

## **AXIS Speed Monitor**

**User manual**

# AXIS Speed Monitor

## About the application

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### About the application

AXIS Speed Monitor visualizes the speed of vehicles in a radar detection zone in the camera's live view, and logs the radar tracks on the SD card for statistical processing. The application requires an Axis camera and an Axis radar, or just an Axis radar. For a list of compatible Axis cameras, see [axis.com/products/axis-speed-monitor#compatible-products](https://axis.com/products/axis-speed-monitor#compatible-products).

For standalone radar installations without a camera, due to privacy concerns or for statistical purpose only, the application can be installed in the radar directly. The speed overlay will then be visualized in the radar's live view. In this case, the SD card should be installed in the radar to log the statistics.

The radar needs to be mounted and configured according to the installation guide. For more information, see the user documentation for each radar:

- *AXIS D2110-VE Security Radar*
- *AXIS D2210-VE Radar*
- *AXIS Q1656-DLE Radar-Video Fusion Camera*

#### Note

To be able to log statistics, install the SD card in the device where the app is installed.

# AXIS Speed Monitor

## Get started

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### Get started

#### Calibrate the radar

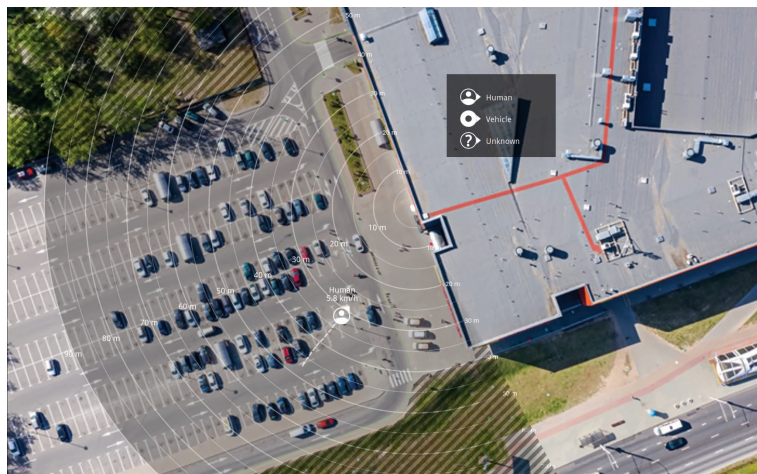
When the radar is installed, the default live view of the radar will show the radar coverage and any detected movement, and you can add detection zones and rules right away. Before you set up the connection with the radar and configure the application overlays, calibrate the radar for the scene.

Check that the mounting height of the radar corresponds with the set height in the radar's web interface. If the radar is mounted on a different height, you need to calibrate the radar to compensate for the mounting height. To set the mounting height, go to **Radar > Settings > General**.

#### Note

Make sure you turn on **Ignore swaying objects** under **Radar > Settings > Detection** to exclude bushes, trees and signs from your scenarios. Avoid having a road sign just in front of the radar.

If you only want statistics of vehicles, go to **Radar > Scenarios** and select the scenario. Edit your scenario, and under **Trigger on object type**, uncheck **Human**.



*Example of a reference map in AXIS D2110-VE Security Radar.*

To make it easier to see where objects are moving, upload a reference map, for example a ground plan or an aerial photo, that shows the area covered by the radar.

Image requirements:

- Supported file formats are jpeg and png.
- The image can be cropped in the radar.
- The orientation is not important, since the radar coverage shape will move to adapt to the image during calibration.

Go to **Radar > Map calibration** to upload your reference map and follow the setup assistance to calibrate it.

For more information about the settings in the radar's web interface, see the user documentation for your radar on [axis.com](http://axis.com).

#### Select a radar profile

You can use Axis radars for area monitoring or road monitoring. There are two profiles that are optimized for each one of the scenarios:

- **Area monitoring profile:** track humans, vehicles and unknown objects moving at lower speeds.

# AXIS Speed Monitor

## Get started

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- **Road monitoring profile:** track mainly vehicles moving at higher speeds.

To select a profile, go to **Radar > Settings > Detection** in the radar's web interface.

For information about detection ranges, installation examples and use cases, see the user manuals for each product:

- *AXIS D2110-VE Security Radar user manual*
- *AXIS D2210-VE Radar user manual*
- *AXIS Q1656-DLE Radar-Video Fusion Camera user manual*

## Add scenarios

Add scenarios (previously called include zones) to define the areas of interest in the radar. The scenarios will be imported to AXIS Speed Monitor and will be listed as labels.

Add a scenario:

1. In the radar's web interface, go to **Radar > Scenarios**.
2. Click **Add scenario**.
3. Type the name of the scenario.
4. Select if you want to trigger on objects moving in an area or on objects crossing one, or two, lines.

Trigger on objects moving in an area:

1. Select **Movement in area**.
2. Click **Next**.
3. Select the type of zone that should be included in the scenario.  
Use the mouse to move and shape the zone so that it covers the desired part of the radar image or reference map.
4. Click **Next**.
5. Add detection settings.
  - 5.1 Add seconds until trigger after under **Ignore short-lived objects**.
  - 5.2 Select which object type to trigger on under **Trigger on object type**.
  - 5.3 Add a range for the speed limit under **Speed limit**.
6. Click **Next**.
7. Set the minimum duration of the alarm under **Minimum trigger duration**.
8. Click **Save**.

Trigger on objects crossing a line:

1. Select **Line crossing**.
2. Click **Next**.
3. Position the line in the scene.  
Use the mouse to move and shape the line.
4. To change the detection direction, turn on **Change direction**.

# AXIS Speed Monitor

## Get started

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5. Click **Next**.
6. Add detection settings.
  - 6.1 Add seconds until trigger after under **Ignore short-lived objects**.
  - 6.2 Select which object type to trigger on under **Trigger on object type**.
  - 6.3 Add a range for the speed limit under **Speed limit**.
7. Click **Next**.
8. Set the minimum duration of the alarm under **Minimum trigger duration**.

The default value is set to 2 seconds. If you want the scenario to trigger every time an object crosses the line, lower the duration to 0 seconds.
9. Click **Save**.

Trigger on objects crossing two lines:

1. Select **Line crossing**.
2. Click **Next**.
3. To make the object cross two lines for the alarm to trigger, turn on **Require crossing of two lines**.
4. Position the lines in the scene.

Use the mouse to move and shape the line.
5. To change the detection direction, turn on **Change direction**.
6. Click **Next**.
7. Add detection settings.
  - 7.1 Set the time limit between crossing the first and the second line under **Max time between crossings**.
  - 7.2 Select which object type to trigger on under **Trigger on object type**.
  - 7.3 Add a range for the speed limit under **Speed limit**.
8. Click **Next**.
9. Set the minimum duration of the alarm under **Minimum trigger duration**.

The default value is set to 2 seconds. If you want the scenario to trigger every time an object has crossed the two lines, lower the duration to 0 seconds.
10. Click **Save**.

## Download and install the application

To install the application, go to [axis.com/products/axis-speed-monitor](https://axis.com/products/axis-speed-monitor) and download the latest version. Log in to the camera you want to connect to the radar, or log in to the radar directly, and follow these steps:

1. Go to **Apps**.
2. Click **Add app**.
3. Select the file in your downloads folder.
4. Click **Install**.

# AXIS Speed Monitor

## Get started

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5. Turn on the app to activate the application.

**Note**

To upgrade the application, just install the new version. There is no need to uninstall the previous version.

# AXIS Speed Monitor

## Configure the application

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### Configure the application

#### Note

Sync the time and date of the camera and the connected radar with an NTP server. If the time and date of the devices aren't synced, the statistics export will not show the correct information, and the AXIS Speed Monitor events that you have set up on the camera may not trigger correctly.

In the camera's web interface:

1. Go to **Apps**.
2. Go to **AXIS Speed Monitor** and click **Open**.

#### Note

In AXIS Q1656-DLE, the integrated radar connects to the camera automatically.

3. Go to **Connect to radar**.
4. Enter the radar's address, username and password.
5. Click **Connect**.

Scenarios (previously called include zones) are imported from the radar and will be listed as labels.

6. Click on the labels to edit the parameters. Remove the parameters to remove the overlay from the view.

#### Parameters:

These modifiers can be applied to each of the scenarios:

- **#n**: Name of the scenario.
- **#M**: Live speed measurement of the fastest moving object in the scenario.
- **#c**: How many cars have passed in the last 15 minutes.
- **#a**: Average speed in the last 15 minutes.

#### Note

To change the name of the scenarios in the radar, go to **Radar > Scenarios** in the radar's web interface. Click on the name of the scenario to edit.

# AXIS Speed Monitor

## Export statistics

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### Export statistics

You can download the logged statistics of the day, or from a set date range. The information in the downloaded file includes all detected moving objects within range, and when those objects entered or exited a particular radar scenario. The statistics will be saved as a comma separated file (csv).

#### Note

To be able to log radar tracking data, install the SD card in the device where the app is installed.

You can also send the radar tracking data over MQTT. For more information, see *Use MQTT to send radar data on page 8*.

Parameters in the file:

- **rmd\_zone name**: Name of the scenario.
- **tracking\_id**: The object ID in the radar metadata stream. Restarting the radar will reset the counter to 1.
- **trigger\_count**: The number of times the scenario has been triggered while there is an active tracked object in the scenario.
- **object\_class**: Currently, the object classes consists of "Human", "Vehicle" and "Unknown". Select the class you would like to count in the scenario.
- **weekday**: The weekday when the **track\_id** entered the scenario.
- **date**: The date the **track\_id** entered the scenario.
- **time**: The time when the **track\_id** entered the scenario. In HH:MM:SS.
- **duration**: How long the **track\_id** spent inside the scenario. Given in seconds.
- **enter\_azimuth** and **exit\_azimuth**: The direction the object was pointing when it first entered and exited the scenario. The azimuth is given in degrees, and follows the same convention as radar metadata.
- **enter\_direction** and **exit\_direction**: A textual description of the movement, such as "departing", "rightwards", "approaching" and "leftwards".
- **min\_speed**, **avg\_speed**, **max\_speed**: The minimum, average and maximum speed, respectively, that the object travelled while inside the scenario. Given in meters per second (m/s).
- **speed\_delta**: The difference between the speed the object exited the scenario versus when it entered the scenario. Given in meters per second (m/s). A positive number means acceleration, and a negative means deceleration.
- **alarm**: Denotes whether the object has travelled at an unacceptable speed while inside the scenario. 0 means acceptable speed and 1 unacceptable speed at one point.

### Use MQTT to send radar data

You can send the radar tracking data that is listed in *Export statistics on page 8* over MQTT.

This example explains how to set up an MQTT client in the device where you have installed AXIS Speed Monitor, and how to create a condition that will publish the radar data collected in AXIS Speed Monitor as a payload to an MQTT broker.

Before you start:

- Set up an MQTT broker and get the broker's IP address, username and password.

Learn more about MQTT and MQTT brokers in *AXIS OS Portal*.

Set up the MQTT client in the web interface of the device where you have installed AXIS Speed Monitor:

1. Go to **System > MQTT > MQTT client > Broker** and enter the following information:



# AXIS Speed Monitor

## Export statistics

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- **Host:** The broker IP address
- **Client ID:** The ID of the device
- **Protocol:** The protocol the broker is set to
- **Port:** The port number used by the broker
- The broker **Username** and **Password**

2. Click **Save** and **Connect**.

Create a condition that publishes the radar data as a payload to the MQTT broker:

3. Go to **System > MQTT > MQTT publication** and click **+ Add condition**.
4. In the list of conditions, under **Application**, select **Speed Monitor: Track exited zone**.

The device will now be able to send information about the radar tracks for every moving object that exits a scenario. Every object will have its own radar track parameters like `rmd_zone_name`, `tracking_id`, `trigger_count`, and more. For a full list of the radar track parameters, see *Export statistics on page 8*.

# AXIS Speed Monitor

## Set up rules for events

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### Set up rules for events

To learn more, check out our guide *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** the device should 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.

### Activate a strobe siren when the radar detects a speed violation

Use an Axis strobe siren to let possible speeders know that your perimeter is protected.

This example explains how to activate a profile in the strobe siren whenever AXIS Speed Monitor detects a speed violation using the connected radar.

#### Prerequisites

- Create a new user with the role Operator or Administrator in the strobe siren.
- Create two profiles in the strobe siren: one for when the driver is moving within the allowed speed, and the other when the speed limits are violated.
- Set up AXIS Speed Monitor in the camera
- Add a scenario called "Area 1" in the connected radar.

#### Create two recipients in the camera

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

# AXIS Speed Monitor

## Set up rules for events

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- Type: HTTP
  - URL: http://<IPaddress>/axis-cgi/virtualinput/deactivate.cgi  
Replace <IPaddress> with the address of the strobe siren.
  - The username and password of the newly created strobe siren user.
6. Click **Test** to make sure all data is valid.
  7. Click **Save**.

### Create two rules in the camera

1. Go to **Rules** and add a rule.
2. Enter the following information:
  - Name: Activate virtual IO1
  - Condition: **Applications > Speed Monitor: Area 1**
  - Action: **Notifications > Send notification through HTTP**
  - Recipient: **Activate virtual port**
  - Query string suffix: schemaversion=1&port=1
3. Click **Save**.
4. Add another rule with the following information:
  - Name: Deactivate virtual IO1
  - Condition: **Applications >Speed Monitor: Area 1**
  - Action: **Notifications > Send notification through HTTP**
  - Recipient: **Deactivate virtual port**
  - Query string suffix: schemaversion=1&port=1
5. Click **Save**.

### Create a rule in the strobe siren

1. In the strobe siren's device interface, go to **System > Events** and add a rule.
2. Enter the following information:
  - Name: Trigger on virtual input 1
  - Condition: **I/O > Virtual input**
  - Port: 1
  - Action: **Light and siren > Run light and siren profile while the rule is active**
  - Profile: select the newly created profile
3. Click **Save**.

# AXIS Speed Monitor

## For users of AXIS Camera Station

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### For users of AXIS Camera Station


#### Set up AXIS Speed Monitor

The AXIS Speed Monitor app can be installed on a device that is connected to a radar, or directly installed on a radar.

If a device or radar is configured with AXIS Speed Monitor, it is considered as an external data source in AXIS Camera Station. You can connect a view to the data source, search for the object speeds that are captured by the device, and view the related image.

##### Note

Requires AXIS Camera Station 5.47 or later.

1. Download and install the application on your device.
2. Configure the application and the radar. See *AXIS Speed Monitor 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 the AXIS Camera Station server as the NTP server. See *Server settings*.
5. Add the related devices to AXIS Camera Station. See *Add devices*.
  - If the app is installed on a device connected to radar, add the device and radar.
  - If the app is installed on a radar, add the radar.
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 object speeds that are captured by the device. See *Data search*.
9. Click  to export the search results to a .txt file.

# AXIS Speed Monitor

## For users of Milestone Xprotect

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### For users of Milestone Xprotect

AXIS Optimizer for Milestone Xprotect® includes a feature called **Zone speed search**. The feature works together with AXIS Speed Monitor to visualize the speed of vehicles in a radar detection zone in the live view of the camera.

Use Zone speed search to search for speeding vehicles that have been detected when entering a predetermined zone in the camera's view. See *Zone speed search* in the AXIS Optimizer user manual for more information.

