AXIS D2110-VE Security Radar

User Manual

AXIS D2110-VE Security Radar

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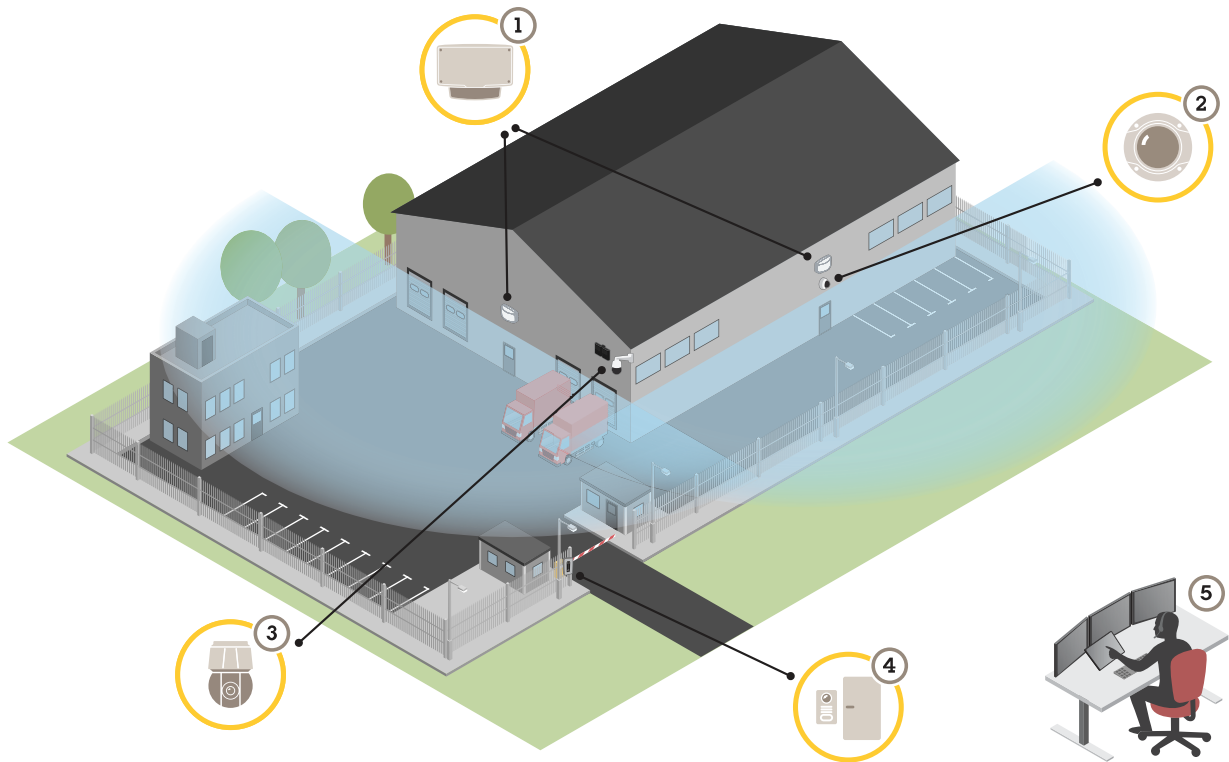# AXIS D2110-VE Security Radar

Solution overview

1 AXIS D2110-VE
2 Fixed dome camera
3 PTZ camera and illuminator
4 Door controller
5 Surveillance center

Where to install the product

The radar is intended for monitoring open areas. Any solid object (such as a wall, a fence, a tree, or a large bush) in the coverage area will create a blind spot (radar shadow) behind it.

Install the radar on a pole, or on a spot on a wall where there are no other objects or installations next to it. Objects that reflect radio waves close to the radar affects the performance.

To be able to correctly identify movement in the coverage area, the radar needs to be installed on a stable mount. Do not install the radar on a swaying pole.

Metal objects in the field of view causes reflections that affects the performance.

Avoid aiming the radar towards another radar.

If more than three radars are mounted close together they may interfere with each other. To avoid interference from other AXIS D2110-VE Security Radars, see *Install multiple radars on page 4* .

AXIS D2110-VE Security Radar

Solution overview

Detection range

For optimal performance, install the radar 3.5 m (11 ft) above ground.

Note

- If you install the radar at a different height, enter the actual mounting height in the product's web pages when you calibrate the radar.
- The detection range is affected by the scene.
- The detection range is affected by neighboring radars.
- The detection range is affected by the object type.

The detection range was measured under these conditions:

- The range was measured along the ground.
- The object was a 170 cm (5 ft 7 in) tall person.
- The person was walking straight in front of the radar.
- The values are measured when the person enters the detection zone.
- The radar sensitivity was set to **Medium**.

| Mounting height	0° tilt	10° tilt	20° tilt
2.5 m (8.2 ft)	3.0–60 m (9.8–197 ft)	Not recommended	Not recommended
3.5 m (11 ft)	3.0–60 m (9.8–197 ft)	Not recommended	Not recommended
4.5 m (15 ft)	4.0–60 m (13–197 ft)	Not recommended	Not recommended
5.5 m (18 ft)	7.5–60 m (25–197 ft)	Not recommended	Not recommended
6.5 m (21 ft)	7.5–60 m (25–197 ft)	5.5–60 m (18–197 ft)	Not recommended
8 m (26 ft)	Not recommended	9–60 m (30–197 ft)	7.5–30 m (25–98 ft)
10 m (33 ft)	Not recommended	15–60 m (49–197 ft)	9–35 m (30–115 ft)
12 m (39 ft)	Not recommended	23–60 m (75–197 ft)	13–38 m (43–125 ft)
14 m (36 ft)	Not recommended	27–60 m (89–197 ft)	17–35 m (56–115 ft)
16 m (52 ft)	Not recommended	Not recommended	25–50 m (82–164 ft)

Install multiple radars

The radio waves continue beyond the detection area, and can interfere with other radars up to 350 m (380 yd) away.
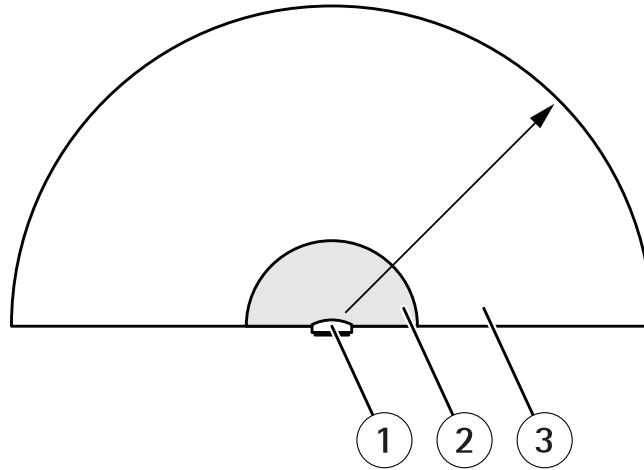
1. Radar
2. Detection area
3. Coexistence area

1. To avoid interference when more than three radars of are mounted close together, go to **Settings > Radar > General** and select **Number of neighboring radars** under **Coexistence**.

If the radar has more than two neighboring radars within its coexistence area the performance decreases. The detection range becomes shorter, the radar doesn't classify objects correctly, and false alarms occur due to interference between the radars.

The probability and severity of these issues increases with the number of radars within the same coexistence area. It also depends on the environment and the radar's direction towards fences, buildings, or neighboring radars.

If more than three radars are crucial in an installation, see *Installation examples on page 5* .

Installation examples

Cover a perimeter

To create a virtual fence you can place multiple radars side by side. We recommend placing them with 100 m (330 ft) spacing.
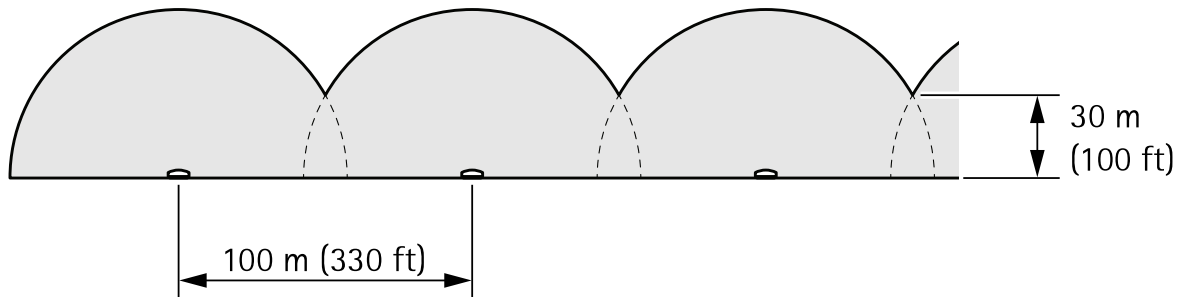
Cover a field around a building

To cover the area around a building, place the radars on the walls of the building. The radars can be close to each other without interfering since they are aimed away from each other.

If you place the radars aimed towards the building, the radars will transmit radio waves into each other, which decreases performance.
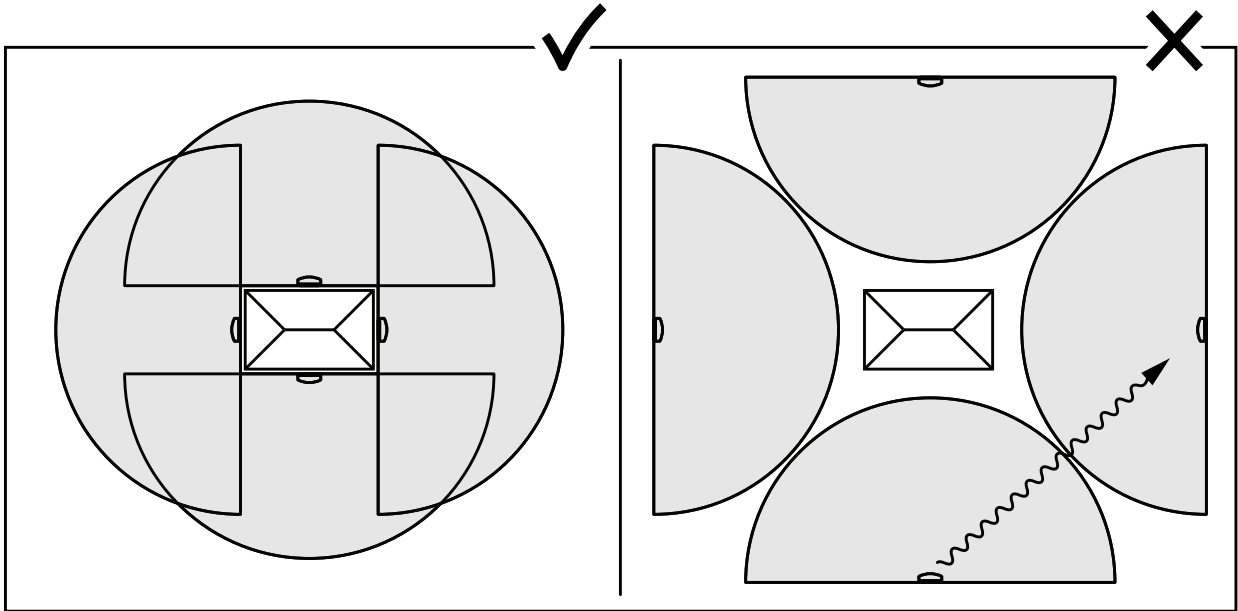
Cover an area

To cover a large open area, use two pole mounts to place two radars back to back.

Note
> When two radars are mounted this close together, they are in the same coexistence zone.

You can use the PoE output from one radar to power the second radar, but it is not possible to connect a third radar this way.

Note
> The PoE output on the radar is enabled when the radar is powered by a 60 W midspan.

Get started

Find the device on the network
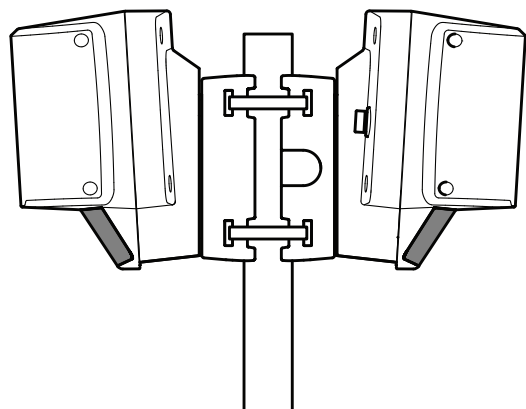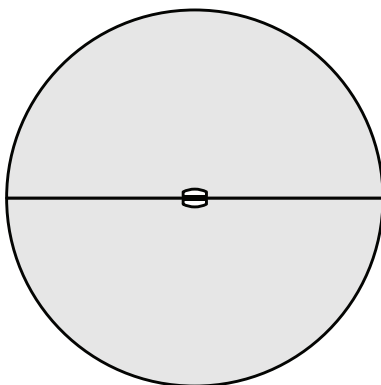
To find Axis devices on the network and assign them IP addresses in Windows®, use AXIS IP Utility or AXIS Device Manager. Both applications are free and can be downloaded from *axis.com/support*.

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

Browser support

You can use the device with the following browsers:

	Chrome™	Firefox®	Edge®	Safari®
Windows®	recommended	x	x	
macOS®	recommended			x
Other operating systems	x	x		

Access the device

1. Open a browser and enter the IP address or host name of the Axis device.

Set a new password for the root account

Important

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

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

2. Retype the password to confirm the spelling.

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

www.axis.com/products/online-manual/45364

Secure passwords

Important

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

The device password is the primary protection for 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.

Webpage overview
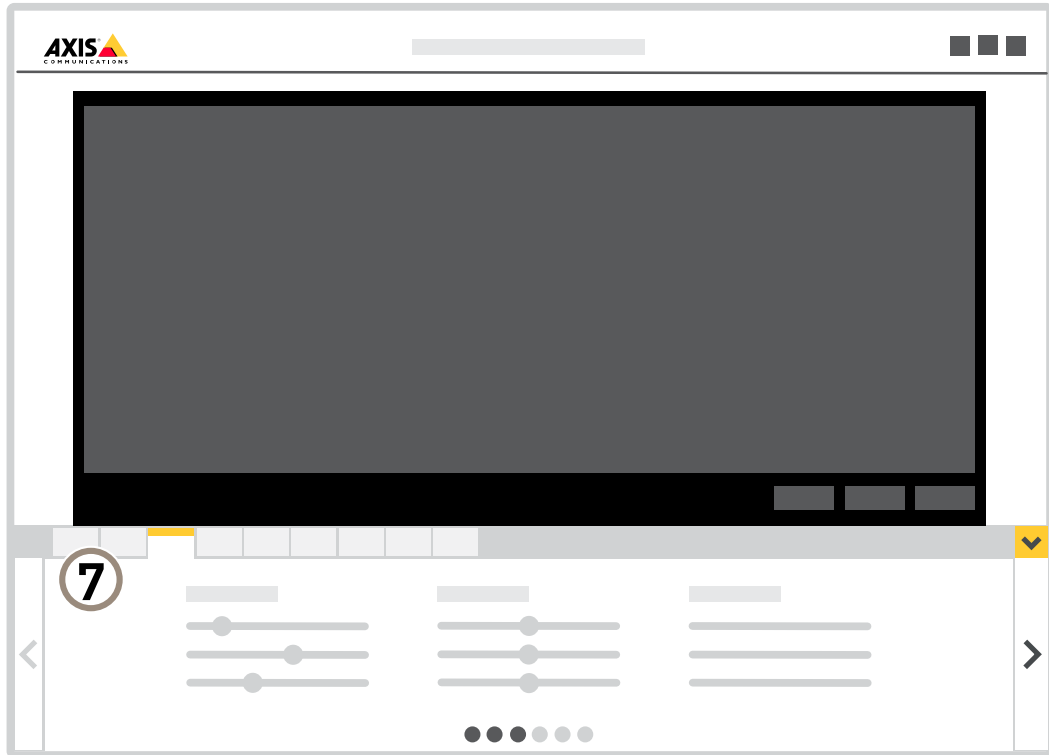

1   Live view control bar
2   Live view
3   Product name
4   User information, color themes, and help
5   Video control bar
6   Settings toggle

# AXIS D2110-VE Security Radar

Get started

7   Settings tabs

Additional settings

Calibrate the radar

The radar is ready to use as soon as it is installed. The default live view will show the radar coverage and any detected movement, and you can add detection zones and rules right away.

If the radar is mounted 3.5 m (11 ft) above ground, there is no need to do anything else. If the radar is mounted on a different height you need to calibrate the radar to compensate for the mounting height.
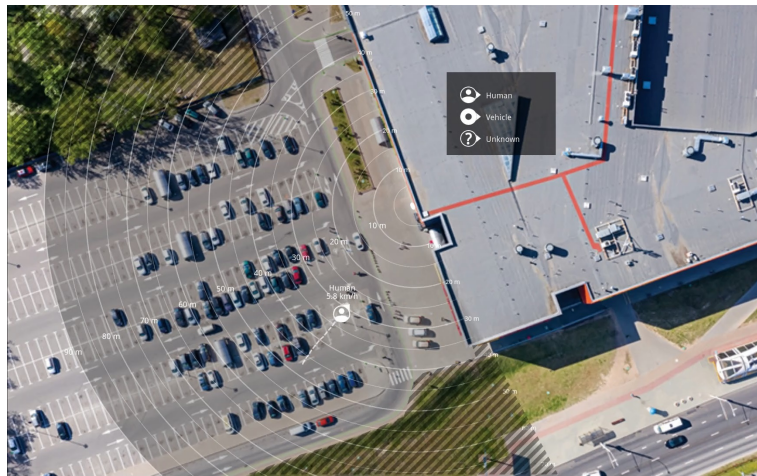
To make it easier to see where objects are moving, you can upload a reference map, for example a ground plan or an aerial photo, that shows the area covered by the radar.

Image requirements:

- Supported file formats are jpeg and png.

- The image can be cropped in the radar.

- The image can be rotated ±35° in the radar.

- The orientation is not important, since the radar coverage shape will move to adapt to the image during calibration.

After uploading the reference map you need to calibrate the reference map so that the actual radar coverage fits the position, direction and scale of the reference map.

There are two methods for calibrating the reference map:

- **Pins (easy)**: This calibration is performed in the web interface by clicking in the reference map. This is the easiest way to calibrate the reference map, and you can use it if you do not have physical access to the site.

- **Tracks (accurate)**: This calibration method requires a person to move in front of the radar. This is the most accurate way to calibrate the reference map, but you can't use it if there is a lot of other movement in the scene.

  You can do this yourself while accessing the web interface from a mobile device, or have someone else move and follow your instructions.

  When moving around in the different steps, move to places that are easy to find in the reference map.

How to calibrate the radar

1. To configure the radar, go to **Settings > Radar > Calibration**, click **Start** and follow the instructions.

Additional settings

About detection zones

To determine where to detect motion, you can add multiple zones. Different zones can be used to trigger different actions.

There are two types of zones:

- An **include zone** is an area in which moving objects will trigger rules. The default include zone matches the entire area covered by the radar.

- An **exclude zone** is an area in which moving objects will be ignored. Use exclude zones if there are areas inside an include zone that trigger a lot of unwanted alarms.

Remove unwanted reflections

Objects of radar-reflective materials, such as metal roofs, fences, vehicles, and even brick walls may disturb the radar's performance. They may create reflections which cause apparent detections that can be difficult to separate from real detections.
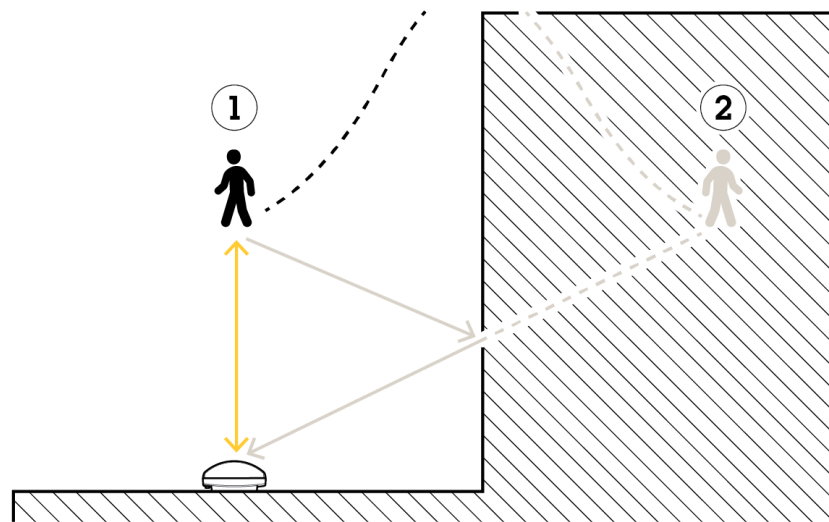
1	Actual detection
2	Reflected detection

To avoid unwanted detections, set up an exclude zone.

Add an include zone

1. Go to **Settings > RMD zones** and click ✚.

2. Select **Include zone**.

3. Select ⚙ to modify the settings of the zone. For more information, see the product's built in help.

4. Modify the shape of the include zone, see *Modify a detection zone on page 12*.

Add an exclude zone

1. Go to **Settings > RMD zones** and click ✚.

2. Select **Exclude zone**.

3. Modify the shape of the exclude zone, see *Modify a detection zone on page 12*.

Modify a detection zone

Use the mouse to move and shape the zone so that it covers the desired part of the reference map.

- To add a new corner, click on the zone border. Drag the corner to the desired position.

- To remove a corner, right-click on the corner.

- To move a corner, click and drag the corner to the new position.

- To move the zone, place the pointer inside the zone and drag the zone to the new position.

Add crossline detection

1. Go to **Settings > RMD zones** and click ✛ .

2. Select **Crossline detection**.

3. Modify the line:

   - To move the line, click and drag it.

   - To move a point, click and drag it.

   - To add a point, click on the line.

   - To remove a point, right-click on the point.

4. To change the detection direction and edit other settings, click ⚙ .

For more information, see the product's built in help.

View and record video

To learn more about settings for viewing and recording video, see .

Reduce bandwidth and storage

Important

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

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

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

3. Do one or more of the following:

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

   - Increase the compression.

   - Turn on dynamic FPS.

Set up network storage

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

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

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

3. Enter the IP address of the host server.

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

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

6. Click **Connect**.

Record and watch video

To record video you must first set up network storage, see *Set up network storage on page 12*, or have an SD card installed.

Record video

1. Go to the live view.

2. To start a recording, click **Record**. Click again to stop the recording.

Watch video

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

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

Set up rules and alerts

Trigger an action

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

2. 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.

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

Note

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

Trigger an alarm if someone opens the housing

This example explains how to trigger an alarm if someone opens the housing.

Create a rule:

1. Go to **Settings > System > Events** and add a rule.

2. Type a name for the rule.

3. In the list of conditions, select **Casing open**.

4. In the list of actions, select **Send notification to email**.

5. Select a recipient from the list or go to **Recipients** to create a new recipient.

To create a new recipient, click ╋ . To copy an existing recipient, click ▤ .

6. Type a subject and a message for the email.

7. Click **Save**.

How to record radar data when motion is detected

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

The recording will show the reference map with the trail of the moving object.

Create a rule:

1. Go to **Settings > System > Events** and add a rule.

2. Type a name for the rule.

3. From the list of conditions, select an include zone under **Radar motion**. To set up an include zone, see *Add an include zone on page 11*.

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

5. Set the prebuffer to 5 seconds.

6. Set the postbuffer to 60 seconds.

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

8. Click **Save**.

How to record video from a camera when motion is detected

This example explains how to set up the radar and a camera so that the camera starts recording to the SD card five seconds before the radar detects motion and to stop one minute after.

Connect the devices:

1. Connect a cable from an I/O output on the radar to an I/O input on the camera.

Configure the I/O port of the radar:

2. Go to **Settings > System > I/O ports** and configure the I/O port as an output and select the normal state.

Create a rule in the radar:

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

4. Type a name for the rule.

5. From the list of conditions, select an include zone under **Radar motion**. To set up an include zone, see *Add an include zone on page 11*.

6. From the list of actions, select **Toggle I/O while the rule is active** and then select the port that is connected to the camera.

7. Click **Save**.

Configure the I/O port of the camera:

8. Go to **Settings > System > I/O ports** and configure the I/O port as an input and select the normal state.

Create a rule in the camera:

9. Go to **Settings > System > Events** and add a rule.

10. Type a name for the rule.

11. From the list of conditions, select **Digital Input** and then select the port that should trigger the rule.

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

Additional settings

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

14. Set the prebuffer to 5 seconds.

15. Set the postbuffer to 60 seconds.

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

17. Click **Save**.

How to turn on a light when motion is detected

Turning on a light when an intruder enters the detection zone can have a deterring effect, and will also improve the image quality of a visual camera recording the intrusion.

This example explains how to set up the radar and an illuminator so that the illuminator turns on when the radar detects motion and turns off after one minute.

Connect the devices:

1. Connect one of the illuminator cables to the power supply via the relay port on the radar. Connect the other cable directly between the power supply and the illuminator.

Configure the relay port of the radar:

2. Go to **Settings > System > I/O ports** and select **Open circuit** as the normal state.

Create a rule in the radar:

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

4. Type a name for the rule.

5. From the list of triggers, select an include zone under **Radar motion**. To set up an include zone, see *Add an include zone on page 11*.

6. From the list of conditions, select **Toggle I/O once** and then select the relay port.

7. Select **Active**.

8. Set the **Duration**.

9. Click **Save**.

How to control a PTZ camera with the radar

It is possible to use the information about objects' positions from the radar to make a PTZ camera track objects.

There are two ways to do this:

- Use the built-in **Radar autotracking**. Use this option when you have one PTZ camera and one radar mounted very close together. This option creates an edge to edge solution where the radar directly controls the camera.

    - Go to **Settings > System > Radar autotracking**.

    - Enter the IP address, username and password for the PTZ camera.

    - Click **Connect** and follow the instructions.

- Install AXIS Radar Autotracking for PTZ on your VMS server (or another computer with access to both the camera and the radar), and follow the instructions in the application.

    To download AXIS Radar Autotracking for PTZ, go to *axis.com*.

This is a server-based solution that can handle different setups:

- Control several PTZ cameras with one radar.

- Control one PTZ camera with several radars.

- Control several PTZ cameras with several radars.

- Control one PTZ camera with one radar when they are mounted in different positions covering the same area.

How to minimize false alarms

If you notice that you get too many false alarms, you can filter out certain types of movement or objects, change the coverage, or adjust the detection sensitivity. Test which settings work best for your environment.

- Adjust the detection sensitivity:

  Go to **Settings > Radar > Detection** and select a lower **Detection sensitivity**. This decreases the risk of false alarms, but it could also cause the radar to miss some movement. The sensitivity setting affects all zones.

  - **Low**: Use this sensitivity when there are a lot of metal objects or large vehicles in the area. It will take longer time for the radar to track and classify objects. This can reduce the detection range, especially for fast moving objects.

  - **High**: Use this sensitivity when you have an open field without metal objects in front of the radar. This will increase the detection range for humans.

- Modify the include and exclude zones:

  If the include zone includes hard surfaces, such as a metal wall, there may be reflections that causes multiple detections for a single physical object. In this case, modify the include zone, see *Modify a detection zone on page 12*, or add an exclude zone that masks everything behind the surface, see *Add an exclude zone on page 11*.

- Filter on movement:

  Go to **Settings > Radar > Detection** and select **Ignore swaying objects**. This setting will minimize false alarms from trees, bushes, and flagpoles in the coverage zone.

- Filter on time:

  Go to **Settings > RMD zones** and select a zone to modify its settings.

  Enable **Short-lived object** and set a delay time from when the radar starts tracking an object until it can trigger and alarm. The timer starts when the radar first detects the object, not when the object enters the include zone.

- Filter on object type:

  The radar will classify objects depending on the radar echo that they produce. If it can't determine the object type, the object will be classified as **Unknown**.

  Go to **Settings > RMD zones** and select a zone to modify its settings.

  To avoid triggering on specific object types, enable the filter and deselect the object types that should not trigger events in this zone.

Cleaning recommendations

If the device gets grease stains or becomes heavily soiled, you can clean it with mild, solvent-free soap or detergent.

NOTICE

Never use harsh detergent, for example gasoline, benzene, or acetone.

1. Use a can of compressed air to remove any dust or loose dirt from the device.

2. Clean the device with a soft cloth dampened with mild detergent and lukewarm water.

3. Wipe carefully with a dry cloth.

Note

Avoid cleaning in direct sunlight or at elevated temperatures, as this may cause stains when the water droplets dry.

Troubleshooting

Reset to factory default settings

Important

Reset to factory default should be used with caution. A reset to factory default resets all settings, including the IP address, to the factory default values.

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 20.*

3. Keep the control button pressed for 15–30 seconds until the status LED indicator flashes amber.

4. Release the control button. The process is complete when the status LED indicator turns green. The product has been reset to the factory default settings. If no DHCP server is available on the network, the default IP address is `192.168.0.90`.

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

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

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

Check the current firmware

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

To check the current firmware:

Upgrade the firmware

Important

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

Important

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

Note

When you upgrade the product with the latest firmware 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 upgrading the firmware. To find the latest firmware and the release notes, go to *axis.com/support/firmware.*

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

2. Log in to the product as an administrator.

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

www.axis.com/products/online-manual/45364

Technical issues, clues and solutions

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

Problems upgrading the firmware

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

Problems setting the IP address

The device is located on a different subnet	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 cannot set the IP address. Contact your network administrator to obtain an IP address.
The IP address is being used by another device	Disconnect the Axis device from the network. Run the ping command (in a Command/DOS window, type `ping` and the IP address of the device): - If you receive: `Reply from <IP address>: bytes=32; time=10...` this means that the IP address may already be in use by another device on the network. Obtain a new IP address from the network administrator and reinstall the device. - 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.
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 may be problems accessing the device.

The device cannot be accessed from a browser

Cannot log in	When HTTPS is enabled, ensure that the correct protocol (HTTP or HTTPS) is used when attempting to log in. You may need to manually type `http` or `https` in the browser's address field.
The IP address has been changed by DHCP	

The device is accessible locally but not externally

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

- AXIS Camera Station: 30-day trial version free of charge, ideal for small to mid-size systems.

For instructions and download, go to *axis.com/vms*.

Performance considerations

The following factors are the most important to consider:

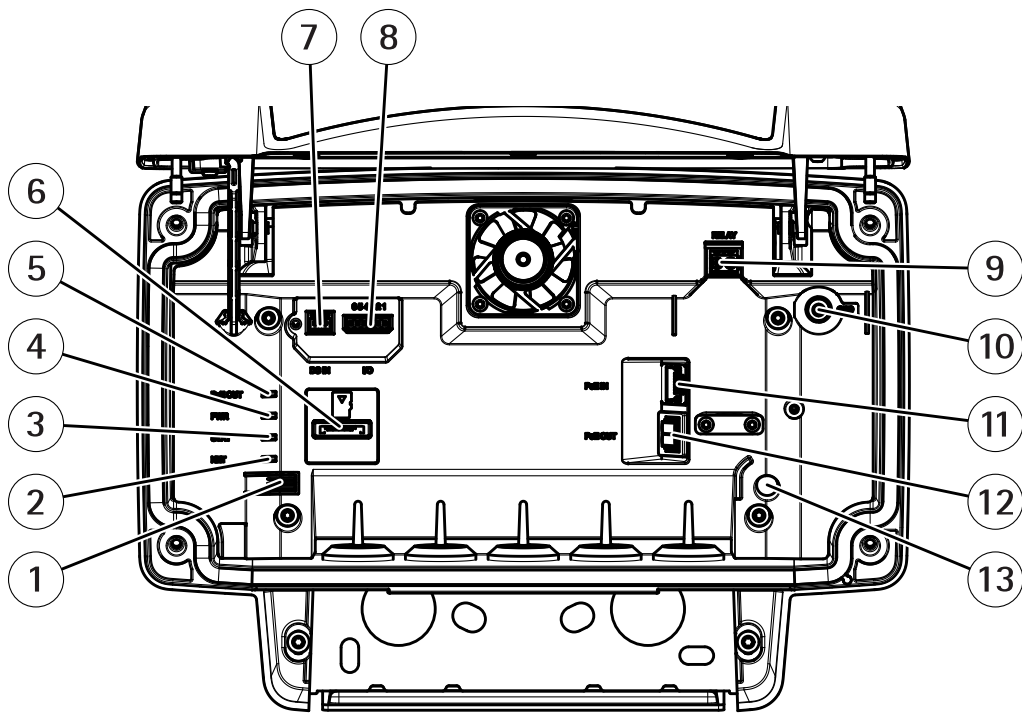- Heavy network utilization due to poor infrastructure affects the bandwidth.

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Specifications

Specifications

Product overview

1   *Control button*
2   *Network LED*
3   *Status LED*
4   *Power LED*
5   *PoE out LED*
6   *microSD card slot*
7   *Power connector (DC)*
8   *I/O connector*
9   *Relay connector*
10   *Grounding screw*
11   *Network connector (PoE in)*
12   *Network connector (PoE out)*
13   *Intrusion alarm sensor*

For technical specifications, see *Specifications on page 20.*

LED Indicators

Status LED	Indication
Green	Steady green for normal operation.

Network LED	Indication
Green	Steady for connection to a 100 Mbit/s network. Flashes for network activity.

Specifications

Amber	Steady for connection to a 10 Mbit/s network. Flashes for network activity.
Unlit	No network connection.

Power LED	Indication
Green	Normal operation.

PoE out LED	Indication
Unlit	PoE out turned off
Green	PoE out turned on

SD card slot

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

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Buttons

Control button

For location of the control button, see *Product overview on page 20*.

The control button is used for:

- Resetting the product to factory default settings. See *page 18*.

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

Connectors

Network connector

RJ45 Ethernet connector with Power over Ethernet Plus (PoE+).

⚠**CAUTION**

Risk of damage to the device. Do not power the device with both PoE and DC.

Network connector (PoE out)

Power over Ethernet IEEE 802.3at type 2, max 30W

Use this connector to supply power to another PoE device, for example a camera, a horn speaker, or a second security radar.

Note

The PoE output is enabled when the radar is powered by a 60 W midspan (Power over Ethernet IEEE 802.3bt, type 3).

Note

If the radar is powered by a 30 W midspan or DC power, the PoE out is disabled.
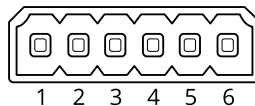
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I/O connector

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

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

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

6-pin terminal block

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

Example
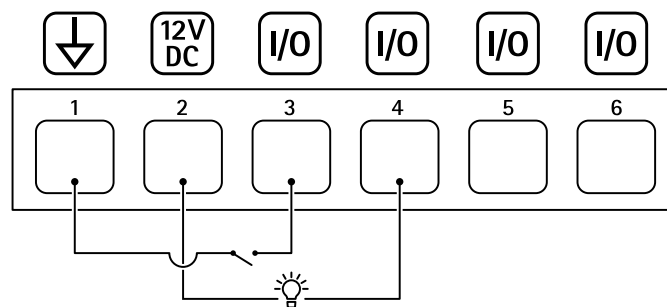
1   DC ground
2   DC output 12 V, max 50 mA
3   I/O configured as input
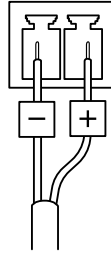4   I/O configured as output
5   Configurable I/O
6   Configurable I/O

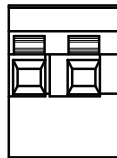# AXIS D2110-VE Security Radar

Specifications

Power connector

2-pin terminal block for DC power input. Use a Safety Extra Low Voltage (SELV) compliant limited power source (LPS) with either a rated output power limited to ≤100 W or a rated output current limited to ≤5 A.

⚠CAUTION

Risk of damage to the device. Do not power the device with both PoE and DC.

Relay connector

⚠CAUTION

Use single core wires for the relay connector.

Function	Specifications
Type	Normally open
Rating	24 V DC/5 A
Isolation from other circuitry	2.5 kV