AXIS D1110 Video Decoder 4K

User manual

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Get started

Find the device on the network

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

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

Browser support

You can use the device with the following browsers:

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

✓: Recommended

*: Supported with limitations

Open the device's web interface

1. Open a browser and type the IP address or host name of the Axis device.
   If you do not 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 .

For descriptions of all the controls and options in the device's web interface, see .

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 .
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 .

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 .
   After the reset, secure boot guarantees the state of the device.
2. Configure and install the device.

Web interface overview

This video gives you an overview of the device's web interface.

Axis device web interface

Configure your device

Add a camera

1. Go to **Video sources > Camera sources**.
2. Click  **Add camera source**:
   - To add a predefined camera from a list, select **Network discovery**.
   - To add a camera manually, select **Manual**.
     - For Axis cameras: enter name, IP address, streaming protocol, port, camera username and password.
     - For third-party cameras: enter name, IP address, camera username and password.
3. Click **Add**.

Edit a camera source

After you've added a camera, you can edit the settings from the **Edit** view.

1. Go to **Video sources > Camera sources**.
2. Select the camera source and click .
3. Click **Edit** and do your changes.
4. Click **Save**.

Remove a camera

1. Go to **Video sources > Camera sources**.
2. Select the camera source and click .
3. Click **Delete** and confirm.

Add a media file

1. Go to **Video sources > Media sources**.
2. Click  **Add media source**.
3. Upload the media file to the device and select the location to put it.
4. Click **Add**.

Set up a sequence

1. Go to **Sequences > Sequences**.
2. Click  **Add sequence**.
3. Enter a name of the new sequence.
4. Click  and select a layout for the view.
5. In the view window, **Click to select camera source or media for this segment**.
6. Select **Camera** or **Media** and select a source from the list.

Note

- To enable low latency mode, select only the H.264 video codec. The latency from camera streams is reduced by disabling B frames which increases network traffic.
- For third-party cameras, add the URI obtained from the manufacturer of the camera.

7. Click **Add** and continue adding sources until the view window is full.
8. To add more view windows to the sequence, click  .
9. Click **Save**.
10. Click  to play the sequence.
11. To set the sequence as the default and have it play when no other is active, click and select **Set as default sequence**.

Use control board to navigate views and operate a camera

1. Add a camera to the decoder. See .
2. Make sure to turn on PTZ for your Axis camera.
3. Connect AXIS TU9001 Control Board to the decoder.
4. In the decoder's web interface, go to **Sequences > Joystick controls** and turn on **Joystick**.

Control board keys reference

Note

Selecting a pane will pause the automatic view change.

Description	AXIS TU9001
Turn on PTZ on camera in a single view.	F1
Turn on PTZ on camera on pane <P> in a split view.	<P> + F1
Set camera on pane <P> in a split view to full screen and turn on PTZ.	<P> +
Turn off PTZ and go back to previous sequence from full screen.	
Pan the selected camera.	Move joystick left or right
Tilt the selected camera.	Move joystick up or down
Zoom the selected camera.	Move joystick head left or right
Go to PTZ preset <N> in a single view and turn on PTZ.	J<N>
Set PTZ preset <N> in a single view and turn on PTZ.	ALT + J<N>
Go to PTZ preset <N> on pane <P> in a split view and turn on PTZ.	<P> + J<N>
Set PTZ preset <N> on pane <P> in a split view and turn on PTZ.	<P> + ALT + J<N>

Example:

- If you press 2 on AXIS TU9003 and then J1 on AXIS TU9002, the camera will go to PTZ preset 1 on pane 2 in the current split view.
- If you press 5 and then F1 on AXIS TU9003, you will turn on PTZ on camera on pane 5 in the current split view.

For more information about the control board, see the *user manual*.

Set up rules for events

You can create rules to make your device perform an action when certain events occur. A rule consists of conditions and actions. The conditions can be used to trigger the actions. For example, the device can start a recording or send an email when it detects motion, or show an overlay text while the device is recording.

To learn more, see *Get started with rules for events*.

Trigger an action

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

Note

- If you make changes to an active rule, the rule must be turned on again for the changes to take effect.

Audio

Audio files

The device doesn't support audio-only files.

The web interface

To reach the device's web interface, type the device's IP address in a web browser.

Note

Support for the features and settings described in this section varies between devices. This icon indicates that the feature or setting is only available in some devices.

Show or hide the main menu.

Access the release notes.

Access the product help.

Change the language.

Set light theme or dark theme.

The user menu contains:

- Information about the user who is logged in.
- **Change account** : Log out from the current account and log in to a new account.
- **Log out** : Log out from the current account.

The context menu contains:

- **Analytics data**: Accept to share non-personal browser data.
- **Feedback**: Share any feedback to help us improve your user experience.
- **Legal**: View information about cookies and licenses.
- **About**: View device information, including AXIS OS version and serial number.

Status

Device info

Shows information about the device, including AXIS OS version and serial number.

Upgrade AXIS OS: Upgrade the software on your device. Takes you to the Maintenance page where you can do the upgrade.

Time sync status

Shows NTP synchronization information, including if the device is in sync with an NTP server and the time remaining until the next sync.

NTP settings: View and update the NTP settings. Takes you to the **Time and location** page where you can change the NTP settings.

Security

Shows what kind of access to the device that is active, what encryption protocols are in use, and if unsigned apps are allowed. Recommendations to the settings are based on the AXIS OS Hardening Guide.

Hardening guide: Link to *AXIS OS Hardening guide* where you can learn more about cybersecurity on Axis devices and best practices.

Connected clients

Shows the number of connections and connected clients.

View details: View and update the list of connected clients. The list shows IP address, protocol, port, state, and PID/process of each connection.

Sequences

Monitor

Shows information about the sequence.

USB

To activate USB functionality, turn on USB ports in **System > Accessories** and restart the device.

Allow USB input: Turn on to let the device use the USB input.

Invert joystick axes: Select if you want to invert the joystick axes:

- **Horizontal:** X axis
- **Vertical:** Y axis

Always play audio when a single segment is selected: Turn on to play audio when a single segment is selected.

Sequences

Important

To avoid problems with multi-stream playbacks, follow the recommendations in the web interface.

Add sequence: Click to add a sequence.

Name: Enter a name for the sequence.

: Click to select how many sources you want to display.

: Click to add one more .

: Click to play the sequence.

The context menu contains:

Edit sequence

Delete sequence

Set as default sequence

Fallback

Add fallback image: Click to add an image that can be displayed if the camera stream is lost.

Audio

Device settings

Audio out

Enable Output: Turn on or off audio from the audio out connector.

Audio out synchronization: Set a time to match the delay difference between the audio out (3.5 mm) port and video stream.

Video sources

Camera sources

Add camera source: Click to add a new camera source.

- **Network discovery**: Search for an IP address manually or select an Axis device from the list.
  - **Streaming protocol**: Select which protocol to use
  - **Port**: Enter the port number used for streaming video.
    - 554 is the default value for **RTSPT**
    - 80 is the default value for **RTSP over HTTP**
    - 443 is the default value for **RTSP over HTTPS**
  - **API port**: Enter the port number for sending HTTP requests to the device. This is only used if **Connect to cameras through secure connections** is turned off.
    - 80 is the default value.
  - **Secure API port**: Enter the port number for sending HTTPS requests to the device.
    - 443 is the default value.
  - **Account**: Enter the username for the device.
  - **Password**: Enter the password for the device.
  - **Include motion events**: Select to allow using motion detected by the camera as an event condition. This setting is only available for Axis cameras.
- **Manual**: Add a device manually.
  - **Name**: Enter the video source's name.
  - **Address or hostname**: Enter the device's IP address or hostname.
  - **Account**: Enter the username for the device.
  - **Password**: Enter the password for the device.
  - **Include motion events**: Select to allow using motion detected by the camera as an event condition. This setting is only available for Axis cameras.

The context menu contains:

Edit: Edit the properties of the video source.

Delete: Delete the video source.

Media sources

Add media source: Click to add a new media source.

- Upload or drag and drop a media file. You can use .mp4, .mkv, .jpeg or .png files.
- **Upload location**: Select the location from the drop-down list.

Apps

Add app: Install a new app.

Find more apps: Find more apps to install. You will be taken to an overview page of Axis apps.

Allow unsigned apps : Turn on to allow installation of unsigned apps.

View the security updates in AXIS OS and ACAP apps.

Note

The device's performance might be affected if you run several apps at the same time.

Use the switch next to the app name to start or stop the app.

Open: Access the app's settings. The available settings depend on the application. Some applications don't have any settings.

The context menu can contain one or more of the following options:

- **Open-source license**: View information about open-source licenses used in the app.
- **App log**: View a log of the app events. The log is helpful when you contact support.
- **Activate license with a key**: If the app requires a license, you need to activate it. Use this option if your device doesn't have internet access.
  If you don't have a license key, go to *axis.com/products/analytics*. You need a license code and the Axis product serial number to generate a license key.
- **Activate license automatically**: If the app requires a license, you need to activate it. Use this option if your device has internet access. You need a license code to activate the license.
- **Deactivate the license**: Deactivate the license to replace it with another license, for example, when you change from a trial license to a full license. If you deactivate the license, you also remove it from the device.
- **Settings**: Configure the parameters.
- **Delete**: Delete the app permanently from the device. If you don't deactivate the license first, it remains active.

System

Time and location

Date and time

The time format depends on the web browser's language settings.

Note

We recommend you synchronize the device's date and time with an NTP server.

Synchronization: Select an option for the device's date and time synchronization.

- **Automatic date and time (PTP)**: Synchronize using the precision time protocol.
- **Automatic date and time (manual NTS KE servers)**: Synchronize with the secure NTP key establishment servers connected to the DHCP server.
  - **Manual NTS KE servers**: Enter the IP address of one or two NTP servers. When you use two NTP servers, the device synchronizes and adapts its time based on input from both.
  - **Trusted NTS KE CA certificates**: Select the trusted CA certificates to use for secure NTS KE time synchronization, or leave at none.
  - **Max NTP poll time**: Select the maximum amount of time the device should wait before it polls the NTP server to get an updated time.
  - **Min NTP poll time**: Select the minimum amount of time the device should wait before it polls the NTP server to get an updated time.
- **Automatic date and time (NTP servers using DHCP)**: Synchronize with the NTP servers connected to the DHCP server.
  - **Fallback NTP servers**: Enter the IP address of one or two fallback servers.
  - **Max NTP poll time**: Select the maximum amount of time the device should wait before it polls the NTP server to get an updated time.
  - **Min NTP poll time**: Select the minimum amount of time the device should wait before it polls the NTP server to get an updated time.
- **Automatic date and time (manual NTP servers)**: Synchronize with NTP servers of your choice.
  - **Manual NTP servers**: Enter the IP address of one or two NTP servers. When you use two NTP servers, the device synchronizes and adapts its time based on input from both.
  - **Max NTP poll time**: Select the maximum amount of time the device should wait before it polls the NTP server to get an updated time.
  - **Min NTP poll time**: Select the minimum amount of time the device should wait before it polls the NTP server to get an updated time.
- **Custom date and time**: Manually set the date and time. Click **Get from system** to fetch the date and time settings once from your computer or mobile device.

Time zone: Select which time zone to use. Time will automatically adjust to daylight saving time and standard time.

- **DHCP**: Adopts the time zone of the DHCP server. The device must be connected to a DHCP server (v4 or v6) before you can select this option. If both versions are available, the device prefers IANA time zones over POSIX, and DHCPv4 over DHCPv6.
  - DHCPv4 uses Option 100 for POSIX time zones and Option 101 for IANA time zones.
  - DHCPv6 uses Option 41 for POSIX and Option 42 for IANA.
- **Manual**: Select a time zone from the drop-down list.

Note

The system uses the date and time settings in all recordings, logs, and system settings.

Network

IPv4

Assign IPv4 automatically: Select IPv4 automatic IP (DHCP) to let the network assign your IP address, subnet mask, and router automatically, without manual configuration. We recommend using automatic IP assignment (DHCP) for most networks.

IP address: Enter a unique IP address for the device. Static IP addresses can be assigned at random within isolated networks, provided that each address is unique. To avoid conflicts, we recommend you contact your network administrator before you assign a static IP address.

Subnet mask: Enter the subnet mask to define what addresses are inside the local area network. Any address outside the local area network goes through the router.

Router: Enter the IP address of the default router (gateway) used to connect devices that are attached to different networks and network segments.

Fallback to static IP address if DHCP isn't available: Select if you want to add a static IP address to use as fallback if DHCP is unavailable and can't assign an IP address automatically.

Note

If DHCP isn't available and the device uses a static address fallback, the static address is configured with a limited scope.

IPv6

Assign IPv6 automatically: Select to turn on IPv6 and to let the network router assign an IP address to the device automatically.

Hostname

Assign hostname automatically: Select to let the network router assign a hostname to the device automatically.

Hostname: Enter the hostname manually to use as an alternative way of accessing the device. The server report and system log use the hostname. Allowed characters are A–Z, a–z, 0–9 and -.

Enable dynamic DNS updates: Allow your device to automatically update its domain name server records whenever its IP address changes.

Register DNS name: Enter a unique domain name that points to your device's IP address. Allowed characters are A–Z, a–z, 0–9 and -.

TTL: Time to Live (TTL) sets how long a DNS record stays valid before it needs to be updated.

DNS servers

Assign DNS automatically: Select to let the DHCP server assign search domains and DNS server addresses to the device automatically. We recommend automatic DNS (DHCP) for most networks.

Search domains: When you use a hostname that is not fully qualified, click **Add search domain** and enter a domain in which to search for the hostname the device uses.

DNS servers: Click **Add DNS server** and enter the IP address of the DNS server. This provides the translation of hostnames to IP addresses on your network.

Note

If DHCP is disabled, features that rely on automatic network configuration, such as hostname, DNS servers, NTP, and others, may stop working.

HTTP and HTTPS

HTTPS is a protocol that provides encryption for page requests from users and for the pages returned by the web server. The encrypted exchange of information is governed by the use of an HTTPS certificate, which guarantees the authenticity of the server.

To use HTTPS on the device, you must install an HTTPS certificate. Go to **System > Security** to create and install certificates.

Allow access through: Select if a user is allowed to connect to the device through the **HTTP**, **HTTPS**, or both **HTTP and HTTPS** protocols.

Note

If you view encrypted web pages through HTTPS, you might experience a drop in performance, especially when you request a page for the first time.

HTTP port: Enter the HTTP port to use. The device allows port 80 or any port in the range 1024-65535. If you are logged in as an administrator, you can also enter any port in the range 1-1023. If you use a port in this range, you get a warning.

HTTPS port: Enter the HTTPS port to use. The device allows port 443 or any port in the range 1024-65535. If you are logged in as an administrator, you can also enter any port in the range 1-1023. If you use a port in this range, you get a warning.

Certificate: Select a certificate to enable HTTPS for the device.

Network discovery protocols

Bonjour®: Turn on to allow automatic discovery on the network.

Bonjour name: Enter a friendly name to be visible on the network. The default name is the device name and MAC address.

UPnP®: Turn on to allow automatic discovery on the network.

UPnP name: Enter a friendly name to be visible on the network. The default name is the device name and MAC address.

WS-Discovery: Turn on to allow automatic discovery on the network.

LLDP and CDP: Turn on to allow automatic discovery on the network. Turning LLDP and CDP off can impact the PoE power negotiation. To resolve any issues with the PoE power negotiation, configure the PoE switch for hardware PoE power negotiation only.

Global proxies

Http proxy: Specify a global proxy host or IP address according to the allowed format.

Https proxy: Specify a global proxy host or IP address according to the allowed format.

Allowed formats for http and https proxies:

- http(s)://host:port
- http(s)://user@host:port
- http(s)://user:pass@host:port

Note

Restart the device to apply the global proxy settings.

No proxy: Use **No proxy** to bypass global proxies. Enter one of the options in the list, or enter several separated by a comma:

- Leave empty
- Specify an IP address
- Specify an IP address in CIDR format
- Specify a domain name, for example: www.<domain name>.com
- Specify all subdomains in a specific domain, for example .<domain name>.com

One-click cloud connection

One-click cloud connection (O3C) together with an O3C service provides easy and secure internet access to live and recorded video from any location. For more information, see *axis.com/end-to-end-solutions/hosted-services*.

Allow O3C:

- **One-click**: This is the default option. To connect to O3C, press the control button on the device. Depending on the device model, either press and release or press and hold, until the status LED flashes. Register the device with the O3C service within 24 hours to enable **Always** and stay connected. If you don't register, the device will disconnect from O3C.
- **Always**: The device continuously attempts to connect to an O3C service over the internet. Once you register the device, it stays connected. Use this option if the control button is out of reach.
- **No**: Disconnects the O3C service.

Proxy settings: If needed, enter the proxy settings to connect to the proxy server.

Host: Enter the proxy server's address.

Port: Enter the port number used for access.

Login and **Password**: If needed, enter username and password for the proxy server.

Authentication method:

- **Basic**: This method is the most compatible authentication scheme for HTTP. It's less secure than the **Digest** method because it sends the username and password unencrypted to the server.
- **Digest**: This method is more secure because it always transfers the password encrypted across the network.
- **Auto**: This option lets the device select the authentication method depending on the supported methods. It prioritizes the **Digest** method over the **Basic** method.

Owner authentication key (OAK): Click **Get key** to fetch the owner authentication key. This is only possible if the device is connected to the internet without a firewall or proxy.

SNMP

The Simple Network Management Protocol (SNMP) allows remote management of network devices.

SNMP: Select the version of SNMP to use.

- **v1 and v2c**:
  - **Read community**: Enter the community name that has read-only access to all supported SNMP objects. The default value is **public**.
  - **Write community**: Enter the community name that has read or write access to all supported SNMP objects (except read-only objects). The default value is **write**.
  - **Activate traps**: Turn on to activate trap reporting. The device uses traps to send messages for important events or status changes to a management system. In the web interface, you can set up traps for SNMP v1 and v2c. Traps are automatically turned off if you change to SNMP v3 or turn off SNMP. If you use SNMP v3, you can set up traps through the SNMP v3 management application.
  - **Trap address**: Enter the IP address or host name of the management server.
  - **Trap community**: Enter the community to use when the device sends a trap message to the management system.
  - **Traps**:
    - **Cold start**: Sends a trap message when the device starts.
    - **Link up**: Sends a trap message when a link changes from down to up.
    - **Link down**: Sends a trap message when a link changes from up to down.
    - **Authentication failed**: Sends a trap message when an authentication attempt fails.

Note

All Axis Video MIB traps are enabled when you turn on SNMP v1 and v2c traps. For more information, see *AXIS OS Portal > SNMP*.

- **v3**: SNMP v3 is a more secure version, which provides encryption and secure passwords. To use SNMP v3, we recommend you to activate HTTPS, as the password is then sent through HTTPS. This also prevents unauthorized parties' access to unencrypted SNMP v1 and v2c traps. If you use SNMP v3, you can set up traps through the SNMP v3 management application.
  - **Privacy**: Select what encryption to use for protecting your SNMP data.
  - **Password for the account "initial"**: Enter the SNMP password for the account named "initial". Although the password can be sent without activating HTTPS, we don't recommend it. The SNMP v3 password can only be set once, and preferably only when HTTPS is enabled. Once the password is set, the password field is no longer displayed. To set the password again, you must reset the device to factory default settings.

Security

Certificates

Certificates are used to authenticate devices on a network. The device supports two types of certificates:

- **Client/server certificates**
  A client/server certificate validates the device's identity, and can be self-signed or issued by a Certificate Authority (CA). A self-signed certificate offers limited protection and can be used before a CA-issued certificate has been obtained.
- **CA certificates**
  You can use a CA certificate to authenticate a peer certificate, for example to validate the identity of an authentication server when the device connects to a network protected by IEEE 802.1X. The device has several pre-installed CA certificates.

These formats are supported:

- Certificate formats: .PEM, .CER, and .PFX
- Private key formats: PKCS#1 and PKCS#12

Important

If you reset the device to factory default, all certificates are deleted. Any pre-installed CA certificates are reinstalled.

Add certificate : Click to add a certificate. A step-by-step guide opens up.

- **More** : Show more fields to fill in or select.
- **Secure keystore**: Select to use **Trusted Execution Environment (SoC TEE)**, **Secure element** or **Trusted Platform Module 2.0** to securely store the private key. For more information on which secure keystore to select, go to *help.axis.com/axis-os#cryptographic-support*.
- **Key type**: Select the default or a different encryption algorithm from the drop-down list to protect the certificate.

The context menu contains:

- **Certificate information**: View an installed certificate's properties.
- **Delete certificate**: Delete the certificate.
- **Create certificate signing request**: Create a certificate signing request to send to a registration authority to apply for a digital identity certificate.

Secure keystore :

- **Trusted Execution Environment (SoC TEE)**: Select to use SoC TEE for secure keystore.
- **Secure element (CC EAL6+, FIPS 140-3 Level 3)** : Select to use secure element for secure keystore.
- **Trusted Platform Module 2.0 (CC EAL4+, FIPS 140-2 Level 2)** : Select to use TPM 2.0 for secure keystore.

Network access control and encryption

IEEE 802.1x

IEEE 802.1x is an IEEE standard for port-based network admission control providing secure authentication of wired and wireless network devices. IEEE 802.1x is based on EAP (Extensible Authentication Protocol).

To access a network protected by IEEE 802.1x, network devices must authenticate themselves. The authentication is performed by an authentication server, typically a RADIUS server (for example, FreeRADIUS and Microsoft Internet Authentication Server).

IEEE 802.1AE MACsec

IEEE 802.1AE MACsec is an IEEE standard for media access control (MAC) security that defines connectionless data confidentiality and integrity for media access independent protocols.

Certificates

When configured without a CA certificate, server certificate validation is disabled and the device tries to authenticate itself regardless of what network it is connected to.

When using a certificate, in Axis' implementation, the device and the authentication server authenticate themselves with digital certificates using EAP-TLS (Extensible Authentication Protocol - Transport Layer Security).

To allow the device to access a network protected through certificates, you must install a signed client certificate on the device.

Authentication method: Select an EAP type used for authentication.

Client certificate: Select a client certificate to use IEEE 802.1x. The authentication server uses the certificate to validate the client's identity.

CA certificates: Select CA certificates to validate the authentication server's identity. When no certificate is selected, the device tries to authenticate itself regardless of what network it is connected to.

EAP identity: Enter the user identity associated with the client certificate.

EAPOL version: Select the EAPOL version that is used in the network switch.

Use IEEE 802.1x: Select to use the IEEE 802.1x protocol.

These settings are only available if you use **IEEE 802.1x PEAP-MSCHAPv2** as the authentication method:

- **Password**: Enter the password for your user identity.
- **Peap version**: Select the Peap version that is used in the network switch.
- **Label**: Select 1 to use client EAP encryption; select 2 to use client PEAP encryption. Select the Label that the network switch uses when using Peap version 1.

These settings are only available if you use **IEEE 802.1ae MACsec (Static CAK/Pre-Shared Key)** as the authentication method:

- **Key agreement connectivity association key name**: Enter the connectivity association name (CKN). It must be 2 to 64 (divisible by 2) hexadecimal characters. The CKN must be manually configured in the connectivity association and must match on both ends of the link to initially enable MACsec.
- **Key agreement connectivity association key**: Enter the connectivity association key (CAK). It should be either 32 or 64 hexadecimal characters long. The CAK must be manually configured in the connectivity association and must match on both ends of the link to initially enable MACsec.

Prevent brute-force attacks

Blocking: Turn on to block brute-force attacks. A brute-force attack uses trial-and-error to guess login info or encryption keys.

Blocking period: Enter the number of seconds to block a brute-force attack.

Blocking conditions: Enter the number of authentication failures allowed per second before the block starts. You can set the number of failures allowed both on page level and device level.

Firewall

Firewall: Turn on to activate the firewall.

Default Policy: Select how you want the firewall to handle connection requests not covered by rules.

- **ACCEPT:** Allows all connections to the device. This option is set by default.
- **DROP:** Blocks all connections to the device.

To make exceptions to the default policy, you can create rules that allows or blocks connections to the device from specific addresses, protocols, and ports.

+ New rule: Click to create a rule.

Rule type:

- **FILTER**: Select to either allow or block connections from devices that match the criteria defined in the rule.
  - **Policy**: Select **Accept** or **Drop** for the firewall rule.
  - **IP range**: Select to specify a range of addresses to allow or block. Use IPv4/IPv6 in **Start** and **End**.
  - **IP address**: Enter an address that you want to allow or block. Use IPv4/IPv6 or CIDR format.
  - **Protocol**: Select a network protocol (TCP, UDP, or Both) to allow or block. If you select a protocol, you must also specify a port.
  - **MAC**: Enter the MAC address of a device that you want to allow or block.
  - **Port range**: Select to specify the range of ports to allow or block. Add them in **Start** and **End**.
  - **Port**: Enter a port number that you want to allow or block. Port numbers must be between 1 and 65535.
  - **Traffic type**: Select a traffic type that you want to allow or block.
    - **UNICAST**: Traffic from a single sender to a single recipient.
    - **BROADCAST**: Traffic from a single sender to all devices on the network.
    - **MULTICAST**: Traffic from one or more senders to one or more recipient.
- **LIMIT**: Select to accept connections from devices that match the criteria defined in the rule but apply limits to reduce excessive traffic.
  - **IP range**: Select to specify a range of addresses to allow or block. Use IPv4/IPv6 in **Start** and **End**.
  - **IP address**: Enter an address that you want to allow or block. Use IPv4/IPv6 or CIDR format.
  - **Protocol**: Select a network protocol (TCP, UDP, or Both) to allow or block. If you select a protocol, you must also specify a port.
  - **MAC**: Enter the MAC address of a device that you want to allow or block.
  - **Port range**: Select to specify the range of ports to allow or block. Add them in **Start** and **End**.
  - **Port**: Enter a port number that you want to allow or block. Port numbers must be between 1 and 65535.
  - **Unit**: Select the type of connections to allow or block.
  - **Period**: Select the time period related to **Amount**.
  - **Amount**: Set the maximum number of times a device is allowed to connect within the set **Period**. The maximum amount is 65535.
  - **Burst**: Enter the number of connections allowed to exceed the set **Amount** once during the set **Period**. Once the number has been reached, only the set amount during the set period is allowed.
  - **Traffic type**: Select a traffic type that you want to allow or block.
    - **UNICAST**: Traffic from a single sender to a single recipient.
    - **BROADCAST**: Traffic from a single sender to all devices on the network.

- **MULTICAST**: Traffic from one or more senders to one or more recipient.

Test rules: Click to test the rules that you have defined.

- **Test time in seconds**: Set a time limit for testing the rules.
- **Roll back**: Click to roll back the firewall to its previous state, before you have tested the rules.
- **Apply rules**: Click to activate the rules without testing. We don't recommend that you do this.

Custom signed AXIS OS certificate

To install test software or other custom software from Axis on the device, you need a custom signed AXIS OS certificate. The certificate verifies that the software is approved by both the device owner and Axis. The software can only run on a specific device which is identified by its unique serial number and chip ID. Only Axis can create custom signed AXIS OS certificates, since Axis holds the key to sign them.

Install: Click to install the certificate. You need to install the certificate before you install the software.

The context menu contains:

- **Delete certificate**: Delete the certificate.

Accounts

Accounts

Add account: Click to add a new account. You can add up to 100 accounts.

Account: Enter a unique account name.

New password: Enter a password for the account. Passwords must be 1 to 64 characters long. Only ASCII printable characters (code 32 to 126) are allowed in the password, for example, letters, numbers, punctuation, and some symbols.

Repeat password: Enter the same password again.

Privileges:

- **Administrator**: Has full access to all settings. Administrators can also add, update, and remove other accounts.
- **Operator**: Has access to all settings except:
  - All **System** settings.
- **Viewer**: Has access to:
  - Watch and take snapshots of a video stream.
  - Watch and export recordings.
  - Pan, tilt, and zoom; with **PTZ account** access.

The context menu contains:

Update account: Edit the account properties.

Delete account: Delete the account. You can't delete the root account.

Anonymous access

Allow anonymous viewing: Turn on to allow anyone access the device as a viewer without logging in with an account.

Allow anonymous PTZ operating : Turn on to allow anonymous users to pan, tilt, and zoom the image.

SSH accounts

Add SSH account: Click to add a new SSH account.

- **Enable SSH**: Turn on to use SSH service.

Account: Enter a unique account name.

New password: Enter a password for the account. Passwords must be 1 to 64 characters long. Only ASCII printable characters (code 32 to 126) are allowed in the password, for example, letters, numbers, punctuation, and some symbols.

Repeat password: Enter the same password again.

Comment: Enter a comment (optional).

The context menu contains:

Update SSH account: Edit the account properties.

Delete SSH account: Delete the account. You can't delete the root account.

Virtual host

Add virtual host: Click to add a new virtual host.

Enabled: Select to use this virtual host.

Server name: Enter the name of the server. Only use numbers 0-9, letters A-Z, and hyphen (-).

Port: Enter the port the server is connected to.

Type: Select the type of authentication to use. Select between **Basic**, **Digest**, **Open ID**, and **Client Credential Grant**.

HTTPS: Select to use HTTPS.

The context menu contains:

- **Update virtual host**
- **Delete virtual host**

Client Credentials Grant Configuration

Admin claim: Enter a value for the admin role.

Verification URI: Enter the web link for the API endpoint authentication.

Operator claim: Enter a value for the operator role.

Require claim: Enter the data that should be in the token.

Viewer claim: Enter the value for the viewer role.

Save: Click to save the values.

OpenID Configuration

Important

If you can't use OpenID to sign in, use the Digest or Basic credentials you used when you configured OpenID to sign in.

Client ID: Enter the OpenID username.

Outgoing Proxy: Enter the proxy address for the OpenID connection to use a proxy server.

Admin claim: Enter a value for the admin role.

Provider URL: Enter the web link for the API endpoint authentication. Format should be https://[insert URL]/.well-known/openid-configuration

Operator claim: Enter a value for the operator role.

Require claim: Enter the data that should be in the token.

Viewer claim: Enter the value for the viewer role.

Remote user: Enter a value to identify remote users. This assists to display the current user in the device's web interface.

Scopes: Optional scopes that could be part of the token.

Client secret: Enter the OpenID password

Save: Click to save the OpenID values.

Enable OpenID: Turn on to close current connection and allow device authentication from the provider URL.

Events

Rules

A rule defines the conditions that triggers the product to perform an action. The list shows all the currently configured rules in the product.

Note

You can create up to 256 action rules.

Add a rule: Create a rule.

Name: Enter a name for the rule.

Wait between actions: Enter the minimum time (hh:mm:ss) that must pass between rule activations. It is useful if the rule is activated by, for example, day-night mode conditions, to avoid that small light changes during sunrise and sunset activate the rule repeatedly.

Condition: Select a condition from the list. A condition must be met for the device to perform an action. If multiple conditions are defined, all of them must be met to trigger the action. For information about specific conditions, see *Get started with rules for events*.

Use this condition as a trigger: Select to make this first condition function only as a starting trigger. It means that once the rule is activated, it remains active for as long as all the other conditions are met, no matter the state of the first condition. If you don't select this option, the rule will simply be active whenever all the conditions are met.

Invert this condition: Select if you want the condition to be the opposite of your selection.

Add a condition: Click to add an additional condition.

Action: Select an action from the list and enter its required information. For information about specific actions, see *Get started with rules for events*.

Recipients

You can set up your device to notify recipients about events or send files.

Note

If you set up your device to use FTP or SFTP, don't change or remove the unique sequence number that's added to the file names. If you do that, only one image per event can be sent.

The list shows all the recipients currently configured in the product, along with information about their configuration.

Note

You can create up to 20 recipients.

Add a recipient: Click to add a recipient.

Name: Enter a name for the recipient.

Type: Select from the list:

- FTP
  - **Host**: Enter the server's IP address or hostname. If you enter a hostname, make sure that a DNS server is specified under **System > Network > IPv4 and IPv6**.
  - **Port**: Enter the port number used by the FTP server. The default is 21.
  - **Folder**: Enter the path to the directory where you want to store files. If this directory doesn't already exist on the FTP server, you will get an error message when uploading files.
  - **Username**: Enter the username for the login.
  - **Password**: Enter the password for the login.
  - **Use temporary file name**: Select to upload files with temporary, automatically generated filenames. The files get renamed to the desired names when the upload completes. If the upload is aborted/interrupted, you don't get any corrupt files. However, you probably still get the temporary files. This way you know that all files that have the desired name are correct.
  - **Use passive FTP**: Under normal circumstances, the product simply requests the target FTP server to open the data connection. The device actively initiates both the FTP control and data connections to the target server. This is normally needed if there is a firewall between the device and the target FTP server.
- HTTP
  - **URL**: Enter the network address to the HTTP server and the script that will handle the request. For example, http://192.168.254.10/cgi-bin/notify.cgi.
  - **Username**: Enter the username for the login.
  - **Password**: Enter the password for the login.
  - **Proxy**: Turn on and enter the required information if a proxy server must be passed to connect to the HTTP server.
- HTTPS
  - **URL**: Enter the network address to the HTTPS server and the script that will handle the request. For example, https://192.168.254.10/cgi-bin/notify.cgi.
  - **Validate server certificate**: Select to validate the certificate that was created by HTTPS server.
  - **Username**: Enter the username for the login.
  - **Password**: Enter the password for the login.
  - **Proxy**: Turn on and enter the required information if a proxy server must be passed to connect to the HTTPS server.
- Network storage
  You can add network storage such as NAS (network-attached storage) and use it as a recipient to store files. The files are stored in the Matroska (MKV) file format.
  - **Host**: Enter the IP address or hostname for the network storage.
  - **Share**: Enter the name of the share on the host.
  - **Folder**: Enter the path to the directory where you want to store files.
  - **Username**: Enter the username for the login.
  - **Password**: Enter the password for the login.

- SFTP
  - **Host**: Enter the server's IP address or hostname. If you enter a hostname, make sure that a DNS server is specified under **System > Network > IPv4 and IPv6**.
  - **Port**: Enter the port number used by the SFTP server. The default is 22.
  - **Folder**: Enter the path to the directory where you want to store files. If this directory doesn't already exist on the SFTP server, you will get an error message when uploading files.
  - **Username**: Enter the username for the login.
  - **Password**: Enter the password for the login.
  - **SSH host public key type (MD5)**: Enter the fingerprint of the remote host's public key (a 32-digit hexadecimal string). The SFTP client supports SFTP servers using SSH-2 with RSA, DSA, ECDSA, and ED25519 host key types. RSA is the preferred method during negotiation, followed by ECDSA, ED25519, and DSA. Make sure to enter the right MD5 host key that is used by your SFTP server. While the Axis device supports both MD5 and SHA-256 hash keys, we recommend using SHA-256 due to stronger security over MD5. For more information on how to configure an SFTP server with an Axis device, go to the *AXIS OS Portal*.
  - **SSH host public key type (SHA256)**: Enter the fingerprint of the remote host's public key (a 43-digit Base64 encoded string). The SFTP client supports SFTP servers using SSH-2 with RSA, DSA, ECDSA, and ED25519 host key types. RSA is the preferred method during negotiation, followed by ECDSA, ED25519, and DSA. Make sure to enter the right MD5 host key that is used by your SFTP server. While the Axis device supports both MD5 and SHA-256 hash keys, we recommend using SHA-256 due to stronger security over MD5. For more information on how to configure an SFTP server with an Axis device, go to the *AXIS OS Portal*.
  - **Use temporary file name**: Select to upload files with temporary, automatically generated filenames. The files get renamed to the desired names when the upload completes. If the upload is aborted or interrupted, you don't get any corrupt files. However, you probably still get the temporary files. This way, you know that all files that have the desired name are correct.
- SIP or VMS :
  SIP: Select to make a SIP call.
  VMS: Select to make a VMS call.
  - **From SIP account**: Select from the list.
  - **To SIP address**: Enter the SIP address.
  - **Test**: Click to test that your call settings works.
- Email
  - **Send email to**: Enter the email address to send emails to. To enter multiple addresses, use commas to separate them.
  - **Send email from**: Enter the email address of the sending server.
  - **Username**: Enter the username for the mail server. Leave this field empty if the mail server does not require authentication.
  - **Password**: Enter the password for the mail server. Leave this field empty if the mail server does not require authentication.
  - **Email server (SMTP)**: Enter the name of the SMTP server, for example, smtp.gmail.com, smtp.mail.yahoo.com.
  - **Port**: Enter the port number for the SMTP server, using values in the range 0-65535. The default value is 587.
  - **Encryption**: To use encryption, select either SSL or TLS.
  - **Validate server certificate**: If you use encryption, select to validate the identity of the device. The certificate can be self-signed or issued by a Certificate Authority (CA).

- **POP authentication**: Turn on to enter the name of the POP server, for example, pop.gmail.com.

Note

Some email providers have security filters that prevent users from receiving or viewing large amount of attachments, from receiving scheduled emails and similar. Check the email provider's security policy to avoid your email account being locked or missing out on your expected emails.

- **TCP**
  - **Host**: Enter the server's IP address or hostname. If you enter a hostname, make sure that a DNS server is specified under **System > Network > IPv4 and IPv6**.
  - **Port**: Enter the port number used to access the server.

Test: Click to test the setup.

⋮ The context menu contains:

View recipient: Click to view all the recipient details.

Copy recipient: Click to copy a recipient. When you copy, you can make changes to the new recipient.

Delete recipient: Click to delete the recipient permanently.

Schedules

Schedules and pulses can be used as conditions in rules. The list shows all the schedules and pulses currently configured in the product, along with information about their configuration.

+ **Add schedule**: Click to create a schedule or pulse.

Manual triggers

You can use the manual trigger to manually trigger a rule. The manual trigger can, for example, be used to validate actions during product installation and configuration.

MQTT

MQTT (Message Queuing Telemetry Transport) is a standard messaging protocol for the Internet of Things (IoT). It was designed for simplified IoT integration and is used in a wide variety of industries to connect remote devices with a small code footprint and minimal network bandwidth. The MQTT client in Axis device software can simplify integration of data and events produced in the device to systems which are not video management software (VMS).

Set up the device as an MQTT client. MQTT communication is based on two entities, the clients and the broker. The clients can send and receive messages. The broker is responsible for routing messages between clients.

You can learn more about MQTT in *AXIS OS Knowledge base*.

ALPN

ALPN is a TLS/SSL extension that allows for the selection of an application protocol during the handshake phase of the connection between the client and server. This is used to enable MQTT traffic over the same port that is used for other protocols, such as HTTP. In some cases, there might not be a dedicated port open for MQTT communication. A solution in such cases is to use ALPN to negotiate the use of MQTT as the application protocol on a standard port, allowed by the firewalls.

MQTT client

Connect: Turn on or off the MQTT client.

Status: Shows the current status of the MQTT client.

Broker

Host: Enter the hostname or IP address of the MQTT server.

Protocol: Select which protocol to use.

Port: Enter the port number.

- 1883 is the default value for **MQTT over TCP**
- 8883 is the default value for **MQTT over SSL**
- 80 is the default value for **MQTT over WebSocket**
- 443 is the default value for **MQTT over WebSocket Secure**

ALPN protocol: Enter the ALPN protocol name provided by your MQTT broker provider. This is only applicable with MQTT over SSL and MQTT over WebSocket Secure.

Username: Enter the username that the client will use to access the server.

Password: Enter a password for the username.

Client ID: Enter a client ID. The client identifier is sent to the server when the client connects to it.

Clean session: Controls the behavior at connection and disconnection time. When selected, the state information is discarded at connect and disconnect.

HTTP proxy: A URL with a maximum length of 255 bytes. You can leave the field empty if you don't want to use an HTTP proxy.

HTTPS proxy: A URL with a maximum length of 255 bytes. You can leave the field empty if you don't want to use an HTTPS proxy.

Keep alive interval: Enables the client to detect when the server is no longer available without having to wait for the long TCP/IP timeout.

Timeout: The time interval in seconds to allow a connect to complete. Default value: 60

Device topic prefix: Used in the default values for the topic in the connect message and LWT message on the **MQTT client** tab, and in the publication conditions on the **MQTT publication** tab.

Reconnect automatically: Specifies whether the client should reconnect automatically after a disconnect.

Connect message

Specifies if a message should be sent out when a connection is established.

Send message: Turn on to send messages.

Use default: Turn off to enter your own default message.

Topic: Enter the topic for the default message.

Payload: Enter the content for the default message.

Retain: Select to keep the state of client on this **Topic**

QoS: Change the QoS layer for the packet flow.

Last Will and Testament message

The Last Will Testament (LWT) lets a client provide a testament along with its credentials when connecting to the broker. If the client disconnects ungracefully at some point later (maybe because his power source died), it

can let the broker deliver a message to other clients. This LWT message has the same form as an ordinary message and gets routed via the same mechanics.

Send message: Turn on to send messages.

Use default: Turn off to enter your own default message.

Topic: Enter the topic for the default message.

Payload: Enter the content for the default message.

Retain: Select to keep the state of client on this **Topic**

QoS: Change the QoS layer for the packet flow.

MQTT publication

Use default topic prefix: Select to use the default topic prefix, that is defined in the device topic prefix in the **MQTT client** tab.

Include condition: Select to include the topic that describes the condition in the MQTT topic.

Include namespaces: Select to include ONVIF topic namespaces in the MQTT topic.

Include serial number: Select to include the device's serial number in the MQTT payload.

Add condition: Click to add a condition.

Retain: Defines which MQTT messages are sent as retained.

- **None**: Send all messages as non-retained.
- **Property**: Send only stateful messages as retained.
- **All**: Send both stateful and stateless messages as retained.

QoS: Select the desired level for the MQTT publication.

MQTT subscriptions

Add subscription: Click to add a new MQTT subscription.

Subscription filter: Enter the MQTT topic that you want to subscribe to.

Use device topic prefix: Add the subscription filter as prefix to the MQTT topic.

Subscription type:

- **Stateless**: Select to convert MQTT messages into a stateless message.
- **Stateful**: Select to convert MQTT messages into a condition. The payload is used as the state.

QoS: Select the desired level for the MQTT subscription.

Storage

Onboard storage

Important

Risk of data loss and corrupted recordings. Do not remove the SD card while the device is running. Unmount the SD card before you remove it.

Unmount: Click to safely remove the SD card.

Write protect: Turn on to stop writing to the SD card and protect recordings from being removed. You can't format a write-protected SD card.

Autoformat: Turn on to automatically format a newly inserted SD card. It formats the file system into ext4.

Ignore: Turn on to stop storing recordings on the SD card. When you ignore the SD card, the device no longer recognizes that the card exists. The setting is only available to administrators.

Retention time: Select how long to keep recordings to limit the amount of old recordings or comply with data storage regulations. When the SD card is full, it deletes old recordings before their retention time has passed.

Tools

- **Check**: Check for errors on the SD card.
- **Repair**: Repair errors in the file system.
- **Format**: Format the SD card to change the file system and erase all data. You can only format the SD card to the ext4 file system. You need a third-party ext4 driver or application to access the file system from Windows®.
- **Encrypt**: Use this tool to format the SD card and enable encryption. This erases all data stored on the SD card. Any new data you store on the SD card will be encrypted.
- **Decrypt**: Use this tool to format the SD card without encryption. This erases all data stored on the SD card. Any new data you store on the SD card will not be encrypted.
- **Change password**: Change the password required to encrypt the SD card.

Use tool: Click to activate the selected tool.

Wear trigger: Set a value for the SD card wear level at which you want to trigger an action. The wear level ranges from 0–200%. A new SD card that has never been used has a wear level of 0%. A wear level of 100% indicates that the SD card is close to its expected lifetime. When the wear-level reaches 200%, there is a high risk of the SD card malfunctioning. We recommend setting the wear trigger between 80–90%. This gives you time to download any recordings as well as replace the SD card in time before it potentially wears out. The wear trigger allows you to set up an event and get a notification when the wear level reaches your set value.

ONVIF

ONVIF accounts

ONVIF (Open Network Video Interface Forum) is a global interface standard that makes it easier for end-users, integrators, consultants, and manufacturers to take advantage of the possibilities offered by network video technology. ONVIF enables interoperability between different vendor products, increased flexibility, reduced cost and future-proof systems.

When you create an ONVIF account, you automatically enable ONVIF communication. Use the account name and password for all ONVIF communication with the device. For more information see the Axis Developer Community at *axis.com*.

Add accounts: Click to add a new ONVIF account.

Account: Enter a unique account name.

New password: Enter a password for the account. Passwords must be 1 to 64 characters long. Only ASCII printable characters (code 32 to 126) are allowed in the password, for example, letters, numbers, punctuation, and some symbols.

Repeat password: Enter the same password again.

Privileges:

- **Administrator**: Has full access to all settings. Administrators can also add, update, and remove other accounts.
- **Operator**: Has access to all settings except:
  - All **System** settings.
  - Adding apps.
- **Media account**: Allows access to the video stream only.

The context menu contains:

Update account: Edit the account properties.

Delete account: Delete the account. You can't delete the root account.

Video out

HDMI

You can connect an external monitor to the device through an HDMI cable.

Outputs: shows the current HDMI status and settings.

- To change the display mode, select your preferred mode from the dropdown list and go to **Maintenance** and click **Restart**. Your device will reboot to apply the changes.

Accessories

USB configuration

By default, the USB port is disabled and won't respond to any connections. When enabled, your device can connect to external USB devices, such as memory sticks, Axis control boards and other compatible accessories.

- To enable the USB port, toggle the switch and go to **Maintenance** and click **Restart**. Your device will reboot to apply the changes.

Logs

Reports and logs

Reports

- **View the device server report**: View information about the product status in a pop-up window. The Access Log is automatically included in the Server Report.
- **Download the device server report**: It creates a .zip file that contains a complete server report text file in UTF–8 format, as well as a snapshot of the current live view image. Always include the server report .zip file when you contact support.
- **Download the crash report**: Download an archive with detailed information about the server's status. The crash report contains information that is in the server report as well as detailed debug information. This report might contain sensitive information such as network traces. It can take several minutes to generate the report.

Logs

- **View the system log**: Click to show information about system events such as device startup, warnings, and critical messages.
- **View the access log**: Click to show all failed attempts to access the device, for example, when a wrong login password is used.
- **View the audit log**: Click to show information about user and system activities, for example, successful or failed authentications and configurations.

Remote system log

Syslog is a standard for message logging. It allows separation of the software that generates messages, the system that stores them, and the software that reports and analyzes them. Each message is labeled with a facility code, which indicates the software type generating the message, and assigned a severity level.

 **Server**: Click to add a new server.

Host: Enter the hostname or IP address of the server.

Format: Select which syslog message format to use.

- Axis
- RFC 3164
- RFC 5424

Protocol: Select the protocol to use:

- UDP (Default port is 514)
- TCP (Default port is 601)
- TLS (Default port is 6514)

Port: Edit the port number to use a different port.

Severity: Select which messages to send when triggered.

Type: Select the type of logs you want to send.

Test server setup: Send a test message to all servers before you save the settings.

CA certificate set: See the current settings or add a certificate.

Plain config

Plain config is for advanced users with experience of Axis device configuration. Most parameters can be set and edited from this page.

Maintenance

Maintenance

Restart: Restart the device. This does not affect any of the current settings. Running applications restart automatically.

Restore: Return most settings to the factory default values. Afterwards you must reconfigure the device and apps, reinstall any apps that didn't come preinstalled, and recreate any events and presets.

Important

The only settings saved after restore are:

- Boot protocol (DHCP or static)
- Static IP address
- Default router
- Subnet mask
- 802.1X settings
- O3C settings
- DNS server IP address

Factory default: Return all settings to the factory default values. Afterwards you must reset the IP address to make the device accessible.

Note

All Axis device software is digitally signed to ensure that you only install verified software on your device. This further increases the overall minimum cybersecurity level of Axis devices. For more information, see the white paper "Axis Edge Vault" at *axis.com*.

AXIS OS upgrade: Upgrade to a new AXIS OS version. New releases can contain improved functionality, bug fixes, and completely new features. We recommend you to always use the latest AXIS OS release. To download the latest release, go to *axis.com/support*.

When you upgrade, you can choose between three options:

- **Standard upgrade**: Upgrade to the new AXIS OS version.
- **Factory default**: Upgrade and return all settings to the factory default values. When you choose this option, you can't revert to the previous AXIS OS version after the upgrade.
- **Automatic rollback**: Upgrade and confirm the upgrade within the set time. If you don't confirm, the device reverts to the previous AXIS OS version.

AXIS OS rollback: Revert to the previously installed AXIS OS version.

Troubleshoot

Reset PTR : Reset PTR if for some reason the **Pan**, **Tilt**, or **Roll** settings aren't working as expected. The PTR motors are always calibrated in a new camera. But calibration can be lost, for example, if the camera loses power or if the motors are moved by hand. When you reset PTR, the camera is re-calibrated and returns to its factory default position.

Calibration : Click **Calibrate** to recalibrate the pan, tilt, and roll motors to their default positions.

Ping: To check if the device can reach a specific address, enter the hostname or IP address of the host you want to ping and click **Start**.

Port check: To verify connectivity from the device to a specific IP address and TCP/UDP port, enter the hostname or IP address and port number you want to check and click **Start**.

Network trace

Important

A network trace file might contain sensitive information such as certificates or passwords.

A network trace file can help you troubleshoot problems by recording activity on the network.

Trace time: Select the duration of the trace in seconds or minutes and click **Download**.

Learn more

Streaming and storage

Video compression formats

Decide which compression method to use based on your viewing requirements, and on the properties of your network. The available options are:

H.264 or MPEG-4 Part 10/AVC

Note

H.264 is a licensed technology. The Axis product includes one H.264 viewing client license. To install additional unlicensed copies of the client is prohibited. To purchase additional licenses, contact your Axis reseller.

H.264 can, without compromising image quality, reduce the size of a digital video file by more than 80% compared to the Motion JPEG format and by as much as 50% compared to older MPEG formats. This means that less network bandwidth and storage space are required for a video file. Or seen another way, higher video quality can be achieved for a given bitrate.

H.265 or MPEG-H Part 2/HEVC

H.265 can, without compromising image quality, reduce the size of a digital video file by more than 25% compared to H.264.

Note

- H.265 is licensed technology. The Axis product includes one H.265 viewing client license. Installing additional unlicensed copies of the client is prohibited. To purchase additional licenses, contact your Axis reseller.
- Most web browsers don't support H.265 decoding and because of this the camera doesn't support it in its web interface. Instead you can use a video management system or application supporting H.265 decoding.

External storage device

To be recognized by the video decoder, the first partition of you external storage device must use an exFAT or ext4 file system.

Cybersecurity

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

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

Signed OS

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

Secure boot

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

Axis Edge Vault

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

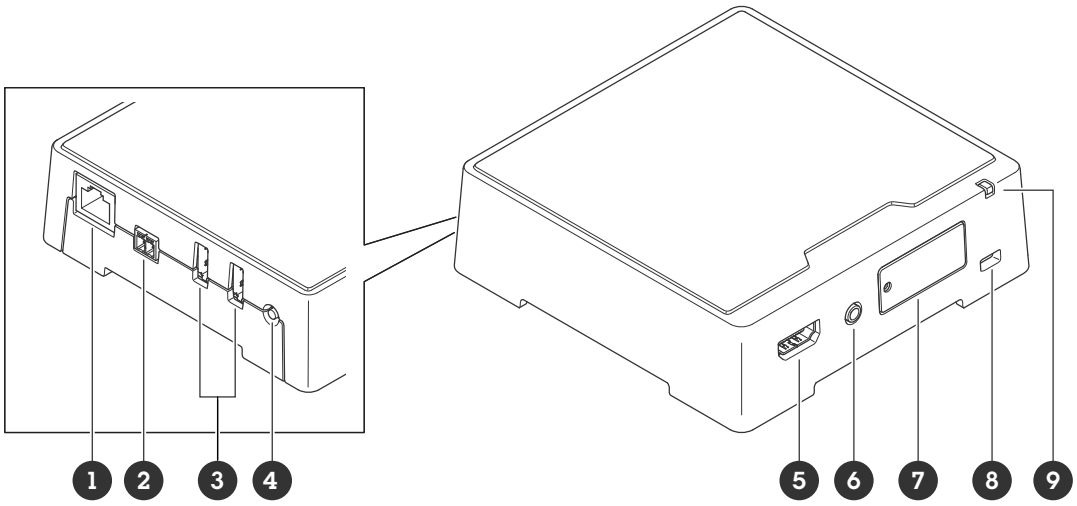
Axis device ID

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

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

Specifications

Product overview



1 *Network connector PoE*
2 *Power connector*
3 *2x USB ports*
4 *Control button*
5 *HDMI type A connector*
6 *Audio out*
7 *MicroSD card slot*
8 *Security slot*
9 *Status LED*

LED indicators

Status LED	Indication
Amber	Steady during startup, during reset to factory default or when restoring settings.
Amber/Red	Flashes during startup, and if network connection is unavailable or lost.
Green	Shows steady green for 10 seconds for normal operation after startup completed. When the LED turns off after being green, the device is running.
Green/Red	Flashes for identification purposes.

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 .
- Connecting to a one-click cloud connection (O3C) service over the internet. To connect, press and release the button, then wait for the status LED to flash green three times.

Connectors

HDMI connector

Use the HDMI™ connector to connect a display or public view monitor.

Network connector

RJ45 Ethernet connector with Power over Ethernet (PoE).

USB connector

Use the USB connector to connect external accessories. See the product's datasheet for supported accessories.

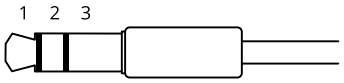
Important

Only one USB storage is supported at a time.

Turn off the device before removing the USB storage.

Audio connector

- **Audio out** – 3.5 mm output for audio (line level) that can be connected to a public address (PA) system or an active speaker with a built-in amplifier. A stereo connector must be used for audio out.



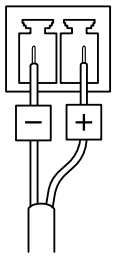
Audio output

1 Tip	2 Ring	3 Sleeve
Channel 1, unbalanced line, mono	Channel 1, unbalanced line, mono	Ground

Power connector

AC/DC connector. Use the supplied adapter.

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.



Note

When DC is available, it takes priority over PoE.

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 .
3. Keep the control button pressed for 15–30 seconds until the status LED indicator flashes amber.
4. Release the control button. The process is complete when the status LED indicator turns green. If no DHCP server is available on the network, the device IP address will default to one of the following:
   - **Devices with AXIS OS 12.0 and later:** Obtained from the link-local address subnet (169.254.0.0/16)
   - **Devices with AXIS OS 11.11 and earlier:** 192.168.0.90/24
5. Use the installation and management software tools to assign an IP address, set the password, and access the device.
   The installation and management software tools are available from the support pages on *axis.com/support*.

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

AXIS OS options

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

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

Check the current AXIS OS version

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

To check the current AXIS OS version:

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

Upgrade AXIS OS

Important

- When you upgrade the device software, your preconfigured and customized settings are saved. Axis Communications AB can't guarantee that the settings are saved, even if the features are available in the new AXIS OS version.
- Starting from AXIS OS 12.6, you must install every LTS version between your device's current version and the target version. For example, if the currently installed device software version is AXIS OS 11.2, you

have to install the LTS version AXIS OS 11.11 before you can upgrade the device to AXIS OS 12.6. For more information, see *AXIS OS Portal: Upgrade path*.

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

Note

- When you upgrade the device with the latest AXIS OS version in the active track, the product receives the latest functionality available. Always read the upgrade instructions and release notes available with each new release before you upgrade. To find the latest AXIS OS version and the release notes, go to *axis.com/support/device-software*.

1. Download the AXIS OS file to your computer, available free of charge at *axis.com/support/device-software*.
2. Log in to the device as an administrator.
3. Go to **Maintenance > AXIS OS upgrade** and click **Upgrade**.

When the upgrade has finished, the product restarts automatically.

You can use AXIS Device Manager to upgrade multiple devices at the same time. Find out more at *axis.com/products/axis-device-manager*.

Technical problems and possible solutions

Problems upgrading AXIS OS

AXIS OS upgrade failed

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

Problems after AXIS OS upgrade

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

Problems setting the IP address

Can't set the IP address

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

Problems accessing the device

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

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

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

The IP address has been changed by DHCP

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

If required, you can assign a static IP address manually. For instructions, go to *axis.com/support*.

Certificate error when using IEEE 802.1X

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

The browser isn't supported

For a list of recommended browsers, see .

Can't access the device externally

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

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

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

Problems with 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.

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

Performance considerations

- Using HTTPS may reduce frame rate.
- Heavy network utilization due to poor infrastructure affects the bandwidth.

- A non-correlation between the input and output of the video stream can affect the performance of the video decoder.

Contact support

If you need more help, go to *axis.com/support*.

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