AXIS M5000 PTZ Camera

User manual

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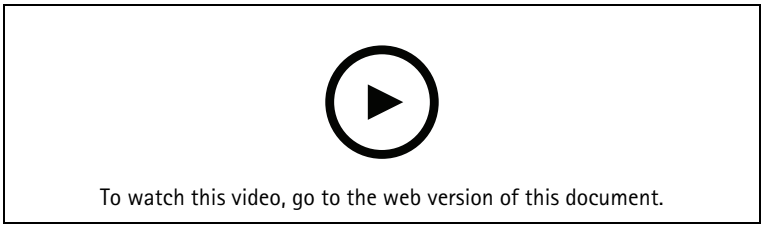
Preview mode

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.



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*.

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 26*.

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 26*.
   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 .

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 17*.

Level the camera

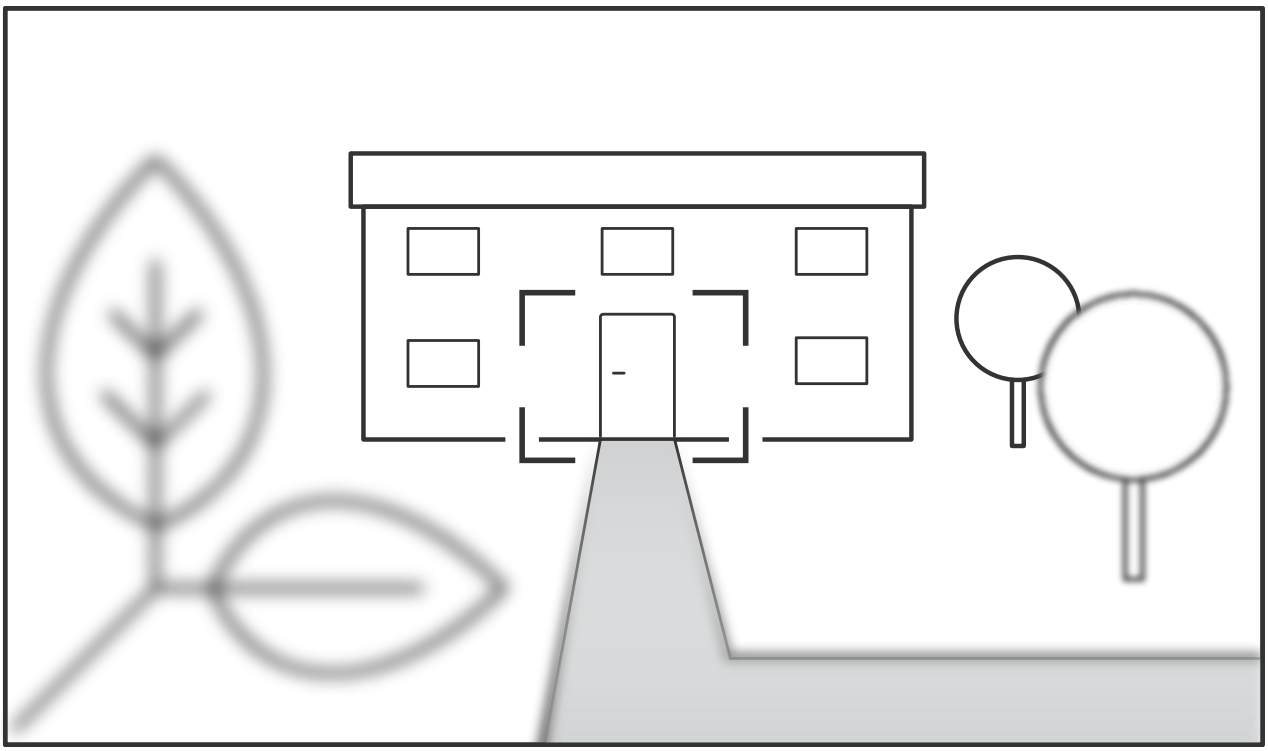
To adjust the view in relation to a reference area or an object, use the level grid in combination with a mechanical adjustment of the camera.

1. Go to **Video > Image >** and click  .
2. Click  to show the level grid.
3. Adjust the camera mechanically until the position of the reference area or the object is aligned with the level grid.

Adjust the focus

This product can have four focus modes:

- **Auto**: The camera automatically adjusts focus based on the entire image.
- **Area**: The camera automatically adjusts focus based on a selected area of the image.
- **Manual**: The focus is set manually at a fixed distance.
- **Spot**: The focus is set to a fixed area in the center of the image.



Spot focus

To turn off autofocus and adjust the focus manually:

1. In the live view window, if the **Zoom** slider is visible, click **Zoom** and select **Focus**.
2. Click  and use the slider to set the focus.

Adjust the focus faster with focus recall areas

To save the focus settings at a specific pan/tilt range, add a focus recall area. Each time the camera moves into that area it recalls the previously saved focus. It's enough to cover half of the focus recall area in the live view.

We recommend the focus recall feature in the following scenarios:

- When there is a lot of manual operation in live view, for example with a joystick.
- Where PTZ preset positions with manual focus are not efficient, for example movements where the focus setting changes continuously.
- In low-light scenarios, where the autofocus is challenged by the lighting conditions.

Important

- The focus recall overrides the camera's autofocus at the specific pan/tilt range.
- A preset position overrides the focus setting saved in the focus recall area.
- The maximum number of focus recall areas is 20.

Create a focus recall area

1. Pan, tilt, and zoom into the area where you would like to have focus.

   As long as the focus recall button shows a plus  , you can add a focus recall area in that position.
2. Adjust the focus.
3. Click the focus recall button.

Delete a focus recall area

1. Pan, tilt, and zoom into the focus recall area you want to delete.

The focus recall button toggles to minus when the camera detects a focus recall area:  .

2. Click the focus recall button.

Select scene profile

A scene profile is a set of predefined image appearance settings including color level, brightness, sharpness, contrast and local contrast. Scene profiles are preconfigured in the product for quick setup to a specific scenario, for example **Forensic** which is optimized for surveillance conditions. For a description of each available setting, see *The web interface, on page 16*.

You can select a scene profile during the initial setup of the camera. You can also select or change scene profile later.

1. Go to **Video > Image > Appearance**.
2. Go to **Scene profile** and select a profile.

Select exposure mode

To improve image quality for specific surveillance scenes, use exposure modes. Exposure modes lets you control aperture, shutter speed, and gain. Go to **Video > 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**.

Reduce noise in low-light conditions

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

- Adjust the trade-off between noise and motion blur. Go to **Video > Image > Exposure** and move the **Blur-noise trade-off** slider toward **Low noise**.
- Set the exposure mode to automatic.

Note

A high max shutter value can result in motion blur.

- To slow down the shutter speed, set max shutter to the highest possible value.

Note

When you reduce the max gain, the image can become darker.

- Set the max gain to a lower value.
- If there is an **Aperture** slider, move it towards **Open**.
- Reduce sharpness in the image, under **Video > Image > Appearance**.

Reduce motion blur in low-light conditions

To reduce motion blur in low-light conditions, adjust one or more of the following settings in **Video > Image > Exposure**:

Note

When you increase the gain, image noise also increases.

- Set **Max shutter** to a shorter time, and **Max gain** to a higher value.

If you still have problems with motion blur:

- Increase the light level in the scene.
- Mount the camera so that objects move toward it or away from it rather than sideways.

Handle scenes with strong backlight

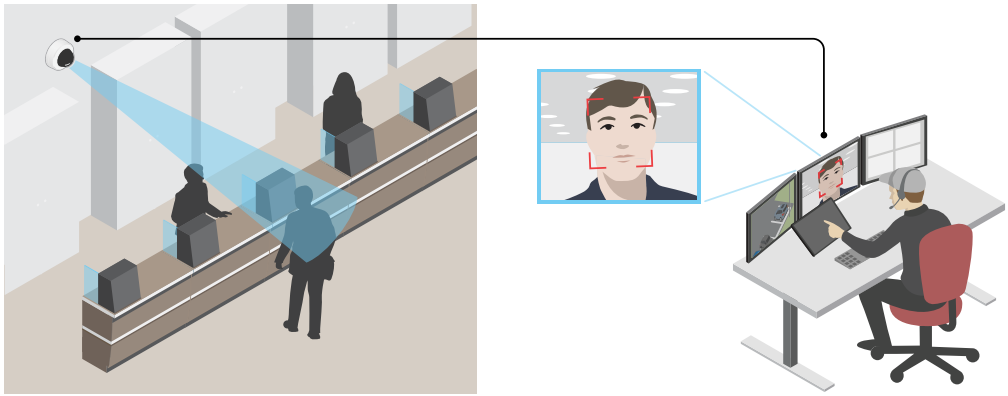
Dynamic range is the difference in light levels in an image. In some cases the difference between the darkest and the brightest areas can be significant. The result is often an image where either the dark or the bright areas are visible. Wide dynamic range (WDR) makes both dark and bright areas of the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

1. Go to **Video > Image > Wide dynamic range**.
2. Use the **Local contrast** slider to adjust the amount of WDR.
3. If you still have problems, go to **Exposure** and adjust the **Exposure zone** to cover the area of interest.

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

Verify the pixel resolution

To verify that a defined part of the image contains enough pixels to, for example, recognize the face of a person, you can use the pixel counter.



1. Go to **Video > Image** and click .
2. Click for **Pixel counter**.
3. In the camera's live view, adjust the size and position of the rectangle around the area of interest, for example where you expect faces to appear.
   You can see the number of pixels for each of the rectangle's sides, and decide if the values are enough for your needs.

Hide parts of the image with privacy masks

You can create one or several privacy masks to hide parts of the image.

1. Go to **Video > Privacy masks**.
2. Click .
3. Click the new mask and type a name.
4. Adjust the size and placement of the privacy mask according to your needs.
5. To change the color for all privacy masks, click **Privacy masks** and select a color.

See also *Privacy masks, on page 17*

Show the pan or tilt position as a text overlay

You can show the pan or tilt position as an overlay in the image.

1. Go to **Video > Overlays** and click  .
2. In the text field, type `#x` to show the pan position.
   Type `#y` to show the tilt position.
3. Choose appearance, text size, and alignment.
4. The current pan and tilt positions show up in the live view image and in the recording.

Adjust the camera view (PTZ)

Limit the pan, tilt, and zoom movements

If there are parts of the scene that you don't want the camera to reach, you can limit the pan, tilt, and zoom movements. For example, you want to protect the privacy of residents in an apartment building, which is located close to a parking lot that you intend to monitor.

To limit the movements:

1. Go to **PTZ > Limits**.
2. Set the limits as needed.

Create a recorded guard tour

1. Go to **PTZ > Guard tours**.
2. Click  **Guard tour**.
3. Select **Recorded** and click **Create**.
4. Enter a name for the guard tour and specify the pause length between each tour.
5. Click **Start recording tour** to start recording the pan/tilt/zoom movements.
6. When you're satisfied, click **Stop recording tour**.
7. Click **Done**.
8. To schedule the guard tour, go to **System > Events**.

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 18*.

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:
   - 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.

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 12*
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*.

Trigger an action

1. Go to **System > Events** and add a rule. The rule defines when the device will perform certain actions. You can set up rules as scheduled, recurring, or manually triggered.
2. Enter a **Name**.
3. Select the **Condition** that must be met to trigger the action. If you specify more than one condition for the rule, all of the conditions must be met to trigger the action.

4. Select which **Action** to perform when the conditions are met.

Note

- If you make changes to an active rule, the rule must be turned on again for the changes to take effect.
- If you change the definition of a stream profile that is used in a rule, you need to restart all the rules that use that stream profile.

Record video when the camera detects an object

This example explains how to set up the camera to start recording to the SD card when the camera detects an object. The recording will include five seconds before detection and one minute after detection ends.

Before you start:

- Make sure you have an SD card installed.

1. Start the application if it is not already running.
2. Make sure you have set up the application according to your needs.

Create a rule:

1. Go to **System > Events** and add a rule.
2. Type a name for the rule.
3. In the list of actions, under **Recordings**, select **Record video while the rule is active**.
4. In the list of storage options, select **SD_DISK**.
5. Select a camera and a stream profile.
6. Set the prebuffer time to 5 seconds.
7. Set the postbuffer time to 1 minute.
8. Click **Save**.

Show a text overlay in the video stream when the device detects an object

This example explains how to display the text "Motion detected" when the device detects an object.

1. Start the application if it is not already running.
2. Make sure you have set up the application according to your needs.

Add the overlay text:

1. Go to **Video > Overlays**.
2. Under **Overlays**, select **Text** and click + .
3. Enter `#D` in the text field.
4. Choose text size and appearance.
5. To position the text overlay, click and select an option.

Create a rule:

1. Go to **System > Events** and add a rule.
2. Type a name for the rule.
3. In the list of actions, under **Overlay text**, select **Use overlay text**.
4. Select a video channel.
5. In **Text**, type "Motion detected".
6. Set the duration.
7. Click **Save**.

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.

Turn on shock detection:

1. Go to **System > Detectors > Shock detection**.
2. Turn on shock detection, and adjust the shock sensitivity.

Create a rule:

3. Go to **System > Events > Rules** and add a rule.
4. Type a name for the rule.
5. In the list of conditions, under **Device status**, select **Shock detected**.
6. Click **+** to add a second condition.
7. In the list of conditions, under **Scheduled and recurring**, select **Schedule**.
8. In the list of schedules, select **After hours** .
9. In the list of actions, under **Recordings**, select **Record video while the rule is active**.
10. Select where to save the recordings.
11. Select a **Camera**.
12. Set the prebuffer time to 5 seconds.
13. Set the postbuffer time to 50 seconds.
14. Click **Save**.

Use PIR and audio to deter intruders

This example explains how to set up the camera to play an audio clip with a barking dog when the PIR sensor detects movement outside office hours.

Before you start:

- Add an audio clip with a barking dog to the device. For more information, see .

Create a rule:

1. Go to **System > Events** and add a rule.
2. Enter a name for the rule.
3. In the list of conditions, select **Device status > PIR sensor**.
4. Click **+** to add a second condition.
5. In the list of conditions, select **Scheduled and recurring > Schedule**.
6. In the list of schedules, select **After hours** .
7. In the list of actions, select **Audio clips > Play audio clip**.
8. In the list of clips, select **Dog barking**.
9. Click **Save**.

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.
4. If you make any changes to the input source, click **Apply changes**.

Edit the stream profile that is used for the recording:

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

The web interface

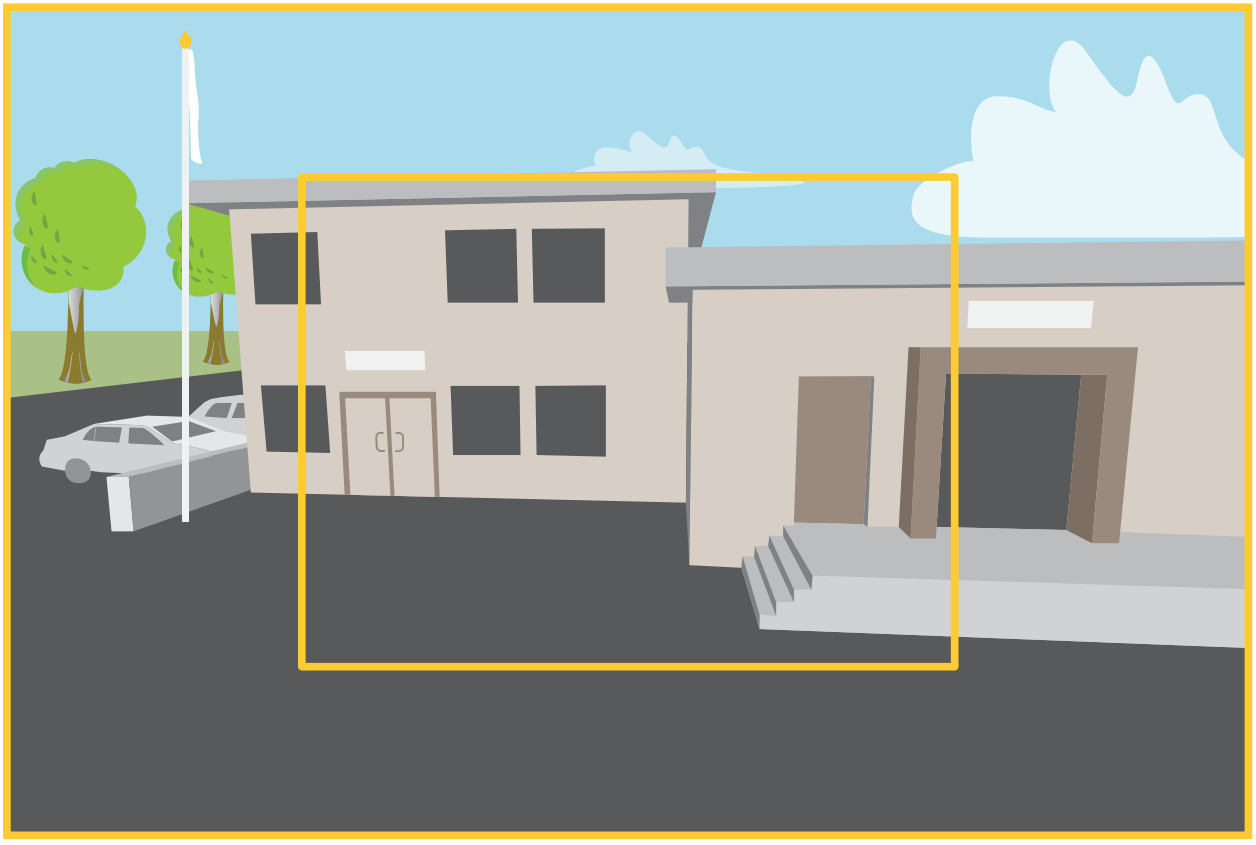
To read about all the features and settings available in the web interface of devices with AXIS OS, go to *AXIS OS web interface help*.

Learn more

Capture modes

A capture mode is a preset configuration that defines how the camera captures images. The capture mode setting can affect the camera's field of view and aspect ratio. The shutter speed can also be affected, which in turn affects the light sensitivity.

The lower resolution capture mode might be sampled from the original resolution, or it might be cropped out from the original, in which case the field of view could also be affected.



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

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

Privacy masks

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.

The privacy mask is relative to the pan, tilt, and zoom coordinates, so regardless of where you point the camera, the privacy mask covers the same place or object.

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

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

Important

If you use multiple privacy masks it may affect the product's performance.

You can create several privacy masks. Each mask can have 3 to 10 anchor points.

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.

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

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.

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.

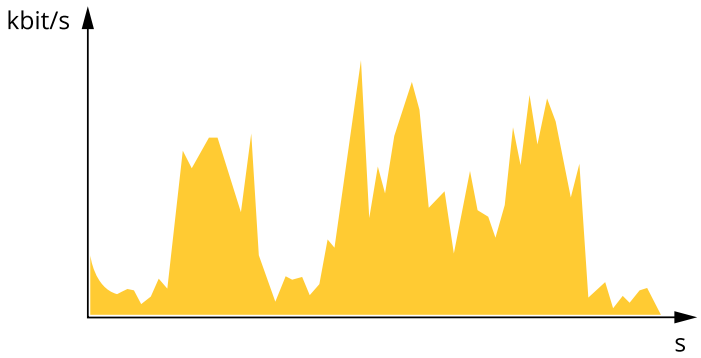
The **Stream profiles** settings override the settings from the **Stream** tab. If you request a stream with a specific stream profile, the stream contains the settings of that profile. If you request a stream without specifying a stream profile, or request a stream profile that doesn't exist in the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

Bitrate control

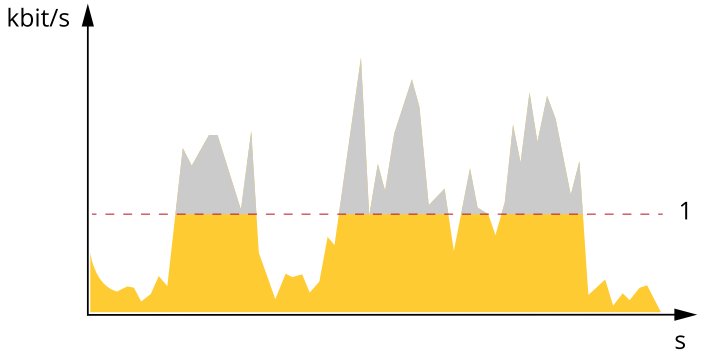
Bitrate control helps you to manage the bandwidth consumption of your video stream.

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.



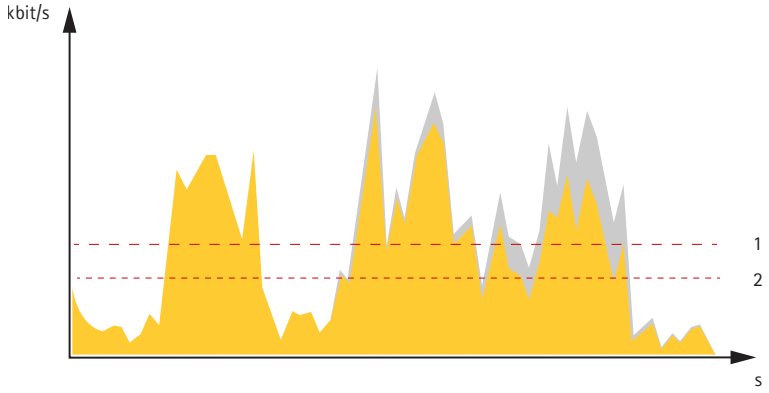
Maximum bitrate (MBR)
Maximum bitrate lets you set a target bitrate to handle bitrate limitations in your system. You might see a decline in image quality or frame rate as the instantaneous bitrate is kept below the specified target bitrate. You can choose to prioritize either image quality or frame 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

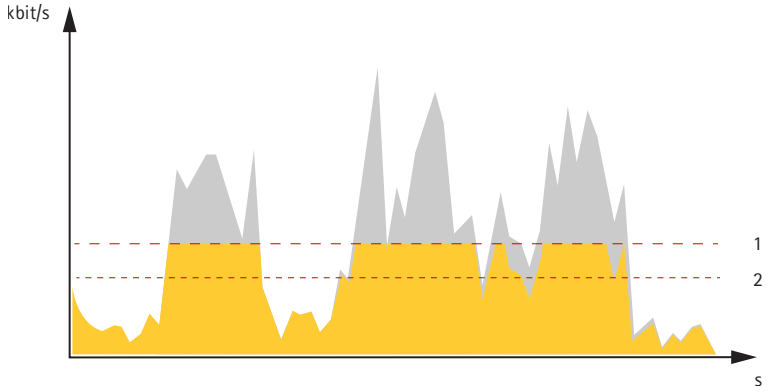
Average bitrate (ABR)
With average bitrate, the bitrate is automatically adjusted over a longer period of time. This is so you can meet the specified target and provide the best video quality based on your available storage. Bitrate is higher in scenes with a lot of activity, compared to static scenes. 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.



1 *Target bitrate*
2 *Actual average bitrate*

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



1 *Target bitrate*
2 *Actual average bitrate*

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*.

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.

Important

AXIS 3D People Counter is an app that is embedded in the device. We don't recommend you to run any other apps on this device since it can affect the performance of the AXIS 3D People Counter.

Cybersecurity

For product-specific information about cybersecurity, see the product's datasheet at axis.com.

For in-depth information about cybersecurity in AXIS OS, read the *AXIS OS Hardening guide*.

Axis Edge Vault

Axis Edge Vault provides a hardware-based cybersecurity platform that safeguards the Axis device. It offers features to guarantee the device's identity and integrity and to protect your sensitive information from unauthorized access. It builds on a strong foundation of cryptographic computing modules (secure element and TPM) and SoC security (TEE and secure boot), combined with expertise in edge device security.

Signed OS

Signed OS is implemented by the software vendor signing the AXIS OS image with a private key. When the signature is attached to the operating system, the device will validate the software before installing it. If the device detects that the integrity of the software is compromised, the AXIS OS upgrade will be rejected.

Secure boot

Secure boot is a boot process that consists of an unbroken chain of cryptographically validated software, starting in immutable memory (boot ROM). Being based on the use of signed OS, secure boot ensures that a device can boot only with authorized software.

Secure keystore

A tamper-protected environment for the protection of private keys and secure execution of cryptographic operations. It prevents unauthorized access and malicious extraction in the event of a security breach. Depending on security requirements, an Axis device can have either one or multiple hardware-based cryptographic computing modules, which provide a hardware-protected secure keystore. Depending on security requirements, an Axis device can have either one or multiple hardware-based cryptographic computing modules, like a TPM 2.0 (Trusted Platform Module) or a secure element, and/or a TEE (Trusted Execution Environment), which provide a hardware-protected secure keystore. Furthermore, selected Axis products feature a FIPS 140-2 Level 2-certified secure keystore.

Axis device ID

Being able to verify the origin of the device is key to establishing trust in the device identity. During production, devices with Axis Edge Vault are assigned a unique, factory-provisioned, and IEEE 802.1AR-compliant Axis device ID certificate. This works like a passport to prove the origin of the device. The device ID is securely and permanently stored in the secure keystore as a certificate signed by Axis root certificate. The device ID can be leveraged by the customer's IT infrastructure for automated secure device onboarding and secure device identification

Signed video

Signed video ensures that video evidence can be verified as untampered without proving the chain of custody of the video file. Each camera uses its unique video signing key, which is securely stored in the secure keystore, to add a signature into the video stream. When the video is played, the file player shows whether the video is intact. Signed video makes it possible to trace the video back to the camera origin and verifies that the video has not been tampered with after it left the camera.

Encrypted file system

The secure keystore prevents the malicious exfiltration of information and prevents configuration tampering by enforcing strong encryption upon the file system. This ensures no data stored in the file system can be extracted or tampered with when the device is not in use, unauthenticated access to the device is achieved and/or the Axis device is stolen. During the secure boot process, the read-write filesystem is decrypted and can be mounted and used by the Axis device.

To learn more about the cybersecurity features in Axis devices, go to *axis.com/learning/white-papers* and search for cybersecurity.

Axis security notification service

Axis provides a notification service with information about vulnerability and other security related matters for Axis devices. To receive notifications, you can subscribe at *axis.com/security-notification-service*.

Vulnerability management

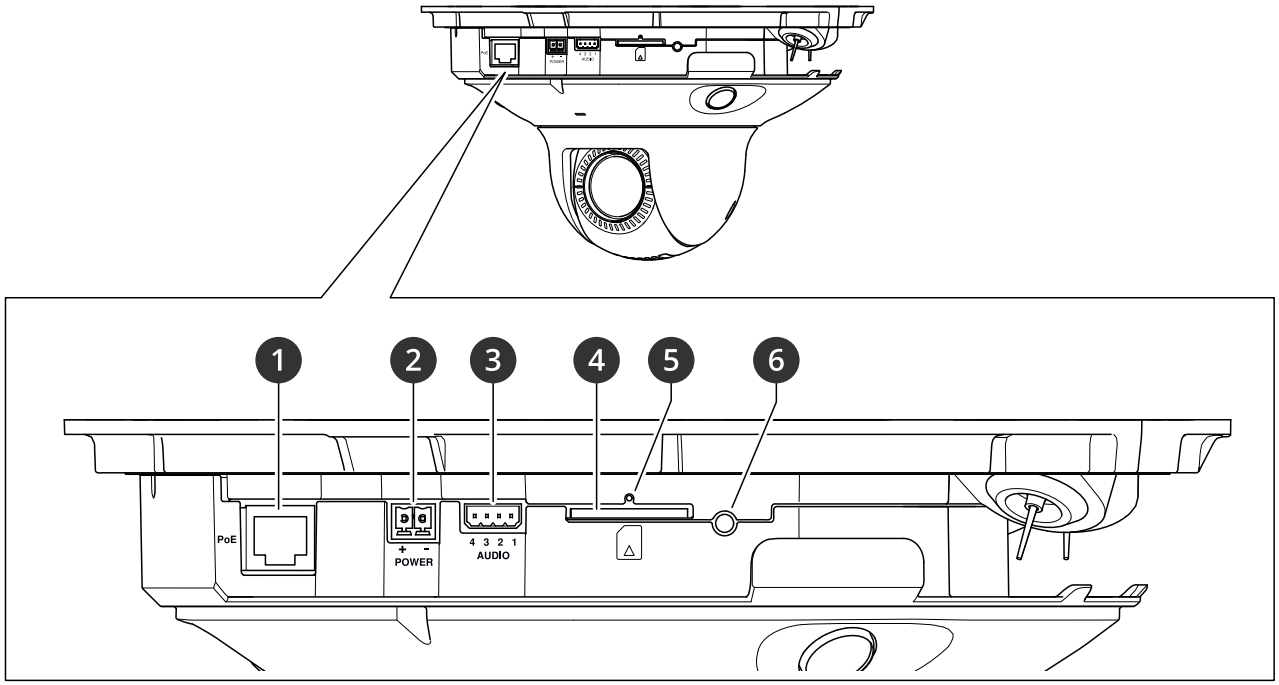
To minimize customers' risk of exposure, Axis, as a **Common Vulnerability and Exposures (CVE) numbering authority (CNA)**, follows industry standards to manage and respond to discovered vulnerabilities in our devices, software, and services. For more information about Axis vulnerability management policy, how to report vulnerabilities, already disclosed vulnerabilities, and corresponding security advisories, see *axis.com/vulnerability-management*.

Secure operation of Axis devices

Axis devices with factory default settings are pre-configured with secure default protection mechanisms. We recommend using more security configuration when installing the device. To learn more about Axis' approach to cybersecurity, including best practices, resources, and guidelines for securing your devices, go to *axis.com/about-axis/cybersecurity*.

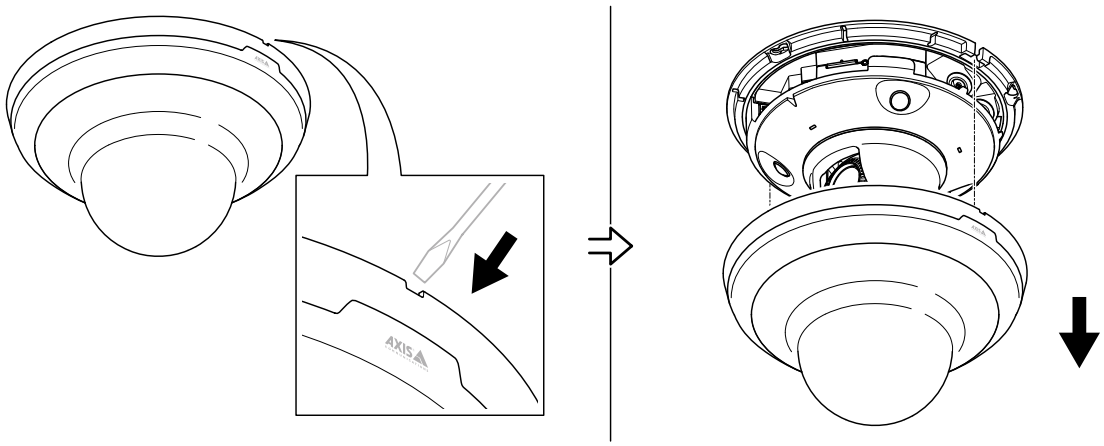
Specifications

Product overview



1 *Network connector (PoE)*
2 *Power connector*
3 *Audio connector*
4 *SD card slot (SD/SDHC/SDXC card)*
5 *Status LED indicator*
6 *Control button*

How to remove the dome



LED indicators

Status LED	Indication
Unlit	Connection and normal operation.
Green	Shows steady green for 10 seconds for normal operation after startup completed.

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.

Wireless LED	Indication
Unlit	Wired mode.
Green	Steady for connection to a wireless network. Flashes for network activity.
Red	Steady for no wireless network connection. Flashes while scanning for wireless networks.
Amber	Steady or flashing during wireless network pairing.

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 SD/SDHC/SDXC cards.

For SD card recommendations, see *axis.com*.

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

Buttons

Control button

The control button is used for:

- Resetting the product to factory default settings. See *Reset to factory default settings, on page 26*.
- Connecting to a one-click cloud connection (O3C) service over the internet. To connect, press and release the button, then wait for the status LED to flash green three times.

Connectors

Network connector

RJ45 Ethernet connector with Power over Ethernet (PoE).

Audio connector

4-pin terminal block for audio input and output. See *Product overview, on page 22*.

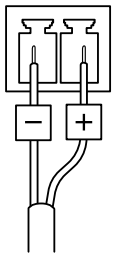
For audio in, the left channel is used from a stereo signal.

Function	Pin	Notes
GND	1	Audio GND
NC	2	Not connected

AUDIO IN	3	Audio line in
AUDIO OUT	4	Audio line out

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 ≤100 W or a rated output current limited to ≤5 A.



Clean your device

You can clean your device with lukewarm water.

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.
3. To avoid stains, dry the device with a clean, nonabrasive cloth.

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.

Note

The camera has been preconfigured with AXIS License Plate Verifier. If you reset to factory default, you need to reinstall the license key. See .

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 22*.
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*.

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*.

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 Portal: 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*.

1. Download the AXIS OS file to your computer, available free of charge at *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*.

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 26*.

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*.

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*.

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.

Color saturation is different in H.264 and Motion JPEG

Modify the settings for your graphics adapter. Check the adapter's documentation for more information.

Lower frame rate than expected

- See *Performance considerations, on page 30*.
- 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 device's web interface and set a capture mode that prioritizes frame rate. If you change the capture mode to prioritize frame rate it might lower the maximum resolution, depending on the device used and capture modes available.

Can't select H.265 encoding in live view

Web browsers don't support H.265 decoding. Use a video management system or application that supports H.265 decoding.

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*.

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*.

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