

## **AXIS Q1659 Network Camera**

## **User Manual**

# AXIS Q1659 Network Camera

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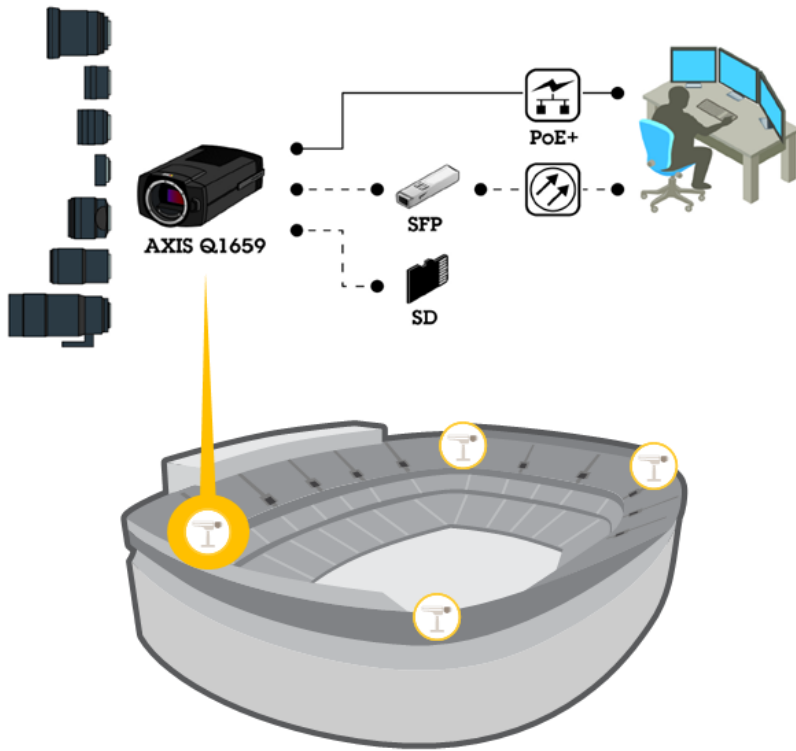
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# AXIS Q1659 Network Camera

## System overview

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### System overview

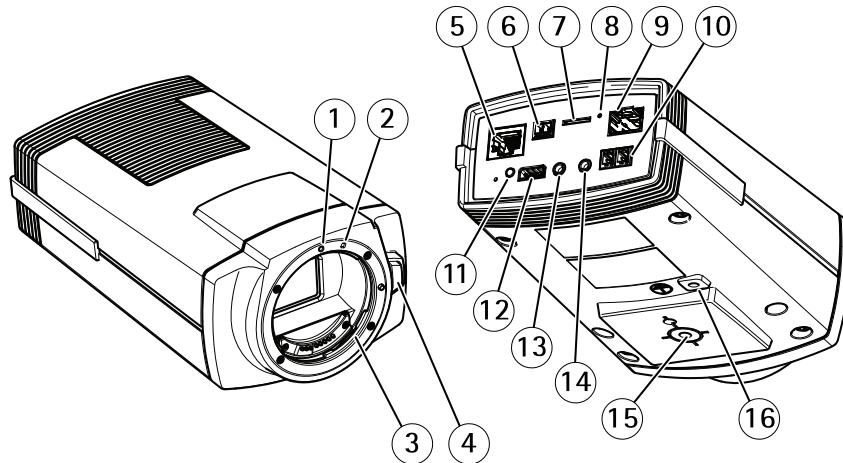


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## Product overview

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### Product overview



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### How to choose lens

There are several lens options for this 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

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## Product overview

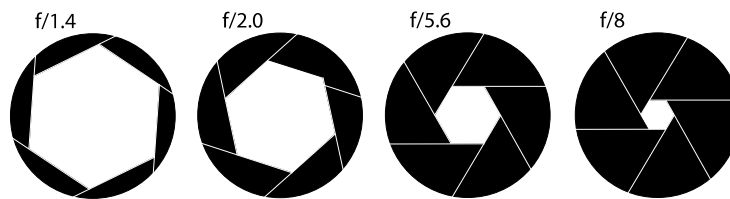
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product than in traditional surveillance cameras. Depth of field becomes shallower in dark conditions, due to the fact that the iris opens up to provide enough light to the sensor.

To learn more, go to [www.axis.com/learning/web-articles/lenses-for-network-video-cameras](http://www.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.



*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, see [www.axis.com/tools/lens-calculator](http://www.axis.com/tools/lens-calculator)

### About lens filters

You can use any filter for standard optics to protect the lens from damages or to modify the image. This can be useful in difficult light conditions, to filter certain wave lengths or to reduce reflections.

### About network redundancy

The software controls the network redundancy and requires that both network connectors (RJ45 and SFP) are connected. The SFP module has higher priority than the RJ45 connector. If the connection between the SFP module and the switch is lost the product switches to the RJ45 connector to establish a continued connection.

### About power redundancy

The software controls the power redundancy. If, for example, the DC connection fails, the camera automatically switches to PoE. Depending on the setup, the camera may restart for the change to take effect.

# AXIS Q1659 Network Camera

## Setup

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### Setup

#### How to access the product

The product can be used with the following browsers:

- Chrome™ (recommended), Firefox®, Edge®, or Opera® with Windows®
- Chrome™ (recommended) or Safari® with OS X®
- Chrome™ or Firefox® with other operating systems.

#### 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.

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 *Assign an IP Address and Access the Video Stream* on Axis Support web at [www.axis.com/support](http://www.axis.com/support)

#### Note

To show Bonjour as a browser bookmark, go to Safari > Preferences.

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.

#### Note

The controls and layout of the live view page may have been customized to meet specific installation requirements and user preferences. Consequently, some of the examples and functions featured here may differ from those displayed in your own live view page.

#### About secure passwords

##### Important

When setting the initial password, the password is sent in clear text over the network. If there is a risk of network sniffing, first set up a secure encrypted HTTPS connection before resetting the passwords.

The device password is the primary protection for the data and services. Axis' products do not impose a password policy as products may be used in various types of installations, but to protect your data do the following:

- Don't use the default password that comes with the products.
- Use a password with at least 8 characters, preferably using a password generator.
- Don't expose the password.
- Change password at a recurring interval, at least once a year.

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### Set a password for the root account

#### Important

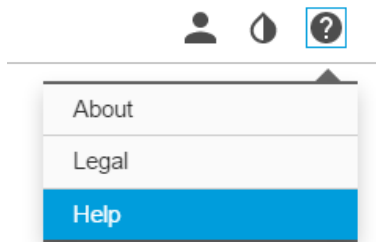
The default administrator user name **root** is permanent and cannot be deleted. If the password for root is lost, the product must be reset to the factory default settings.

The default root account has full privileges and should be reserved for administrative tasks. Always create a user account with limited privileges for daily use. This reduces the exposure of the administrative account.

1. Make sure to follow the instructions about secure passwords, see *About secure passwords on page 6*.
2. Type a password and then retype it to confirm the spelling.
3. Click **Create login**. The password has now been configured.

### About the product's built-in help

To set up the product, you need to access the product's webpage. In the webpage you can also find detailed instructions in the product's built-in help.



### 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.*

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## Setup

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### How to select capture mode

What capture mode to choose depends on the requirements of frame rate and resolution for the specific surveillance setup. See the datasheet for specifications about available capture modes. To find the latest version of the datasheet, go to [www.axis.com](http://www.axis.com) > product > Support & Documentation.

### How to choose video compression format

Deciding which compression method to choose depends 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.

For more information, see [www.axis.com/learning/web-articles/technical-guide-to-network-video/compression-formats](http://www.axis.com/learning/web-articles/technical-guide-to-network-video/compression-formats)

### How to focus

1. Go to the **Image** tab in the product's webpage.
2. Click **Autofocus**.

#### Focus aid

If the autofocus function is not sufficient, or to prevent focus from being lost when the lighting conditions changes from day to night, we recommend that you use the focus aid. Follow the instructions in the focus aid window to set the aperture as large as possible before turning on autofocus. This makes the camera keep focus when the lighting conditions changes.

### How to reduce noise in low-light conditions

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

- Make sure that the exposure mode is automatic.

##### Note

Increasing the max shutter value can result in motion blur.

- The shutter speed should be as slow as possible, which means you should set max shutter to the highest possible value.
- Reduce sharpness in the image.
- Try lowering the max gain value.


If the above settings do not improve the image sufficiently, change to a lens with a lower f-value.



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For detailed instructions, go to the product's built-in help. 

### How to select exposure mode

There are several exposure mode options in the camera that adjusts aperture, shutter speed, and gain to improve image quality for specific surveillance scenes. In the **Image** tab, select between the following options:

- For most use cases, select **Automatic** exposure.
- For fast moving objects that require a fast or fixed shutter, select **Automatic aperture**.
- To maintain a longer depth of field or focus range, select **Automatic shutter**.
- For environments with certain artificial lighting, for example fluorescent lighting, select **Flicker-free**.
- For environments with certain artificial light and bright light, for example outdoors with fluorescent lighting at night and sun during daytime, select **Flicker-reduced**.
- If you need full control of all parameters, mostly useful for scenes with little change in lighting, select **Manual**.

For more detailed instructions, go to the product's built-in help. 

### How to maximize the details in the image

#### Important

If you maximize the details in the image the bitrate becomes higher which in turn might result in reduced frame rate.

- Make sure to select the capture mode with the highest resolution.
- Set the compression as small as possible.
- Select MJPEG streaming.
- Turn off the Zipstream functionality.

# AXIS Q1659 Network Camera

## Troubleshooting


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### Troubleshooting

#### 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.

##### 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 [www.axis.com](http://www.axis.com) > product > Support & Documentation.

1. Download the latest firmware file to your computer, available free of charge at [www.axis.com/support/firmware](http://www.axis.com/support/firmware)
2. Log in to the product as an administrator.
3. Go to **Settings > System > Maintenance** in the product's webpage and follow the instructions.
4. The upgrade takes a while, don't break the power to the product. When the upgrade is finished, the product restarts automatically.

AXIS Camera Management can be used for multiple upgrades, see [www.axis.com/products/axis-camera-management](http://www.axis.com/products/axis-camera-management) for more information.

#### 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*.
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.

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## Troubleshooting

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The installation and management software tools are available from the support pages on [www.axis.com/support](http://www.axis.com/support)

### Technical issues, clues and solutions

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

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#### 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.
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#### Problems setting the IP address

When using ARP/Ping	Try the installation again. The IP address must be set within two minutes after power has been applied to the product. Ensure that the ping length is set to 408.
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 <code>ping</code> and the IP address of the product): <ul style="list-style-type: none"><li>• If you receive: <code>Reply from &lt;IP address&gt;: bytes=32; time=10...</code> 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.</li><li>• If you receive: <code>Request timed out</code>, this means that the IP address is available for use with the Axis product. Check all cabling and reinstall the product.</li></ul>
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.

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#### 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 <code>http</code> or <code>https</code> in the browser's address field.  If the password for the user <code>root</code> is lost, the product must be reset to the factory default settings. See <i>How to reset to factory default settings</i> .
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 Camera Management 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 <a href="http://www.axis.com/support">www.axis.com/support</a> .

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#### 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.

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#### Problems with streaming H.264

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.
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## Troubleshooting

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No multicast H.264 displayed in the client	<p>Check with your network administrator that the multicast addresses used by the Axis product are valid for your network.</p> <p>Check with your network administrator to see if there is a firewall preventing viewing.</p>
Poor rendering of H.264 images	<p>Ensure that your graphics card is using the latest driver. The latest drivers can usually be downloaded from the manufacturer's website.</p>
Color saturation is different in H.264 and Motion JPEG	<p>Modify the settings for your graphics adapter. Go to the adapter's documentation for more information.</p>
Lower frame rate than expected	<ul style="list-style-type: none"><li>• See <i>Performance considerations on page 12</i>.</li><li>• Reduce the number of applications running on the client computer.</li><li>• Limit the number of simultaneous viewers.</li><li>• Check with the network administrator that there is enough bandwidth available.</li><li>• Lower the image resolution.</li><li>• In the product's webpage, 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.</li></ul>

### 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.
- 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.

# AXIS Q1659 Network Camera

## Technical specifications

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### Technical specifications

To find the latest version of the datasheet, go to [www.axis.com](http://www.axis.com) > product > Support & Documentation.

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

### LED indicators

Status LED	Indication
Green	Connection and normal operation.
Amber	Steady during startup. Flashes during firmware upgrade or reset to factory default.

### 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. Disconnect power or unmount the SD card from the product's webpage before removal.

This product supports microSD/microSDHC/microSDXC cards (not included).

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

### Buttons

#### Control button

The control button is used for:

- Resetting the product to factory default settings. See *How to reset to factory default settings on page 10*.
- Connecting to an AXIS Video Hosting System service. To connect, press and hold the button for about 3 seconds until the status LED flashes green.

### Connectors

#### Network connector

RJ45 Ethernet connector with Power over Ethernet (PoE).

SFP connector.

#### **NOTICE**

The product shall be connected using a shielded network cable (STP) or an optical fiber cable. All cables connecting the product to the network shall be intended for their specific use. Make sure that the network devices are installed in accordance with the manufacturer's instructions. For information about regulatory requirements, see the Installation Guide available at [www.axis.com](http://www.axis.com)

#### About I/O connectors

Use the I/O connector with external devices in combination with, for example, tampering alarms, 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:

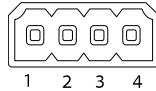
# AXIS Q1659 Network Camera

## Technical specifications

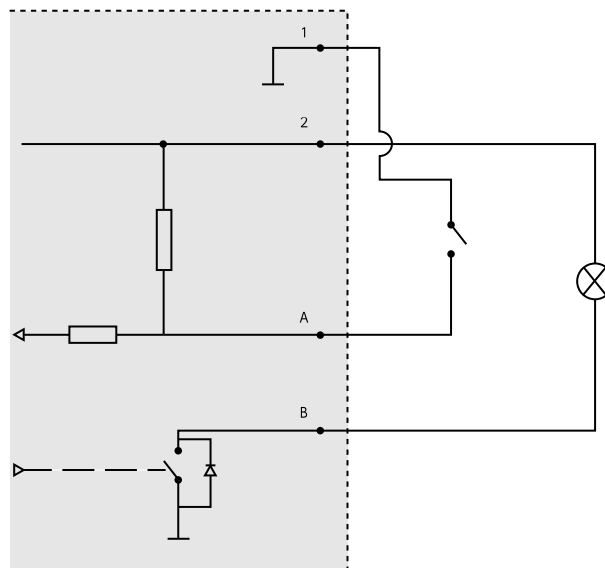
**Digital output** – For connecting external devices such as relays and LEDs. Connected devices can be activated by the VAPIX® Application Programming Interface or in the product's webpage.

**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.

4-pin terminal block



Function	Pin	Notes	Specifications
0 V DC (-)	1	DC ground	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)	3-4	Digital input – Connect to pin 1 to activate, or leave floating (unconnected) to deactivate.	0 to max 30 V DC
		Digital output – Connected to pin 1 when activated, floating (unconnected) when deactivated. If used with an inductive load, e.g. a relay, a diode must be connected in parallel with the load, for protection against voltage transients.	0 to max 30 V DC, open drain, 100 mA



- 1 0 VDC (-)
- 2 DC output 12 V, max 50 mA
- A I/O configured as input
- B I/O configured as output

### 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.

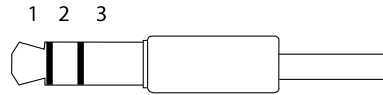
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## Technical specifications

- **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. A stereo connector must be used for audio out.

For audio in, the left channel is used from a stereo signal.

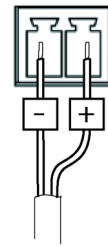
3.5 mm audio connectors  
(stereo)



	1 Tip	2 Ring	3 Sleeve
Audio Input	Microphone/Line in		Ground
Audio Output	Line out, mono (stereo connector compatible)	Line out, mono (stereo connector compatible)	Ground

### 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.



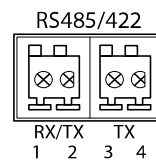
Power supply	20–28 V DC, max 15.8 W
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### RS485/RS422 connector

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

