AXIS Q16 Network Camera Series

AXIS Q1645‑LE Network Camera

AXIS Q1647‑LE Network Camera

User Manual

AXIS Q16 Network Camera Series

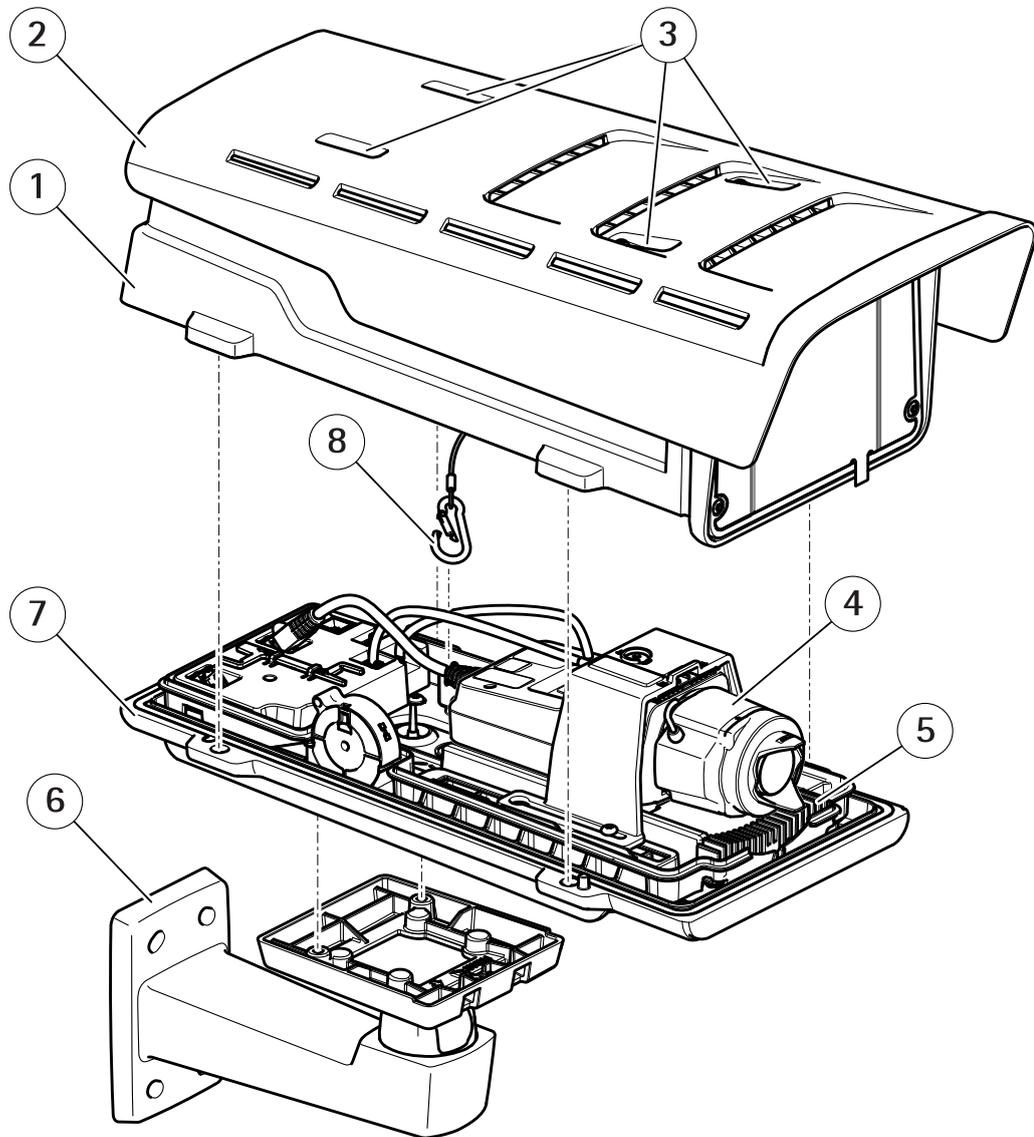## Table of Contents

About this manual

This user manual describes multiple products. Some of the instructions may not be relevant for your product.

AXIS Q16 Network Camera Series

Product overview

Product overview

1   Top cover
2   Sunshield
3   Sunshield adjustment screws
4   Network camera
5   Heater
6   Wall mount
7   Bottom cover
8   Safety hook

Product overview
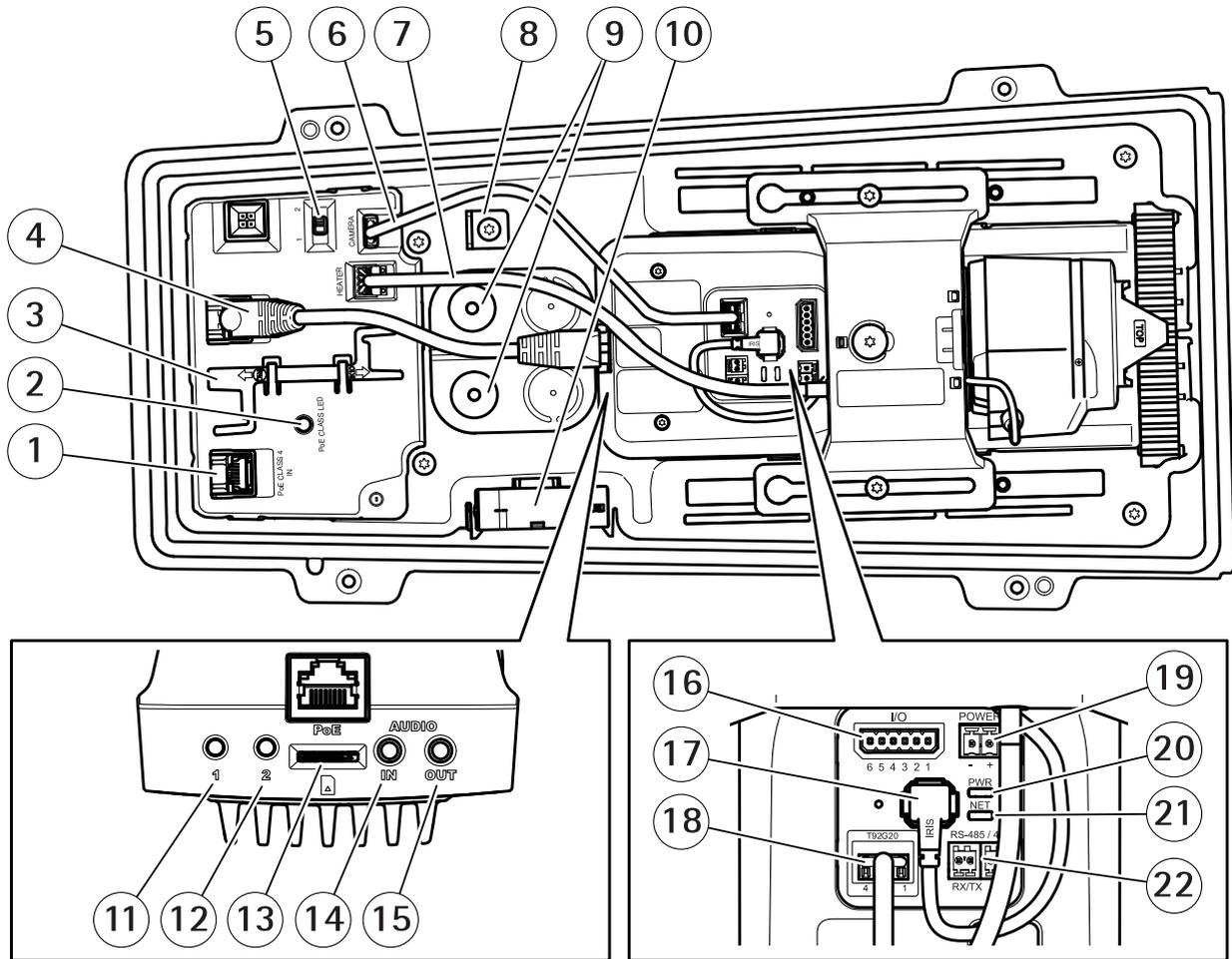
1. Network connector (PoE in)
2. PoE class LED
3. IK10 tool
4. Network connector (PoE out)
5. Cold startup delay switch (Pos 1: Startup –20°, Pos 2: Startup: 0°)
6. Camera housing communication cable
7. Camera heater
8. Safety hook anchor
9. Cable gasket (x2)
10. Fan
11. Control button (1)
12. Function button (2)
13. microSD Card slot
14. Audio in
15. Audio out
16. I/O connector
17. Iris connector
18. Camera housing communication connector
19. Power connector (Indoor use only)
20. Power LED indicator
21. Network LED indicator
22. RS485/RS422 connector

How to choose lens

There is more than one lens option for your camera. Which lens to choose depends on the surveillance requirements. The lenses have different capabilities when it comes to light sensitivity and field of view. See the product's datasheet for lens alternatives.

About depth of field and sensor size

The depth of field depends on the lens aperture, the size of the image sensor and the distance to the scene. The lower the f-number and larger the sensor, the shallower depth of field. Due to the large sensor, the depth of field is more shallow in this particular product than in traditional surveillance cameras. Depth of field becomes shallower in dark conditions, due to the fact that the iris opens up to provide enough light to the sensor.

Find out more at *axis.com/learning/web-articles/lenses-for-network-video-cameras*

About focus and light sensitivity

The focus point is affected by the aperture (f-stop) of the lens. The lower the f-stop value, the more light reaches the image sensor. The smaller the aperture, the deeper depth of field which may lead to an unwanted absolute focus point. During low light conditions, when the aperture is as large as possible, the depth of field decreases and the image may therefore appear unfocused.

f/1.4   f/2.0   f/5.6   f/8
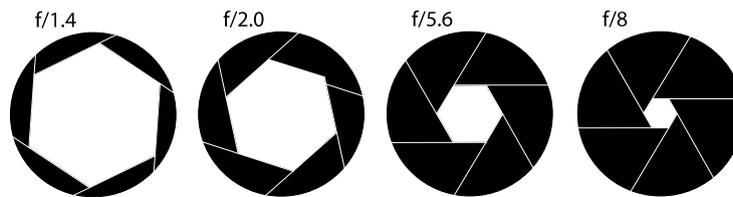
Examples of apertures for different f-numbers.

To calculate the distance between the camera and the object of interest in relation to scene dimensions, resolution, and focal length, use the lens calculator tool, go to *axis.com/tools/lens-calculator*

How to access the product

AXIS IP Utility and AXIS Device Manager are recommended methods for finding Axis products on the network and assigning them IP addresses in Windows®. Both applications are free and can be downloaded from *axis.com/support*

The product can be used with the following browsers:

- Windows®: Chrome^{TM} (recommended), Firefox®, Edge®, or Opera®

- OS X®: Chrome^{TM} (recommended) or Safari®

- Other operating systems: Chrome^{TM} or Firefox®.

If you need more information about recommended browsers, go to *axis.com/browser-support*

How to access the product from a browser

1. Start a web browser.

2. Enter the IP address or host name of the Axis product in the browser's address field.

   To access the product from a Mac computer (OS X), go to Safari, click on Bonjour and select the product from the drop-down list. To add Bonjour as a browser bookmark, go to **Safari > Preferences**.

   If you do not know the IP address, use AXIS IP Utility to locate the product on the network. For information about how to discover and assign an IP address, see the document *How to assign an IP address and access your device* on the product page at *axis.com*.

3. Enter your username and password. If this is the first time the product is accessed, the root password must first be configured.

4. The product's live view page opens in your browser.

About secure passwords

Important

> Axis devices send the initially set password in clear text over the network. To protect your device after the first login, set up a secure and encrypted HTTPS connection and then change the password.

The device password is the primary protection for the 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 recommend that you:

- Change the default password that comes with each device.

- 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.

Set a secure password for the root account

Important

> The default administrator username is **root**. If the password for root is lost, reset the device to factory default settings.

1. Type a password. Follow the instructions about secure passwords. See *About secure passwords on page 7* .

2. Retype the password to confirm the spelling.

3. Click **Create login**. The password has now been configured.

Setup

Product webpage overview

1	Live view control bar
2	Live view
3	Product name
4	Controls
5	Video control bar
6	Settings toggle
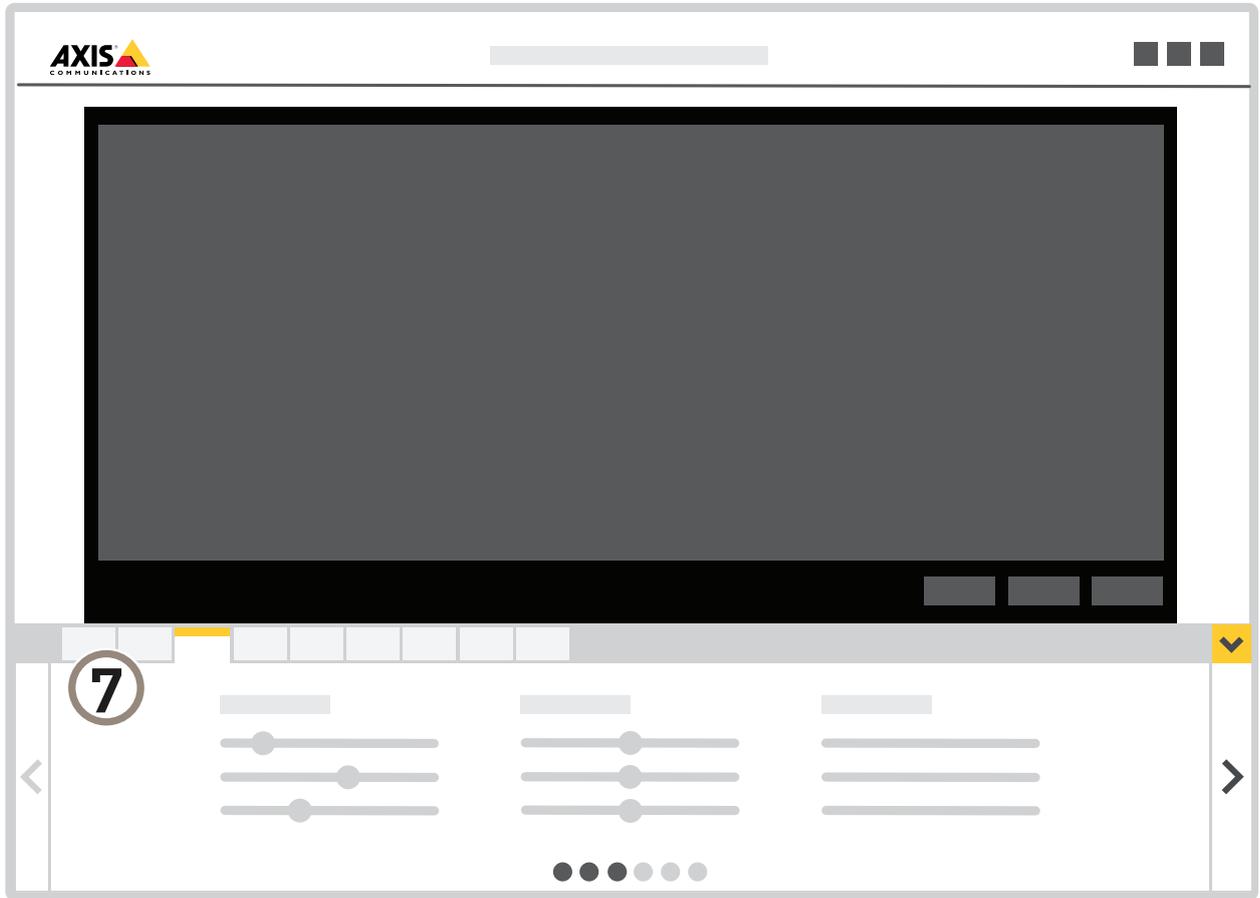
7 Settings tabs

About the product's built-in help

You can access the built-in help from the product's webpage. The help provides more detailed information on the product's features and their settings.
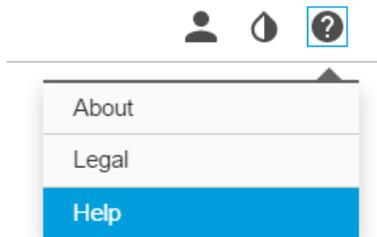
About long-distance connections

This product supports fiber-optic cable installations through a media converter. Fiber-optic cable installations offer a number of benefits such as:

- Long-distance connection

- High speed

- Long lifetime

- Large capacity of data transmission

- Electromagnetic interference immunity

Find out more about fiber-optic cable installations on *www.axis.com/technologies/fiber-optics* . For information about how to install the media converter see the Installation Guide for this product.

Image quality

About capture modes

A capture mode consists of a resolution and the corresponding frame rate available in the product. The capture mode setting affects the camera's field of view and aspect ratio.

The lower resolution capture mode is cropped out from the highest resolution.

The image shows how the field of view and aspect ratio can change between two different capture modes.

How to select capture mode

Which capture mode to choose depends on the requirements of frame rate and resolution for the specific surveillance setup. For specifications about available capture modes, see the product's datasheet. To find the latest version of the datasheet, go to *axis.com*

How to replace the lens

1. Stop all recordings and disconnect power from the product.

2. Disconnect the lens cable and remove the standard lens.

3. Attach the new lens and connect the lens cable.

4. Reconnect the power.

5. Log in to the product's webpage, go to the **Image** tab and then select the **P-Iris lens** you have installed.

Note

If you use a DC iris lens, select **Generic DC Iris**.

6. For the changes to take effect, you need to restart the device. Go to **System > Maintenance** and click **Restart**.

7. Adjust the zoom and focus.

How to focus

1. Log in to the product's webpage and go to **Settings > Image > Focus**.

2. To set which area of the image that should be in focus, click **Show AF area**. If you don't select an autofocus area, the camera focuses on the entire scene.

3. Click **Autofocus**.

4. To fine tune the focus, use the focus slider.

About remote focus and zoom

The remote focus and zoom functionality allows you to make focus and zoom adjustments to your camera from a computer. It is a convenient way to ensure that the scene's focus, viewing angle and resolution are optimized without having to visit the camera's installation location.

Left: no focus. Right: remote focus applied.

Left: no zoom. Right: remote zoom applied.

How to reduce motion blur in low-light conditions

To reduce motion blur in low-light conditions, you can adjust one or more of the following settings:

Note

Image noise will increase if you increase the gain.

- Increase shutter speed and gain. Go to **Settings > Image** > **Exposure** and set **Max shutter** to a lower value, and **Max gain** to a higher value.

If you are still experiencing motion blur, you can try one of the following:

- Increase the light level in the scene.

- Mount the camera so that objects move toward it or away from it rather than sideways.

How to benefit from IR light in low-light conditions using night mode

Your camera uses visible light to deliver color images during the day. As light diminishes, you can set the camera to automatically shift to night mode. In night mode the camera uses both visible light and near-infrared light to deliver black-and-white images. Since the camera uses more of the available light it can deliver brighter, more detailed, images.

1. Go to **Settings > Image > Day and night**, and make sure that the **IR cut filter** is set to **Auto**.

How to select exposure mode

There are different exposure mode options in the camera that adjusts aperture, shutter speed, and gain to improve image quality for specific surveillance scenes. Go to **Settings > Image > Exposure** and select between the following exposure modes:

- For most use cases, select **Automatic** exposure.

- For environments with certain artificial lighting, for example fluorescent lighting, select **Flicker-free**.

  Select the same frequency as the power line frequency.

- For environments with certain artificial light and bright light, for example outdoors with fluorescent lighting at night and sun during daytime, select **Flicker-reduced**.

  Select the same frequency as the power line frequency.

- To lock the current exposure settings, select **Hold current**.

How to maximize details in an image

Important

If you maximize details in an image, bitrate increases and might lead to reduced frame rate.

- Make sure to select capture mode that has the highest resolution.

- Set compression as low as possible.

- Select MJPEG streaming.

- Turn off the Zipstream functionality.

How to stabilize a shaky image with Electronic Image Stabilization (EIS)

EIS can be used in environments where the product is mounted in an exposed location and subject to vibrations, for example, wind or passing traffic. Turn on EIS to get a smoother and steadier image without blur.

EIS also reduces the file size of the compressed image and lowers the bitrate of the video stream.

Note

When EIS is turned on the image is cropped slightly, lowering the maximum resolution.

1. Go to **Settings > Image**.

2. Turn on **EIS**.

How to compensate for barrel distortion

Barrel distortion is a phenomenon where straight lines appear increasingly bent closer to the edges of the frame. A wide field of view will often create barrel distortion in an image. Barrel distortion correction will compensate for this distortion.

> Note
>
> Barrel distortion correction affects the image resolution and field of view.

1. Go to **Settings > Image**.

2. Turn on **Barrel distortion correction (BDC)**.

3. Set the level of correction that gives you the best image.

How to enhance facial recognition

To better recognize the face of a person passing by the camera, you can set the optimal pixel resolution with the camera's pixel counter.
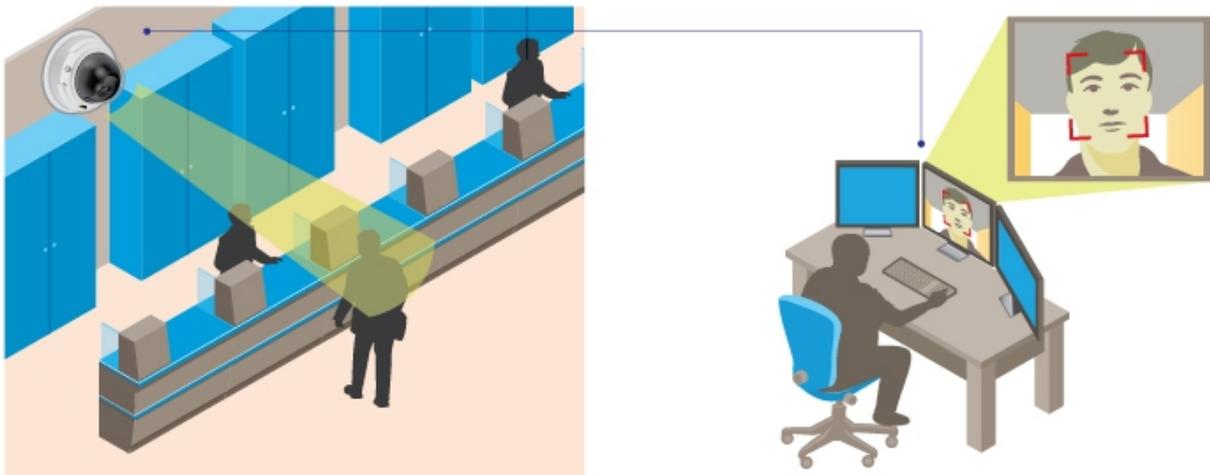
1. Go to **Settings > System > Orientation** and click ⬚ .

2. Adjust the size and placement of the rectangle in the camera's live view around the area of interest, for example where the faces of passing persons are expected to appear. You can then see the number of pixels represented by the sides of the rectangle.

> Note
>
> You can use an object of a known size in the view as a reference to decide how much resolution is needed for recognition.

How to enhance license plate recognition

To better recognize the license plate of a car passing by the camera, you can apply and adjust a number of things.

One option is to use the pixel counter in your camera to set the optimal pixel resolution:

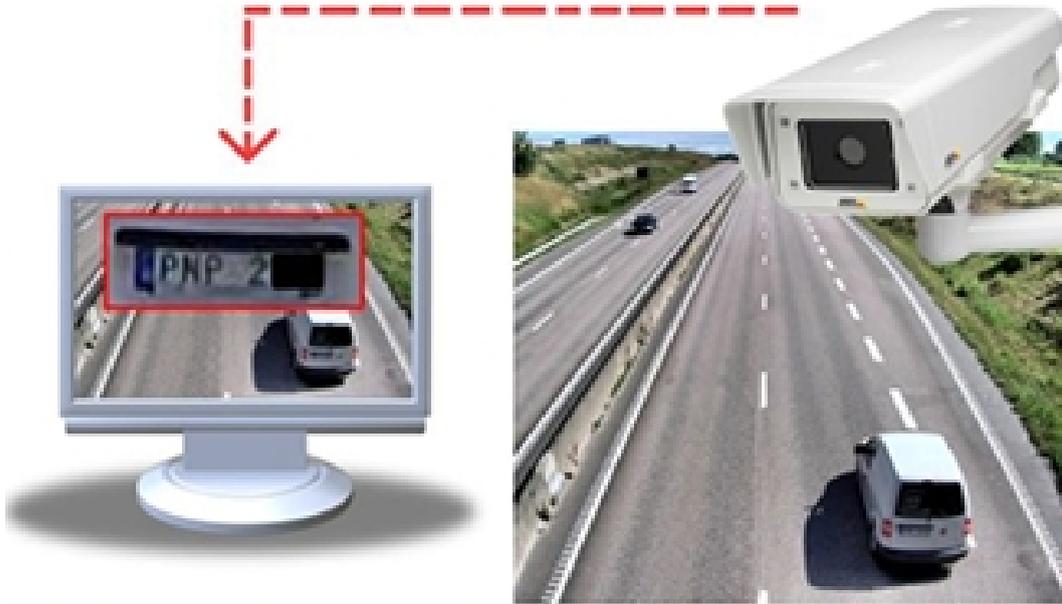1. Go to **Settings > System** > **Orientation** and click [icon].

2. Adjust the size and placement of the rectangle in the camera's live view around the area of interest, for example where the license plates of passing cars are expected to appear. You can then see the number of pixels represented by the sides of the rectangle.

Note

You can use an object of a known size in the view as a reference to decide how much resolution is needed for recognition.

In addition, you can try to adjust the following to optimize license plate recognition:

- Shutter speed

- Gain

- Zoom

How to optimize the image for traffic surveillance

To get the best possible image for traffic surveillance, use the AXIS Traffic Wizard in combination with the Traffic overview scene profile.

1. Go to **Settings > Apps** > **AXIS Traffic Wizard**.

2. Start the application if it is not already running.

3. To set up the application, click **Open**.

4. Select units (metric or imperial).

5. Enter the values for Road distance, Camera height, Vehicle distance and Max speed.

6. To make both dark and bright areas of the image visible, turn on WDR.

7. Set the level of low-light gain depending on the light conditions.

8. If external IR illumination is available, select the **Supplemental IR illumination** checkbox.

9. Click **Save**.

10. Go to **System** > **Orientation**.

11. Select **Traffic overview** under **Scene profile**.

12. Click **Done**.

About view area

A view area is a cropped part of the full view. You can stream and store view areas instead of the full view to minimize bandwidth and storage needs. If you enable PTZ for a view area, you can pan, tilt and zoom within it. By using view areas you can remove parts of the full view, for example, the sky.

When you set up a view area, we recommend you to set the video stream resolution to the same size as or smaller than the view area size. If you set the video stream resolution larger than the view area size it implies digitally scaled up video after sensor capture, which requires more bandwidth without adding image information.

How to handle scenes with strong backlight

Dynamic range is the difference in light levels in an image. In some cases the difference between the darkest and the brightest areas can be significant. The result is often an image where either the dark or the bright areas are visible. Wide dynamic range (WDR) makes both dark and bright areas of the image visible.

1. Go to **Settings > Image**.

2. Use the **Local contrast** slider to adjust the amount of WDR.

Image without WDR.

Image with WDR.

WDR may cause artifacts in the image.

Find out more about WDR and how to use it at *axis.com/web-articles/wdr*

Privacy masks

How to hide parts of the image with privacy masks

What is a privacy mask?

A privacy mask is a user-defined area that prevents users from viewing a part of the monitored area. In the video stream, privacy masks appear as blocks of solid color.

You'll see the privacy mask on all snapshots, recorded video, and live streams.

You can use the VAPIX® application programming interface (API) to turn off the privacy masks.

Important

Using multiple privacy masks may affect the product's performance.

How to create a privacy mask

To create a privacy mask, go to **Settings > Privacy mask** .

Overlays

About 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.

How to show a text overlay when the camera detects motion

This example explains how to display the text "Motion detected" when the camera detects motion:

Make sure the AXIS Video Motion Detection application is running:

1. Go to **Settings > Apps** > **AXIS Video Motion Detection**.

2. Start the application if it is not already running.

3. Make sure you have set up the application according to your needs.

Add the overlay text:

17

4. Go to **Settings > Overlay**.

5. Enter #D in the text field.

6. Choose alignment, text size and appearance.

Create an action rule:

7. Go to **System > Events** > **Action rules**.

8. Create an action rule with AXIS Video Motion Detection as trigger.

9. From the list of actions, select **Overlay text**.

10. Type "Motion detected".

11. Set the duration.

How to add street names and compass direction to the image

Note

The street name and compass direction will be visible on all video streams and recordings.

1. Go to **Settings > Apps**.

2. Select **axis-orientationaid**.

3. Click **Open**.

4. To add a street name, select **Add text** and modify the text to fit the street.

5. To add a compass, select **Add compass**.
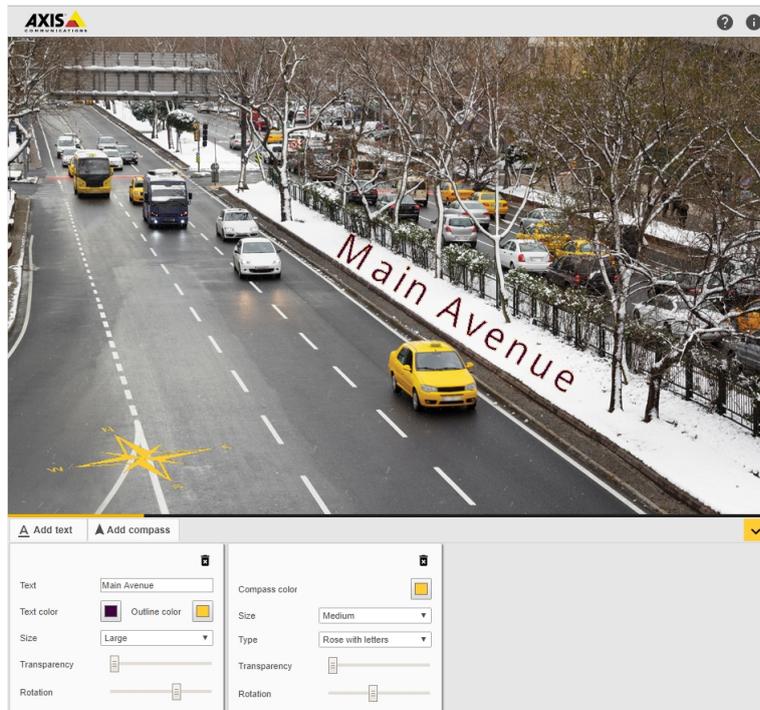
Streaming and storage

How to choose video compression format

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

Motion JPEG

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. Installing 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 the MPEG-4 standard. 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.

How to reduce bandwidth and storage

Important

> If you reduce the bandwidth it can result in loss of details in the picture.

1. Go to live view and select **H.264**.

2. Go to **Settings > Stream**.

3. Do one or more of the following:

   - Turn on the Zipstream functionality and select the desired level.

   - Turn on dynamic GOP and set a high GOP length value.

   - Increase the compression.

   - Turn on dynamic FPS.

How to set up network storage

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

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

2. Click **Setup** under **Network storage**.

3. Enter the IP address of the host server.

4. Enter the name of the shared location on the host server.

5. Move the switch if the share requires a login, and enter username and password.

6. Click **Connect**.

How to add audio to your recording

Edit the stream profile which is used for the recording:

1. Go to **Settings > System > Stream profiles**.

2. Select the stream profile and click **Modify**.

3. In the **Audio** tab, select the **Audio stream** checkbox and select **On** from the drop-down list.

4. Click **Ok**.

How to record and watch video

To record video you must first set up network storage, see *How to set up network storage on page 19*, or have an SD card installed.

1. Go to the camera's live view.

2. Click on **Record** once to start recording and one more time to stop recording.

To watch your recording:

1. Click on **Storage > Go to recordings**.

2. Select your recording in the list and it will play automatically.

Events

About events

The event pages allow you to configure your product to perform actions when different events occur. For example, the product can start a recording or send an email notification when motion is detected. The set of conditions that defines how and when the action is triggered is called an action rule.

How to trigger an action

1. Go to **Settings > System > Events** to set up an action rule. The action rule defines when the camera will perform certain actions. Action rules can be setup as scheduled, recurring, or for example, triggered by motion detection.

2. Select what **Trigger** must be met to trigger the action. If you specify more than one trigger for the action rule, all of them must be met to trigger the action.

3. Select which **Action** the camera should perform when the conditions are met.

Note

     If you make changes to an active action rule, the action rule needs to be restarted for the changes to take effect.

How to record video when the camera detects motion

This example explains how to set up the camera to start recording to the SD card five seconds before it detects motion and to stop one minute after.

Make sure the AXIS Video Motion Detection application is running:

1. Go to **Settings > Apps** > **AXIS Video Motion Detection**.

2. Start the application if it is not already running.

3. Make sure you have set up the application according to your needs.

Create an action rule:

4. Go to **Settings > System > Events** and add an action rule.

5. Type a name for the action rule.

6. From the list of triggers, select **Applications** and then select **AXIS Video Motion Detection (VMD)**.

7. From the list of actions, select **Record video**.

8. Select an existing stream profile or create a new one.

9. Enable and set the pre-trigger time to 5 seconds.

10. Enable **While the rule is active**.

11. Enable and set the post-trigger time to 60 seconds.

12. Select **SD card** from the list of storage options.

13. Click **Ok**.

How to record video when the camera detects loud noises

This example explains how to set up the camera to start recording to the SD card five seconds before it detects loud noise and to stop one minute after.

Make sure audio turned on:

1. Set up the stream profile to include audio, see *How to add audio to your recording on page 20*.

Make sure the audio detection is set up:

2. Go to **Settings > System > Detectors > Audio detection**.

3. Adjust the alarm level according to your needs.

Create an action rule:

4. Go to **Settings > System > Events** and add an action rule.

5. Type a name for the action rule.

6. From the list of triggers, select **Detectors** and then select **Audio Detection**.

7. From the list of actions, select **Record video**.

8. Select the stream profile where audio has been turned on or create a new one.

9. Enable and set the pre-trigger time to 5 seconds.

10. Enable **While the rule is active**.

11. Enable and set the post-trigger time to 60 seconds.

12. Select **SD card** from the list of storage options.

13. Click **OK**.

How to record video when the camera detects impact

Shock detection allows the camera to detect tampering caused by vibrations or shock. Vibrations due to the environment or to an object can trigger an action depending on the shock sensitivity range, which can be set from 0 to 100. In this scenario, someone is throwing rocks at the camera after hours and you would like to get a video clip of the event.

1. Go to **Settings > System > Detectors**.

21

2. Set shock detection to on, and set a value for the shock sensitivity.

Create an action rule:

3. Go to **Settings > System > Events** and add an action rule.

4. Type a name for the action rule.

5. From the list of triggers, select **Detectors** and then select **Shock detection**.

6. From the list of schedules, select **After Hours**.

7. From the list of actions, select **Send Video Clip**.

8. Select an existing stream profile or create a new one.

9. Enable and set the pre-trigger time to 5 seconds.

10. Enable **While the rule is active**.

11. Enable and set the post-trigger time to 60 seconds.

12. Select an existing recipient or create a new one.

13. Click **OK**.

How to automatically send an email if someone spray paints the lens

1. Go to **System > Detectors**.

2. Turn on **Trigger on dark images**. This will trigger an alarm if the lens is sprayed, covered, or rendered severely out of focus.

3. Set a duration for **Trigger after**. The value indicates the time that must pass before an email is sent.

Create an action rule:

4. Go to **Events > Action rules** and add an action rule.

5. Enter a name for the action rule.

6. From the list of triggers, select **Detectors** and then select **Tampering**.

7. From the list of actions, select **Send Notification** and then select a recipient from the list or click **New Recipient** to create a new recipient.

8. Enter name and address for the email.

9. Click **Ok**.

Applications

About applications

AXIS Camera Application Platform (ACAP) is an open platform that enables third parties to develop analytics and other applications for Axis products. To find out more about available applications, downloads, trials and licenses, go to *axis.com/applications*

To find the user manuals for Axis applications, go to *axis.com*

Note
*   It is recommended to run one application at a time.
*   Avoid running applications when the built-in motion detection is active.

Troubleshooting

If you can't find what you're looking for here, try the troubleshooting section at *axis.com/support*

How to 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 4* .

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. The product has been reset to the factory default settings. If no DHCP server is available on the network, the default IP address is 192.168.0.90

5. Use the installation and management software tools to assign an IP address, set the password, and access the video stream.

   The installation and management software tools are available from the support pages on *axis.com/support*

It is also possible to reset parameters to factory default through the web interface. Go to **Settings > System > Maintenance** and click **Default**.

How to check the current firmware

Firmware is the software that determines the functionality of network devices. One of your first actions when troubleshooting a problem should be to check the current firmware version. The latest version may contain a correction that fixes your particular problem.

To check the current firmware:

1. Go to the product's webpage.

2. Click on the help menu.

3. Click **About**.

How to upgrade the firmware

Important

> Preconfigured and customized settings are saved when the firmware is upgraded (provided that the features are available in the new firmware) although this is not guaranteed by Axis Communications AB.

Important

> Make sure the product remains connected to the power source throughout the upgrade process.

Note

> When you upgrade the product with the latest firmware, the product receives the latest functionality available. Always read the upgrade instructions and release notes available with each new release before upgrading the firmware. To find the latest firmware and the release notes, go to *axis.com/support/firmware*

1. Download the latest firmware file to your computer, available free of charge at *axis.com/support/firmware*

2. Log in to the product as an administrator.

3. Go to **Settings > System > Maintenance**. Follow the instructions on the page. When the upgrade has finished, the product restarts automatically.

AXIS Device Manager can be used for multiple upgrades. Find out more at *axis.com/products/axis-device-manager*

Technical issues, clues and solutions

If you can't find what you're looking for here, try the troubleshooting section at *axis.com/support*

Problems upgrading the firmware

Firmware upgrade failure	If the firmware upgrade fails, the product reloads the previous firmware. The most common reason is that the wrong firmware file has been uploaded. Check that the name of the firmware file corresponds to your product and try again.

Problems setting the IP address

The product is located on a different subnet	If the IP address intended for the product and the IP address of the computer used to access the product are located on different subnets, you cannot set the IP address. Contact your network administrator to obtain an IP address.
The IP address is being used by another device	Disconnect the Axis product from the network. Run the ping command (in a Command/DOS window, type `ping` and the IP address of the product): - If you receive: `Reply from <IP address>:  bytes=32; time=10...` this means that the IP address may already be in use by another device on the network. Obtain a new IP address from the network administrator and reinstall the product. - If you receive: `Request timed out`, this means that the IP address is available for use with the Axis product. Check all cabling and reinstall the product.
Possible IP address conflict with another device on the same subnet	The static IP address in the Axis product 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 may be problems accessing the product.

The product cannot be accessed from a browser

Cannot log in	When HTTPS is enabled, ensure that the correct protocol (HTTP or HTTPS) is used when attempting to log in. You may need to manually type `http` or `https` in the browser's address field. If the password for the user root is lost, the product must be reset to the factory default settings. See *How to reset to factory default settings on page 23*.
The IP address has been changed by DHCP	IP addresses obtained from a DHCP server are dynamic and may change. If the IP address has been changed, use AXIS IP Utility or AXIS Device Manager to locate the product on the network. Identify the product using its model or serial number, or by the DNS name (if the name has been configured). If required, a static IP address can be assigned manually. For instructions, go to *axis.com/support*
Certificate error when using IEEE 802.1X	For authentication to work properly, the date and time settings in the Axis product must be synchronized with an NTP server. Go to **Settings > System > Date and time**

The product is accessible locally but not externally

Router configuration	Check that your router allows incoming data traffic to the Axis product. The router must support UPnP®.
Firewall protection	Check the Internet firewall with your network administrator.

Troubleshooting

Problems with streaming

Multicast H.264 only accessible by local clients	Check if your router supports multicasting, or if the router settings between the client and the product need to be configured. The TTL (Time To Live) value may need to be increased.
No multicast H.264 displayed in the client	Check with your network administrator that the multicast addresses used by the Axis product are valid for your network.
	Check with your network administrator to see if there is a firewall preventing viewing.
Poor rendering of H.264 images	Ensure that your graphics card is using the latest driver. The latest drivers can usually be downloaded from the manufacturer's website.
Color saturation is different in H.264 and Motion JPEG	Modify the settings for your graphics adapter. Go to the adapter's documentation for more information.
Lower frame rate than expected	• See *Performance considerations on page 25*. • Reduce the number of applications running on the client computer. • Limit the number of simultaneous viewers. • Check with the network administrator that there is enough bandwidth available. • Lower the image resolution. • Log in to the product's webpage and set a capture mode that prioritizes frame rate. Changing the capture mode to prioritize frame rate might lower the maximum resolution depending on the product used and capture modes available. • The maximum frames per second is dependent on the utility frequency (60/50 Hz) of the Axis product.

Performance considerations

When setting up your system, it is important to consider how various settings and situations affect the performance. Some factors affect the amount of bandwidth (the bitrate) required, others can affect the frame rate, and some affect both. If the load on the CPU reaches its maximum, this also affects the frame rate.

The following factors are the most important to consider:

- High image resolution or lower compression levels result in images containing more data which in turn affects the bandwidth.

- Rotating the lens manually will result in better performance compared to rotating the image from the GUI.

- Access by large numbers of Motion JPEG or unicast H.264 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 Motion JPEG and H.264 video streams simultaneously affects both frame rate and bandwidth.

- 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.

Specifications

To find the latest version of the product's datasheet, go to the product page at *axis.com* and locate **Support & Documentation**.

LED Indicators

Note

- The Status LED can be configured to be unlit during normal operation. To configure, go to **Settings > System > Plain config**. See the online help for more information.
- The Status LED can be configured to flash while an event is active.

Status LED	Indication
Green	Steady green for normal operation.
Amber	Steady during startup. Flashes when restoring settings.

Note

The Network LED can be disabled so that it does not flash when there is network traffic. To configure, go to **Settings > System > Plain config**. See the online help for more information.

Network LED	Indication
Green	Steady for connection to a 100 Mbit/s network. Flashes for network activity.
Amber	Steady for connection to a 10 Mbit/s network. Flashes for network activity.
Unlit	No network connection.

Note

The Power LED can be configured to be unlit during normal operation. To configure, go to **Settings > System > Plain config**. See the online help for more information.

Power LED	Indication
Green	Normal operation.
Amber	Flashes green/amber during firmware upgrade.

Status LED behavior for focus assistant

Note

Only valid for optional P-iris, DC-iris or manual iris lenses.

The status LED flashes when the Focus Assistant is active.

Color	Indication
Red	The image is out of focus. Adjust the lens.
Amber	The image is close to focus. The lens needs fine tuning.
Green	The image is in focus.

Specifications

Buzzer signal for focus assistant

Note

Only valid for optional P-iris, DC-iris or manual iris lenses.

Buzzer	Lens
Fast interval	Optimally adjusted
Medium interval	Less optimally adjusted
Slow interval	Poorly adjusted

Status LED behavior and buzzer signal for leveling assistant

For information on the function button used for leveling the camera, see *page 28*.

Color	Buzzer	Camera position
Fixed green	Continuous beep	Level
Flashing green	Fast beeps	Almost level
Flashing orange	Medium beeps	Not level
Flashing red	Slow beeps	Far from level

Buzzer signal for focus assistant

Note

Only valid for optional P-iris, DC-iris or manual iris lenses.

Buzzer	Lens
Fast interval	Optimally adjusted
Medium interval	Less optimally adjusted
Slow interval	Poorly adjusted

Status LED behavior and buzzer signal for leveling assistant

For information on the function button used for leveling the camera, see *page 28*.

Press and hold the function button (2) for more than two seconds to level the camera.

- When the camera is level, both LEDs are steady green, and the beep is continuous.

- When the camera is not level, the LEDs flash a combination of red, green and orange, and the beep occurs at slow intervals.

Both LEDs briefly flash green to indicate that the leveling is getting better.

SD card slot

NOTICE
- Risk of damage to SD card. Do not 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. Do not remove the SD card while the product is running. Unmount the SD card from the product's webpage before removal.

Specifications

This product supports microSD/microSDHC/microSDXC cards.

For SD card recommendations, see *axis.com*

microSD, microSDHC, and microSDXC Logos are trademarks of SD-3C LLC. microSD, microSDHC, microSDXC are trademarks or registered trademarks of SD-3C, LLC in the United States, other countries or both.

Buttons

Control button

For location of the control button, see *Product overview on page 4* .

The control button is used for:

- Resetting the product to factory default settings. See *page 23*.

- Connecting to an AXIS Video Hosting System service. See . To connect, press and hold the button for about 3 seconds until the Status LED flashes green.

- Connecting to AXIS Internet Dynamic DNS Service. See . To connect, press and hold the button for about 3 seconds.

Function button

Note

Focus assistant is only valid for optional P-iris, DC-iris or manual iris lenses.

The function button has multiple functions:

- **Leveling assistant** – This function helps to ensure the camera is level. Press the button for about 3 seconds to start the leveling assistant and press again to stop the leveling assistant. The status LED and buzzer signal assist leveling of the camera, see *Status LED behavior and buzzer signal for leveling assistant on page 27*. The camera is level when the buzzer beeps continuously.

- **Focus assistant** – This function is used for enabling the focus assistant. To enable the focus assistant, press and very quickly release the button. Press again to stop the focus assistant. To find out more, see the Installation Guide.
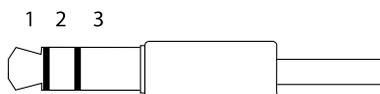
Connectors

Network connector

RJ45 Ethernet connector with Power over Ethernet (PoE).

Audio connector

The Axis product has the following audio connectors:

- **Audio in (pink)** – 3.5 mm input for a mono microphone, or a line-in mono signal.

- **Audio out (green)** – 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. It is recommended to use a stereo connector for audio out.

3.5 mm audio connectors

Specifications

	1 Tip	2 Ring	3 Sleeve
Audio Input	Balanced: 'Hot' signal Microphone/Line in Unbalanced: Microphone/Line in	Balanced: 'Cold' signal Microphone/Line in Unbalanced: Unused	Ground
Audio Output	Line out, mono	Line out, mono	Ground

The internal microphone is used by default; the external microphone is used when connected. It is possible to disable the internal microphone by connecting a plug to the microphone input.
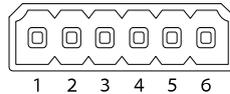
I/O connector

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 V DC reference point and power (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.

Digital output – For connecting external devices such as relays and LEDs. Connected devices can be activated by the VAPIX® Application Programming Interface or from the product's webpage.

6-pin terminal block

I/O Connector
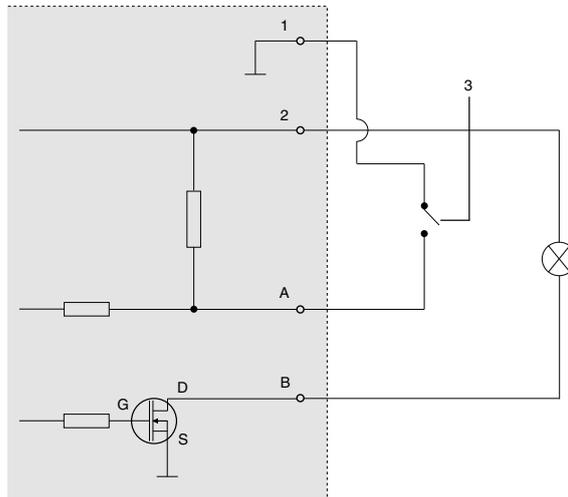
1	0 V DC (-)
2	DC output 12 V, max 50 mA
3	Example: push button
A	I/O configured as input
B	I/O configured as output

Specifications

Function	Pin	Notes	Specifications
DC ground	1		0 V DC
DC output	2	Can be used to power auxiliary equipment. Note: This pin can only be used as power out.	12 V DC Max load = 50 mA
Configurable (Input or Output)	3–6	Digital input – Connect to pin 1 to activate, or leave floating (unconnected) to deactivate.	0 to max 30 V DC
		Digital output – Connect to pin 1 to activate, or leave floating (unconnected) to deactivate. 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 V DC, open drain, 100 mA

RS485/RS422 connector

Two 2-pin terminal blocks for RS485/RS422 serial interface used to control auxiliary equipment such as pan-tilt devices.

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
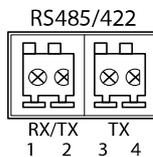
Function	Pin	Notes
RS485B alt RS485/422 RX(B)	1	RX pair for all modes (combined RX/TX for 2-wire RS485)
RS485A alt RS485/422 RX(A)	2	
RS485/RS422 TX(B)	3	TX pair for RS422 and 4-wire RS485
RS485/RS422 TX(A)	4	

Important

The maximum cable length is 30 m (98 ft).