

# USER'S MANUAL

## AXIS Q7401 Video Encoder



## Notices

This manual is intended for administrators and users of the AXIS Q7401 Video Encoder, and is applicable for firmware release 5.20 and later. It includes instructions for using and managing the encoder on your network. Previous experience of networking will be of use when using this product. Some knowledge of UNIX or Linux-based systems may also be beneficial, for developing shell scripts and applications. Later versions of this document will be posted to the Axis Website, as required. See also the product's online help, available via the Web-based interface. AXIS Q7401 supports ONVIF v1.0. For more information about ONVIF go to [www.onvif.org](http://www.onvif.org) For more information about enabling ONVIF go to the developers page at [www.axis.com](http://www.axis.com)

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### Equipment Modifications

This equipment must be installed and used in strict accordance with the instructions given in the user documentation. This equipment contains no user-serviceable components. Unauthorized equipment changes or modifications will invalidate all applicable regulatory certifications and approvals.

### Trademark Acknowledgments

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### Support

Should you require any technical assistance, please contact your Axis reseller. If your questions cannot be answered immediately, your reseller will forward your queries through the appropriate channels to ensure a rapid response. If you are connected to the Internet, you can:

- download user documentation and firmware updates
- find answers to resolved problems in the FAQ database. Search by product, category, or phrases
- report problems to Axis support by logging in to your private support area
- visit Axis Support at [www.axis.com/techsup](http://www.axis.com/techsup)

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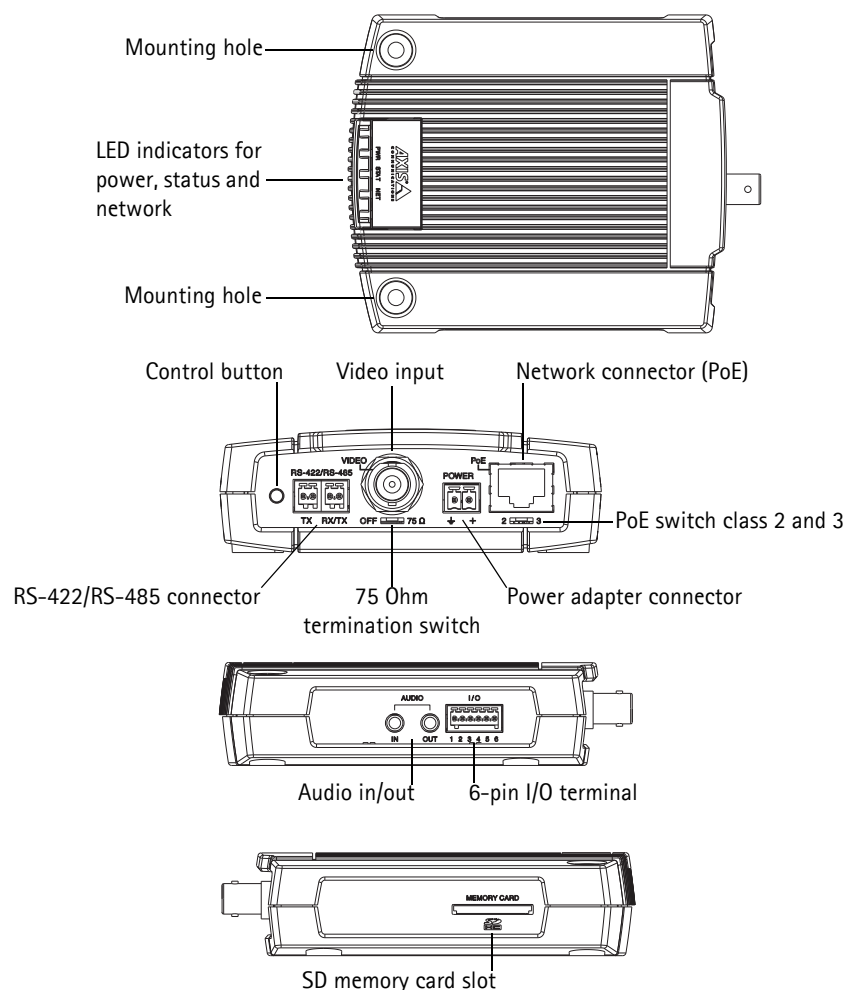
## Product Description

This manual applies to the AXIS Q7401 Video Encoder.

### Key features

- **Superb video quality**  
 AXIS Q7401 offers the highly efficient H.264 video compression, which drastically reduces bandwidth and storage requirements without compromising image quality. Motion JPEG is also supported for increased flexibility.
- **Multiple H.264 streams**  
 AXIS Q7401 can deliver multiple, individually configurable video streams simultaneously at full frame rate in all resolutions up to D1 (720x480 in NTSC, 720x576 in PAL). This means that several video streams can be configured with different compression formats, resolutions and frame rates for different needs.
- **Image setting adjustment**  
 The video encoder also enables users to adjust image settings such as contrast, brightness and saturation to improve images before encoding takes place.
- **Intelligent video capabilities**  
 AXIS Q7401 includes intelligent capabilities such as enhanced video motion detection, active tampering alarm and audio detection. The encoder's external inputs and outputs can be connected to devices such as sensors and relays, enabling the system to react to alarms and activate lights or open/close doors.
- **Power over Ethernet**  
 Support for Power over Ethernet (IEEE802.3af) enables the unit, as well as the analog camera that is connected to it, to receive power through the same cable as for data transmission. This makes for easy installation since no power outlet is needed.
- **Audio support and Local storage**  
 AXIS Q7401 also supports two-way audio and has an SD/SDHC memory card slot for local storage.
- **ONVIF**  
 This 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.

## Overview



Product label includes:  
Product ID & Serial number (S/N).  
The serial number may be  
required during the installation.

## LED indicators

LED	Color	Indication
Network	Green	Steady for connection to a 100 Mbit/s network. Flashes for network activity.
	Amber	Steady for connection to 10 Mbit/s network. Flashes for network activity.
	Unlit	No network connection.
Status	Green	Steady green for normal operation.
	Amber	Steady during startup, during reset to factory default or when restoring settings.
	Red	Slow flash for failed upgrade.
Power	Green	Normal operation.
	Amber	Flashes green/amber during firmware upgrade.

## Accessing the Video Encoder

Refer to the installation guide supplied with your product in order to install the AXIS Q7401 Video Encoder.

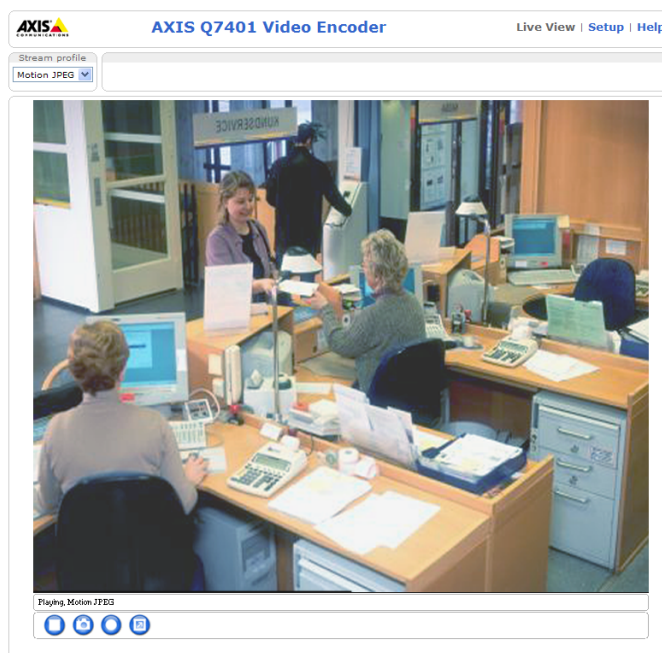
The AXIS Q7401 can be used with most standard operating systems and browsers.

### Notes:

- To view streaming video in Microsoft Internet Explorer, set your browser to allow ActiveX controls and install AXIS Media Control (AMC) on your workstation.
- QuickTime™ is also supported for viewing streaming H.264 video and audio.
- If your workstation restricts the use of additional software components, the video encoder can be configured to use a Java applet for viewing Motion JPEG.
- The video encoder includes one (1) decoder license for viewing H.264 video streams. This is automatically installed with AMC. The administrator can disable the installation of the H.264 decoder, to prevent installation of unlicensed copies.

### Access from a browser

1. Start a browser (Internet Explorer, Firefox, Safari).
2. Enter the IP address or host name of the encoder in the **Location/Address** field of your browser.  
To access the video encoder from a Macintosh computer (Mac OSX), click on the Bonjour tab and select the AXIS Q7401 from the drop-down list.
3. If this is the first time you are accessing the AXIS Q7401, see *Access from the Internet*, on page 7. Otherwise enter your user name and password, set by the administrator.
4. The encoder's Live View page appears in your browser.



### Note:

The layout of the Live View page may have been customized to specific requirements. Consequently, some of the examples and functions featured here may differ from those displayed on your own Live View page.

## Access from the Internet

Once connected, the video encoder is accessible on your local network (LAN). To access the video encoder from the Internet you must configure your broadband router to allow incoming data traffic to the video encoder. To do this, enable the NAT-traversal feature, which will attempt to automatically configure the router to allow access to the video encoder. This is enabled from Setup > System Options > Network > TCP/IP Advanced.

For more information, please see *NAT traversal (port mapping) for IPv4*, on page 38. See also the AXIS Internet Dynamic DNS Service at [www.axiscam.net](http://www.axiscam.net) For Technical notes on this and other topics, visit the Axis Support web at [www.axis.com/techsup](http://www.axis.com/techsup)

## Setting the root password

To gain access to the product, the password for the default administrator user root must be set. This is done in the 'Configure Root Password' dialog, which is displayed when the video encoder is accessed for the first time.

To prevent network eavesdropping when setting the root password, this can be done via an encrypted HTTPS connection, which requires an HTTPS certificate (see note below).

To set the password via a standard HTTP connection, enter it directly in the first dialog shown below.

To set the password via an encrypted HTTPS connection, follow these steps:

1. Click the **Create self-signed certificate** button.
2. Provide the requested information and click **OK**. The certificate is created and the password can now be set securely. All traffic to and from the video encoder is encrypted from this point on.
3. Enter a password and then re-enter it to confirm the spelling. Click **OK**. The password has now been configured.

To create an HTTPS connection, start by clicking this button.

To configure the password directly via an unencrypted connection, enter the password here.

### Notes:

- The default administrator user name 'root' is permanent and cannot be deleted.
- If the password for root is lost, the camera must be reset to the factory default settings. See page 45.
- If prompted, click **Yes** to install AXIS Media Control, which allows viewing of the video stream in Internet Explorer. You will need administrator rights on the computer to do this. If using Windows 7 or Windows Vista, you must also run Internet Explorer as administrator; right-click the Internet Explorer icon and select **Run as administrator**.

## The Live View page

If your video encoder has been customized to meet specific requirements, the buttons and other items described below may or may not be displayed on the Live View page. The following provides an overview of each available button:

### General controls



The Stream Profile drop-down list allows you to select a customized or pre-programmed stream profile on the Live View page. Stream profiles are configured under **Video & Audio > Stream Profiles**, see *Stream Profiles*, on page 14 for more information.



**Pulse** – click this button to activate the output for a defined period of time – e.g. switching a light on for 20 seconds.



**Active/Inactive** – click these buttons to manually start and stop a connected device – e.g. switch a light on/off.



The **Action** buttons can trigger an event directly from the Live View page. These are configured under **Setup > Live View Config > Layout**.



The **Snapshot** button saves a snapshot of the video image currently on display. Right-click on the video image to save it in JPEG format on your computer. This button is primarily intended for use when the AMC viewer toolbar is not available.

### AXIS Media Control toolbar

The AMC viewer toolbar (AXIS Media Control) is available in Microsoft Internet Explorer only. See *AXIS Media Control (AMC)*, on page 11 for more information. AMC displays the following buttons:



The **Play** button connects to the Axis product and starts playing a media stream.



The **Stop** button stops the video stream being played.



The **Snapshot** button takes a snapshot of the current image. The location where the image is saved can be specified using the AXIS Media Control (AMC).



Click the **View Full Screen** button and the video image will fill the entire screen area. No other windows will be visible. Press **Esc** (Escape) on the computer keyboard to cancel full screen view.



The **Record** button is used to record the current video stream. The location where the recording is saved can be specified using the AXIS Media Control toolbar.



### AMC Audio controls

AMC audio buttons control the speakers and microphone connected to the client computer. The buttons are only visible when audio is enabled.



**Speaker button** – Click to switch the sound on or off.



**Microphone button** – Click to switch the sound on or off.

In Simplex - Network Camera speaker only mode, click this button to stop sending audio to the network camera.



Use the slider to control the **volume** of the speakers and the microphone.



#### *Half-duplex mode*

The **Talk/Listen button** is used to switch between sending and receiving audio. The button can be configured from the Audio tab in the AMC Control panel:

- Push-To-Talk mode: Click and hold the button to talk/send, release the button to listen.
- Toggle mode: Click once to switch between talking and listening.

#### *Simplex – Network Camera speaker only mode*

To send audio, the Talk and Microphone buttons must both be enabled. Click either button to stop audio transmission.

### Pan/Tilt/Zoom controls



When in Center Mode, click on any part of the image other than its exact center and the video encoder will move so that the point you clicked on becomes the new center of the image.



If you select Emulate Joystick Mode, the video encoder moves in the direction of the mouse pointer. If you click and hold down on the left mouse button, and then point your cursor at the lower left hand corner of the image, the video encoder continues to move left and down until you release the mouse button.

## Video and Audio Streams

The video encoder provides several image and video stream formats. Your requirements and the properties of your network will determine the type you use.

The Live View page in the video encoder provides access to H.264 and Motion JPEG video streams, and to the list of available stream profiles. Other applications and clients can also access these video streams/images directly, without going via the Live View page.

### How to stream H.264

This video compression standard makes good use of bandwidth, and can provide high quality video streams at less than 1 Mbit/s.

Deciding which combination of protocols and methods to use depends on your viewing requirements, and on the properties of your network. The available options in AMC are:

Unicast RTP	This unicast method (RTP over UDP) should be your first consideration for live unicast video, especially when it is important to always have an up-to-date video stream, even if some images are dropped.	Unicasting is used for video-on-demand broadcasting, so that there is no video traffic on the network until a client connects and requests the stream.  Note that there are a maximum of 20 simultaneous unicast connections.
RTP over RTSP	This unicast method (RTP tunneled over RTSP) is useful as it is relatively simple to configure firewalls to allow RTSP traffic.	
RTP over RTSP over HTTP	This unicast method can be used to traverse firewalls. Firewalls are commonly configured to allow the HTTP protocol, thus allowing RTP to be tunneled.	
Multicast RTP	This method (RTP over UDP) should be used for live multicast video. The video stream is always up-to-date, even if some images are dropped.  Multicasting provides the most efficient usage of bandwidth when there are large numbers of clients viewing simultaneously. A multicast broadcast cannot however, pass a network router unless the router is configured to allow this. It is not possible to multicast over the Internet, for example.  Note also that all multicast viewers count as one unicast viewer in the maximum total of 20 simultaneous connections.	

AMC negotiates with the video encoder to determine the transport protocol to use in the order listed above. This order can be changed and the options disabled, to suit specific requirements.

#### Important!

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

## AXIS Media Control (AMC)

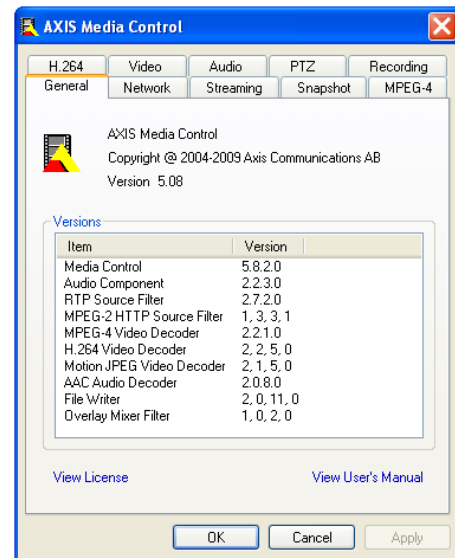
The recommended method of accessing live video from the video encoder is to use the AXIS Media Control (AMC) in Microsoft Internet Explorer in Windows.

The AMC control panel can be used to configure various video and audio settings. Please see the readme file included in the tool for more information.

The AMC control panel is automatically installed on first use, after which it can be configured.

Open the AMC Control Panel from:

- Windows Control Panel (from the Start menu)
- Alternatively, right-click the video image in Internet Explorer and click **Settings** to access the AMC window.



## Motion JPEG

This format uses standard JPEG still images for the video stream. These images are then displayed and updated at a rate sufficient to create a stream that shows constantly updated motion.

The Motion JPEG stream uses considerable amounts of bandwidth, but provides excellent image quality and access to every image contained in the stream. The recommended method of accessing Motion JPEG live video from the video encoder is to use the AXIS Media Control (AMC) in Microsoft Internet Explorer in Windows.

## Alternative methods of accessing the video stream

Video/images from the video encoder can also be accessed in the following ways:

- Motion JPEG server push (if supported by the client, Firefox, for example). This option maintains an open HTTP connection to the browser and sends data as and when required, for as long as required.
- Still JPEG images in a browser. Enter the path - `http://<ip>/axis-cgi/jpg/image.cgi`
- Windows Media Player. This requires AMC and the H.264 viewing client to be installed. The paths that can be used are listed below in the order of preference:
  - Unicast via RTP: `axrtpu://<ip>/axis-media/media.amp`
  - Unicast via RTSP: `axrtsp://<ip>/axis-media/media.amp`
  - Unicast via RTSP, tunneled via HTTP: `axrtsphttp://<ip>/axis-media/media.amp`
  - Multicast: `axrtpm://<ip>/axis-media/media.amp`
- To access the video stream from **QuickTime™** the following paths can be used:
  - `rtsp://<ip>/axis-media/media.amp`
  - `rtsp://<ip>/axis-media/media.3gp`

### Notes:

- The video encoder supports QuickTime 6.5.1 and later
- QuickTime adds latency to the video and audio stream (up to 3 seconds)
- It may be possible to use other players to view the H.264 stream using the paths above, although Axis does not guarantee this
- <ip> = IP address

## Accessing audio streams

The Live View page provides access to audio through AXIS Media Control; in addition audio can be accessed in the following ways:

### VAPIX®

Audio can be accessed through the VAPIX® Application Programming Interface (API). For more information visit <http://www.axis.com/techsup>

### QuickTime and Windows Media Player


Simplex audio can be accessed via QuickTime and Windows Media Player by using the same paths as for video streams (see above). QuickTime supports G.711 and AAC audio encoding.

### Java applet

The Java applet supports simplex audio with G.711 encoding.

## Video & Audio settings

This section describes how to configure the video encoder, and is intended for product **Administrators**, who have unrestricted access to all the Setup tools; and **Operators**, who have access to the settings for Video & Image, Audio, Live View Config, and Event Configuration.

You can configure the video encoder by clicking **Setup** in the top right-hand corner of the Live View page. Click  on this page to access the online help that explains the setup tools.


### Video Stream

The video stream settings are separated into 4 different tabs:

- Image
- Audio
- H.264
- MJPEG

#### Image


##### Image Appearance

Use these settings to modify the image resolution and compression. Setting the compression level affects the image quality and the amount of bandwidth required, the lower the compression, the higher the image quality with higher bandwidth requirements. The image can also be mirrored (reversed), and rotated. Define the color setting as color or black and white. Black and white uses less bandwidth than color. See the online help files  for more information.

##### Video Stream

To avoid bandwidth problems on the network, the **frame rate** allowed to each viewer can be limited. Select the **Unlimited** radio button to allow the highest available frame rate or select the **Limited to...** radio button and enter a value (1-30) fps in the field.

##### Text Overlay Settings

Use these settings to include a text, date, and time as overlay. You can also define the color and the background of the text, and its position on the image. Click  for information on available options.

##### Preview

For a preview of the image before saving, select video format and **Open**. When satisfied with the settings, click **Save**.

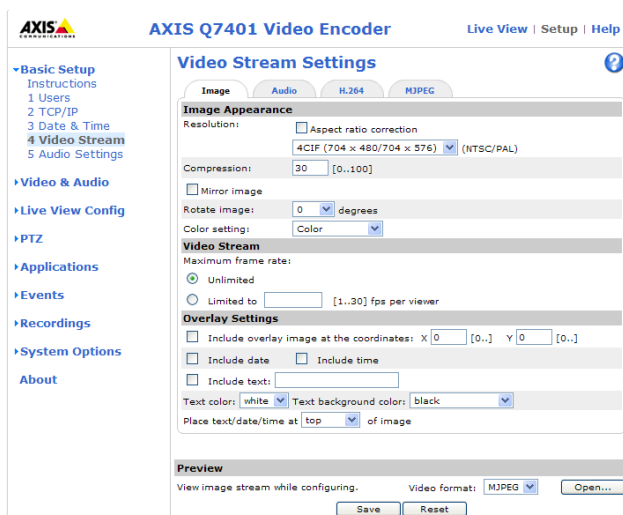
#### Audio

##### Enable Audio

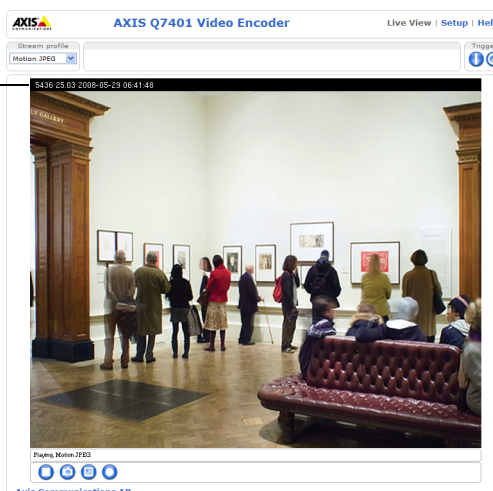
Check this box to enable audio in the video stream.

##### Note:

Audio Setup > Systems Options > Audio Support > Enable audio support must be selected to enable sound. See *Audio Support*, on page 36.



Text, date & time overlay



#### Current Audio Settings:

Configuration under **Video & Audio > Audio Settings** will be shown here. See *Audio Settings*, on page 16 for more information on the audio settings.

## H.264

### GOV Settings

The GOV structure describes the composition of the video stream and setting the GOV-length to a higher value saves considerably on bandwidth.

### Bit Rate Control

The bit rate can be set as **Variable Bit Rate (VBR)** or **Constant Bit Rate (CBR)**.

VBR adjusts the bit rate according to the image complexity, using up bandwidth for increased activity in the image, and less for lower activity in the monitored area.

When using CBR you can set a fixed Target bit rate, which will ensure that the level of bandwidth consumed is predictable.

**Priority** – As the bit rate would usually need to increase for increased image activity, but cannot when CBR is selected, the frame rate and image quality will both be affected negatively. To go some of the way towards compensating for this, it is possible to prioritize either the frame rate or the image quality whenever the bit rate would normally need to be increased. Not setting a priority means the frame rate and image quality will be affected approximately equally.

## MJPEG

Sometimes the image size is large due to low light or complex scenery. Adjusting the maximum frame size helps to control the bandwidth and storage used by the Motion JPEG video stream in these situations. Defining the frame size as **Unlimited** provides consistently good image quality at the expense of increased bandwidth and storage usage during low light. Limiting the frame size optimizes bandwidth and storage usage, but may give poor image quality. To prevent increased bandwidth and storage usage, the maximum frame size should be set to an optimal value.

## Stream Profiles

There are 4 pre-programmed stream profiles available for quick set-up. These settings can be adjusted and new customized profiles can be created. Each profile has a descriptive name, describing its usage and/or purpose. The profiles can be accessed from the Live View page.

- To add a new stream profile, click **Add** to bring up the Stream Profile Settings panel.
- Choose a descriptive name and enter a description for your profile.
- Choose the form of **Video encoding** you wish to use from the drop-down list:

**H.264** – Also known as MPEG-4 Part 10. This is the new generation compression standard for digital video. This function offers higher video resolution than Motion JPEG or MPEG-4 at the same bit rate and bandwidth, or the same quality video at a lower bit rate.

**Motion JPEG** – Delivers a high quality video stream, from which individual images can be extracted and saved.

- **Copy** an existing stream profile to your system and rename the copy
- **Modify** an existing stream profile based on the light situation and motion to be captured by your video encoder. See Stream Profile Settings for more information.
- Highlight the stream profile you wish to remove, then click **Remove** to remove it from the list.

## Camera Settings

This page provides access to the advanced image settings for the AXIS Q7401.

### Image Appearance

**Color level** – Select an appropriate level by entering a value in the range 0-100. Lower values mean less color saturation, whilst the value 100 gives maximum color saturation.

**Brightness** – The image brightness can be adjusted in the range 0-100, where a higher value produces a brighter image.

**Contrast** – Adjust the image's contrast by raising or lowering the value in this field.

**Rotate image** – The image can be rotated to the correct orientation. Select the appropriate value from the drop-down list.

### Video Input

To eliminate a black border surrounding the image, change the horizontal and vertical synchronization for the image.

**Note:** Be careful to only use low values, no more than 1-3, as higher values may put the image out of sync.

To improve image quality from analog devices, select **Adaptive Interpolation** from the **4CIF de-interlacing** drop down list for best image quality or select **Blending** for improved image quality. If de-interlacing is not necessary select **None**.

Once satisfied, click **Save**. Click **View** to view the video stream with the current configuration.

## Overlay Image

An overlay image is a static image superimposed over the video image. An overlay can be used to e.g. provide extra information, or to mask a part of the video image.

### Selecting and Uploading Overlay Images

To use an overlay image in the AXIS Q7401 Video Encoder, it must be selected from the drop-down list of available images. The overlay (e.g. a logo) is then displayed in the video image.

To use your own image, first upload it to the AXIS Q7401 Video Encoder by entering the name of the file in the field provided, or by clicking the Browse button and locating it. Then click the Upload button.

Once your own image has been uploaded it will be available for selection from the drop-down list.

### Image Overlay Placement

To place the overlay image at specific coordinates in the live view image, check Include overlay image at the coordinates and enter the X and Y coordinates.

### View Image Settings

To test the overlay and its placement click Save and View. A popup window appears with the camera's live view image.

For more information, please see the online help [?](#) .

## Privacy mask

Privacy masks are up to 3 configurable areas of solid color that allow concealment of parts of the image that are not to be viewable. Privacy masks cannot be bypassed via the AXIS VAPIX HTTP API.

## Privacy Mask List

The Privacy Mask List shows all the masks that are currently configured in the AXIS Q7401 Video Encoder and if they are enabled.

### Add/Edit Mask

To define a new mask:

1. Click **Add** and place the box over the desired area to conceal.
2. Choose a color, black, white, gray or red for the box from the drop-down list Privacy mask color
3. Enter a descriptive name in Mask name.
4. Click **Save**.

To edit a privacy mask, select it and reshape, move or change color as needed.

## Audio Settings

This section describes how to configure the basic audio settings for the video encoder.

The audio functionality for all streams is enabled under **Video & Audio > Video Stream > Audio**.

### Audio Channels

**Audio mode** – The Half duplex mode transmits and receives audio in both directions, but only in one direction at a time. To speak, press and hold the button (check that the microphone is not muted). To receive audio, release the button.

#### Note:

The push-to-talk button is configured from AMC (see *AXIS Media Control toolbar*, on page 8). It is possible to configure the push-to-talk button so that it toggles between the speaking and listening modes.

When selecting the **Simplex – Network Video Encoder speaker only** mode, the speaker connected to the video encoder plays audio, but no audio is transmitted from the video encoder to other web clients. This could be used to provide spoken instructions to a person seen in the camera. This mode requires you to use the push-to-talk button.

The **Simplex – Network Video Encoder microphone only** mode transmits audio only from the video encoder to web clients. It does not receive audio from other web clients. This can be used in remote monitoring, and web attractions, to provide live audio and video, of a monitored situation.

### Audio Input

Audio from an external microphone or a line source can be connected to the Audio in the connector of the video encoder. The audio source must be set to **Microphone** or **Line** depending on the connected device.

The **Enable microphone power** option provides DC power for an external microphone. If using a small electret condenser microphone such as a clip-on microphone or a PC microphone, enable this option.

#### Note:

To use a high impedance dynamic microphone, do not enable microphone power. Microphone power will not harm the microphone; if you are uncertain, try switching it off and on. The default value is microphone power enabled. To use a professional microphone requiring 48V phantom power, you need an external power supply and a balanced-unbalanced converter (audio transformer) in between.

If the sound input is too low or too high, adjust the **input gain** for the microphone attached to the video encoder.

Select the desired audio **Encoding** format: AAC, G.711  $\mu$ -law or G.726.

Select the required **Sample rate** (number of times per second the sound is sampled). The higher the sample rate, the better the audio quality and the greater the bandwidth required.



Depending on the selected encoding, set the desired audio quality (**Bit rate**). The settings affect the available bandwidth and the required audio quality.

The video encoder can be set to trigger an event if the incoming sound level rises above, falls below, or passes the set value. The **Alarm level** is set between 0-100%.

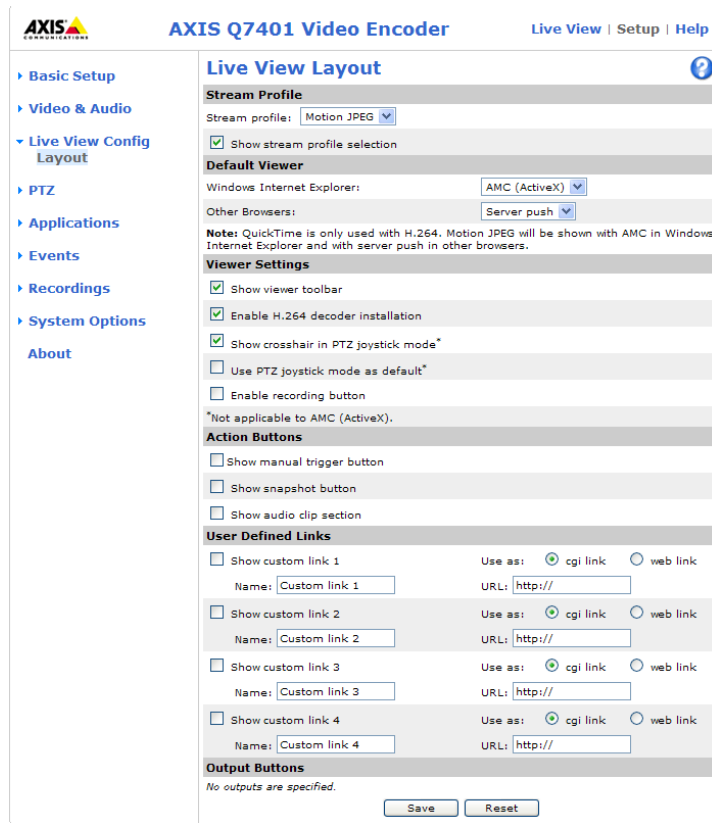
### Audio Output

If the sound from the speaker is too low or too high, adjust the **output gain** for the active speaker attached to the video encoder.


When satisfied with the settings, click **Save**, or click **Reset** to revert to previously saved settings.

# Live View Config

## Layout



### Stream Profile

From the **Stream Profile** drop-down list, select the stream profile that is to be used for the Live View page. Listed are the standard stream profiles as well as the ones created under **Video & Audio > Stream Profiles**. See the online help files  on this page for more information.

### Default Viewer

From the drop-down lists, select the default method for viewing video images for your browser. The video encoder attempts to show the video images in the selected video format and viewer. If this is not possible, the video encoder overrides the settings and selects the best available combination.

Browser	Viewer	Description
Windows Internet Explorer	AMC	Recommended viewer in Windows Internet Explorer (H.264/Motion JPEG).
	QuickTime	H.264 only.
	Java applet	A slower imaging alternative to AMC. Requires one of the following installed on the client: <ul style="list-style-type: none"> <li>JVM (J2SE) 1.4.2 or higher</li> <li>JRE (J2SE) 5.0 or higher</li> </ul>
	Still image	Displays still images only. Hit the Refresh button in your browser to view a new image.
Other browsers	Server Push	Recommended viewer for other browsers (Motion JPEG).
	QuickTime	H.264 only.
	Java applet	A slower imaging alternative to Server Push (Motion JPEG only).
	Still image	Displays still images only. Hit the Refresh button in your browser to view a new image.

### Viewer Settings

Check the **Show viewer toolbar** box to display the AXIS Media Control (AMC) or the QuickTime viewer toolbar under the video image in your browser.

The administrator can disable the installation of the **H.264 decoder** included with AMC. This is used to prevent the installation of unlicensed copies. Further decoder licenses can be purchased from your Axis dealer.

Enable **Show crosshair in PTZ joystick mode** and a cross will indicate the center of the image in PTZ joystick mode.

Use **PTZ joystick mode as default** - this mode can be changed temporarily on the PTZ Control Panel, but will default to joystick if enabled.

Check the **Enable recording button** to enable recording from the Live View page.

### Action Buttons

The **Show manual trigger button** can be used to manually trigger and stop an event from the Live View page. See *Events*, on page 28.

Check the **Show snapshot button** to save a snapshot from the video stream. This button is mainly intended for use with browsers other than Internet Explorer, or when not using AXIS Media Control (AMC) to view the video stream. AMC for Internet Explorer provides its own snapshot button.

**Show audio clip section** - Enabling the display of the Audio clip drop-down box and play button allows users to play a pre-recorded audio clip from the camera. Go to Video & Audio > Audio Clips to work with the audio clips.

### User Defined Links

User defined links can be CGI links or web links. Once configured, the link(s) appear on the Live View page.

To set up a web link, select the Use as web link radio button, enter a descriptive name and enter the URL in the provided field. Click Save and the link appears in the Live View page.

User defined CGI links can be used to issue HTTP API requests, such as PTZ commands.

#### Example:

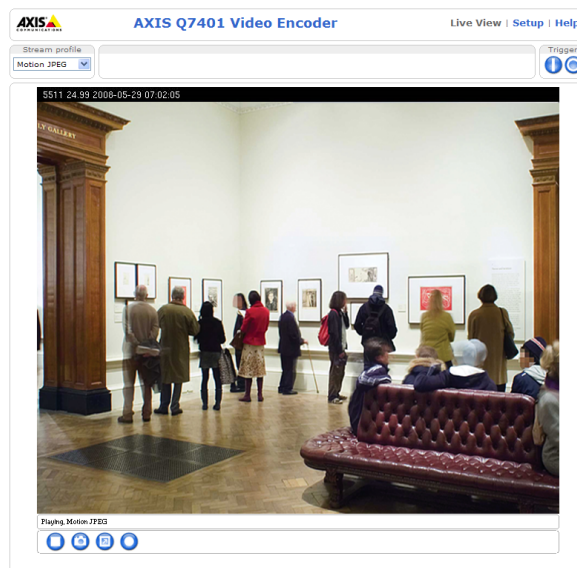
1. Check Show Custom Link 1.
2. Enter a descriptive name, such as "Start continuous pan".
3. Select the Use as cgi link radio button and enter the cgi link in the field:

`http://<ip>/axis-cgi/com/ptz.cgi?continuouspantiltmove=30,-30`

4. Check Show Custom Link 2.
5. Enter a descriptive name, such as "Stop continuous pan".
6. Select the Use as cgi link radio button and enter the cgi link in the field:

`http://<ip>/axis-cgi/com/ptz.cgi?continuouspantiltmove=0,0`

These links appear in the web interface and can be used to control the Axis video encoder.



Axis Communications  
user defined link

For more information on the Axis HTTP API, see the Support/Developer pages on the Axis Web site at <http://www.axis.com>

Please use the online help files for more information.

### **Output Buttons**

The output buttons are used to manually activate the output from the Live View page, for example, switching a light on and off. There are two options to activate the output:

- Pulse button - activates the output for a defined period
- Active/Inactive - displays two buttons (on/off)

## PTZ (Pan Tilt Zoom)

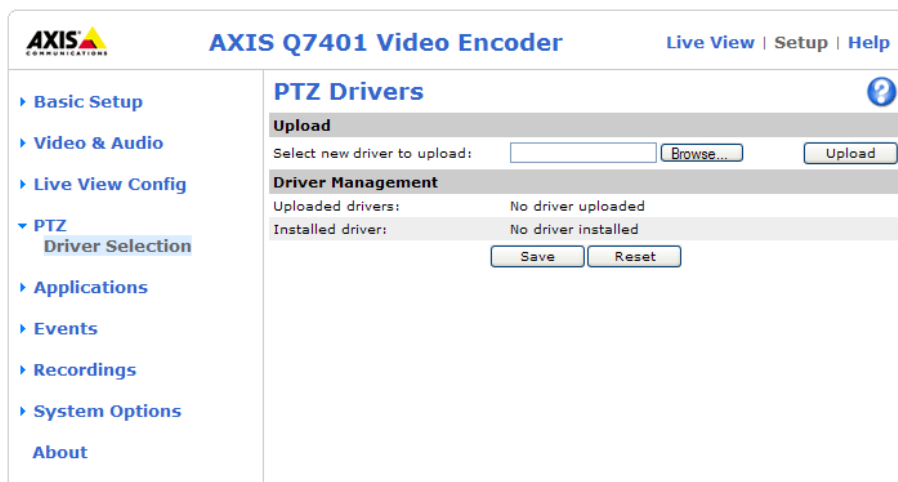
This Axis product supports several PTZ devices. Please see [www.axis.com](http://www.axis.com) for a complete list of supported devices, and to obtain the correct driver. Follow the instructions below to install a PTZ device.

Installing a PTZ device is accomplished in two steps:

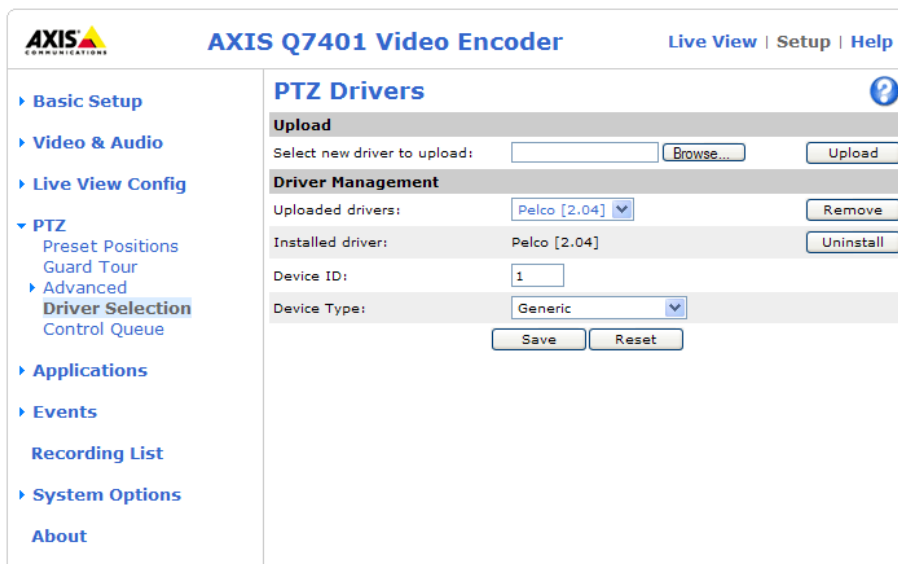
- Installing the PTZ driver
- Setting up the COM Port, see page 43

### Installing the PTZ driver

1. Go to PTZ > Driver Selection.



2. Under Upload, click **Browse...** to find the driver. The driver has the file extension.ptz (e.g. driver.ptz).
3. Click **Upload**. If the driver was successfully uploaded, it will be available under **Driver Management > Uploaded drivers**.




4. From the **Uploaded drivers** drop-down list, select the driver to install and click **Save**.
5. Enter the **Device ID**, select the **Device Type** from the drop down list and click **Save**.
6. Set up the COM Port for PTZ driver. See *COM Port*, on page 43 for instructions.

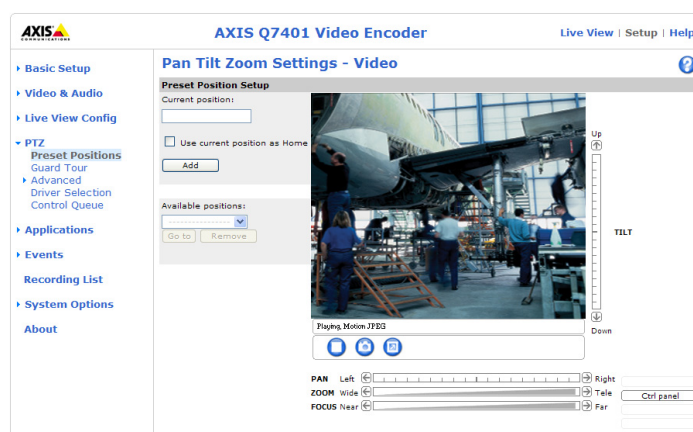
**Notes:**

- After a PTZ driver has been installed, **PTZ > Advanced > Device** will contain additional driver specific settings that can be configured for the PTZ device.
- Advanced users and application developers can also use the Axis Application Programming Interface and HTTP specification for generic control of PTZ devices using CGI commands or a TCP/IP client. Refer to the Axis website at [www.axis.com](http://www.axis.com) for further information.

**Uninstalling a PTZ driver**

1. Go to **PTZ > Driver Selection**
2. Click **Uninstall**

For more information see the online help  .



**Preset positions**

A preset position is a pre-defined camera view than can be used to quickly move the camera to a specific location.

From **Preset Position Setup**, use the Pan, Tilt and Zoom (PTZ) controls to steer the camera to the required position. When satisfied with the camera's position, enter a descriptive name. The camera position, iris and focus settings are then saved as a preset position.

The position can be assumed at any time, by selecting the preset's name from the Preset positions drop-down list. Preset positions can be selected in the Live View page; they can be selected as an action when an event is triggered as a part of a **Guard Tour**.

One position can be set as the Home position, which is readily accessible by clicking the box beside **Use current position as Home**. The position's name will then have (H) added to the end, for example, Office Entrance (H).

## Guard tour

A guard tour moves between chosen **Preset Positions**, one-by-one, in a pre-determined order or at random, and for configurable time periods. The guard tour sequence will keep running, after the user has logged off or closed the browser.



## Advanced

**Device Settings** - The device settings window is for driver specific settings, so the appearance of this window can vary depending on the driver installed. Options that can be configured include: **Driver Specific Settings for Video Source 1**, **Mechanical Limits for Moving Video Source 1**, **Light Control for Video Source 1**, and **Extended Driver Specific Settings for Video Source 1**.

**Note:**

For download and installation information about PTZ drivers for your Axis product please visit [www.axis.com/techsup/](http://www.axis.com/techsup/)

**Ctrl Panel** - The **Panel View Settings** window contains tools for creating and saving short command buttons that are located under the **Control panel**. These buttons provide direct access to various built-in auxiliary commands provided by the PTZ driver and are displayed in the PTZ Panel.

**Limits** - Define the pan, tilt, zoom and focus limits for the video encoder. Movements to the left and right, up and down can be restricted to narrow the area under surveillance. The near focus limit can be set to avoid focusing on objects too close to the camera.

**Note:**

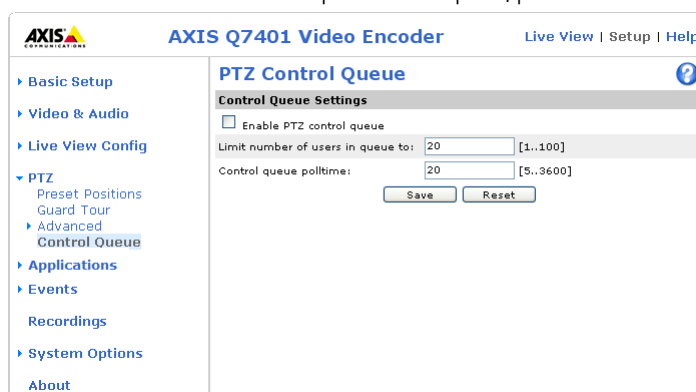
To be able to set limits, the driver needs to be an "absolute" driver.

**OSD Menu** – If the PTZ unit supports an internal configuration menu, this can be accessed using the On-Screen Display (OSD). Configure the analog camera by opening and navigating through its internal menu in this display.



## PTZ control queue

Use the PTZ control queue window to enable and disable PTZ queueing. This window allows you to set up a queue for viewers wanting to access the video encoder, and limits the number of viewers and the length of time each viewer can access and control the PTZ unit. For more information on how to set up the control queue, please see the online help [?](#).



Note also that a viewer who belongs to a group (see *Security*, on page 35) with a higher PTZ priority can go before other users in the queue and take control of the video encoder.

The order of priority for taking control of the queue is as follows:

1. **Administrators** – An administrator takes over PTZ control regardless of who is first in queue. The administrator will be removed from the queue 60 seconds after their last PTZ control command.
2. **Event** – The AXIS Q7401 can be set up to take control of the queue and move to a specific position for 20 seconds when triggered by an alarm. The event will immediately be placed first in the queue, except when an administrator is in control. For more information, see *Triggered Event*, on page 29.
3. **Operator** – Same as administrator, but with lower priority.
4. **Guard Tour** – A guard tour has PTZ control for an indefinite period of time. It may be overridden by an Operator, Event or administrator. Guard Tour will resume when higher priority groups leave the queue. For more information see *Guard tour*, on page 23.
5. **Viewer** – Multiple viewers must wait for their turn. The viewer has 60 seconds PTZ control before control is passed to the next viewer in queue.

**Note:**

To identify the different users in the viewer group, cookies must be enabled on the client.



## PTZ controls

If the video encoder has been appropriately configured, the Live View page displays the controls available for the installed Pan Tilt Zoom (PTZ) device. The administrator can enable/disable the controls for specified users.



The controls shown depends on the make and model of PTZ device. The most common controls are:

- the Pan bar - moves the camera to the right and left
- the Tilt bar - tips the camera up and down
- the Zoom bar - zooms the view in and out. Note that this is only available if the camera is fitted with a zoom lens
- the Iris bar - adjusts the brightness of the image

Clicking on the bars themselves or on the arrows at the end of the bars moves the camera to a new position. The type of movement and the location of this new position depends on the type of PTZ driver.

When controlling the camera using a relative PTZ driver (see the bars in the illustration above) the new position is relative to the previous position, for example, left of, below, or above. Clicking the bar further from the center results in a larger movement.

In contrast, when using an absolute driver, each position on the bar (see right) represents a defined position in the device's range of movement, with the center of the bar representing the point midway between the two extremes of movement.



Clicking a position directly on the bar moves the camera directly to the new position in one smooth movement. Clicking on the arrows at the ends of a bar causes an incremental change.

## Using CGI links to control PTZ devices

User-defined CGI links on the Live View page can be used to issue HTTP API requests, such as PTZ commands. These links are configured in the Live View Layout settings, see *Live View Config*, on page 18.

## PTZ control modes

The PTZ device can also be controlled using **click-in-image** movement, which has two different types of navigation - **Center** and **Joystick**.

**Center** mode means that when clicking in the image, the camera view centers on the absolute position that was clicked.

**Joystick** mode moves the camera in the direction of the mouse pointer. By clicking and holding the mouse button down in the image, the PTZ device moves the camera in that direction, relative to the center of the image. The farther from the center the image is clicked, the greater the movement. The camera stops moving when the button is released.

**Note:**

There is also joystick support in AXIS Media Control (AMC).

## Control panel

The focus and iris (image brightness) can be adjusted manually by using the control bars, or they can be set for automatic adjustment, by clicking the **Auto iris** and **Auto focus** buttons.

**Note:**

These buttons appear only if the PTZ driver installed supports them.

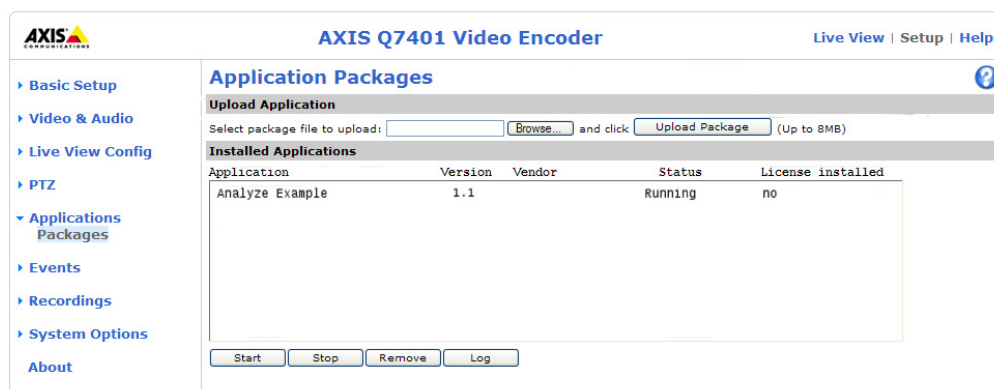
To access the **Auto iris** and **Auto focus** buttons, click on the **Control panel** button. The menu to the right will then appear in the upper left hand corner of the screen.

There are also driver specific shortcuts that can appear in the Control Panel. In the screen to the right, a driver has been installed that brings up the **Wiper** shortcut button, which allows the user to configure and use a windshield wiping action with the video encoder.



## Applications

### Application Packages



The Applications feature allows you to upload third party applications for use on this device. Listed under **Applications > Packages** are the applications that have already been installed. Click on the name to view the menu options - Settings, License and About.

**Settings** - This depends on the application.

**License** - Once uploaded some applications need a license to run, and a license code is required for the uploaded application. If there is an Internet connection **Automatic Installation** appears in the web page. If there is no Internet connection to the camera, go to [www.axis.com](http://www.axis.com) to acquire a License key file. You will need a license code and the device's serial number to receive a license key.

**About** - Details support for this application. To upload an application, browse to the package and click **Upload Package**.

**Installed Applications** - A list of installed applications with information about the version, and the vendor; the status of the application (running or not running), and information about the license (if installed).

**Start/Stop** - Start or stop the application.

**Remove** - To delete an application, select it and click **Remove**.

**Log** - To generate a log of the application happenings, select an application and click **Log**. This log is helpful when requesting support from the application's vendor.

**Note:**

It is recommended that you do not run more than one application at a time. Also do not run an application when the motion detection feature is active.

## Events

Pre-defined parameters, known as an **event** or **Event Type** can trigger certain actions in the camera. A common event type is an alarm that causes the camera to upload images. Many event types use an **Event Server**, to receive uploaded images.

An event that is triggered by a signal, such as a door switch, motion detection, or system event, is called a **triggered event**, see page 29.

A **scheduled event** runs at pre-programmed times.


An **Action** refers to what happens when the event occurs.

This section describes how to configure the camera to perform certain actions when events occur.

## Event Servers

Event Servers are used to receive uploaded image files and/or notification messages. To set up Event Server connections in your video encoder, go to **Setup > Event Configuration > Event Servers** and enter the required information for the required server type.

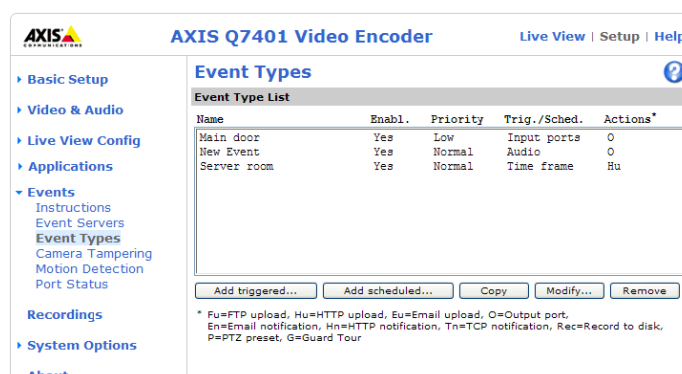
Server type	Purpose	Information required
FTP Server	<ul style="list-style-type: none"> <li>Receives uploaded images</li> </ul>	<ul style="list-style-type: none"> <li>Descriptive name</li> <li>Network address and Upload path</li> <li>User Name and password</li> </ul>
HTTP Server	<ul style="list-style-type: none"> <li>Receives notification messages</li> <li>Receives uploaded images</li> </ul>	<ul style="list-style-type: none"> <li>Descriptive name</li> <li>URL (IP address or host name)</li> <li>User Name and password</li> </ul>
TCP Server	<ul style="list-style-type: none"> <li>Receives notification messages</li> </ul>	<ul style="list-style-type: none"> <li>Descriptive name</li> <li>Network address (IP address or host name)</li> <li>Port number</li> </ul>

For details on each setting, see the online help  available from each web page.

When the setup is complete, the connection can be tested by clicking the **Test** button (the connection test takes approximately 10 seconds).

## Event Types

An **Event Type** describes how and when the video encoder performs certain actions.



**Example:** If somebody passes in front of a video encoder and an event has been configured to detect and respond to motion, the video encoder can record and saves images to an FTP server, and can send a notification e-mail to an e-mail address. Images can be sent as e-mail attachments.

## Triggered Event


A triggered event could be activated by:

- a push button connected to the video encoder's input port
- a manually activated action, such as from an action button in the web interface
- an application that has been uploaded to the video encoder.
- detected movement in a configured motion detection window
- on restart (reboot), after power loss
- camera tampering
- disk full
- video loss
- sound at a certain decibel level

## How to set up a triggered event

The following example describes how to set up the video encoder to upload images when the main door is opened.

1. Click **Add triggered...** on the **Event Types** page. The **Triggered Event Type Setup** page appears.
2. Enter a descriptive **Name** for the event, such as Main door open.
3. Set the **Priority** – High, Normal or Low (see the online help).
4. Set the **Respond to Trigger...** parameters to define when the event is active, for example, after office hours.
5. Select the trigger alternative from the **Triggered by...** drop-down list. For example, select Input ports, for a sensor connected to the door.
6. Set the **When Triggered...** parameters, that is, define what the video encoder will do if the main door is opened – upload images to an FTP server or send an e-mail notification.
7. Click **OK** to save the event in the Event Types list.

Please see the online help  for descriptions of each available option.

### Notes:

- Up to 10 event types can be configured in the video encoder, and up to four of these can be configured to upload images.
- File names can be formatted according to specific requirements. See **File Naming & Date/Time Formats** online help.

## Pre-trigger and Post-trigger buffers

This function is very useful when checking to see what happened immediately before and/or after a trigger, for example, 30 seconds before and/or after a door was opened. Check the **Save stream** checkbox under **Event Types > Add Triggered... > When Triggered...** to view the options. All uploaded images are JPEG images.

**Include pre-trigger buffer** – contains images from the time immediately preceding the trigger. Check the box to enable the pre-trigger buffer, enter the desired length of time and specify the required image frequency.

**Include post-trigger buffer** – contains images from the time immediately after the trigger. Configure as for pre-trigger.

### Notes:

- Pre-trigger and Post-trigger buffers will be lost if the connection to the event server fails.
- The maximum length of the pre-/post-buffer depends on the video image size and selected frame rate.
- If the pre- or post-buffer is too large for the video encoder's internal memory, the buffer size is reduced so that the recorded time is less than expected. If this occurs, an entry is created in the unit's log file.

**Continue image upload (unbuffered)** – enables the upload of video images for a fixed length of time. Specify the length of time for the uploaded recording, in seconds, minutes or hours, or for as long as the trigger is active. Finally, set the desired image frequency to the maximum (the maximum available) or to a specified frame rate. The frame rate will be the best possible, but might not be as high as specified, especially if uploading via a slow connection.

## Scheduled Event

A Scheduled event can be activated at preset times, in a repeating pattern on selected weekdays.

### Configuration example:

1. Click **Add scheduled...** on the **Event Types** page.
2. Enter a descriptive **Name** for the event, such as Scheduled e-mail upload.
3. Set the **Priority** (High, Normal or Low).
4. Set the **Activation Time** parameters (24h clock) for the event - start on Sundays at 13.00 with a duration of 12 hours.
5. Set the **When Activated...** parameters, (what the video encoder would do at the specified time) for example, send uploaded images to an e-mail address.
6. Click **OK** to save the Event in the Event Types list.

Please see the online help [?](#) for descriptions of each available option.

## Camera tampering

The camera tampering application generates an alarm whenever the camera is repositioned, or when the lens is covered, sprayed, or severely defocused.

First, you must create an event, see *How to set up a triggered event*, on page 29, for the video encoder to send an alarm.

### Settings

The **Minimum duration** parameter sets the minimum tampering period, that is an alarm will not be triggered until this period has elapsed, even if the tampering conditions are otherwise met. This can help prevent false alarms for known conditions that affect the image.

If the camera lens is sprayed or covered so that the camera live view becomes dark, it will not be possible to distinguish this situation from other situations where the same effect is seen, such as when lighting conditions change.

When the **Alarm for dark images** parameter is enabled, alarms are generated for all cases where the lights are either dimmed or turned off, or if the lens is sprayed, covered, or rendered severely out of focus. If not enabled, no alarm will be sent.

After you define these settings, click **Save**.



## Motion Detection

Motion detection is used to generate an alarm whenever movement occurs (or stops) in the video image. A total of 10 Include and/or Exclude windows can be configured.

- **Included** windows target specific areas within the whole video image
- **Excluded** windows define areas within an Include window that should be ignored (areas outside Include windows are automatically ignored)

Once configured, the motion detection windows appear in the list of available triggers, for triggering events. See *How to set up a triggered event*, on page 29.

**Note:**


Using the motion detection feature may decrease the video encoder's overall performance.



### Configuring Motion Detection

1. Click **Motion Detection** in the **Event Configuration** menu.
2. Click the **New Window** button.
3. Select the **Include** or **Exclude** option to define an Include or Exclude window, and enter a descriptive name in the field below.
4. Adjust the size (drag the bottom right-hand corner) and position (click on the text at the top and drag to the desired position) of the active window.
5. Adjust the **Object Size**, **History** and **Sensitivity** profile sliders (see table below for details). Any detected motion within an active window is then indicated by red peaks in the **Activity** window (the active window has a red frame).
6. Click **Save**.

To exclude parts of the Include window, select the **Exclude** option and position the Exclude window as required, within the Include window.

Please see the online help  for descriptions of each available option.

	Object Size	History	Sensitivity
High level	Only very large objects trigger motion detection	An object that appears in the region will trigger the motion detection for a long period	Ordinary colored objects on ordinary backgrounds will trigger the motion detection
Low level	Even very small objects trigger motion detection	An object that appears in the region will trigger motion detection for only a very short period	Only very bright objects on a dark background trigger motion detection
Default value	Low	High	High

**Examples:**

- Avoid triggering on small objects in the video image by setting the **object size** level to high.
- To reduce the number of triggers if there is a lot of movement during a short period of time, select a **high history** level.
- To only detect flashing light, select **low sensitivity**. In other cases, a **high sensitivity** level is recommended.

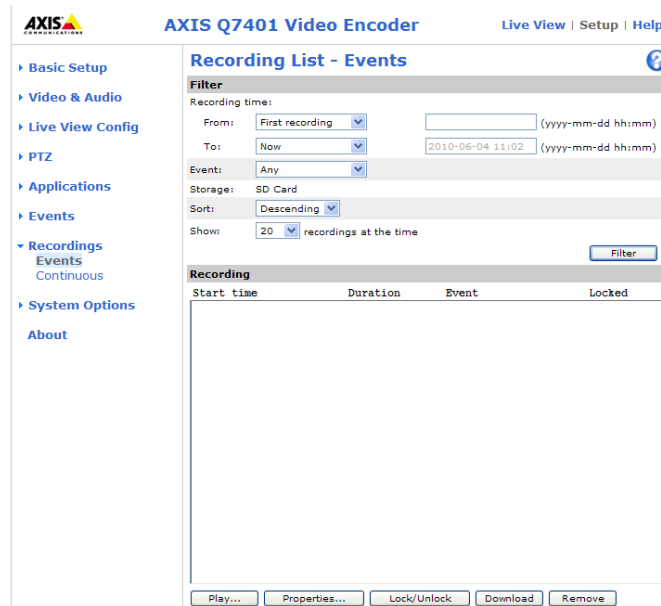
**Port Status**

Under **Event Configuration > Port Status** there is a list showing the status for the video encoder's input and output. This is for the benefit of **Operators** who have no access to the **System Options** section.

**Example:** If the Normal state for a push button connected to an input is set to **Open circuit** – as long as the button is not pushed, the state is **inactive**. If the button is pushed, the state of the input changes to **active**.



## Recordings



The AXIS Q7401 Video Encoder can be set to record continuously or as result of a triggered or scheduled event. See *Continuous Recording*, on page 34 and *Event Types*, on page 28 for more information. The Recording List window contains a list of recordings made to the local storage. It shows each recording's start time, length, the event type used to start the recording, and if the recording is locked so that it can neither be deleted nor recorded over.

To view a recording, select it from the list and click the **Play** button.

For detailed recording and video information, select an individual recording from the list and click the **Properties** button.

Use the **Lock/Unlock** button to control whether a recording can either be removed. If the recording is important and needs to be saved for future use, locking the recording can help prevent its accidental removal.

Recordings can be downloaded by selecting one or more recordings and clicking **Download**. The package downloaded is a zip file containing a minimum of 3 files, of which the .mkv or Matroska file is the actual recording.

### Note

To play recordings in Windows Media Player download and install AXIS Matroska File Splitter from [www.axis.com/techsup/software/](http://www.axis.com/techsup/software/) For more information on Matroska files see the online help [?](#).

The **Remove** button is used to delete unlocked recordings.

**Filter** - Use the filter to narrow down the list according to certain criteria such as a particular time frame. Note that certain filters, may take a long time to complete.

For more information on filters see the online help [?](#).

## Continuous Recording



The AXIS Q7401 video encoder can be configured to continuously save video to local storage. Automatic Disk Cleanup should be enabled when using Continuous Recording to prevent the local storage from becoming full. See *Storage - Disk Management*, on page 42.

### Recording Settings

**Enabled** - Must be checked to record continuously.

**Disk** - Shows as SD Card for this product.

**Stream Profile** - Select a stream profile to use for recordings. For more information, see *Stream Profiles*, on page 14.

**Note:** The recording will be restarted and all previous continuous recordings will be removed if Stream profile is changed.

Click **Save** to activate these settings.

### Recording

**Start time** - Shows the time the current continuous recording began. If no continuous recording is taking place the status will display as Not started.

**Duration** - Shows the length of the current continuous recording.

**Restart** - Click to start a new recording.

**Note:** All previous continuous recording data will be removed.

**From** - To play or download the recording from a point in time, enter the year, month, day and the time in hours and minutes.

**Duration** - Enter the amount of the recording to play or download in hours, minutes and seconds.

**Play...** - Click this button to open a window to play the selected amount of the continuous recording.

**Download** - Click this button to download the recorded video to a storage disk. The package downloaded is a zip file containing a minimum of 3 files, of which the .mkv or Matroska file is the actual recording. The zip file is named after the time set in the From field.

#### Notes:

- The zip file will contain at least the time period selected. The first matroska file contains the start time, and the last matroska contains at least the stop time
- To play recordings in Windows Media Player download and install AXIS Matroska File Splitter from [www.axis.com/techsup/software/](http://www.axis.com/techsup/software/)

## System Options

### Security

#### Users

User access control is enabled by default. An administrator can set up other users, by giving these user names and passwords. It is also possible to allow anonymous viewer login, which means that anybody may access the Live View page, as described below:

The user list displays the authorized users and user groups (levels):

Viewer	Provides the lowest level of access, which only allows access to the Live View page.
Operator	An operator can view the Live View page, create and modify events, and adjust certain other settings. Operators have no access to System Options.
Administrator	An administrator has unrestricted access to the Setup tools and can determine the registration of all other users.

**HTTP/RTSP Password Settings** – Select the type of password to allow. You may need to allow unencrypted passwords if there are viewing clients that do not support encryption, or if you recently upgraded the firmware and the existing clients do support encryption, but need to log in again, and be configured to use this functionality.

**User Settings** – Check the relevant box to enable **anonymous viewer login** – allows any viewer direct access to the Live View page.

**Enable Basic Setup** – Before using the AXIS Q7401, there are certain settings that should be made, most of which require Administrator access privileges. To quickly access these settings use the Basic Setup in the menu. All settings are also available from the standard setup links in the menu. Basic Setup is enabled by default but can be disabled and removed from the menu.

#### IP Address Filter

Enable IP Address Filtering to allow or deny access to the video encoder. Once enabled, the IP addresses in the list are allowed or denied access according to the choice made in the drop-down list **Allow/Deny the following IP addresses**.


The administrator can add up to 256 IP address entries to the list (a single entry can contain multiple IP addresses). The users from these IP addresses need to be specified in the user list with the appropriate access rights. This is done from **Setup > System Options > Security > Users**.

#### HTTPS

The video encoder supports encrypted browsing using HTTPS.

A **self-signed certificate** can be used until a Certificate Authority-issued certificate has been obtained. Click the **Create self-signed Certificate** button to install a self-signed certificate. Although self-signed certificates are free and offer some protection, true security is only implemented after the installation of a signed certificate issued by a certificate authority.

A signed certificate can be obtained from an issuing Certificate Authority by clicking the **Create Certificate Request** button. When the signed certificate is returned, click the **Install signed certificate** button to import the certificate. The properties of any certificate request currently resident in the video encoder or installed can also be viewed by clicking the **Properties...** button. The HTTPS Connection Policy must also be set in the drop-down lists to enable HTTPS in the video encoder.

For more information, please refer to the online help .

#### IEEE 802.1X

IEEE 802.1X is a 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, devices must authenticate themselves. The authentication is performed by a third-party entity called an authentication server, typically a RADIUS server, examples of which are FreeRADIUS and Microsoft Internet Authentication Service. In Axis implementation, the network device and the authentication server authenticate themselves with the help of digital certificates using EAP-TLS (Extensible Authentication Protocol – Transport Layer Security). The certificates are provided by an Certification Authority (CA). You need:

- a CA certificate to validate the identity of the authentication server
- a CA-signed client certificate and a private key to authenticate the network device.

To allow the network device to access a network protected by IEEE 802.1X:

1. Obtain a CA certificate, a client certificate and a client private key (contact your network administrator).
2. Go to Setup > System Options > Security > IEEE 802.1X and upload the CA certificate, the client certificate and the client private key.
3. Under SETTINGS, select the EAPOL version, provide your EAP identity and private key password.
4. Check the box to enable IEEE 802.1X and click **Save**.

### Certificates

**CA Certificate** – The CA certificate is used to validate the identity of the authentication server. Enter the path to the certificate directly, or locate the file using the Browse button. Then click Upload. To remove a certificate, click Remove.

**Client Certificate/Client private key** – The client certificate and private key are used to authenticate the network device. They can be uploaded as separate files or in one combined file (e.g. a PFX file or a PEM file). Use the Client private key field if uploading one combined file. For each file, enter the path to the file, or locate the file using the Browse button. Then click Upload. To remove a file, click Remove.

### Settings

**Eapol version** – Select the EAPOL version (1 or 2) as used in your network switch.

**Eap identity** – Enter the user identity (maximum 16 characters) associated with your certificate.

**Private key password** – Enter the password (maximum 16 characters) for the private key.

**Enable IEEE 802.1X** – 5. Check the box to enable the IEEE 802.1X protocol.

## Audio Support

**Enable audio support** – Allow clients to retrieve audio streams from the AXIS Q7401, and is used to totally enable or disable the sound source. See also *Audio Settings*, on page 16 for information on how to configure the audio settings.

## Date & Time

**Current Server Time** – displays the current date and time (24h clock). The time can be displayed in 12h clock format in the overlay (see below).

**New Server Time** – select your time zone from the drop-down list. If you want the server clock to automatically adjust for daylight savings time, select the **Automatically adjust for daylight saving time changes**.


From the **Time Mode** section, select the preferred method to use for setting the time:

- **Synchronize with computer time** – sets the time from the clock on your computer.
- **Synchronize with NTP Server** – the video encoder will obtain the time from an NTP server on a regular basis.
- **Set manually** – this option allows you to manually set the time and date.

**Note:**

If using a host name for the NTP server, a DNS server must be configured under **TCP/IP** settings. See **Network > Basic TCP/IP Settings** below.

**Date & Time Format Used in Images** – specify the formats for the date and time (12h or 24h) displayed in the video streams.

Use the predefined formats or use your own custom date and time formats. See **Advanced File Naming & Date/Time Formats** in the online help  for information on how to create your own date and time formats.

## Network

### Basic TCP/IP Settings

AXIS P3301/-V support both IP version 4 and IP version 6. Both versions may be enabled simultaneously, and at least one version must always be enabled. When using IPv4, the IP address for the video encoder can be set automatically via DHCP, or a static IP address can be set manually. If IPv6 is enabled, the video encoders receive an IP address according to the configuration in the network router. There is also the option of using the AXIS Internet Dynamic DNS Service. For more information on setting the IP address, please see the Installation Guide supplied with the product.

**Network Settings** – Click the **View** button for an overview of the IP configuration of the video encoder.

**IPv4 Address Configuration** – Check this box to enable IPv4.

**Obtain IP address via DHCP** – Dynamic Host Configuration Protocol (DHCP) is a protocol that lets network administrators centrally manage and automate the assignment of IP addresses on a network. DHCP is enabled by default. Although a DHCP server is mostly used to set an IP address dynamically, it is also possible to use it to set a static, known IP address for a particular MAC address.

**Note:**

DHCP should only be enabled if using dynamic IP address notification (see below), or if your DHCP server can update a DNS server, which then allows you to access the AXIS Q7401 by name (host name). If DHCP is enabled and you cannot access the unit, you may have to reset it to the factory default settings and then perform the installation again.

**Use the following IP address** – To use a static IP address for the AXIS Q7401, check the radio button and then make the following settings:

- IP address – Specify a unique IP address for your AXIS Q7401. (To check if the IP address you intend to use is available or not, click the Test button)
- Subnet mask – Specify the mask for the subnet the AXIS Q7401 is located on
- Default router – Specify the IP address of the default router (gateway) used for connecting devices attached to different networks and network segments.

**IPv6 Address Configuration** – Check the box to enable IPv6. Other settings for IPv6 are configured in the network router.

### Services

**Enable ARP/Ping setting of IP address** – The IP address can be set using the ARP/Ping method, which associates the unit's MAC address with an IP address. Check this box to enable the service. Leave disabled to prevent unintentional resetting of the IP address.

**Note:**

- The ARP/Ping service is automatically disabled two minutes after the unit is started, or as soon as an IP address is set.
- Pinging the unit is still possible when this service is disabled.

**Enable AVHS** – AXIS Video Hosting System (AVHS) in conjunction with an AVHS service provides easy and secure Internet access to live and recorded video accessible from any location. For more information and help to find a local AVHS Service Provider please go to [www.axis.com](http://www.axis.com) If AVHS is not to be used this option can be disabled.

- **One-Click enabled** – Press the camera's control button (see Hardware overview, on page 6) to connect to an AVHS service over the Internet. Once registered the camera stays connected to the AVHS service. If the camera is not registered within 24 hours after the button is pressed, the camera will disconnect from the AVHS service.
- **Always** – The camera will constantly attempt to connect to the AVHS service over the Internet. Once registered the camera will stay connected to the service. This option can be used when the camera is already installed and it is not convenient to use the one-click installation.

**AXIS Internet Dynamic DNS Service** – Use the AXIS Internet Dynamic DNS service to assign a host name for easy access to your video encoder (requires Internet access).

Click **Settings...** to register the video encoder with the Axis Internet Dynamic DNS service, or to modify the existing settings (requires access to the Internet). The domain name currently registered at the Axis Internet Dynamic DNS service for your product can at any time be removed.

For more information, please refer to the online help.

### Advanced TCP/IP Settings

**DNS Configuration** – DNS (Domain Name Service) provides the translation of host names to IP addresses on your network.

**Obtain DNS server address via DHCP** – automatically use the DNS server settings provided by the DHCP server. Click the **View** button to see the current settings.

Use the following DNS server address – enter the desired DNS server by specifying the following:

**Domain name** – enter the domain(s) to search for the host name used by the video encoders. Multiple domains can be separated by semicolons (;). The host name is always the first part of a Fully Qualified Domain Name, for example, **myserver** is the host name in the Fully Qualified Domain Name **myserver.mycompany.com** where **mycompany.com** is the Domain name.

**DNS servers** – enter the IP addresses of the primary, and secondary DNS servers.

**Note:**

This is not mandatory with regard to secondary DNS servers.

**NTP Configuration** – **Obtain NTP server address via DHCP** – check this radio button to automatically look up and use the NTP server settings as provided by DHCP. Click the **View** button to see the current settings.

Use the following NTP server address – to create manual settings, check this radio button and enter the host name or IP address of the NTP server.

**Host Name Configuration** – The video encoders can be accessed using a host name, instead of an IP address. The host name is usually the same as the assigned DNS Name.

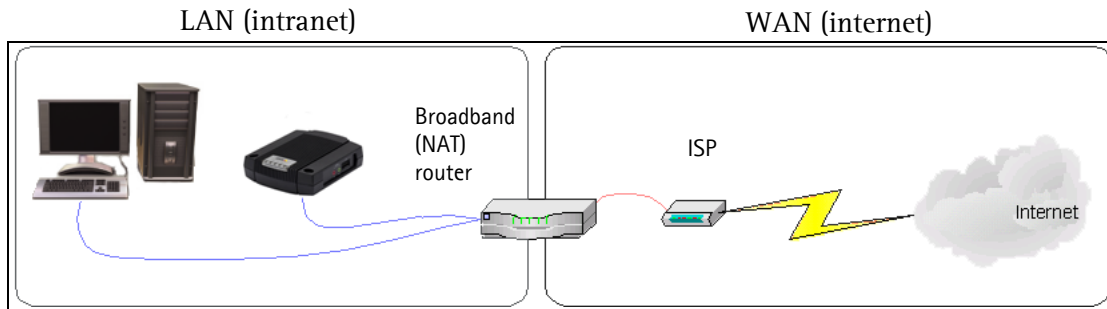
For more information, please see *Security*, on page 35.

**Link-Local IPv4 Address** – This is enabled by default and assigns the video encoders an additional IP address for use with UPnP™. The video encoder can have both a Link-Local IP and a static/DHCP-supplied IP address at the same time – these will not affect each other.

**HTTP and HTTPS** – The default HTTP/HTTPS port numbers (80 and 443 respectively) can be changed to any port within the range 1024-65535. This is useful for simple security port mapping, for example.

**NAT traversal (port mapping) for IPv4** – A broadband router allows devices on a private network (LAN) to share a single connection to the Internet. This is done by forwarding network traffic from the private network to the "outside", that is, the Internet. Security on the private network (LAN) is increased since most broadband routers are pre-configured to stop attempts to access the private network (LAN) from the public network/Internet.

Use **NAT traversal** when your video encoders are located on an intranet (LAN) and you wish to make it available from the other (WAN) side of a NAT router. With NAT traversal properly configured, all HTTP traffic to an external HTTP port in the NAT router is forwarded to the video encoder.



**Notes:**

- For NAT traversal to work, this must be supported by the broadband router.
- The broadband router has many different names: "NAT router", "Network router", "Internet Gateway", "Broadband sharing device" or "Home firewall" but the essential purpose of the device is the same.

**Enable/Disable** - when enabled, the video encoders attempt to configure port mapping in a NAT router on your network, using UPnP™. Note that UPnP™ must be enabled in the video encoder (see **System Options > Network > UPnP**).

**Use manually selected NAT router** - select this option to manually select a NAT router and enter the IP address for the router in the field provided.

If a router is not manually specified, the video encoders automatically search for NAT routers on your network. If more than one router is found, the default router is selected.

**Alternative HTTP port** - select this option to manually define an external HTTP port. Enter the port number in the field provided. If no port is entered here a port number is automatically selected when NAT traversal is enabled.

**Notes:**

- An alternative HTTP port can be used/be active even if NAT traversal is disabled. This is useful if your NAT router does not support UPnP and you need to manually configure port forwarding in the NAT router.
- If you attempt to manually enter a port that is already in use, another available port is automatically selected.
- When the port is selected automatically it is displayed in this field. To change this enter a new port number and click Save.

**FTP** - The FTP server running in the video encoders enables the upload of new firmware, and user applications. Check the box to enable the service.

**RTSP** - The RTSP protocol allows a connecting client to start an H.264 stream. Check the box to enable the server and enter the RTSP port number to use. The default setting is 554. Note that H.264 video streams will not be available if this service is not enabled.

**SOCKS**

SOCKS is a networking proxy protocol. The Axis video encoder can be configured to use a SOCKS server to reach networks on the other side of a firewall/proxy server. This functionality is useful if the video encoder is located on a local network behind a firewall, and notifications, uploads, alarms, and such need to be sent to a destination outside the local network (such as the Internet). See the online help [?](#) for more information.

## QoS (Quality of Service)

Quality of Service (QoS) guarantees a certain level of a specified resource to selected traffic on a network. Quality can be defined as a maintained level of bandwidth, low latency, and no packet losses. The main benefits of a QoS-aware network can be summarized as:

- The ability to prioritize traffic and thus allow critical flows to be served before flows with lesser priority.
- Greater reliability in the network, thanks to the control of the amount of bandwidth an application may use, and thus control over bandwidth races between applications.

The QoS in Axis network video products marks the data packets for various types of network traffic originating from the product. This makes it possible for network routers and switches to reserve a fixed amount of bandwidth for these types of traffic. The video encoders mark the following types of traffic:


- video
- audio
- event/alarm
- management network traffic

**QoS Settings** – For each type of network traffic supported by your Axis network video product, enter a DSCP (Differentiated Services Codepoint) value. This value is used to mark the traffic's IP header. When the marked traffic reaches a network router or switch, the DSCP value in the IP header tells the router or switch the type of treatment to apply to this type of traffic, for example, how much bandwidth to reserve for it. Note that DSCP values can be entered in decimal or hex form, but saved values are always shown in decimal.

For more information on Quality of Service, please see the Axis support web at [www.axis.com/techsup](http://www.axis.com/techsup)

## SMTP (email)

Enter the host names (or IP addresses) and port numbers for your primary and secondary mail servers in the fields provided, to enable the sending of notifications and image email messages from the video encoder to predefined addresses via SMTP.

If your mail server requires authentication, check the box for **Use authentication to log in to this server** and enter the necessary information. See the online help  for more information.

## SNMP

The Simple Network Management Protocol (SNMP) allows remote management of network devices. Depending on the level of security required, select the version of SNMP to use. The three levels of security are:

- SNMP v1 – includes no security.
- SNMP v2c – uses very simple security. The community name can be specified as a password for read or read/write access to all supported SNMP objects. The community is the the group of network devices using SNMP.
- SNMP v3 – provides encryption and secure passwords. HTTPS must be enabled.

**Traps for SNMP v1/v2** – Traps are used by the camera to send messages to a management system for important events or status changes. These settings are used with SNMP v1/v2.

**Enable traps** – Check this box to activate trap reporting.

**Trap address** – Enter the IP address of the management server.

**Trap community** – Community to use when sending a trap message to the management system.

Available traps are:

- Cold start** – Sends a trap message when SNMP has started and the configuration as well as the MIB (Management Information Base) may have changed
- Warm start** – Sends a trap message when SNMP has started and the configure file has changed, but not the MIB.
- Link up** – Sends a trap message when a link changes from down to up
- Authentication failed** – Sends a trap message when an authentication attempt fails



**SNMP v3** – provides encryption and secure passwords. HTTPS must be enabled. To use traps with SNMP v3 an SNMP v3 management application is required.

If the **Enable SNMP v3** option is enabled, provide the Initial user password. Note that the initial password is activated only when HTTPS is enabled and can only be set once.

If HTTPS is enabled, SNMP v1 and SNMP v2c should be disabled.

When SNMP configuration is ready, click **Save** to use the new settings or **Reset** to return to the default values.

### **UPnP™**

The video encoder includes support for UPnP™. UPnP™ is enabled by default, and the video encoder then is automatically detected by operating systems and clients that support this protocol.

### **RTP/H.264**

These settings are the port range, IP address, port number (video and audio), and Time-To-Live value to use for the video stream(s) in multicast H.264 format. Only certain IP addresses and port numbers should be used for multicast streams. For more information, please see the online help.

### **Bonjour**

The video encoders include support for Bonjour. When enabled, the video encoder is automatically detected by operating systems and clients that support this.

## Storage – Disk Management

Disk Management is used to setup and manage local storage devices. Local storage can be used to save video streams from triggered, scheduled or continuous recordings. For information on how to use the local storage with Triggered and Scheduled Event Type Setup and Continuous Recordings see the online help [?](#) .

### Storage Device

Once a formatted SD card has been inserted in the SD memory card slot, it is automatically mounted and information such as the available space and the size of the storage device is shown. The disk is full when there is less than 10 MB of space left on the memory card.

Disks are normally preformatted when purchased, if a SD Card needs to be formatted click the **Format** button to format the disk. Any previous data stored on the disk will be lost. Mounting is done automatically when a new memory card is inserted, or when the system boots. The only time you need to do a manual mount, is when you have executed an unmount command and the memory card has not been ejected and reinserted.

Status shows as follows:

- **OK** - The storage device is mounted and working correctly
- **connected** - The storage device is present but not mounted
- **disconnected** - The storage device is not present.
- **failed** - A problem has been discovered.

If the status shows as failed, click **Check disk** to see if the problem can be found and then try **Repair**. As a final measure the storage device might need to be reformatted. If there is important data on the storage device, see *Troubleshooting*, on page 50.

**Read only** shows the status of write-protect tab on the memory card. The status **no** means the tab is in the write-enabled mode and recordings can be saved to the memory card. The status **yes** means the memory card's tab is in the write-protected/read-only position, or there is a system error and recordings cannot be saved to the memory card.

### Important!

To prevent loss of data, click **Unmount** before removing a storage device.

### Storage Device Settings

Storage Device Settings is used to configure removal of recorded video.

#### Automatic disk cleanup

To avoid filling up local storage, Automatic disk cleanup can be set to continually remove older recordings to create more space.

Once enabled, automatic disk cleanup can be set to remove recordings that are older than a set number of days or weeks and when a percentage of the disk is full. For longer or continuous recordings, the oldest part of the recording is removed, it is recommended to have a time and date overlay in the video for proper tracking of recordings. See *Text Overlay Settings*, on page 14.

#### Note:

For continuous recording to work properly, do not set the limit to more than 95% full.

Interrupted recordings with an Unknown status, partial recordings and any other recording that has not been removed by disk cleanup can be removed manually from the **Recording List** using the **Remove** button.

Check **Lock disk** to stop writing to the disk and protect recordings from being removed. A locked disk cannot be formatted.

## Ports & Devices

**I/O Ports** – the pinout, interface support and the control and monitoring functions provided by this connector are described in *Unit connectors*, on page 46.

### COM Port

The COM port and serial connector allow you to connect legacy and auxiliary equipment to the AXIS P3301/-V. After consulting the auxiliary device's user documentation, select the appropriate settings for connecting to the AXIS P3301/-V. The COM port can enable the video encoder to receive status/data and send commands via either generic HTTP or IP/TCP applications, or control a PTZ device.

The serial port can be selected as either RS422 2/4 wire, RS485 2-wire or RS485 4-wire. For more information about the serial connector see *RS-422/RS-485 connector*, on page 47.

#### Setting up COM Port for a PTZ device

A PTZ driver needs to have been uploaded and installed before setting up the COM port. If this step has not been completed click the link **Upload and select driver** and complete this step before continuing.

1. Using an appropriate cable, connect the device to your selected port (RS-422 or RS-485). These ports are available via the RS-422/RS-485 connector. See *RS-422/RS-485 connector*, on page 46.
2. Go to **Port Settings**, check **Enable port** and **Pan Tilt Zoom**.
3. In **Serial Port Settings > Port mode**, select either port RS-485 2 wire, RS-485 4 wire, or RS-422 2/4 wire.
4. For any additional settings that might be necessary, consult the driver's user documentation. Click the link **Specify advanced device settings** to gain access to driver specific settings for the PTZ device.
5. Click **Save** activate settings.

## Maintenance

- **Restart** – the video encoder is restarted without changing any setting.
- **Restore** – the unit is restarted and most current settings are reset to factory default values. The settings that do not reset are:
  - the boot protocol (DHCP or static)
  - the static IP address
  - the default router
  - the subnet mask
  - the system time
  - 802.1X settings
- **Default** – the default button should be used with caution. Pressing this returns the video encoder's settings to the factory default values (including the IP address).

**Upgrade Server** – See *Upgrading the Firmware*, on page 50.

## Support

The **Support Overview** page provides valuable information on troubleshooting and contact information, should you require technical assistance.

**System Overview** – is an overview of the video encoder's status and settings. Information that can be found here includes the video encoder's firmware version, IP address, security, event and image settings and recent log items. Many of the captions are also links to the proper **Setup** page to conveniently make adjustments in the video encoder's settings.

**Logs & Reports** – when contacting Axis support, please be sure to provide a valid Server Report with your query. The Access Log is automatically included in the server report.

### Information

The **Logs**, the **Server Report** and the **Parameter List** may prove useful when troubleshooting a problem or when contacting the Axis support web.

**System Log** – Provides information about system events.

**Access Log** – The Access Log may be used for various purposes:

- Security – Tracking all access to your the video encoder. The access log lists the IP addresses, users and networking protocols used to access the video encoder.
- Simple web attraction tracker.
- System analysis and trouble shooting.

**Server Report** – Provides information about the server status and should always be included when requesting support.

**Parameter List** – Shows the unit's parameters and their current settings.

**Connection List** – Lists all clients that are currently accessing video and audio. It is also used for system analysis and trouble shooting.

### Configuration

From the drop-down lists, select the size and level of information to be added to the System and Access Log files.

The default information level for the Access Log is set to Critical & Warnings. However, in an error situation and when requesting support, set it to the lowest information level Critical & Warnings & Info.

For the Log Level for Email, select from the drop-down list the level of information to send as email and enter the destination email address.

## Advanced

Scripting is an advanced function that enables you to customize and use scripts. This function is a very powerful tool.

### Caution!

Improper use may cause unexpected behavior or even cause loss of contact with the unit. If a script does cause problems, reset the unit to its factory default settings.

Axis strongly recommends that you do not use this function unless you understand the consequences. Note that Axis support does not provide assistance for problems with customized scripts.

For more information, visit the Developer pages at [www.axis.com/developer](http://www.axis.com/developer)

**Upload/Remove Own Web Files** – To use your own files (e.g. web pages and images) as custom settings, they must first be uploaded to the AXIS P3301/-V Video Encoder.

To do this, enter the name and path to the file to upload in the field provided. The file might be on e.g. your workstation. As an alternative to entering the path directly, click the Browse button and then select the correct file.

Now select the user level for the uploaded file. Setting the user access level means that you have complete control over which files can be viewed by which users. When the file is shown correctly in the text field, click the Upload button.

All uploaded files are shown in the list in the lower section of the page. To remove a file, check the box provided next to it and then click the Remove button.

**Plain Config** – this function is for the advanced user with experience of Axis video encoder configuration. All parameters can be set and modified from this page. Help is available from the standard help pages.

### About

Here you can find basic information about your video encoder. You can also view third party software licenses.

### Resetting to the Factory Default Settings

To reset the video encoder to the original factory default settings, go to the **System Options > Maintenance** web page (as described in *Maintenance*, on page 43) or use the **Control** button on the side of the video encoder (see *Overview*, on page 5) as described below:

#### Using the Control Button

To reset the video encoder to the factory default settings using the Control Button:

1. Disconnect the power adapter.
2. Press and hold the Control button while reconnecting the power.
3. Keep the Control button pressed until the **Status Indicator** color changes to amber (this may take up to 15 seconds).
4. Release the Control button.
5. When the Status Indicator changes to green (which may take up to 1 minute), the process is complete and the video encoder has been reset. The unit now has the default IP address 192.168.0.90

**Note:**

For other methods of setting the IP address, please refer to the product's Installation Guide that accompanies the product, or download a copy from [www.axis.com](http://www.axis.com)

## Unit connectors

**Network connector** – RJ-45 Ethernet connector. Supports Power over Ethernet (PoE). Using shielded cables is recommended.

**PoE classification switch** – Power over Ethernet (IEEE 802.3af), selectable power classification:

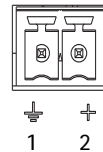
- Class 2 – max 6.49W
- Class 3 – max 12.95W (default)

**Note:**

Power classification is performed at power up. If the video encoder does not power the connected analog camera, select PoE Class 2 to inform the PoE switch that the video encoder only needs max 6.49W. PoE Class 3 is the default setting.

**Power connector** – 2-pin terminal block used for power input or power output.

- Power input – To supply power to the video encoder with the supplied power adapter or an external power supply 8-20V DC, max. 7.2W.
- Power output – the video encoder can supply power to an analog camera or auxiliary equipment if powered by PoE, 12V DC max 5W (420mA).



Function	Pin number	Description
GND	1	Ground
DC Power	2	Power input 8-20V DC, max 7.2W or Power output 12V DC, max 5W (420mA).

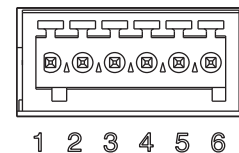
**Notes:**

- The video encoder can deliver a maximum of 5W (420mA) with PoE. This includes the output on the power connector and the I/O terminal connector.
- Do not connect a power supply if the video encoder is connected to PoE.

**Audio in** – 3.5mm input for a mono microphone, or a line-in mono signal (left channel is used from a stereo signal).

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

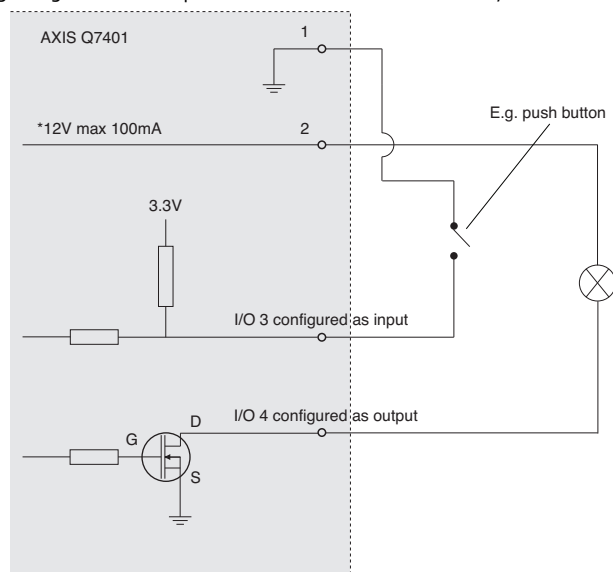
**I/O terminal connector** – Used in applications for e.g. motion detection, event triggering, time lapse recording and alarm notifications. In addition to an auxiliary power and a GND pin, the AXIS Q7401 has 4 pins that can be configured as either input or out put. These pins provide the interface to:



- Transistor output – For connecting external devices such as relays and LEDs. Connected devices can be activated by AXIS VAPIX API, output buttons on the Live View page or by an Event Type. The output will show as active (shown under Event Configuration > Port Status) if the alarm device is activated.
- Digital input – An alarm input for connecting devices that can toggle between an open and closed circuit, for example: PIRs, door/window contacts, and glass break detectors. When a signal is received the state changes and the input becomes active (shown under Event Configuration > Port Status.).

Function	Pin number	Notes	Specifications
GND	1	Ground	
12VDC Power	2	Can be used to power auxiliary equipment. <b>Notes:</b> This pin can only be used as power out. Same voltage as pin 2 of the power connector.	Max load = 100mA
Configurable (Input or Output)	3 - 6	Digital input - Connect to GND to activate, or leave floating (or unconnected) to deactivate.	Min input = - 40V DC Max input = + 40V DC
		Digital output - Uses an open-drain NFET transistor with the source connected to GND. If used with an external relay, a diode must be connected in parallel with the load, for protection against voltage transients.	Max load = 100mA Max voltage = + 40V DC

The following connection diagram gives an example of how to connect an auxiliary device to the AXIS Q7401.

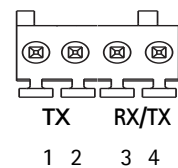


\* Note: Same voltage as pin 2 of the power connector

**RS-422/RS-485 connector** - Two 2-pin terminal blocks for RS-485/422 serial interface used to control auxiliary equipment, e.g. PTZ devices.

The RS-485/422 serial port can be configured in the following port modes:

- Bidirectional RS-485 half-duplex port for data transmission using two wires, one combined RX/TX pair.
- Bidirectional RS-485 full-duplex port for data transmission using four wires, one RX pair and one TX pair.
- Unidirectional RS-422 port for transmitting or receiving data using two wires, RX- or TX pair.
- Bidirectional RS-422 full-duplex port for data transmission (point-to-point) using four wires, one RX pair and one TX pair.



Function	Pin	Notes
RS 485/422TX(A)	1	TX pair for RS-422 and 4-wire RS-485
RS 485/422TX(B)	2	
RS-485A alt RS-485/422RX(A)	3	RX pair for all modes (combined RX/TX for 2-wire RS-485)
RS-485B alt RS-485/422RX(B)	4	

**SDHC memory card slot** – The high capacity SD memory card can be used for local recording with removable storage.

**BNC connector** – Connect a 75 ohm coaxial video cable (max. length 800 feet (250 meters)).

**Note:**

If the video source is to be connected in parallel with other equipment using a BNC T adaptor, disable the input termination by setting the 75 ohm termination switch to OFF. Failure to do so may cause reduced image quality.



## LED indicators

LED	Color	Indication
Network	Green	Steady for connection to a 100 Mbit/s network. Flashes for network activity.
	Amber	Steady for connection to 10 Mbit/s network. Flashes for network activity.
	Unlit	No network connection.
Status	Green	Steady green for normal operation.
	Amber	Steady during startup, during reset to factory default or when restoring settings.
	Red	Slow flash for failed upgrade.
Power	Green	Normal operation.
	Amber	Flashes green/amber during firmware upgrade.

## Troubleshooting

### Checking the Firmware

Firmware is software that determines the functionality of the video encoders. 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. The current firmware version in your encoder can be seen on the page **Setup > Basic Setup** or under **About**.

### Upgrading the Firmware

When you upgrade your encoder with the latest firmware from the Axis Web site, your encoder receives the latest functionality available. Always read the upgrade instructions and release notes available with each new release, before updating the firmware.

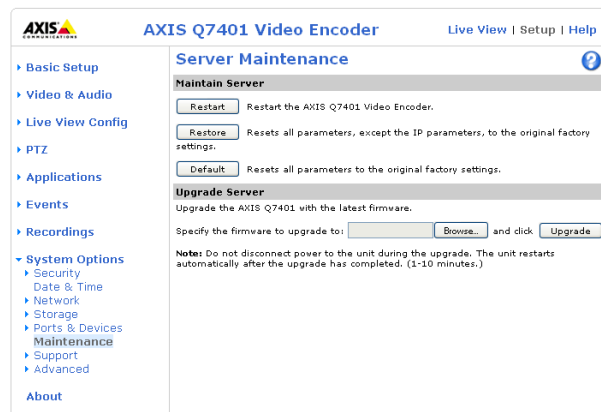
**Note:**

Preconfigured and customized settings are saved when the firmware is upgraded (providing the features are available in the new firmware) although this is not guaranteed by Axis Communications. Always read the instructions and release notes available with each new release, before upgrading the firmware.

1. Save the firmware file to your computer. The latest version of the firmware is available free of charge from the Axis website at [www.axis.com/techsup](http://www.axis.com/techsup)
2. Go to **Setup > System Options > Maintenance** in the encoder's web pages.
3. In the **Upgrade Server** section, browse to the desired firmware file on your computer. Click **Upgrade**.

**Notes:**

- After starting the upgrade process, always wait at least 5-10 minutes before restarting the encoder, even if you suspect the upgrade has failed.
- Your dealer reserves the right to charge for any repair attributable to faulty upgrading by the user.
- The AXIS Camera Management software tool can be used for multiple upgrades. Please see the Axis website at [www.axis.com](http://www.axis.com) for more information.



### Emergency Recovery Procedure

If power or the network connection to the encoder is lost during the upgrade, the process fails and the unit becomes unresponsive. A flashing red Status LED indicates a failed upgrade. To recover the unit, follow the steps below. The serial number is found on the label attached to the bottom of the encoder.

1. **UNIX/Linux** – From the command line, type the following:  

```
arp -s <IP address of encoder> <serial number> temp
ping -s 408 <IP address of encoder>
```

**Windows** – From a command/DOS prompt, type the following:

```
arp -s <IP address of encoder> <serial number>
ping -l 408 -t <IP address of encoder>
```

2. If the unit does not reply within a few seconds, restart it and wait for a reply. Press CTRL+C to stop Ping.
3. Open a browser and type in the encoder's IP address. In the page that appears, use the **Browse** button to select the upgrade file to use, for example, axisq7401.bin. Then click the **Load** button to restart the upgrade process.
4. After the upgrade is complete (1-10 minutes), the unit automatically restarts and shows a steady green on the Power and Status LEDs and flashing green or amber on the Network LED.
5. Reinstall the encoder, referring to the installation guide.

If the emergency recovery procedure does not get the encoder up and running again, please contact Axis support at [www.axis.com/techsup/](http://www.axis.com/techsup/)

### **Axis Support**

If you contact Axis support, please help us to help you solve your problems by providing the server report, the log file and a detailed description of the problem.

**Server Report** - go to **Setup > System Options > Support > Support Overview**. The server report contains important information about the server and its software, as well as a list of the current parameters.

The **Log file** is available from **Setup > System Options > Support > Logs & Reports**. The Log file records events in the unit since the last system restart and can be a useful diagnostic tool when troubleshooting.

## Symptoms, Possible Causes, and Remedial Action

Problems setting the IP address	
When using ARP/Ping	Try the installation again. The IP address must be set within two minutes after power has been applied to the encoder. Ensure the Ping length is set to 408. See the Installation Guide.
The encoder is located on a different subnet	If the IP address intended for the encoder and the IP address of your computer are located on different subnets, you will not be able to set the IP address. Contact your network administrator to obtain an appropriate IP address.
The IP address is being used by another device	Disconnect the encoder from the network. Run the Ping command. (In a Command/DOS window, type <code>ping</code> and the IP address of the unit).  If you receive: <code>Reply from &lt;IP address&gt;: bytes = 32; time = 10 ms....</code> - this means that the IP address may already be in use by another device on your network. You must obtain a new IP address and reinstall the unit.  If you see: <code>Request timed out</code> - this means that the IP address is available for use with your encoder. In this case, check all cabling and reinstall the unit.
Possible IP address conflict with another device on the same subnet	The static IP address in the encoder 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 encoder. To avoid this, set the static IP address to 0.0.0.0.
The encoder cannot be accessed from a browser	
Problems with ONVIF	If ONVIF is not working as expected, it may be that for security reasons ONVIF was disabled when the camera was accessed over VAPIX. To enable ONVIF, reset the product to Factory default settings (see page 45).
The IP address has been changed by DHCP	If the encoder and client are on the same network, Run AXIS IP Utility to locate the encoder. Identify the encoder using its model or serial number  Alternatively: 1) Move the encoder to an isolated network or to one with no DHCP or BOOTP server. Set the IP address again, using the AXIS IP Utility (see the Installation Guide) or the ARP/Ping commands. 2) Access the unit and disable DHCP in the TCP/IP settings. Return the unit to the main network. The unit now has a fixed IP address that will not change. 3) As an alternative to 2), if dynamic IP address via DHCP or BOOTP is required, select the required service and then configure IP address change notification from the network settings. Return the unit to the main network. The unit now has a dynamic IP address, but will notify you if the address changes.
Other networking problems	Test the network cable by connecting it to another network device, then Ping that device from your workstation. See instructions above.
Encoder is accessible locally, but not externally	
Broadband router configuration	To configure your broadband router to allow incoming data traffic to the encoder, enable the NAT-traversal feature which will attempt to automatically configure the router to allow access to the encoder. This is enabled from <b>Setup &gt; System Options &gt; Network &gt; TCP/IP Advanced</b> .
Firewall protection	Check the Internet firewall with your system administrator.
Default routers required	Check if you need to configure the default router settings.
Problems with the H.264 format	
No H.264 displayed in the client	Check that the relevant H.264 connection methods are enabled in the AMC control panel applet (network tab). In the AMC control applet, select the H.264 tab and click the button Set to default H.264 decoder.
No multicast H.264 displayed in the client	Check that the correct network interface is selected in the AMC control panel applet (network tab). Check with your network administrator that the multicast addresses used by the encoder are valid for your network. Check with your network administrator to see if there is a firewall preventing viewing.
Multicast H.264 only accessible by local clients	Check if your router supports multicasting, or if the router settings between the client and the server need to be configured. The TTL (Time To Live) value may need to be increased.
Poor rendering of H.264 images	Color depth set incorrectly on clients. Set to 16-bit or 32-bit color. If text overlays are blurred, or if there are other rendering problems, you may need to enable Advanced Video Rendering from the H.264 tab in the AMC control panel applet. Ensure that your graphics card is using the latest device driver. The latest drivers can usually be downloaded from the manufacturer's web site.

Color saturation is different in H.264 and Motion JPEG	Modify the settings for your graphics adapter. Please see the adapter's documentation for more information.
Lower frame rate than expected	Reduce number of applications running on the client computer. Limit the number of simultaneous viewers. Check with the system administrator that there is enough bandwidth available. See also the online help. Check in the AMC control panel applet (H.264 tab) that video processing is set to Decode all frames possible. Lower the image resolution.
Why do I not get 30 frames per second?	See the section <i>Optimizing your system</i> , on page 57.
Image degeneration	Decrease the GOV length, see the online help for more information.
<b>The Power indicator is not constantly lit</b>	
Faulty power supply	Check that you are using the correct power supply.
<b>The Status and Network indicator LEDs are flashing red rapidly</b>	
Hardware failure	Contact your Axis dealer.
<b>The Status indicator LED is flashing red and the encoder is inaccessible</b>	
A firmware upgrade has been interrupted or the firmware has otherwise been damaged	See the <i>Emergency Recovery Procedure</i> above.
<b>No images displayed on web page</b>	
Problem with AMC. ( <i>Internet Explorer only</i> )	To enable the updating of video images in Microsoft Internet Explorer, set your browser to allow ActiveX controls. Also, make sure that AXIS Media Control (AMC) component is installed on your workstation.
Installation of additional ActiveX component restricted or prohibited	Configure your encoder to use a Java applet for updating the video images under <b>Live View Config &gt; Layout &gt; Default Viewer</b> for Internet Explorer. See the online help for more information.
<b>Video/Image problems, general</b>	
Image too dark or too light	Check the video image settings. See the online help on Video and Image Settings.
Missing images in uploads	This can occur when trying to use a larger image buffer than is actually available. Try lowering the frame rate or the upload period.
Slow image update	Configuring pre-buffers, motion detection, high-resolution images, or high frame rates, will affect the performance of the encoder.
Poor performance	Poor performance may be caused by heavy network traffic, multiple users accessing the unit, low performance clients, use of features such as Motion Detection, Event handling, Image rotation other than 180 degrees.
<b>Poor quality snapshot images</b>	
Screen incorrectly configured on your workstation	In Display Properties, configure your screen to show at least 65000 colors, that is, at least 16-bit. Using only 16 or 256 colors will produce dithering artifacts in the image.
<b>Overlay/Privacy mask is not displayed</b>	
Incorrect size or location of overlay or privacy mask.	The overlay or privacy mask may have been positioned incorrectly or wrong resolution may have been used while positioning. Refer to the online help for information on the limitations when using image overlays and privacy masks.
<b>Browser freezes</b>	
Mozilla/Firefox 1.4 (or later) can sometimes freeze on a slow computer	Lower the image resolution.
<b>Problems uploading files</b>	
Limited space	There is only limited space available for the upload of your own files. Try deleting existing files to free up space.
<b>Motion Detection triggers unexpectedly</b>	
Changes in luminance	Motion detection is based on changes in luminance in the image. This means that if there are sudden changes in the lighting, motion detection may be triggered mistakenly. Lower the sensitivity setting to avoid problems with luminance.
<b>No audio</b>	
Incorrect setup	Check the sound card in the PC. Ensure that the mute button is not pressed and the volume settings are correct.
No audio or very poor audio quality	Check that the correct Audio Input source is selected under <b>Setup &gt; Video &amp; Audio &gt; Audio Settings</b> . Select Microphone for a connected external microphone. Select Line for a connected line in source.

<b>Audio volume too low/high</b>	
Volume settings incorrect	The volume of the microphone is either too high or too low. Change the volume for the microphone in the toolbar on the Live View page.
<b>Poor audio quality</b>	
CPU overloaded	Reduce the number of listeners and viewers and decrease the image resolution and compression.
Unsynchronized audio and video	It is recommended that the encoder's time setting is synchronized with an NTP Server. This is enabled under <b>System Options &gt; Date &amp; Time</b> .
Distorted audio	Check that the correct Audio Input source is selected under <b>Setup &gt; Video &amp; Audio &gt; Audio Settings</b> . Select Microphone for a connected external microphone. Select Line for a connected line in source.
<b>Local Storage problem</b>	
SD Card has critical data on it but shows as needing to be reformatted.	Critical data might be accessed and saved by placing the SD card in a card reader.

For further assistance, please contact your reseller or see the support pages on the Axis website at [www.axis.com/techsup](http://www.axis.com/techsup)

## Technical Specifications

Item	Specification
Video compression	<ul style="list-style-type: none"> <li>• H.264</li> <li>• Motion JPEG</li> </ul>
Resolutions	<ul style="list-style-type: none"> <li>• 176x120 to 720x576</li> </ul>
Frame rate H.264	<ul style="list-style-type: none"> <li>• 30/25 (NTSC/PAL) fps in all resolutions</li> </ul>
Frame rate Motion JPEG	<ul style="list-style-type: none"> <li>• 30/25 (NTSC/PAL) fps in all resolutions</li> </ul>
Video streaming	<ul style="list-style-type: none"> <li>• Multi-stream H.264 and Motion JPEG</li> <li>• Controllable frame rate and bandwidth</li> <li>• VBR/CBR H.264</li> </ul>
Image settings	<ul style="list-style-type: none"> <li>• Compression, color, brightness, contrast, saturation</li> <li>• Rotation: 90°, 180°, 270°</li> <li>• Aspect ratio correction</li> <li>• Mirroring of images</li> <li>• Text and image overlay</li> <li>• Privacy mask</li> <li>• Enhanced deinterlace filter</li> </ul>
Pan/Tilt/Zoom	<ul style="list-style-type: none"> <li>• Wide range of analog PTZ cameras supported (drivers available for download at <a href="http://www.axis.com">www.axis.com</a>)</li> <li>• 100 presets/camera, guard tour, PTZ control queue</li> <li>• Supports Windows compatible joysticks</li> </ul>
Users	<ul style="list-style-type: none"> <li>• 20 simultaneous viewers</li> </ul>
Audio streaming	<ul style="list-style-type: none"> <li>• Two way, half-duplex</li> </ul>
Audio compression	<ul style="list-style-type: none"> <li>• AAC-LC 8 kHz 32 kbit/s, 16 kHz 64 kbit/s</li> <li>• G.711 <math>\mu</math>-law PCM 64 kbit/s</li> <li>• G.726 ADPCM 32 or 24 kbit/s</li> </ul>
Audio input/output	<ul style="list-style-type: none"> <li>• External microphone input or line input</li> <li>• Line level output</li> </ul>
Security	Password protection, IP address filtering, HTTPS encryption, IEEE 802.1X network access control, digest authentication, user access log
Supported protocols	<ul style="list-style-type: none"> <li>• IPv4/v6, HTTP, HTTPS, QoS layer 3 DiffServ, FTP, SMTP, Bonjour, UPnP, SNMPv1/v2c/v3(MIB-II), DNS, DynDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP, SOCKS, etc.</li> <li>• SSL/TLS*</li> <li>• *This product includes software developed by the Open SSL Project for use in the Open SSL Tool kit (<a href="http://www.openssl.org">www.openssl.org</a>)</li> </ul>
Application Programming Interface	<ul style="list-style-type: none"> <li>• Open API for software integration, including VAPIX® from Axis Communications*, AXIS Media Control SDK*, event trigger data in video stream, the ONVIF specification available at <a href="http://www.onvif.org">www.onvif.org</a></li> <li>• Quality of Service (QoS) layer 3, DiffServ Model</li> <li>• Embedded Linux operating system</li> <li>• Support for AXIS Video Hosting System (AVHS) with One-Click Camera connection</li> <li>• *Available at <a href="http://www.axis.com">www.axis.com</a></li> </ul>
Intelligent video	Video motion detection, active tampering alarm, audio detection
Alarm triggers	Intelligent video, external inputs, video loss, disk full
Alarm events	<ul style="list-style-type: none"> <li>• File upload via FTP, HTTP and email</li> <li>• Notification via email, HTTP and TCP</li> <li>• External output activation</li> <li>• Local storage</li> </ul>
Video buffer	64 MB pre- and post-alarm

## AXIS Q7401 – Technical Specifications

Item	Specification
Video access from web browser	<ul style="list-style-type: none"> <li>• Camera live view</li> <li>• Video recording to file (ASF)</li> <li>• Customizable HTML pages</li> <li>• Windows XP, 2000, 2003 server</li> <li>• DirectX 9c or higher</li> <li>• For other operating systems and browsers see <a href="http://www.axis.com/techsup">www.axis.com/techsup</a></li> </ul>
Casing	Metal casing. Standalone or wall mount
Processor and memory	<ul style="list-style-type: none"> <li>• ARTPEC-3, 128 MB RAM, 128 MB Flash</li> <li>• Battery backed-up real-time clock</li> </ul>
Power	<ul style="list-style-type: none"> <li>• 8-20 V DC, max. 7.2 W or</li> <li>• Power over Ethernet IEEE 802.3af Class 2/3</li> </ul>
Connectors	<ul style="list-style-type: none"> <li>• Analog composite video BNC input, NTSC/PAL auto-sensing</li> <li>• RJ-45 10BaseT/100BaseTX PoE</li> <li>• DC terminal block: power in 8-20 V DC, max. 7.2 W or power out 12 V DC, max. 5 W</li> <li>• I/O terminal block for four configurable inputs/outputs</li> <li>• 3.5 mm mic/line in, 3.5 mm line out</li> <li>• RS-485/ RS-422</li> </ul>
Local storage	SD/SDHC memory card slot (Card is not included)
Operating conditions	<ul style="list-style-type: none"> <li>• 0-50 °C (32-122 °F)</li> <li>• Humidity 20-80% RH (non-condensing)</li> </ul>
Approvals	<ul style="list-style-type: none"> <li>• EN 55022 Class B, EN 61000-3-2, EN 61000-3-3, EN 55024,</li> <li>• EN 61000-6-1, EN 61000-6-2, FCC Part 15 Subpart B Class B,</li> <li>• ICES-003 Class B, VCCI Class B, C-tick AS/NZS CISPR 22,</li> <li>• EN 60950-1</li> <li>• Power supply PS-T: EN 60950-1, CSA, C/US</li> <li>• Power supply PS-K: EN 60950-1, UL, cUL</li> </ul>
Dimensions (HxWxD)	32.1 x 98.9 x 118.0 mm (1.3" x 3.9" x 4.7")
Weight	335 g (0.74 lb) (power supply not included)
Included accessories	<ul style="list-style-type: none"> <li>• Power supply, mounting and connector kits, Installation Guide,</li> <li>• CD with installation and management tools, software and User's</li> <li>• Manual, 1 Windows decoder user license</li> </ul>
Video management software (not incl.)	<ul style="list-style-type: none"> <li>• AXIS Camera Station - Video management software for viewing, recording and archiving up to 25 cameras</li> </ul> <p>See <a href="http://www.axis.com/partner/adp_partners.htm">www.axis.com/partner/adp_partners.htm</a> for more software applications via partners</p>



## General performance considerations

When setting up your system, it is important to consider how various settings and situations will affect performance. Some factors affect the amount of bandwidth (the bit rate) required, others can affect the frame rate, and some will affect both. If the load on the CPU reaches its maximum, this will also affect the frame rate.

The following factors are among the most important to consider:

- High image resolutions and/or lower compression levels result in larger images. Bandwidth affected.
- Access by large numbers of Motion JPEG and/or unicast H.264 clients. Bandwidth affected.
- Simultaneous viewing of different streams (resolution, compression, etc.) by different clients. Bandwidth affected.
- Heavy usage of event settings affects the CPU load. Frame rate affected.
- Heavy network utilization due to poor infrastructure. Bandwidth affected
- Viewing on poorly performing client PC lowers perceived performance. Frame rate affected.

## Optimizing your system

To see the bandwidth and frame rate currently required by the video stream, the video encoder provides a tool that can be used to display these values directly in the video image.

To do this, special format strings are added as part of a text overlay. Simply add **#r** (average frame rate in fps) and/or **#b** (average bandwidth in Kbps) to the overlay.

For detailed instructions, please see the online help for **Video & Image > Text Overlay Settings**, and the help for **File Naming & Date/Time Formats**.

**Text Overlay Settings**

Include date  Include time

Include text:

Place text/date/time at top of image

### Important!

- The figures displayed here are the values as delivered by the server. If other restrictions are currently in force, (e.g. bandwidth limitation) these values might not correspond to those actually received by the client.
- For Motion JPEG, these values will only be accurate as long as no frame rate limit has been specified.

## Glossary

**Active Speaker** – a speaker with a built-in power amplifier.

**ActiveX** – A control (or set of rules) used by a browser. ActiveX controls are often downloaded and installed automatically as required.

**Advanced Audio Coding (AAC)** – is an audio codec that is at the core of the MPEG-4, 3GPP and 3GPP2 specifications, and is used for Internet, wireless and digital broadcast audio. AAC combines high quality audio encoding with a small file size.

**AMC** – AXIS Media Control. The control required for viewing video images in Internet Explorer. Installs automatically on first use.

**API** – Application Programming Interface. The Axis API can be used for integrating Axis products into other applications.

**ARP** – Address Resolution Protocol. Used to associate an IP address to a hardware MAC address. A request is broadcast on the local network to find out what the MAC address is for the IP address.

**ARTPEC** – Axis Real Time Picture Encoder – used for image compression.

**Aspect ratio** – A ratio of width to height in images. A common aspect ratio used for television screens and computer monitors is 4:3. High-definition television (HDTV) uses an aspect ratio of 9:16.

**BOOTP** – A protocol that can automatically configure a network device (give it an IP address).

**Bonjour** – Also known as zero-configuration networking, Bonjour enables automatic discovery of computers, devices, and services on IP networks. Bonjour allows devices to automatically discover each other without the need to enter IP addresses or configure DNS servers. Bonjour is developed by Apple Computer Inc.

**CGI** – Common Gateway Interface. A set of rules (or a program) that allows a Web Server to communicate with other programs.

**Client/Server** – Describes the network relationship between two computer programs, in which one, the client, makes a service request from another – the server.

**DC-Iris** – This special type of iris is electrically controlled by the Axis camera, to automatically regulate the amount of light allowed to enter.

**dB (Decibels)** – A unit to measure sound level changes. A 3dB change is the smallest level change we can hear. A 3dB change is actually twice or half the audio power level. A gain of 0dB will leave the signal level unchanged.

**De-interlacing** – De-interlacing is the process taking a stream of interlaced frames and converting it to a stream of progressive frames.

**DSL** – Digital Subscriber Line. A means of transferring data via standard phone lines.

**Ethernet** – A widely used networking standard.

**ETRAX** – Axis' own microprocessor.

**Firewall** – A virtual barrier between a LAN (Local Area Network) and other networks, e.g. the Internet.

**FTP** – File Transfer Protocol. Used for the simple transfer of files to and from an FTP-server.

**Full-duplex** – Transmission of data, e.g. audio, in two directions

simultaneously.

**G.711** – G.711 is the international standard for encoding telephone audio on 64 kbps channel. It is a pulse code modulation (PCM) scheme operating at 8 kHz sample rate.

**G.726** – Frequently used speech-compression algorithm in telecommunications due to its high perceived speech quality and low resource requirements.

**H.264** – Also known as MPEG-4 Part 10. This is the new generation compression standard for digital video. H.264 offers higher video resolution than Motion JPEG or MPEG-4 at the same bit rate and bandwidth, or the same quality video at a lower bit rate.

**Half-duplex** – A half-duplex link communicates in one direction at a time only, much like a walkie-talkie. Two way communication is possible, but not simultaneously.

**HTTP** – Hypertext Transfer Protocol. The set of rules for exchanging files (text, images, sound, video, and other files) on the World Wide Web.

**HTTPS** – An extension to the HTTP protocol to support sending data securely over the World Wide Web.

**Intranet** – A private network limited to an organization or corporation. Usually closed to external traffic.

**IP** – Internet Protocol. See TCP/IP.

**IP address** – A unique number used by a computer on the network to allow it to be identified and found.

**ISMA** – Internet Streaming Media Alliance.

**JPEG** – A standard image format, used widely for photographs. Also known as JPG.

**LAN** – A local area network (LAN) is a group of computers and associated devices that typically share common resources within a limited geographical area.

**Linux** – A popular operating system that is "open source" and practically free of charge.

**Local storage** – If a camera or video encoder supports local storage, an SD card can be inserted into the SD card slot to locally record and store a video stream.

**Lux** – A standard unit for light measurement.

**Mbit/s** – Megabits per second. A unit for measuring speeds in networks. A LAN might run at 10 or 100 Mbit/s.

**Motion JPEG** – Delivers a high quality video stream, from which individual images can be extracted and saved.

**MPEG-4** – A video compression standard that makes good use of bandwidth, and which can provide DVD-quality video streams at less than 1 Mbit/s.

**Multicast** – A bandwidth-conserving technology that reduces bandwidth usage by simultaneously delivering a single stream of information to multiple network recipients.

**PEM** – Privacy Enhanced Mail. An early standard for securing electronic mail. The PEM-format is often used for representing an HTTPS certificate or certificate request.

**Ping** – A small utility used for sending data packets to network resources to check that they are working and that the network is intact.

**Pre/post alarm image** – The images from immediately before and after an alarm.

**Protocol** – A special set of rules governing how two entities will communicate. Protocols are found at many levels of

communication, and there are hardware protocols and software protocols.

**(QoS) Quality of Service** – QoS provides the means to guarantee a certain level of a specified resource to selected traffic on a network. Quality can be defined as e.g. a maintained level of bandwidth, low latency, and no packet losses.

**Router** – A device that determines the next network point to which a packet should be forwarded on its way to its final destination. A router is often included as part of a network switch (see below).

**RTP**– Real-Time Transfer Protocol. A transfer protocol designed for the delivery of live content, e.g. MPEG-4.

**RTSP (Real Time Streaming Protocol)** – RTSP is a control protocol, and a starting point for negotiating transports such as RTP, multicast and Unicast, and for negotiating codecs. RTSP can be considered a "remote control" for controlling the media stream delivered by a media server. RTSP servers typically use RTP as the protocol for the actual transport of audio/video data.

**Simplex** – In simplex operation, a network cable or communications channel can only send information in one direction; it's a "one-way street".

**SMTP** – Simple Mail Transfer Protocol is the protocol used to send e-mail across the Internet. SMTP authentication is a way of allowing people outside of a domain to use an SMTP server when sending e-mail.

**SNMP** – Simple Network Management Protocol. An application layer protocol that facilitates the exchange of management information between network devices. It is part of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite.

**Subnet Mask** – An IP address consists of two components: the network address and the host address. "Subnetting" enables a network administrator to further divide the host part of the address into two or more subnets. The subnet mask identifies the subnet to which an IP address belongs.

**Switch** – Whilst a simple hub transmits all data to all devices connected to it, a switch only transmits the data to the device it is specifically intended for.

**TCP/IP** – Transmission Control Protocol/Internet Protocol. A suite of network protocols that determine how data is transmitted. TCP/IP is used on many networks, including the Internet. TCP keeps track of the individual packets of information and IP contains the rules for how the packets are actually sent and received.

**UDP** – The User Datagram Protocol is a communications protocol that offers a limited amount of service when messages are exchanged between computers in a network that uses the Internet Protocol (IP). UDP is an alternative to the Transmission Control Protocol (TCP) and, together with IP, is also known as UDP/IP.

**Unicast** – Communication between a single sender and a single receiver over a network. A new connection is established for each new user.

**URL** – Uniform Resource Locator. An "address" on the network.

**Varifocal** – A varifocal lens provides a wide range of focal lengths, as opposed to a lens with a fixed focal length, which only provides one.

**WAN** – Wide-Area-Network. Similar to a LAN, but on a larger geographical scale.

**Web server** – A program on a computer that delivers the

resources (usually web pages) requested by the web user (the client).

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