

# AXIS P3265-LVE-3 License Plate Verifier Kit

## Get started

### Find the device on the network

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

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

### Browser support

You can use the device with the following browsers:

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

✓: Recommended

\*: Supported with limitations

### Open the device's web interface

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

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 3*.
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 43*.

## 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 43*.  
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*

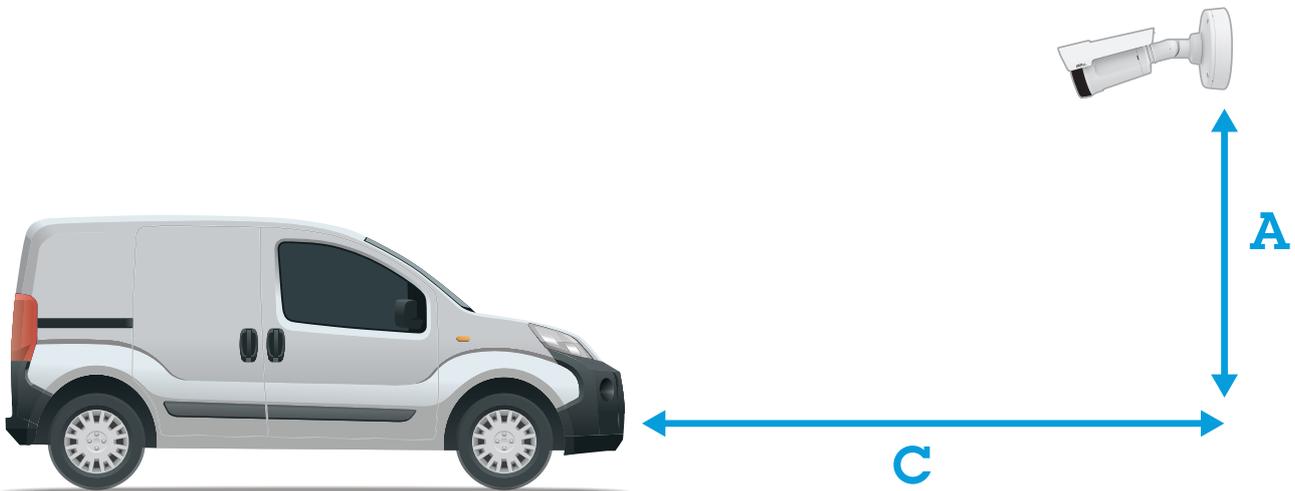
## Basic setup

These setup instructions are valid for all scenarios:

- 1.
- 2.
3. *Adjust the area of interest, on page 8*
4. *Select region, on page 9*
5. *Set up event storage, on page 9*

## Camera mounting recommendations

- When you select the mounting location, remember that direct sunlight can distort the image, for example, during sunrise and sunset.
- The mounting height for a camera in a **Access control** scenario should be half of the distance of that between the vehicle and the camera.
- The mounting height for camera in a **Free flow** (slow traffic license plate recognition) scenario should be less than half of the distance of that between the vehicle and the camera.



**Access control capture distance:** 2–7 m (6.6–23 ft). This example is based on the AXIS P3265–LVE-3 License Plate Verifier kit.

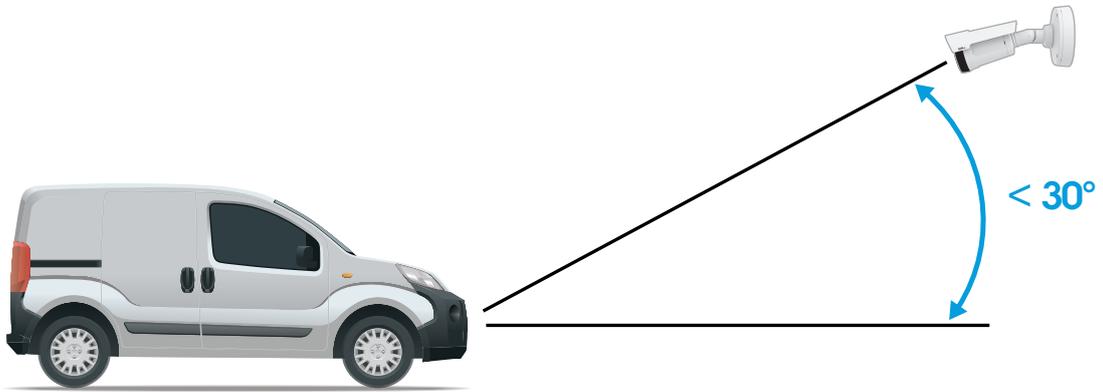
Capture distance: (C)	Mounting height (A)
2.0 m (6.6 ft)	1.0 m (3.3 ft)
3.0 m (9.8 ft)	1.5 m (4.9 ft)
4.0 m (13 ft)	2.0 m (6.6 ft)
5.0 m (16 ft)	2.5 m (8.2 ft)
7.0 m (23 ft)	3.5 m (11 ft)

**Free flow capture distance:** 7–20m (23–65 ft). This example is based on the AXIS P1465–LE-3 License Plate Verifier kit.

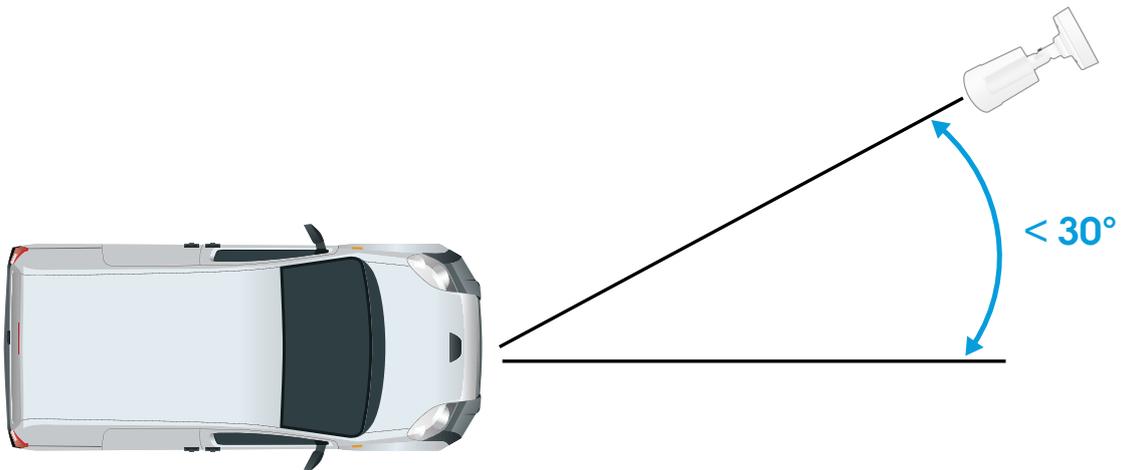
Capture distance (C)	Mounting height (A)
7.0 m (23 ft)	3.0 m (9.8 ft)
10.0 m (33 ft)	4.0 m (13 ft)

15.0 m (49 ft)	6.0 m (19.5 ft)
20.0 m (65 ft)	10.0 m (33 ft)

- The camera's mounting angle should not be larger than 30° in any direction.

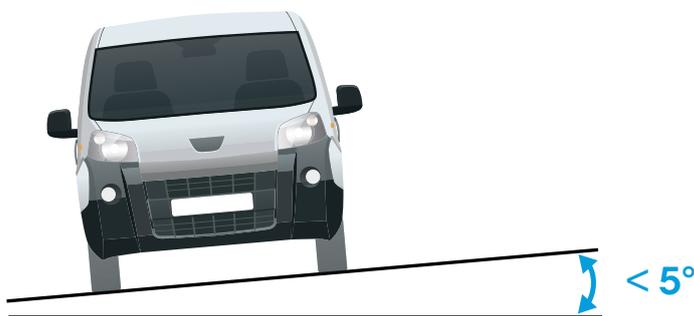


*Mounting angle from the side.*



*Mounting angle from above.*

- The image of the license plate should not tilt more than 5° horizontally. If the image is tilted more than 5°, we recommended that you adjust the camera so that the license plate is displayed horizontally in the live stream.



Roll angle.

## Setup assistant

When you first run the application, set up **Free flow** or **Access control** using the setup assistant. If you want to make changes later on, go to **Settings > Maintenance** and under **Setup assistant** press **Start**.

### Free flow

In Free flow, the application can detect and read license plates in slow speed traffic on larger access roads, city centers and enclosed areas like campuses, ports or airports. This allows for LPR-forensic search and LPR triggered events in a VMS.

1. Select **Free flow** and click **Next**.
2. Select the image rotation that corresponds to how your camera is mounted.
3. Select the number of areas of interest. Note that one area can detect plates in both directions.
4. Select the region where the camera is located.
5. Select capture type.
  - **License plate crop** saves only the license plate.
  - **Vehicle crop** saves the entire captured vehicle.
  - **Frame downsized 480x270** saves the entire image and reduces the resolution to 480x270.
  - **Full frame** saves the entire image at full resolution.
6. Drag the anchor points to adjust the area of interest. See *Adjust the area of interest, on page 8*.
7. Adjust the direction of the area of interest. Click the arrow and rotate to set the direction. The direction determines how the application registers vehicles entering or exiting the area.
8. Click **Next**
9. In the **Protocol** drop-down list, select one of the following protocols:
  - **TCP**
  - **HTTP POST**
10. In the **Server URL** field, type the server address and port in the following format: 127.0.0.1:8080
11. In the **Device ID** field, type the name of the device or leave as is.
12. Under **Event types**, select one or more of the following options:
  - **New** means the first detection of a license plate.

- **Update** is either a correction of a character on a previously detected license plate, or when a direction is detected as the plate moves and is tracked across the image.
  - **Lost** is the last tracked event of the license plate before it exits the image. It also contains the direction of the license plate.
13. To turn on the feature, select **Send event data to server**.
  14. To reduce bandwidth when using HTTP POST, you can select **Do not to send images through HTTP POST**.
  15. Click **Next**.
  16. If you already have a list of registered plates, choose to import as either a **blocklist** or **allowlist**.
  17. Click **Finish**.

## Access control

Use the setup wizard for quick and easy configuration. You can choose to **Skip** to leave the guide at any time.

1. Select **Access control** and click **Next**.
2. Select the type of access control to use:
  - **Internal I/O** if you want keep list management in the camera. See *Open a barrier for known vehicles using the camera's I/O, on page 26*.
  - **Controller** if you want to connect a Door controller. See .
  - **Relay** if you want to connect to a relay module. See .
3. In the **Barrier mode** drop-down list, under **Open from lists**, select **Allowlist**.
4. In the **Vehicle direction** drop-down list, select **out**.
5. In the **ROI** drop-down-list, select the area of interest you would like to use, or if you would like to use all.
6. Click **Next**.

On the **Image settings** page:

1. Select the number of areas of interest.
2. Select the region where the camera is located.
3. Select capture type. See *Adjust the image capture settings, on page 9*.
4. Drag the anchor points to adjust the area of interest. See *Adjust the area of interest, on page 8*.
5. Adjust the direction of the area of interest. The direction determines how the application registers vehicles entering or exiting the area.
6. Click **Next**

On the **Event data** page:

### Note

For detailed settings see: *Push event information to third-party software, on page 34*.

1. In the **Protocol** drop-down list, select one of the following protocols:
  - TCP
  - HTTP POST
2. In the **Server URL** field, type the server address and port in the following format: 127.0.0.1:8080.
3. In the **Device ID** field, type the name of the device or leave as is.
4. Under **Event types**, select one or more of the following options:
  - **New** means the first detection of a license plate.
  - **Update** is either a correction of a character on a previously detected license plate, or when a direction is detected as the plate moves and is tracked across the image.

- **Lost** is the last tracked event of the license plate before it exits the image. It also contains the direction of the license plate.
- 5. To turn on the feature, select **Send event data to server**.
- 6. To reduce bandwidth when using HTTP POST, you can select **Do not to send images through HTTP POST**.
- 7. Click **Next**

On the **Import list from a .csv file** page:

1. If you already have a list of registered plates, choose to import as either a **blocklist** or **allowlist**.
2. Click **Finish**.

## Access the application settings

1. In the camera's web interface, go to **Apps**, start the application and click **Open**.

## Adjust the area of interest

The area of interest is the area in the live view where the application looks for license plates. For optimal performance, keep the area of interest as small as possible. To adjust the area of interest, do the following:

1. Go to **Settings**.
2. Click **Image**.
3. Click on 1:1 to zoom in where you want monitor traffic or manage access control.
4. To improve verification and captured images, click on **AF**.
5. To have the camera automatically focus on the vehicles, click **AF**. To set the focus manually, adjust it with the slider.
6. Click on **Area of interest** to see it displayed in the view area.
7. To move the area of interest, click anywhere in the area to select it and drag it to where the license plates are most visible. Make sure the region of interest stays in position after you have saved the settings.
8. To adjust the area of interest, click anywhere in the area to select it and drag the anchor points highlighted in blue.
  - To reset the area of interest, click on the reset button on the lower left corner next to the number icon.
  - To add anchor points, click the on one of the dark anchor points. The anchor point will turn yellow, showing it can be manipulated. New dark points are automatically added next to the yellow anchor point. The maximum amount of yellow anchor points is eight.
9. Click anywhere outside the area of interest to save your changes.
10. To get the correct direction feedback in the **Event log**, you need to turn the arrow to match the driving direction.
  - 10.1. Click the arrow icon.
  - 10.2. Select the anchor point and rotate the arrow so it aligns with the driving direction.
  - 10.3. Click outside the area of interest to save the changes.

Note that one area can detect plates in both directions. The direction feedback shows up in the **Direction** column.

11. To check if your area of interest is large enough for the best results, use the pixel counter.
  - To show the pixel counter, click on the calculator icon.
  - To adjust the full size pixel counter area, drag the lower right corner of the area highlighted in yellow.
  - To move the pixel counter area, click anywhere in the area and drag it where you want.
- To add a second area of interest, click on **+** next to 1.

- If you are using a standalone camera, you can have the app set the recommended settings for license plate recognition.
  1. Click on the magic wand icon and the settings will be optimized for license plate recognition.
  2. Click on the menu button next to the magic wand to see the set values.

### Select region

1. Go to **Settings > Recognition**.
2. In the **Region** drop-down list, select your region.

### Adjust the image capture settings

1. Go to **Settings > Image**.
2. To change the resolution of captured images, go to **Image resolution**
3. To change the rotation of the captured image, go to **Rotation**

### Set up event storage

An event consists of the captured image, the license plate, the area of interest number, vehicle direction, access, and the date and time.

This example use case explains how to store events of allowlisted license plate numbers for 30 days.

Requirements:

- Camera physically installed and connected to the network.
  - AXIS License Plate Verifier up and running on the camera.
  - Internal storage or an SD card installed in the camera.
1. Go to **Settings > Storage**.
  2. Under **Retain events**, select **Allowlisted**.
  3. Under **Retention period**, select **30 days**.
  4. To change how you save your captured images, go to **Save full frame**:
    - **License plate crop** saves only the license plate.
    - **Vehicle crop** saves the entire captured vehicle.
    - **Frame downsized 480x270** saves the entire image and reduces the resolution to 480x270.
    - **Full frame** saves the entire image at full resolution.

#### Note

To detect an inserted SD card when the app is running, you need to restart the app. If an SD card is installed in the camera, the app will automatically choose the SD card as the default storage.

AXIS License Plate Verifier uses the cameras internal memory to save up to 1,000 events, using license plate crops as the frame. If you use larger frames, it will vary the amount of events you can save.

An SD card can save up to 100,000 events using any type of frame.

## Installation

### Preview mode

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



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

*This video demonstrates how to use preview mode.*

## Configure your device

### For users of AXIS Camera Station

#### Set up AXIS License Plate Verifier

When a device is configured with AXIS License Plate Verifier, it is considered as an external data source in the video management system. You can connect a view to the data source, search for the license plates that are captured by the device, and view the related image.

#### Note

- It requires AXIS Camera Station 5.38 or later.
  - AXIS License Plate Verifier requires a license.
1. Download and install the application on your device.
  2. Configure the application. See *AXIS License Plate Verifier user manual*.
  3. For an existing AXIS Camera Station installation, renew your server certificate that is used to communicate with the client. See *Certificate renewal*.
  4. Turn on time synchronization to use AXIS Camera Station server as the NTP server. See *Server settings*.
  5. Add the device to AXIS Camera Station. See *Add devices*.
  6. When the first event is received, a data source is automatically added under **Configuration > Devices > External data sources**.
  7. Connect the data source to a view. See *External data sources*.
  8. Search for license plates that are captured by the device. See *Data search*.
  9. Click  to export the search results to a .txt file.

### Basic settings

#### Set the mounting position

1. Go to **Video > Installation > Mounting position**.
2. Click **Change**.
3. Select a mounting position and click **Save and restart**.

#### Set the power line frequency

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

### Adjust the image

This section includes instructions about configuring your device.

#### Reduce image processing time with low latency mode

You can optimize the image processing time of your live stream by turning on low latency mode. The latency in your live stream is reduced to a minimum. When you use low latency mode, the image quality is lower than usual.

1. Go to **System > Plain config**.
2. Select **ImageSource** from the drop-down list.
3. Go to **ImageSource/I0/Sensor > Low latency mode** and select **On**.
4. Click **Save**.

## 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**.

## 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 often creates barrel distortion in an image. Barrel distortion correction compensates for this distortion.

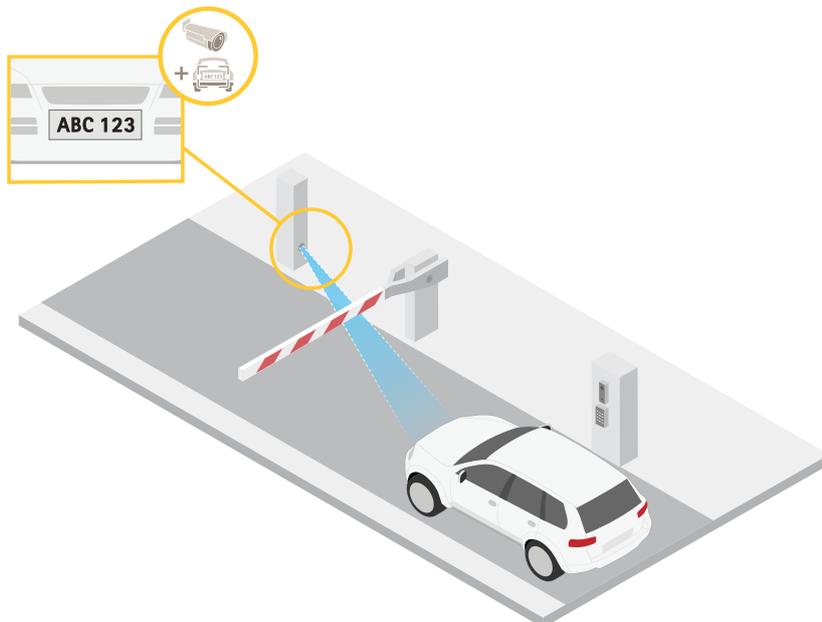
### Note

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

1. Go to **Video > Installation > Image correction**.
2. Turn on **Barrel distortion correction (BDC)**.

## Verify the pixel resolution

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



1. Go to **Video > Image**.
2. Click  **A**.
3. Click  for **Pixel counter**.

4. In the camera's live view, adjust the size and position of the rectangle around the area of interest, for example where you expect license plates to appear.
5. You can see the number of pixels for each of the rectangle's sides, and decide if the values are enough for your needs.

## View and record video

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

## Reduce bandwidth and storage

### Important

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

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

### Note

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

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

### Note

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

## Set up network storage

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

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

## Record and watch video

Record video directly from the camera

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

- 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 13*

- To stop recording, click  again.

#### Watch video

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

#### Verify that no one has tampered with the video

With signed video, you can make sure that no one has tampered with the video recorded by the camera.

- Go to **Video > Stream > General** and turn on **Signed video**.
- Use AXIS Camera Station (5.46 or later) or another compatible video management software to record video. For instructions, see the *AXIS Camera Station user manual*.
- Export the recorded video.
- Use AXIS File Player to play the video. *Download AXIS File Player*.



 indicates that no one has tampered with the video.

#### Note

To get more information about the video, right-click the video and select **Show digital signature**.

#### 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*.

#### Record video when the camera detects a license plate

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.

Make sure that AXIS Licence Plate Verifier is running:

- Go to **Apps > AXIS License Plate Verifier**.
- Start the application if it is not already running.
- Make sure you have set up the application according to your needs.

Create a rule:

- Go to **System > Events** and add a rule.
- Type a name for the rule.
- In the list of conditions, under **Application**, select **ALPV.PlateInView**.
- In the list of actions, under **Recordings**, select **Record video while the rule is active**.
- In the list of storage options, select **SD\_DISK**.
- Select a camera and a stream profile.

7. Set the prebuffer time to 5 seconds.
8. Set the postbuffer time to 1 minute.
9. Click **Save**.

### Trigger a notification when the camera lens is tampered

This example explains how to set up an email notification when the camera lens gets either spray painted, covered, or blurred.

#### Activate the tampering detection:

1. Go to **System > Detectors > Camera tampering**.
2. Set a value for **Trigger delay**. The value indicates the time that must pass before an email is sent.
3. Turn on **Trigger on dark images** to detect if the lens is sprayed, covered, or rendered severely out of focus.

#### Add an email recipient:

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

#### Create a rule:

12. Go to **System > Events > Rules** and add a rule.
13. Type a name for the rule.
14. In the list of conditions, under **Video**, select **Tampering**.
15. In the list of actions, under **Notifications**, select **Send notification to email** and then select the recipient from the list.
16. Type a subject line and message for the email.
17. 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**.

## Add audio capability to your product using portcast

With portcast technology, you can add audio capability to your product. It allows audio and I/O communication digitally over the network cable between the camera and the interface.

To add audio capability to your Axis network video device, connect the portcast compatible Axis audio device and I/O Interface between your device and the PoE switch which provides power.

1. Connect the Axis network video device (1) and the Axis portcast device (2) with a PoE cable.
2. Connect the Axis portcast device (2) and the PoE switch (3) with a PoE cable.



- 1 Axis network video device
- 2 Axis portcast device
- 3 Switch

Once the devices are connected, an audio tab becomes visible in the settings for your Axis network video device. Go to the audio tab and turn on **Allow audio**.

See your Axis portcast device's user manual for more information.

## Manage lists

### Add detected license plate to list

A license plate can be added directly to a list after being detected by the application.

1. Click on **Home**.
2. Go to **Live**.
3. Click on the arrow icon on the registered plate in the list.
4. Click on **Append plate to list**.
5. Select the list you would like to add the license plate in the dialog.
6. Click **Append**.

#### Note

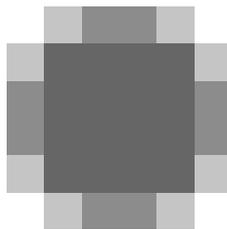
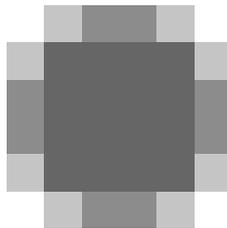
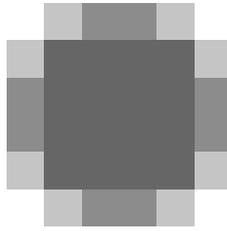
Make sure the symbols <, > and & aren't used in either the license plate or description.

### Add descriptions to license plates

To add a description to a license plate in the list:

- Go to **List management**.

- Select the license plate and click



then select **Edit** in the drop-down menu.

- Type the relevant information in the **Description** field.
- Click **Save**.

**Note**

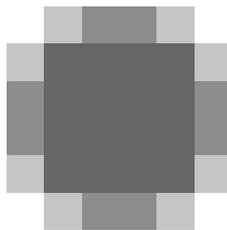
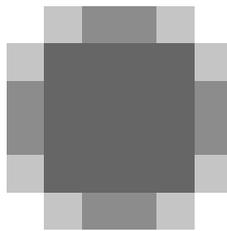
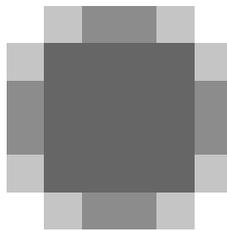
Make sure the symbols **<**, **>** and **&** aren't used in either license plates or descriptions.

### **Customize list names**

You can change the name of any of the lists to fit your specific use case.

1. Go to **List management**.

2. Click



next to the list you want to change.

3. Select **Edit**.
4. Type the name of the list.
5. Click **Submit**.

The new list name will be updated in any existing configurations.

### **Import allowlisted license plate numbers**

You can import allowlisted license plate numbers from a .csv file on the computer. In addition to the license plate number, you can also add comments for each license plate number in the .csv file.

The structure of the .csv file must look like this: `license plate, date, description`

**Example:**

Only license plate: `AXIS123`

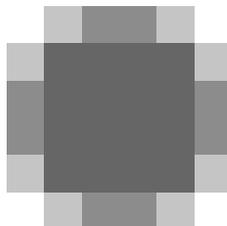
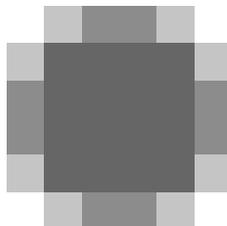
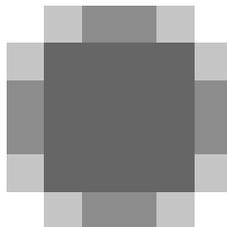
License plate + description: `AXIS123, , John Smith`

License plate + date + description: `AXIS123, 2022-06-08, John Smith`

**Note**

Make sure the symbols <, > and & aren't used in either license plates or descriptions.

1. Go to List management
2. Click on



next to Allowlist and select **Import** in the drop-down menu.

3. Browse to select a .csv file on the computer.
4. Click **OK**.
5. Check that the imported license plate numbers appear in the **Allowlist**.

### Share license plate lists with other cameras

You can share the license plate lists with other cameras on the network. The synchronization will override all current license plate lists in the other cameras.

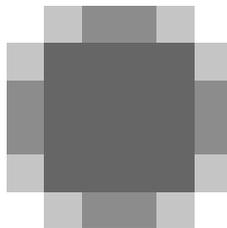
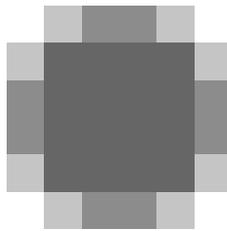
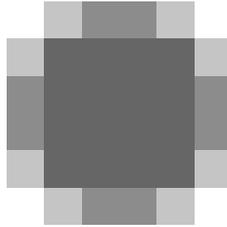
1. Go to List management > List synchronization.
2. Under Remote connected devices, type the IP address, username and password.
3. Click **Add**.
4. Click **Synchronize list**.

5. Check that the date and time under **Last sync** updates accordingly.

## Schedule lists

Lists can be scheduled to only be active during certain times during certain days of the week. To schedule a list:

- Go to **List management**.
- Click



next to the list you want to change.

- Select **Schedule** in the drop-down menu.
- Select the start and end time, and the day when the list should be active.
- Click the button next to **Enabled**.
- Click **Save**.

## Additional settings

### Configure text overlay

A text overlay shows the following event information in the live view: *weekday, month, time, year, license plate number*.

1. Go to **Settings > Image**.
2. Activate **Text overlay**.
3. Select either **Timestamp and license plate** or **License plate only**.
4. Set **Overlay duration** to a value between 1 and 9 seconds.
5. Check that the overlay appears in the live view.

### Detect license plates in low-light conditions

Each detection gets a score by the algorithm, this is called the confidence threshold. Detections that have a lower score than the selected level will not show up in the list of events.

For scenes with low lighting you can set a lower confidence threshold, which will allow for detection of more plates.

1. Go to **Settings > Recognition**.
2. Adjust the slider under **Confidence threshold**.
3. Check that the algorithm detects the license plates as expected.

### Allow fewer characters on license plates

The application has a default minimum number of characters for a license plate to be detected. The default minimum number of characters is five. You can configure the application to detect license plates with fewer characters.

1. Go to **Settings > Recognition**.
2. Under **Number of characters**, adjust the slider to set the minimum number of characters you want to allow.
3. Check that the application detects license plates as expected.

### Allow only exact matches of license plates

The matching algorithm automatically allows a deviation of one character when matching the detected license plate against the allowlist or blacklist. However, some scenarios need an exact match of all characters of the license plate.

1. Go to **List management**.
2. Click to activate **Strict matching**.
3. Check that the application matches the license plates as expected.

### Allow more than one character deviation when matching license plates

The matching algorithm automatically allows a deviation of one character when matching the detected license plate against the allowlist or blacklist. However, you can allow more than one character deviation.

1. Go to **Settings > Recognition**.
2. Under **Allowed character deviation**, select the number of characters that are allowed to be different.
3. Check that the application matches the license plates as expected.

## Give limited access to operators

Operators can be given a limited access to the app using an URL. This way they only have access to the Event log and List management. The URL can be found under **Settings > User rights**.

## Set up secure connection

To protect communication and data between devices, for example between the camera and the door controller, set up a secure connection with HTTPS using certificates.

1. Go to **Settings > Security**.
2. Under HTTPS, select either **Self-signed** or **CA-signed**.

### Note

Find out more about HTTPS and how to use it at .

## Backup and restore app settings

You can backup and restore settings made in the app related to image capture, security, detection and integration. If something should go wrong, you can now restore the settings you have backed up.

To backup app settings:

- Go to **Settings > Maintenance**.
- Click **Download backup configuration**.

A JSON file will be downloaded to you downloads folder.

To restore app settings:

- Go to **Settings > Maintenance**.
- Click **Restore configuration**.

Select the JSON file containing the backup.

The setting are restored automatically.

## Clear all events

After you set up the app, it can be a good idea to clear the records of any images or captured plates from the setup process.

To clear all images and plates from the database:

Go to **Settings > Maintenance**.

- Click **Clear all recognition results**.
- Click **Yes**.

## Use virtual ports to trigger actions

Virtual ports can be used together with access control to trigger any kind of action. This example explains how to set up AXIS License Plate Verifier together with the camera's I/O port to display a text overlay using a virtual port.

Requirements:

- Camera physically installed and connected to the network.
- AXIS License Plate Verifier up and running on the camera.
- Cables connected between the barrier and the camera's I/O port.
- Basic setup done. See .

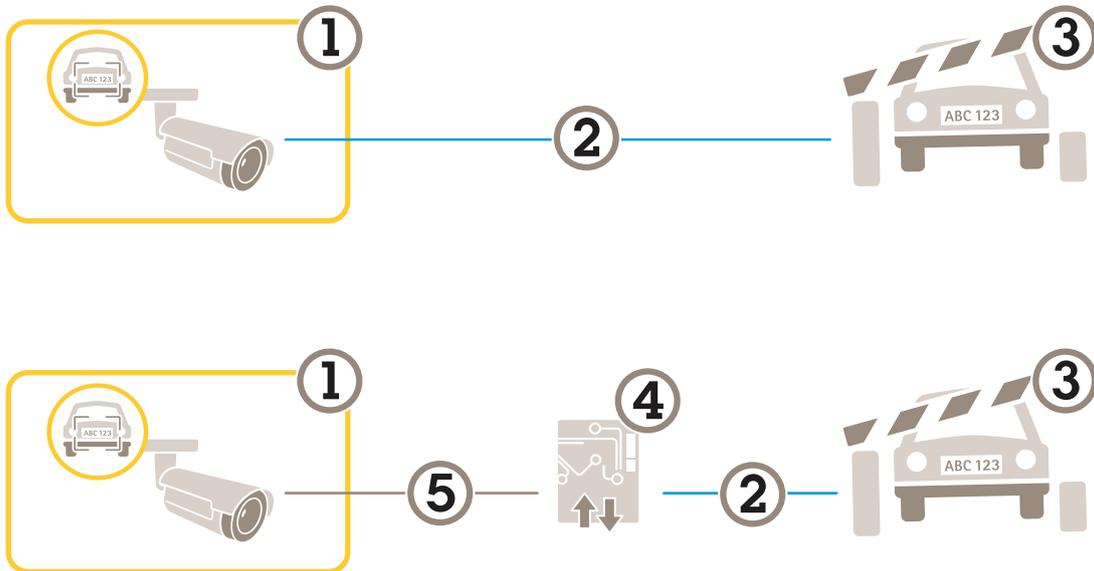
1. Go to the application's webpage and select the **Settings** tab.
2. Go to **Access control**.

3. Under **Access control**, select **Internal I/O**.
4. Select the **I/O output #**.
5. Select a port in the **Virtual port** drop-down list.
6. Under **Barrier mode**, select **Open to all**.
7. Under **Vehicle direction**, select **Any**.
8. Select the **Area of interest** you would like to use.
9. In the camera's webpage, go to **System > Events**.
10. Click **Add rule**.
11. Under **Condition** select **Virtual input is active** and the port number you have selected.
12. Under **Action**, select **Use overlay text**.
13. Select **Video channels**.
14. Type the text you want displayed.
15. Add the duration of the text.
16. Click **Save**.
17. Go to **Video > Overlays**.
18. Go to **Overlays**.
19. Select **Text** in the drop-down menu and click **+**.
20. Type **#D** or select the modifier in the **Modifiers** drop-down list.
21. Check that the text overlay is displayed when a vehicle enters the region of interest in the live view.

## Vehicle entry and exit scenario

In the scenario for vehicle entry and exit, the application reads the vehicle license plate captured by the camera and verifies the license plate against a list of authorized or unauthorized license plate numbers stored in the camera.

This scenario requires the application embedded in a camera with I/O support or a connected I/O relay module to open and close the barrier.



Two possible setups for the vehicle entry and exit scenario.

- 1 Axis camera with AXIS License Plate Verifier
- 2 I/O communication
- 3 Barrier
- 4 Axis I/O relay module
- 5 IP communication

## Open a barrier for known vehicles using a relay module

This example use case explains how to set up AXIS License Plate Verifier together with a relay module to open a barrier for a known vehicle driving through a specific region of interest (ROI) into, let's say a parking area.

### Requirements:

- Camera physically installed and connected to the network.
  - AXIS License Plate Verifier up and running on the camera.
  - Cables connected between the barrier and the relay module.
  - Basic setup done. See *Basic setup, on page 4*.
1. Go to the camera's webpage, select **Settings** and open **AXIS License Plate Verifier**.
  2. Go to the relay module's webpage and make sure the relay port is connected to the camera's I/O port.
  3. Copy the relay module's IP address.
  4. Go back to **AXIS License Plate Verifier**.
  5. Go to **Settings > Access control**.
  6. Go to **Type** and select **Relay** in the drop-down list.
  7. In the **I/O output** drop-down list, select the I/O port that is connected to the barrier.
  8. In the **Barrier mode** drop-down list, select **Open from lists** and then check **Allowlist**.
  9. In the **Vehicle direction** drop-down list, select **in**.

10. In the **ROI** drop-down list, select the area of interest that covers the traffic lane.
11. Enter the following information:
  - the IP address for the relay module in format 192.168.0.0
  - the username for the relay module
  - the password for the relay module
12. To make sure the connection works, click **Connect**.
13. To activate the connection, click **Turn on integration**.
14. Go to the **List management** tab
15. Enter the license plate number in the **Allowlist** field.

**Note**

The physical input ports 1 to 8 on the relay module correspond to ports 1 to 8 in the drop-down list. However, the relay ports 1 to 8 on the relay module correspond to ports 9 to 16 in the drop-down list. This is valid even if the relay module only has 8 ports.

16. Check that the application identifies the license plate number in the allowlist as a known vehicle and that the barrier opens as expected.

### Open a barrier for known vehicles using the camera's I/O

This example explains how to set up AXIS License Plate Verifier together with the camera's I/O port to open a barrier for a known vehicle entering, for example, a parking area.

Requirements:

- Camera physically installed and connected to the network.
  - AXIS License Plate Verifier up and running on the camera.
  - Cables connected between the barrier and the camera's I/O port.
  - Basic setup done. See .
1. Go to the application's webpage and go to **Home** and add detected license plates to a list. See *Add detected license plate to list, on page 17*
  2. To edit the lists directly, go to **List management** .
  3. Enter the authorized license plate numbers in the **Allowlist** field.
  4. Go to **Settings**.
  5. Under **Access control** , select **Internal I/O**.
  6. Select the **I/O output #**.
  7. Under **Barrier mode**, select **Open from lists** and then check **Allowlist**.
  8. In the **Vehicle direction** drop-down list, select **in**.
  9. Under **Area of interest**, select the area of interest you would like to use, or if you would like to use all.
  10. Check that the application identifies the license plate number in the allowlist as a known vehicle and that the barrier opens as expected.

**Note**

You can change the name of any of the lists to fit your specific use case.

### Get notified about an unauthorized vehicle

This example explains how to set up the application so that an event that triggers a notification can be created in the camera.

Requirements:

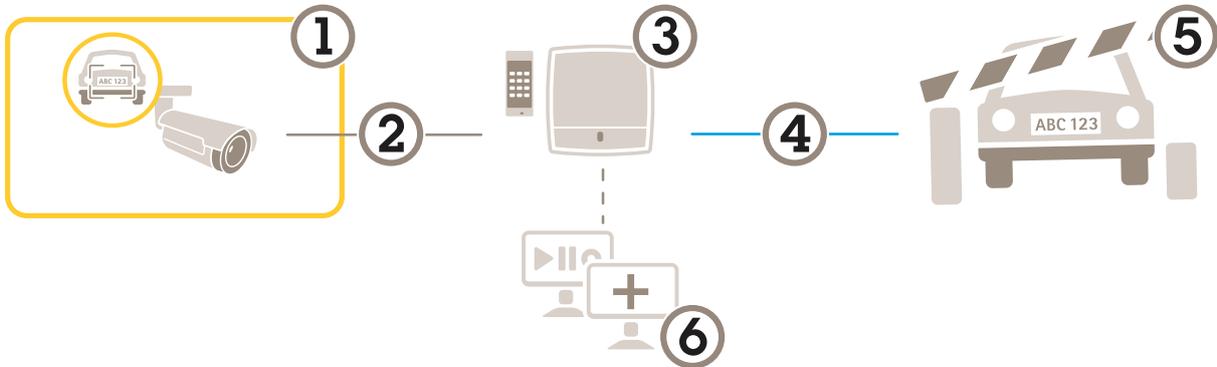
- Basic setup done. See *Basic setup, on page 4*.

1. Go to **List management**.
2. Enter the license plate number in the **Blocklist** field.
3. Go to the camera's webpage.
4. Go to **Settings > Events** and set up an action rule with the application as a condition and with a notification as an action.
5. Check that the application identifies the added license plate number as an unauthorized vehicle and that the action rule runs as expected.

## Vehicle access control scenario

In the scenario for vehicle access control, the application can be connected to an Axis network door controller to configure access rules, create schedules for access times, and handle vehicle access not only for employees, but also, for example, visitors and suppliers.

For backup, use an access system involving a door controller and card reader. To set up the door controller and the card reader, see the user documentation at [axis.com](http://axis.com)



- 1 Axis camera with AXIS License Plate Verifier
- 2 IP communication
- 3 Axis network door controller with card reader
- 4 I/O communication
- 5 Barrier
- 6 Optional third-party software

## Connect to a door controller

In this example we connect the camera to a network door controller which means the camera works as a sensor. The camera forwards the information to the controller which in turn analyzes the information and triggers the events.

### Note

When switching between the AXIS License Plate Verifier and AXIS Entry Manager, make sure to refresh the webpages to get access to all parameters.

### Requirements:

- Camera and door controller physically installed and connected to the network.
- AXIS License Plate Verifier up and running on the camera.
- Basic setup done. See *Basic setup, on page 4*.



*How to get the application up and running with AXIS A1001 Door Controller.*

## Hardware configuration in AXIS Entry Manager

1. Go to AXIS Entry Manager and start a new hardware configuration under **Setup**.
2. In the hardware configuration, rename the network door controller to "Gate controller".
3. Click **Next**.
4. In **Configure locks connected to this controller**, clear the **Door monitor** option.
5. Click **Next**.

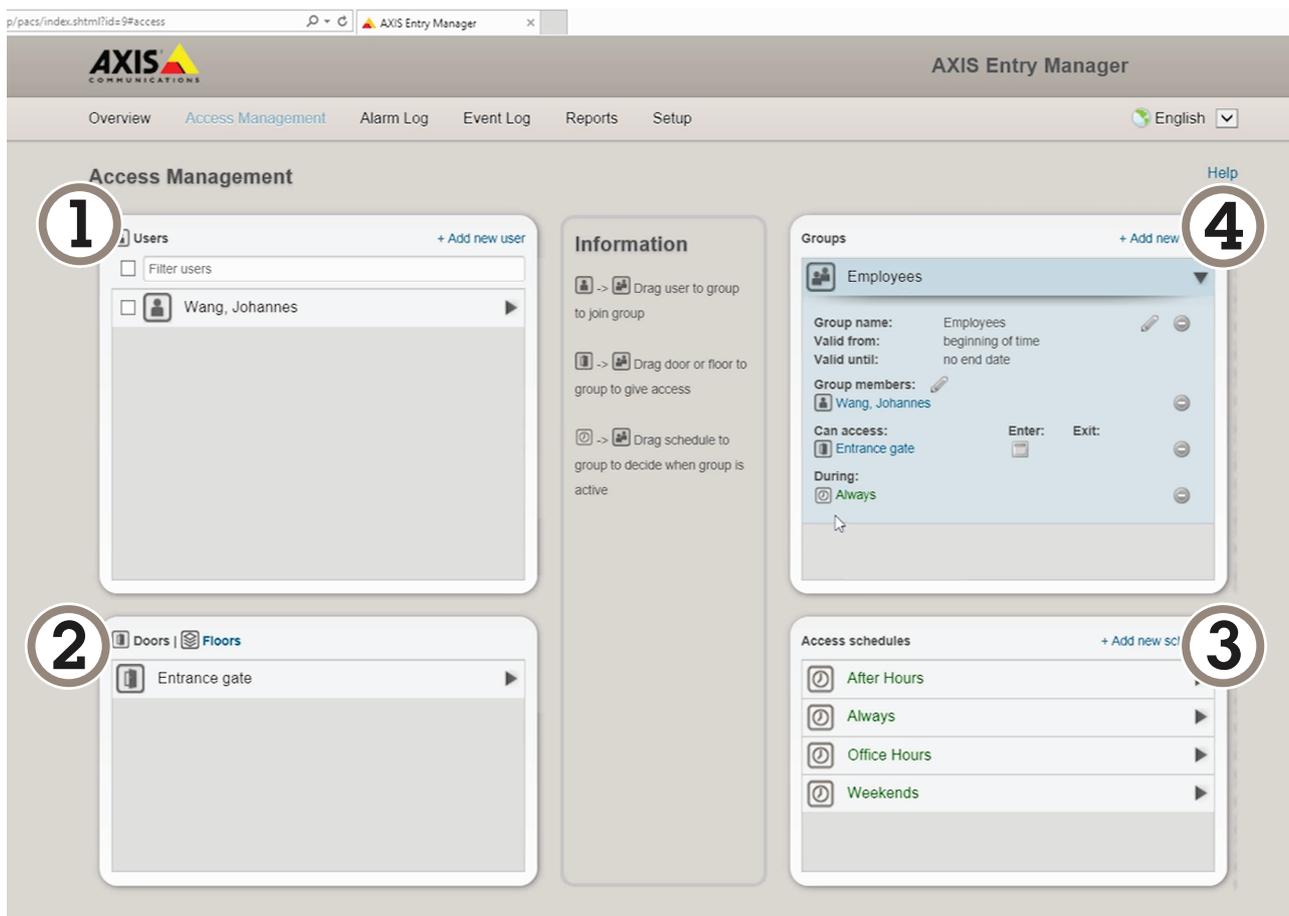
6. In **Configure readers connected to this controller**, clear the **Exit reader** option.
7. Click **Finish**.

#### Configuration in AXIS License Plate Verifier

1. Go to the **AXIS License Plate Verifier** webpage.
2. Go to the **Settings > Access control**.
3. Go to **Type** and select **Controller** in the drop-down list.
4. Enter the following information:
  - the IP address for the controller in format **192.168.0.0**
  - the username for the controller
  - the password for the controller
5. Click **Connect**.
6. If the connection is successful, "Gatecontroller" shows up in the **Network Door Controller name** drop-down list. Select "Gatecontroller".
7. In the **Reader name** drop-down list, select the reader connected to the door "Gatecontroller", for example "Reader entrance". These names can be changed in **AXIS Entry Manager**.
8. To activate the connection, select **Turn on integration**.
9. Enter one of the user's license plate number, or use the default, in the test field and click **Test integration**. Check that the test was successful.

#### Configure users, groups, doors, and schedules in AXIS Entry Manager

1. Go to **AXIS Entry Manager**.
2. Go to **Access Management**.
3. Go to **Doors > Add identification type**.
4. In the **Credentials needed** drop-down list, select **License plate only**.
5. To set limits for when the identification type can be used, drag and drop a **Schedule** to the door.
6. Add users and, for each user, add the credential **License plate**.
7. Click **Add credential** again and enter the license plate information.
8. Click **Add new group** and enter the information.
9. To add users to a group, drag and drop **Users** to the user group.
10. To give users access, drag and drop the **Door** to the user group.
11. To limit the access time, drag and drop a **Schedule** to the user group.



Overview of AXIS Entry Manager user interface.

- 1 Users
- 2 Doors
- 3 Schedules
- 4 User groups

### Connect to AXIS Secure Entry

This example describes connecting an Axis door controller in AXIS Camera Station and AXIS Secure Entry with AXIS Licence Plate Verifier.

Requirements:

- Camera and door controller physically installed and connected to the network.
- AXIS License Plate Verifier up and running on the camera.
- AXIS Camera Station client version 5.49.449 and up.
- Basic setup done. See *Basic setup, on page 4*.

In **AXIS Camera Station**, see *Add a reader*.

In the **AXIS License Plate Verifier** app:

1. In the **Settings** tab, go to **Configuration wizard** and click **Start**.
2. Select **Access Control**.
3. Select **Secure Entry**, and click **Next**.

In **AXIS Camera Station**:

4. Type the IP address of the door controller, available in the device list in **AXIS Camera Station > Configuration > Other Devices**.
5. To add a Authentication key, go to **AXIS Camera Station > Configuration > Encrypted communication**.

6. Go to **External Peripheral Authentication Key** and click **Show authentication key**.
7. Click **Copy key**.

In the **AXIS License Plate Verifier** app:

8. Go to **Authentication key** in the configuration wizard and paste the key.
9. Click **Connect**.
10. Select the **Door controller name** in the drop-down menu.
11. Select the **Reader name** in the drop-down menu.
12. Check **Turn on integration**.
13. Click **Next**.
14. Adjust the area of interest. See *Adjust the area of interest, on page 8*.
15. Click **Next** twice and then **Finish**.

## Free flow scenario with speed measurement

In a free flow scenario with speed measurement, the camera is paired with an Axis radar through the edge-to-edge technology. The camera covers two lanes and reads the license plates of the passing vehicles, and the paired radar covers the same two lanes to measure the speed of the vehicles. Additionally, the application *AXIS Speed Monitor* can visualize the maximum speed in each lane through overlays in the camera's live view.

To find out more about edge-to-edge, see *Edge-to-edge technology, on page 39*.

### Requirements:

- An Axis license plate verifier camera kit and *AXIS D2210-VE Radar* installed and connected to the network

## Set up the scenario

Set up the scenario in four steps: first configure the camera, then pair and configure the radar, and finally use *AXIS Speed Monitor* to add overlays.

### Before you start:

- Make sure that the camera and radar are directed towards the same area of interest.
- Make sure that the camera and radar are time synced. To check the status, go to **Installation > Time sync status** in each device.
- Make sure that the camera's second view area (**View area 2**) isn't used, since the radar will use it after pairing.

### Configure the camera:

1. Set up the camera according to the instructions in *Basic setup, on page 4*.
2. Make sure to select free flow when you follow the setup assistant. For more information, see *Free flow, on page 6*.

### Pair the camera with a radar:

1. In the camera's web interface, go to **System > Edge-to-edge > Radar pairing**.
2. Enter the host name, user name, and password of the radar.
3. Click **Connect** to pair the devices.  
When the connection is established, the radar settings will be available in the camera's web interface.

### Note

The default resolution of the paired radar is 1280x720. Keep the default resolution of the radar in the camera's web interface, and if you add it to a VMS.

### Configure the radar:

1. In the camera's web interface, go to **Radar > Scenarios**.
2. Add one radar scenario that covers one lane, and another radar scenario that covers the other lane.
3. For both scenarios, select **Movement in area**, trigger on **Vehicles**, and set a **Speed limit**.  
For more information, go to *Add scenarios* in *AXIS D2210-VE Radar user manual*.

### Note

If you want to add overlays containing license plate information through *AXIS License Plate Verifier*, make sure to add these before you add any overlays in *AXIS Speed Monitor*.

### Use *AXIS Speed Monitor* to add speed overlays:

1. Download and install *AXIS Speed Monitor* on your camera.
2. Add one overlay for each lane, which will show the maximum speed in the camera's live view.  
For installation and configuration instructions, go to *AXIS Speed Monitor user manual*.

## Search for specific events

Use the search feature to search for events using a number of criteria.

1. Go to the application's webpage and select the **Search** page.
2. Select the date in the **From** and **To** calendar menus.
3. Click the **AOI** drop down menu to select which area of interest should be included in the search.
4. select **Direction** to filter by entry or exit.
5. Enter the license plate in the **Plate** field, if you want to search for a plate.
6. To find license plates that belong to a specific country, select a country in the **Country** drop-down list..
7. To filter out images based on the view of the vehicle, select **Front** or **Rear** in the **Vehicle view** drop-down list.
8. To filter the search results based on the make, model, type or color of the vehicle, select what you are looking for in the **Vehicle details** drop-down menus.
9. Click **Apply filters** to view the search results.

## Export and share search results

To export any search result as a CSV file with the statistics at that time, click **Export** to save the results as a CSV file

To copy the API as a link which can be used to export data to third party systems, click **Copy search link**.

## Integration

### Use profiles to push events to multiple servers

With profiles, you can push an event to different servers using different protocols at the same time. To use profiles:

1. Go to **Integration** and the **Push events** page.
2. Select **Profile 1**.
3. Configure the rule. See *Push event information to third-party software, on page 34*.
4. Test the rule.
5. Select a new profile tab to configure a new rule.

### Push event information to third-party software

#### Note

The application sends the event information in JSON format. For more information, *log in using your MyAxis account*, go to the *AXIS VAPIX Library* and select **AXIS License Plate Verifier**

With this feature you can integrate third-party software by pushing the event data through TCP or HTTP POST.

Before you start:

- The camera must be physically installed and connected to the network.
  - AXIS License Plate Verifier must be up and running on the camera.
1. Go to **Integration > Push events**.
  2. Select an empty profile
  3. In the **Protocol** drop-down list, select **HTTP POST**.
  4. In the **Server URL** field, type the server address and port in the following format: `127.0.0.1:8080`
  5. Type the user name and password.
  6. If you are using a proxy, turn the proxy on and type the hostname, username and password.
  7. In the **Device ID** field, type the name of the device or leave as is.
  8. Select which direction to trigger push events under **Push conditions**.
  9. Under **LPR Event types**, select one or more of the following options:
    - **New** means the first detection of a license plate.
    - **Update** is either a correction of a character on a previously detected license plate, or when a direction is detected as the plate moves and is tracked across the image.
    - **Lost** is the last tracked event of the license plate before it exits the image. It also contains the direction of the license plate.
    - **Conditional** pushes one event for one object when conditions are met.
  10. To reduce bandwidth when using HTTP POST, you can select **Do not to send images**.
  11. Enable **Event buffer** to buffer events if the server goes down, and send them when the server becomes available.
  12. To include the license plate crop in addition to the image if you've chosen under **Retention settings** select **Send two images**.
  13. To send the events in multipart format instead of base64, select **Multipart**.
  14. Click **Test** to test the integration with a virtual license plate.
  15. To turn on the feature, select **Activate**.

**Note**

To push events using HTTP POST, you can use an authorization header instead of a user name and password, go to **Auth-Header** , and add a path to an authentication API.

## Send images of license plates to a server

With this feature you can push images of the license plates to a server through FTP.

Before you start:

- The camera must be physically installed and connected to the network.
  - AXIS License Plate Verifier must up and running on the camera.
1. Go to **Integration > Push events**.
  2. In the **Protocol** drop-down list, select **FTP**.
  3. In the **Server URL** field, type the server address in the following format: `ftp://10.21.65.77/LPR`.
  4. Type the username and password for the FTP server.
  5. Select the path and name modifiers for the filenames.
  6. In the **Device ID** field, type the name of the device. A folder with this name will be created for the images. Images are created using the following format: `timestamp_area of interest_direction_carID_license plate text_country.jpg`.
  7. Select which direction to trigger push events under **Push conditions**.
  8. Under **Event types**, select one or more of the following options:
    - **New** means the first detection of a license plate.
    - **Update** is either a correction of a character on a previously detected license plate, or when a direction is detected as the plate moves and is tracked across the image.
    - **Lost** is the last tracked event of the license plate before it exits the image. It also contains the direction of the license plate.
    - **Conditional** pushes one event for one object when conditions are met.

**Note**

Direction is only included in the filename when **Lost** or **Update** is selected.

9. Click **Test** to test the integration with a virtual license plate.
10. To turn on the feature, click **Activate**.

**Note**

Note that the image varies depending on what type of capture mode you have selected, see *Adjust the image capture settings, on page 9*.

**Note**

If push events fail, the app will resend up to the first 100 failed events to the server. When using FTP in push events to a Windows server, do not use %c for naming of images that gives you date and time. This is due to the fact that Windows does not accept the naming set by the function %c for date and time. Note that this is not an issue when using a Linux server.

## Direct integration with 2N

This example describes direct integration with a 2N IP device.

Set up an account in your 2N device:

1. Go to **2N IP Verso**.
2. Go to **Services > HTTP API > Account 1**.
3. Select **Enable account**.
4. Select **Camera access**.

5. Select **License plate recognition**.
6. Copy the IP address.

In the AXIS License Plate Verifier app:

1. Go to **Integration > Direct integration**.
2. Select **2N IP Device**.
3. Add the IP address or URL to the 2N device.
4. Type your username and password.
5. Select **Connection type**.
6. Select what the **Barrier is used for**.
7. Click **Enable integration**.
8. Select the direction of the vehicles..
9. To turn on the feature, select **Activate**.

To check in the integration is working:

1. Go to **2N IP Verso**.
2. Go to **Status > Events**.

## **Integrate with Genetec Security Center**

This example describes setting up a direct integration with Genetec Security Center.

In Genetec Security Center:

1. Go to **Overview**.
2. Make sure that **Database, Directory and License** are online. If they're not, run all Genetec and SQLEXPRESS services in Windows.
3. Go to **Genetec Config Tool > Plugins**.
4. Click **Add an entity**.
5. Go to **Plugin** and select **LPR plugin**.
6. Click **Next**.
7. Click **Next**.
8. Click **Next**.
9. Select the LPR plugin you've added and go to **Data sources** .

Under **ALPR reads API**:

10. Check **Enabled**.
11. In **Name**, type: **Plugin REST API**.
12. In **API path prefix**, type: **lpr**.
13. In **REST port**, select **443**.
14. In **WebSDK host**, type: **localhost**.
15. In **WebSDK port**, select **443**.
16. Check **Allow self signed certificates**.

Under **Security Center events data source**:

17. Check **Enabled**.
18. In **Name**, type **Security Center Lpr Events**.
19. In **Processing frequency**, select **5 sec** in the drop-down menu.

20. Go to the **Data sinks** tab.
21. Click **+**.
22. In **Type**, select **Database**.
23. **Select and configure the database:**
  - Check **Enabled**.
  - In **Source**, check **Plugin REST API and Native ALPR Events**.
  - In **Name**, type **Reads DB**.
  - In **Include**, check **Reads, Hits and Images**.
  - Go to the **Resources** tab.
  - Click **Delete the database** and then **Create a database**.

**Create an API user:**

24. Go to **Config Tool > User Management**.
25. Click **Add an entity**.
26. Select **User**.
27. Type a username and password. Leave the other fields unchanged.
28. Select the added user and go to the **Privileges** tab.
29. Check to allow everything under **Application privileges**.
30. Check to allow **Third-party ALPR reads API**.
31. Click **Apply**.

**In the AXIS License Plate Verifier app:**

1. Go to **Integration > Direct integration**.
2. Select **Genetec Security Center**.
3. In **URL/IP**, type your address according to this template: `https://server-address/api/V1/lpr/lpringestion/reads`.
4. Type in your Genetec username and password.
5. Select **Connection type**.
6. To turn on the feature, select **Activate**.
7. Click **Test** to test the integration with a virtual license plate.
8. If you've chosen **HTTPS**, go to the **Settings** tab.
9. Under **Security > HTTPS**.
10. Select **Self-signed**, or **CA-signed** depending on the settings in Genetec Security Center.

**In Genetec Security Center:**

1. Go to **Genetec Security desk**.
2. Under **Investigation**, click **Reads**.
3. Go to the **Reads** tab.
4. Filter the result to your needs.
5. Click **Generate report**.

**Note**

You can also read Genetec's documentation on integrating third party ALPR plugins. *You can do that here (requires registration).*

## 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

### Edge-to-edge technology

Edge-to-edge is a technology that makes IP devices communicate directly with each other. It offers smart pairing functionality between, for example, Axis cameras and Axis audio or radar products.

#### Note

Make sure the paired devices run the same AXIS OS version.

For more information, see the white paper "Edge-to-edge technology" at [whitepapers.axis.com/edge-to-edge-technology](http://whitepapers.axis.com/edge-to-edge-technology).

### Radar pairing

With edge-to-edge radar pairing, you can connect your camera to a compatible Axis radar and benefit from integrated radar features, such as speed detection.

Radar pairing is a one-way setup where you pair one camera with one radar and use the camera to configure and maintain both devices. When paired, you can access the radar's settings and create rules for radar-specific events directly in the camera's web interface. The camera will also identify itself to a VMS as a camera with integrated radar functionality.

Additionally, the radar stream is visualized in the camera's second view area, called **view area 2**. The metadata produced by the radar is available through the camera's second metadata producer channel, called **channel 2**.

### Speaker pairing

Edge-to-edge speaker pairing allows you to use a compatible Axis network speaker as if it's part of your camera. Once paired, the speaker's features are integrated in the camera's web interface and the network speaker acts as an audio out device where you can play audio clips and transmit sound through the camera.

The camera will identify itself to the VMS as a camera with integrated audio output and redirect any played audio to the speaker.

### 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.

#### Note

If you pair the camera with a radar through edge-to-edge, the radar stream is visualized in the camera's second view area.

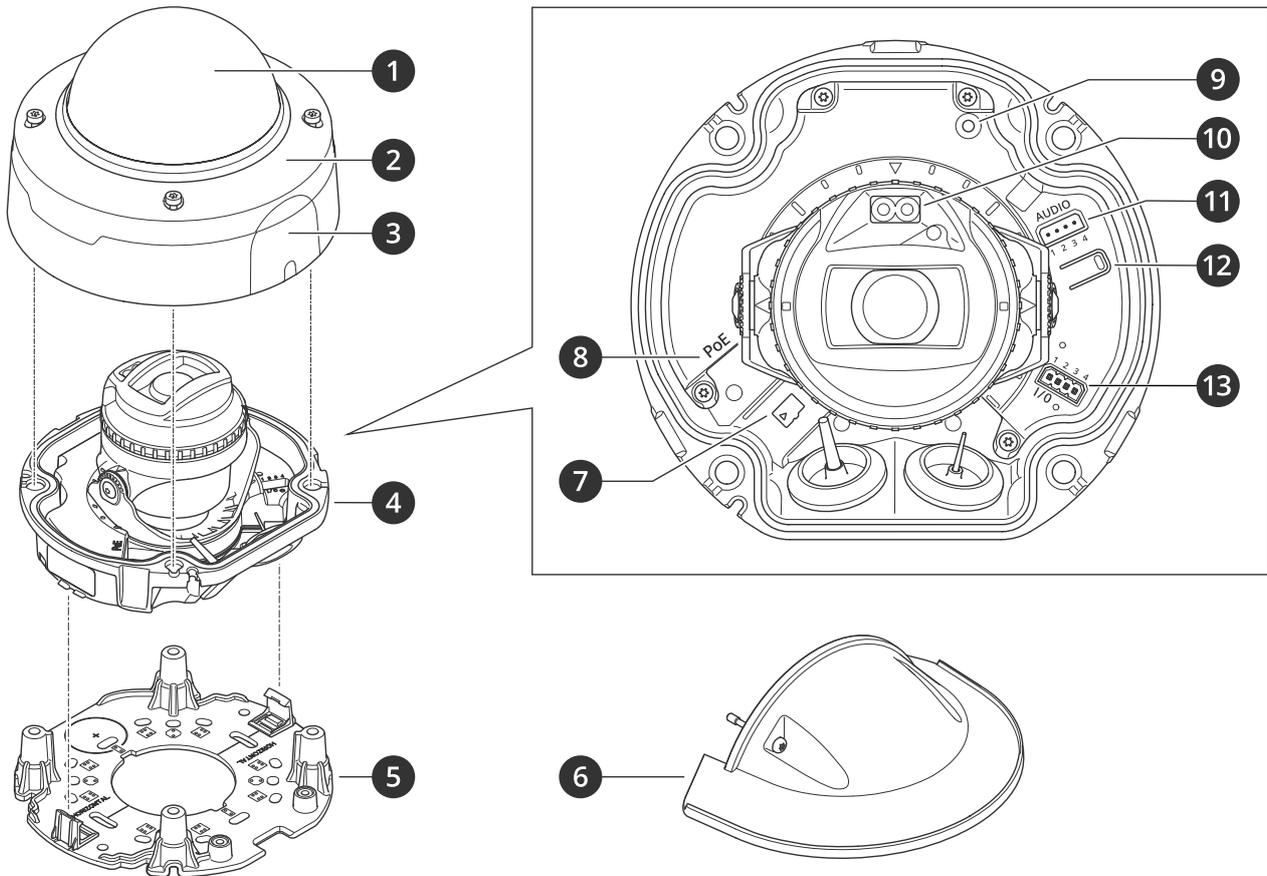
### AXIS Image Health Analytics

AXIS Image Health Analytics is an AI-based application that can be used to detect image degradations or tampering attempts. The application analyzes and learns the behavior of the scene to detect blurriness or underexposure in the image, or to detect an obstructed or redirected view. You can set up the application to send events for any of these detections, and trigger actions through the camera's event system or third-party software.

To find out more about how the application works, see *AXIS Image Health Analytics user manual*.

## Specifications

### Product overview



- 1 Dome
- 2 Dome cover
- 3 Lid
- 4 Camera unit
- 5 Mounting bracket
- 6 Weathershield
- 7 SD card memory slot
- 8 Network connector (PoE)
- 9 Status LED indicator
- 10 IR LED
- 11 Audio connector
- 12 Control button
- 13 I/O connector

### 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.

## SD card slot

### NOTICE

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

This device supports microSD/microSDHC/microSDXC cards.

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



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

The control button is used for:

- Resetting the product to factory default settings. See *Reset to factory default settings, on page 43*.

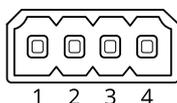
## Connectors

### Network connector

RJ45 Ethernet connector with Power over Ethernet (PoE).

### Audio connector

4-pin terminal block for audio input and output.



Function	Pin	Notes
GND	1	Ground
Ring power	2	12 V for external source
Microphone/Line in	3	Microphone (analog or digital) or line in (mono). 5 V microphone bias is available.
Line out	4	Line level audio output (mono). Can be connected to a public address (PA) system or an active speaker with a built-in amplifier.

### I/O connector

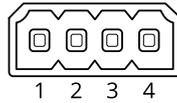
Use the I/O connector with external devices in combination with, for example, motion detection, event triggering, and alarm notifications. In addition to the 0 VDC reference point and power (12 V DC output), the I/O connector provides the interface to:

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

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

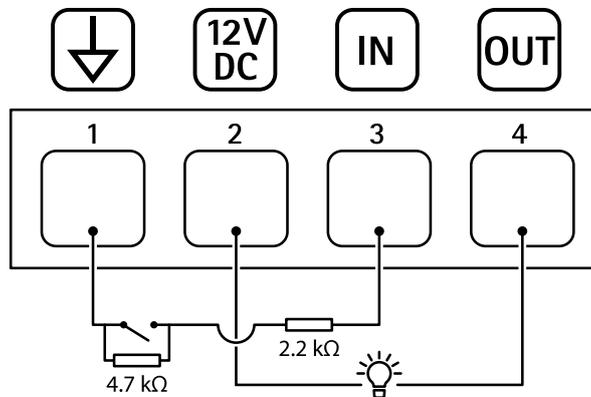
**Digital output** – For connecting external devices such as relays and LEDs. Connected devices can be activated by the VAPIX® Application Programming Interface, through an event or from the device's web interface.

4-pin terminal block



Function	Pin	Notes	Specifications
DC ground	1		0 VDC
DC output	2	 Can be used to power auxiliary equipment. Note: This pin can only be used as power out.	12 VDC Max load = 25 mA
Digital Input or Supervised Input	3	Connect to pin 1 to activate, or leave floating (unconnected) to deactivate. To use supervised input, install end-of-line resistors. See connection diagram for information about how to connect the resistors.	0 to max 30 VDC
Digital Output	4	Internally connected to pin 1 (DC ground) when active, and floating (unconnected) when inactive. If used with an inductive load, e.g., a relay, connect a diode in parallel with the load, to protect against voltage transients.	0 to max 30 VDC, open drain, 100 mA

Example:



- 1 DC ground
- 2 DC output 12 V, max 25 mA
- 3 Supervised input
- 4 Digital output

## Troubleshooting

### Reset to factory default settings

#### ▲ WARNING

⚠ Possibly hazardous optical radiation is emitted from this product. It can be harmful to the eyes. Do not stare at the operating lamp.

#### 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 will keep the license key. You will not need to reinstall the application after a factory reset.

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 40.
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 device.  
The installation and management software tools are available from the support pages on [axis.com/support](https://axis.com/support).

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

### AXIS OS options

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

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

### Check the current AXIS OS version

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

To check the current AXIS OS version:

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

## Upgrade AXIS OS

### Important

- When you upgrade the device software, your preconfigured and customized settings are saved. Axis Communications AB can't guarantee that the settings are saved, even if the features are available in the new AXIS OS version.
- Starting from AXIS OS 12.6, you must install every LTS version between your device's current version and the target version. For example, if the currently installed device software version is AXIS OS 11.2, you have to install the LTS version AXIS OS 11.11 before you can upgrade the device to AXIS OS 12.6. For more information, see *AXIS OS 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](https://axis.com/support/device-software).
1. Download the AXIS OS file to your computer, available free of charge at [axis.com/support/device-software](https://axis.com/support/device-software).
  2. Log in to the device as an administrator.
  3. Go to **Maintenance > AXIS OS upgrade** and click **Upgrade**.

When the upgrade has finished, the product restarts automatically.

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

## Technical problems and possible solutions

### Problems upgrading AXIS OS

#### AXIS OS upgrade failed

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

#### Problems after AXIS OS upgrade

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

### Problems setting the IP address

#### Can't set the IP address

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

#### Problems accessing the device

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

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

If you've lost the password for the root account, you must reset the device to the factory default settings. For instructions, see *Reset to factory default settings, on page 43*.

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

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

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

##### Certificate error when using IEEE 802.1X

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

##### The browser isn't supported

For a list of recommended browsers, see *Browser support, on page 2*.

##### Can't access the device externally

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

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

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

## Problems with streaming

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

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

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

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

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

### Poor rendering of H.264 images

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

### 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 48*.
- 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](http://axis.com/support).

**Unknown vehicles are marked as accepted**

If the application lets in vehicles with license plates that are not in the allowlist, one probable reason is that the comparison allows a deviation of one character.

For example, if AXI S1234 is in the allowlist the application accepts AXI SI234.

Similarly, if AXIS 1234 is in the allowlist the application accepts AXI 1234.

Go to *Additional settings*, on page 22 to set the characters allowed.

**The connection between the application and controller or relay module doesn't work**

Make sure the controller, or relay module, allows data traffic through HTTP. To find out how to change this setting, go to the user manual for the corresponding device.

**Problems with radar pairing**

<p>I can't pair the camera with the radar</p>	<p>Make sure the camera's second view area (<b>View area 2</b>) isn't used since the radar will be assigned to this automatically.</p> <p>If the second view area is used, go to <b>Video &gt; View areas</b> to remove it, and then try to pair the devices again.</p>
<p>The moving vehicles in the camera view are not in sync with the speed overlays, or with the tracks in the radar view</p>	<p>Make sure the camera and radar are time synced.</p> <p>To check the status, go to <b>Status &gt; Time sync status</b> in the web interface of each device. If the status shows <b>Synchronized: No</b>, click on <b>NTP settings</b> and select a time source for synchronizing the device. Make sure to use the same time source for both devices.</p>
<p>The camera's second view area doesn't show the radar stream correctly</p>	<p>The default resolution of the radar after edge-to-edge pairing is 1280x720, both in the camera's web interface and in a VMS. If you select another resolution, the radar stream will appear incorrectly.</p> <p>To adjust the resolution of the radar, go to <b>Video &gt; Stream &gt; General</b> in the camera's web interface and select <b>View area 2</b>.</p>

Problems with overlays	
The overlays I have added through the camera's web interface disappear after radar pairing	<p>If you have added more than one view area in the camera, any previously added overlays will disappear from the camera's web interface. Since the radar will occupy the second view area after radar pairing, all existing overlays in the camera's web interface will disappear.</p> <p>The overlays will only disappear from the web interface. You can still request a stream containing the overlays, for example in a VMS.</p>
The license plate overlays I have added in AXIS License Plate Verifier don't appear	<p>If you have added overlays that show the vehicle speed in AXIS Speed Monitor, and then turn on license plate overlays in AXIS License Plate Verifier, the license plate overlays won't appear.</p> <p>Make sure to turn on the overlays in AXIS License Plate Verifier first, before you add any speed overlays through AXIS Speed Monitor.</p>

### Performance considerations

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

The most important factors to consider:

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

### Contact support

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



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