

**AXIS Q21-TE Thermal Camera Series**  
**AXIS Q2101-TE Thermal Camera**

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## Installation

### Preview mode

Preview mode is ideal for installers when fine tuning the camera view during the installation. No login is required to access the camera view in preview mode. It is available only in factory defaulted state for a limited time from powering up the device.



To watch this video, go to the web version of this document.

*This video demonstrates how to use preview mode.*

## Get started

### Find the device on the network

To find Axis devices on the network and assign them IP addresses in Windows®, use AXIS IP Utility or AXIS Device Manager. Both applications are free and can be downloaded from [axis.com/support](http://axis.com/support).

For more information about how to find and assign IP addresses, go to *How to assign an IP address and access your device*.

### Browser support

You can use the device with the following browsers:

	Chrome™	Edge™	Firefox®	Safari®
Windows®	✓	✓	*	*
macOS®	✓	✓	*	*
Linux®	✓	✓	*	*
Other operating systems	*	*	*	*

✓: Recommended

\*: Supported with limitations

### Open the device's web interface

1. Open a browser and type the IP address or host name of the Axis device. If you don't know the IP address, use AXIS IP Utility or AXIS Device Manager to find the device on the network.
2. Type the username and password. If you access the device for the first time, you must create an administrator account. See *Create an administrator account, on page 5*.

For descriptions of all features and settings in the web interface of devices with AXIS OS, see *AXIS OS web interface help*.

### Create an administrator account

The first time you log in to your device, you must create an administrator account.

1. Enter a username.
2. Enter a password. See *Secure passwords, on page 6*.
3. Re-enter the password.
4. Accept the license agreement.
5. Click **Add account**.

#### Important

The device has no default account. If you lose the password for your administrator account, you must reset the device. See *Reset to factory default settings, on page 29*.

## Secure passwords

### Important

Use HTTPS (which is enabled by default) to set your password or other sensitive configurations over the network. HTTPS enables secure and encrypted network connections, thereby protecting sensitive data, such as passwords.

The device password is the primary protection for your data and services. Axis devices do not impose a password policy as they may be used in various types of installations.

To protect your data we strongly recommend that you:

- Use a password with at least 8 characters, preferably created by a password generator.
- Don't expose the password.
- Change the password at a recurring interval, at least once a year.

## Make sure that no one has tampered with the device software

To make sure that the device has its original AXIS OS, or to take full control of the device after a security attack:

1. Reset to factory default settings. See *Reset to factory default settings, on page 29*.  
After the reset, secure boot guarantees the state of the device.
2. Configure and install the device.

## Web interface overview

This video gives you an overview of the device's web interface.



*Axis device web interface*

## Configure your device

### Basic settings

Set the power line frequency

1. Go to **Video > Installation > Power line frequency**.
2. Select a power line frequency and click **Save and restart**.

Set the orientation

1. Go to **Video > Installation > Rotate**.
2. Select **0**, **90**, **180** or **270** degrees.  
See also *Monitor long and narrow areas, on page 7*.

### Adjust the image

This section includes instructions about configuring your device. If you want to learn more about how certain features work, go to *Learn more, on page 16*.

### Stabilize a shaky image with image stabilization

Image stabilization is suitable in environments where the product is mounted in an exposed location where vibrations can occur, for example, due to wind or passing traffic.

The feature makes the image smoother, steadier, and less blurry. It also reduces the file size of the compressed image and lowers the bitrate of the video stream.

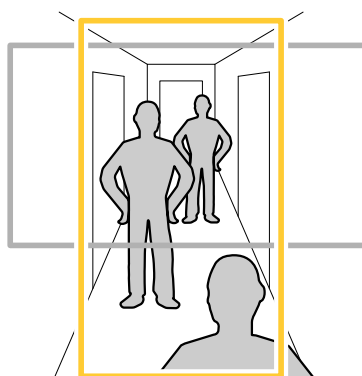
#### Note

When you turn on image stabilization, the image is slightly cropped, which lowers the maximum resolution.

1. Go to **Video > Installation > Image correction**.
2. Turn on **Image stabilization**.

### Monitor long and narrow areas


Use corridor format to better utilize the full field of view in a long and narrow area, for example a staircase, hallway, road, or tunnel.



1. Depending on your device, turn the camera or the 3-axis lens in the camera **90°** or **270°**.
2. If the device doesn't have automatic rotation of the view, go to **Video > Installation**.
3. Rotate the view **90°** or **270°**.


### Show an image overlay

You can add an image as an overlay in the video stream.

1. Go to **Video > Overlays**.
2. Click **Manage images**.
3. Upload or drag and drop an image.
4. Click **Upload**.
5. Select **Image** from the drop-down list and click .
6. Select the image and a position. You can also drag the overlay image in the live view to change the position.

### Show a text overlay

You can add a text field as an overlay in the video stream. This is useful for example when you want to display the date, time or a company name in the video stream.

1. Go to **Video > Overlays**.
2. Select **Text** and click .
3. Type the text you want to display, or select modifiers to show for example the current date.
4. Select a position. You can also click-and-drag the overlay in the live view to change the position.


### View and record video

This section includes instructions about configuring your device. To learn more about how streaming and storage works, go to *Streaming and storage*, on page 17.

### Reduce bandwidth and storage

#### Important

Reducing the bandwidth can lead to loss of detail in the image.

1. Go to **Video > Stream**.
2. Click  in the live view.
3. Select **Video format AV1** if your device supports it. Otherwise select **H.264**.
4. Go to **Video > Stream > General** and increase **Compression**.
5. Go to **Video > Stream > Zipstream** and do one or more of the following:

#### Note

The **Zipstream** settings are used for all video encodings except MJPEG.

- Select the **Zipstream Strength** that you want to use.
- Turn on **Optimize for storage**. This can only be used if the video management software supports B-frames.
- Turn on **Dynamic FPS**.
- Turn on **Dynamic GOP** and set a high **Upper limit GOP length** value.


#### Note

Most web browsers don't support H.265 decoding and because of this the device doesn't support it in its web interface. Instead you can use a video management system or application that supports H.265 decoding.

### Set up network storage

To store recordings on the network, you need to set up your network storage.

1. Go to **System > Storage**.

2. Click  **Add network storage** under **Network storage**.
3. Type the IP address of the host server.
4. Type the name of the shared location on the host server under **Network share**.
5. Type the username and password.
6. Select the SMB version or leave it on **Auto**.
7. Select **Add share without testing** if you experience temporary connection issues, or if the share is not yet configured.
8. Click **Add**.


## Record and watch video

### Record video directly from the camera


1. Go to **Video > Stream**.

2. To start a recording, click  .

If you haven't set up any storage, click  and . For instructions on how to set up network storage, see *Set up network storage, on page 8*

3. To stop recording, click  again.

### Watch video

1. Go to **Recordings**.
2. Click  for your recording in the list.

## Set up rules for events

You can create rules to make your device perform an action when certain events occur. A rule consists of conditions and actions. The conditions can be used to trigger the actions. For example, the device can start a recording or send an email when it detects motion, or show an overlay text while the device is recording.

To learn more, see *Get started with rules for events*.

### Activate strobe siren when a freezer gets warm

With the thermometry functionality, you can detect temperature changes in the monitored area. In this example, the camera monitors the temperature in a freezer. If the freezer gets too warm, the camera triggers an Axis strobe siren to alert staff on the premises.

This example explains how to:

- Set up a temperature detection area in the camera, that monitors if the temperature in the area's warmest part exceeds  $-18\text{ }^{\circ}\text{C}$  ( $0\text{ }^{\circ}\text{F}$ ) for more than 30 seconds.
- Create a rule in the camera, that starts the Axis strobe siren if the freezer gets too warm.

#### Before you start

- Create a new user with the role Operator or Administrator in the strobe siren.
- Create a profile called "Temperature alarm 15 sec" in the Axis strobe siren. Set the duration of the profile to 15 seconds.

#### Set up a temperature detection area in the camera

1. In the camera's web interface, go to **Thermometry > Temperature detection** and add an area.
2. In **Name**, type *High temp*.
3. Turn on **Use area**.

4. In **Temperature in the area**, select **Warmest spot**.
5. Select **Above** and type **-18 (0)** in the temperature input field, and **30 seconds** in the delay input field.

#### Create a recipient in the camera

1. In the camera's web interface, go to **System > Events > Recipients** and add a recipient.
2. Enter the following information:
  - **Name:** Strobe siren
  - **Type:** HTTP
  - **URL:** `http://<IPaddress>/axis-cgi/siren_and_light.cgi`  
Replace `<IPaddress>` with the address of the strobe siren.
  - The username and password of the newly created strobe siren user.
3. Click **Test** to make sure all data is valid.
4. Click **Save**.

#### Create a rule in the camera to start the strobe siren profile

1. Go to **Rules** and add a rule.
2. Enter the following information:
  - **Name:** Start temperature alarm
  - **Condition:** **Video > Temperature detection**
  - **Action:** **Notifications > Send notification through HTTP**
  - **Recipient:** Strobe siren
  - **Method:** POST
  - **Body:**

```
{
  "apiVersion": "1.0",
  "method": "start",
  "params": {
    "profile" : "Temperature alarm 15 sec"
  }
}
```
3. Click **Save**.

#### Detect tampering with input signal

This example explains how to send an email when the input signal is cut or short-circuited. For more information about the I/O connector, see *page 23*.

1. Go to **System > Accessories > I/O ports** and turn on **Supervised** for the relevant port.

#### Add an email recipient:

1. Go to **System > Events > Recipients** and add a recipient.
2. Type a name for the recipient.
3. Select **Email** as the notification type.
4. Type the recipient's email address.
5. Type the email address that you want the camera to send notifications from.
6. Provide the login details for the sending email account, along with the SMTP hostname and port number.
7. To test your email setup, click **Test**.
8. Click **Save**.

**Create a rule:**

1. Go to **System > Events > Rules** and add a rule.
2. Type a name for the rule.
3. In the list of conditions, under **I/O**, select **Supervised input tampering is active**.
4. Select the relevant port.
5. In the list of actions, under **Notifications**, select **Send notification to email** and then select the recipient from the list.
6. Type a subject line and message for the email.
7. Click **Save**.

**Send an email automatically if someone spray paints the lens**

Activate the tampering detection:

1. Go to **System > Detectors > Camera tampering**.
2. Set a value for **Trigger delay**. The value indicates the time that must pass before an email is sent.

Add an email recipient:

3. Go to **System > Events > Recipients** and add a recipient.
4. Type a name for the recipient.
5. Select **Email**.
6. Type an email address to send the email to.
7. The camera doesn't have its own email server, so it has to log into another email server to send mails. Fill in the rest of the information according to your email provider.
8. To send a test email, click **Test**.
9. Click **Save**.

Create a rule:

10. Go to **System > Events > Rules** and add a rule.
11. Type a name for the rule.
12. In the list of conditions, under **Video**, select **Tampering**.
13. In the list of actions, under **Notifications**, select **Send notification to email** and then select the recipient from the list.
14. Type a subject and a message for the email.
15. Click **Save**.

**Detect a smoldering fire**

With the thermometry functionality, you can detect temperature changes in the monitored area. The early fire detection app filters uninteresting moving objects, to minimize false alarms.

In this example, the camera monitors the temperature in a pile of debris. The app filters work vehicles that move in the detection area. If the pile itself becomes so hot that a fire might start, the camera shows an overlay.

This example explains how to:

- Set up a temperature detection area that monitors if the temperature in the area's warmest part exceeds 50° C (122° F).
- Turn on overlay if the temperature exceeds the preset threshold.

**Set up the Palette**

1. Go to **Thermometry > Temperature reading**.

**Note**

For optimal performance, do not select any option that starts with Iso under **Palette**. You can select other ones but we recommend **White-hot**.

2. In the list under **Palette**, select **White-hot**.

**Start Early fire detection app**

1. Go to **Apps** and turn on **Early fire detection**.

**Set up a temperature detection area**

1. Go to **Thermometry > Temperature detection** and add an area.
2. In **Name**, type **Pile**.
3. Turn on **Use area**.
4. In **Temperature in the area**, select **Warmest spot**.
5. Select **Above** and type **50 (122)** in the temperature input field.

**Turn on Overlays**

1. Go to **Apps > Early Fire Detection** and click **Open**.
2. Move the slider under **Overlays > Include** to turn on overlay for the detection areas.

**Trigger a notification when the enclosure is opened**

This example explains how to set up an email notification when the housing or casing of the device is opened.

**Add an email recipient:**

1. Go to **System > Events > Recipients** and click **Add recipient**.
2. Type a name for the recipient.
3. Select **Email** as the notification type.
4. Type the recipient's email address.
5. Type the email address that you want the camera to send notifications from.
6. Provide the login details for the sending email account, along with the SMTP hostname and port number.
7. To test your email setup, click **Test**.
8. Click **Save**.

**Create a rule:**

9. Go to **System > Events > Rules** and click **Add a rule**.
10. Type a name for the rule.
11. In the list of conditions, select **Casing open**.
12. In the list of actions, select **Send notification to email**.
13. Select a recipient from the list.
14. Type a subject line and message for the email.
15. Click **Save**.



**Adjust the camera view (PTZ)**

**Create a thermometric guard tour**

If you install the camera on a positioning unit, you can point the camera in different directions. With a guard tour you can automatically move between different preset positions.

This example explains how to create a guard tour to monitor the temperature in different preset positions.

## Prerequisites

- Install the camera on a positioning unit, to enable pan and tilt functionality.
  - Select a driver in **System > Accessories > PTZ**.
1. Go to **PTZ > Preset positions**.
  2. To create a new preset position, click  under **Preset positions**.
  3. Go to **PTZ > Guard tours**.
  4. To create a guard tour click  under **Guard tours**.
  5. To edit the guard tour's settings, adjust the parameters in the **Settings** tab.
  6. To add preset positions to the guard tour, go to the **Preset positions** tab and drag the preset position into the **View order** area.
  7. When you have done the setup of the guard tour, click **Done**.
  8. Go to **Thermometry > Temperature detection**.
  9. Create temperature detection areas for each of the preset positions used in the guard tour:
    - 9.1. Select a preset position.
    - 9.2. Create one or more temperature detection areas.

To start the guard tour, click  in the live view.

To schedule the guard tour, go to **System > Events**.

## Audio

### Add audio to your recording

Turn on audio:

1. Go to **Video > Stream > Audio** and include audio.
2. If the device has more than one input source, select the correct one in **Source**.
3. Go to **Audio > Device settings** and turn on the correct input source.

Edit the stream profile that is used for the recording:

4. Go to **System > Stream profiles** and select the stream profile.
5. Select **Include audio** and turn it on.
6. Click **Save**.


### Connect to a network speaker

Network speaker pairing allows you to use a compatible Axis network speaker as if it is connected directly to the camera. Once paired, the speaker acts as an audio out device where you can play audio clips and transmit sound through the camera.

#### Important

For this feature to work with a video management software (VMS), you must first pair the camera with the network speaker, then add the camera to your VMS.

#### Pair camera with network speaker

1. Go to **System > Edge-to-edge > Pairing**.
2. Click  **Add** and select the pairing type **Audio** from the drop-down list.
3. Select **Speaker pairing**.

4. Type the network speaker's IP address, username and password.
5. Click **Connect**. A confirmation message appears.

## The web interface

To read about all the features and settings available in the web interface of devices with AXIS OS, go to *AXIS OS web interface help*.

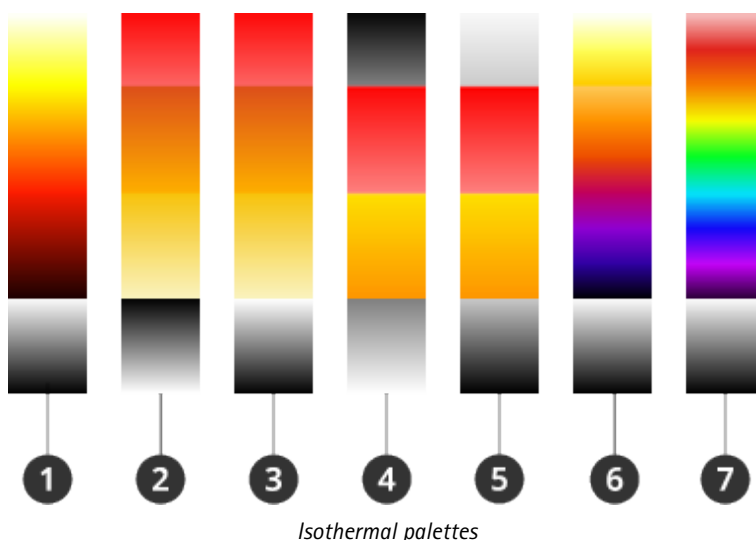
## Learn more

### Color palettes

To help the human eye distinguish details in a thermal image, you can apply a color palette to the image. The colors in the palette are artificially created pseudocolors that emphasize temperature differences.

There are two types of palettes:

- Thermal palettes: the colors in these palettes don't correspond to specific temperatures in the image. If an operator watches the video stream, you can choose any of the palettes. If the video stream is only used by applications, select the white-hot palette.
- Isothermal palettes: the colors in these palettes correspond to user-defined temperature levels. The colored part of the palette starts at the lowest temperature defined. This makes objects with a higher temperature stand out in the image. It's then easy for an operator to see what caused the alarm.



- 1 Iso-Axis-WH
- 2 Iso-Fire-BH
- 3 Iso-Fire-WH
- 4 Iso-MidRange-BH
- 5 Iso-MidRange-WH
- 6 Iso-Planck-WH
- 7 Iso-Rainbow-WH

You can read more in the white paper *Thermometric cameras*.

### Overlays

Overlays are superimposed over the video stream. They are used to provide extra information during recordings, such as a timestamp, or during product installation and configuration. You can add either text or an image.

The video streaming indicator is another type of overlay. It shows you that the live view video stream is live.

### Pan, tilt, and zoom (PTZ)

#### Guard tours

A guard tour displays the video stream from different preset positions either in a predetermined or random order, and for configurable periods of time. Once started, a guard tour continues to run until stopped, even when there are no clients (web browsers) viewing the images.

## Streaming and storage

### Video compression formats

Decide which compression method to use based on your viewing requirements, and on the properties of your network. The available options are:

#### Motion JPEG

##### Note

To ensure support for the Opus audio codec, the Motion JPEG stream is always sent over RTP.

Motion JPEG, or MJPEG, is a digital video sequence that is made up of a series of individual JPEG images. These images are then displayed and updated at a rate sufficient to create a stream that shows constantly updated motion. For the viewer to perceive motion video the rate must be at least 16 image frames per second. Full motion video is perceived at 30 (NTSC) or 25 (PAL) frames per second.

The Motion JPEG stream uses considerable amounts of bandwidth, but provides excellent image quality and access to every image contained in the stream.

#### H.264 or MPEG-4 Part 10/AVC

##### Note

H.264 is a licensed technology. The Axis product includes one H.264 viewing client license. To install additional unlicensed copies of the client is prohibited. To purchase additional licenses, contact your Axis reseller.

H.264 can, without compromising image quality, reduce the size of a digital video file by more than 80% compared to the Motion JPEG format and by as much as 50% compared to older MPEG formats. This means that less network bandwidth and storage space are required for a video file. Or seen another way, higher video quality can be achieved for a given bitrate.

#### H.265 or MPEG-H Part 2/HEVC

H.265 can, without compromising image quality, reduce the size of a digital video file by more than 25% compared to H.264.

##### Note

- H.265 is licensed technology. The Axis product includes one H.265 viewing client license. Installing additional unlicensed copies of the client is prohibited. To purchase additional licenses, contact your Axis reseller.
- Most web browsers don't support H.265 decoding and because of this the camera doesn't support it in its web interface. Instead you can use a video management system or application supporting H.265 decoding.

### How do Image, Stream, and Stream profile settings relate to each other?

The **Image** tab contains camera settings that affect all video streams from the product. If you change something in this tab, it immediately affects all video streams and recordings.

The **Stream** tab contains settings for video streams. You get these settings if you request a video stream from the product and don't specify for example resolution, or frame rate. When you change the settings in the **Stream** tab, it doesn't affect ongoing streams, but it will take effect when you start a new stream.

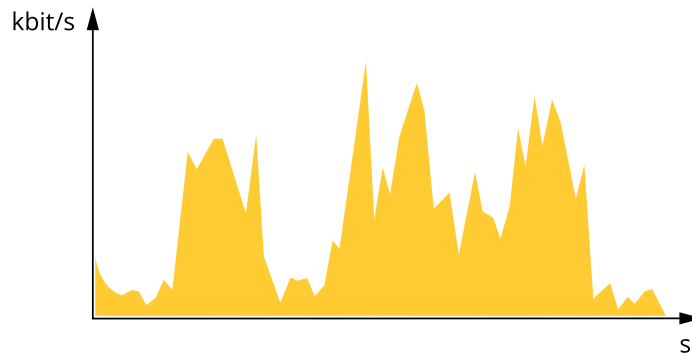
The **Stream profiles** settings override the settings from the **Stream** tab. If you request a stream with a specific stream profile, the stream contains the settings of that profile. If you request a stream without specifying a stream profile, or request a stream profile that doesn't exist in the product, the stream contains the settings from the **Stream** tab.

### Bitrate control

Bitrate control helps you to manage the bandwidth consumption of your video stream.

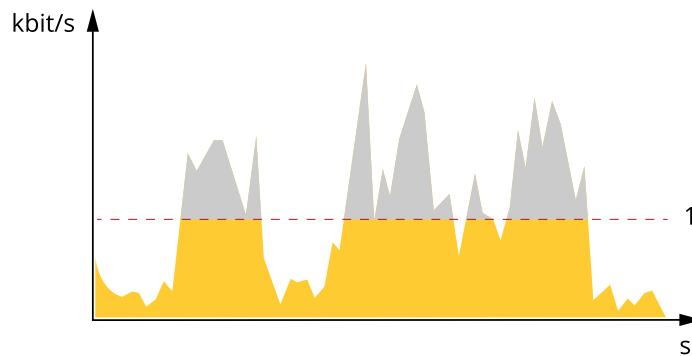
### Variable bitrate (VBR)

Variable bitrate allows the bandwidth consumption to vary depending on the level of activity in the scene. The more activity, the more bandwidth you need. With variable bitrate you are guaranteed constant image quality, but you need to make sure you have storage margins.



### Maximum bitrate (MBR)

Maximum bitrate lets you set a target bitrate to handle bitrate limitations in your system. You might see a decline in image quality or frame rate as the instantaneous bitrate is kept below the specified target bitrate. You can choose to prioritize either image quality or frame rate. We recommend that you configure the target bitrate to a higher value than the expected bitrate. This gives you a margin in case there is a high level of activity in the scene.

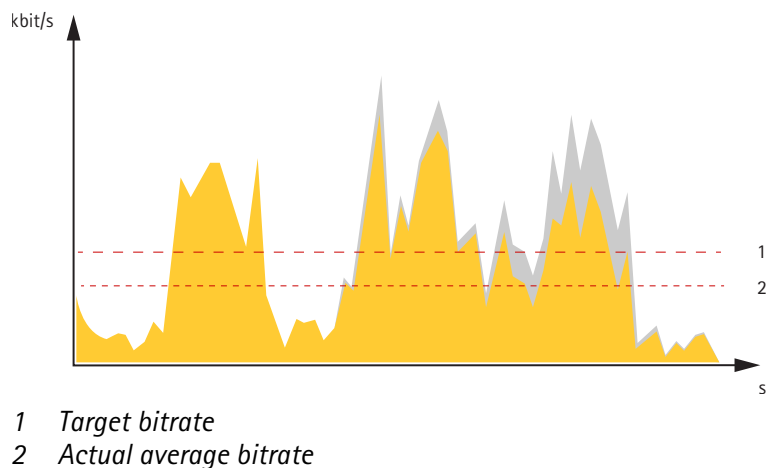


1 Target bitrate

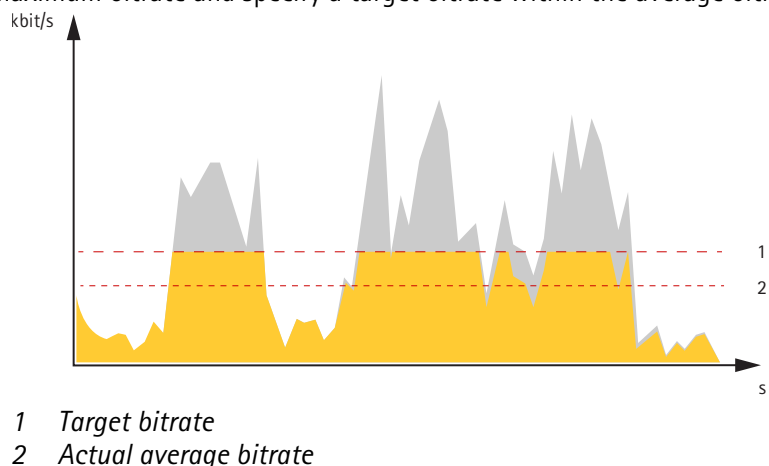
### Average bitrate (ABR)

With average bitrate, the bitrate is automatically adjusted over a longer period of time. This is so you can meet the specified target and provide the best video quality based on your available storage. Bitrate is higher in scenes with a lot of activity, compared to static scenes. You are more likely to get better image quality when in scenes with a lot of activity if you use the average bitrate option. You can define the total storage required to store the video stream for a specified amount of time (retention time) when image quality is adjusted to meet the specified target bitrate. Specify the average bitrate settings in one of the following ways:

- To calculate the estimated storage need, set the target bitrate and the retention time.
- To calculate the average bitrate, based on available storage and required retention time, use the target bitrate calculator.



You can also turn on maximum bitrate and specify a target bitrate within the average bitrate option.



## Analytics and apps

With analytics and apps you can get more out of your Axis device. AXIS Camera Application Platform (ACAP) is an open platform that makes it possible for third parties to develop analytics and other apps for Axis devices. Apps can be preinstalled on the device, available for download for free, or for a license fee.

To find the user manuals for Axis analytics and apps, go to [help.axis.com](http://help.axis.com).

### Note

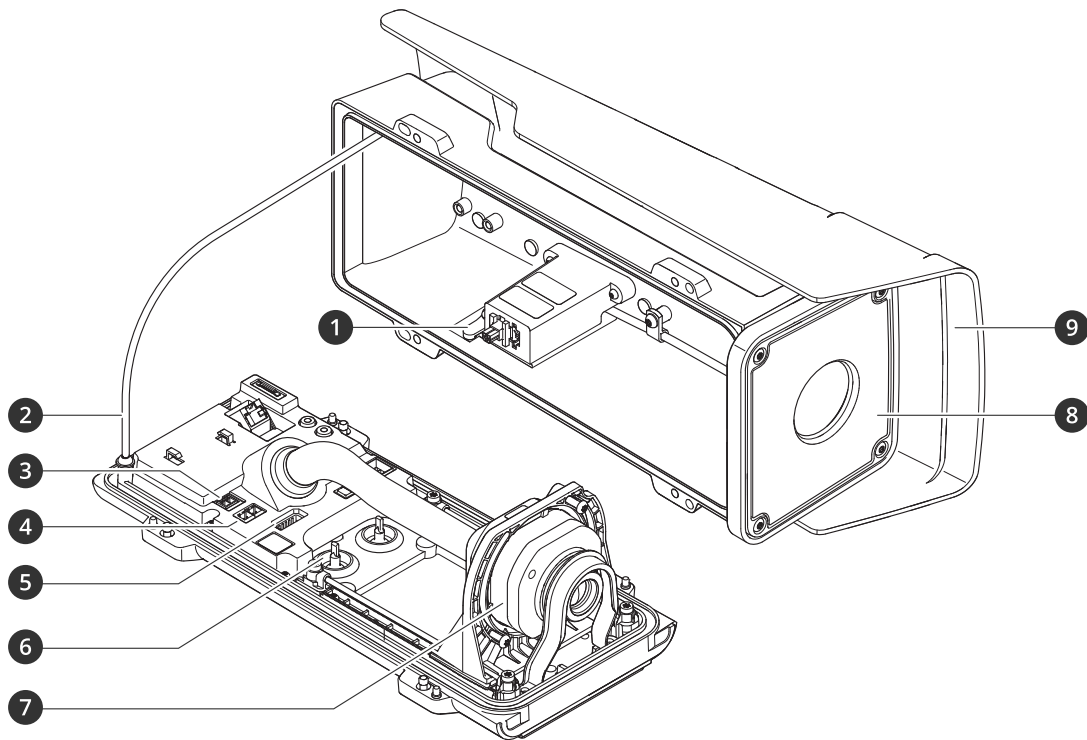
- Several apps can run at the same time but some apps might not be compatible with each other. Certain combinations of apps might require too much processing power or memory resources when run in parallel. Verify that the apps work together before deployment.

## Early fire detection

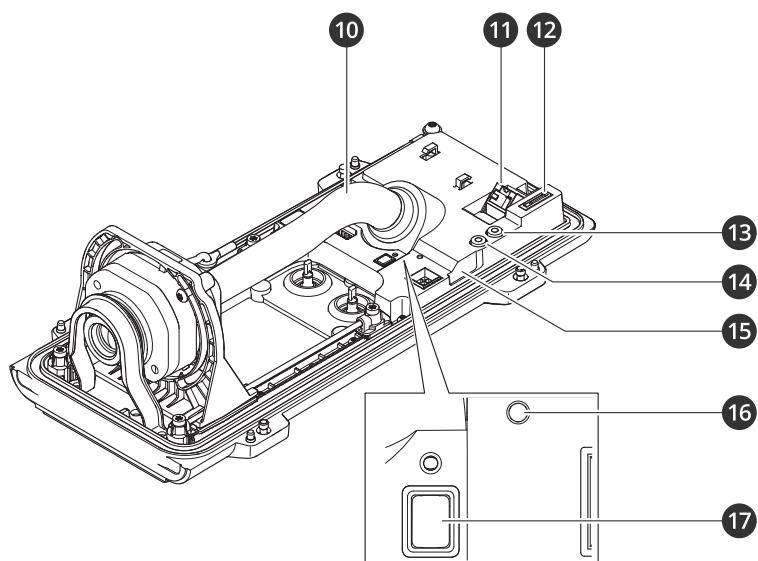
The thermometry functionality in the camera detects temperature changes in the monitored area. You can set up the camera to, for example, send notifications if the temperature in the area rises above a preset threshold. The early fire detection app filters temporary objects with temperatures above the preset threshold, such as passing work vehicles. This can help reduce the number of false alarms.

## Specifications

### Product overview



- 1 *Intrusion alarm magnet*
- 2 *Safety wire*
- 3 *Power connector*
- 4 *RS485/422 connector*
- 5 *I/O connector*
- 6 *Cable gasket M20 (2x)*
- 7 *Optical unit*
- 8 *Front window*
- 9 *Weathershield*



- 10 Cable cover
- 11 Network connector (PoE)
- 12 microSD card slot
- 13 Audio out
- 14 Audio in
- 15 Intrusion alarm sensor
- 16 Status LED
- 17 Control button

**NOTICE**

Don't lift the camera in the cable cover.

**LED indicators**

**Note**

- The Status LED can be configured to flash while an event is active.
- The LEDs turn off when you close the casing.

Status LED	Indication
Unlit	Connection and normal operation.
Green	Connection and normal operation.
Amber	Steady during startup. Flashes during device software upgrade or reset to factory default.
Amber/Red	Flashes amber/red if network connection is unavailable or lost.
Red	Device software upgrade failure.

**Buzzer**

**Buzzer signal for leveling assistant**

For information about the control button used for leveling the image, see *page 22*.

Buzzer	Camera position
Continuous beep	Level
Fast beep	Almost level
Medium beeps	Not level
Slow beeps	Far from level

## SD card slot

### NOTICE

- Risk of damage to SD card. Don't use sharp tools, metal objects, or excessive force when inserting or removing the SD card. Use your fingers to insert and remove the card.
- Risk of data loss and corrupted recordings. Unmount the SD card from the device's web interface before removing it. Don't remove the SD card while the product is running.

This device supports microSD/microSDHC/microSDXC cards.

For SD card recommendations, see [axis.com](http://axis.com).



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## Buttons

### Control button

The control button is used for:

- Resetting the product to factory default settings. See *Reset to factory default settings, on page 29*.
- Ensuring the camera is level. Press the button for not more than two seconds to start the leveling assistant and press again to stop. The buzzer signal (see *page 21*) assist leveling of the camera. The camera is level when the buzzer beeps continuously.

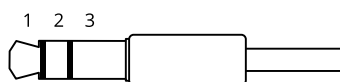
## Connectors

### Network connector

RJ45 Ethernet connector with Power over Ethernet (PoE).

### Audio connector

- **Audio in** – 3.5 mm input for a digital microphone, an analog mono microphone, or a line-in mono signal (left channel is used from a stereo signal).
- **Audio out** – 3.5 mm output for audio (line level) that can be connected to a public address (PA) system or an active speaker with a built-in amplifier. A stereo connector must be used for audio out.



### Audio input

1 Tip	2 Ring	3 Sleeve
Unbalanced microphone (with or without electret power) or line-in	Electret power if selected	Ground
Digital signal	Ring power if selected	Ground

Audio output

1 Tip	2 Ring	3 Sleeve
Channel 1, unbalanced line, mono	Channel 1, unbalanced line, mono	Ground

I/O connector

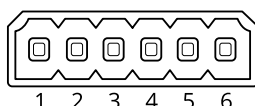
Use the I/O connector with external devices in combination with, for example, motion detection, event triggering, and alarm notifications. In addition to the 0 VDC reference point and power (12 V DC output), the I/O connector provides the interface to:


**Digital input** – For connecting devices that can toggle between an open and closed circuit, for example PIR sensors, door/window contacts, and glass break detectors.

**Supervised input** – Enables possibility to detect tampering on a digital input.

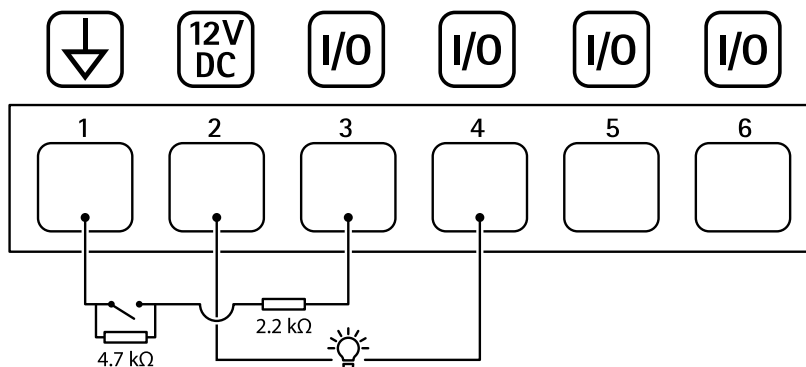
**Digital output** – For connecting external devices such as relays and LEDs. Connected devices can be activated by the VAPIX® Application Programming Interface, through an event or from the device's web interface.

6-pin terminal block



Function	Pin	Notes	Specifications
DC ground	1		0 VDC
DC output	2	 Can be used to power auxiliary equipment. Note: This pin can only be used as power out.	12 VDC Max load = 50 mA
Configurable (Input or Output)	3-6	Digital input or Supervised input – Connect to pin 1 to activate, or leave floating (unconnected) to deactivate. To use supervised input, install end-of-line resistors. See connection diagram for information about how to connect the resistors.	0 to max 30 VDC
		Digital output – Internally connected to pin 1 (DC ground) when active, and floating (unconnected) when inactive. If used with an inductive load, e.g., a relay, connect a diode in parallel with the load, to protect against voltage transients.	0 to max 30 VDC, open drain, 100 mA

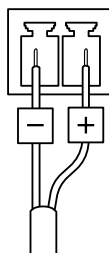
Example:



- 1 DC ground
- 2 DC output 12 V, max 50 mA
- 3 I/O configured as supervised input
- 4 I/O configured as output
- 5 Configurable I/O
- 6 Configurable I/O

**Power connector**

2-pin terminal block for DC power input. Use a Safety Extra Low Voltage (SELV) compliant limited power source (LPS) with either a rated output power limited to  $\leq 100$  W or a rated output current limited to  $\leq 5$  A.

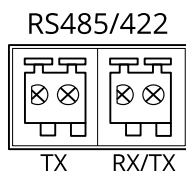


**RS485/RS422 connector**

Two 2-pin terminal blocks for RS485/RS422 serial interface.

The serial port can be configured to support:

- Two-wire RS485 half duplex
- Four-wire RS485 full duplex
- Two-wire RS422 simplex
- Four-wire RS422 full duplex point to point communication



Function	Notes
RS485/RS422 TX(A)	TX pair for RS422 and 4-wire RS485
RS485/RS422 TX(B)	
RS485A alt RS485/422 RX (A)	RX pair for all modes (combined RX/TX for 2-wire RS485)
RS485B alt RS485/422 RX (B)	

**Note**

To use the camera with an AXIS T99 Positioning Unit, connect it to RS485A and RS485B (RX/TX).

**PTZ drivers**

**APTP**

This is a list of models supported by this driver. The physical installation depends on your Axis product and the PTZ unit.

**Important**

Check what serial communication your Axis product and the PTZ unit will support.

Supported models with RS485 2-wire interface:

- AXIS T99A Positioning Unit Series.  
For information about compatible Axis products, see *axis.com*.

Other models may be supported but this has not been verified by Axis.

**Technical information**

DEFAULT capabilities for PTZ driver:

Driver	APTP
Version	1.1.0

DEFAULT serial configuration:

PortMode	RS485
BaudRate	115,200
DataBits	8
StopBits	1
Parity	None

DEFAULT supported capabilities in this PTZ driver:

**Note**

Different PTZ units may have other capabilities (both less and more).

Movement	Absolute	Relative	Continuous
Pan	yes	yes	yes
Tilt	yes	yes	yes

**Pelco**

This is a list of models supported by this driver. The physical installation depends on your Axis product and the PTZ unit.

**Important**

Check what serial communication your Axis product and the PTZ unit will support.

Supported models:

- Pelco DD5-C
- Pelco Esprit ES30C/ES31C
- Pelco LRD41C21
- Pelco LRD41C22
- Pelco Spectra III
- Pelco Spectra IV
- Pelco Spectra Mini
- Videotec DTRX3/PTH310P
- Videotec ULISSE

- PTK AMB
- YP3040

Other models may be supported but this has not been verified by Axis.

**Technical information**

DEFAULT capabilities for PTZ driver:

Driver	Pelco
Version	4.17

DEFAULT serial configuration:

PortMode	RS485
BaudRate	2,400
DataBits	8
StopBits	1
Parity	None

DEFAULT supported capabilities in this PTZ driver:

**Note**

Different PTZ units may have other capabilities (both less and more).

Movement	Absolute	Relative	Continuous
Pan	no	yes	yes
Tilt	no	yes	yes
Zoom	no	yes	yes
Focus	no	yes	yes
Iris	no	yes	yes

Autolris	yes
AutoFocus	yes
IrCutFilter	no
BackLight	yes
OSDMenu	yes

**Visca**

This is a list of models supported by this driver. The physical installation depends on your Axis product and the PTZ unit.

**Important**

Check what serial communication your Axis product and the PTZ unit will support.

Supported models with RS422 4-wire interface:

- Sony EVI-D70/D70P

- WISKA DCP-27 (PT-head)

Supported models with RS232 interface (may require external RS422-4-wire/RS232 converter):

- Axis EVI-D30/D31
- Sony EVI-G20/G21
- Sony EVI-D30/D31
- Sony EVI-D100/D100P
- Sony EVI-D70/D70P

Other models may be supported but this has not been verified by Axis.

**Technical information**

DEFAULT capabilities for PTZ driver:

Driver	Visca/EVI
Version	4.11

DEFAULT serial configuration:

PortMode	RS422
BaudRate	9,600
DataBits	8
StopBits	1
Parity	None

DEFAULT supported capabilities in this PTZ driver:

**Note**

Different PTZ units may have other capabilities (both less and more).

Movement	Absolute	Relative	Continuous
Pan	yes	yes	yes
Tilt	yes	yes	yes
Zoom	yes	yes	yes
Focus	yes	yes	yes
Iris	yes	yes	no

AutoIris	yes
AutoFocus	yes
IrCutFilter	yes
BackLight	yes
OSDMenu	no

## Clean your device

You can clean your device with lukewarm water and mild, nonabrasive soap.

### **NOTICE**

- Harsh chemicals can damage the device. Don't use chemicals such as window cleaner or acetone to clean your device.
  - Avoid cleaning in direct sunlight or elevated temperatures, since this can cause stains.
1. Use a can of compressed air to remove dust and loose dirt from the device.
  2. If necessary, clean the device with a soft microfiber cloth dampened with lukewarm water and mild, nonabrasive soap.
  3. To remove any residual cleaning agents, wipe the device with a soft microfiber cloth dampened with lukewarm water.
  4. To avoid stains, dry the device with a clean, nonabrasive cloth.

For more information about cleaning of Axis devices, see the white paper *Chemical resistance to common cleaning agents*.

## Troubleshooting

### Reset to factory default settings

#### Important

Reset to factory default should be used with caution. A reset to factory default resets all settings, including the IP address, to the factory default values.

To reset the product to the factory default settings:

1. Disconnect power from the product.
2. Press and hold the control button while reconnecting power. See *Product overview, on page 20*.
3. Keep the control button pressed for 15–30 seconds until the status LED indicator flashes amber.
4. Release the control button. The process is complete when the status LED indicator turns green. If no DHCP server is available on the network, the device IP address will default to one of the following:
  - **Devices with AXIS OS 12.0 and later:** Obtained from the link-local address subnet (169.254.0.0/16)
  - **Devices with AXIS OS 11.11 and earlier:** 192.168.0.90/24
5. Use the installation and management software tools to assign an IP address, set the password, and access the device.  
The installation and management software tools are available from the support pages on [axis.com/support](https://axis.com/support).

You can also reset parameters to factory default through the device's web interface. Go to **Maintenance > Factory default** and click **Default**.

### AXIS OS options

Axis offers device software management according to either the active track or the long-term support (LTS) tracks. Being on the active track means continuously getting access to all the latest product features, while the LTS tracks provide a fixed platform with periodic releases focused mainly on bug fixes and security updates.

Using AXIS OS from the active track is recommended if you want to access the newest features, or if you use Axis end-to-end system offerings. The LTS tracks are recommended if you use third-party integrations, which are not continuously validated against the latest active track. With LTS, the products can maintain cybersecurity without introducing any significant functional changes or affecting any existing integrations. For more detailed information about Axis device software strategy, go to [axis.com/support/device-software](https://axis.com/support/device-software).

### Check the current AXIS OS version

AXIS OS determines the functionality of our devices. When you troubleshoot a problem, we recommend that you to start by checking the current AXIS OS version. The latest version might contain a correction that fixes your particular problem.

To check the current AXIS OS version:

1. Go to the device's web interface > **Status**.
2. Under **Device info**, see the AXIS OS version.

### Upgrade AXIS OS

#### Important

- When you upgrade the device software, your preconfigured and customized settings are saved. Axis Communications AB can't guarantee that the settings are saved, even if the features are available in the new AXIS OS version.
- Starting from AXIS OS 12.6, you must install every LTS version between your device's current version and the target version. For example, if the currently installed device software version is AXIS OS 11.2, you

have to install the LTS version AXIS OS 11.11 before you can upgrade the device to AXIS OS 12.6. For more information, see *AXIS OS Lifecycle guide: Upgrade path*.

- Make sure the device remains connected to the power source throughout the upgrade process.

### Note

- When you upgrade the device with the latest AXIS OS version in the active track, the product receives the latest functionality available. Always read the upgrade instructions and release notes available with each new release before you upgrade. To find the latest AXIS OS version and the release notes, go to [axis.com/support/device-software](https://axis.com/support/device-software).
1. Download the AXIS OS file to your computer, available free of charge at [axis.com/support/device-software](https://axis.com/support/device-software).
  2. Log in to the device as an administrator.
  3. Go to **Maintenance > AXIS OS upgrade** and click **Upgrade**.

When the upgrade has finished, the product restarts automatically.

You can use AXIS Device Manager to upgrade multiple devices at the same time. Find out more at [axis.com/products/axis-device-manager](https://axis.com/products/axis-device-manager).

## Technical problems and possible solutions

### Problems upgrading AXIS OS

#### AXIS OS upgrade failed

If the upgrade fails, the device reloads the previous version. The most common reason is that the wrong AXIS OS file has been uploaded. Check that the name of the AXIS OS file corresponds to your device and try again.

#### Problems after AXIS OS upgrade

If you experience problems after the upgrade, roll back to the previously installed version from the **Maintenance** page.

### Problems setting the IP address

#### Can't set the IP address

- If the IP address intended for the device and the IP address of the computer used to access the device are located on different subnets, you can't set the IP address. Contact your network administrator to obtain an IP address.
- The IP address could be in use by another device. To check:
  1. Disconnect the Axis device from the network.
  2. In a Command/DOS window, type `ping` and the IP address of the device.
  3. If you receive: `Reply from <IP address>: bytes=32; time=10...` this means that the IP address might already be in use by another device on the network. Obtain a new IP address from the network administrator and reinstall the device.
  4. If you receive: `Request timed out`, this means that the IP address is available for use with the Axis device. Check all cabling and reinstall the device.
- There could be a possible IP address conflict with another device on the same subnet. The static IP address in the Axis device is used before the DHCP server sets a dynamic address. This means that if the same default static IP address is also used by another device, there could be problems accessing the device.

### Problems accessing the device

#### Can't log in when accessing the device from a browser

When HTTPS is enabled, make sure that you use the correct protocol (HTTP or HTTPS) when you try to log in. You might need to manually type `http` or `https` in the browser's address field.

If you've lost the password for the root account, you must reset the device to the factory default settings. For instructions, see *Reset to factory default settings, on page 29*.

#### The IP address has been changed by DHCP

IP addresses obtained from a DHCP server are dynamic and could change. If the IP address has been changed, use AXIS IP Utility or AXIS Device Manager to locate the device on the network. Identify the device using its model or serial number, or by the DNS name (if the name has been configured).

If required, you can assign a static IP address manually. For instructions, go to [axis.com/support](http://axis.com/support).

#### Certificate error when using IEEE 802.1X

For authentication to work properly, the date and time settings in the Axis device must be synchronized with an NTP server. Go to **System > Date and time**.

#### The browser isn't supported

For a list of recommended browsers, see *Browser support, on page 5*.

#### Can't access the device externally

To access the device externally, we recommend you to use one of the following applications for Windows®:

- AXIS Camera Station Edge: free of charge, ideal for small systems with basic surveillance needs.
- AXIS Camera Station Pro: 90-day trial version free of charge, ideal for small to mid-size systems.

For instructions and download, go to [axis.com/vms](http://axis.com/vms).

### Problems with streaming

#### Multicast H.264 only accessible by local clients

Check if your router supports multicasting, or if you need to configure the router settings between the client and the device. You might need to increase the TTL (Time To Live) value.

#### No multicast H.264 displayed in the client

Check with your network administrator that the multicast addresses used by the Axis device are valid for your network.

Check with your network administrator to see if there is a firewall that prevents viewing.

#### Poor rendering of H.264 images

Ensure that your graphics card uses the latest driver. You can usually download the latest drivers from the manufacturer's website.

### Problems with MQTT

#### Can't connect over port 8883 with MQTT over SSL

The firewall blocks traffic that uses port 8883 since it's regarded insecure.

In some cases the server/broker might not provide a specific port for MQTT communication. It might still be possible to use MQTT over a port normally used for HTTP/HTTPS traffic.

- If the server/broker supports WebSocket/WebSocket Secure (WS/WSS), typically on port 443, use this protocol instead. Check with the server/broker provider to see if WS/WSS is supported and which port and basepath to use.
- If the server/broker supports ALPN, the use of MQTT can be negotiated over an open port, such as 443. Check with your server/broker provider to see if ALPN is supported and which ALPN protocol and port to use.

#### Problems with operating the device

##### Front heater and wiper aren't working

If the front heater or wiper are not turning on, confirm that the top cover is properly fastened to the bottom of the housing unit.

If you can't find what you're looking for here, try the troubleshooting section at [axis.com/support](https://axis.com/support).

#### Performance considerations

When you set up your system, it's important to consider how different settings and situations affect performance. Some factors affect bandwidth (bitrate), others affect frame rate, and some affect both.

The most important factors to consider:

- High image resolution or lower compression levels result in images containing more data which in turn affects the bandwidth.
- Rotating the image in the GUI can increase the product's CPU load.
- Access by large numbers of Motion JPEG clients or unicast H.264/H.265/AV1 clients affects the bandwidth.
- Simultaneous viewing of different streams (resolution, compression) by different clients affects both frame rate and bandwidth.  
Use identical streams wherever possible to maintain a high frame rate. Stream profiles can be used to ensure that streams are identical.
- Accessing video streams with different codecs simultaneously affects both frame rate and bandwidth.  
For optimal performance, use streams with the same codec.
- Heavy usage of event settings affects the product's CPU load which in turn affects the frame rate.
- Using HTTPS may reduce frame rate, in particular if streaming Motion JPEG.
- Heavy network utilization due to poor infrastructure affects the bandwidth.
- Viewing on poorly performing client computers lowers perceived performance and affects frame rate.
- Running multiple AXIS Camera Application Platform (ACAP) applications simultaneously may affect the frame rate and the general performance.

#### Contact support

If you need more help, go to [axis.com/support](https://axis.com/support).

## Cybersecurity

Cybersecurity supports a successful product lifecycle with minimized risks. You can find in-depth information and documentation about our cybersecurity approach at [axis.com/about-axis/cybersecurity](https://axis.com/about-axis/cybersecurity). Follow the cybersecurity guidelines below to receive product security notifications from Axis and to configure your product for a secure lifecycle and decommissioning.

At *Axis Trust Center*, you can find information about how Axis implements security compliance, transparency, data protection, and privacy.

### Vulnerability management

Axis is a *Common Vulnerability and Exposures (CVE) Numbering Authority (CNA)*. To minimize your risk of exposure, we follow industry standards when identifying and resolving vulnerabilities in our devices, software, and services. Refer to [axis.com/vulnerability-management](https://axis.com/vulnerability-management) for information about our vulnerability management policy or to report a vulnerability.

### Security notifications

Subscribe to Axis security notification emails at [axis.com/security-notification-service](https://axis.com/security-notification-service). We will send you information about vulnerabilities, corresponding security advisories, and other security-related matters for your Axis product.

### Secure product lifecycle

Axis minimizes risks throughout the lifetime of our products through secure lifecycle management. Use our hardening guides at [help.axis.com](https://help.axis.com) to more securely configure and operate your Axis products and to find information about:

**Secure first-use** – Axis products are pre-configured with high default protection to allow for secure initialization and encrypted communication from the very start.

**Intended use and common configuration mistakes** – Our guides provide information about the intended usage of Axis products, including common security-relevant misuse and configuration mistakes that should be avoided.

**Managing vulnerabilities and supply chain transparency** – A Software Bill of Material (SBOM) is published with every software release on [axis.com](https://axis.com) to disclose vulnerabilities and improve supply chain transparency.

**Decommissioning and the secure erasure of data** – To securely decommission a product when it reaches the end of its lifecycle, reset it to factory default settings. This erases your configurations, stored data, and sensitive information.

T10188608

2026-07 (M17.2)

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