 according to the DI pins (Figure 3.3—10).

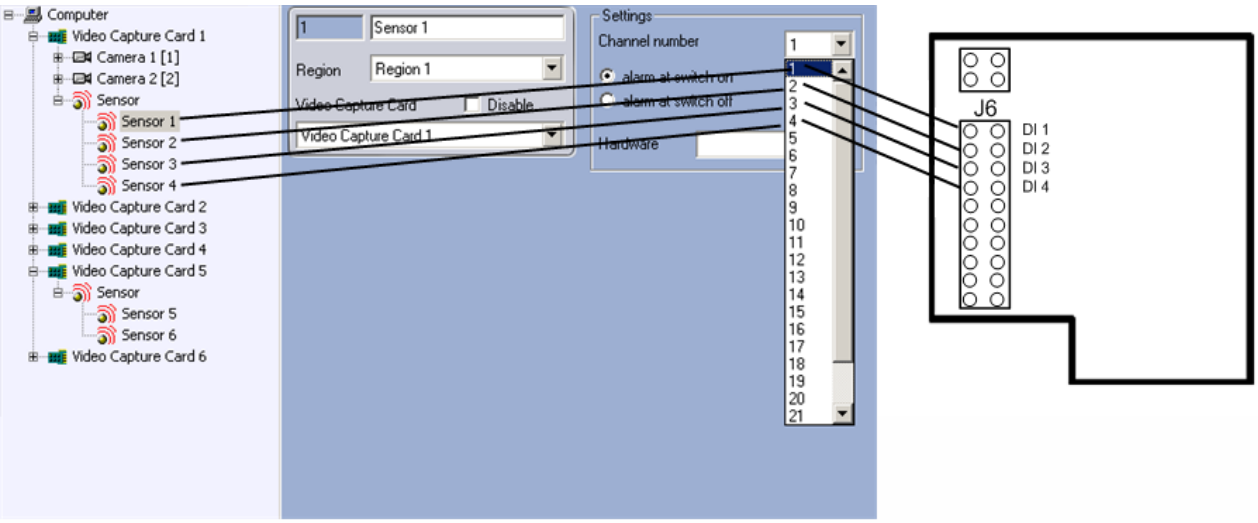



**Figure 3.3—10 Example of the of the channel numbers configuration of sensors connected on the second (next) 4/4 DI/DO card installed on FS-6 (FS-16) video capture card (4 ADCs for 4 Video capture card objects)**

### *3.3.3.3 Connecting sensors via 16/4 DI/DO card*

One can create up to 16 **Sensor** objects under the **Video capture card** object when 16/4 DI/DO card is installed.

All the **Sensor** objects corresponding to sensors connected to one 16/4 DI/DO card are to be created in the **Hardware** object tree under the **Video capture card** object corresponding to the video capture card where the DI/DO card is installed.

If the DI/DO card is installed on FS-5, FS-6 or FS-16 video capture card, then the **Sensor** objects are to be created under any **Video capture card** object within the hardware card.

If the DI/DO card is installed on FS-8 video capture card, then the **Sensor** objects are to be created under the **Video capture card** object with **07** value of the PCI-channel (Figure 3.3—11).

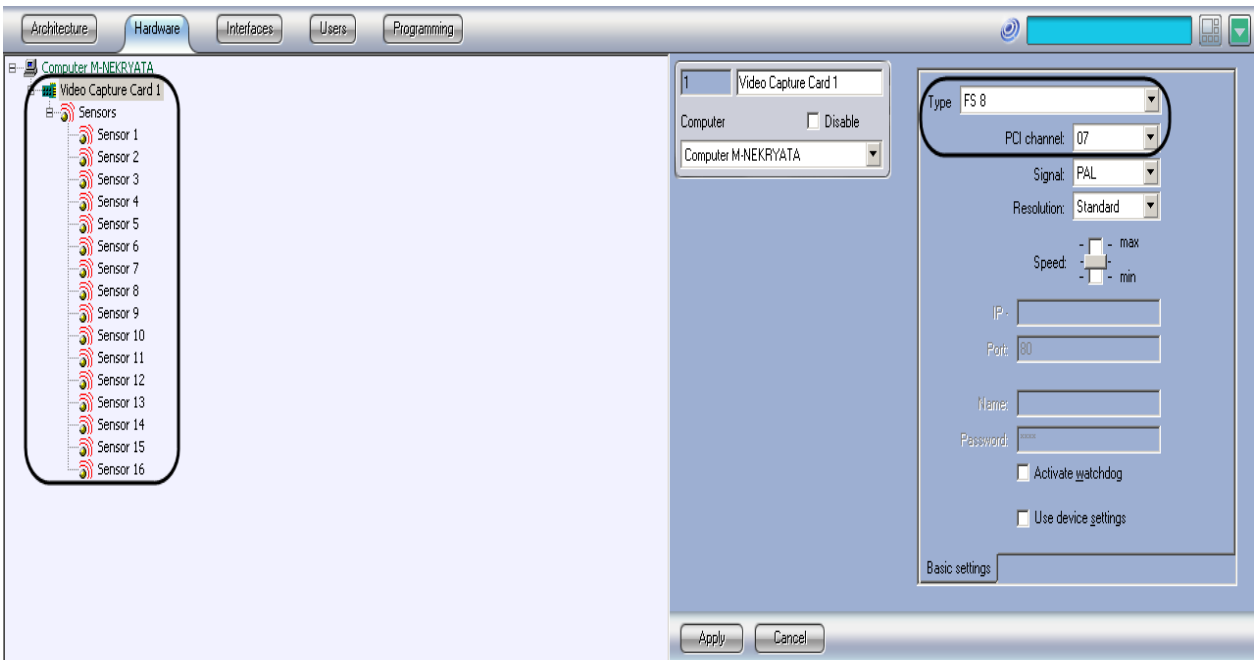



Figure 3.3—11 Connecting sensors on FS-8 card

One can relocate the **Sensor** objects in the object tree. To change the parent **Video capture card** object of the **Sensor** objects, change the value of the **Video capture card** object on the settings panel of the **Sensor** object. The value of this parameter is to correspond to the number of the **Video capture card** object (in the object tree) under which the **Sensor** object is to be located. If the value of the **Video capture card** parameter is changed on the settings panel of the **Sensor** object, then the object is moved to the branch of child objects of the corresponding **Video capture card** object.

Figure 3.3—12 shows an example of locating the **Sensor** objects in the object tree when two FS-6 (FS-16 ) video capture cards are used, with 16 sensors connected to the first 16/4 DI/DO card and 2 sensors connected to the second one.

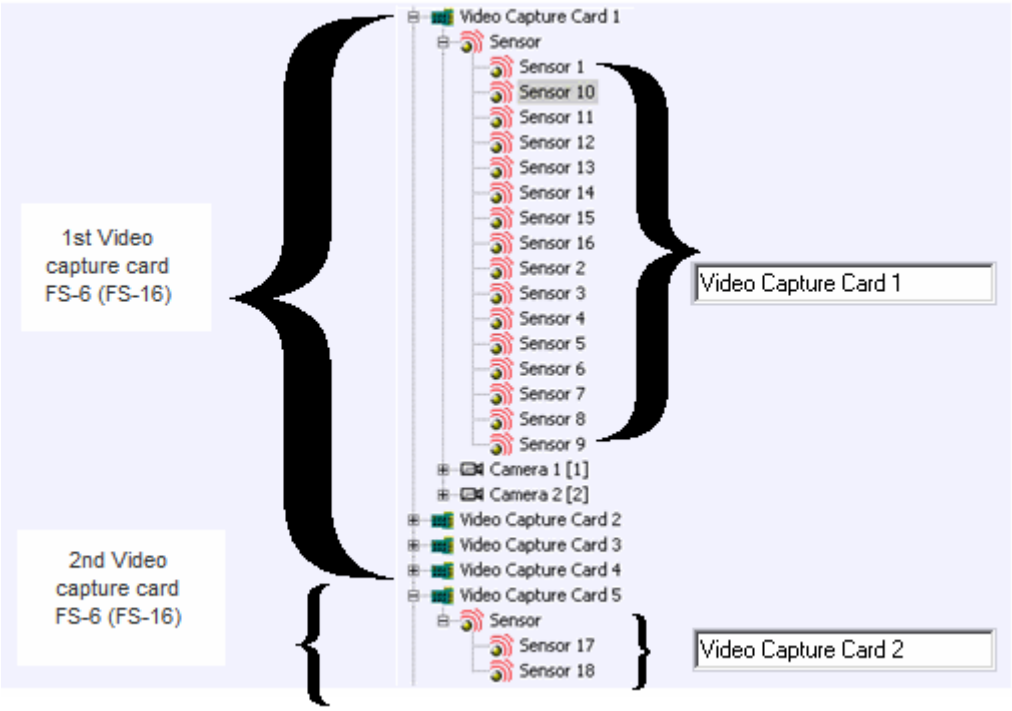



**Figure 3.3—12 Example of the Video capture card parameters when two video capture cards with two 16/4 DI/DO cards with 6 sensors are used**

Configuring the **Sensor** objects one is to specify the channel numbers of sensor connection to the DI/DO card according to the numbers of the DO pins.

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Sensor** object.

16/4 DI/DO card allows connecting up to 16 sensor channels according to the license key file.

Figure 3.3—13 shows an example of the channel numbers configuration of 16 sensors connected to one 16/4 DI/DO card installed on FS-6 (FS-16) video capture card.

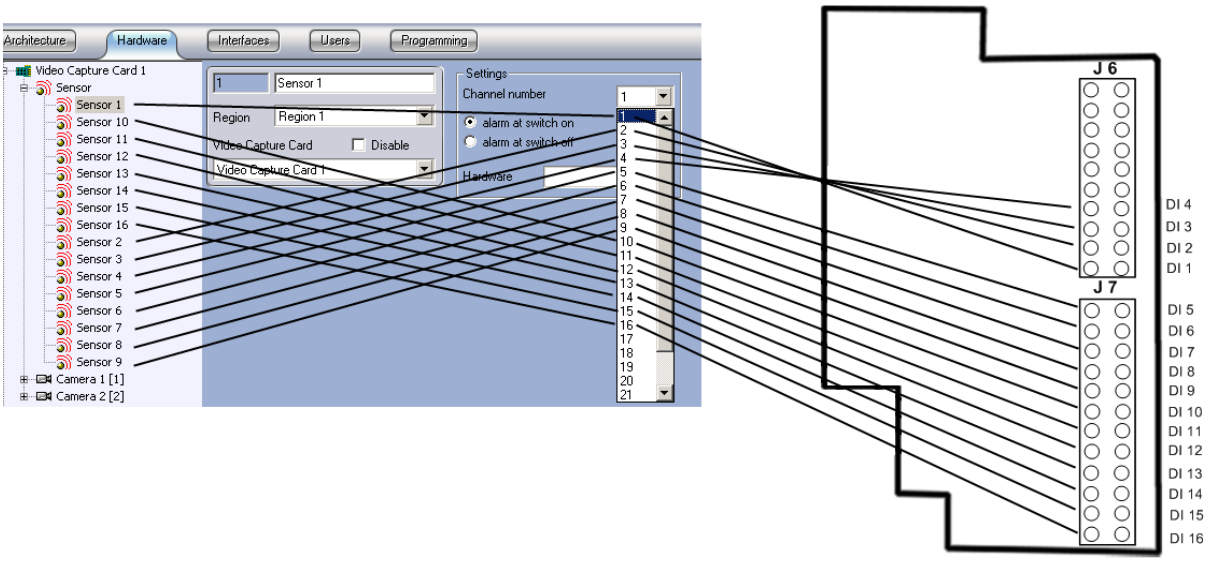



**Figure 3.3—13 Example of the of the channel numbers configuration of sensors connected on 16/4 DI/DO card installed on FS-6 (FS-16) video capture card (4 ADCs for 4 Video capture card objects)**

The channels of the second (next) 16/4 DI/DO card are numbered from 1 to 16 according to the DI pins (Figure 3.3—14).

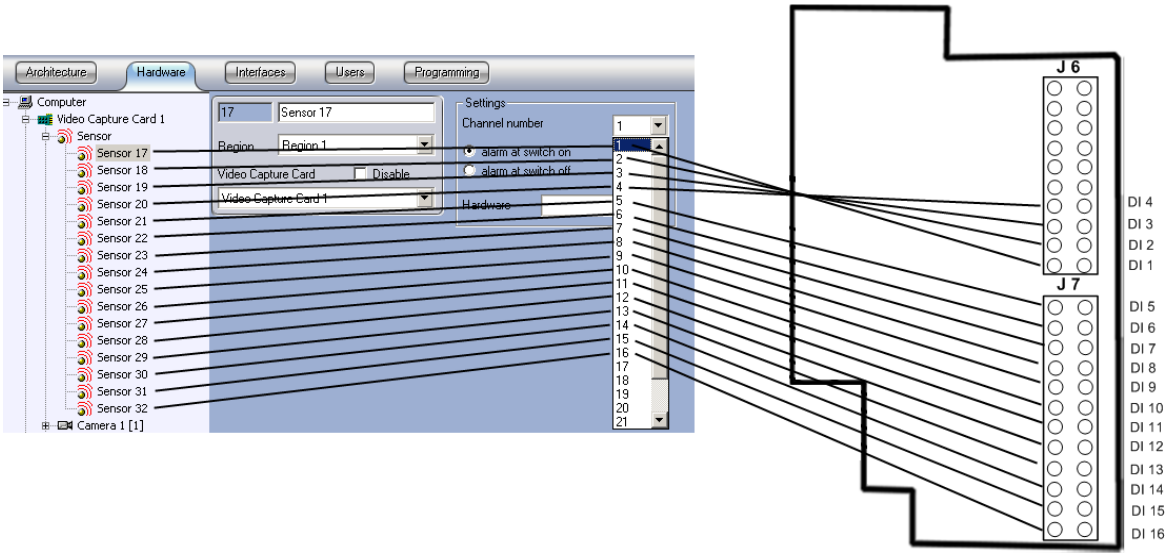



**Figure 3.3—14 Example of the of the channel numbers configuration of sensors connected on the second (next) 16/4 DI/DO card installed on FS-6 (FS-16) video capture card (4 ADCs for 4 Video capture card objects)**

## 3.3.4 Configuring DI/DO expansion cards (low profile)

### *3.3.4.1 Connecting relays*

Depending on what video capture card is used, the **Relay** objects corresponding to relays connected to 4/4 DI/DO card (low profile) are created under the **Video capture card** objects of one of the following types: FS 115, FX 4, FX 8 and FX 16 (Figure 3.3—15).

The **Relay** objects are to be created under the **Video capture card** object that has the first PCI channel. E.g., building security video subsystem with the use of two FX4 and two DI/DO cards (low profile) the **Relay** objects are to be created under the **Video capture card** objects with **00** (for the first FX4 card) and **04** (for the second FX4 card) values of PCI channels.

*Note 1. For FX16 video capture card the **Relay** objects can be created under the **Video capture card** object with **00** or **08** value of PCI channel. Working channel is discovered experimentally.*

*Note 2. Number of PCI channels (number of the **Video capture card** objects) for all types of cards is given in Features of video subsystem configuration section.*

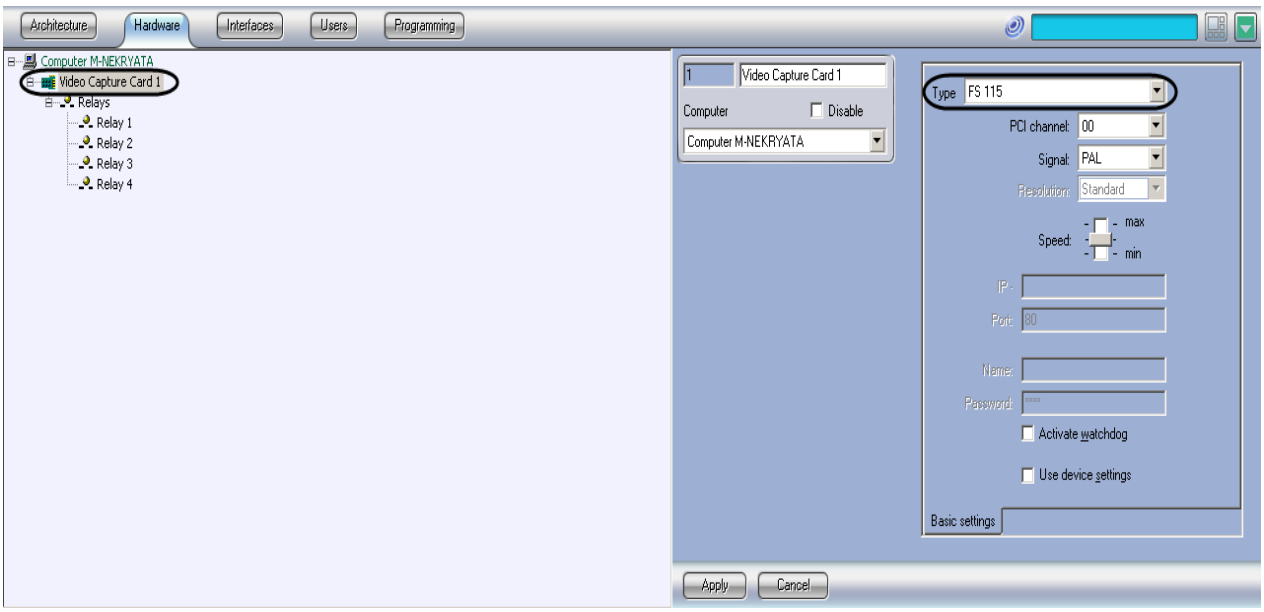



Figure 3.3—15 Creating the Relay objects under the Video capture card object

One can create up to 4 **Relay** objects under the **Video capture card** object. Configuring the **Relay** objects one is to specify the channel numbers of relay connection to 4/4 DI/DO card (low profile) according to external pinout of the card.

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Relay** object.

4/4 DI/DO card (low profile) allows connecting up to 4 relay channels according to the license key file.

Figure 3.3—16 shows an example of the channel numbers configuration of 4 relays connected to one 4/4 DI/DO card (low profile).

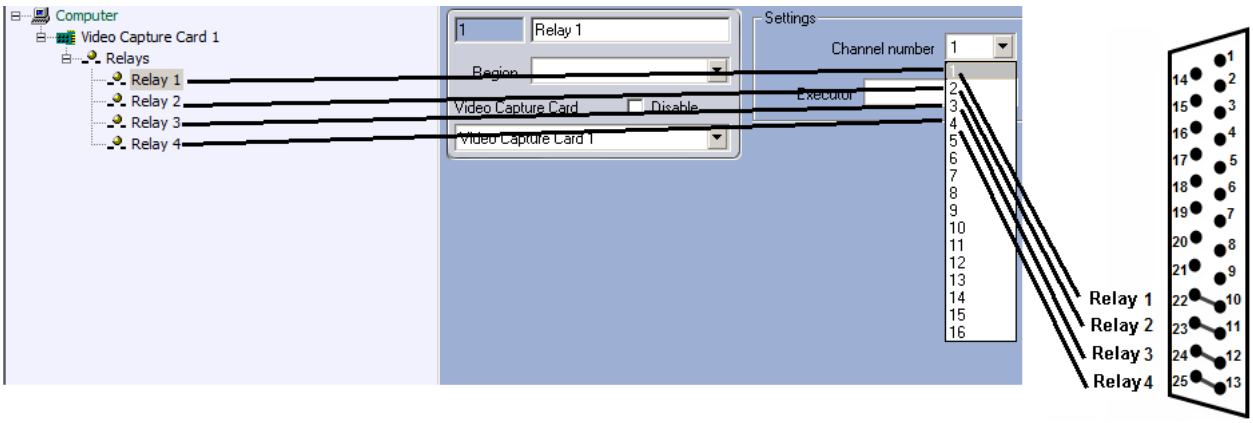



Figure 3.3—16 Channel numbers configuration of 4 relays connected to one 4/4 DI/DO card (low profile)

The channels of the second (next) 4/4 DI/DO card (low profile) are numbered from 1 to 4.

### *3.3.4.2 Connecting sensors*

Depending on what video capture card is used, the **Sensor** objects corresponding to sensors connected to 4/4 DI/DO card (low profile) are created under the **Video capture card** objects of one of the following types: FS 115, FX 4, FX 8 and FX 16 (Figure 3.3—17).

The **Sensor** objects are to be created under the **Video capture card** object that has the first PCI channel. E.g., building security video subsystem with the use of two FX4 and two DI/DO cards (low profile) the

**Sensor** objects are to be created under the **Video capture card** objects with **00** (for the first FX4 card) and **04** (for the second FX4 card) values of PCI channels.

*Note 1. For FX16 video capture card the **Sensor** objects can be created under the **Video capture card** object with **00** or **08** value of PCI channel. Working channel is discovered experimentally.*

*Note 2. Number of PCI channels (number of the **Video capture card** objects) for all types of cards is given in Features of video subsystem configuration section.*

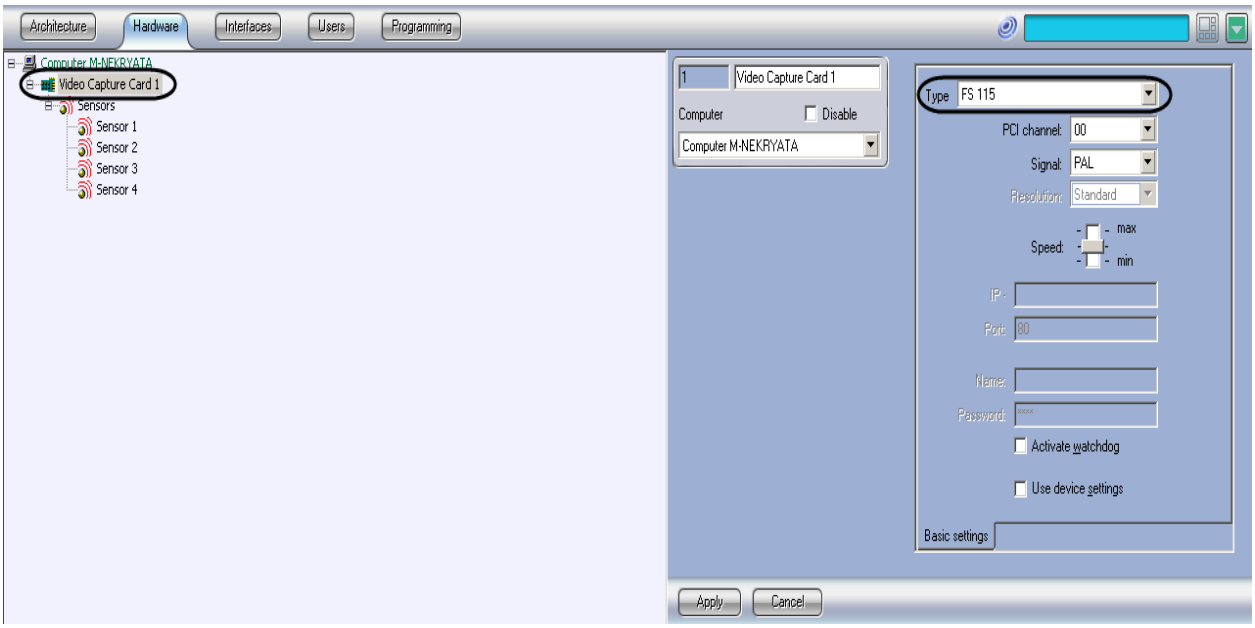



Figure 3.3—17 Creating the Sensor objects under the Video capture card object

One can create up to 4 **Sensor** objects under the **Video capture card** object. Configuring the **Sensor** objects one is to specify the channel numbers of sensor connection to 4/4 DI/DO card (low profile).

4/4 DI/DO card (low profile) allows connecting up to 4 sensor channels according to the license key file.

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Sensor** object.

Channels are numbered according to external pinout of the card. Figure 3.3—18 shows an example of the channel numbers configuration of 4 sensors connected to one 4/4 DI/DO card (low profile).

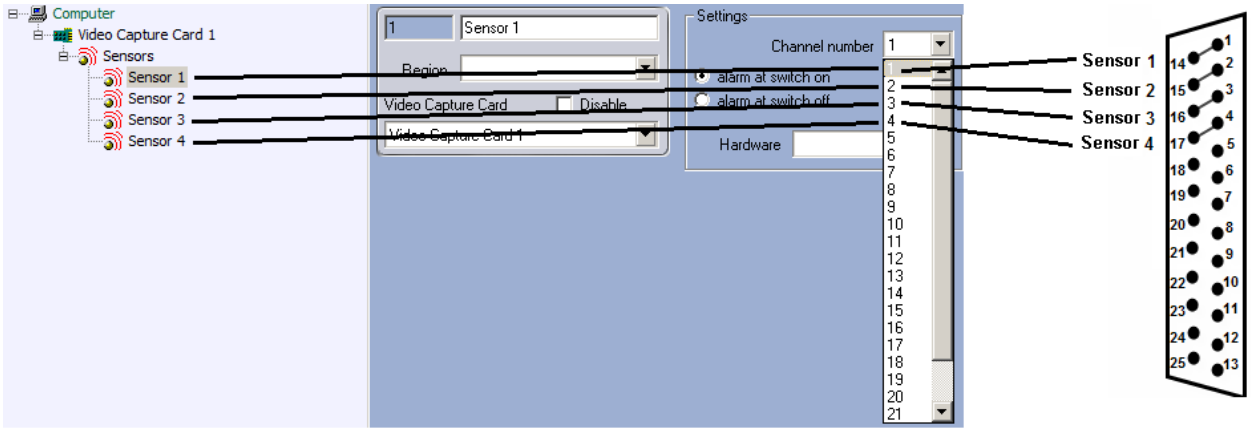



Figure 3.3—18 Channel numbers configuration of 4 sensors connected to one 4/4 DI/DO card (low profile)

The channels of the second (next) 4/4 DI/DO card (low profile) are numbered from 1 to 4.

### 3.3.5 Configuring SL USBIO card

#### *3.3.5.1 Connecting relays*

The **Relay** objects corresponding to relays connected to SL USBIO («4x4», «16x8», «24x4») card are created under the **Video capture card** objects of the **SL USBio** type (Figure 3.3—19).

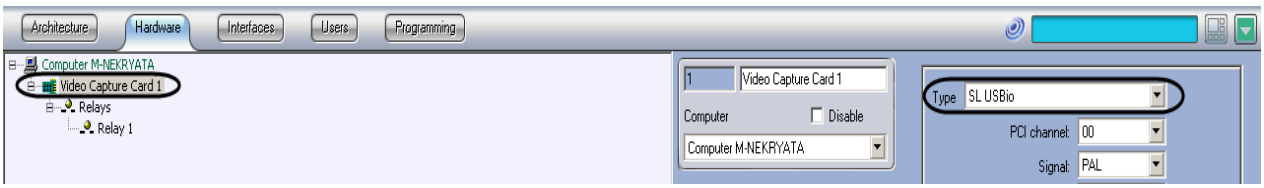



Figure 3.3—19 Configuring the Video capture card object for SL USBIO («4x4», «16x8», «24x4») card

Configuring the **Relay** objects one is to specify the channel numbers of relay connection to the card. Channels are numbered according to external pinout of the card (see Appendix 6. Electrical and technical specifications of DI/DO cards).

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Relay** object.

#### *3.3.5.2 Connecting sensors*

The **Sensor** objects corresponding to sensors connected to SL USBIO («4x4», «16x8», «24x4») card are created under the **Video capture card** objects of the **SL USBio** type (Figure 3.3—20).

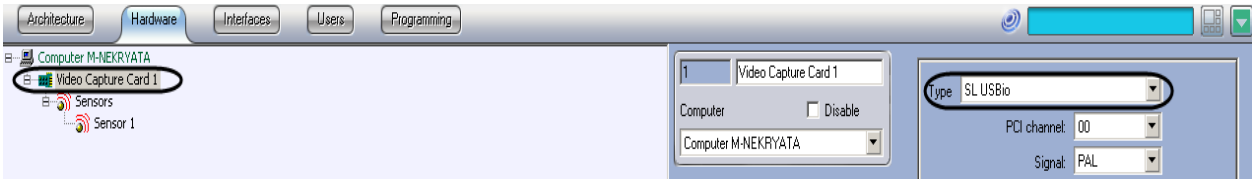



Figure 3.3—20 Configuring the Video capture card object for SL USBIO («4x4», «16x8», «24x4») card

Configuring the **Sensor** objects one is to specify the channel numbers of sensor connection to the card. Channels are numbered according to external pinout of the card (see Appendix 6. Electrical and technical specifications of DI/DO cards).

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Sensor** object.

### 3.3.6 Configuring MO USBIO 4x4 device

#### *3.3.6.1 Connecting relays*

The **Relay** objects corresponding to relays connected to MO USBIO 4x4 device are created under the **Video capture card** objects of the **MO USBio** type (Figure 3.3—21). One can create up to 4 **Relay** objects under the **Video capture card** object.

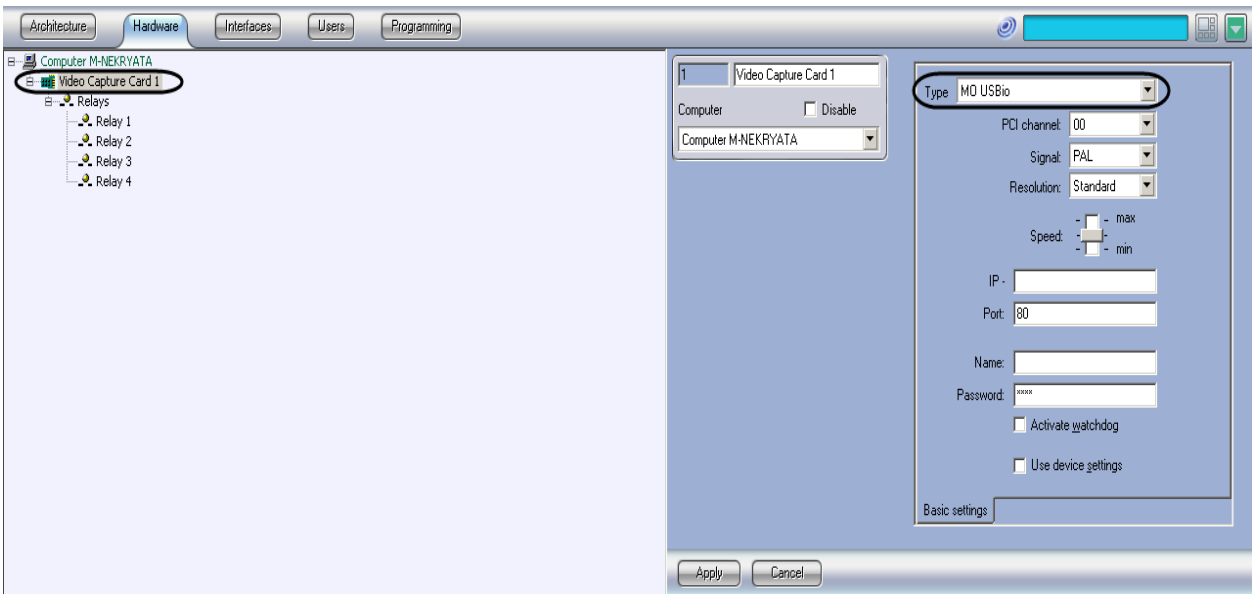



Figure 3.3—21 Configuring the Video capture card object for MO USBIO 4x4 device

*Note. One is to specify the number of PCI channel that is not used by another object.*

Configuring the **Relay** objects one is to specify the channel numbers of relay connection to MO USBIO 4x4 device. Channels are numbered according to external pinout of the device (see Connecting MO USBIO 4x4 external module or Connecting MO USBIO 4x4 cards sections).

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Relay** object.

MO USBIO 4x4 device allows connecting up to 4 relay channels according to the license key file.

Figure 3.3—22 shows an example of the channel numbers configuration of 4 relays connected to one MO USBIO 4x4 device.

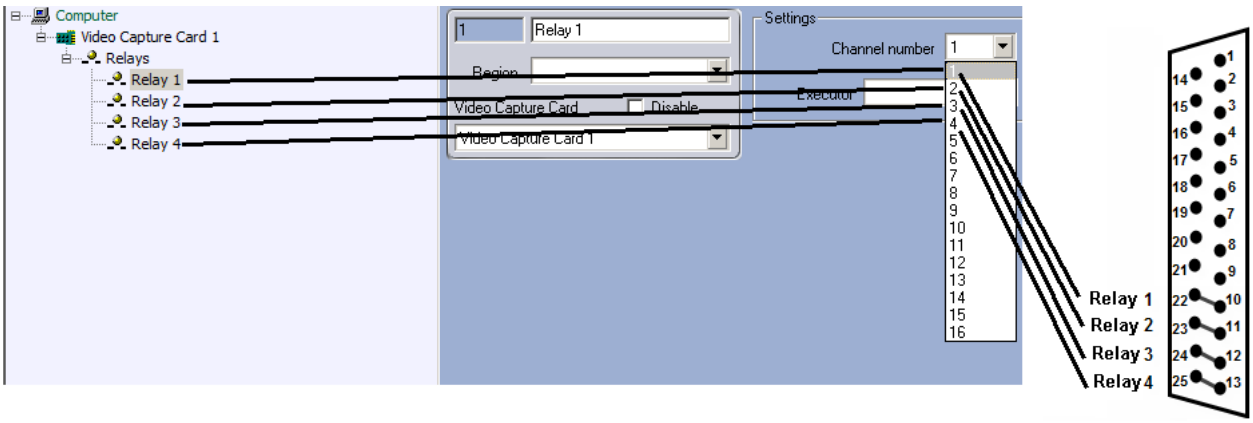



Figure 3.3—22 Channel numbers configuration of 4 relays connected to MO USBIO 4x4 device

The channels of the second (next) device are numbered from 1 to 4.

### *3.3.6.2 Connecting sensors*

The **Sensor** objects corresponding to sensors connected to MO USBIO 4x4 device are created under the **Video capture card** objects of the **MO USBio** type (Figure 3.3—23). One can create up to 4 **Sensor** objects under the **Video capture card** object.

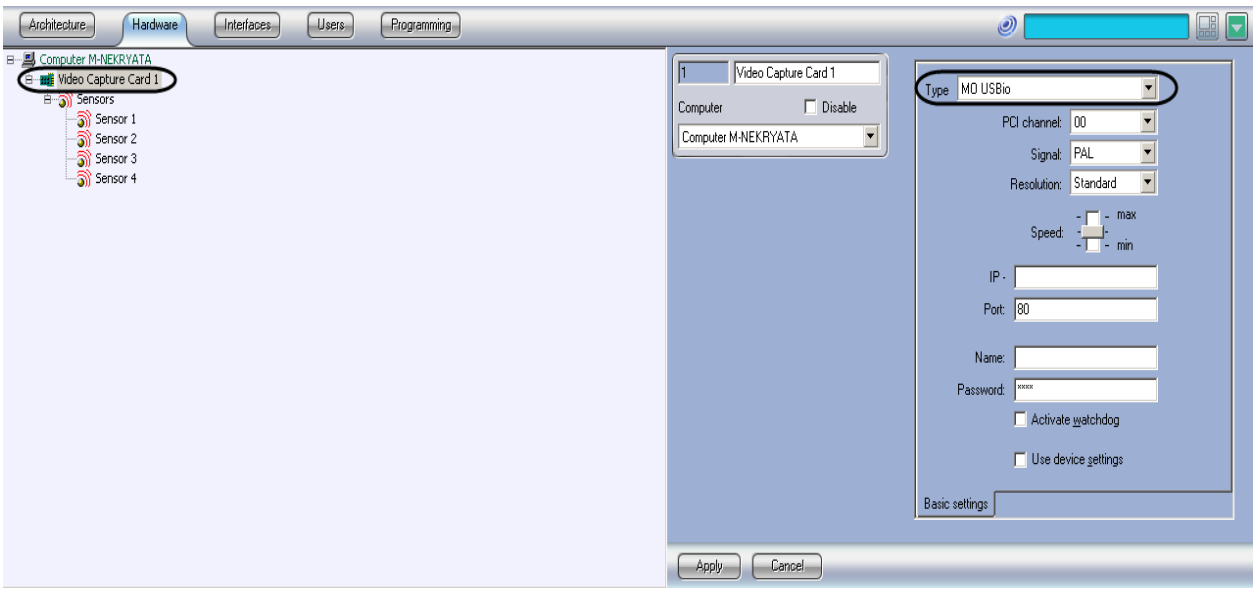



Figure 3.3—23 Configuring the Video capture card object for MO USBIO 4x4 device

*Note. One is to specify the number of PCI channel that is not used by another object.*

Configuring the **Sensor** objects one is to specify the channel numbers of sensor connection to MO USBIO 4x4 device. Channels are numbered according to external pinout of the device (see Connecting MO USBIO 4x4 external module or Connecting MO USBIO 4x4 cards sections).

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Sensor** object.

MO USBIO 4x4 device allows connecting up to 4 sensor channels according to the license key file.

Figure 3.3—24 shows an example of the channel numbers configuration of 4 sensors connected to one MO USBIO 4x4 device.

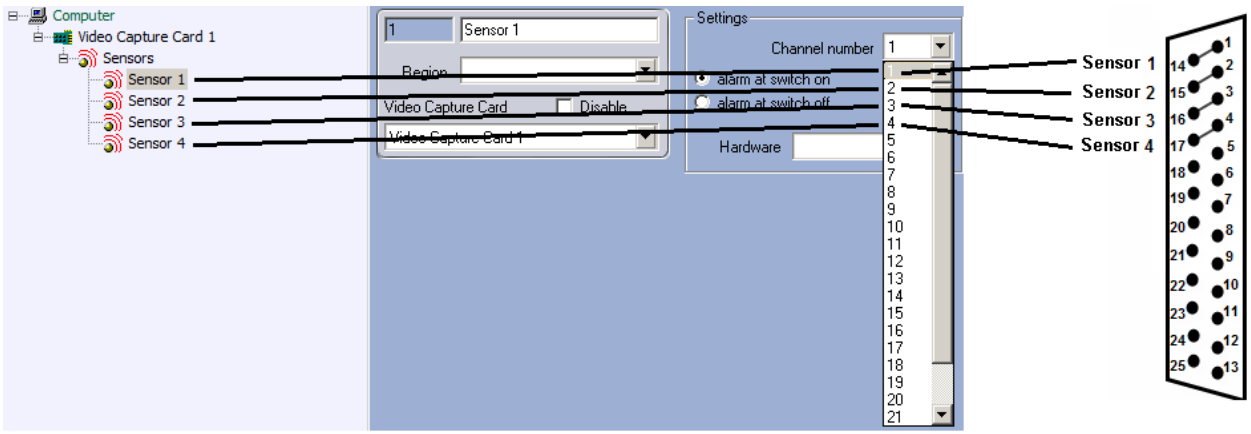



Figure 3.3—24 Channel numbers configuration of 4 sensors connected to MO USBIO 4x4 device

The channels of the second (next) device are numbered from 1 to 4.

## 3.3.7 Configuring DI/DO (Stretch) cards

### *3.3.7.1 Connecting relays*

One can connect up to 8 executive devices (relays) to one DI/DO (Stretch) card.

The **Relay** objects corresponding to relays connected to DI/DO (Stretch) card are created under the **Video capture card** objects of the **Stretch** type (Figure 3.3—25).

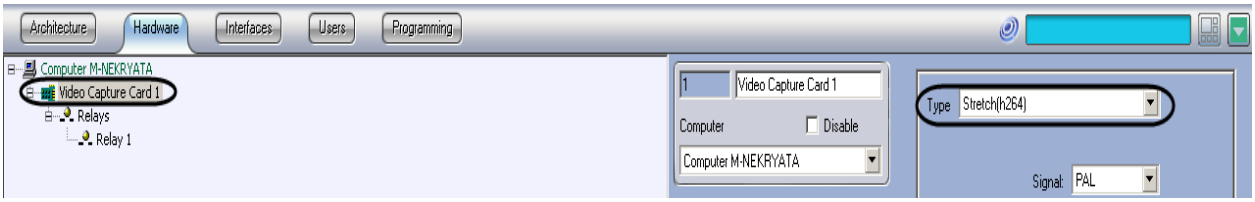



Figure 3.3—25 Creating the Relay objects under the Video capture card object of Stretch type

Configuring the **Relay** objects one is to specify the channel numbers of relay connection to the card. Channels are numbered according to external pinout of the card (see Connecting DI/DO (Stretch) section).

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Relay** object.

### *3.3.7.2 Connecting sensors*

One can connect up to 8 sensors to one DI/DO (Stretch) card.

The **Sensor** objects corresponding to sensors connected to DI/DO (Stretch) card are created under the **Video capture card** objects of the **Stretch** type (Figure 3.3—26).

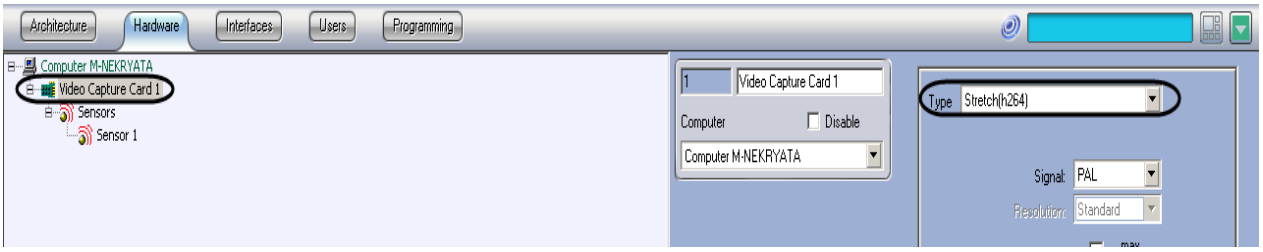



Figure 3.3—26 Creating the Sensor objects under the Video capture card object of Stretch type

Configuring the **Sensor** objects one is to specify the channel numbers of sensor connection to the card. Channels are numbered according to external pinout of the card (see Connecting DI/DO (Stretch) section).

To change the channel numbers, use the **Channel Number** list in the settings panel of the **Sensor** object.

## 3.3.8 Configuring sensors and relays connected via IP devices

If relays are connected to Server via IP devices, then select the corresponding type of IP device on the setting panel of the **Video capture card** object; set IP address, name and password to connect to camera (see *Configuring IP devices* section).

*Note. If relays are connected to Server via Bosh IP device, then enter the **service** value in the **Name** field (Figure 3.3—27). With another value the functionality of the relay is not performed on Server.*

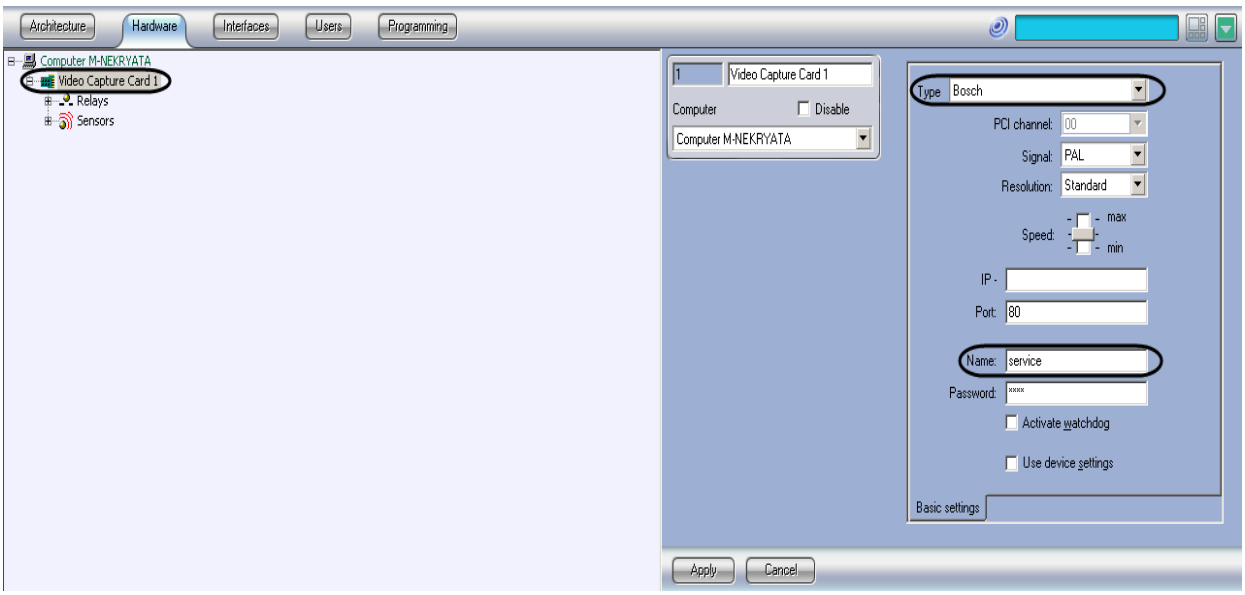



Figure 3.3—27 Configuring the Video capture card object of Bosch IP camera to connect relays

If Smartec STS-IPT-880 IP server is used, then sensors are to be connected to those channels that have the **Camera** objects. Channel with N number corresponds to 2 sensor channels with 2N-1 and 2N numbers.

*Note. Smartec STS-IPT-880 IP Server supports up to 8 video channels and 16 sensors (2 sensors for each channel).*

To connect each pair of sensors create the **Camera** object with **N** channel number, create two **Sensor** objects with 2N-1 and 2N numbers. The **Camera** and **Sensor** objects are created under one Video capture card object of the **Smartec** type. If sensors are connected via inactive video channel (no **Camera** object), then the functionality of sensora is not performed on Server.

To implement the functionality of sensors connected via AEBELL BL-E704F IP server disable the **Auto Work Plan** mode. Enabling/disabling of this mode is made via Web interface of IP server or in the dialog box of the **Network DVR Monitor System** utility (see the reference documentation on IP server).

## 3.4 Telemetry configuration

### 3.4.1 Use of PTZ devices in the digital video surveillance system

PTZ cameras in the digital video surveillance system are used to widen the video surveillance zone by mechanical rotating of the video camera.

The following interface elements of the INTELLECT™ software control the PTZ devices:

1. Surveillance monitor;
2. Telemetry control;
3. Telemetry control panel.

PTZ device control is performed with the help of the following:

1. Mouse and standard keyboard (when the **Surveillance monitor** and **Telemetry control panel** interface objects are used).
2. Specialized devices used for telemetry control, like telemetry remote control and joystick.

To manage simultaneous use of PTZ devices by different users, priorities of PTZ devices control must be set up for the following interface objects:

1. Surveillance monitor;
2. Telemetry control;
3. Telemetry control panel.

### 3.4.2 Priorities of PTZ control

The **PTZ control** or **Priority** parameter (depending on the type of the object) gives the privileges to control PTZ devices, when several interface objects are used or several users control the same PTZ device simultaneously.

To configure interface objects, used for PTZ control, the value of PTZ control priority should be selected from the list.

The **PTZ control** parameter is set for the following objects:

1. Surveillance monitor;
2. Telemetry control;
3. Telemetry control panel.

*Note. The priority of PTZ control with joystick is equal to the priority of PTZ control withSurveillance monitor and mouse.*

Priority parameter of PTZ control can be:

1. Control is forbidden (Forbidden). This item forbids PTZ control.
2. Low (Low priority). PTZ control is last in the queue after the “normal” and “high” priorities. It is the lowest in the queue in PTZ control.
3. Normal (Normal priority). PTZ is controlled after the device with “high” priority. It is higher in the queue in PTZ control than any device with “low” priority.
4. High (High priority). This item is set as first in the queue in PTZ control. It is highest in the PTZ control queue.

Contextual menu of selecting the PTZ control priority for the **Monitor** interface object is called **PTZ control** and consists of **Forbidden**, **Low priority**, **Normal priority** and **High priority** items (Figure 3.4—1):

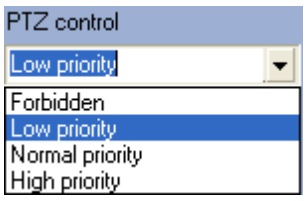



Figure 3.4—1 The setting panel of the PTZ control parameter for the Monitor interface object

Panel of selecting the PTZ control priority for the **Telemetry control panel** interface object and **Telemetry remote control** system object is called **Priority** and consists of **Forbidden**, **Low priority**, **Normal priority** and **High priority** items (Figure 3.4—2):

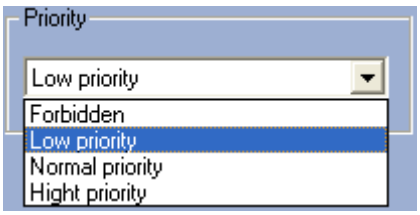



Figure 3.4—2 The settings panel of the Priority parameter

If the same PTZ device is controlled from several workstations with the interface objects of the same type with the same PTZ control priority, then the following rules apply:

1. Any user can control a PTZ device, when it is not controlled by another user with the interface of the same control priority.
2. If a user with a higher priority interface object delegates control to a user with a lower priority interface object, then this procedure is delayed. The priority delay time is set with the help of the tweaki.exe utility (Intellect tweaker).

To change the priority delay time using the tweaki.exe utility, do the following:

1. Run the tweaki.exe utility in the **Tools** folder of the INTELLECT™ software installation directory (Figure 3.4—3).

2. Select the **Telemetry** section (Figure 3.4—3, 1).

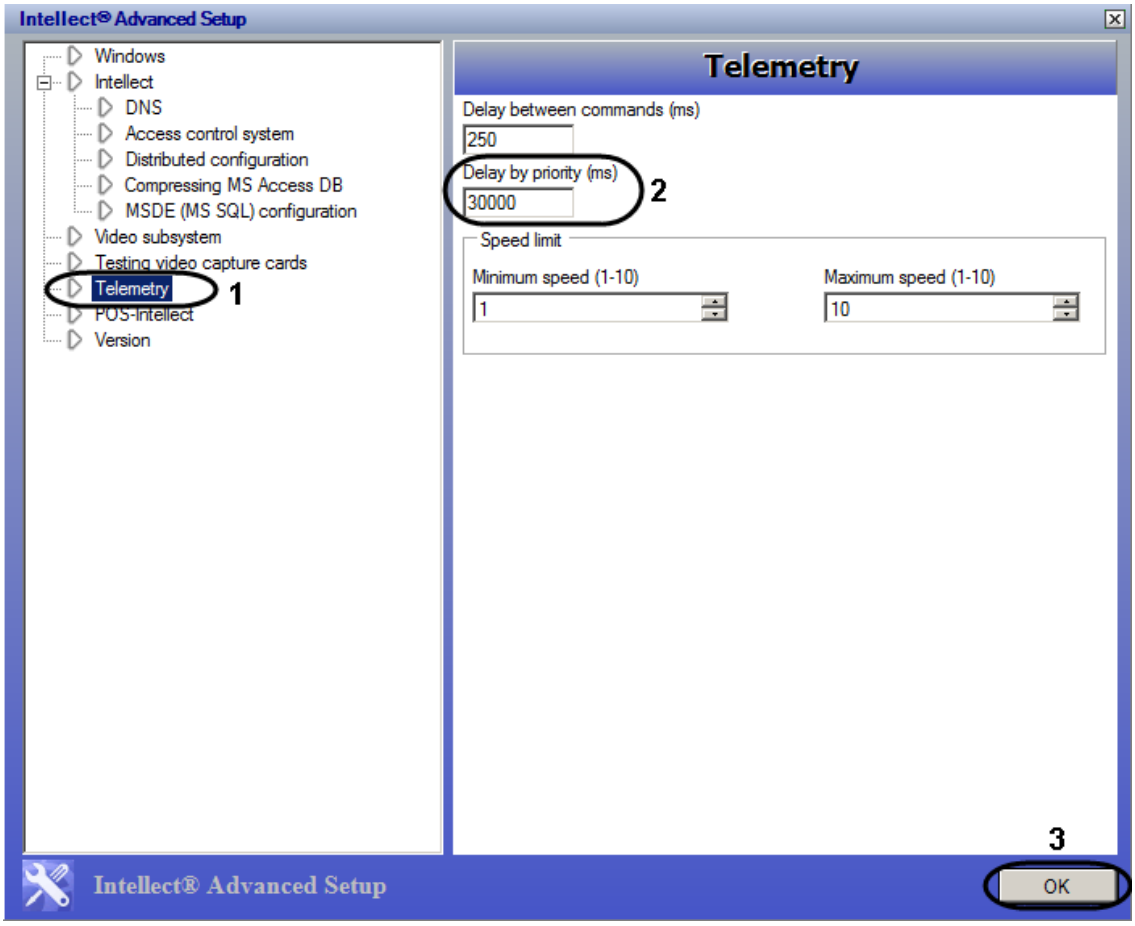



Figure 3.4—3 The Telemetry section of the tweaki.exe utility

3. Enter the value of PTZ control priority delay in the **Priority delay (ms)** field (Figure 3.4—3, 2).

The delay parameter is given in milliseconds. The default value is 30000.

4. Click **OK** to save the changes (Figure 3.4—3, 3).

*Note. When the objects are configured with variable PTZ priority controls it is recommended to assign different PTZ control priorities to different system objects (object types). If different system objects have the same PTZ control priority, problems may occur in operation, especially in controlling the PTZ devices.*

### 3.4.3 PTZ device (telemetry) configuration

#### *3.4.3.1 Sequence of PTZ device configuration*

PTZ device configuration in the INTELLECT™ software consists of creation and configuration of system objects corresponding to the PTZ module, and user interface for PTZ device operation.

The user interface for PTZ device operation is represented by the following interface objects:

1. Telemetry control;
2. Operator window;
3. Surveillance monitor.

To configure PTZ devices and control panels do the following:

1. Configuration of Server ports for PTZ connection.
2. PTZ configuration.
3. Telemetry control panel configuration.
4. Telemetry control configuration.
5. Configuration of Operator window for telemetry control (PTZ devices of certain type).
6. Configuration of Surveillance monitor to control PTZ device with the help of mouse or joystick.

#### *3.4.3.2 Configuration of Server ports and remote workplace for PTZ connection*

PTZ devices are connected to the Server serial ports (COM). The INTELLECT™ software has the facility to plug in the required number of PTZ devices on demand.

Data exchange with a PTZ device is performed via the serial port (COM) in accordance with special protocol. Any type of PTZ devices has its own individual exchange protocol. Only one exchange protocol can be selected for data exchange via the serial port (COM). In this connection only one type of PTZ devices may be connected to one serial port (COM).

Configuration of several serial ports (COM) is performed in turn. Each type of serial ports (COM), used to connect the PTZ device, has the corresponding **Telemetry card** object, created and configured on the **Hardware** tab in the **System settings** dialog box.

To configure the serial port (COM) used for connecting PTZ devices of the same type, do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box (Figure 3.4—4, 1).
2. Create the **Telemetry card** system object under the **Computer** object or select the corresponding object in the object tree on the **Hardware** tab in the **System settings** dialog box (Figure 3.4—4, 2).

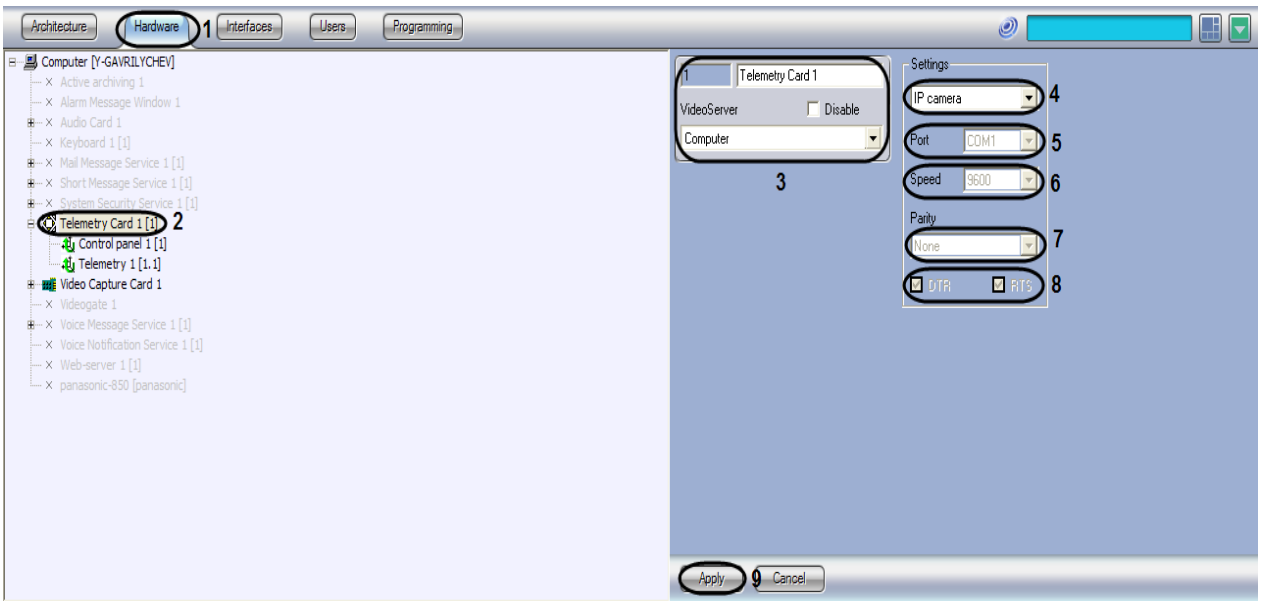



Figure 3.4—4 The setting panel of the Telemetry card object

3. When the **Telemetry card** object is created, enter the ID, the name of the object and select Server to the COM port of which the PTZ device is connected (Figure 3.4—4, 3).
4. Select the protocol of data exchange with PTZ device from the list. The data exchange protocol names in this list correspond to the PTZ types (Figure 3.4—4, 4).
5. Select the serial port (COM) number from the **Port** list (Figure 3.4—4, 5).
6. If it is necessary change the data exchange speed (Figure 3.4—4, 6).

*Note 1. Take into account that the data exchange speed via the COM port is specified by the vendor of PTZ device. The speed of data exchange with the PTZ device via the COM port must correspond to the speed specified by the vendor.*

*Note 2. If you need to change the COM port settings, change the relevant COM port settings in the Windows OS (for instructions on COM port configuration in the Windows OS see Appendix 4. Technical specifications of video capture cards).*

7. If it is necessary change the parity check parameters for the data exchange (Figure 3.4—4, 7).
8. If PTZ devices are passive (i.e. with no independent power supply), the power supply of the PTZ devices must be activated via the DTR or RTS outputs of the COM port by setting the **DTR** or **RTS** check boxes (Figure 3.4—4, 8).
9. To save the changes click **Apply** (Figure 3.4—4, 9).

### *3.4.3.3 PTZ device configuration in the INTELLECT™ software*

The number of PTZ devices connected to the videoserver is stated in the activation key supplied with the INTELLECT™ software distribution kit.

Every PTZ device has the corresponding **Telemetry** system object in INTELLECT™ software. The **Telemetry** object is a child object relative to the **Telemetry card** object.

PTZ device configuration involves selection of the camera equipped with a PTZ device and setting of PTZ hardware addresses.

Configuration of several PTZ devices is performed in turn.

To configure PTZ devices do the following:

1. Go to the **Hardware** tab in the setting panel of INTELLECT™ (Figure 3.4—5, 1).
2. Create the **PTZ device** object under the **Telemetry controller** object or select the relevant object in the object tree on the **Hardware** tab in the **System settings** dialog box (Figure 3.4—5, 2).

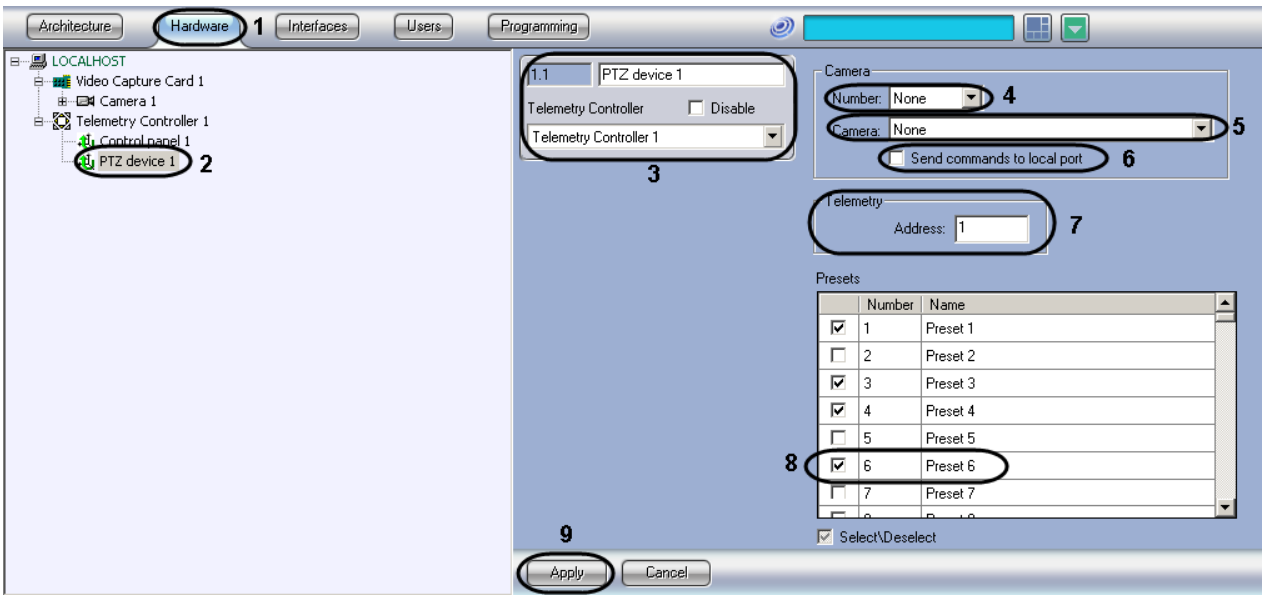



Figure 3.4—5 The setting panel of the PTZ device

3. Enter the ID, the name of the **PTZ device** object and select the **Telemetry controller** object to which the PTZ device is connected (Figure 3.4—5, 3).
4. Select the ID of the camera equipped with a PTZ device (Figure 3.4—5, 4).
5. Select the name of the camera equipped with a PTZ device (Figure 3.4—5, 5).

*Note. Enter either the video camera ID or its name.*

6. If it is necessary to increase priority of a COM port specified in the settings of the **Telemetry controller** object, then set the **Send commands to local port** checkbox (Figure 3.4—5, 6). This parameter is used when, for ex., commands are sent not to COM port but to video capture card.
7. Enter the hardware address for the PTZ device in the **Address** field. The PTZ hardware address corresponds to the address set on the PTZ device with the help of bridges (jumpers) or configured while programming the PTZ device in the the supplied software (Figure 3.4—5, 7)
8. In the **Presets** table set checkboxes for presets names of which should be displayed on Telemetry control panel (see Telemetry panel configuration section). If it is necessary change the preset name (Figure 3.4—5, 8).

*Note. In order to select all presets or cancel this operation, use the Select/Cancel checkbox.*

9. To save the changes click **Apply** (Figure 3.4—5, 9).

### 3.4.4 Telemetry control panel configuration

The Telemetry control panel is used for PTZ device control. The **Control panel** system object is used for the **Telemetry control panel** hardware device registration in INTELLECT™ software.

To register and configure the **Control panel** object, do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box (Figure 3.4—6, 1).
2. Create the **Control panel** system object under the **Telemetry card** object or select the relevant object on the **Hardware** tab in the **System settings** dialog box (Figure 3.4—6, 2).

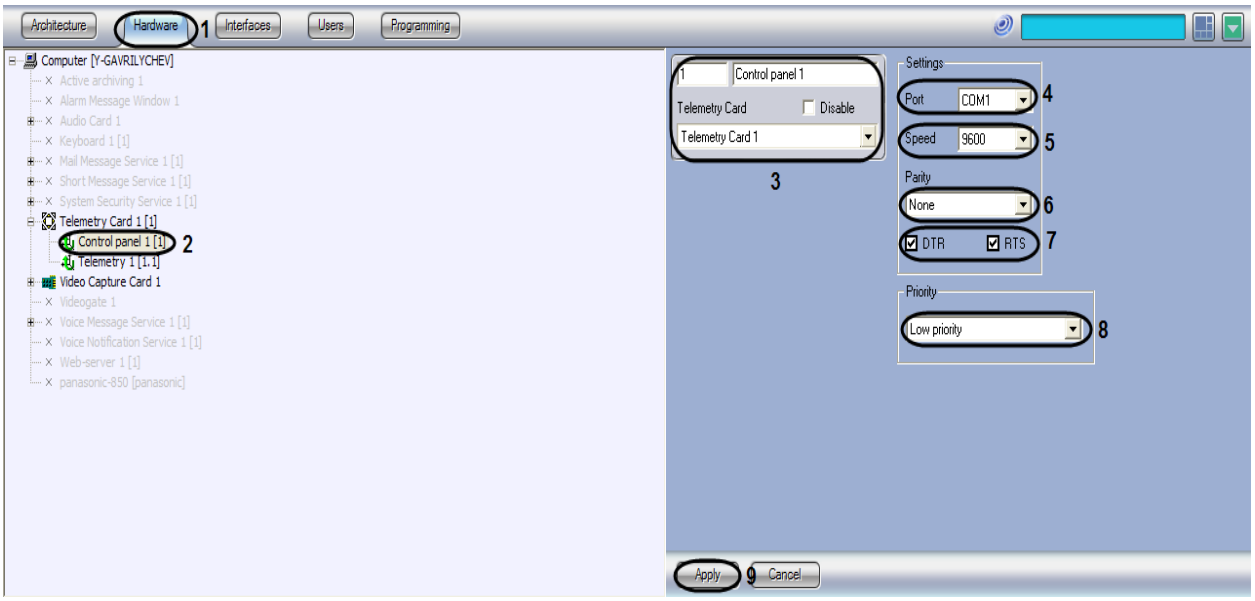



Figure 3.4—6 The setting panel of the Control panel object

3. Enter the ID, the name of the **Telemetry** object and select the **Telemetry card** object to which the PTZ device is connected (Figure 3.4—6, 3).
4. Select the COM port number from the **Port** list in order to connect the **Control panel** device (Figure 3.4—6, 4).

*Note. The Control panel is connected to the COM port different from that to wich the PTZ device is connected. Consequently on the settings panel of the parent (for the **Control panel** object) **Telemetry card** object, another COM port number must be specified.*

5. If it is necessary enter the speed of data exchange between the computer and the **Telemetry control panel** device (Figure 3.4—6, 5).
6. If it is necessary enter parity check parameters for the data exchange (Figure 3.4—6, 6).
7. If the **Telemetry control panel** device is passive (i.e. with no independent power supply), the power supply must be activated via the DTR or RTS outputs of the COM port by setting the **DTR** or **RTS** check boxes (Figure 3.4—6, 7).

*Note 1. The COM port speed and parity settings of the parent **Telemetry card** object do not relate to the similar settings of the **Control panel** object as they refer to another COM port.*

*Note 2.The **Speed** and **Parity** settings must correspond to the COM port settings in the Windows OS*

8. If it is necessary to change the PTZ device control priority for the **Telemetry control panel** device, select the relevant item from the **Priority** list (Figure 3.4—6, 8).
9. To save the changes click **Apply** (Figure 3.4—6, 9).

### *3.4.4.1 Features of BOSCH 12c-KBD-Digital control panel configuration and operation*

#### 3.4.4.1.1 Configuring BOSCH 12c-KBD-Digital control panel in INTELLECT™

To configure BOSCH 12c-KBD-Digital control panel in INTELLECT™ do the following:

1. Create the **Telemetry Controller** object.
2. Configure the **Telemetry Controller** object as follows (Figure 3.4—7):

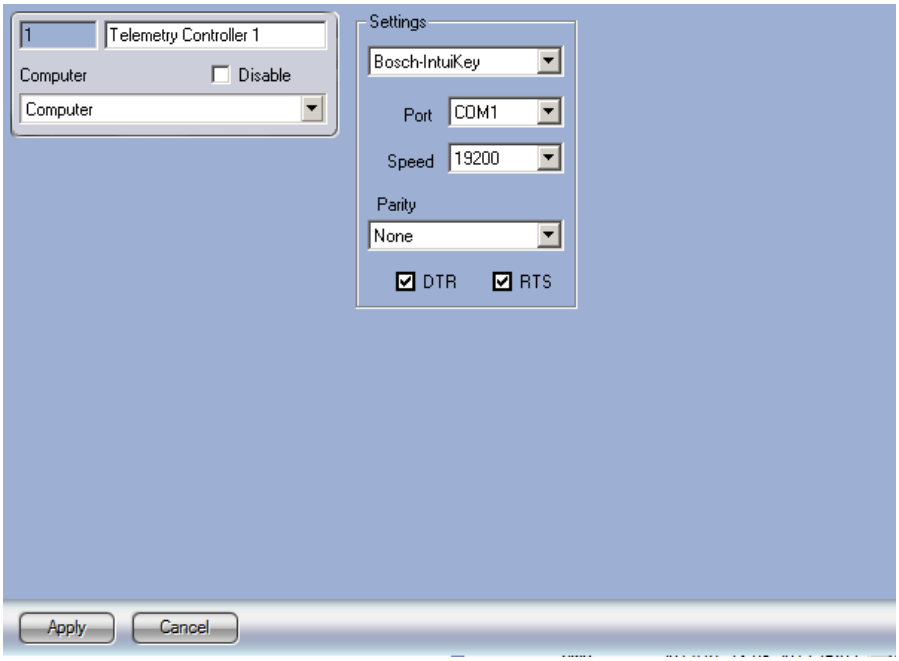



Figure 3.4—7 Configuring the Telemetry Controller object for BOSCH 12c-KBD-Digital operation

   2.1 Set the **Bosch-IntuiKey** interface protocol.
   2.2 Select the **COM** port in the **Port** list.
   2.3 Set **19200** value to the **Speed** parameter.
   2.4 Set the **None** value for the **Parity** parameter.
   2.5 Set the **DTR** and **RTS** checkboxes.
3. Create the **Control panel** system object under the **Telemetry Controller**.
4. Configure the **Control panel** object as described in section *Telemetry control panel configuration*.

BOSCH 12c-KBD-Digital control panel is configured in INTELLECT™ software.

#### 3.4.4.1.2 Features of BOSCH 12c-KBD-Digital control panel operation INTELLECT™ software

***Attention! Before starting work with BOSCH 12c-KBD-Digital control panel in INTELLECT™ switch it to the Terminal mode. For this press the Prod key and select Terminal on the monitor.***

*Note.Detailed information on BOSCH 12c-KBD-Digital control panel is given in official reference documentation on this device.*

Pressing the key on BOSCH 12c-KBD-Digital control panel in INTELLECT™ there is **Key is pressed** or **Key is released** message.

Table 3.4—1 Description of 'Key is pressed' and 'Key is released' messages

| Event | Message | Parameter | Description |
|---|---|---|---|
| KEY_PRESSED | Key pressed | param0 | Code of pressed key |
| KEY_RELEASED | Key released | param0 | Code of released key |

In the comments to these events the code (param0) of pressed and released key is specified (Table 3.4—2).

*Note. With long key pressing (more then 500 milliseconds) the **Key is pressed** event is repeated with 100 milliseconds interval. Releasing the key one **Key is released** message is received.*

**Table 3.4—2 Key codes of BOSCH 12c-KBD-Digital control panel**

| Key | Key code | Key | Key code |
|---|---|---|---|
| SOFTKEY 1L | 0x01 | 4 | 0x34 |
| SOFTKEY 2L | 0x02 | 5 | 0x35 |
| SOFTKEY 3L | 0x03 | 6 | 0x36 |
| SOFTKEY 4L | 0x04 | 7 | 0x37 |
| SOFTKEY 5L | 0x05 | 8 | 0x38 |
| SOFTKEY 6L | 0x06 | 9 | 0x39 |
| SOFTKEY 7L | 0x07 | MONITOR | 0x20 |
| SOFTKEY 1R | 0x08 | PRODUCT | 0x21 |
| SOFTKEY 2R | 0x09 | CLEAR | 0x22 |
| SOFTKEY 3R | 0x0A | IRISA | 0x23 |
| SOFTKEY 4R | 0x0B | IRISB | 0x24 |
| SOFTKEY 5R | 0x0C | ACK | 0x25 |
| SOFTKEY 6R | 0x0D | ENTER | 0x26 |
| SOFTKEY 7R | 0x0E | SHOT | 0x27 |
| 0 | 0x30 | FOCUSA | 0x28 |
| 1 | 0x31 | FOCUSB | 0x29 |
| 2 | 0x32 | 0 + 1 | 0x81 |
| 3 | 0x33 | MONITOR + CLEAR | 0x82 |

The following special features are available for BOSCH 12c-KBD-Digital control panel:

1. **Paint figure** (set by **Figure**, **Type of painting**, **Paint figure**, **original Y-coordinate**, **end Y-coordinate**, **original X-coordinate**, **end X-coordinate** and **Screen**).
2. **Clear screen** (set by **Screen** parameter).
3. **Type text** (set by **X-coordinate**, **Y-coordinate**, **Coding**, **Style**, **Screen** and **Text** parameters).

*Note 1. Bold text is displayed only on the status display.*

*Note 2. These actions are described in INTELLECT™ software . Programming Guide.*

### *3.4.4.2 Features of Axis T8310 control panel configuration and operation*

#### 3.4.4.2.1 Configuring Axis T8310 control panel in INTELLECT™

To configure Axis T8310 control panel in INTELLECT™ do the following:

1. Create the **Telemetry controller** object.
2. Configure the **Telemetry controller** object as follows (Figure 3.4—7):

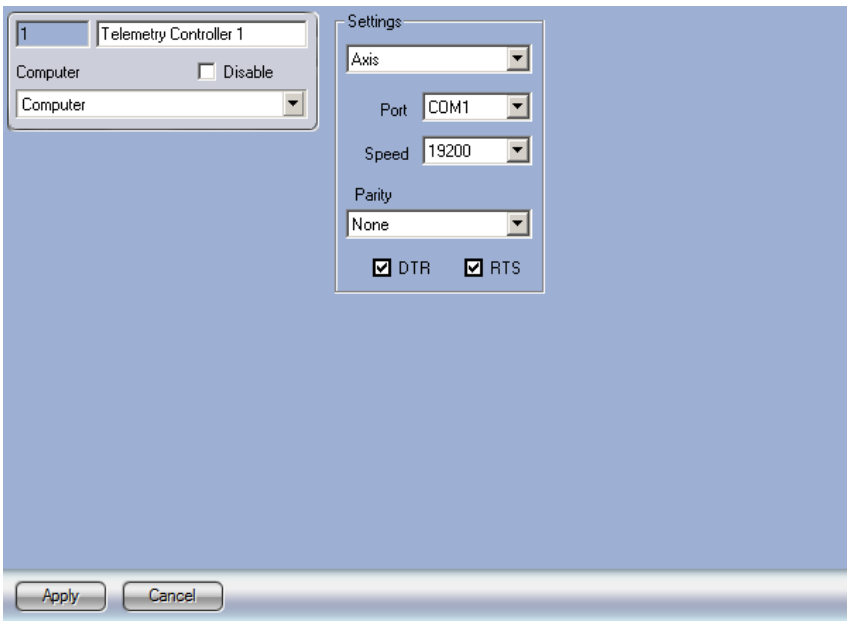



Figure 3.4—8 Configuring the Telemetry Controller object for Axis T8310 operation

2.1 Set the **Axis** interface protocol.
2.2 Select the **COM** port in the **Port** list.
2.3 Set **19200** value to the **Speed** parameter.
2.4 Set the **None** value for the **Parity** parameter.
2.5 Set the **DTR** and **RTS** checkboxes.

5. Create the **Control panel** system object under the **Telemetry controller**.
6. Configure the **Control panel** object as described in section *Telemetry control panel configuration*.

Axis T8310 control panel is configured in INTELLECT™ software.

#### 3.4.4.2.2 Features of Axis T8310 control panel operation INTELLECT™ software

*Note.Detailed information on Axis T8310 control panel is given in official reference documentation on this device.*

Pressing the key on Axis T8310 control panel in INTELLECT™ there is **Key is pressed** or **Key is released** message.

AXIS T8310 control panel is a modular system that consists of three devices:

1. AXIS T8311 joystick. This device has functionality of an ordinary joystick and it is configured as normal (see *Joystick configuration for telemetry control* section). The device also has 6 hot keys.
2. AXIS T8312 keyboard has 10 hot keys and 12 programmed keys.
3. AXIS T8313 Jog Dial has 6 hot keys and a navigation wheel.

Modules of AXIS T8310 control panel are connected to Server via the USB-interface. If complete AXIS T8310 control panel is used, then modules are connected to each other via AXIS T8312 keyboard (USB hub).

Functions of control panel related to pressing keys can be performed with the help of following:

1. scripts in JScript (see details of creating scripts in *INTELLECT™ software. Programming Guide (JScript)*);
2. programs in embedded language (see details in *INTELLECT™ software . Programming Guide*) ;
3. macros (see details in *INTELLECT™ software . Administrator's Guide*, *Creating and using macros* section).

Pressing the key on the keyboard of AXIS T8310 control panel in INTELLECT™ there is **Key is pressed** or **Key is released** message (Table 3.4—3).

**Table 3.4—3 Description of 'Key is pressed' and 'Key is released' messages**

| Event | Message | Parameter | Description | Value range |
|---|---|---|---|---|
| KEY_PRESSED | Key pressed | param0 | Code of pressed key | 0..21 |
| | | device | Device with pressed key. | 0 - AXIS T8312 main keyboard,<br>1 - AXIS T8313 keyboard |
| KEY_RELEASED | Key pressed | param0 | Code of released key | 0..21 |
| | | device | Device with released key | 0 - AXIS T8312 main keyboard,<br>1 – AXIS T8313 Jog Dial |

The **Cotrol panel** object (TELEMETRY_EXT) is the issuer of these events. In the comment to these events the code of pressed and released key is specified (Table 3.4—4).

**Table 3.4—4 Key codes of AXIS T8312 control panel**

| Key | Key code | Key | Key code |
|---|---|---|---|
| 0 | 0 | Alt | 11 |
| 1 | 1 | | 12 |
| 2 | 2 | | 13 |
| 3 | 3 | | 14 |
| 4 | 4 | | 15 |
| 5 | 5 | | 16 |
| 6 | 6 | F1 | 17 |
| 7 | 7 | F2 | 18 |
| 8 | 8 | F3 | 19 |
| 9 | 9 | F4 | 20 |
| | 10 | F5 | 21 |

When the position of AXIS T8313 joystik is changed then there is **Position is changed** message (Table 3.4—5).

**Table 3.4—5 Description of Position is changed message**

| Event | Message | Parameter | Description | Value range |
|---|---|---|---|---|
| MOVED | Position changed | param0 | Offset value | JogDial -1.. 1; shuttle -7..7 |
| | | device | 'AXIS T8313' type of control-gear | 0 – JogDial,<br>1 – shuttle |

The following special features are available for AXIS T8310 control panel:

1. Switch on relay (set by **Relay identifier** parameter). This command allows swiching on the light on the key with light (12-16).
2. Switch off relay (set by **Relay identifier** parameter). This command allows swiching off the light on the key with light (12-16).

*Note. These actions are described in INTELLECT™ software . Programming Guide.*

### *3.4.4.3 Features of Panasonic WV-CU950 control panel configuration and operation*

#### 3.4.4.3.1 Configuring Panasonic WV-CU950 control panel in INTELLECT™

Before connecting the Panasonic WV-CU950 control panel make sure that the MODE switches are set to the position corresponding to connection via RS-485 protocol: switches number 1 and number 5 should be set to ON, the rest to OFF. See details about setting switches in the manufacturer's documentation.

To configure Panasonic WV-CU950 control panel in INTELLECT™ do the following:

1. Create the **Telemetry controller** object.
2. Configure the **Telemetry controller** object as follows (Figure 3.4—9):

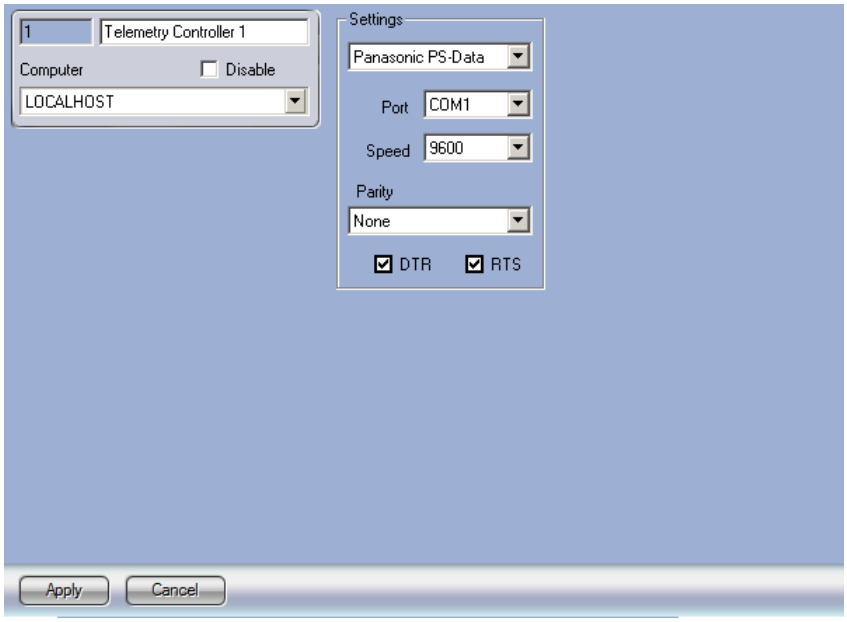



**Figure 3.4—9 Configuring the Telemetry Controller object for Panasonic WV-CU950 operation**

   2.1. Set the **Panasonic PS-Data** interface protocol.
   2.2. Select the **COM** port in the **Port** list.
   2.3. Set **9600** value to the **Speed** parameter.
   2.4. Set the **None** value for the **Parity** parameter.
   2.5. Set the **DTR** and **RTS** checkboxes.
3. Create the **Control panel** system object under the **Telemetry controller**.
4. Configure the **Control panel** object as described in section *Telemetry control panel configuration*.

Panasonic WV-CU950 control panel is configured in INTELLECT™ software.

#### 3.4.4.3.2 Features of Panasonic WV-CU950 control panel operation INTELLECT™ software

Pressing the key on Panasonic WV-CU950 control panel in INTELLECT™ there is **Key pressed** or **Key released** message.

Table 3.4—6 Description of 'Key pressed' and 'Key released' messages

| Event | Message | Parameter | Description |
|---|---|---|---|
| KEY_PRESSED | Key pressed | param0 | Code of pressed key |
| KEY_RELEASED | Key pressed | param0 | Code of released key |

The **Cotrol panel** object (TELEMETRY_EXT) is the issuer of these events. In the comment to these events the code of pressed and released key is specified (Table 3.4—7).

Table 3.4—7 Key codes of Panasonic WV-CU950 control panel

| Key | Key code | Key | Key code |
|---|---|---|---|
| 1 | '1' | 30 | 'T' |
| 2 | '2' | 31 | 'U' |
| 3 | '3' | 32 | 'V' |
| 4 | '4' | 33 | 'W' |
| 5 | '5' | 34 | 'X' |
| 6 | '6' | 35 | 'Y' |
| 7 | '7' | 36 | 'Z' |
| 8 | '8' | 37 | 'a' |
| 9 | '9' | 38 | 'b' |
| 10 | '0' | 39 | 'c' |
| 11 | 'A' | 40 | 'd' |
| 12 | 'B' | 41 | 'e' |
| 13 | 'C' | 42 | 'f' |
| 14 | 'D' | 43 | 'g' |
| 15 | 'E' | 44 | 'h' |
| 16 | 'F' | 45 | 'i' |
| 17 | 'G' | 46 | 'j' |
| 18 | 'H' | 47 | 'k' |
| 19 | 'I' | 48 | 'l' |
| 20 | 'J' | 49 | 'm' |
| 21 | 'K' | 50 | 'n' |
| 22 | 'L' | 51 | 'o' |
| 23 | 'M' | 52 | 'p' |
| 24 | 'N' | 53 | 'q' |
| 25 | 'O' | 54 | 'r' |
| 26 | 'P' | 55 | 's' |
| 27 | 'Q' | 56 | 't' |
| 28 | 'R' | 57 | 'u' |
| 29 | 'S' | | |

When the position of Panasonic WV-CU950 joystik is changed then there is **Position is changed** message (Table 3.4—8).

Table 3.4—8 Description of Position changed message

| Event | Message | Parameter | Description | Value range |
|---|---|---|---|---|
| MOVED | Position changed | param0 | Offset value | JogDial -1.. 1; shuttle -6..6 |
| | | device | Type of control-gear | 0 – JogDial,<br>1 – shuttle |

Functions of control panel related to pressing keys can be performed with the help of following:

4. scripts in JScript (see details of creating scripts in *INTELLECT™ software. Programming Guide (JScript)*);
5. programs in embedded language (see details in *INTELLECT™ software . Programming Guide*) ;
6. macros (see details in *INTELLECT™ software . Administrator's Guide*, *Creating and using macros* section).

The following special features are available for Panasonic WV-CU950 control panel using Macros:

1. Clear screen – allows clearing the device screen.
2. Print text (set by **Y coordinate**, **Text** and **Indication** parameters) – displaying text with certain position and indication on the device screen.
3. Set alarm (set by Audio alarm parameter). Set alarm signal type.
4. Switch on relay (set by **Relay identifier** parameter). This command allows switching on the indicator.
5. Switch off relay (set by **Relay identifier** parameter). This command allows switching off the indicator.
6. Reboot (set by **Reboot type** parameter). Allows to reboot the device immediately or after a time period.

*Note. Using these actions in programms is described in INTELLECT™ software . Programming Guide.*

### 3.4.5 PTZ IP cameras configuration

Configuration of PTZ IP-cameras differs from that of other PTZ devices.

PTZ IP-cameras are connected via the local net with the TCP/IP transport protocol. Common communication protocol is used for all PTZ IP cameras.

To configure the **Telemetry card** object do the following:

1. Go to the **Hardware** tab in the **System settings** dialog box (Figure 3.4—10, 1).
2. Create the **Telemetry card** system object under the **Computer** object or select the relevant object on the **Hardware** tab in the **System settings** dialog box (Figure 3.4—10, 2).

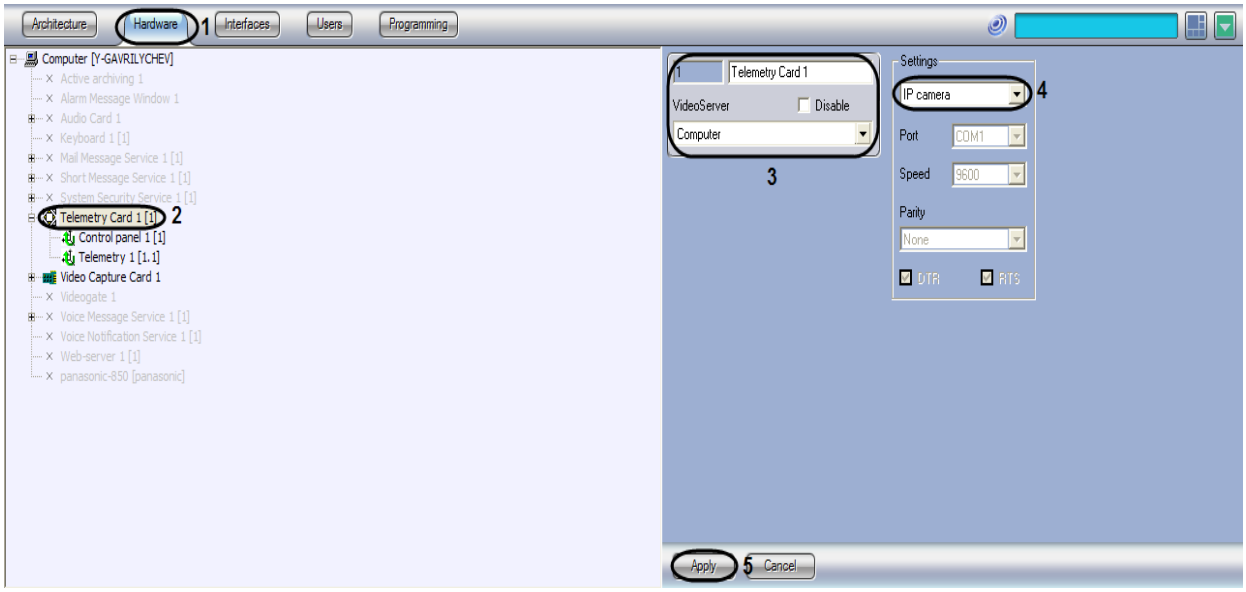



Figure 3.4—10 The setting panel of the Telemetry card object

3. Enter the ID, the name of the **Telemetry card** object and select the Server connected with the PTZ device (Figure 3.4—10, 3)
4. Choose the data exchange protocol from the list. To use TCP/IP protocol for the data exchange with a PTZ IP-camera, select **IP camera** as the protocol (Figure 3.4—10, 4).

*Note 1. When the "IP-camera" item is selected on the "Settings" panel of the "Telemetry card" object, the other settings cannot be changed.*

*Note 2. To enable presetting mechanism for Bosch-Autodome control protocol, create the "UseBoschOSRD40" parameter with "1" value in the branch of SOFTWARE\ITV\Intellect\Telemetry registry (HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\ITV\INTELLECT\TELEMETRY for 64-bit system).*

5. To save the changes click the "Apply" button (Figure 3.4—10, 5).

*Note. The "Telemetry" object configuration for PTZ IP camera control is the same as for control over PTZ devices when they are connected via the Server COM port.*

### 3.4.6 Telemetry panel configuration

Telemetry panel is an interface object for PTZ device control. The telemetry panel interface is the same for all PTZ devices.

To create and configure the Telemetry panel, do the following:

1. Go to the "Interfaces" tab in the "System settings" dialog box (Figure 3.4—11, 1).
2. Create the "Telemetry panel" object under the "Monitor" object or select the relevant object on the "Interfaces" tab in the "System settings" dialog box (Figure 3.4—11, 2).

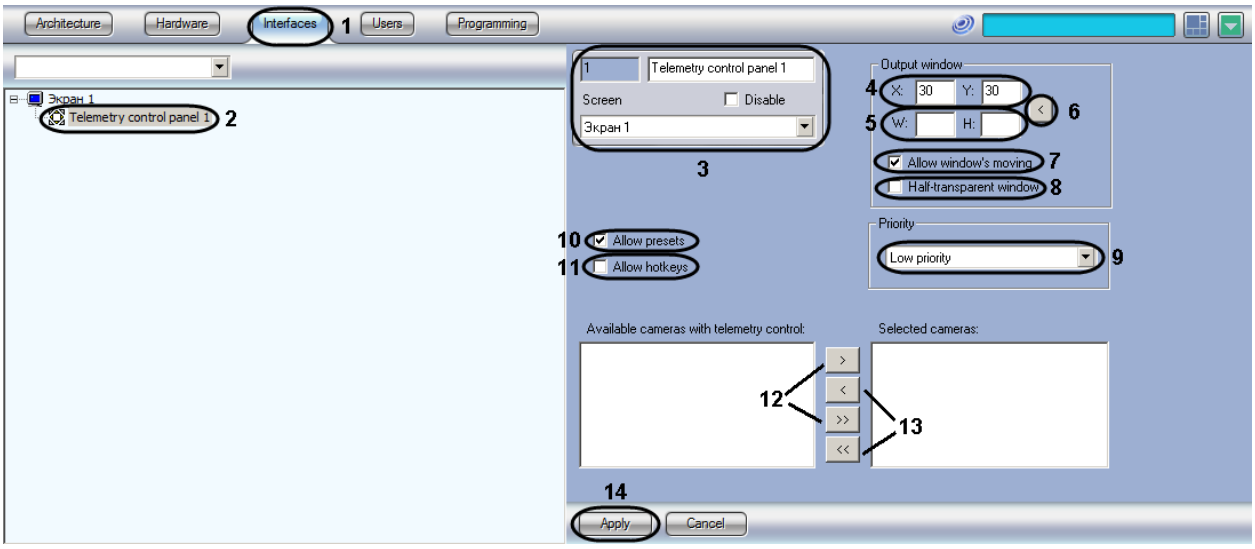



Figure 3.4—11 The Telemetry panel configuration

3. Enter the ID, the name of the **Telemetry card** object and select the **Screen** object under which the **Telemetry card** object is created (Figure 3.4—11, 3).
4. Change the **X** and **Y** coordinates of the telemetry panel position on the screen in the relevant fields. The **X** and **Y** values correspond to the screen coordinates of the top left corner of the telemetry panel, and are expressed as a percentage of the horizontal and vertical screen sizes correspondingly (Figure 3.4—11, 4).
5. Enter the measures of the **Telemetry panel** interface object: the **W** (window width) and **H** (window height). Measures are expressed as a percentage of the horizontal and vertical screen sizes correspondingly (Figure 3.4—11, 5).

*Note. The < button (Figure 3.4—11, 6) is used for automatic input of the current object coordinates specified by the user.*

6. By default, the telemetry panel can be dragged over the screen. To fix the telemetry panel position, set the **Allow window's displacement** checkbox unchecked (Figure 3.4—11, 7).
7. By default, the telemetry panel is opaque. To display interface objects on the same screen with the telemetry panel, set the **Transparent** checkbox (Figure 3.4—11, 8).
8. If it is necessary to change the PTZ control priority via the **Telemetry panel**, select the relevant item from the **Priority** list (Figure 3.4—11, 9).
9. By default, the Operator is allowed to save the presets of PTZ device (presets of the camera position). To save presets, use the digital buttons on the **Presets** panel. To forbid the Operator to save the presets, set the **Allow set presets** checkbox unchecked (Figure 3.4—11, 10).
10. Set the **Allow hot key** checkbox if it is necessary to control PTZ device via the keyboard (Figure 3.4—11, 11).
11. Move the names of the cameras, equipped with PTZ devices, to the **Selected cameras** list. These cameras will be controlled by the **Telemetry panel** object. You can move the selected cameras in turn, if you click the one-arrow button, or move all cameras, if you click the two-arrow button (Figure 3.4—11, 12).
12. Move the camera names from the **Selected cameras** list to the **Available cameras with telemetry control** list. These cameras will not be controlled by the **Telemetry panel** object. To move the selected cameras in turn, click the one-arrow button; to move all cameras, click the two-arrow button (Figure 3.4—11, 13).
13. To save the changes click the "Apply" button (Figure 3.4—11, 14).

### 3.4.7 Creation and configuration of the Operator dialog box for telemetry control

The INTELLECT™ software provides the PTZ control option with the help of the "Operator dialog box" interface object. The "Operator dialog box" interface object is a separate user dialog box with the relevant elements for a certain PTZ device type control.

The unique control panel is designed by the PTZ device vendor and is supplied together with the PTZ software. The files of the unique PTZ control panels are stored in the "Program" folder of the INTELLECT™ software installation directory.

To create and configure the Operator dialog box, do the following:

1. Open the "Programming" tab in the "System settings" dialog box (Figure 3.4—12, 1).
2. Create a "Macro" object under the "Macro" object on the "Programming" tab (Figure 3.4—12, 2). Enter the object ID and name.

*Note. The "Macro" object is necessary to refer to the INTELLECT™ software core and to display the Operator dialog box on the screen.*

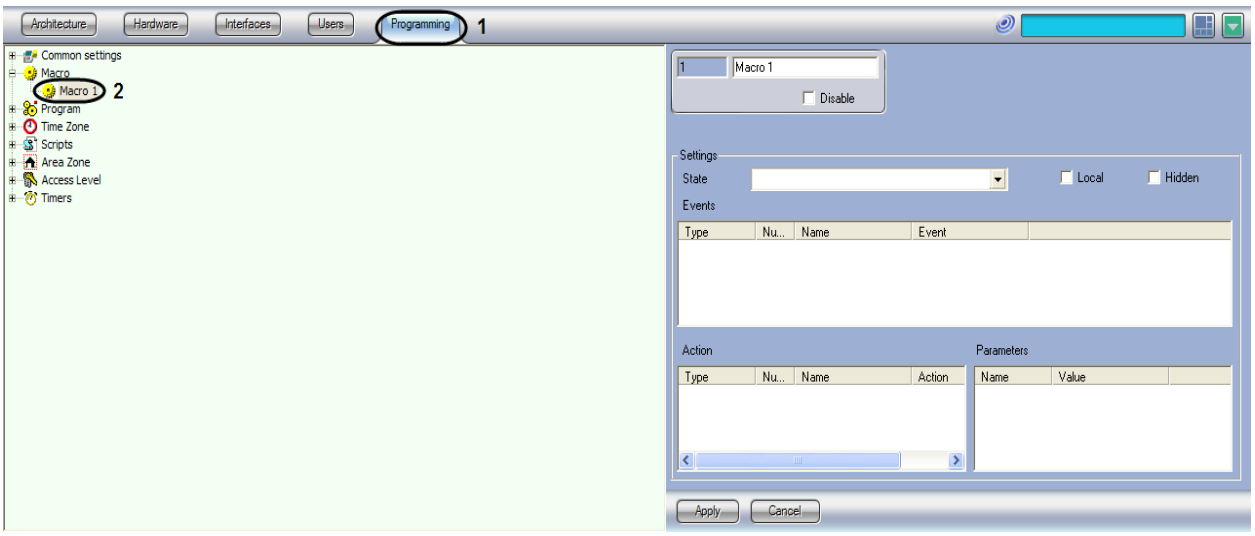



Figure 3.4—12 The setting panel of the Macro object

3. Open the **Hardware** tab in the **System settings** dialog box (Figure 3.4—13, 3).
4. Create the **Operator dialog box** object under the **Computer** object on the **Hardware** tab (Figure 3.4—13, 4).

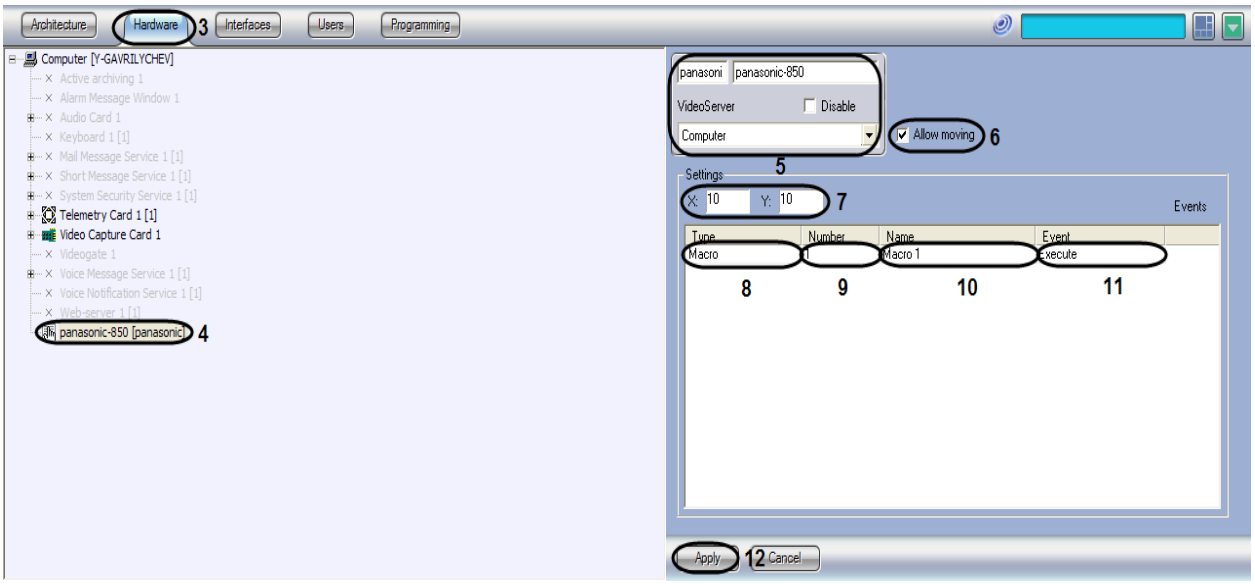



Figure 3.4—13 The setting panel of the Operator dialog box

5. Enter the file name (without extension) of the dialog box, used for PTZ device control, in the ID field (Figure 3.4—13, 5). The necessary files are stored in the **Program** folder of the INTELLECT™ software installation directory (Figure 3.4—14).

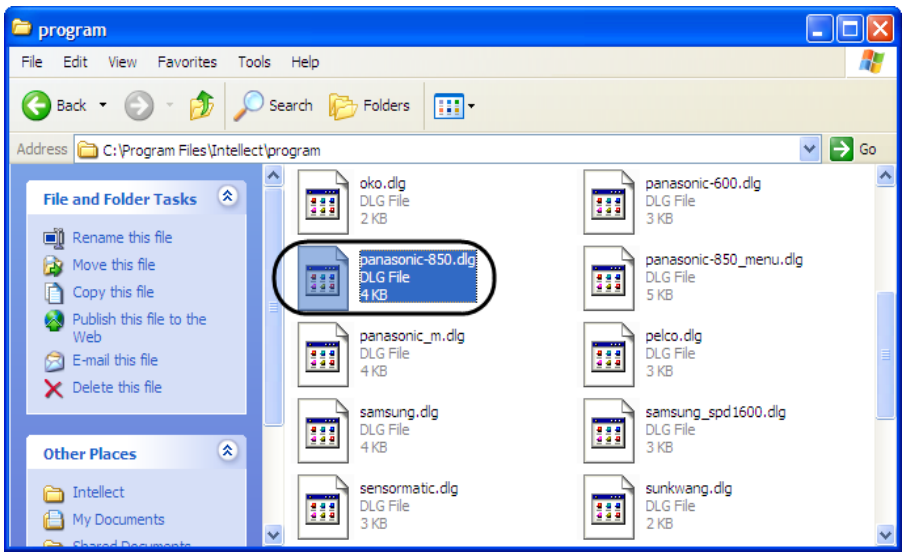



Figure 3.4—14 The Program folder of the INTELLECT™ software installation directory

6. To activate the moving option for the **Operator dialog box** object, set the **Allow moving** checkbox (Figure 3.4—13, 6).
7. Enter the **X** and **Y** coordinates of the **Operator dialog box** position on the screen in the relevant fields. The **X** and **Y** settings correspond to the screen coordinates of the top left corner of the **Operator dialog box** and are measured as a percentage of the horizontal and vertical screen sizes correspondingly (Figure 3.4—13, 7).
8. Select the type of the **Macro** objects from the objects and events list (Figure 3.4—13, 8).
9. Enter the ID of the **Macro** object, created to call up the **Operator dialog box** (Figure 3.4—13, 9).
10. The name of selected **Macro** object is automatically displayed in the **Name** column (Figure 3.4—13, 10).
11. Select the **Execute** item from the list of possible events (Figure 3.4—13, 11).
12. To save the changes click **Apply** (Figure 3.4—13, 12).

### 3.4.8 Configuration of the Monitor for telemetry control

The INTELLECT™ software has facilities to control PTZ devices via monitor windows, which correspond to the cameras with PTZ devices. In this case the PTZ device is controlled by the mouse via video surveillance windows of the PTZ cameras.

PTZ control function via the video surveillance windows, corresponding to the cameras with PTZ devices, is always activated and can't be disabled. To access PTZ control via the video surveillance window, do the following:

1. On condition that the equipment is functional, configure the **Telemetry** object related to the selected PTZ device.
2. Select the PTZ control priority for the video surveillance window in the settings of the **Monitor** object.

Additional configuration of telemetry control is not necessary.

### 3.4.9 Joystick configuration for telemetry control

#### *3.4.9.1 Joystick configuration procedure*

If the joystick is connected to the Server and is configured in Windows OS, then the INTELLECT™ software automatically activates the joystick telemetry control option. The option is valid for all PTZ devices, connected to the Server and configured in INTELLECT™ software.

Generally the joystick configuration includes the following stages:

1. Testing joystick handle performance in INTELLECT™ software. This procedure is described in the *Testing joystick performance* section.
2. Configuration of issuing the command to PTZ devices with joystick keys. For configuration instructions see the *Assignment of the commands to joystick keys for telemetry control* section.
3. Testing joystick keys performance in INTELLECT™ software. The procedure is similar to testing joystick handle performance. For a detailed description see the *Testing joystick performance* section.

The following functions are available by default and do not require additional configuration:

1. Rotation of cameras equipped with PTZ devices is performed by inclination of a joystick handle;

*Note. Joystick threshold corresponds to the **Joystic Threshold** line parameter and is set at the HKLM\SOFTWARE\ITV\Intellect\Telemetry register of the Windows OS. By default Joystic Threshold=1, this parameter possesses the value from 0 and more. The more the value, the less sensitive the joystick is, best value is selected empirically.*

2. The image shrinkage function from cameras is performed by turning a joystick handle around its vertical axis.

The image shrinkage function is available only for joysticks with Z axis, as for example Axis 295. This axis is formed by joystick handle's angles of rotation.

Z axis is activated by default and corresponds to value of the **Zenable=1** line parameter at the HKLM\SOFTWARE\ITV\INTELLECT\Telemetry register of the Windows OS.

***Attention! Coordinate of joystick Z axis should be automatically zeroized after every image shrinkage operation for correct telemetry control. Otherwise Z axis should be disconnected by setting the Zenable=0 parameter in the HKLM\SOFTWARE\ITV\INTELLECT\Telemetry section.***

*Note. Z axis should be disconnected when the Logitech USB joystick is used.*

#### *3.4.9.2 Testing joystick performance*

Before you configure and use a joystick to control PTZ devices, test its performance in INTELLECT™ software.

To test the joystick performance in INTELLECT™ software, do the following:

1. Make sure that PTZ devices are connected, configured and operate properly in INTELLECT™ software.
2. Display the video surveillance monitor on the screen.
3. Check if cameras equipped with PTZ devices are displayed on the video surveillance monitor. If not, change the video surveillance windows layout .

4. Activate the selected camera surveillance window by left clicking it.
5. Display the telemetry module debug window. To display the telemetry module debug window, left double click the window icon in the notification zone of the Windows OS menu (Figure 3.4—15).

Figure 3.4—15 Telemetry module debug window icon

6. As a result the telemetry module debug window is displayed (Figure 3.4—16).

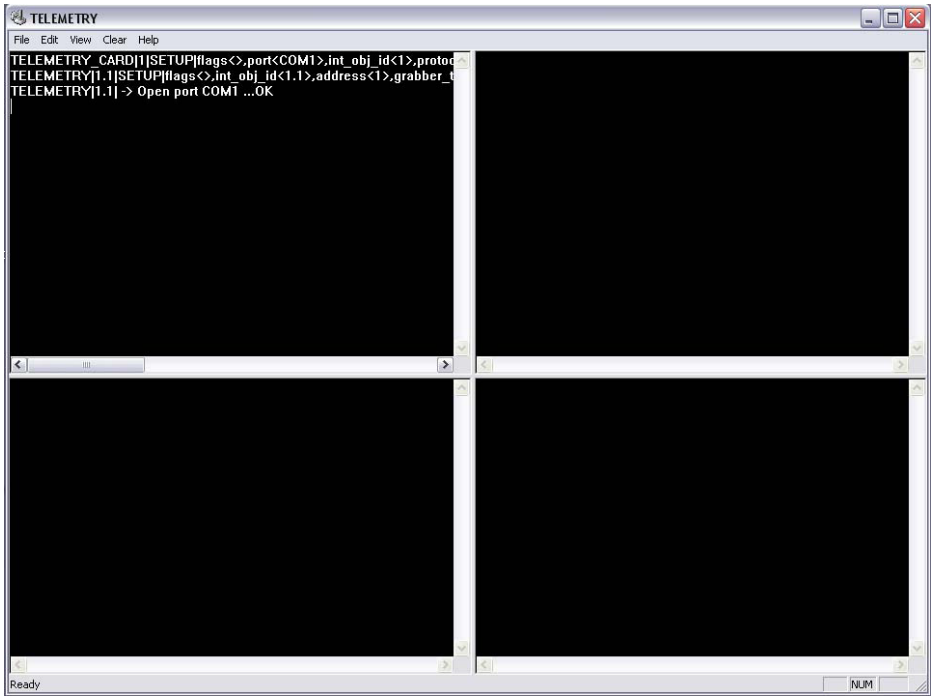



Figure 3.4—16 Telemetry module debug window

7. To test the joystick handle, rotate it in different directions.
8. To check the joystick push-buttons performance, click them in turn.
9. If the joystick operates properly, the relevant commands are displayed in the debug window (Figure 3.4—17).

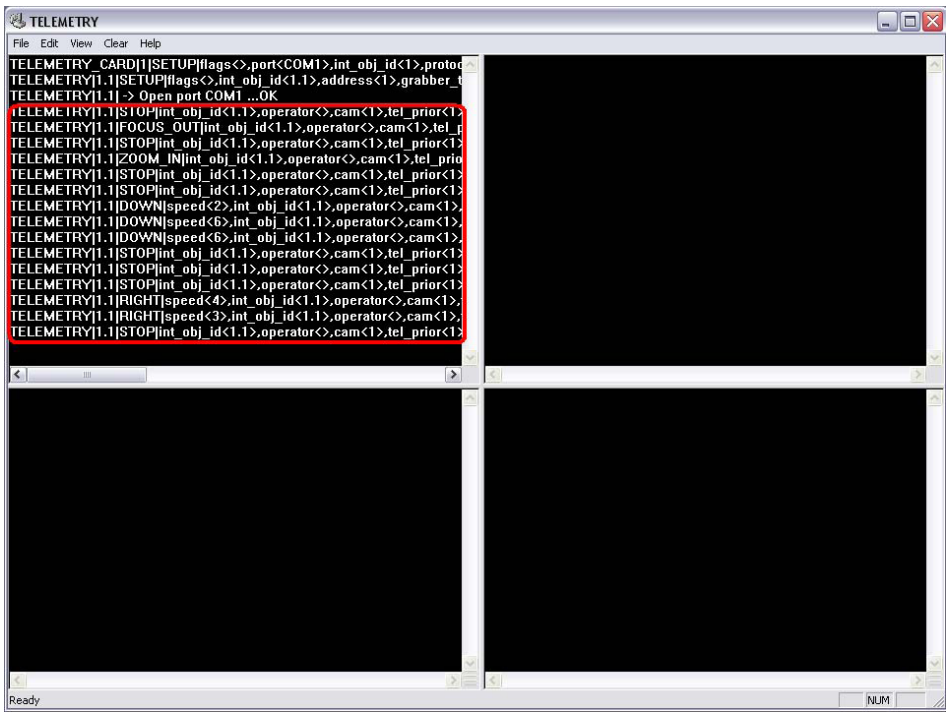



Figure 3.4—17 Telemetry module debug window after the performance of joystick commands

10. If there are no commands in the debug windows, then the joystick does not operate in INTELLECT™ software. Check its connection to the computer and its data exchange driver settings in the Windows OS.

The joystick performance test is completed.

### *3.4.9.3 Assignment of the commands to joystick keys for telemetry control*

Certain commands are assigned to the joystick push-buttons in order to issue default commands to PTZ devices.

To assign the commands to joystick push-buttons, the Windows OS registry is edited.

Below there is a short list of actions to be carried out for configuring the joystick push-buttons. For detailed information on operation of the Windows OS registry see Appendix 4.

To assign the commands to the joystick push-buttons in the Windows OS registry, do the following:

1. Open the **TELEMETRY** folder of the registry **HKEY_LOCAL_MACHINE ⇨ SOFTWARE ⇨ ITV ⇨ Intellect** branch (**HKEY_LOCAL_MACHINE ⇨ SOFTWARE ⇒ Wow6432Node ⇨ ITV ⇨ Intellect** for 64-bit system).
2. Add a line parameter to the **TELEMETRY** folder.
3. Assign the name to the line parameter, identical to the number of the joystick push-button in the Windows OS (Figure 3.4—18).

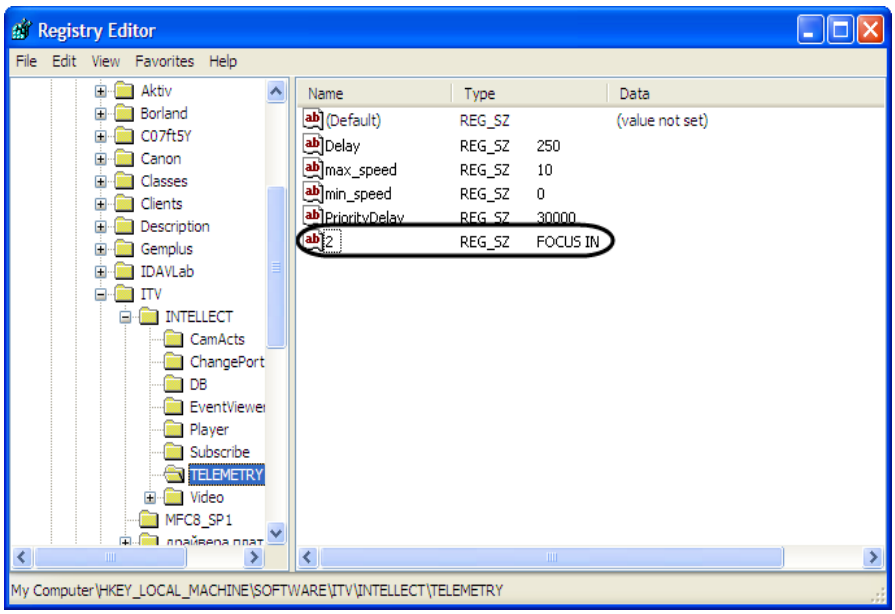



Figure 3.4—18 An example of editing the Windows OS registry for assigning the commands to joystick push-buttons

*Note. To define the numbers of the joystick push-buttons in the Windows OS, use the **Game devices** application. For more information see the **Joystick connection and test** section.*

4. Assign the value to the line parameter, identical to the name of the command executed by the PTZ device in the INTELLECT™ software (the value is to be entered in the uppercase). Available commands in the INTELLECT™ software are listed in Table 3.4—9:

Table 3.4—9 Command symbols

| Symbol | Command |
|---|---|
| AUTOFOCUS_ON | Activate the autofocusing option. |
| AUTOPAN_END_P | Set the autopan endpoint. |
| AUTOPAN_START | Start the autopan. |
| AUTOPAN_START_P | Set the autopan start point. |
| AUTOPAN_STOP | Stop the autopan. |
| CLEAR_PRESET | Clear the selected preset. |
| D2OFF | Disable additional dynamic settings for Panasonic PTZ cameras for improving an analog video signal. |
| D2ON | Enable additional dynamic settings for Panasonic PTZ cameras for improving an analog video signal. |
| DOWN | Rotate the camera lens down. |
| FOCUS_IN | Focusing the image in. |
| FOCUS_OUT | Focusing the image out. |
| FOCUS_STOP | Stop focusing the image in/out. |

| Symbol | Command |
|---|---|
| GO_PRESET.N | Rotate the video camera to the position set in N preset. |
| HOME | Rotate the video camera to the initial (home) position. |
| IRIS_CLOSE | Close the iris diaphragm. |
| IRIS_OPEN | Open the iris diaphragm. |
| IRIS_STOP | Stop the iris diaphragm. |
| LEFT | Rotate the camera lens left. |
| LEFT_DOWN | Rotate the camera lens left and down. |
| LEFT_UP | Rotate the camera lens left and up. |
| PATROL_LEARN | Start the programming procedure of patrolling by learning the video camera behavior. |
| PATROL_PLAY | Start patrolling. |
| PATROL_STOP | Stop patrolling. |
| RIGHT | Rotate the camera lens right. |
| RIGHT_DOWN | Rotate the camera lens right and down. |
| RIGHT_UP | Rotate the camera lens right and up. |
| SET_PRESET | Save the current position of the video camera in the selected preset. |
| STOP | Stop the the camera lens rotation. |
| UP | Rotate the camera lens up. |

Repeat steps 2-4 for each joystick push-button to which the command is assigned.

*Note. Some PTZ devices do not react to commands by the joystick push-buttons used for video camera rotation. In this case you can rotate a video camera with a joystick handle.*

Configuration of the joystick push-buttons is completed.

# 4 Conclusion

Please send your comments or requests concerning this Guide to the AxxonSoft Training and documentation development division at (documentation@itv.ru).

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**www.axxonsoft.com**

# 5 Appendix 1. Features of video capture card configuration

## 5.1 Drivers for video capture cards integrated into the INTELLECT™ software

Drivers for video capture cards integrated into the INTELLECT™ software are in the **Drivers** folder of the INTELLECT™ installation directory (e.g., C:\Program Files\Intellect\Drivers). Structure of the **Drivers** folder is given in Table 5.1—1.

**Table 5.1—1 Structure of the Drivers folder**

| Directory | Drivers for video capture cards |
|---|---|
| ITV\Fs5_6_8_16 | FS5, FS6, FS8, FS16, FX2 |
| ITV\FX116_416 | FX116, FX416 |
| ITV\Ws6 | WS6 |
| ITV\Ws7 | WS7, WS17 |
| TUAN\TW6802 | FS15, FS115, FX4, FX8 |
| TUAN\CX2581 | FX16 |
| TUAN\AH8400 | WS16 |
| TUAN\TW5864 | WS216 |
| TUAN\SA7160 | FX HD4 |

*Note 1. Drivers for Stretch (VRC6004, VRC6008, VRC6416, VRC7008L and VRC6404HD) video capture cards are in the **C:\Program Files\Common Files\AxxonSoft\Drivers\Stretch\x86** directory.*

*Note 2. Drivers for HikVision DS-4016HCI(R) video capture card are in the **c:\Program Files\Common Files\AxxonSoft\Drivers\HikvisionBoard\x86** directory (**c:\Program Files (x86)\Common Files\AxxonSoft\Drivers\HikvisionBoard\x64** for 64-bit system).*

## 5.2 Features of video subsystem configuration

Features of video subsystem configuration are given in Table 5.2—1.

**Table 5.2—1 Features of video subsystem configuration**

| Video capture card | Number of the Video capture card objects for one physical card | Maximum number of the Camera objects for one Video capture card object | Distribution of channel numbers between the Camera objects | Number of the Camera objects (in live mode) for the Video capture card object |
|---|---|---|---|---|
| FS5 | 1 | 16 | 1-16 (for each physical card) | 1 |
| FS6 | 4 | 4 | 1-16 (for each physical card) | 1 |
| FS16 | 4 | 4 | 1-16 (for each physical card) | 1 |
| FS8 | 8 | 2 | 1-16 (for each physical card) | 1 |
| FX2 | 2 | 4 | 1-8 (for each physical | 1 |

| Video capture card | Number of the Video capture card objects for one physical card | Maximum number of the Camera objects for one Video capture card object | Distribution of channel numbers between the Camera objects | Number of the Camera objects (in live mode) for the Video capture card object |
|---|---|---|---|---|
| | | | card) | |
| FS15 | 1 | 4 | 1-4 (for each physical card) | 1 |
| FS115 | 1 | 4 | 1-4(for each physical card) | 1 |
| FX4** | 4 | 4 | 1-4 (for each Video capture card object) | 1 |
| FX8** | 8 | 2 | 1-2 (for each Video capture card object) | 1 |
| FX16 | 16 | 1 | randomly | 1 |
| WS6 | 4 | 1 | randomly | 1 |
| WS7 | 4 | 1 | randomly | 1 |
| WS16 | 16 | 1 | randomly | 1 |
| WS17 | 4 | 1 | randomly | 1 |
| WS216 | 16 | 1 | randomly | 1 |
| FX116 | 1 | 16 | 1-16 (for each physical card) | 8 |
| FX416 | 1 | 16 | 1-16 (for each physical card) | 16 |
| Stretch (VRC6004) | 1 | 4 | 1-4 (for each physical card) | 4 |
| Stretch (VRC6008) | 1 | 8 | 1-8 (for each physical card) | 8 |
| Stretch (VRC6416) | 1 | 16 | 1-16 (for each physical card) | 16 |
| Stretch (VRC7008L) | 1 | 8 | 1-8 (for each physical card) | 8 |
| Stretch (VRC6404HD) | 1 | 4 | 1-4 (for each physical card) | 4 |
| DS4016HCI(R) | 1 | 16 | 1-16 (for each physical card) | 16 |
| FX HD4* | 4 | 1 | randomly | 1 |

*PCI channels are to be distributed between the **Video capture card** objects created for FX HD4 video capture card, taking into account the numbers of external HDMI connectors indicated on the card.

** When a video subsystem is built using FX4 or FX8 video capture card, be aware that each color of BNC video input of interface cable conforms with a certain PCI channel specified in the settings of the Video capture card object (Table 5.2—2).

Table 5.2—2 Conformity of a colour of BNC video input with a PCI channel

| Value of PCI channel | Colour of BNC video input |
|---|---|
| 00 | Blue |
| 01 | Green |
| 02 | Yellow |
| 03 | Black |
| **2nd interface cable** | |
| 04 | Blue |
| 05 | Green |
| 06 | Yellow |
| 07 | Black |

For example, if one FX4 video capture card is used and video cameras are connected to blue BNC video inputs, then the **Camera** objects based on the **Video capture card** object correspond to these video cameras (with 00 value for PCI channel) in the INTELLECT™ system.

## 5.3 Features of audio subsystem configuration

Features of audio subsystem configuration are given in Table 5.3—1.

Table 5.3—1 Features of audio subsystem configuration

| Video capture card | Number of the Audio card objects for one physical card | Maximum number of the Microphone objects for one Audio card object | Distribution of channel numbers between the Microphone objects based on one Audio card object |
|---|---|---|---|
| FS5 (FS 6) | 1 | 2 | #0 - #1 |
| FS6 (FS 6) | 4 | 2 | #0 - #1 |
| FS16 (FS 6) | 4 | 2 | #0 - #1 |
| FS8 (FS 8) | 8 | 2 | #0 - #1 |
| FX2 (FS 6) | 2 | 2 | #0 - #1 |
| FS15 (TW6802 PCI, Analog Waveln) | 1 | 1 | only #0 |
| FS115 | 1 | 1 | only #0 |
| FX4 (TW6802 PCI, Analog Waveln) | 4 | 1 | only #0 |
| FX8 (TW6802 PCI, Analog Waveln)** | 8 | 1 | only #0 |
| FX16 (CX2581 PCI, Analog Waveln) | 16 | 1 | only #0 |
| WS6 (WS 6) | 4 | 2 | #0 - #1 |
| WS7 (WS 7) | 4 | 2 | #0 - #1 |
| WS16 (AH8400 PCI, Analog Waveln) | 16 | 1 | only #0 |
| WS17 (WS 7) | 4 | 2 | #0 - #1 |
| WS216 (TW5864 PCI, Analog Waveln) | 16 | 1 | only #0 |
| FX116 (SLFXR) | 1 | 16 | #0 - #15 |

| Video capture card | Number of the Audio card objects for one physical card | Maximum number of the Microphone objects for one Audio card object | Distribution of channel numbers between the Microphone objects based on one Audio card object |
|---|---|---|---|
| FX416 (SLFXR) | 1 | 16 | #0 - #15 |
| Stretch (VRC6008) | 1 | 8 | #0 - #7 |
| Stretch (VRC6416) | 1 | 16 | #0 - #15 |
| Stretch (VRC7008L) | 1 | 8 | #0 - #7 |
| FX HD4 (SA7160 PCI, Analog Waveln)* | 4 | 1 | only #0 |

* PCI channels are to be distributed between the **Audio card** objects created for FX HD4 video capture card, taking into account the numbers of external HDMI connectors indicated on the card.

** FS8 video capture card allows capturing 16 audio channels with digitization quality up to 32 kHz. Eight right (#1) channels are used to connect to external DB9-M slot (Figure 5.3—1).

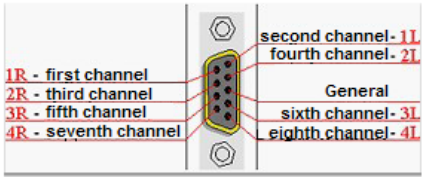



Figure 5.3—1 Pinout of a sound port of FS8 card

Eight left (#0) channels are used to connect to internal 6-pin connector (Figure 5.3—2) using 8-channel audio cable (Figure 5.3—3).

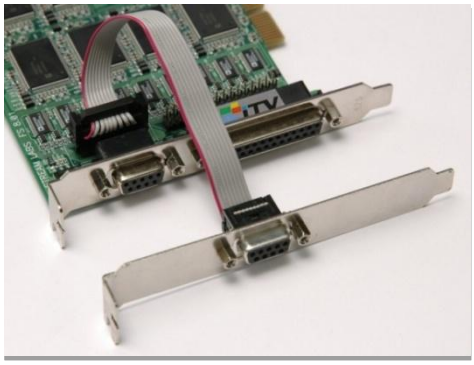


Figure 5.3—2 FS8 card with audio cable

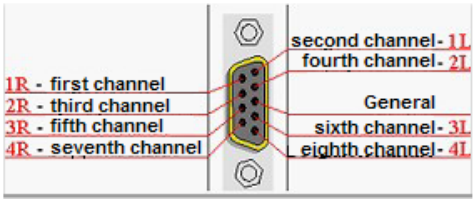



Figure 5.3—3 Pinout of a sound port of an audio cable

Optionally there is an adapter for DB9-M connector (adio input port on FS8 card) with 8 RCA-F connectors that make audio source connection easier.

*Attention! Signs in audio cable connectors do not conform with numbers of card channels. Right channels are performed in DB9 connector (Figure 5.3—2), left channels a re performed in DB9 cable (Figure 5.3—3).*

**Table 5.3—2 Channels in DB9 connector**

| Sign in audio cable connector | Number of a card channel |
|---|---|
| 1R | 1R |
| 2R | 3R |
| 3R | 5R |
| 4R | 7R |
| 1L | 2R |
| 2L | 4R |
| 3L | 6R |
| 4L | 8R |

**Table 5.3—3 Channels in DB9 cable**

| Sign in audio cable connector | Number of a card channel |
|---|---|
| 1R | 1L |
| 2R | 3L |
| 3R | 5L |
| 4R | 7L |
| 1L | 2L |
| 2L | 4L |
| 3L | 6L |
| 4L | 8L |

# 6 Appendix 2. IP-device configuration in the Windows OS

## 6.1 Configuration of IP-devices by the example of Axis camera

IP-devices in Windows OS are configured with the software supplied with the network module.

To configure the IP-device in Windows OS, the following software supplied with the device is used:

1. software included into the package supplied with the network device. This software allows:
    1.1. searching for the network devices connected to the local network computers.
    1.2. assigning initial IP-addresses (without routing).

*Note. An initial IP-address is required to enable access to the home pages of the devices installed in the embedded Web-servers.*

2. The Web-server module of the network device. This module contains home pages of all connected network devices. The Web-server module allows the following:
    2.1. configuring network devices including routing.
    2.2. configuring modes of operation of the network devices with video and audio signals.
    2.3. playback of the video image from the network devices in the standard Web-browser mode.

### 6.1.1 Search for IP-devices

The delivery set of the network devices consists of various software including different utilities designed to search for the network devices of the same type connected to the local network computers.

IPUtility.exe utility is used when Axis cameras are used to search for connected network cameras. IPUtility.exe is a part of delivery set of Axis cameras and is stored in the Axis installation software directory.

To search for Axis IP-cameras connected to the local network computers, using the IPUtility.exe utility, do the following:

1. Select **Search** in the IPUtility.exe tools panel (Figure 6.1—1).

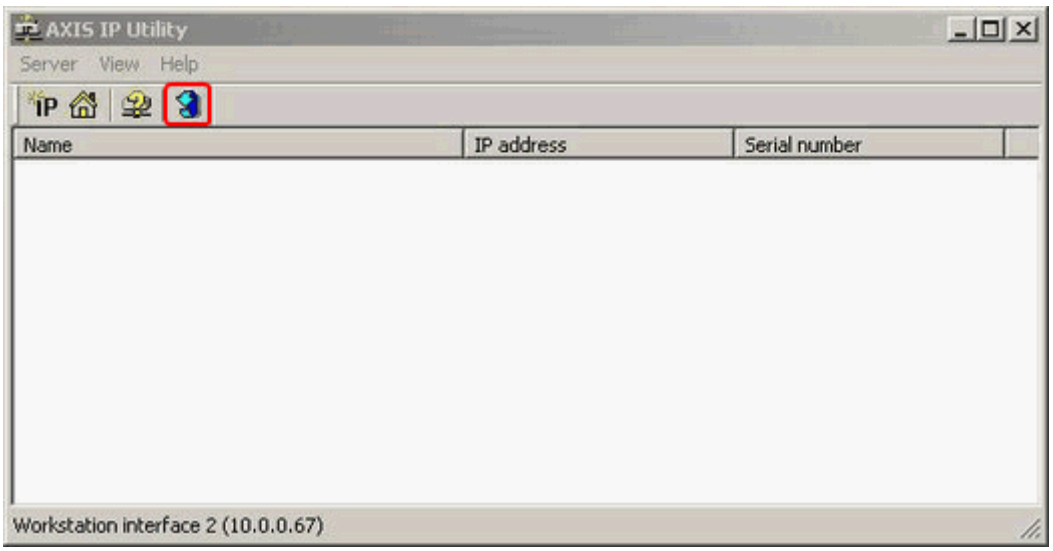



Figure 6.1—1 The IPUtility.exe interface window. The Search button

The search for Axis IP-cameras starts as soon as the Search button is clicked.

2. The IPUtility.exe window displays a list of Axis IP-cameras available in the local network (Figure 6.1—2).

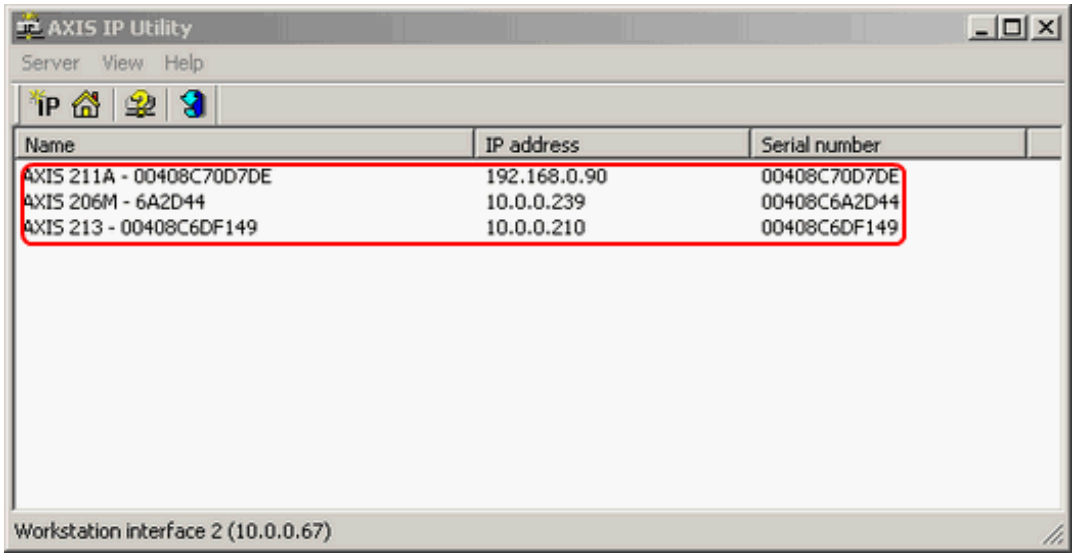



Figure 6.1—2 Example of search result for the network Axis cameras

### 6.1.2 Assigning network addresses to IP devices

To ensure correct operation of the network devices within the local video surveillance system, their IP-addresses are to be configured correctly. IP-addresses are configured using the utilities included into the software distribution kit.

Before assigning an IP-address to the Axis network surveillance camera, do the following:

1. Make sure that the Axis network camera is connected to the mains and correctly connected to the telecommunication network.
2. Get a unique IP-address from the Network administrator.
3. Make sure that the device displays its own MAC-address correctly. The MAC-address of Axis cameras corresponds to the serial number of the camera.

*Note 1.The following examples use a computer with 192.168.0.1 IP-address, whereas an Axis camera is installed to 192.168.0.90 IP-address. The MAC-address for an Axis camera is 00408C70D7DE. The addresses given as an example are not to be used; always consult your network administrator before assigning an IP-address.*

*Note 2. Selecting an IP-address to be assigned to an IP-camera, keep in mind that the initial IP-address of the camera connected for the first time is to correspond to the same subnetwork as the IP-address of computer. Later on, if required, the IP-address can be modified using the Web-server of the device.*

To assign an IP-address to the Axis network camera, do the following:

1. Check that the IP-address to be assigned to the Axis network camera is not used by any other devices.

The IP-address in Windows OS is checked using the command line. To display the command line on the monitor select the **Run** command in the **Start** menu (Figure 6.1—3).

Figure 6.1—3 The Run command selected from the Start menu

Now enter the **cmd** command in the **Open** field of the **Run** dialog box and click **OK** to confirm the entry (Figure 6.1—4).

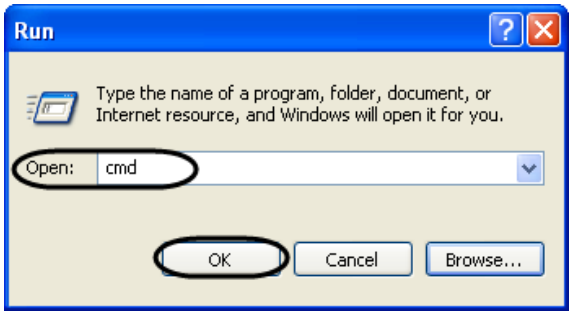



Figure 6.1—4 Command line window

As a result the command line is displayed on the monitor (Figure 6.1—5).

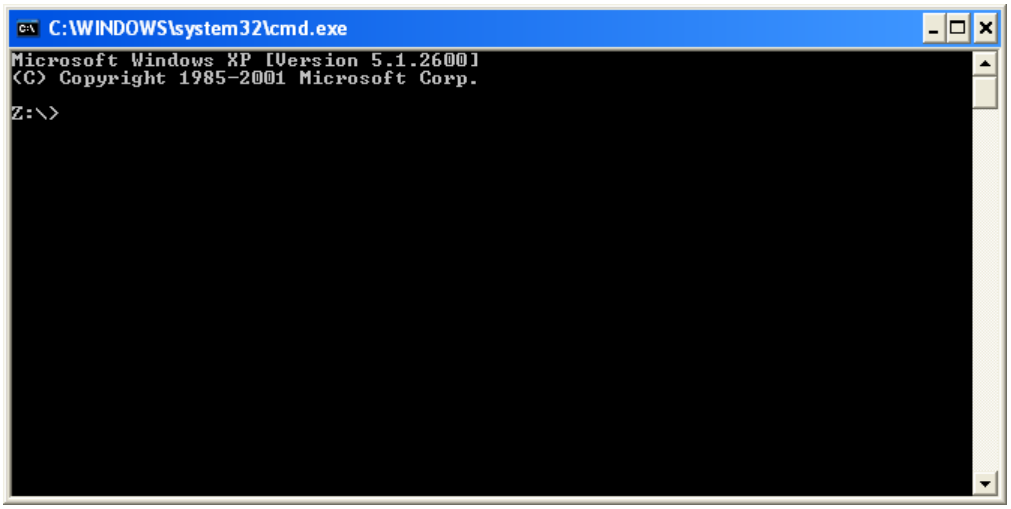



Figure 6.1—5 Command line

To check the selected IP-address enter the **ping 192.168.0.90** command in the command line window. If the given IP-address does not belong to any other device, then the monitor displays the following message: “Request timed out” (Figure 6.1—6).

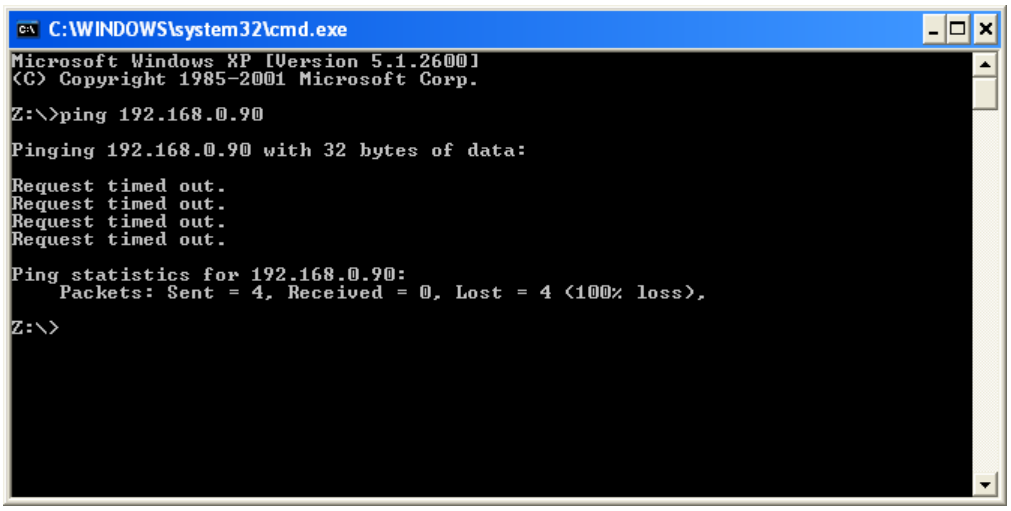



Figure 6.1—6 The message: “Request timed out”

2. Assign the required IP-address to the Axis camera. To assign the selected IP-address, do the following:
   2.1. Start the **IPUtility.exe** utility.
   2.2. Start searching for all Axis IP-cameras (see *Search for IP-devices* section).
   2.3. Highlight the line containing the required IP-camera in the list of Axis IP- cameras connected to the local network.
   2.4. Select **Set IP Address** in the **Server** dropdown list in the main menu of the **IPUtility.exe** utility (Figure 6.1—7).

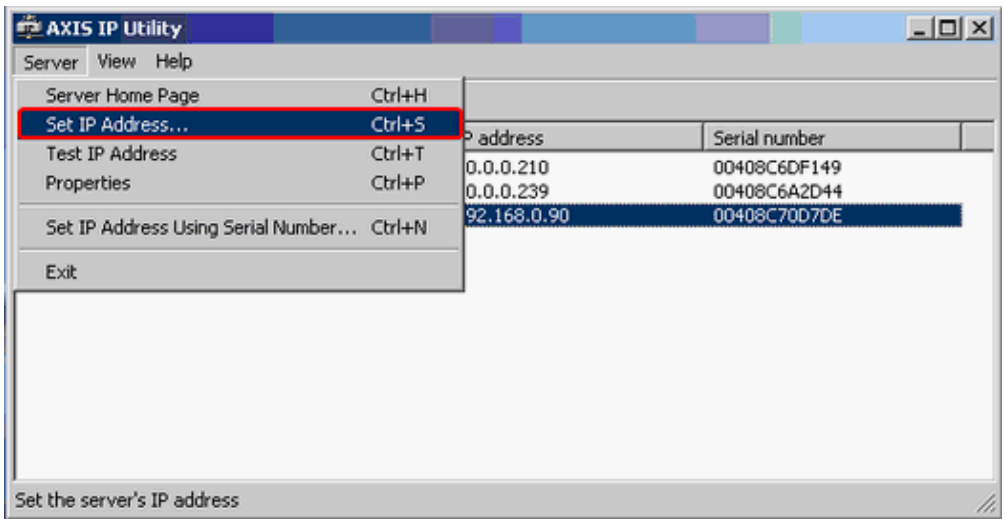



Figure 6.1—7 Set IP Address in the Server dropdown list in the main menu of the IPUtility.exe utility

2.5. Enter the required IP-address in the **Set IP Address** panel (Figure 6.1—8).

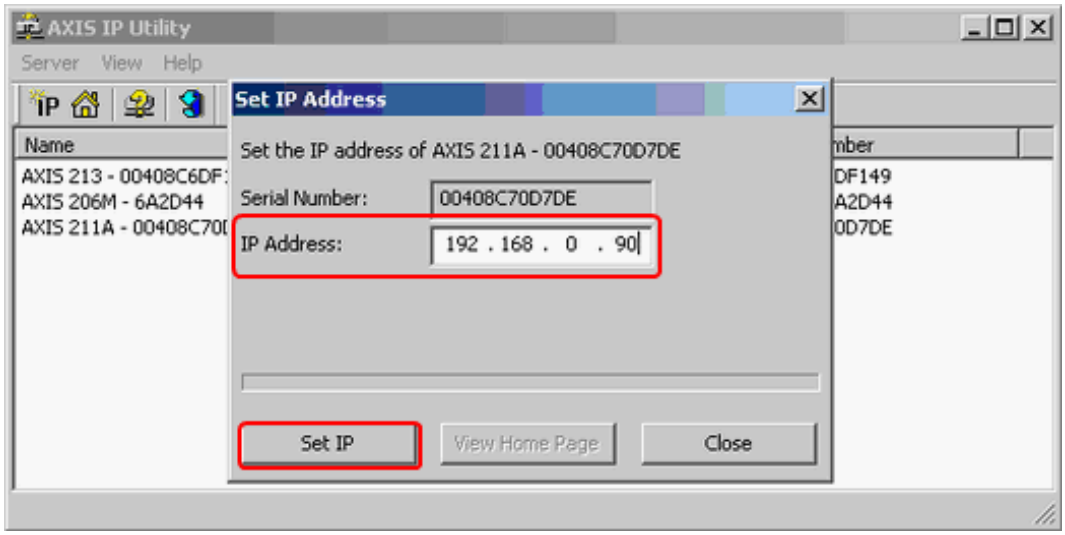



Figure 6.1—8 Entering the required IP-address in the Set IP Address dialog box

2.6. Confirm the IP-address assigned to the Axis network camera by clicking **Set IP** (Figure 6.1—8).

As soon as the above operations are done, IP-address settings of the network device are enabled.

*Note. To prevent possible failures of the camera, check the assigned IP-address again.*

3. Check the IP-address assigned to the Axis network camera.

*Note. The IP-address is checked with the use of the command line (see 1st item of this instruction). If the IP-address is set correctly, then following message should be displayed in the command line window in reply to the **ping 192.168.0.90** command (Figure 6.1—9).*

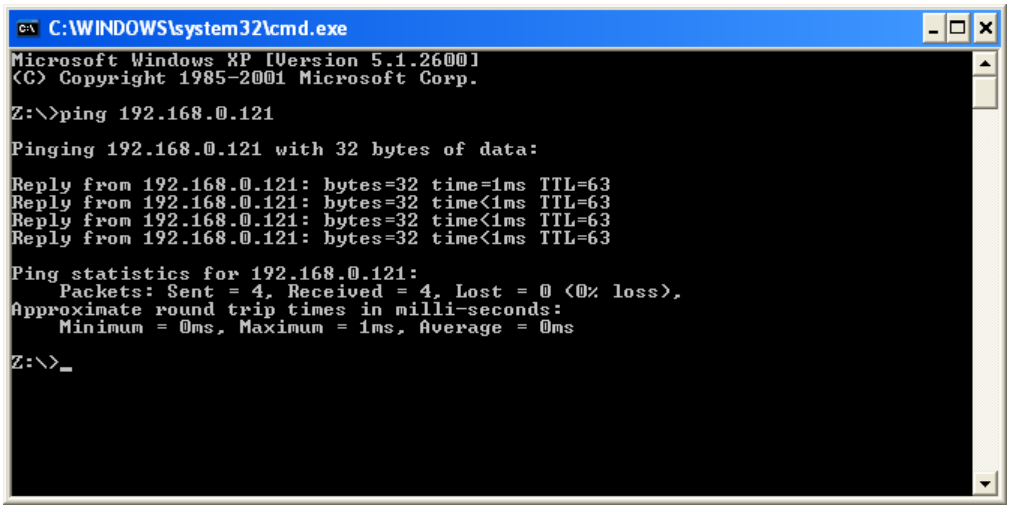



Figure 6.1—9 Reply to the ping 192.168.0.90 command

Now the process of assigning an IP-address to the Axis camera is complete. If assignment of the IP-address to the Axis camera is successful, then proceed to the network configuration of the device using the embedded Web-server.

### 6.1.3 How to call the Web-server home page of IP device

The home page of a network device is automatically created on the Web-server of the network device, as soon as an IP-address is assigned to the device by the IPUtility.exe utility (see *Assigning network addresses to IP devices* section).

To load a home page of a network device, do the following:

1. Start Internet Explorer.

Enter the address in the **Address** line: http://assigned IP-address (for instance, http://192.168.0.90) and click **Enter** (Figure 6.1—10).

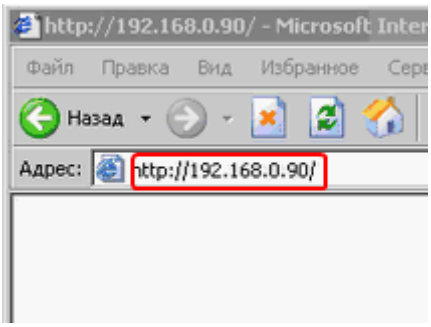



Figure 6.1—10 Entering the IP-address of the network camera

2. Enter a user name and password to access a home page of a network device. The data entered in the **User name** and **Password** fields can be found in the documentation to the add-on network device (Figure 6.1—11).

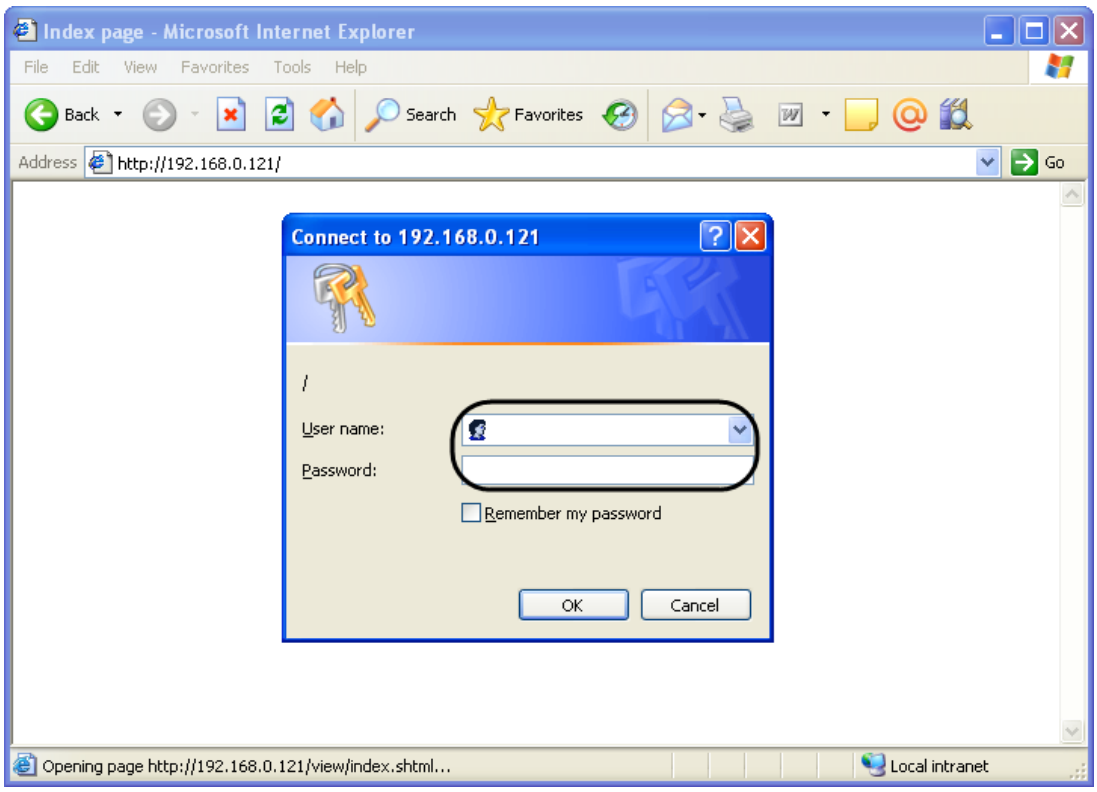



Figure 6.1—11 User name and password dialog box for access a home page of a network device

Click **OK** after entering a user name and password.

3. The monitor displays the surveillance window of the IP-camera, if a network camera is used, or one of the analog cameras connected to the network server, if a network server is used (Figure 6.1—12).

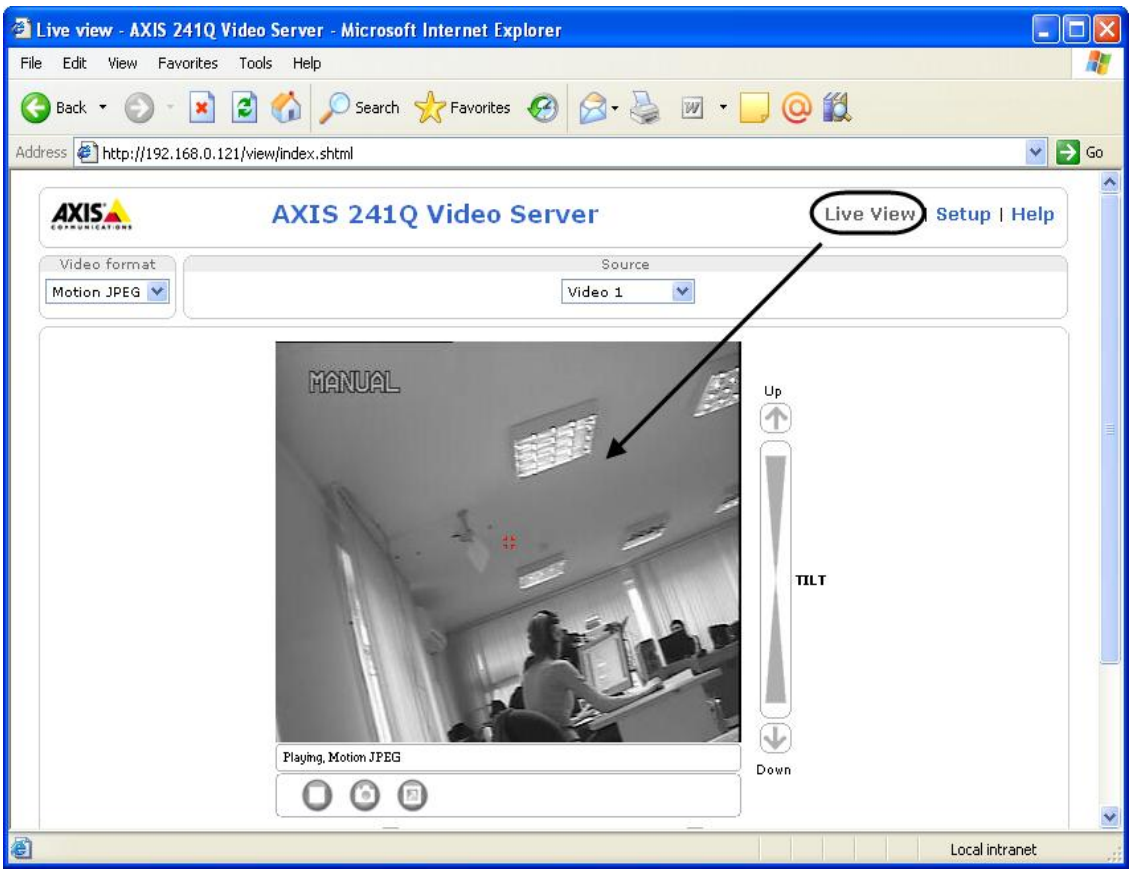



Figure 6.1—12 Surveillance windows displaying an image of an IP camera or one of analog cameras connected to the network server

*Note. If an IP-camera gives no image, check if the IP-address is assigned correctly (see Assigning network addresses to IP devices section).*

### 6.1.4 Configuration of network parameters for IP-devices using the Web-server

Network parameters of the IP-devices are configured via the embedded Web-server of the network device.

*Note. Configuration of the network parameters for IP-devices using the Web-server is a compulsory procedure.*

To configure IP-devices for operations in the local network that is either equipped or non-equipped with the routers, do the following:

1. Start Internet Explorer.
2. Open a home page of the network device (see *How to call the Web-server home page of IP device* section).
3. Open the **Setup** section in the Web-server feature menu of the Web browser home page (Figure 6.1—13).

Figure 6.1—13 The Setup section in the Web-server feature menu of a network device

4. Select the **TCP/IP** tab in the **Setup** section.

Enter the **IP-address**, **Subnet mask** and **Default router** in the given tab. To confirm the settings click **Save** (Figure 6.1—14).

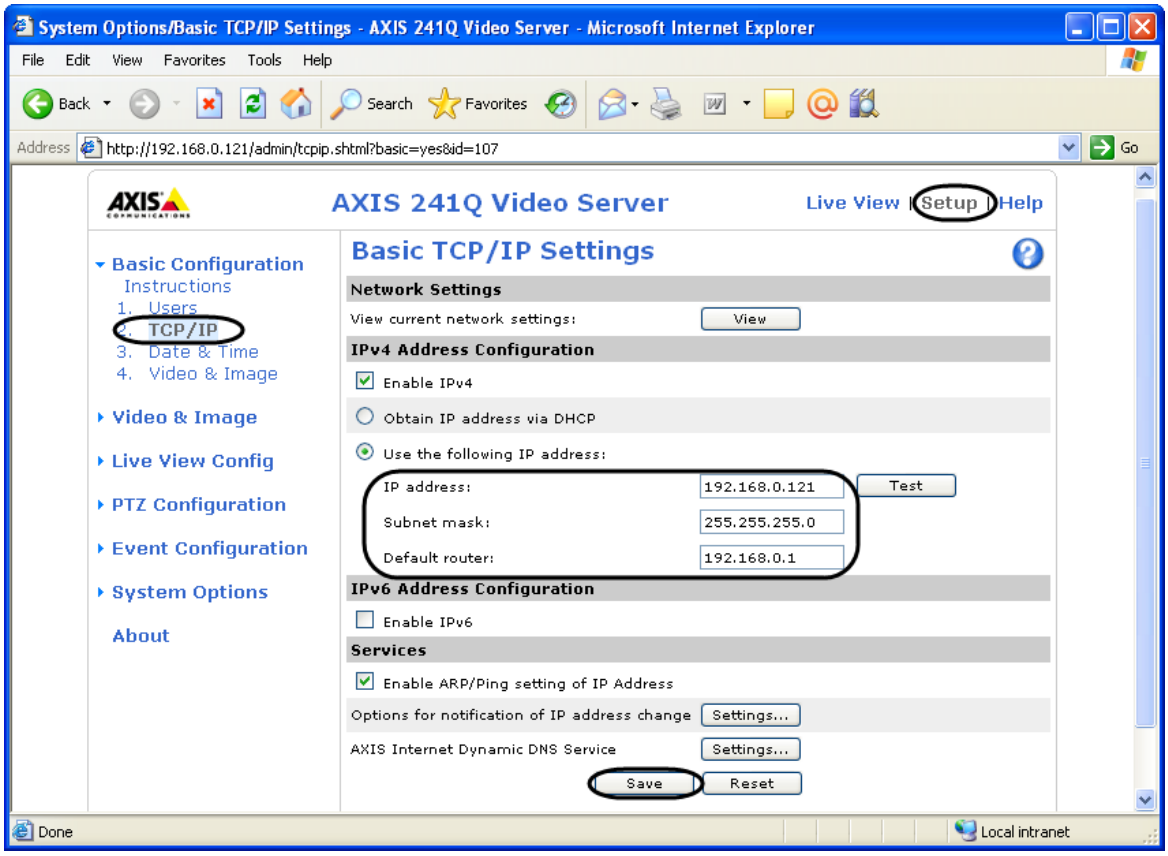



Figure 6.1—14 Network settings for IP devices

In the **IP address** field enter the assigned IP-address of the network device (see *Assigning network addresses to IP devices* section).

In the **Subnet mask** field enter the mask of the subnet to which the network device is connected.

Entering data in the **Default router** field, the following should be taken into consideration:

4.1. If the Server and IP-camera are installed in the same subnetwork, then the **Default router** parameter is not to be specified (Figure 6.1—15).

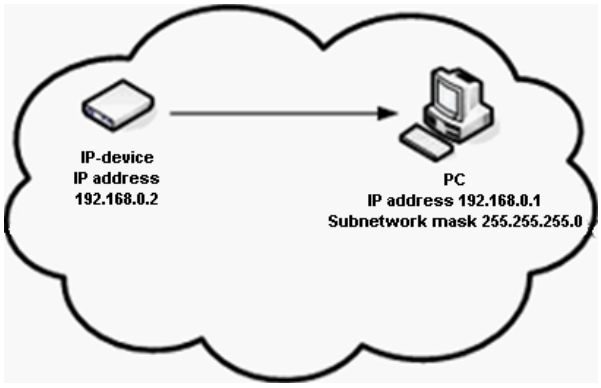



Figure 6.1—15 Server and IP-camera are in the same subnetwork

4.2. If the Server and IP-camera are installed in different subnetworks, then the **Default router** parameter is to be specified (Figure 6.1—16).

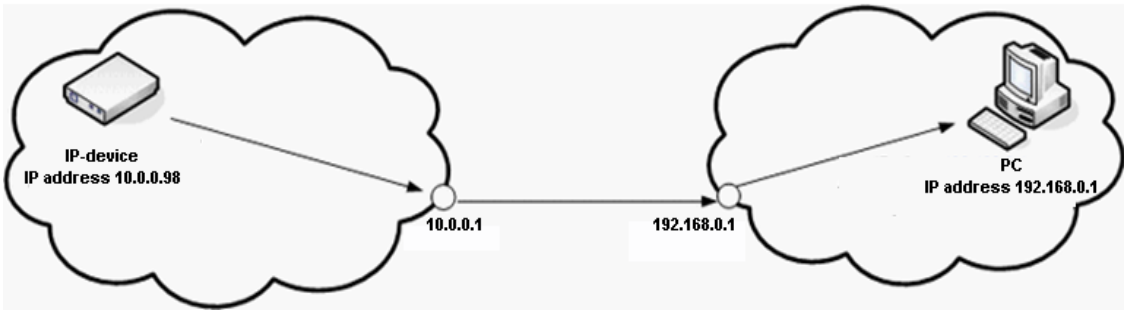



Figure 6.1—16 Server and IP-camera are in different subnetworks

4.3. The IP-address of the default router is to match the subnetwork that the IP-address of the camera belongs to.

*Note. The camera is inoperative if the IP-address of the router is wrong or not specified at all (Figure 6.1*—17*).*

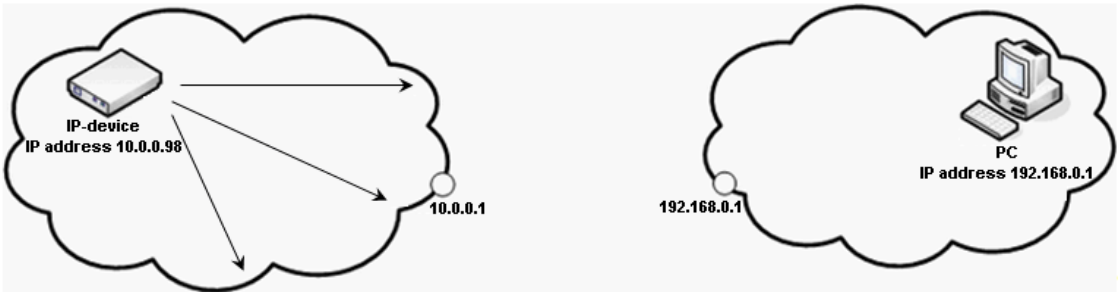



Figure 6.1—17 The IP-address of the router is not specified (no connection)

5. Select **System Options / Ports & Devices / RS232** tab in the **Setup** section.

Select **Pan Tilt Zoom** in the **Port 1 Usage** field to show that the given interface is used for telemetry. To confirm the settings click **Save** (Figure 6.1—18).

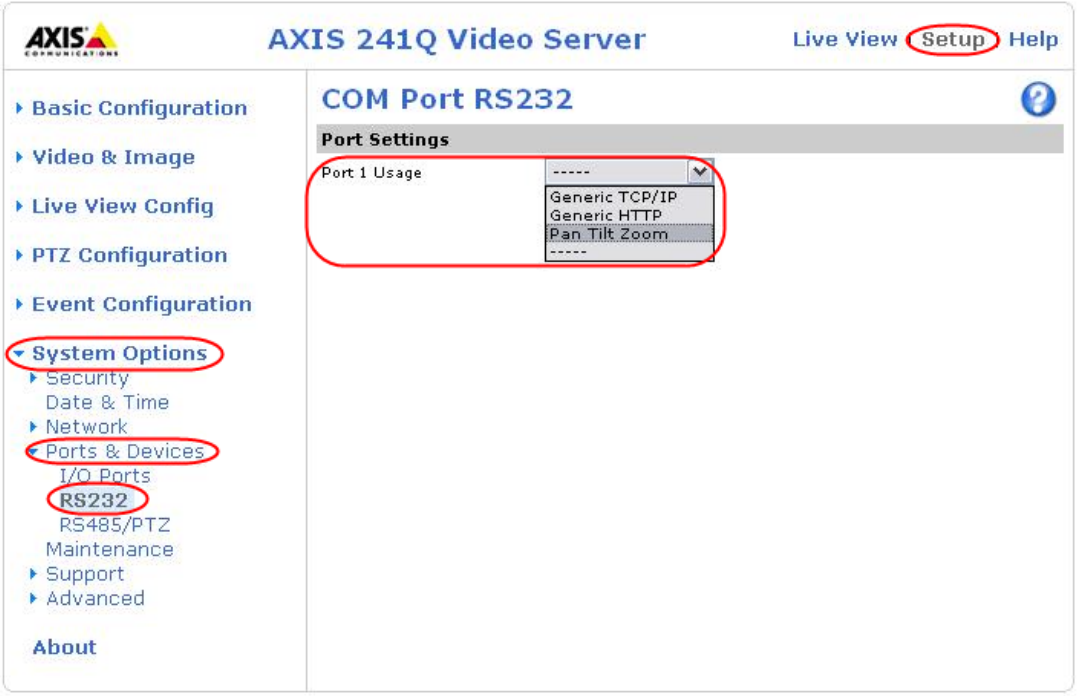



Figure 6.1—18 Configuration of telemetry parameters for IP-devices

Configuration of the network parameters for the IP-devices is completed.

Now proceed to the configuration of IP-devices in the INTELLECT™ software.

## 6.2 Features of configuring Axis IP-device

It is strongly recommended to keep the value by default of the **Friendly name** parameter unchanged for Axis IP-device with enabled and supported *Bonjour* function. If there is an arbitrary value of the **Friendly name** parameter for Axis IP-device, then search for a connected device in the INTELLECT™ software will give incorrect results concerning this IP-device.

*Note1. The **Friendly name** parameter is configured via the Web-interface of IP-device: Setup -> System options -> Network -> Bonjour.*

*Note2. The **Friendly name** parameter has the following value by default: AXIS <model name> - <mac address>, where <model name> is model of Axis IP-device and <mac address> is its MAC-address (for example, AXIS 214 - 00408C7D2610).*

## 6.3 Features of configuring IP-devices using the Web-interface

*Note. Features of configuring IP-devices using the Web-interface are given in reference manual to corresponding devices.*

### 6.3.1 Features of configuring Panasonic IP-devices (i-Pro series) using the Web-interface

If a Panasonic IP device (i-Pro series) is configured to simultaneous transmission of video streams in MJPEG and MPEG-4 formats, then video stream rate in MJPEG format is limited by 5(10) fps.

*Note. WV-NP1000\1004, WV-F284, WV-NP240\244, WV-NS202 and other models belong to IP devices of i-Pro series.*

### 6.3.2 Features of configuring Samsung IP-devices using the Web-interface

An audio input gain for Samsung SNC-B2315 IP device is configured using **Setup** ⇒ **Video & Audio Configuration** ⇒ **Input Gain**. Bn default the **Input Gain** parameter equals 0 and audio signals are not played back by IP-device. To play back audio signals select the value of the **Input Gain** parameter from 1 to 10 depending on the required audio input gain.

Samsung SNC-M300P IP –device supports two-stream mode of video compression in MJPEG and MPEG-4 formats. If the value 25fps is selected for the frame rate of MJPEG-video stream (the **Frame Rate** parameter) then the range of values of analog parameter for MPEG-4 format is restricted by 3fps. To extend the given rate the value less than 25fps for the **Frame Rate** parameter of MJPEG-video stream is to be selected.

### 6.3.3 Features of configuring Mobotix IP-devices using the Web-interface

Resolution of Mobotix MX-Q22M-Sec-D11 panoramic camera is determined by selected mode of video displaying (**Display Mode**) on the **Setup Menu** tab (Table 6.3—1).

Table 6.3—1 Dependense of resolution from the video display mode

| Display Mode | Resolution |
|---|---|
| Full Image | 2048*1536 |
| Normal | 1456*1088 |
| Surround | 1456*1088 |
| Panorama | 2048*768 |
| Double Panorama | 1456*1088 |
| Focus Panorama | 1456*1088 |

*Note. In the **Double Panorama** mode the screen is devided by horizontal line into equal areas, each of which displays a panoramic video.*

As a Mobotix MX-Q22M-Sec-D11 camera is panoramic, proportions are distorted in the INTELLECT™ software. The **Normal** mode is recommended to be installed for correct video displaying.

### 6.3.4 Features of configuring Sony IP-devices using the Web-interface

The **Light Funnel** function is used for sensitivity enhacement of Sony SNC-CM120 IP-device. Access to settings of this function is on the **Setting -> Camera -> Sense up** tab.

Enabling the **Light Funnel** option leads to changing the range of values of the following settings in the INTELLECT™ software (Table 6.3—2):

1. Videostream rate;
2. Video resolution (in MJPEG format).

Table 6.3—2 Configuring INTELLECT using the 'Light Funnel' option

| Setting in the INTELLECT™ software | Implementation of a setting in the INTELLECT™ software | Range of values | |
|---|---|---|---|
| | | The Light Funnel is disabled | The Light Funnel is enabled |
| Videostream rate | The **Speed** slider on the setting panel of the **Video capture card** object | No more then 10fps | Up to 30 fps |
| Video resolution (in MJPEG | The **Resolution** | Full (1280*960) | Standard (640*480) |

| Setting in the INTELLECT™ | Implementation of a | Range of values | |
|---|---|---|---|
| format) | dropdown list on the setting panel of the **Camera** object | High (960*720)<br>Standard (640*480) | |

Example. If a full resolution is set with enabled **Light Funnel** function, then the video is displayed in a standard resolution.

# 7 Appendix 3. Installing the Matrix Linux Server and LinuxHub

## 7.1 Introduction

Matrix is a specialized hardware/software platform for building the integrated security systems based on digital surveillance systems.

Matrix Linux Server (LS) and Matrix LinuxHub (LH) are the hardware/software video commutators used for receiving, processing (analog-to-digital conversion) and transferring video images via IP-networks. LS and LH work under the Linux OS (kernel 2.6). A LH is shown in Figure 7.1—1.

Figure 7.1—1 Matrix LinuxHub

There are two basic configurations of LS (LH):

1. Based on FS5 video capture card;
2. Based on FS6 or FS16 video capture cards;
3. Based on FX4 video capture card;
4. Based on FX8 video capture card;
5. Based on FX16 video capture card.

The main technical specifications of LS (LH) depend on the specifications of video capture cards. LS (LH) is used in conjunction with Intellect-based systems. Remote access to LS (LH) is available through the Web interface.

LH/LS functionality:

1. Enclosed in desktop casing of microATX type (FS6 card) and Mini-ITX type (FS5 card) or 1u type that can be fixed or installed in the computer cabinet (FX4, FX8 and FX16 cards).
2. Watchdog hardware system for system failure prevention.
3. Flash memory used for holding the operating system.
4. Telemetry devices connection.
5. External storage connection for storing video recordings from surveillance cameras (LS only).
6. External devices connection to the embedded sensor-relay module – 4/4 for FS5, FX4, FX8 and FX16 and 4/16 for FS6/16 (optional).
7. Possibility for remote firmware update.
8. No local videostream display (monitor connected directly to LS (LH) for viewing the video received from the cameras).

Figure 7.1—2 shows a general structural diagram of the digital video surveillance system based on the Matrix hardware/software platform.

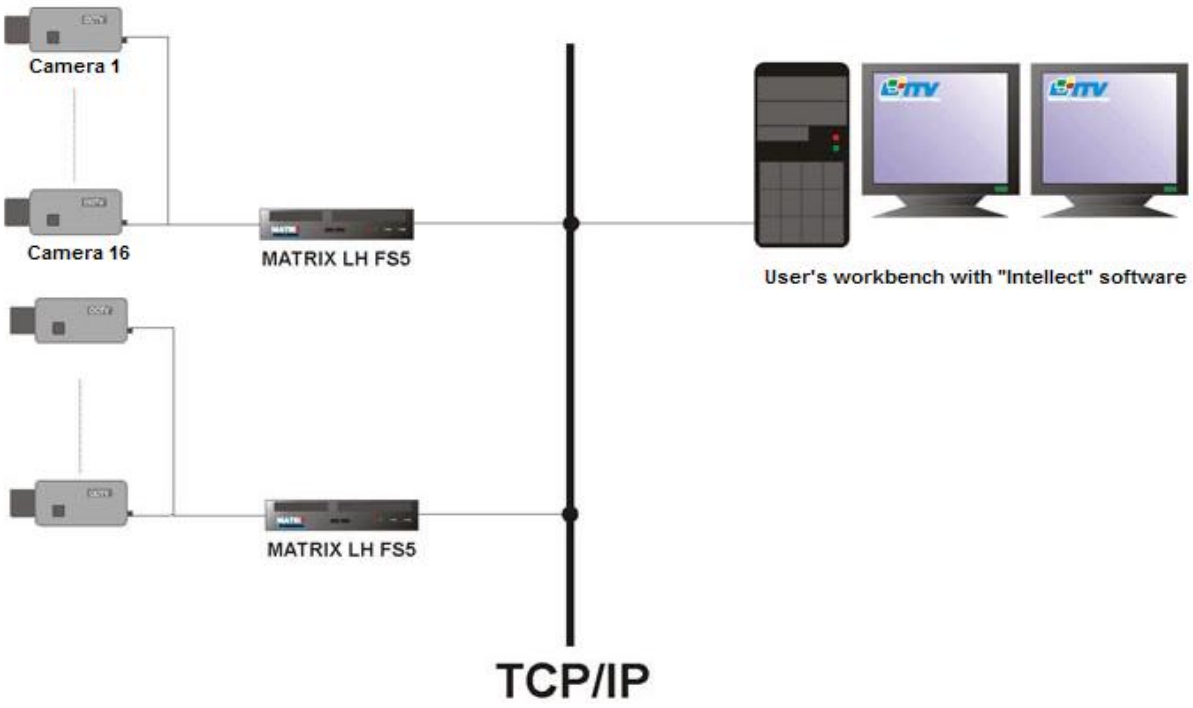



Figure 7.1—2 General structural diagram of the digital video surveillance system based on the Matrix hardware/software platform

## 7.2 Installing the Linux Server (LinuxHub)

### 7.2.1 Introduction

The LS/LH installation and configuration include the following stages:

1. Connecting and running the LS (LH). This stage is common to LS and LH.
2. Network identification of the LS (LH). This stage is common to LS and LH.
3. Configuration of the LS (LH) for the INTELLECT™operation. This stage is different for LS and LH.

### 7.2.2 Connecting and running the Linux Server (LinuxHub)

This stage includes the following:

1. To connect the LS (LH) to the local network, plug the network cable into the network socket and the corresponding LAN socket in the LS (LH).
2. To connect the LS (LH) to the power supply, plug the power cable into the 220 V mains and the corresponding power plug on the back panel of the LS (LH).
3. To turn the LS (LH) on, press the power button on the front panel of the LS (LH).
4. Wait for the LS (LH) system to load. It usually takes no more than one minute.

*Note. Running the LS after incorrect unloading there is a check of hard disks for errors that can take much time (depends on archive size).*

### 7.2.3 Network identification of the Linux Server (LinuxHub)

This stage includes the following steps:

1. Run the **Search for IP devices** utility included in the INTELLECT™ installation kit. To run the utility from Windows click **Start => All Programs => Intellect => Tools => Search for IP devices**.
2. Select the network adapter through which your computer is connected to the LAN to which the LS (LH) is connected (the **Select NetAdapter** drop-down list) and click **Search** (Figure 7.2—1).

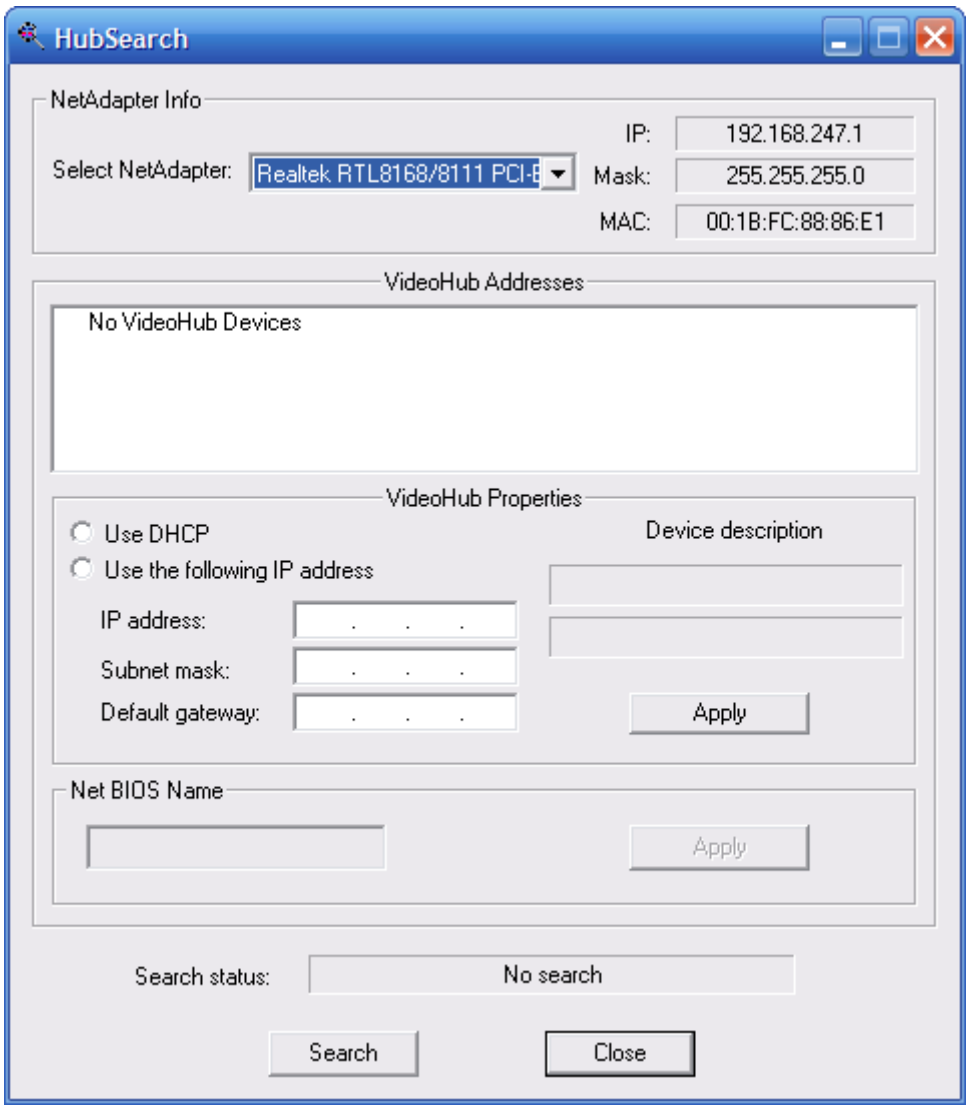



Figure 7.2—1 Selecting the network adapter

3. The system will search for all LSs and LHs connected to this local network (Figure 7.2—2). The **Search status** field will read **Search. Please, wait** during the search process.

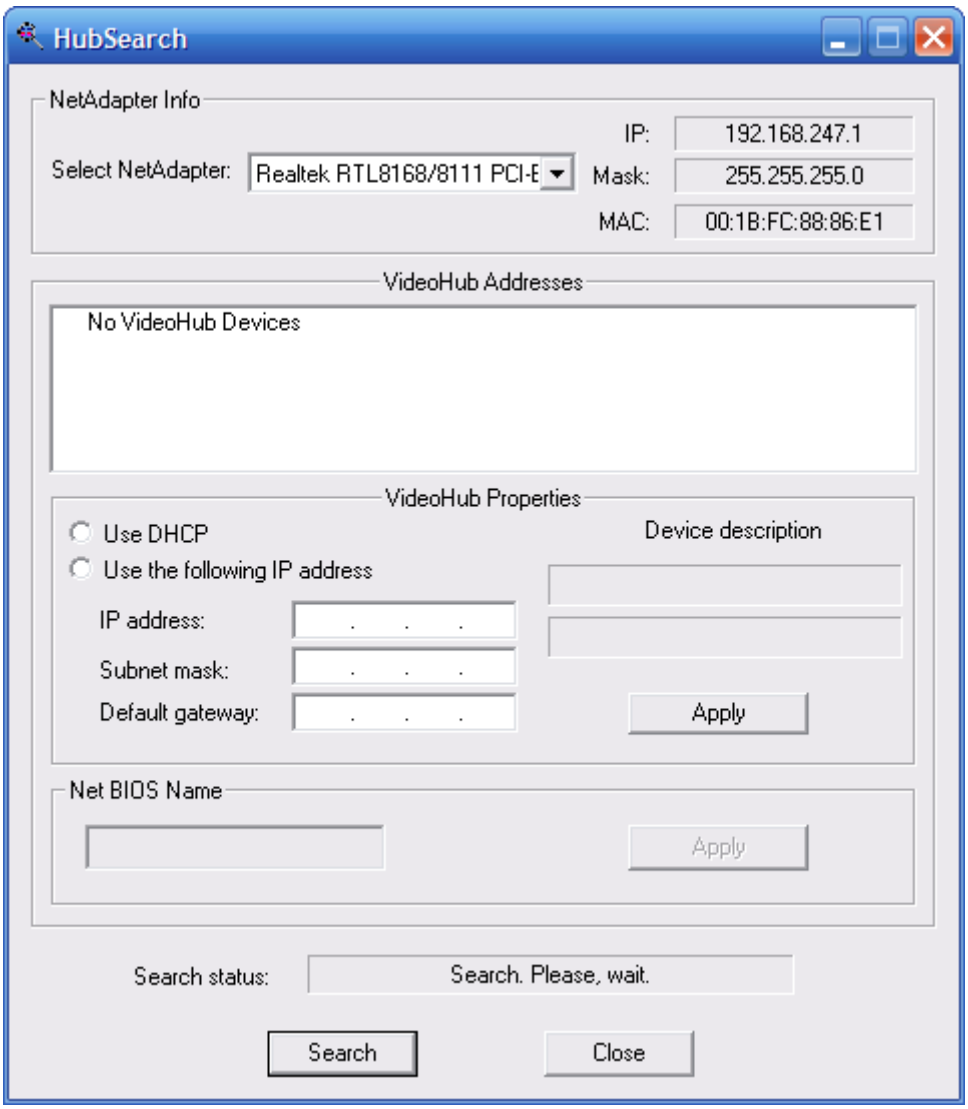



Figure 7.2—2 Searching for LS and LH

4. After the search is completed, the **Search status** field will read **Stop search. Find…** . The found devices will be added to the **VideoHub Addresses** list. Select the required LS (LH) from the list. The **VideoHub Properties** field will display the information on the selected device (Figure 7.2—3).

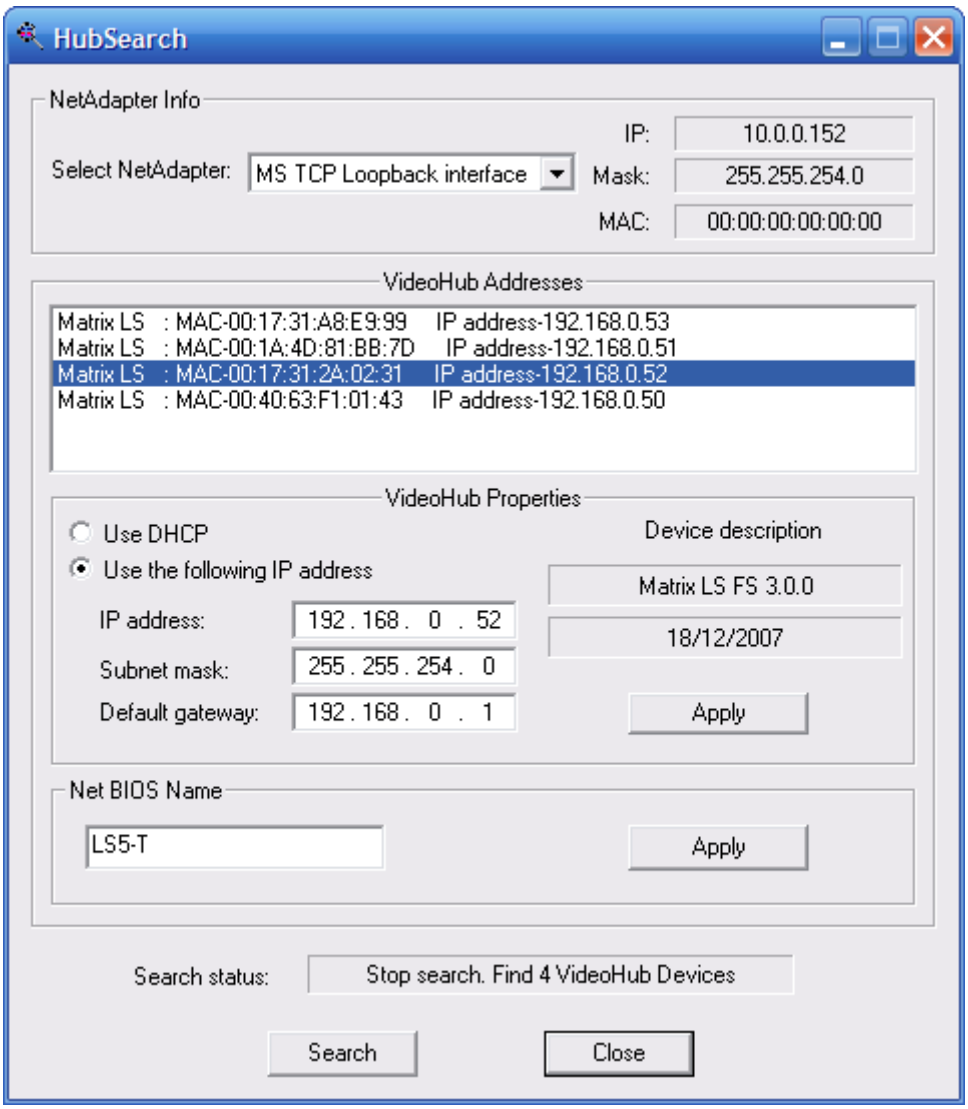



Figure 7.2—3 Search results for LS and LH

5. Some of the parameters of the selected device can be edited (IP-address, subnet mask, default gateway and NET BIOS name). To edit the NETBIOS name, change the value in the Net BIOS Name field and click the button next to this field. To specify the IP-address, subnet mask and default gateway manually, set the **Use the Following IP-address** checkbox, enter the values in the fields and click **Apply** next to these fields. The default values are set by the **Dynamic Host Configuration Protocol** service when the DHCP checkbox is set.
6. To test the LS (LH) connection, send a query to the specified IP-address using the **Ping** utility included in the Windows software package (Figure 7.2—4).

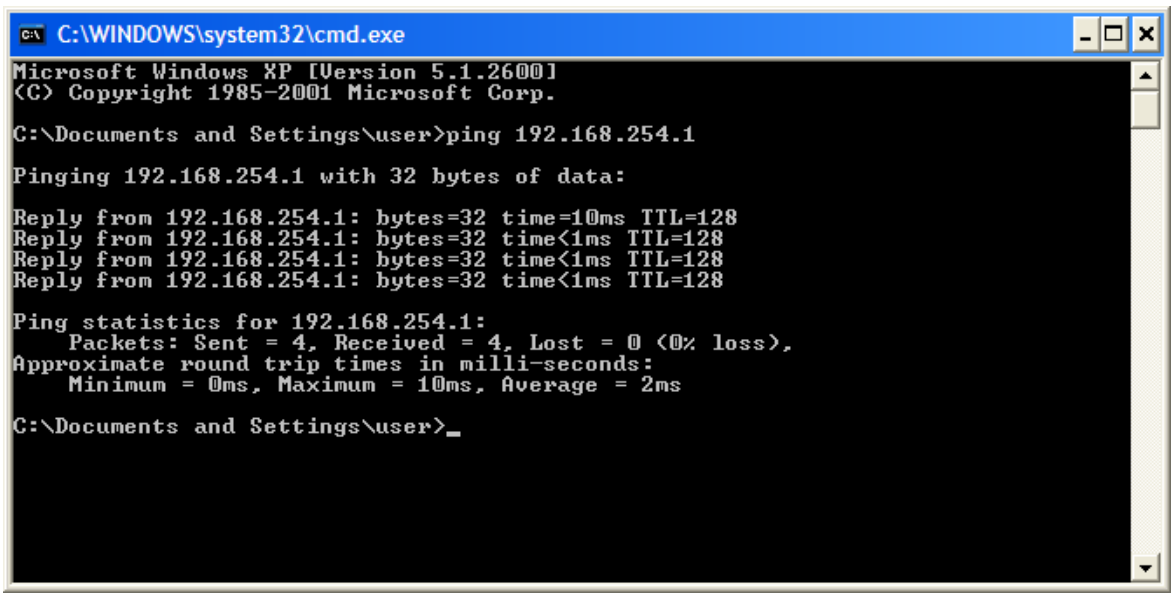



Figure 7.2—4 Using the Ping utility

### 7.2.4 Configuring the Linux Server for the INTELLECT™ operation

This stage includes the following steps:

1. Run the INTELLECT™ system. To run the system from the main Windows menu click Start ⇒ All Programs ⇒ Intellect ⇒ Intellect.
2. Create a new **Computer** object in the **Hardware** tab (Figure 7.2—5) and enter the NetBIOS name (see *Network identification of the Linux Server (LinuxHub)* section) into the **Computer name** field.

Figure 7.2—5 Creating a Computer object

Specify the IP-addresses of your computer and LS in the **Architecture** tab then restart the INTELLECT™ system (Figure 7.2—6, Figure 7.2—7).

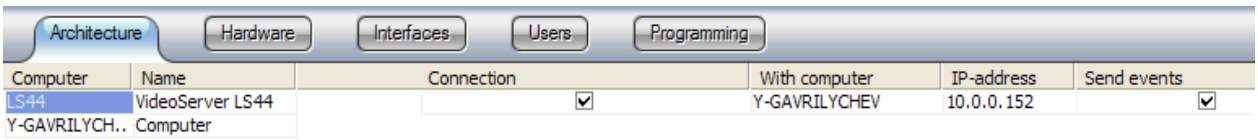



Figure 7.2—6 Entering an LS IP-address

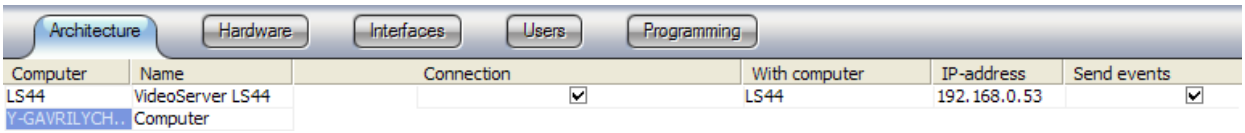



Figure 7.2—7 Entering a computer IP-address

3. In the **Hardware** tab click **Reconnect** in the contextual menu of the created computer object. If the settings are correct, the created computer is displayed in the hardware list (Figure 7.2—8).

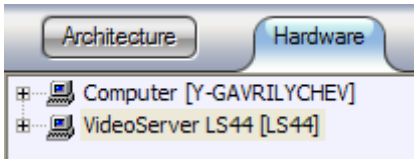



Figure 7.2—8 The connected computer is displayed in the list

Make other settings in the INTELLECT™ system. For example, to display video received from a camera connected to the LS, create a **Video Capture Card** object under the **Computer <NetBIOS name>** object in the tree, and configure the created camera (Figure 7.2—9, Figure 7.2—10).

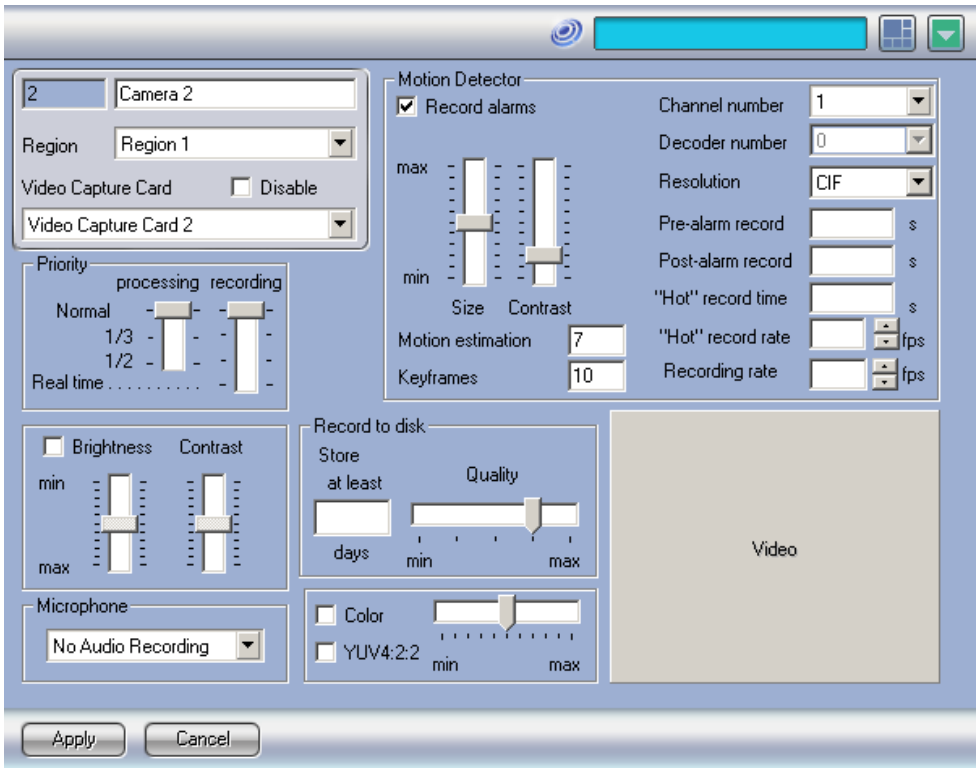



Figure 7.2—9 Creating a Camera object

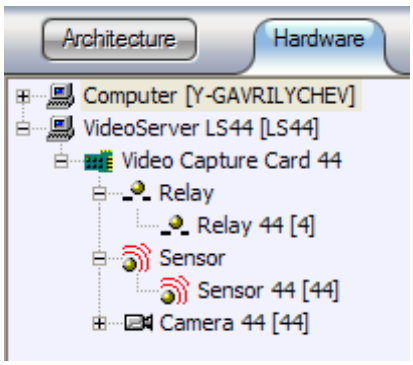



Figure 7.2—10 Example of the LS configuration

*Note. The details on the INTELLECT™ system configuration are described in another section of this manual. Some LS settings can be made through the Web interface (see The Linux Server (LinuxHub) Web interface section).*

The **Relay** and **Sensor** objects are created under the **Video capture card** object with the first PCI channel used by the card. For ex., building security video subsystem with the use of two FX4 video capture cards and two DI/DO cards (low profile), the **Relay** and **Sensor** objects are to be created under the **Video capture card** object with **00** (1st FX4 video capture card) and **04** (2nd FX4 video capture card) values of the PCI channel.

Configuring the **Audio card** object bear in mind that list of available digitization rate can not agree with those stated in the specification. This list depends on ALSA driver for LS.

### 7.2.5 Configuring the LinuxHub for the INTELLECT™operation

This stage includes the following steps:

1. Run the INTELLECT™ system. To run the system from the main Windows menu click Start ⇒ All Programs ⇒ Intellect ⇒ Intellect.

2. Create a new **Video Capture Card** under the **Computer** object (in the **Hardware** tab) (Figure 7.2—11), by specifying the **LinuxHub** type and the IP-address of the required LH (see *Network identification of the Linux Server (LinuxHub)* section).

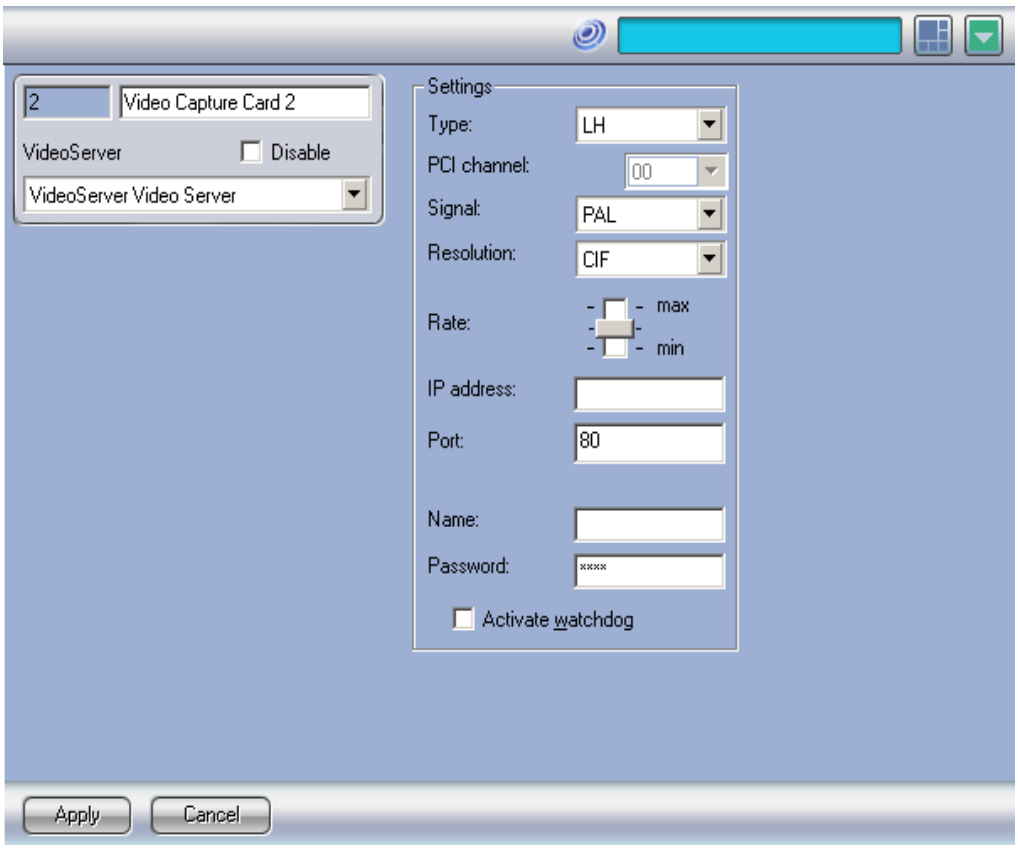



Figure 7.2—11 Creating a Video Capture Card object

3. Make other settings in the INTELLECT™ system. For example, to display video received from a camera connected to the LH, create the **Camera** object under the **Video Capture Card <card id>** object in the object tree, and configure the created camera (Figure 7.2—12, Figure 7.2—13).

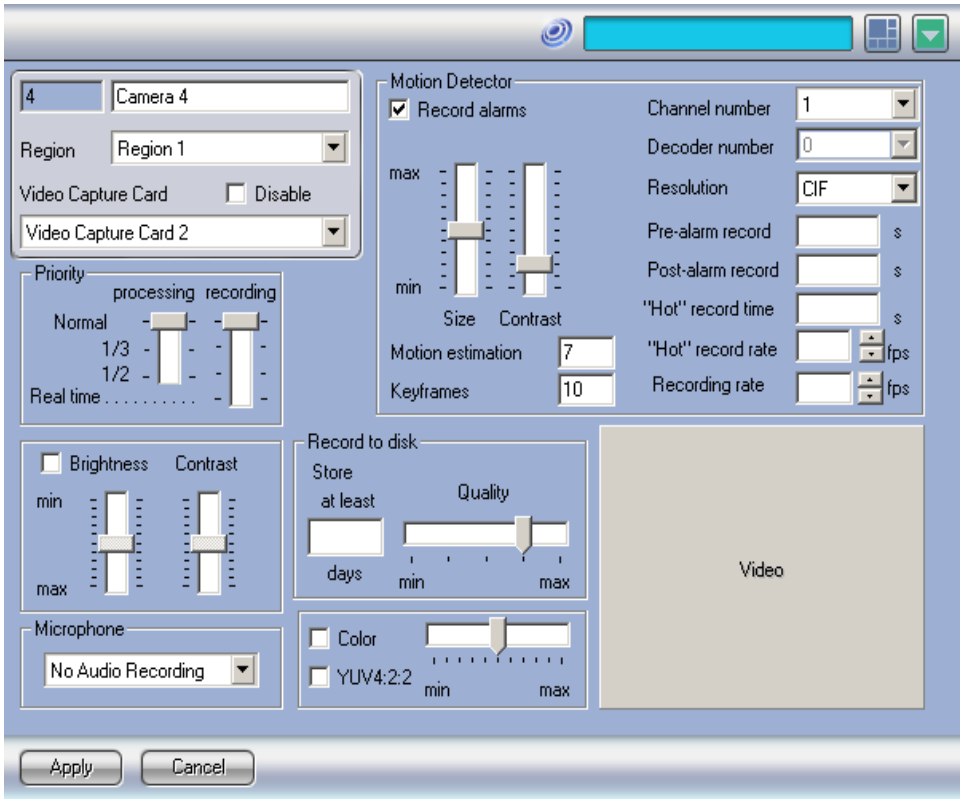



Figure 7.2—12 Creating a Camera object

Figure 7.2—13 Example of the LH configuration

4. Restart the INTELLECT™ system.

*Note. The details on the INTELLECT™ system configuration are described in another section of this manual. Some LH settings can be made through the Web interface (see The Linux Server (LinuxHub) Web interface section).*

LH enables working with audio received both from the cards and from the embedded audio card. To configure the LH audio subsystem, do the following:

1. Create the **Audio card** system object under the **Computer** object in the **Hardware** tab, set the **LH** type of the video capture card (Figure 7.2—14, 1).

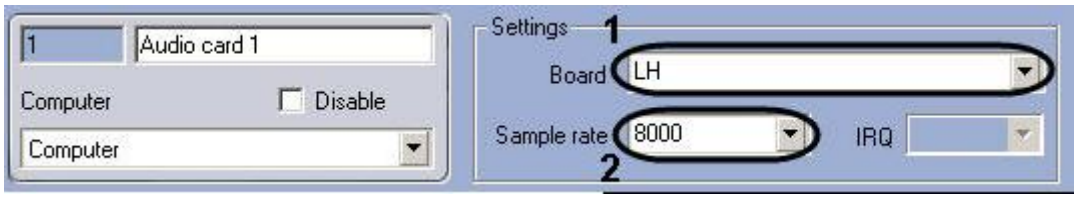



Figure 7.2—14 Configuring the audio card

2. Set the sample rate for audio signal processed in the **LH** (Figure 7.2—14, 2).
3. Create and configure the required number of the **Microphone** objects under the **Audio card** object.
4. Restart the INTELLECT™ system.

*Note. To enable audio stream recording from the microphone set the environment variablebefore starting the VideoServerCore:*
*export WRITE_AUDIO_INPUT= audio_device_number.*

*Number of the audio device can be found in VideoServerCore logs:*
*CBoard(audio_device_number, HDA Intel PCH:VT1708S Analog (hw:0,0)).*

Configuring the LH for the INTELLECT™operation is completed.

## 7.3 The Linux Server (LinuxHub) Web interface

### 7.3.1 Introduction

The Web interface is designed for remote access to the LS (LH) and has the following functionality:

1. Viewing video received from the cameras connected to the LS (LH);

2. Monitoring the LS (LH) operability;

3. Configuration of the LS (LH) network parameters;

4. Resetting the LS (LH) configuration;

5. Updating the LS (LH) firmware;

6. Downloading the activation key to the LS (LH).

### 7.3.2 Access to the Web interface

To open the LS (LH) Web interface, enter the IP-address of the required LS (LH) into the address line of the browser. The Web interface home page will load (Figure 7.3—1).

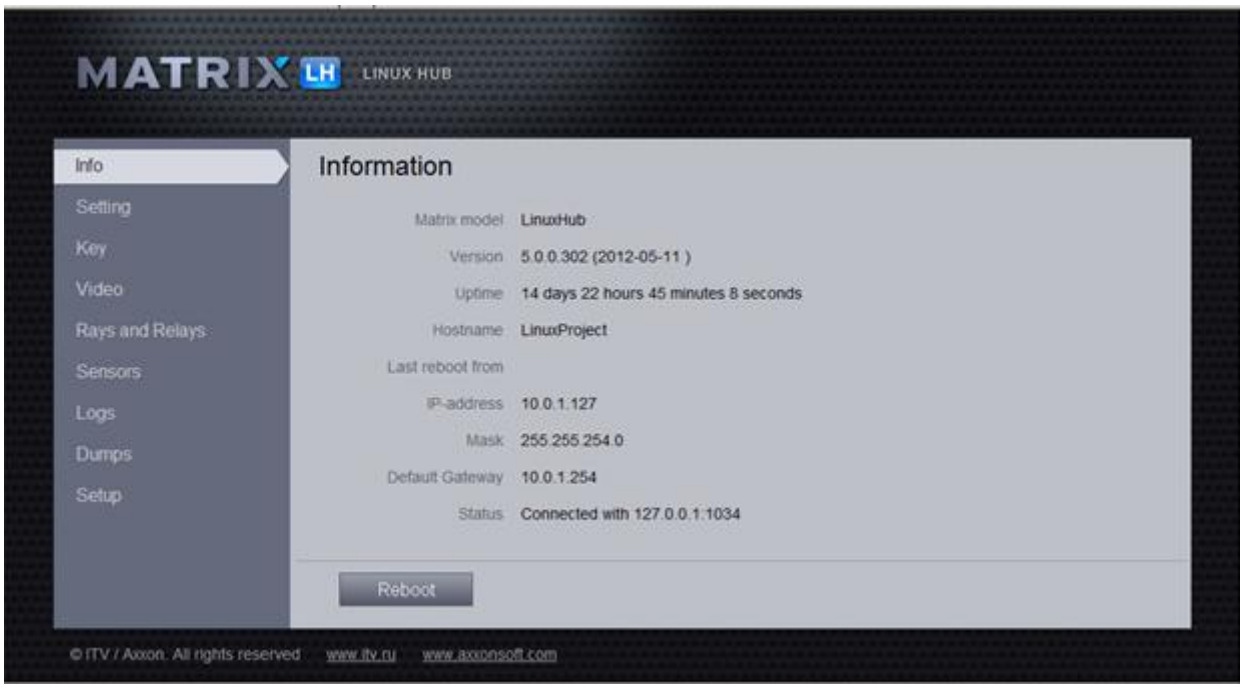



Figure 7.3—1 The LS (LH) Web interface home page (Info tab)

The following information is displayed in the **Info** tab:

1. The LS (LH) name;

2. The LS (LH) firmware version;

3. Operation time since last LS (LH) reboot;

4. NetBIOS name of the LS (LH);

5. IP-address of the remote computer from which the LS (LH) was last rebooted;

6. IP-address, subnet mask and default gateway of the LS (LH).

7. Status of the LS (LH) connection with INTELLECT™.

The **Reboot** button is located below used for the LS (LH) reboot. The **The Matrix is restarting now** message is displayed during the reboot.

*Note. The browser must support Java to work correctly with the Web interface.*

### 7.3.3 Viewing the video

The **Video** tab allows viewing the video signal received from the LS (LH) cameras (Figure 7.3—2).

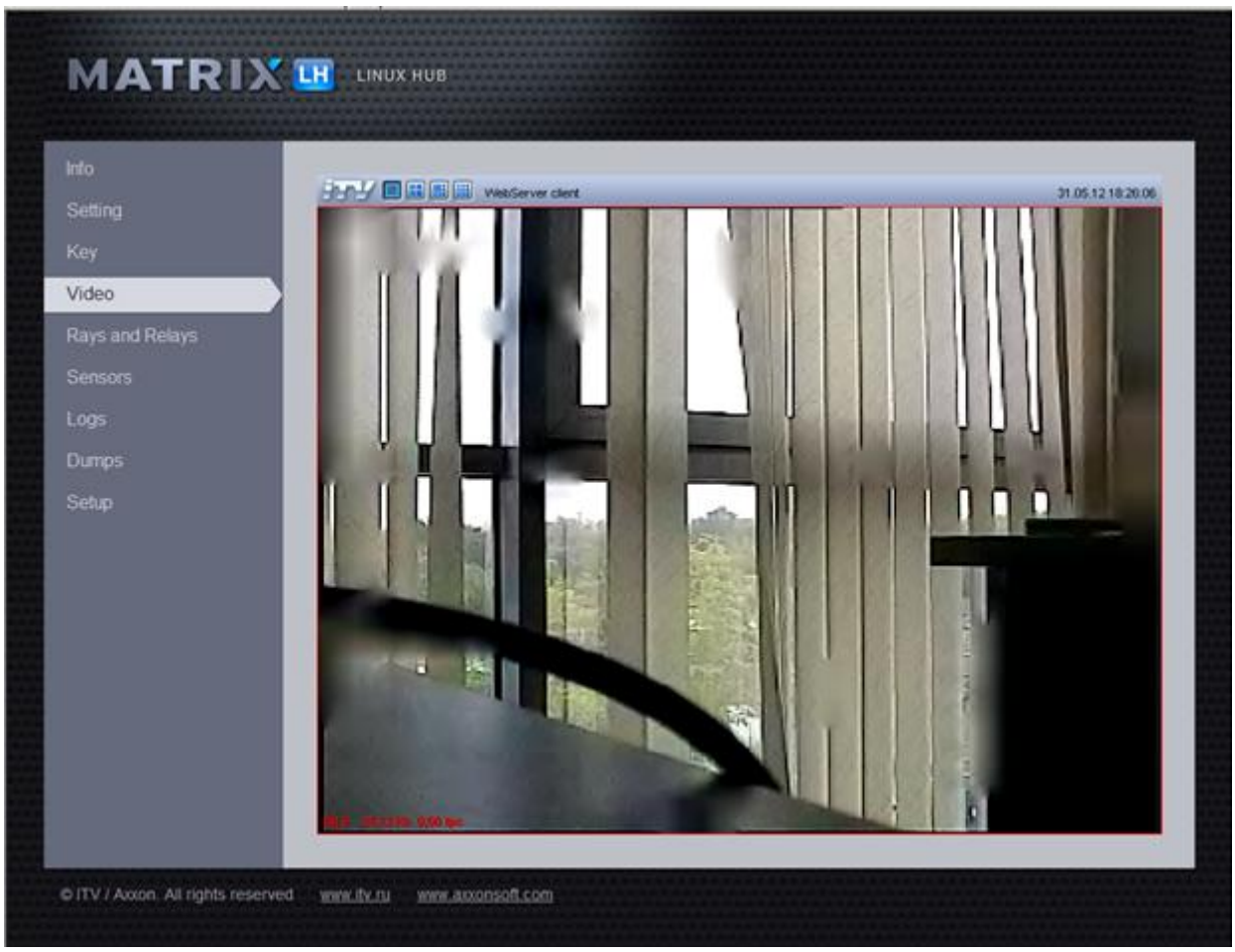



Figure 7.3—2 Viewing the video (Video tab)

Viewing the video received from the LS (LH) cameras in the Web interface is similar to viewing the video through a web browser (see this manual).

### 7.3.4 Monitoring rays and relays status

Monitoring the status of connected rays and relays is made in the **Rays and Relays** tab (Figure 7.3—3).

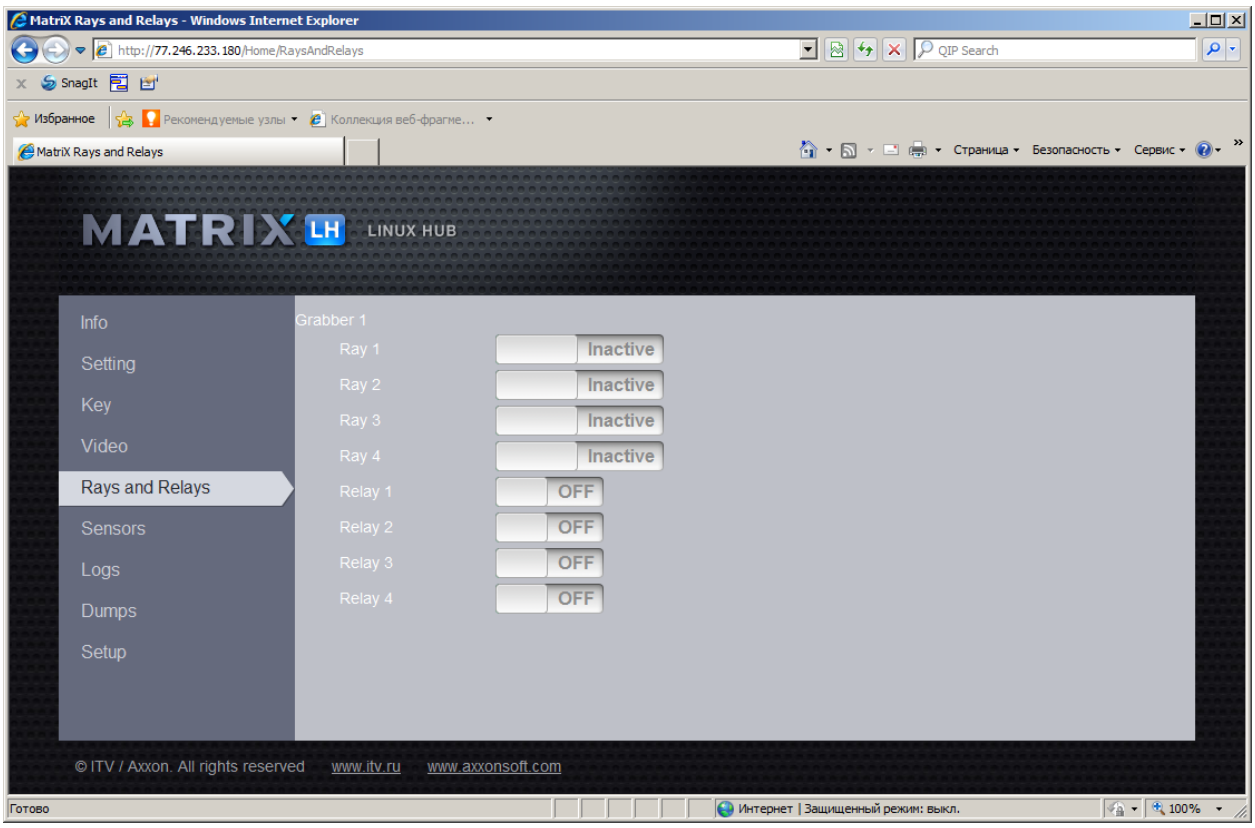



Figure 7.3—3 Monitoring rays and relays status

This tab displays the list of rays and relays connected to LS (LH) and their status.

### 7.3.5 Monitoring the Linux Server (LinuxHub) operability

The **Sensors** tab allows monitoring the operability of the LS (LH) (Figure 7.3—4).

Sensors allow monitoring computer hardware: CPU temperature, fan speed, memory usage, etc. The **LmSensors** library is used to obtain this information. Data received with its help are displayed in the **LmSensors** group. Some data can be obtained without this library; these data are displayed in the **Basic** group. In general these are 'general monitoring data' and extended data.

For basic sensors the name and current value are given, limit of accepted values is specified in parenthesis.

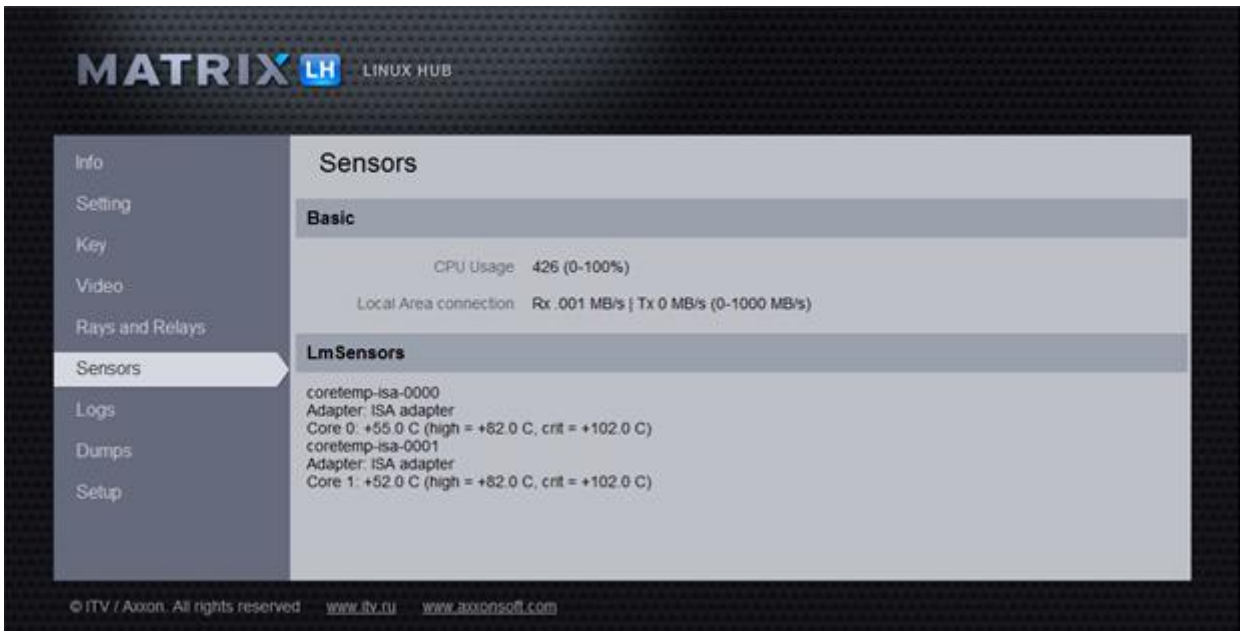



Figure 7.3—4 Monitoring the system operability (Sensors tab)

### 7.3.6 Configuring the Linux Server (LinuxHub) network parameters

The **Setting** tab allows configuring the network parameters of the LS (LH) (Figure 7.3—5):

1. The password for accessing the LS (LH) Web interface (the **Password** and **Confirmation** fields);
2. NetBIOS name of the LS (LH);
3. IP-address, subnet mask and default gateway of the LS (LH);

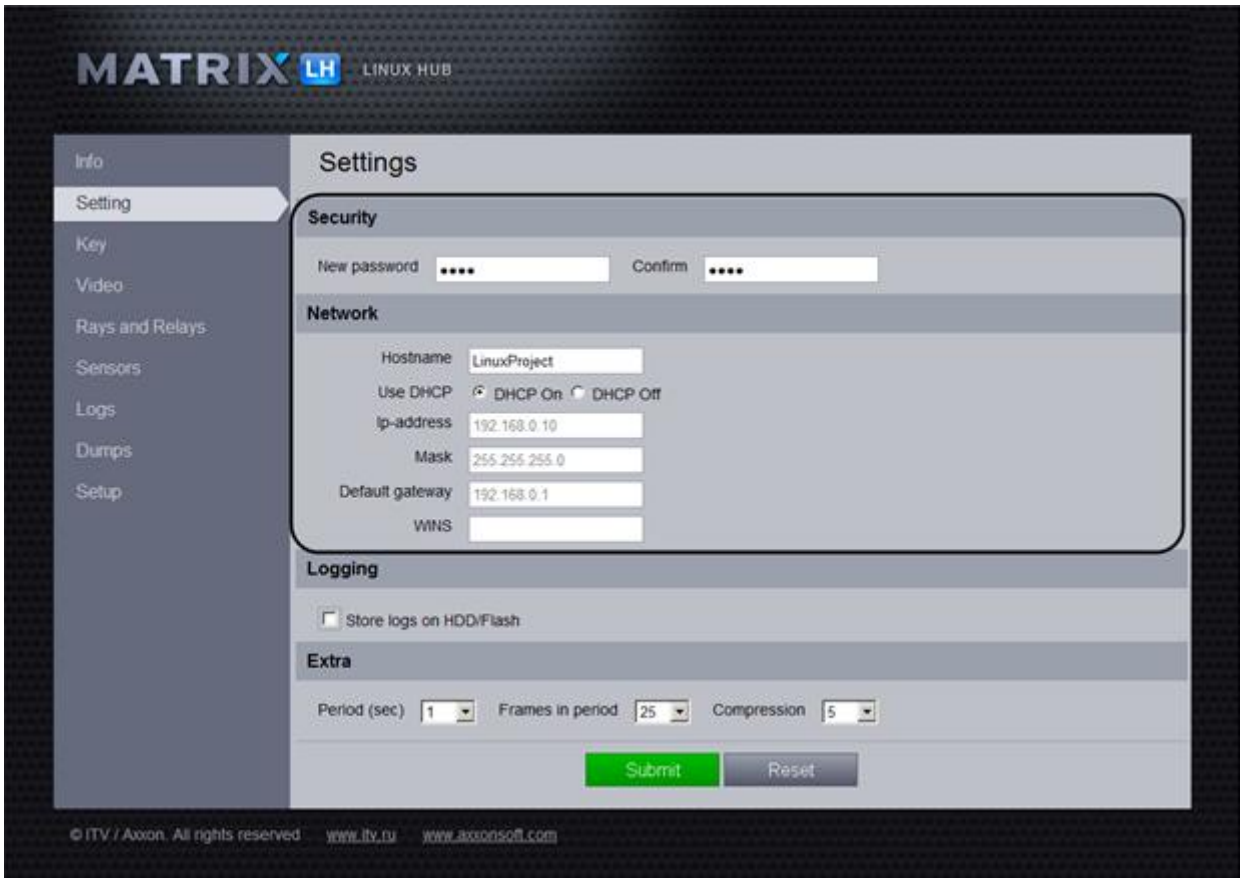



Figure 7.3—5 Network parameters configuration (Setting tab)

*NOTE. To enter an IP-address, subnet mask and default gateway manually, set the **DHCP Off** chechbox and enter the values. To set the parameters automatically using the Dynamic Host Configuration Protocol service, set the **DHCP On** checkbox.*

When all values are set click **Submit** to save the changes or **Reset** to restore the previous values.

### 7.3.7 Configuring the Linux Server (LinuxHub) logging

To start storing logs on HDD or portable data medium set the **Store logs on HDD/Flash** checkbox (Figure 7.3—6).

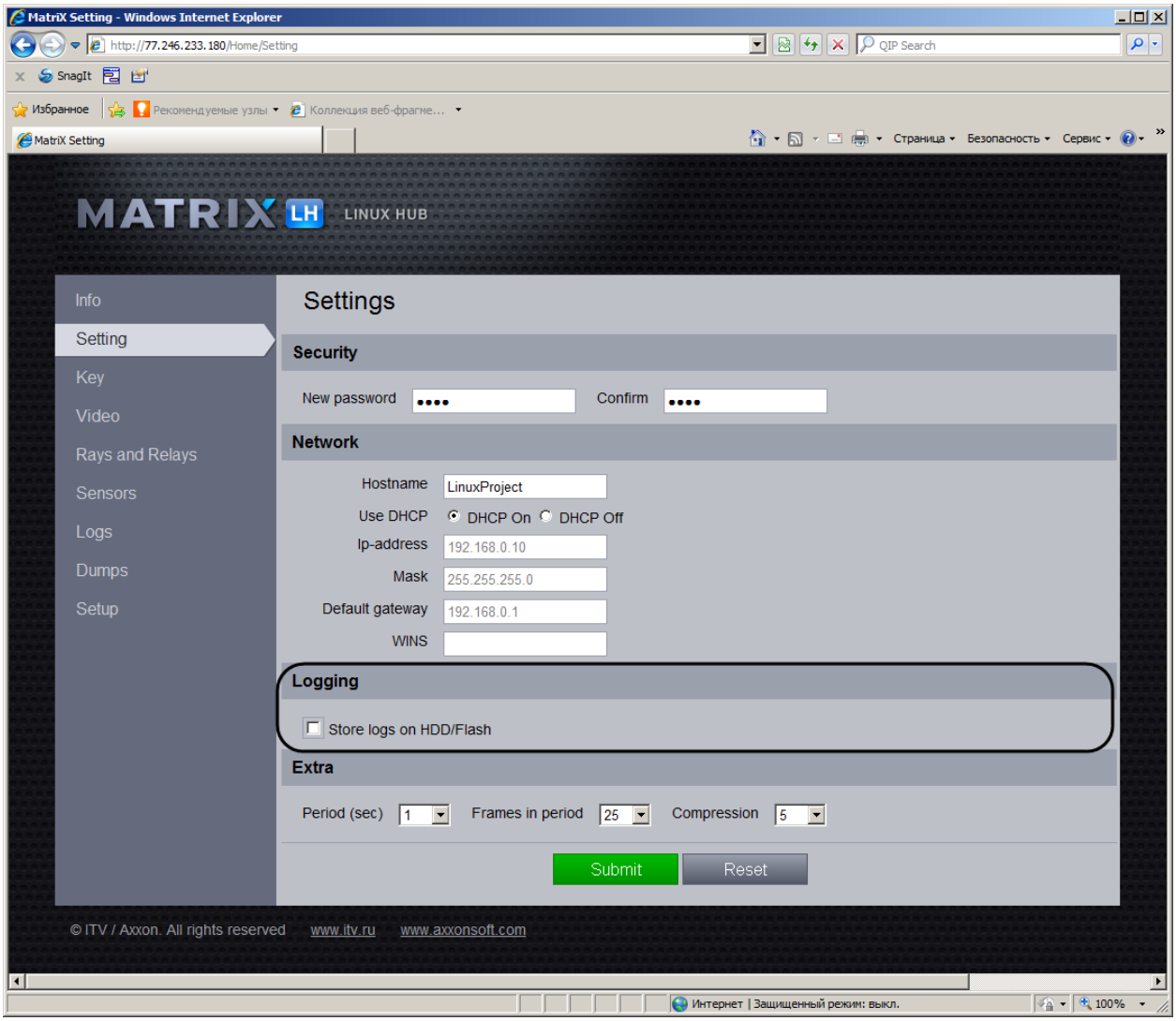



Figure 7.3—6 Logging

After setting all necessary parameters click **Submit** to save all the changes or **Reset** to restore the previous parameters.

### 7.3.8 Configuring parameters of video stream displaying

Parameters of video stream displaying in the LS (LH) Web interface are configured in the **Settings** tab of the **Extra** group (Figure 7.3—7):

5. Select the period (in seconds) in the **Period (sec)** dropdown list.
6. Select the number of frames that are to be displayed for the selected period in the **Frames in period** dropdown list.

7. Select the videostream compression rate in the **Compression** dropdown list.

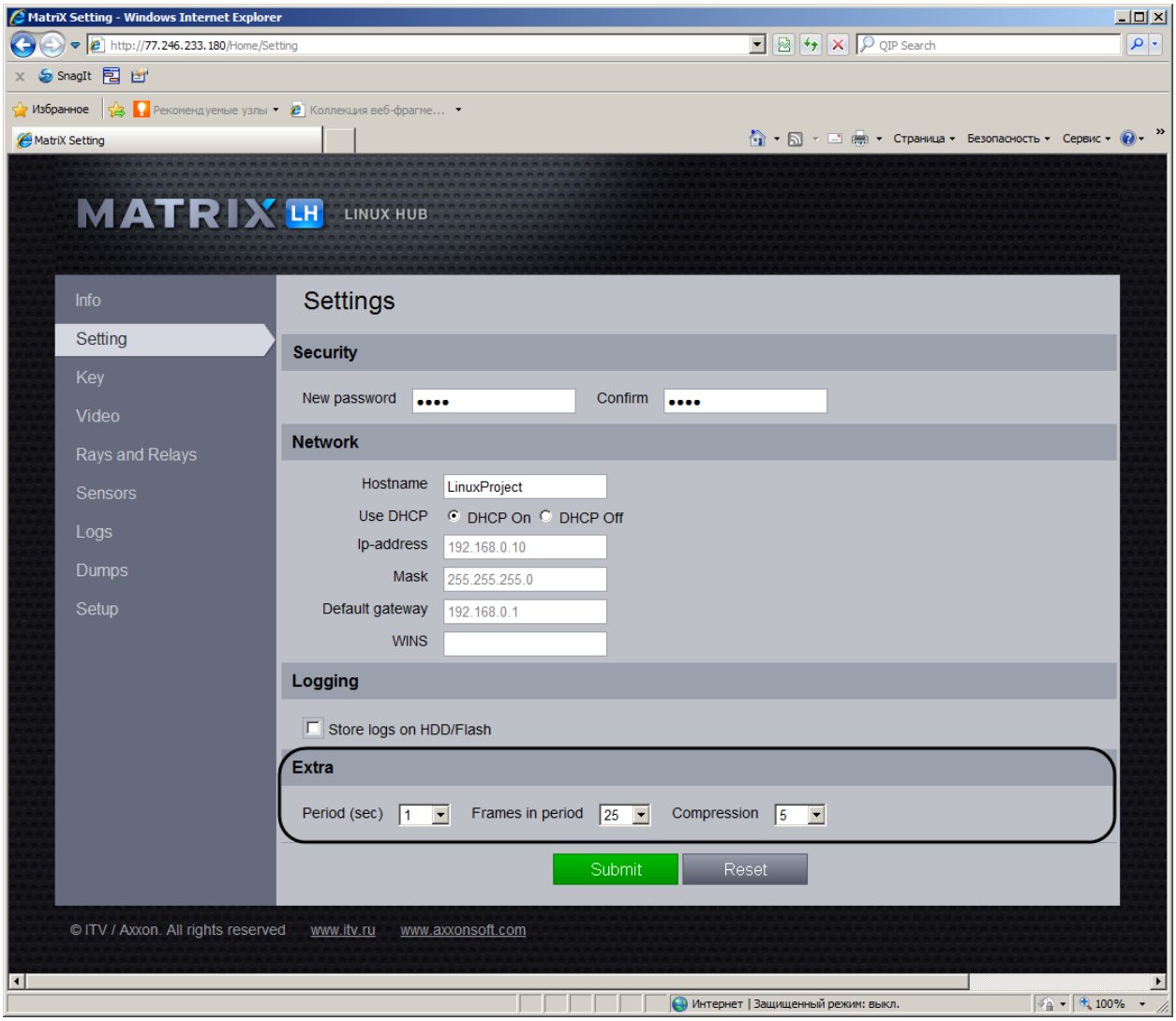



Figure 7.3—7 Configuring parameters of video stream displaying

After setting all necessary parameters click **Submit** to save all the changes or **Reset** to restore the previous parameters.

### 7.3.9 Setting the the Linux Server (LinuxHub) security

The following operations are performed in the **Key** tab (Figure 7.3—8):

1. Viewing the dallas codes of video capture cards' cryptochips installed on the LS (LH);
2. Viewing the information about the compliance of video capture card's dallas-codes with the LS (LH)'s key file;

*Note. intellect.sec is used for the LS security, video.sec is used for the LH security.*

3. Downloading the activation key to the LS (LH).

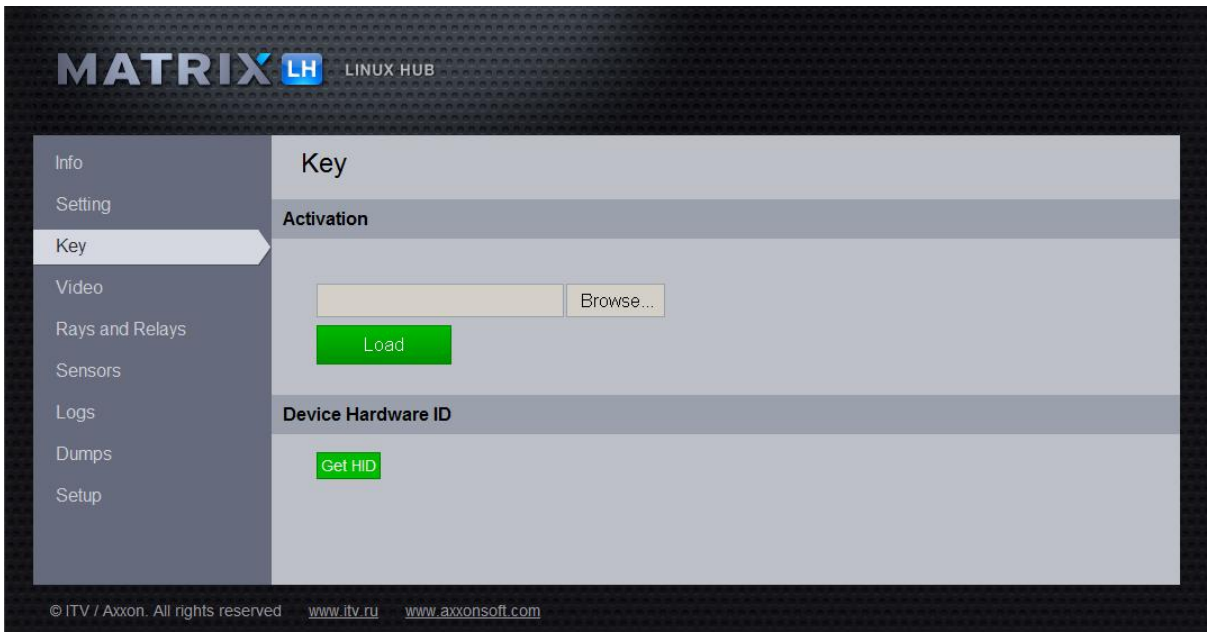



Figure 7.3—8 Downloading the activation key to the LS (LH)

To download the activation key to the LS (LH) do the following (Figure 7.3—8):

1. Click **Browse** to select the activation key;
2. Select the required file and click **Open** in the appeared standard dialog window of the Windows OS;
3. Click **Load;**
4. As a result the intellect.sec (video.sec) activation key is saved on the LS (LH) in the \etc\itv\ directory;
5. Restart the LS (LH).

***Attention! Mozilla Firefox does not download the activation key to the LS (LH).***

Downloading the activation key to LS (LH) is completed.

### 7.3.10 Resetting the Linux Server (LinuxHub) configuration

The **Setup** tab (Figure 7.3—9) allows resetting some configuration parameters of the LS (LH).

*Note. Online updating of the firmware is performed in the **Setup** tab (see Updating the Linux Server (LinuxHub) firmware section).*

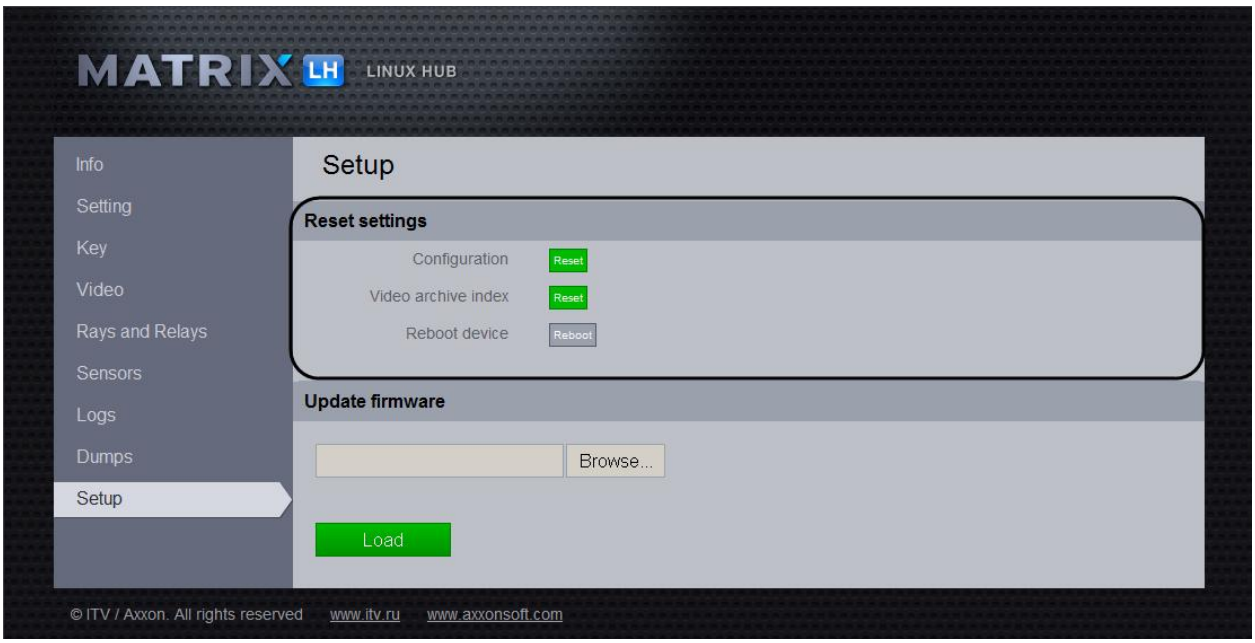



Figure 7.3—9 Resetting some of the configuration parameters (Setup tab)

To reset the current LS (LH) configuration click **Reset** next to **Configuration**. The LS (LH) will reset the selected configuration parameters after restart. Click **Reboot** to restart the LS (LH).

Configuration means hardware configuration received from the INTELLECT™ system. Default configuration (under available and licensed hardware) is created after reset and reboot; hardware configuration created on Server is applied after connecting the INTELLECT™ system.

To reset the LS(LH) database settings ckick **Reset** next to **Video archive index**. Settings will be reset after restart. To restart the LS (LH) click **Reboot**.

The **Reset** button does not make any changes to LS (LH) configuration.

### 7.3.11 Viewing the Linux Server (LinuxHub) logs

Logs of the LS (LH) are viewed in the **Logs** tab (Figure 7.3—10).

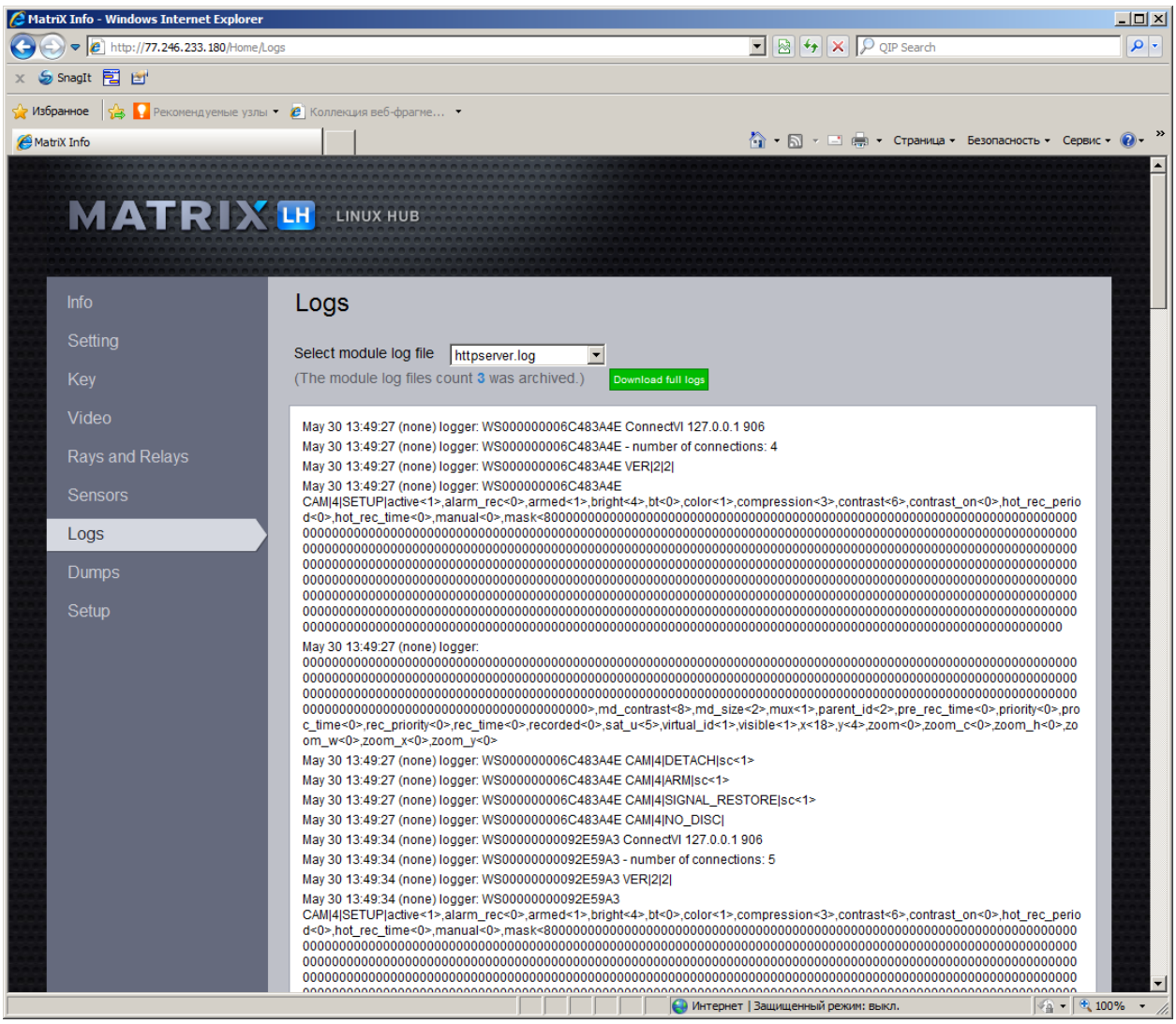



Figure 7.3—10 Viewing the LS (LH) logs

Select the file with necessary log in the **Select module log file** dropdown list.

Only part of .log file is displayed in the Web interface. To get full file click **Download full logs**.

### 7.3.12 Working with memory dumps

Work with memory dumps is performed in the **Dumps** tab (Figure 7.3—11).

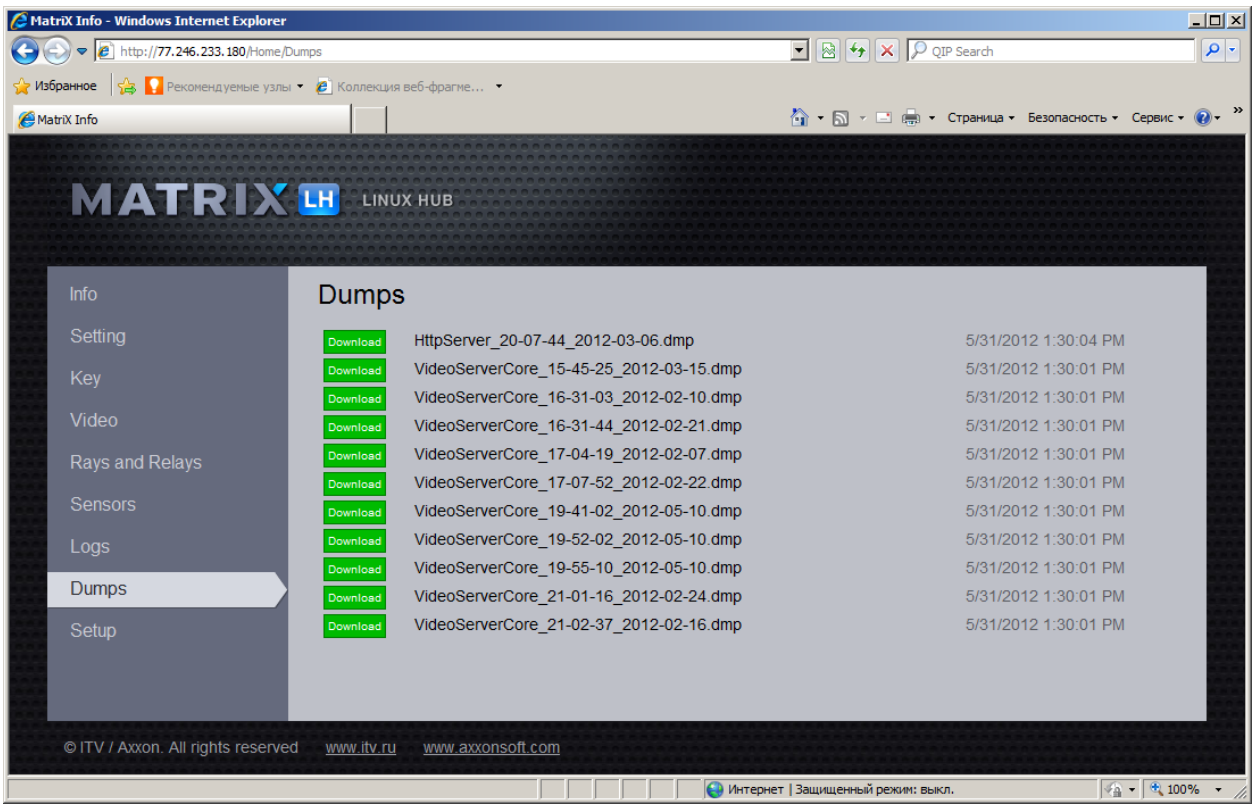



Figure 7.3—11 The Dumps tab

The available dumps are displayed in the **Dumps** tab.

To save the dump click **Download**.

## 7.4 Updating the Linux Server (LinuxHub) firmware

The LS (LH) firmware is updated via the Web interface.

***Attention! Installing the LS firmware onthe LH results in incorrect LH operation.***

*Note. The firmware update can be carried out locally from .iso image.*

To update the LS (LH) firmware via the Web interface, do the following:

1. Go to the **Setup** tab (Figure 7.4—1).

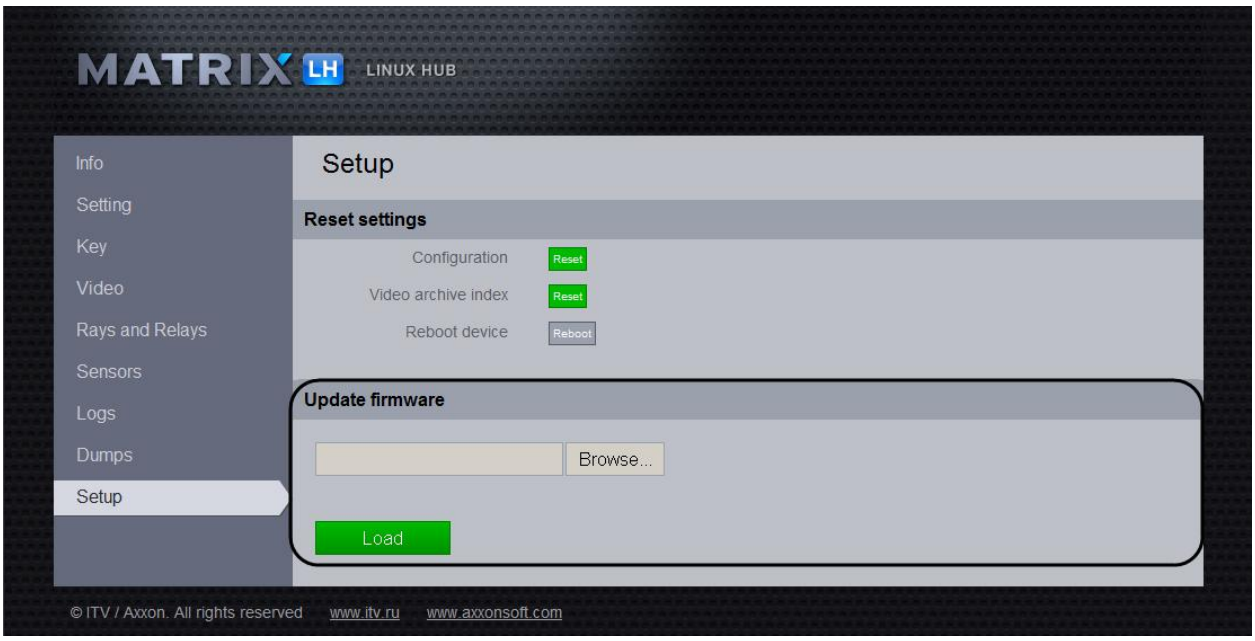



Figure 7.4—1 Updating the Linux Server (LinuxHub) firmware via the web interface

2. Click **Browse** to select the firmware file (Figure 7.4—1).

*Note. To get the firmware file, please, contact AxxonSoft's Help desk.*

*The firmware file has **.iso** extension.*

3. Select the required firmware file and click **Open** in the standard dialog box.
4. Click **Load** (Figure 7.4—1).
5. As the result the firmware is loaded and installed on the LS (LH).
6. Wait till the process ends and then restart the LS (LH).

Updating the LS (LH) firmware via the Web interface is completed.

*Note. There is no need to restore network settings and the LS(LH) activation key while updating the LS (LH) firmware via the Web interface.*

# 8 Appendix 4. Technical specifications of video capture cards

Technical specifications of FS-5, FS-6, FS-16 and FS-8 video capture cards are given in Table 7.4—1.

Table 7.4—1 Technical specifications of FS-5, FS-6, FS-16 and FS-8 video capture cards

| **Parameters** | **FS-5** | | **FS-6** | | **FS-16** | | **FS-8** | |
|---|---|---|---|---|---|---|---|---|
| PCI bus, bit / MHz | 32 / 33, using PCI-66/X | | 32 / 33, using PCI-66/X | | PCI E 1x | | 32 / 33, using PCI-66/X | |
| Supply voltage, V | 3.3 and 5 | | 3.3 and 5 | | 3.3 | | 3.3 and 5 | |
| Power consumption, W | 2 | | 5 | | 5 | | 9 | |
| Video inputs, V / Ohm | 1 / 75 | | 1 / 75 | | 1 / 75 | | 1 / 75 | |
| Video output, V / Ohm | 1 / 75 | | 1 / 75 | | 1 / 75 | | 1 / 75 | |
| Number of video inputs | 16 | | 16 | | 16 | | 16 | |
| Hardware compression | no | | no | | no | | no | |
| Analog video out | 1 (optional) | | 1 (optional) | | 1 (optional) | | 1 (built-in) | |
| Signal type | CCIR PAL, NTSC | | CCIR PAL, NTSC | | CCIR PAL, NTSC | | CCIR PAL, NTSC | |
| Resolution, pixels | PAL | NTSC | PAL | NTSC | PAL | NTSC | PAL | NTSC |
| | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 |
| Resolution, TV lines (b/w, color) | 480 | | 480 | | 480 | | 480 | |
| Color palette | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | |
| Number of multiplexed video inputs | 16 | | 16 | | 16 | | 16 | |
| Number of non-multiplexed (live) video inputs | 1 | | 4 | | 4 | | 8 | |
| Video input rate for each non-multiplexed channel, fps, PAL (NTSC) | 25 (30) | | 25 (30) | | 25 (30) | | 25 (30) | |
| Total video input rate for all multiplexed channels, fps, PAL | 16 (704x288, 352x288)<br>12 (704x576) | | 64 (704x288, 352x288)<br>48 (704x576) | | 64 (704x288, 352x288)<br>48 (704x576) | | 128 (704x288, 352x288)<br>96 (704x576) | |
| Total video input rate for all multiplexed channels, fps, NTSC | 20 (640x240, 320x240)<br>15 (640x480) | | 80 (640x240, 320x240)<br>60 (640x480) | | 80 (640x240, 320x240)<br>60 (640x480) | | 160 (640x240, 320x240)<br>120 (640x480) | |
| Total video input rate for all non-multiplexed channels, fps, PAL (NTSC) | 25 (30) | | 100 (120) | | 100 (120) | | 200 (240) | |
| Galvanic isolation of sensor lines | 4(16), 2000 V | | 4 (16), 2000 V | | 4 (16), 2000 V | | 4 (16), 2000 V | |
| Galvanic isolation of control outputs | 4, 24 V, 30 mA | | 4, 24 V, 30 mA | | 4, 24 V, 30 mA | | 4, 24 V, 30 mA | |
| Number of audio input/output channels | 2 x RCA/ - | | 8 x RCA/ - | | 8 x RCA/ - | | 16 x RCA/ - | |
| Audio digitizing frequency, kHz | 8, 16, 32 | | 8, 16, 32 | | 8, 16, 32 | | 8, 16, 32 | |

| Parameters | FS-5 | FS-6 | FS-16 | FS-8 |
|---|---|---|---|---|
| Watchdog, hardware control of OS hanging-up | yes | yes | yes | yes |
| Digital-analog conversion, bit | 9 | 9 | 9 | 9 |

Technical specifications of WS-6, WS-7, WS16 and WS-17 video capture cards are given in Table 7.4—2.

**Table 7.4—2 Technical specifications of WS-6, WS-7, WS16 and WS-17 video capture cards**

| Parameters | WS-6 | | WS-7 | | WS16* | | WS-17 | |
|---|---|---|---|---|---|---|---|---|
| PCI bus, bit / MHz | 32 / 33, using PCI-66/X | | 32 / 66(33) | | 1x | | 1x | |
| Supply voltage, V | 3,3 and 5 | | 3,3 | | - | | 3,3 | |
| Power consumption, W | 4 | | 8 | | 3,3 | | 8 | |
| Video inputs, V / Ohm | 1 / 75 | | 1 / 75 | | 1 / 75 | | 1 / 75 | |
| Video output, V / Ohm | no | | no | | no | | no | |
| Number of video inputs | 4 | | 4 | | 16 | | 4 | |
| Hardware compression | yes | | yes | | yes | | yes | |
| Analog video out | no | | no | | no | | no | |
| Signal type | PAL, NTSC | | PAL, NTSC | | PAL, NTSC | | PAL, NTSC | |
| Resolution, pixels | PAL | NTSC | PAL | NTSC | PAL | NTSC | PAL | NTSC |
| | 704*544 | 640*480 | 704*288<br>704*544 | 640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 352*240<br>704*240<br>704*480 | 352*288<br>704*288<br>704*544 | 320*240<br>640*240<br>640*480 |
| Resolution, TV lines (b/w, color) | 500 (500) | | 500 (500) | | 625 (PAL)/525(NTSC) | | 500 (500) | |
| Color palette | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | |
| Number of multiplexed video inputs | - | | - | | - | | - | |
| Number of non-multiplexed (live) video inputs | 4 | | 4 | | 16 | | 4 | |
| Video input rate for each non-multiplexed channel, fps, PAL (NTSC) | 25 (30) | | 25 (30) | | 25 (30) | | 25 (30) | |
| Total video input rate for all multiplexed channels, fps, PAL | - | | - | | - | | - | |
| Total video input rate for all multiplexed channels, fps, NTSC | - | | - | | - | | - | |
| Total video input rate for all non-multiplexed channels, fps, PAL (NTSC) | 100 (120) | | 100 (120) | | 400(480) | | 100 (120) | |
| Galvanic isolation of sensor lines | no | | no | | no | | no | |
| Galvanic isolation of control outputs | no | | no | | no | | no | |

| Parameters | WS-6 | WS-7 | WS16* | WS-17 |
|---|---|---|---|---|
| Number of audio input/output channels | 8 x RCA/ - | 8 x RCA/ - | 16 x RCA/ - | 8 x RCA/ - |
| Audio digitizing frequency, kHz | 16 | 8, 16 | 8 | 8,16 |
| Watchdog, hardware control of OS hanging-up | no | no | no | no |
| Digital-analog conversion, bit | 9 | 9 | 10 | 9 |

* Resolutions supported by WS16 video capture card are given in the table for archive recording and for displaying video on the Client. On the Server video is displayed only with 352x288 (PAL) / 352x240 (NTSC) resolution.

Technical specifications of FX8, FS15, FX4 and FX16 video capture cards are given in Table 7.4—3.

**Table 7.4—3 Technical specifications of FX8, FS15, FX4 and FX16 video capture cards**

| Parameters | FX8 | | FS15 | | FX4 | | FX16 | |
|---|---|---|---|---|---|---|---|---|
| Size (mm x mm) | 132,22 x 80 | | 120.55 × 85 | | 132,22 x 80 | | 179.97 × 106.65 | |
| Minimal requirements to the input/output bus, standard | PCI-E x 1 | | PCI (33MHZ ) | | PCI-E x 1 | | PCI-E×4 (33MHZ) | |
| ADC (bit) | 10 | | 10 | | 10 | | 10 | |
| Number of video inputs | 16 x BNC | | 4 × BNC | | 16 x BNC | | 16 x BNC | |
| Hardware compression | no | | no | | no | | no | |
| Analog video out | no | | no | | no | | no | |
| Power consumption, W | 4 | | 0,5 | | 4 | | 5,5 | |
| Video inputs, V / Ohm | 1/75 | | 1/75 | | 1/75 | | 1/75 | |
| Video output, V / Ohm | 1/75 | | 1/75 | | 1/75 | | 1/75 | |
| Audio input, V/ kOhm | 1/40 | | 1/40 | | 1/40 | | 3,5/10 | |
| Signal type | PAL, NTSC | | PAL, NTSC | | PAL, NTSC | | PAL, NTSC | |
| Resolution, pixels | PAL | NTSC | PAL | NTSC | PAL | NTSC | PAL | NTSC |
| | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 |
| Maximum resolution, TV lines (b/w, color) | 576 (PAL) / 480 (NTSC) | | 576 (PAL) / 480 (NTSC) | | 470 | | 625 (PAL) / 525 (NTSC) | |
| Color palette | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | |
| Number of multiplexed video inputs | 16 | | 4 | | 16 | | - | |
| Number of non-multiplexed (live) video inputs | 8 | | 1 | | 4 | | 16 | |
| Video input rate for each non-multiplexed channel, fps, PAL (NTSC) | 25 (30) | | 25 (30) | | 25 (30) | | 25 (30) | |
| Total video input rate for all multiplexed channels, fps, PAL | 128 (704x288, 352x288)<br>128 (704x576) | | 16 (704x288, 352x288)<br>16 (704x576) | | 64 (704x288, 352x288)<br>64 (704x576) | | - | |

| Parameters | FX8 | FS15 | FX4 | FX16 |
|---|---|---|---|---|
| Total video input rate for all multiplexed channels, fps, NTSC | 160(640x240, 320x240) 160(640x480) | 20(640x240, 320x240) 20(640x480) | 80(640x240,320x240) 80(640x480) | - |
| Total video input rate for all non-multiplexed channels, fps, PAL (NTSC) | 200 (240) | 25 (30) | 100 (120) | 400(480) |
| Number of audio input/output channels | 8 x RCA/ - | 1 × TRS/ - | 4 × RCA/ - | 16 × RCA/ - |
| Audio digitizing frequency, kHz | 8, 16, 24, 32, 40, 48 | 8, 16, 24, 32, 40, 48 | 8, 16, 24, 32, 40, 48 | 8, 16, 24, 40, 48 |
| Galvanic isolation of sensor lines | 4 | not integrated | 4 | 4 |
| Control outputs, open collector | 4 | not integrated | 4 | 4 |
| Watchdog, hardware control of OS hanging-up | yes | yes | yes | yes |
| Peak temperature of card | $50^0$C | $40^0$C | $40^0$C | $65^0$C |
| Supported OS | All OS supported by the INTELLECT™ system | All OS supported by the INTELLECT™ system | All OS supported by the INTELLECT™ system | All OS supported by the INTELLECT™ system |

Technical specifications of FS115, FX2, FX116 and FX416 video capture cards are given in Table 7.4—4.

**Table 7.4—4 Technical specifications of FS115, FX2, FX116 and FX416 video capture cards**

| Parameters | FS115 | | FX2 | | FX116 | | FX416 | |
|---|---|---|---|---|---|---|---|---|
| Minimal requirements to the input/output bus, standard | PCI | | PCI-E x 1 | | PCI-E x 1 | | PCI-E×4 | |
| ADC (bit) | 10 | | 9 | | 10 | | 10 | |
| Number of video inputs | 4 × BNC | | 8 x BNC | | 16 x BNC | | 16 x BNC | |
| Hardware compression | no | | no | | no | | no | |
| Analog video out | no | | 1 (optionally) | | no | | no | |
| Power consumption, W | 0,5 | | 3 | | 1,5 | | 1,8 | |
| Video inputs, V / Ohm | 1/75 | | 1/75 | | 1/75 | | 1/75 | |
| Video outputs, V / Ohm | 1/75 | | 1/75 | | 1/75 | | 1/75 | |
| Audio input, V/ kOhm | 1/40 | | 1,4 / 5 | | 1/10 | | 1/10 | |
| Signal type | PAL, NTSC | | PAL, NTSC | | PAL, NTSC | | PAL, NTSC | |
| Resolution, pixels | PAL | NTSC | PAL | NTSC | PAL | NTSC | PAL | NTSC |
| | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 | 352*288<br>704*288<br>704*576 | 320*240<br>640*240<br>640*480 |
| Maximum resolution, TV lines (b/w, color) | 576 (PAL) / 480 (NTSC) | | 480 | | 420 | | 625 (PAL) / 525 (NTSC) | |
| Color palette | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray | |

| Parameters | FS115 | FX2 | FX116 | FX416 |
|---|---|---|---|---|
| Number of multiplexed video inputs | 4 | 8 | 16 | - |
| Number of non-multiplexed (live) video inputs | 1 | 2 | 8 | 16 |
| Video input rate for each non-multiplexed channel, fps, PAL (NTSC) | 25 (30) | 25 (30) | 25 (30) | 25 (30) |
| Total video input rate for all multiplexed channels, fps, PAL | 16 (704x288, 352x288)<br>16 (704x576) | 32 (704x288, 352x288)<br>24 (704x576) | 128 (704x576) | - |
| Total video input rate for all multiplexed channels, fps, NTSC | 20(640x240, 320x240)<br>20(640x480) | 40(640x240,320x240)<br>30(640x480) | 160(640x480) | - |
| Total video input rate for all non-multiplexed channels, fps, PAL (NTSC) | 25 (30) | 50 (60) | 200 (240) | 400 (480) |
| Number of audio inputs/outputs channels | 1 x RCA/ - | 4 x RCA/ - | 16 x RCA/ - | 16 x RCA/ - |
| Audio digitizing frequency, kHz | 8, 16, 24, 32, 40, 48 | 8, 16, 32 | 8, 16 | 8, 16 |
| Galvanic isolation of sensor lines | 4 | 4 (16), 2000 V | not integrated | not integrated |
| Control outputs, open collector | 4 | 4, 24 V, 30 mA | not integrated | not integrated |
| Watchdog, hardware control of OS hanging-up | yes | yes | yes | yes |
| Supported OS | All OS supported by the INTELLECT™ system | All OS supported by the INTELLECT™ system | All OS supported by the INTELLECT™ system | All OS supported by the INTELLECT™ system |

Technical specifications of WS216 and FX HD4 video capture cards are given in Table 7.4—5.

**Table 7.4—5 Technical specifications of WS216 and FX HD4 video capture cards**

| Parameters | WS216* | | FX HD4 |
|---|---|---|---|
| Minimal requirements to the input/output bus, standard | PCI-E x 1 | | PCI-E×4 |
| ADC (bit) | 10 | | - |
| Number of video inputs | 16 | | 4 |
| Hardware compression | yes | | no |
| Analog video out | no | | no |
| Power consumption, W | 3,3 | | 3,3 |
| Video inputs, V / Ohm | 1/75 | | - |
| Video outputs, V / Ohm | - | | - |
| Signal type | PAL, NTSC | | - |
| Resolution, pixels | PAL | NTSC | 1920*1080<br>1280*720 |
| | 352*288<br>704*288 | 352*240<br>704*240 | |

| Parameters | WS216* | | FX HD4 |
|---|---|---|---|
| | 704*576 | 704*480 | |
| Maximum resolution, TV lines (b/w, color) | 576 (PAL) / 480 (NTSC) | | - |
| Color palette | 16 mln colors, 256 shades of gray | | 16 mln colors, 256 shades of gray |
| Number of multiplexed video inputs | - | | - |
| Number of non-multiplexed (live) video inputs | 16 | | 4 |
| Total video input rate for all non-multiplexed channels, fps, PAL (NTSC) | 25 (30) | | 25 (1920x1080 resolution)<br>50 (1270x720 resolution) |
| Total video input rate for all multiplexed channels, fps, PAL (NTSC) | - | | - |
| Total video input rate for all non-multiplexed channels, fps, PAL (NTSC ) | 400 (480) | | 200 (1280x720 resolution )<br>100 (1920x1080 resolution) |
| Number of audio inputs/outputs channels | 16 x RCA/ - | | 4 x HDMI/ 4 x HD SDI |
| Audio digitizing frequency, kHz | 8 | | 32 - 48 |
| Galvanic isolation of sensor lines | 4 | | not integrated |
| Control outputs, open collector | 4 | | not integrated |
| Watchdog, hardware control of OS hanging-up | yes | | yes |
| Supported OS | All OS supported by the INTELLECT™ system | | All OS supported by the INTELLECT™ system |

* Resolutions supported by WS26 video capture card are given in the table for archive recording and displaying video on the Client. On the Server video is displayed only with 352x288 (PAL) / 352x240 (NTSC) resolution.

*Note. When WS216 video capture card with h.264 compression is in use, recording to the archive is in the colour mode. Black-and-white mode is not supported.*

Technical specifications of VRC6004, VRC6008, VRC6416 and VRC7008L video capture cards are given in Table 7.4—6.

**Table 7.4—6 Technical specifications of VRC6004, VRC6008, VRC6416, VRC7008L and VRC6404HD video capture cards**

| Parameters | Stretch VRC6004 | | Stretch VRC6008 | | Stretch VRC6416 | | Stretch VRC7008L | | Stretch VRC6404HD |
|---|---|---|---|---|---|---|---|---|---|
| Interface | PCI-E 1x | | PCI-E 1x | | PCI-E 4x | | PCI-E 1x | | PCI-E 4x |
| Number of video inputs | 4 | | 8 | | 16 | | 8 | | 4 |
| Number of video channels for H264 Svc format | 3 (channel 4 is disabled) | | 6 (channels 4 and 8 are disabled) | | 12 (channels 4, 8, 12 and 16 are disabled) | | 8 | | 4 |
| Signal type | PAL, NTSC | | PAL, NTSC | | PAL, NTSC | | PAL, NTSC | | PAL, NTSC |
| Resolution, pixels | PAL | NTSC | PAL | NTSC | 1920*1072<br>960*528<br>480*256 | NTSC | PAL | NTSC | 1920*1072<br>960*528<br>480*256 |
| | 720*576<br>704*576<br>528*384<br>360*288 | 720*480<br>704*480<br>528*320<br>360*240 | 720*576<br>704*576<br>528*384<br>360*288 | 720*480<br>704*480<br>528*320<br>360*240 | | 720*480<br>704*480<br>528*320<br>360*240 | 720*576<br>704*576<br>528*384<br>352*288 | 720*480<br>704*480<br>528*320<br>352*240 | |

| Parameters | Stretch VRC6004 | | Stretch VRC6008 | | Stretch VRC6416 | | Stretch VRC7008L | | Stretch VRC6404HD |
|---|---|---|---|---|---|---|---|---|---|
| | 180*144 | 180*120 | 180*144 | 180*120 | | 180*120 | 176*144 | 176*120 | |
| Recording rate for each channel | 25fps PAL / 30fps NTSC | | 25fps PAL / 30fps NTSC | | 25fps PAL / 30fps NTSC | | 25fps PAL / 30fps NTSC | | 25fps PAL / 30fps NTSC |
| Video compression format | H.264 AVC/H.264 SVC / MJPEG / MPEG | | H.264 AVC/H.264 SVC / MJPEG/ MPEG | | H.264 AVC/H.264 SVC / MJPEG/ MPEG | | H.264 AVC/H.264 SVC / MJPEG/ MPEG | | H.264 AVC / H.264 SVC / MPEG4 / MJPEG |
| Recording rate for each channel for H264 Svc format | 12fps PAL / 15fps NTSC | | 12fps PAL / 15fps NTSC | | 12fps PAL / 15fps NTSC | | 25fps PAL / 30fps NTSC | | 25fps PAL / 30fps NTSC |
| Number of audio in/out channels | - | | 8 x RCA/ - | | 16 x RCA/ - | | 8 x RCA/ - | | 4 x BNC/- |
| Number of audio channels (input) for H264 Svc format | - | | 6 (channels 4 and 8 are disabled) | | 12 (channels 4, 8, 12 and 16 are disabled) | | 8 | | 4 |
| Audio compression format | - | | G.711 | | G.711 | | G.711 | | G.711 |
| Analog video out modes | - | | NTSC / PAL Analog "Rolling" SMO | | - | | 1CVBS | | - |
| Video out pin | - | | BNC | | - | | DVI | | BNC |
| Video pre-preprocessing | De-interlacing; Titling by user; Stretch Bilateral Filter (additionally) | | De-interlacing; Titling by user; Stretch Bilateral Filter (additionally) | | De-interlacing; Titling by user; Stretch Bilateral Filter (additionally) | | De-interlacing; Titling by user; Stretch Bilateral Filter (additionally) | | De-interlacing; Titling by user; Stretch Bilateral Filter (additionally) |
| Analitics | Motion detector; Flash and break-in detector; Night mode detector | | Motion detector; Flash and break-in detector; Night mode detector | | Motion detector; Flash and break-in detector; Night mode detector | | Motion detector; Flash and break-in detector; Night mode detector | | Motion detector; Flash and break-in detector; Night mode detector |
| Alarm system and triggers support (available in additional daughter cards) | 8 optically isolated inputs; 8 relay outputs | | 8 optically isolated inputs; 8 relay outputs | | 8 optically isolated inputs; 8 relay outputs | | 8 optically isolated inputs; 8 relay outputs | | 16 optically isolated inputs; 16 relay outputs |
| Sertificates | FCC, CE | | FCC, CE | | FCC, CE | | - | | FCC, CE |
| Minimal requirements to processor | Dual Core 2.4 GHz or equivalent | | Dual Core 2.4 GHz or equivalent | | Dual Core 2.4 GHz or equivalent | | Dual Core 2.4 GHz or equivalent | | Dual Core 2.4 GHz or equivalent |
| Minimal requirements to RAM(Gb) | 1 | | 1 | | 1 | | 1 | | 1 |
| Supported OS | All OS supported by the INTELLECT™ | | All OS supported by the INTELLECT™ | | All OS supported by the INTELLECT™ | | All OS supported by the INTELLECT™ | | All OS supported by |

| Parameters | Stretch VRC6004 | Stretch VRC6008 | Stretch VRC6416 | Stretch VRC7008L | Stretch VRC6404HD |
|---|---|---|---|---|---|
| | system | system | system | system | the INTELLECT™ system |

Technical specifications of DS-4016HCI(R) video capture card are given in Table 7.4—7.

**Table 7.4—7 Technical specifications of DS-4016HCI(R) video capture card**

| Parameters | DS-4016HCI(R) | |
|---|---|---|
| Minimal requirements to the input/output bus, standard | PCI | |
| Size (mm x mm) | 198 x 100 | |
| Number of video channels | 16 | |
| Video input interface | BNC (1.0Vp-p, 75Ω) | |
| Maximum fps for a channel | 25fps (PAL)/30 fps (NTSC) | |
| Resolution at recording, pixels | PAL | NTSC |
| | 704 * 576<br>704*288<br>352 * 288 | 704 * 480<br>704*240<br>352 * 240 |
| Resolution under compression, pixels | PAL | NTSC |
| | 704 * 576<br>704*288<br>352 * 288 | 704 * 480<br>704*240<br>352 * 240 |
| Data rate for one video channel | 32Kbps ~ 2Mbps | |
| Video compression format | H.264 orI420 | |
| Number of audio channels | 16 | |
| Audio compression format | OggV or bis, 16Kbps | |
| Audio input interface | BNC(2Vp-p, 1kΩ) | |
| Video/audio output | yes | |
| Resolution of preview, pixels | PAL | NTSC |
| | 704 * 576 | 704 *480 |
| Type of stream | Video/video+audio | |
| Dual stream | yes | |
| Dual coding support | yes | |
| Power consumption | Less then 9W | |
| Peak temperature | from -10°C to +50°C | |

| Parameters | DS-4016HCI(R) |
| --- | --- |
| Humidity | 10%~90% |
| Supported OS | All OS supported by the INTELLECT™ system |

*Note 1. DS-4016HCI(R) video capture card has an embedded motion detector that is not integrated at the time of writing this manual.*

*Note 2. At the time of writing this manual audio is not integrated for DS-4016HCI(R) video capture card.*

# 9 Appendix 5. Video capture cards pins

## 9.1 FS-5 video capture card pins

FS-5 video capture card has 3 external pins– two RCA pins and a D-SUB-25 pin (Figure 9.1—1). Video connection is performed to the D-SUB-25 pin with the help of D-SUB-25/BNC stub. Simultaneous connection of up to 16 cameras is possible. Sound connection is performed with the help of RCA pins (two sound sources are maximum possible). Analog output card is connected to J2, J7, J8 pins. The Watchdog cable is connected to the J1 pin.

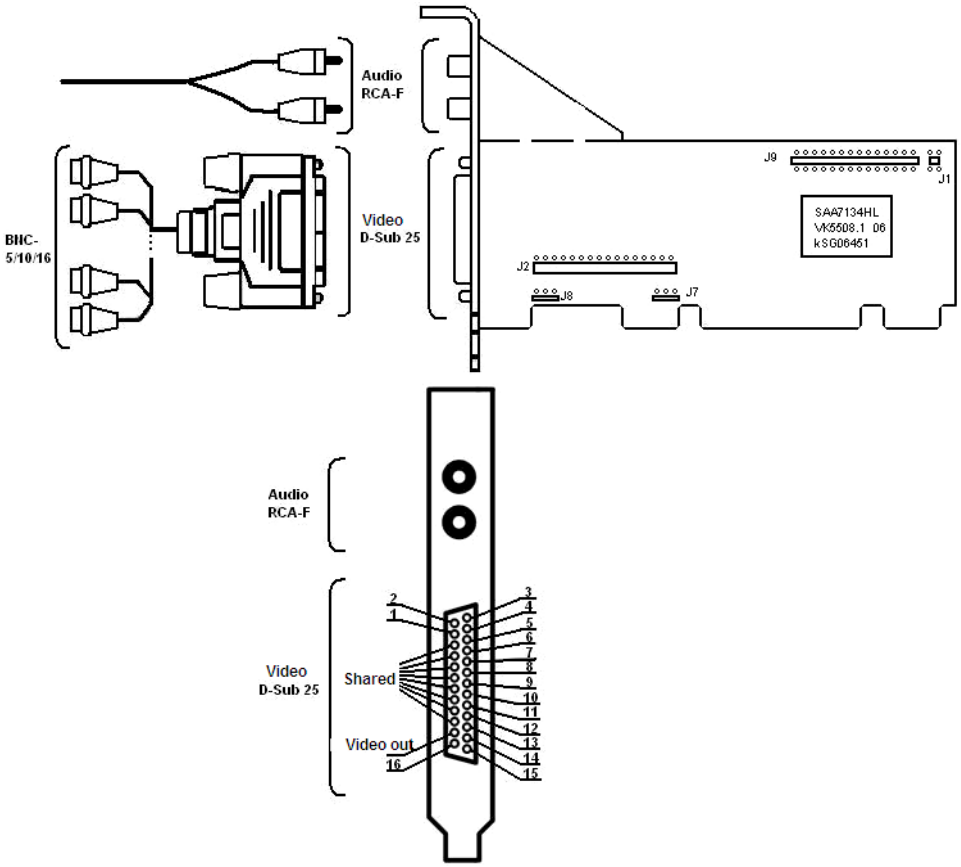



Figure 9.1—1 FS-5 video capture card pins

## 9.2 FS-6 video capture card pins

FS-6 video capture card has 2 external pins - D-SUB-9 and D-SUB-25 (Figure 9.2—1). Video connection is performed with the help of D-SUB-25/BNC stub. Simultaneous connection of up to 16 cameras is possible. D-SUB-9/RCA-8 interface cable is used for connecting the audio channels (up to 8 sound sources simultaneously) to the external D-SUB-9 pin of FS-6 video capture card. Analog output card is connected to J2, J7, J8 pins. The Watchdog cable is connected to the J1 pin.

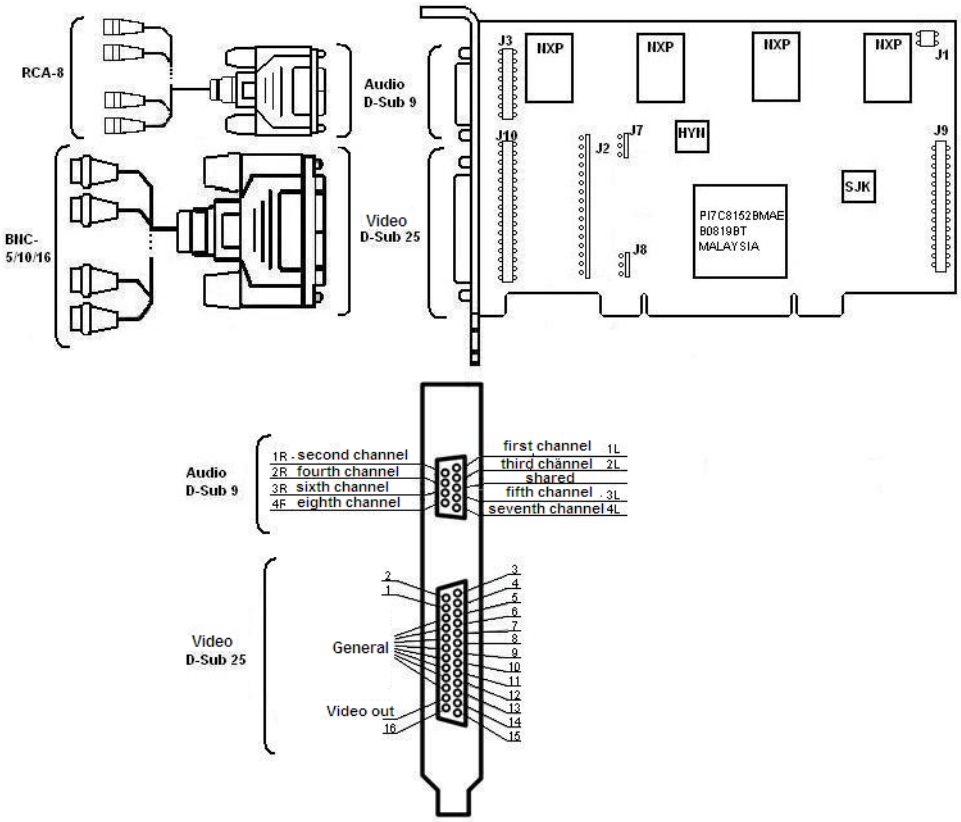



Figure 9.2—1 FS-6 video capture card pins

## 9.3 FS-16(Exp) video capture card pins

FS16 (Exp) video capture card has 2 external pins - D-SUB-9 and D-SUB-25 (Figure 9.3—1). Video connection is performed with the help of D-SUB-25/BNC stub. Simultaneous reception of up to 16 video images is possible. D-SUB-9/RCA-8 interface cable is used for connecting the audio channels to the external D-SUB-9 pin of FS16 (Exp) video capture card (up to 8 sound sources simultaneously). Analog output card is connected to J2, J7, J8 pins. The Watchdog cable is connected to the J1 pin.

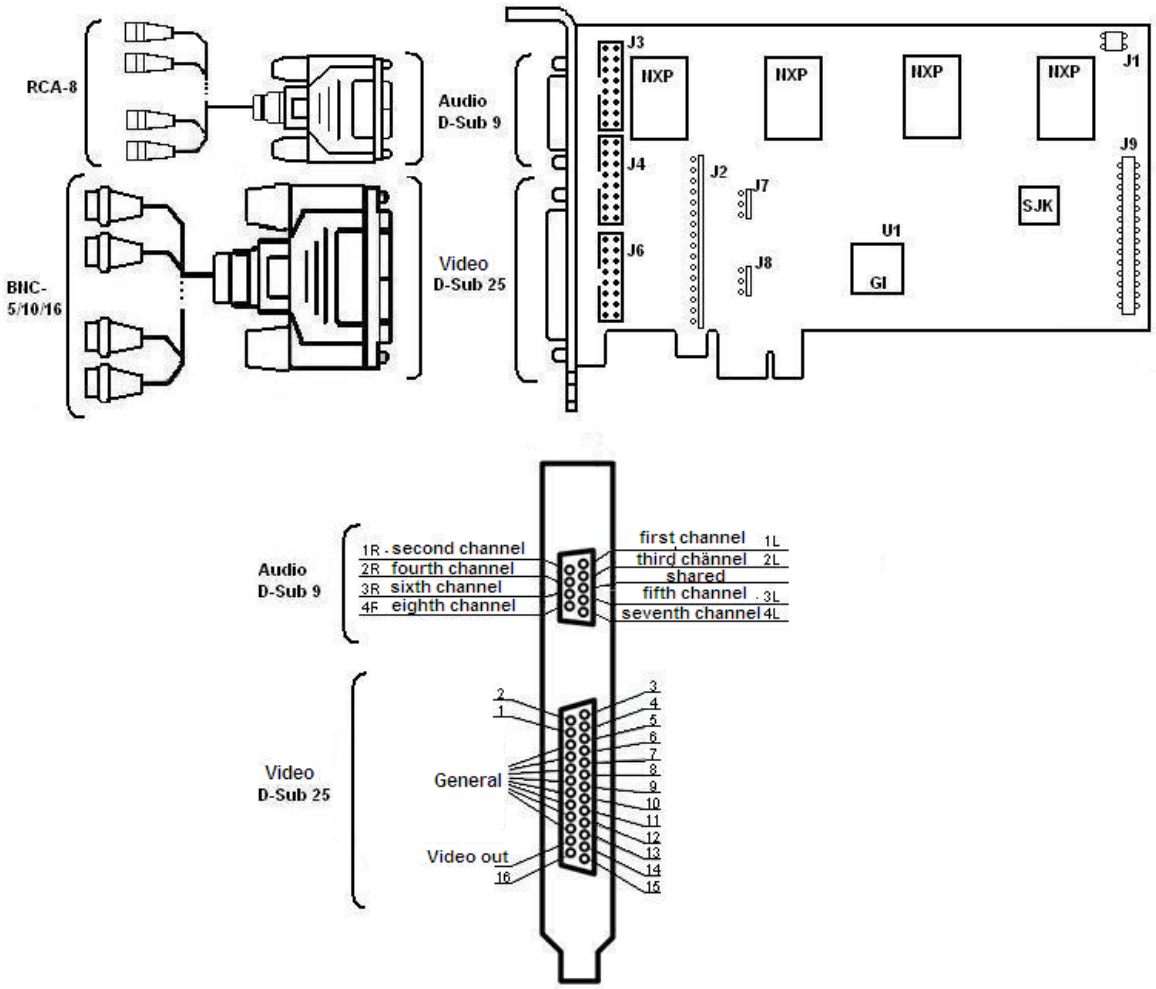



Figure 9.3—1 FS-16(Exp) video capture card pins

## 9.4 FS-8 video capture card pins

FS-8 video capture card has two external pins - D-SUB-9 and D-SUB-25 and one internal pin - IDC-16 (Figure 9.4—1). Video connection is performed with the help of D-SUB-25/BNC stub via D-SUB-25 pin. Simultaneous reception of up to 16 video images is possible. D-SUB-9/RCA-8 interface cable is used for connecting the audio channels to the external D-SUB-9 pin of FS-8 video capture card (up to 8 sound sources simultaneously). IDC-16/D-SUB-9 bracket of sound extension is used (up to 8 sound sources simultaneously) to connect additional audio channels. It is connected to the internal IDC-16 pin of FS-8 video capture card. The Watchdog cable is connected to the J1 pin.

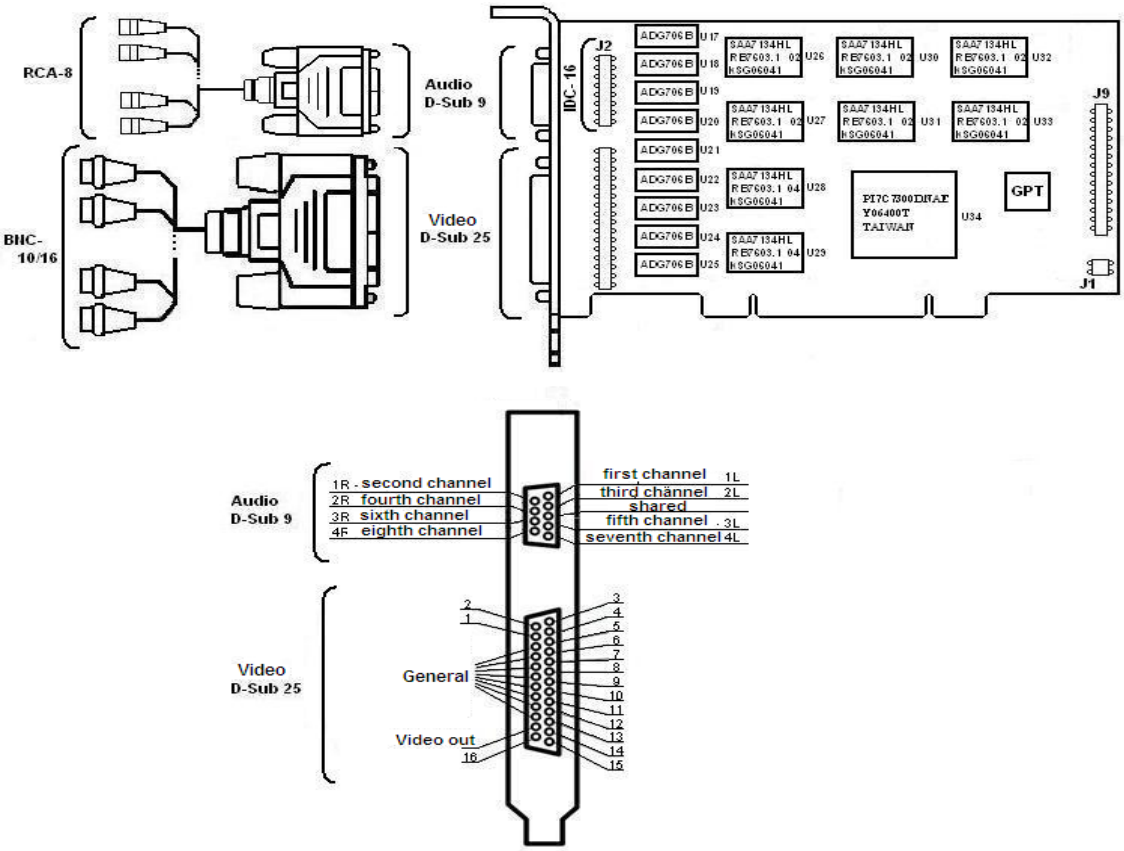



Figure 9.4—1 FS-8 video capture card pins

## 9.5 WS-7 video capture card pins

WS-7 video capture card has two external pins - D-SUB-9 and D-SUB-25 (Figure 9.5—1). D-SUB-25/BNC interface cable is used for simultaneous connection of 4 cameras to the external D-SUB-25 pin of WS-7 video capture card. D-SUB-9/RCA interface cable is used for simultaneous connection of 4 audio channels to the external D-SUB-9 pin of WS-7 video capture card.

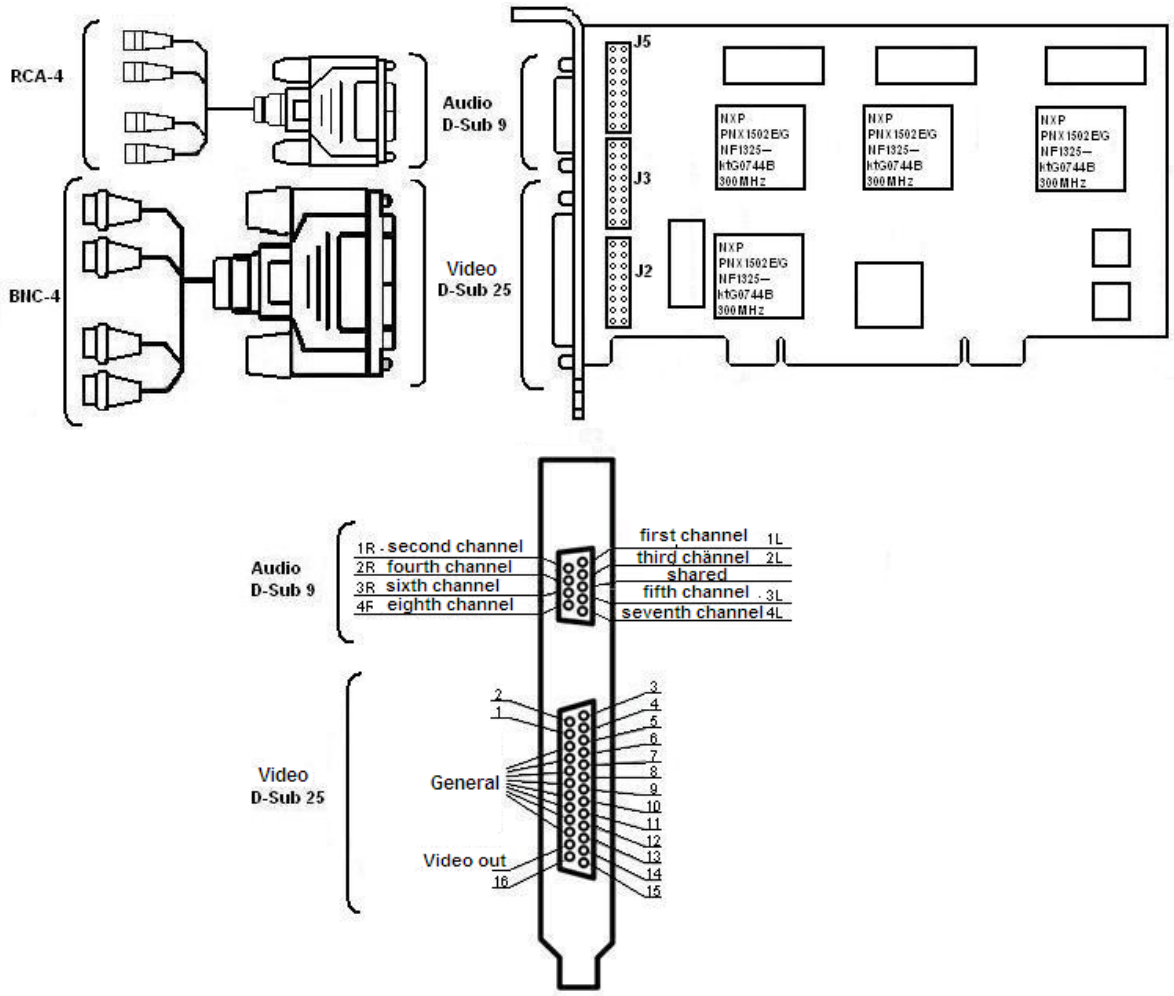



Figure 9.5—1 WS-7 video capture card pins

## 9.6 WS-16 video capture card pins

WS-16 video capture card has two external DVI-I pins (Figure 9.6—1). Video and audio connection is performed with the help of DVI-I/BNC and DVI-I/RCA stubs correspondingly. Simultaneous connection of up to 8 cameras and up to 8 sound sources to one external pin of WS-16 video capture card is possible. The Watchdog cable is connected to the J1 pin.

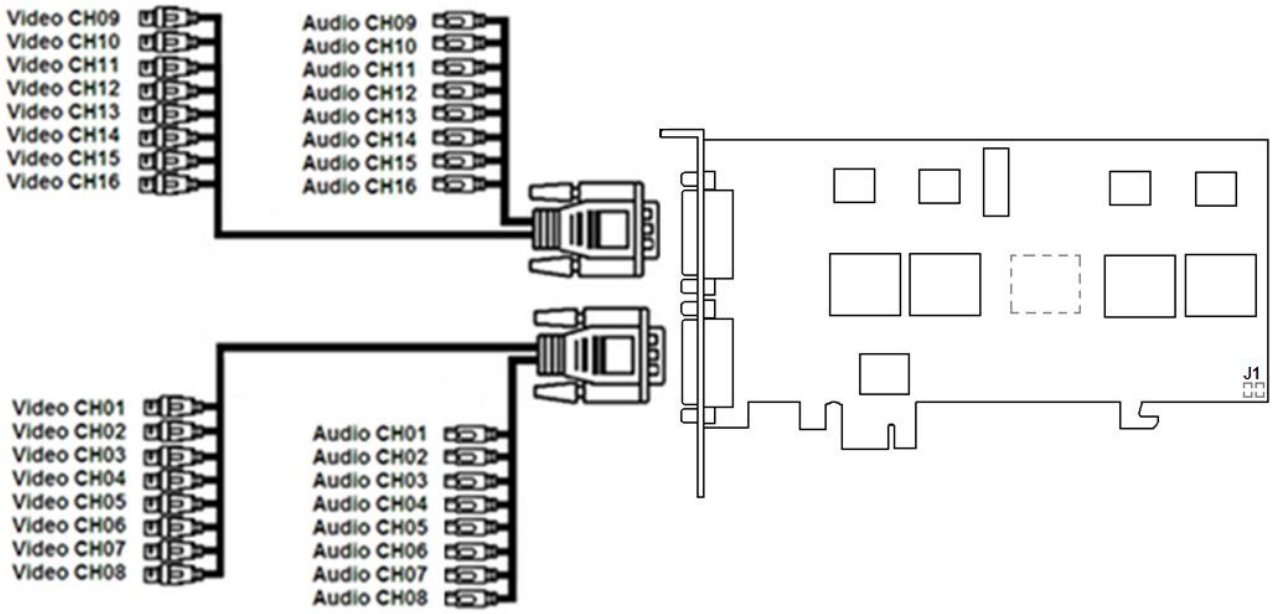



Figure 9.6—1 WS-16 video capture card pins

## 9.7 WS-17 video capture card pins

WS-17 video capture card has two external pins - D-SUB-9 and D-SUB-25 (Figure 9.7—1). D-SUB-25/BNC interface cable is used for simultaneous connection up to 4 cameras to the external D-SUB-25 pin of WS-17 video capture card. D-SUB-9/RCA interface cable is used for simultaneous connection up to 4 audio channels to the external D-SUB-9 pin of WS-17 video capture card.

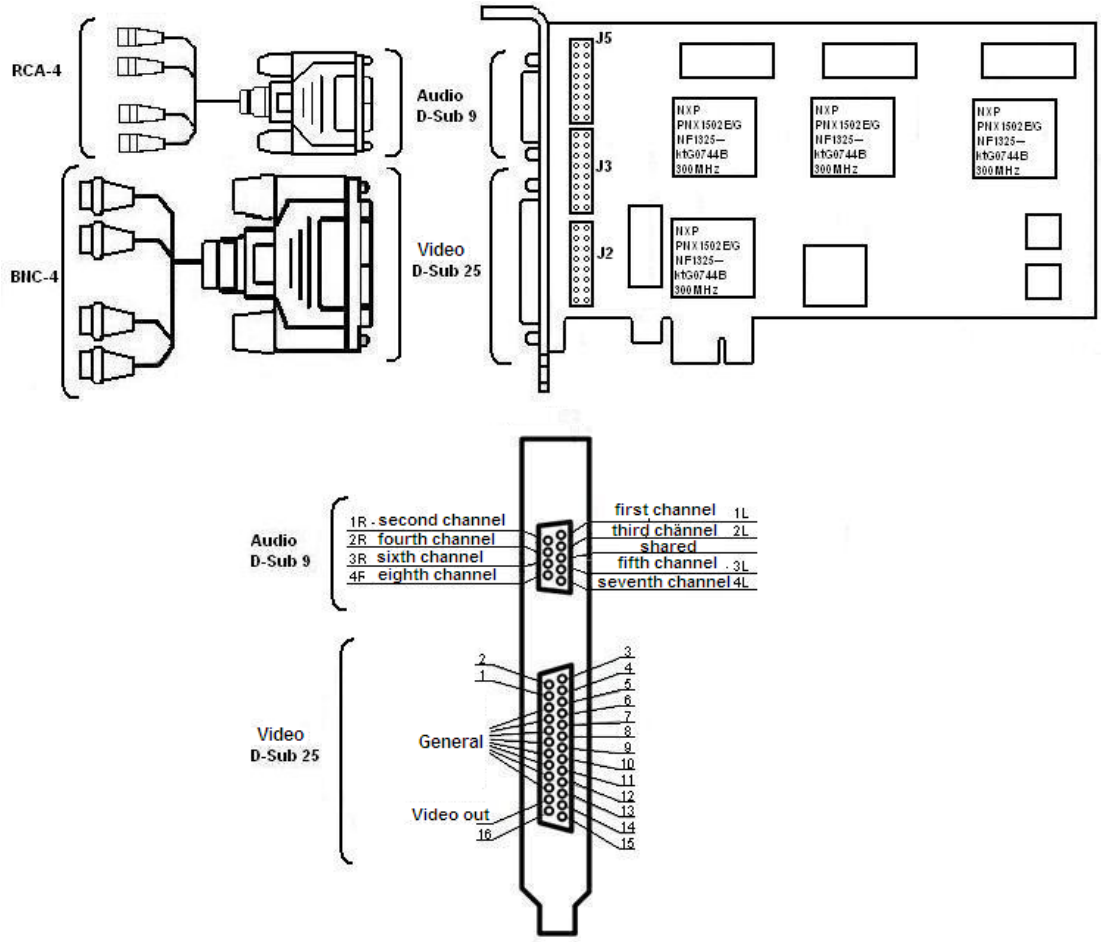



Figure 9.7—1 WS-17 video capture card pins

## 9.8 WS216 video capture card pins

WS216 video capture card has two external DVI-I pins (Figure 9.8—1). Video and audio connection is performed with the help of DVI-I/BNC and DVI-I/RCA stubs correspondingly. Simultaneous connection of up to 8 cameras and up to 8 sound sources to one external pin of WS216 video capture card is possible. The Watchdog cable is connected to the J1 pin. DI/DO card is connected to the J2 pin.

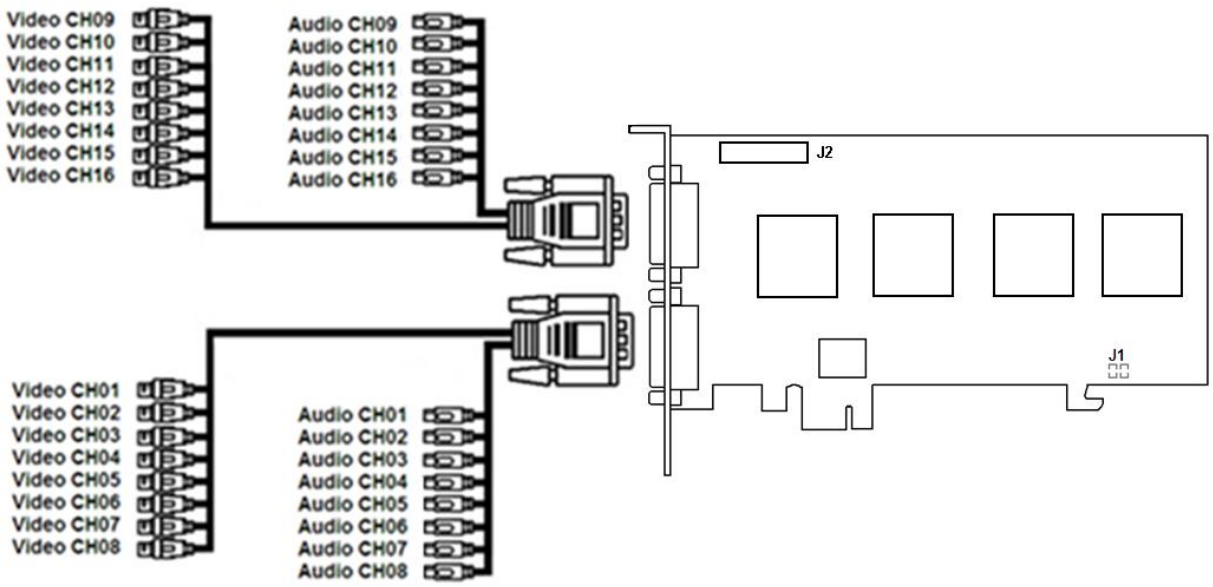



Figure 9.8—1 WS216 video capture card pins

## 9.9 FS15 video capture card pins

FS15 video capture card has five external pins– one TRS (3,5 mm, *mini-jack*) pin and four BNC pins (Figure 9.9—1). Cameras are connected via BNC pin. Simultaneous connection of up to 4 cameras is possible. Sound is connected via TRS pin. The Watchdog cable is connected to the J1 pin.

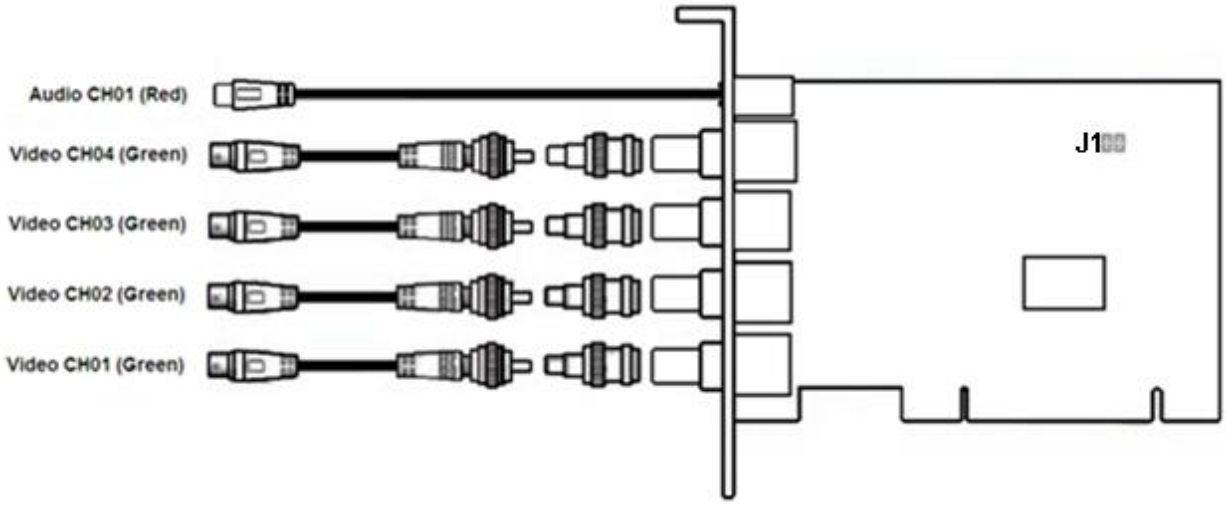



Figure 9.9—1 FS15 video capture card pins

## 9.10 FX8 video capture card pins

FX8 video capture card has two external DVI-I (24+5) pins (Figure 9.10—1). Video and audio connection is performed with the help of DVI-I/BNC and DVI-I/RCA stubs correspondingly. Simultaneous connection of up to 8 cameras and up to 4 sound sources to one external pin of FX8 video capture card is possible. The Watchdog cable is connected to the J1 pin. DI/DO card (low profile) is connected to the J2 pin.

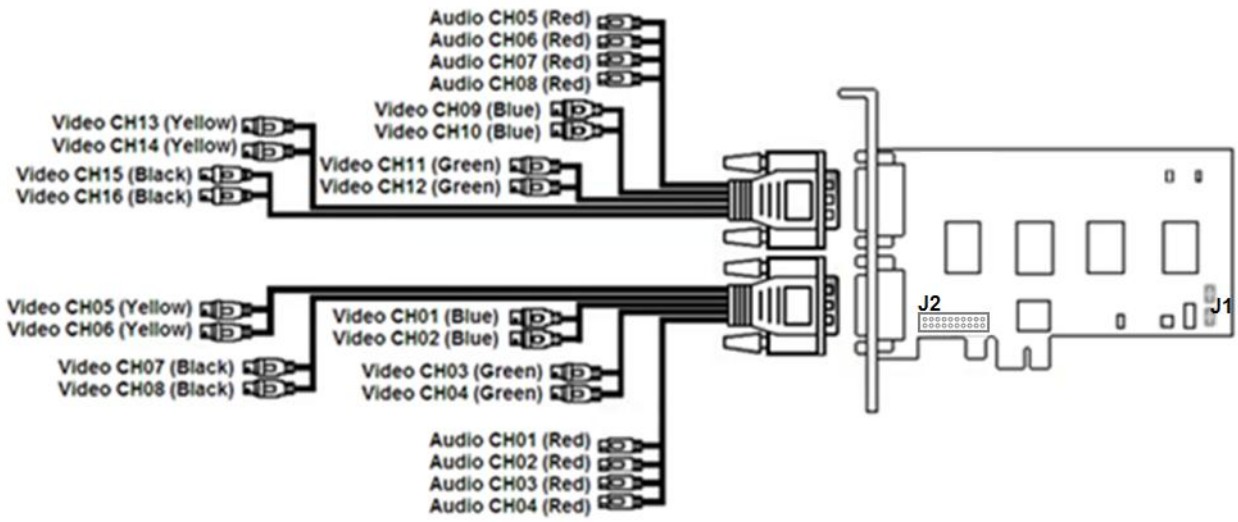



Figure 9.10—1 FX8 video capture card pins

## 9.11 FX4 video capture card pins

FX4 video capture card has one external DVI-I (24+5) pin (Figure 9.11—1). Video and audio connection is performed with the help of DVI-I/BNC and DVI-I/RCA stubs correspondingly. Simultaneous connection of up to 16 cameras and up to 4 sound sources to one external pin of FX4 video capture card is possible. The Watchdog cable is connected to the J1 pin. DI/DO card (low profile) is connected to the J2 pin.

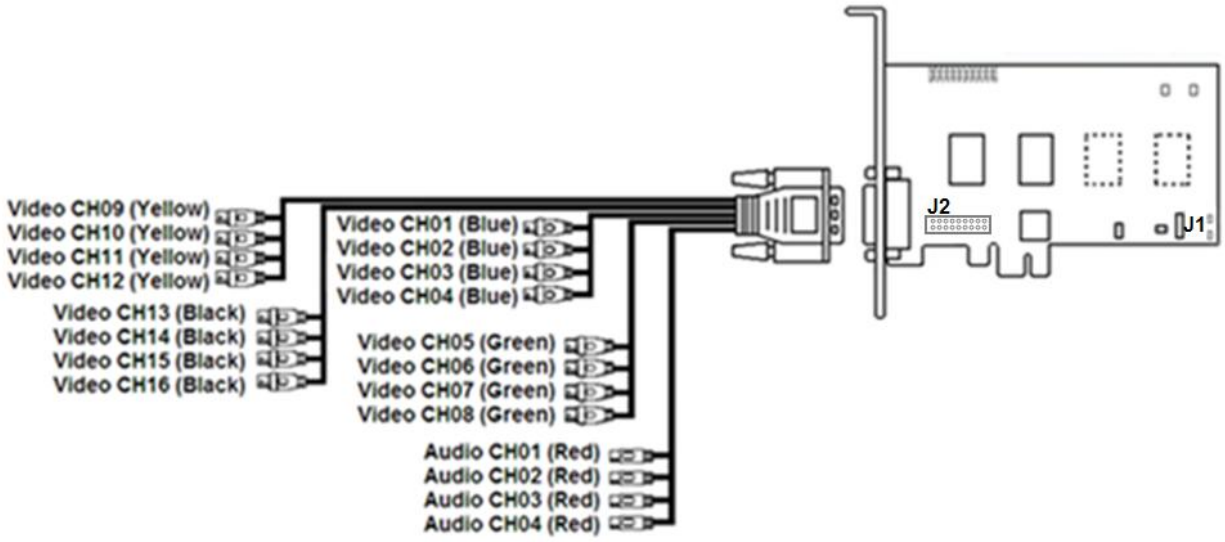



Figure 9.11—1 FX4 video capture card pins

## 9.12 FX16 video capture card pins

FX16 video capture card has two external DVI-I (24 + 5) pins (Figure 9.12—1). Video and audio connection is performed with the help of DVI-I/BNC and DVI-I/RCA stubs correspondingly. Simultaneous connection of up to 8 cameras and up to 8 sound sources to one external pin of FX16 video capture card is possible. The Watchdog cable is connected to the J1 pin. DI/DO card (low profile) is connected to the J2 pin.

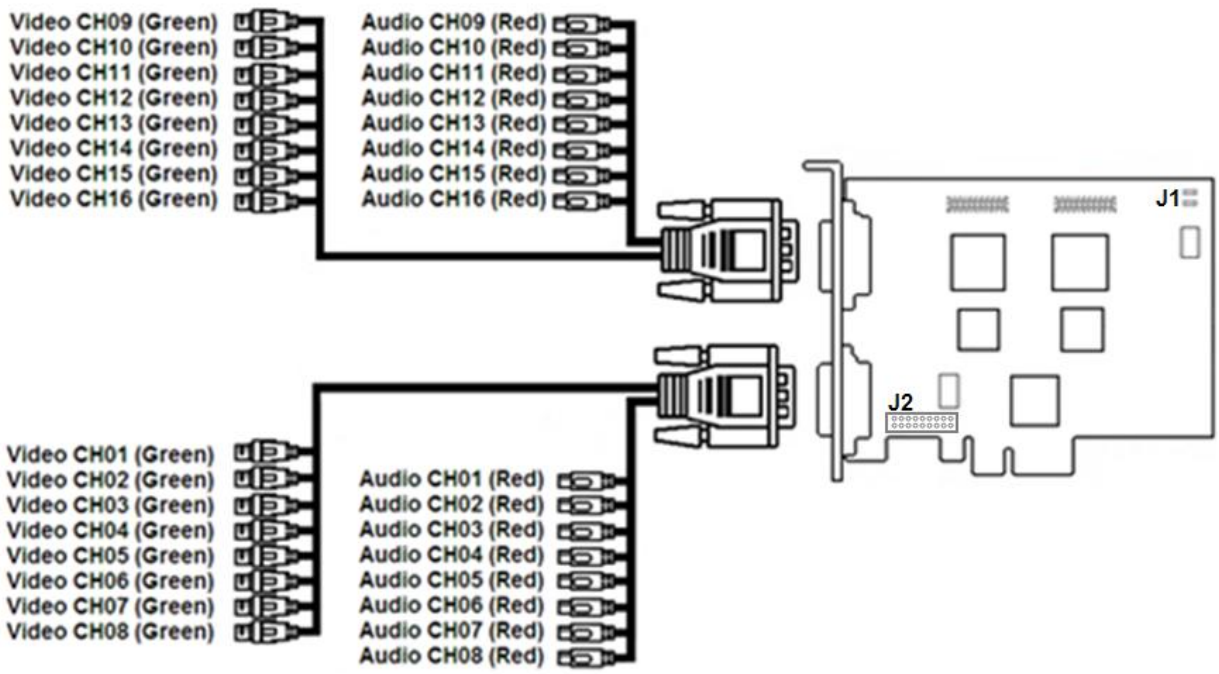



Figure 9.12—1 FX16 video capture card pins

## 9.13 FS115 video capture card pins

FS115 video capture card has one external DVI-I pin (Figure 9.13—1). Video and audio connection is performed with the help of DVI-I/BNC and DVI-I/RCA stubs correspondingly. Simultaneous connection of up to 4 cameras and 1 sound source to one external pin of FS115 video capture card is possible. The Watchdog cable is connected to the J1 pin. DI/DO card (low profile) is connected to the J2 pin.

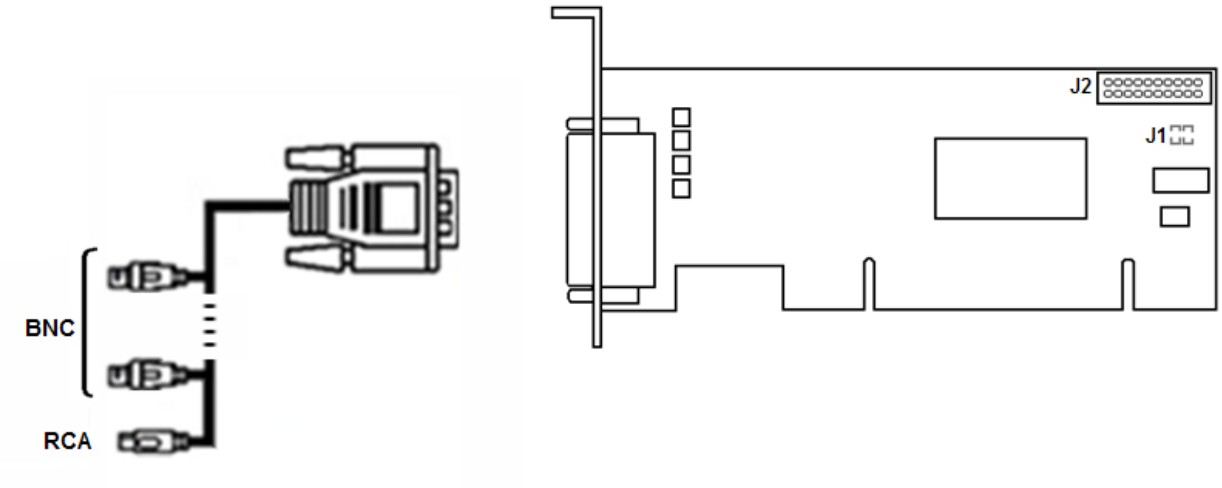



Figure 9.13—1 FS115 video capture card pins

## 9.14 FX116 video capture card pins

FX116 video capture card has two external pins - D-SUB 25 and D-SUB 26 (Figure 9.14—1). Simultaneous connection of up to 8 cameras and 16 sound sources to external pins of FX116 video capture card is possible. Video connection is performed with the help of D-SUB-25/BNC stub and audio connection is performed with the help of D-SUB-26/RCA stub.

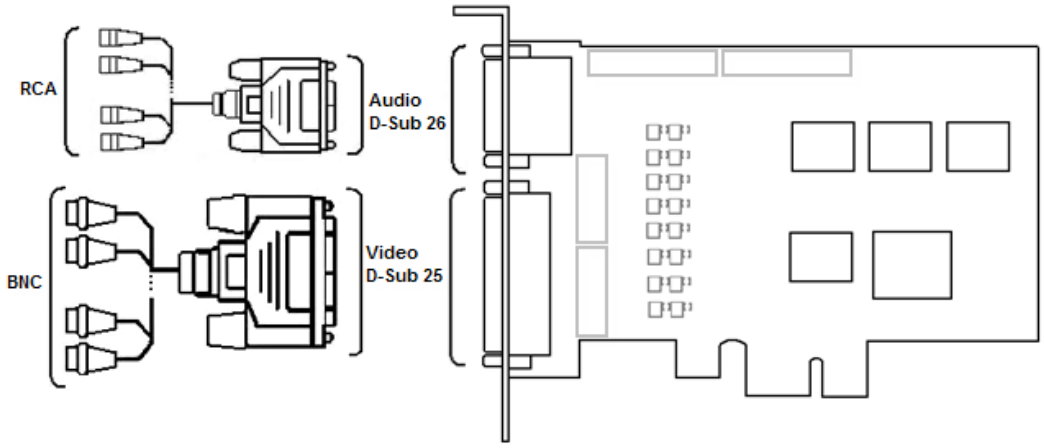



Figure 9.14—1 FX116 video capture card pins

## 9.15 FX416 video capture card pins

FX416 video capture card has two external pins - D-SUB 25 and D-SUB 26 (Figure 9.15—1). Simultaneous connection of up to 16 cameras and 16 sound sources to external pins of FX416 video capture card is possible. Video connection is performed with the help of D-SUB 25/BNC stub and audio connection is performed with the help of D-SUB 26/RCA stub.

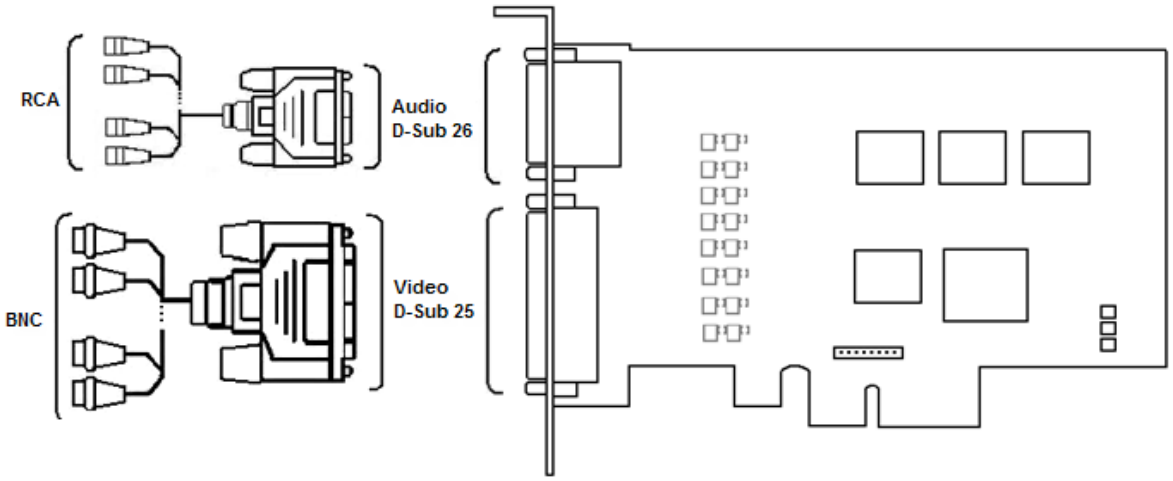



Figure 9.15—1 FX416 video capture card pins

## 9.16 VRC6004 video capture card pins

VRC6004 video capture card has four external BNC pins (Figure 9.16—1). Cameras are connected with the help of BNC pin. Simultaneous connection of up to 4 cameras is possible. DI/DO card is connected to the J1 pin.

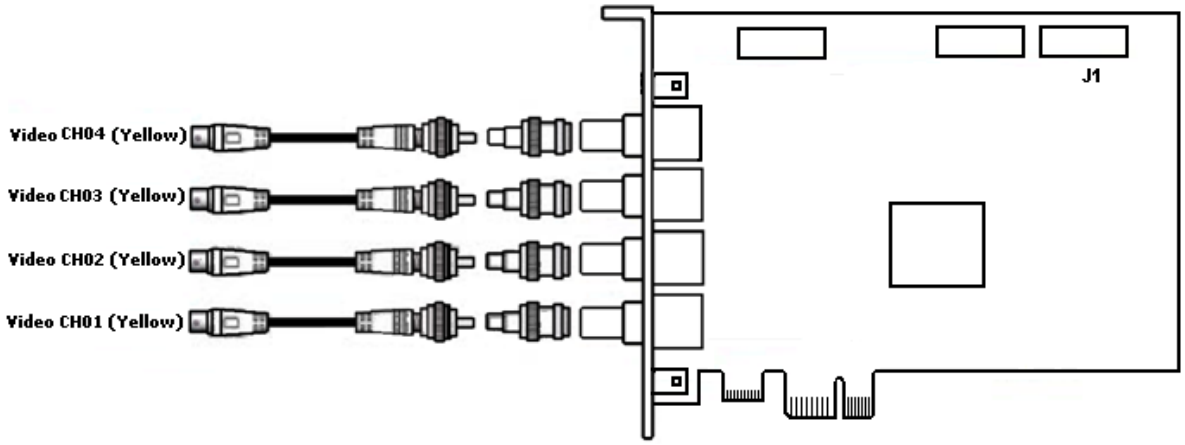



Figure 9.16—1 VRC6004 video capture card pins

## 9.17 VRC6008 video capture card pins

VRC6008 video capture card has two external D-SUB-15 pins (Figure 9.17—1). D-SUB-15/BNC interface cable is used for simultaneous connection of up to 8 cameras and 8 audio channels to the external D-SUB-15 pin of VRC6008 video capture card. DI/DO card is connected to the J2 pin. Pin J1 corresponds to analog video out.

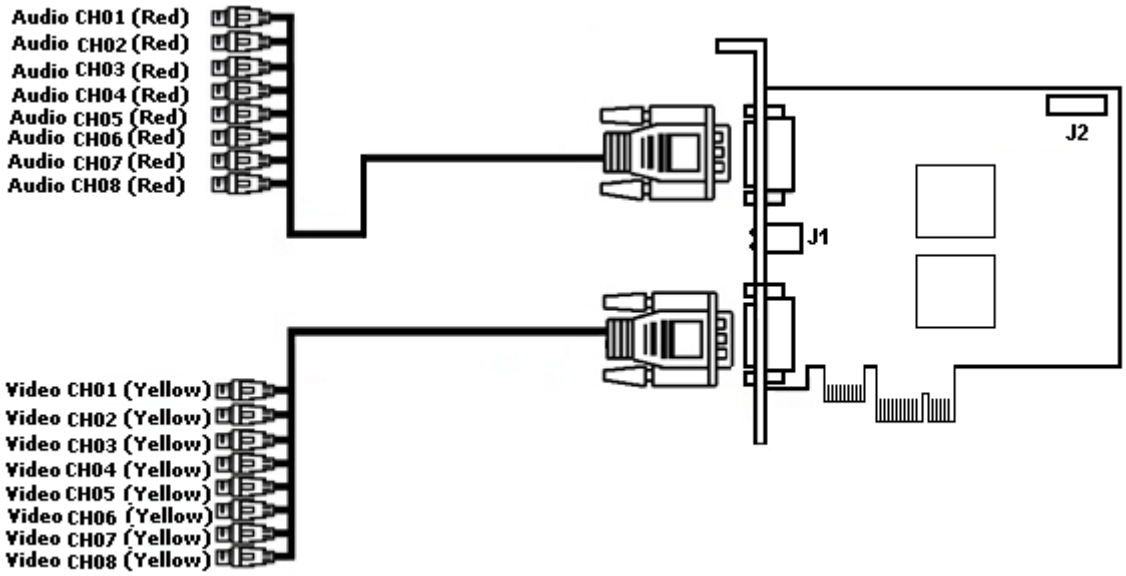



Figure 9.17—1 VRC6008 video capture card pins

## 9.18 VRC6416 video capture card pins

VRC6416 video capture card has two external DVI pins (Figure 9.18—1). DVI /BNC interface cable is used for simultaneous connection of up to 16 cameras and 16 sound sources to external DVI pins of VRC6416 video capture card. DI/DO card is connected to the J1 pin.

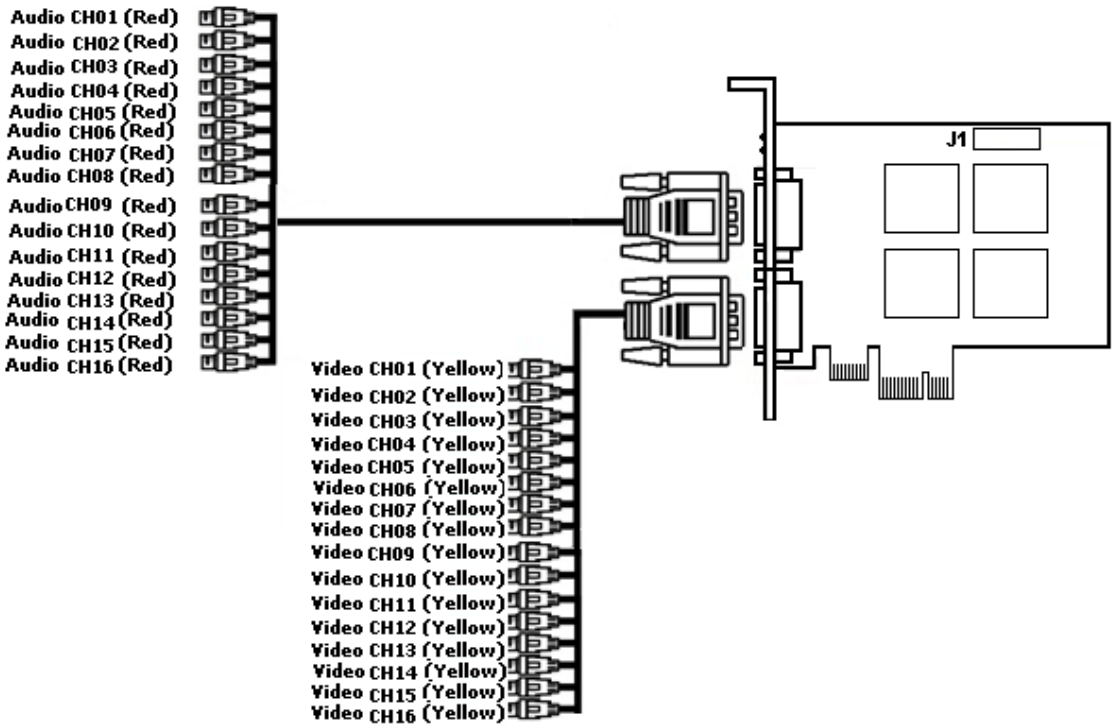



Figure 9.18—1 VRC6416 video capture card pins

## 9.19 VRC7008L video capture card pins

VRC7008L video capture card has a DVI pin (Figure 9.19—1). DVI /BNC interface cable is used for simultaneous connection of up to 8 cameras and 8 sound sources to external DVI pin of VRC7008L video capture card. DI/DO card is connected to the J1 pin. J2 pin corresponds to analog video out.

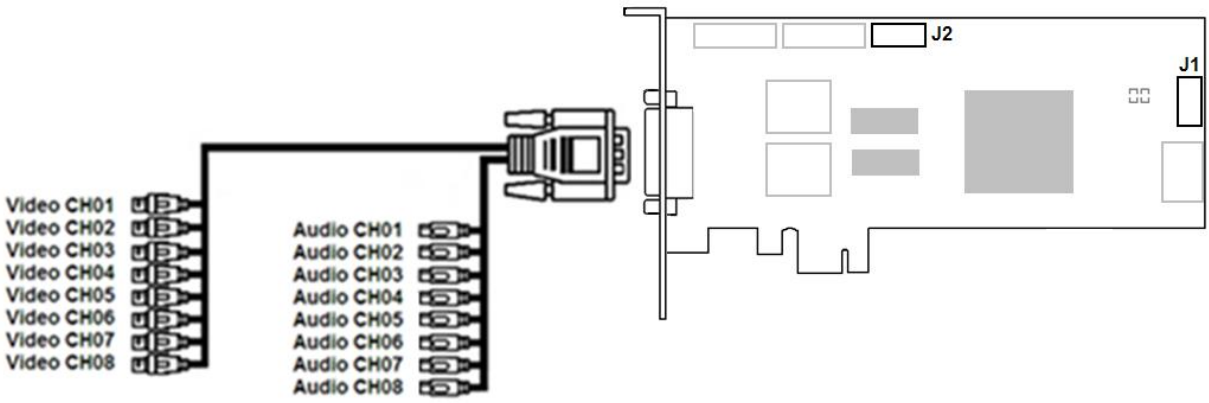



Figure 9.19—1 VRC7008L video capture card pins

## 9.20 VRC6404 HD video capture card pins

VRC6404 HD video capture card has BNC pins through which cameras are connected. Up to 4 cameras can be connected. There is the 15-pin SATA (J4) power socket. D2 pin is used to connect DI/DO card.

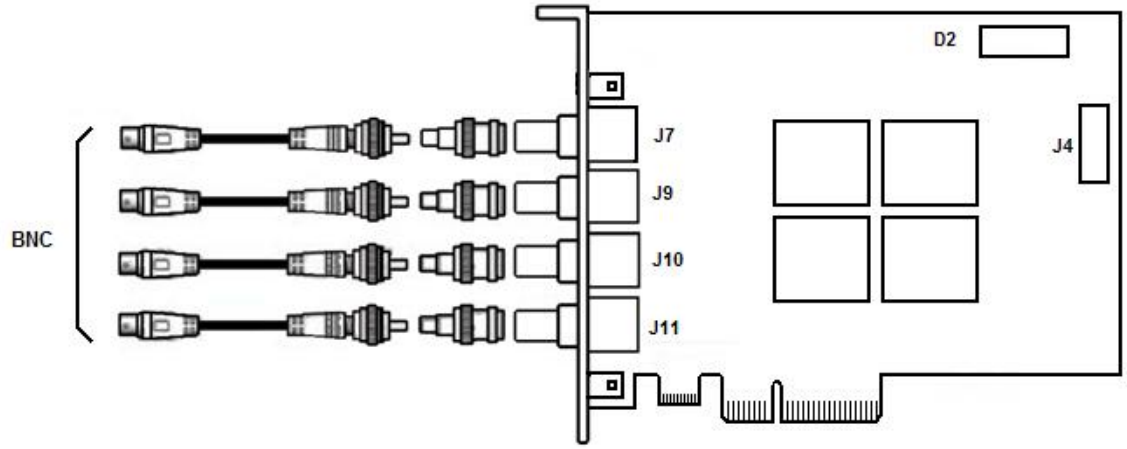



Figure 9.20—1 VRC6404 HD video capture card pins

## 9.21 FX HD4 video capture card pins

FX HD4 video capture card has 4 external HDMI pins (Figure 9.21—1) to connect video and audio devices. The Watchdog cable is connected to the J1 pin.

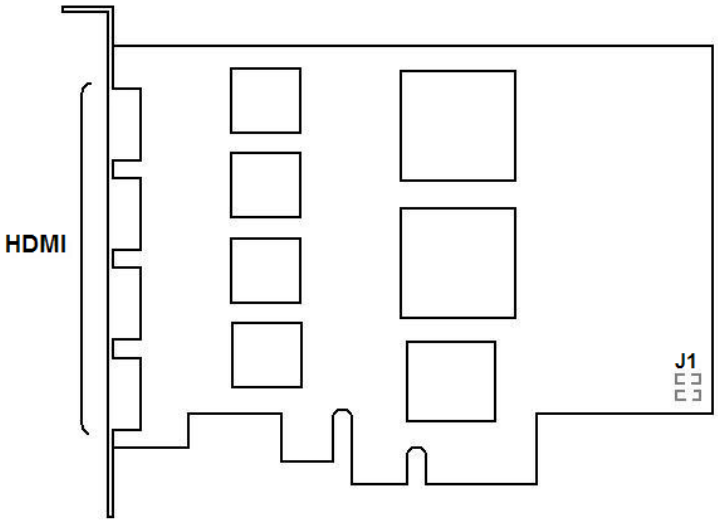



Figure 9.21—1 FX HD4 video capture card pins

## 9.22 DS-4016HCI(R) video capture card pins

DS-4016HCI(R) video capture card has two external DB-15pins to connect 16 video channels and 4 audio channels. The DB15-male to BNC cable is to connect cameras and sound. Extra 12 audio channels (5 - 16) are connected to J21 pin. J1 and J2 pins are to connect audio outputs via the CD_IN-interface.

*Note. At the time of writing this manual audio is not integrated into Intellect software.*

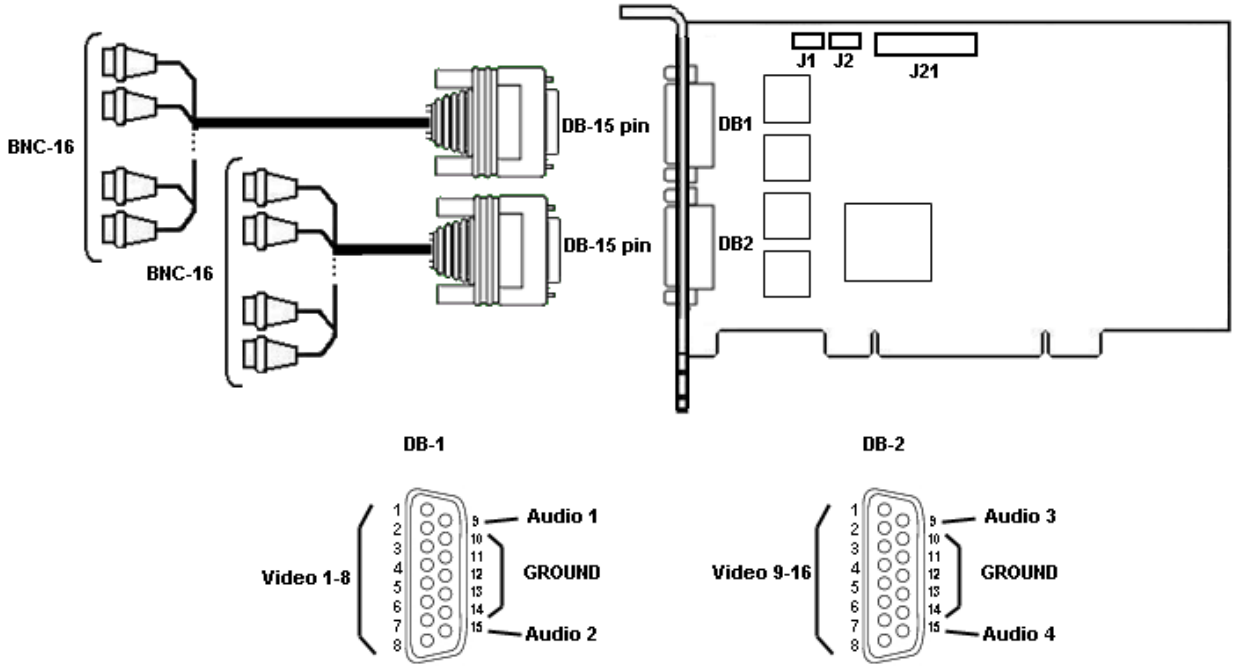



Figure 9.22—1 DS-4016HCI(R) video capture card pins

# 10 Appendix 6. Electrical and technical specifications of DI/DO cards

## 10.1 Electrical and technical specifications of DI/DO cards

DI/DO cards are multichannel digital-analogue converters and transmitters of up to 4 control signals to executive devices (relays) that are to be used in video surveillance systems installed with FS-5, FS-6, FS-16 and FS-8 video capture cards.

While working with DI/DO cards it is necessary to take into account the following electrical specifications:

1. Current state of a sensor.

Depending on the value of resistance between input contacts on the line, the current state of a sensor can be:

1.1 close(below 3 kiloohms);
1.2 open (over 10 kiloohms);
1.3 undefined (from 3 to 10 kiloohms).

*Note. Undefined state may be determined by the system as close or open.*

2. State of a relay at the output.

State of a relay at the output should be «Open» for DI/DO card. The following conditions are to be met:

2.1 maximum current through the open collector– 150 milliamperes;
2.2 resistanse – 24 volts;
2.3 minimal resistanse of connected relay– 160 ohms.

Technical specifications of DI/DO cards should be beared in mind while connecting the sensors (Table 10.1—1).

**Table 10.1—1 Technical specifications of DI/DO cards**

| Parameter | 4/4 DI/DO cards | 16/4 DI/DO cards |
|---|---|---|
| Guard loops (sensors) | 4 | 16 |
| Breakdown voltage | 1000 V up to 1 minute | 1000 V up to 1 minute |
| Control output (relays) | 4 | 4 |
| Open collector (interface) | 24, 30 ma | 24, 30 ma |

## 10.2 Electrical and technical specifications of 4/4 DI/DO (low profile) cards

4/4 DI/DO (low profile) card is to be used in video surveillance systems installed with FS115/FX4/FX8/FX16 video capture cards.

Electrical and technical specifications of 4/4 DI/DO (low profile) cards are given in Table 10.2—1.

**Table 10.2—1 Electrical and technical specifications of 4/4 DI/DO (low profile) card**

| Parameter | DI (sensor) | DO (relay) |
|---|---|---|

| Parameter | DI (sensor) | | DO (relay) |
|---|---|---|---|
| Number of guard loops | 4 | | 4 |
| Triggering time | 0.1 ms | | OFF -> ON: 3.0 ms<br>ON -> OFF: 2.5 ms |
| Maximum value of current strength and voltage | | | direct current: 2 A/24 V<br>alternating current: 1 A/120 V |
| Triggering level | Up to 5 V | Up to 12 V | |
| | 2.5 V – OFF<br>2.1 V – ON | 4.5 V –OFF<br>2.1 V – ON | |

## 10.3 Electrical and technical specifications of MO USBIO 4x4 devices

Power is supplied to MO USBIO 4x4 device via the USB. Maximum permissible current consumed by the device is not more than 500 ma.

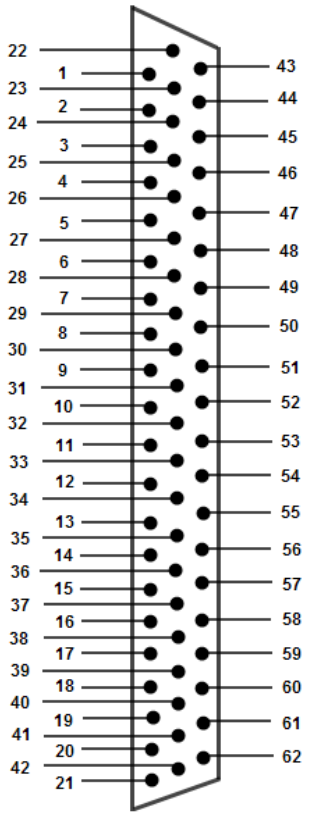
The MO USBIO 4x4 device has a galvanic isolation of DI/DO circuits (sensors and relays) against the USB (breakdown voltage is 1000 V up to 1 minute). Electrical and technical specifications of MO USBIO 4x4 device are given in Table 10.3—1.

Table 10.3—1 Electrical and technical specifications of MO USBIO 4x4 device

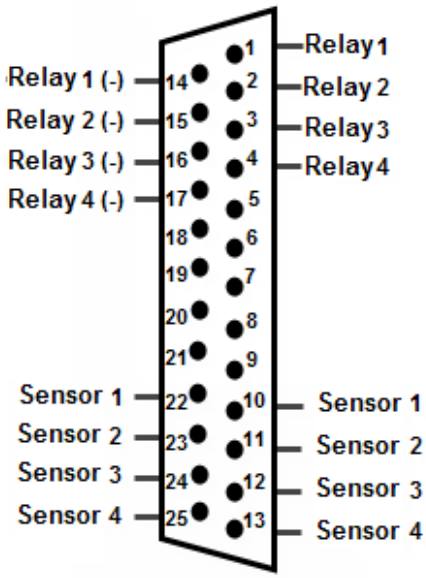
| Parameter | Relay (output circuit) | Sensor (input circuit) |
|---|---|---|
| Number of loops | 4 | 4 |
| Maximum permissible current | 400 ma<br>(in any direction) | 50 ma<br>(in any direction) |
| Ampere rating | - | 8 ma (in any direction) |
| Voltage rating | - | 24 V<br>(in any direction) |
| Maximum permissible voltage | 60 V (in any direction) | - |
| Embedded power supply | - | 24 V |

## 10.4 Electrical and technical specifications of SL USBIO («4x4», «16x8», «24x4») card

Pinout of an external pin of the SL USBIO card is given in Figure 10.4—1.




Pinout of an external pin of SL USBIO 16x8 and USBIO 24x4 cards




Pinout of an external pin of SL USBIO 4x4 card

Figure 10.4—1 Pinout of an external pin of SL USBIO card

Description of channels of SL USBIO 16x8 and SL USBIO 24x4 cards is given in Table 10.4—1.

Table 10.4—1 Pinout of an external pin of SL USBIO 16x8 and SL USBIO 24x4 cards

| USBIO 16x8 | | | | USBIO 24x4 | | | |
|---|---|---|---|---|---|---|---|
| Contact | Application | Contact | Application | Contact | Application | Contact | Application |
| 1 | Sensor 1 | 32 | Sensor 14 | 1 | Sensor 1 | 32 | Sensor 14 |
| 2 | Sensor 1 | 33 | Sensor 14 | 2 | Sensor 1 | 33 | Sensor 14 |
| 3 | Sensor 2 | 34 | Sensor 15 | 3 | Sensor 2 | 34 | Sensor 15 |
| 4 | Sensor 2 | 35 | Sensor 15 | 4 | Sensor 2 | 35 | Sensor 15 |
| 5 | Sensor 3 | 36 | Sensor 16 | 5 | Sensor 3 | 36 | Sensor 16 |
| 6 | Sensor 3 | 37 | Sensor 16 | 6 | Sensor 3 | 37 | Sensor 16 |
| 7 | Sensor 4 | 38 | Not used | 7 | Sensor 4 | 38 | Not used |
| 8 | Sensor 4 | 39 | Not used | 8 | Sensor 4 | 39 | Not used |
| 9 | Sensor 5 | 40 | Not used | 9 | Sensor 5 | 40 | Not used |
| 10 | Sensor 5 | 41 | Relay 3 (+) | 10 | Sensor 5 | 41 | Relay 3 (+) |
| 11 | Sensor 6 | 42 | Relay 3 (–) | 11 | Sensor 6 | 42 | Relay 3 (–) |
| 12 | Sensor 6 | 43 | Not used | 12 | Sensor 6 | 43 | Sensor 17 |
| 13 | Sensor 7 | 44 | Not used | 13 | Sensor 7 | 44 | Sensor 17 |
| 14 | Sensor 7 | 45 | Not used | 14 | Sensor 7 | 45 | Sensor 18 |
| 15 | Sensor 8 | 46 | Not used | 15 | Sensor 8 | 46 | Sensor 18 |
| 16 | Sensor 8 | 47 | Not used | 16 | Sensor 8 | 47 | Sensor 19 |
| 17 | Not used | 48 | Not used | 17 | Not used | 48 | Sensor 19 |
| 18 | Relay 1 (+) | 49 | Not used | 18 | Relay 1 (+) | 49 | Sensor 20 |
| 19 | Relay 1 (–) | 50 | Not used | 19 | Relay 1 (–) | 50 | Sensor 20 |
| 20 | Relay 2 (+) | 51 | Relay 5 (+) | 20 | Relay 2 (+) | 51 | Sensor 21 |
| 21 | Relay 2 (–) | 52 | Relay 5 (-) | 21 | Relay 2 (–) | 52 | Sensor 21 |
| 22 | Sensor 9 | 53 | Relay 6 (+) | 22 | Sensor 9 | 53 | Sensor 22 |
| 23 | Sensor 9 | 54 | Relay 6 (-) | 23 | Sensor 9 | 54 | Sensor 22 |

| USBIO 16x8 | | | | USBIO 24x4 | | | |
|---|---|---|---|---|---|---|---|
| **Contact** | **Application** | **Contact** | **Application** | **Contact** | **Application** | **Contact** | **Application** |
| 24 | Sensor 10 | 55 | Relay 7 (+) | 24 | Sensor 10 | 55 | Sensor 23 |
| 25 | Sensor 10 | 56 | Relay 7 (-) | 25 | Sensor 10 | 56 | Sensor 23 |
| 26 | Sensor 11 | 57 | Relay 8 (+) | 26 | Sensor 11 | 57 | Sensor 24 |
| 27 | Sensor 11 | 58 | Relay 8 (-) | 27 | Sensor 11 | 58 | Sensor 24 |
| 28 | Sensor 12 | 59 | Not used | 28 | Sensor 12 | 59 | Not used |
| 29 | Sensor 12 | 60 | Not used | 29 | Sensor 12 | 60 | Not used |
| 30 | Sensor 13 | 61 | Relay 4 (+) | 30 | Sensor 13 | 61 | Relay 4 (+) |
| 31 | Sensor 13 | 62 | Relay 4 (–) | 31 | Sensor 13 | 62 | Relay 4 (–) |

Electrical and technical specifications of SL USBIO card are given in Table 10.4—2.

**Table 10.4—2 Electrical and technical specifications of SL USBIO card**

| **Parameter** | **Characteristic** |
|---|---|
| Polling interval for all alarm inputs | 250 ms for all contacts. Not configured. |
| Galvanic isolation of input/output | 1000 V |
| Interface connection to PC | USB 2.0 up to 5 m |
| Alarm contacts | ▪ Maximum current – 0.5 A<br>▪ Voltage – 100 V<br>▪ Power – 10 W |
| Relay contacts | ▪ Permissible voltage - up to 80 V<br>▪ Minimum triggering voltage - 1.0 V<br>▪ Minimum triggering current - 5 ma |
| Real-time clock for event logging | Yes |
| ROM | For 1000 alarm events |
| Power supply | Using USB port or PSU, voltage - 9-50 V, consumption - 500 ma |