VaxOCR Containers

ON CAMERA Version

User Manual

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1. Introduction

VaxOCR Containers is an application developed by Vaxtor Recognition Technologies that runs onboard certain Axis CCTV cameras which will read standard shipping container codes which adhere to the International Standard **ISO 6346.**

Note that a separate version is available which will run on Windows-based PCs.
Contact Vaxtor for more details.

The Container Code OCR engine has been developed from Vaxtor's ALPR engine and therefore takes advantage of many of the current integration and publishing capabilities that have been developed by Vaxtor over many years.

Container code reads can be written to the Axis internal SD card (if fitted), a shared network drive, sent to Helix (Vaxtor's comprehensive Back Office program), or data can be sent to many other destinations and VMS systems such as Milestone and Genetec using the comprehensive list of reporting options.

This manual will guide you through the installation, configuration and these result publishing procedures. It also includes some tips about camera setup and configuration to maximize the OCR analytics performance and container code read accuracy.

2. Requirements for Container Code Images

OCR (Optical Character Recognition) is an image processing technology used to locate and read codes printed or painted onto shipping containers. However, recognizing the characters is more challenging if the images have any of the following characteristics or artifacts:

- Over / Under exposed
- Blurred or Distorted
- Unevenly lit
- Low contrast
- Damaged text
- Bad weather conditions

Badly worn text is almost impossible to read correctly

The less clear that the container text images are, then the more likely it is that the OCR software will report them incorrectly -- Garbage In –> Garbage Out.

As a general guide, if a human has difficulty reading the codes, then so will an intelligent OCR camera!

3. Camera Requirements

It is recommended that you use an **Axis Camera** with an **ARTPEC-6** processor or later.
Most current Axis models have these processors and normally a high resolution capable of reading container code text.

3.1 Frame Rate

The frame rate, also known as frames per second (FPS), is the number of frames or images that the camera can capture per second. For example, 30 fps means the camera captured 30 frames in a single second of video.

When using VaxOCR On Camera, then setting the frame rate has no effect, – the camera sends frames at about 25fps to the App. However, if you use the camera as a remote IP OCR camera connected to a PC running the Vaxtor OCR software – then the fps settings will have an effect and it should be set to at least 25fps.

3.2 Shutter Speed

Shutter speed, also known as the “exposure time”, is the length of time a camera shutter is open for in order to expose light onto the camera sensor. The shutter speed is measured in seconds, or fractions of a second. The bigger the denominator, the faster the speed. For example, 1/250th means one two-hundred-and-fiftieth of a second or four milliseconds.
(1 second = 1000 milliseconds)

The following minimum shutter speeds are recommended but may be decreased:

Container speed:

- **Stationary** → Minimum exposure time **1/125th sec** (8 milliseconds)
- **Very Slow** → Minimum exposure time **1/250th sec** (4 milliseconds)
- **Slow** → Minimum exposure time **1/500th sec** (2 milliseconds)

Fast moving containers cannot be read.

3.3 Resolution and Lens Focal Length

3.3.1 Resolution

The resolution of the camera determines the amount of detail that can be captured. The smaller the object detail, the higher the resolution that is required. There are several factors that determine the detail captured:

1. The resolution (pixel size) of the camera sensor. This sensor (normally CMOS) where the light eventually falls and a typical IP camera has a sensor resolution of 2 or 4 Megapixels.

2. The resolution of the camera's electronics. An Axis Q1700 can output video at a resolution of 1920 x 1080 – but may be set to a lower resolution if not needed.

3. The quality and focal length of the lens. The quality of the optics can play a part in challenging circumstances. The focal length (zoom factor) determines the field of view that can be seen.

3.3.2 Focal length

The focal length of the lens determines how "zoomed in" the image is. It is usually expressed in millimeters (e.g., 6 mm, 25 mm, or 50 mm).

The focal length tells us the angle of view (how much of the scene will be captured) and the magnification (how large individual elements will be). The longer the focal length, the narrower the angle of view and the higher the magnification. The shorter the focal length, the wider the angle of view and the lower the magnification.

In the case of zoom lenses, both the minimum and maximum focal lengths are stated, for example 10–40 mm.

3.3.3 Illumination

Container codes are normally painted onto the contains on all sides and, unlike license plates are NOT retro-reflective. Sufficient ambient lighting must be used to adequately illuminate the text so that it can be read at a reasonably fast shutter speed without the camera adding too much gain to brighten the image. (a maximum gain of about 12 is advised)

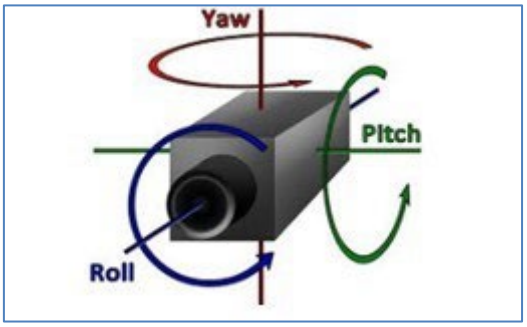
Adding gain effectively amplifies the video signal, including any noise which can result in a very grainy image and prone to OCR errors.

4. Other requirements

The positioning of the camera is key to achieving maximum OCR accuracy**.**

4.1 Camera Orientation and Placement

The image orientation is a key factor to achieve the maximum OCR efficiency. It is recommended that you stay within the following thresholds



Roll Rotation: Below 25°

Yaw Rotation: Below 25°

Pitch Rotation: Below 25°

In other words, keep the camera as perpendicular to the container as possible.

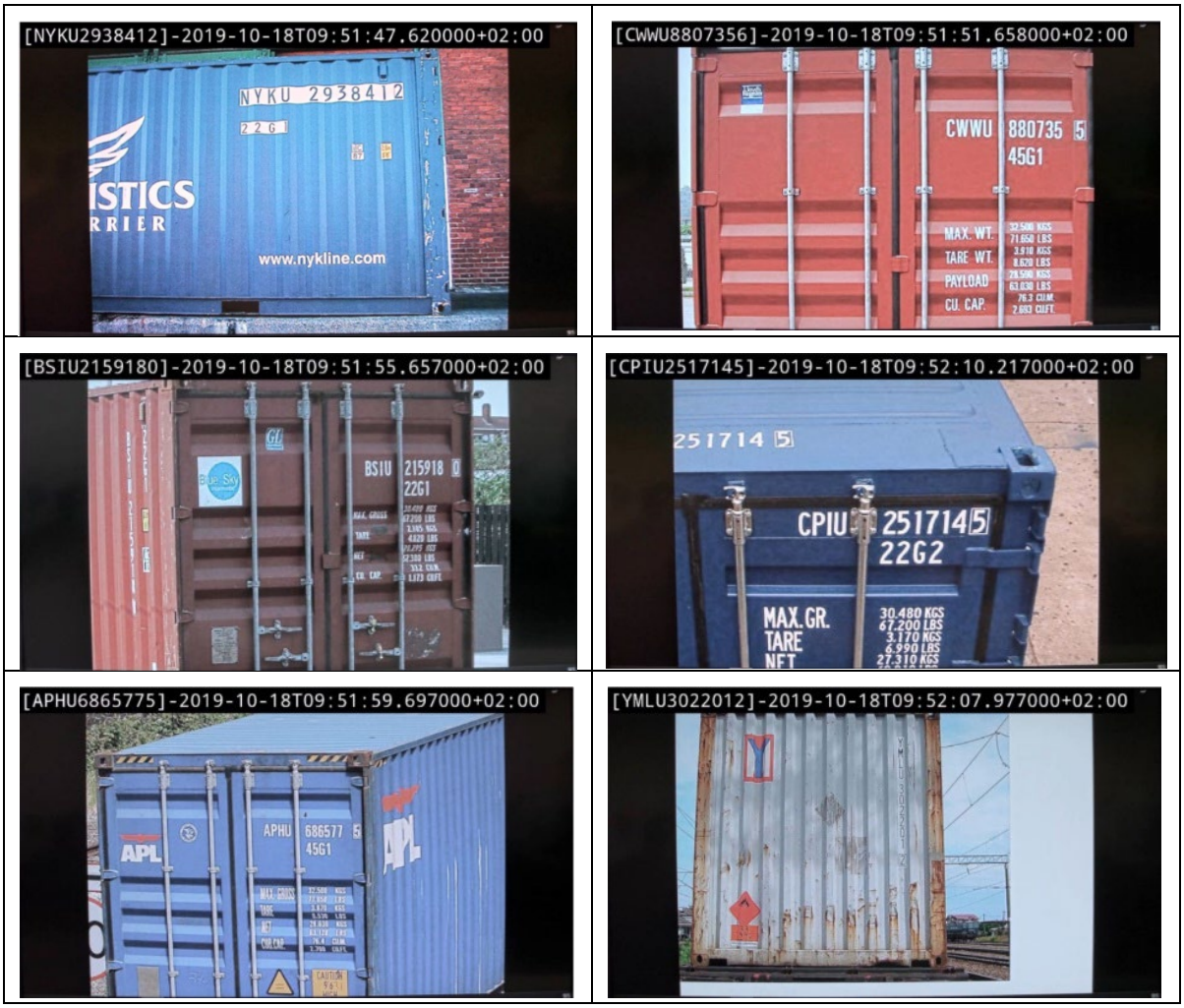
Accuracy will decrease significantly if these guidelines are not adhered to.

The camera may be placed at the side of the camera, behind the container or even above the container as long as the angles are minimal. Note that containers are corrugated and severe angles will prevent characters from being read as they become obscured by the corrugation.

4.2 Examples of camera orientation

The following examples illustrate various camera positions.

Note that in the last example (bottom right), the Vaxtor software has read a vertically written code.



4.3 Character pixel height

The most accurate way of measuring the size of the characters on a container is to use the height of each character. The optimal range is from 20 to 30 pixels high. There is a tool to help determine the correct lens to use to attain this height described later in this manual.

The software can be configured to read characters as low as 14 pixels high – or as high as 70 pixels high, but in order to maximize reading accuracy and not waste processor time looking for very large characters you should keep to this 20-30 range.

5. Speed of traffic

The software may be run onboard an Axis camera as described in this manual, but may also be run on a PC or server and the Axis cameras used to send live video to the PCs for processing. This is used for faster moving containers.

The Axis camera's processor (ARTPEC 6 or 7) takes several seconds or more to process a container code read and so the container must be stationary or moving very slowly.

(This is due to the huge variance in possible locations, qualities and orientation of codes with no specific background such as found on license plates)

In the case of containers being pulled by trucks there are two scenarios:

Side View

This scenario is often used at site entrances or weigh bridges and the container should be stationary. (or moving **extremely** slowly).

Rear View

In this case the truck would normally be moving away from the camera which should be positioned at the side of the lane or road so as to keep the code in view for as long as possible. The maximum speed would be about 10Km/h.

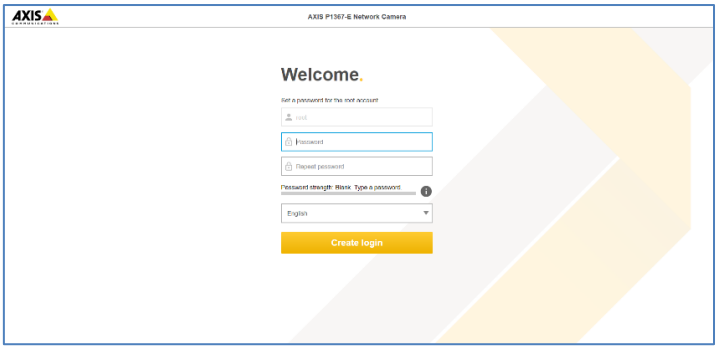
However, by connecting the video stream to a PC and running the On-PC version of the Vaxtor application then speeds of 10Km/h side view or 50Km/h rear view are possible. Several Axis cameras may be connected to one PC. Contact Vaxtor for further details.

Applications

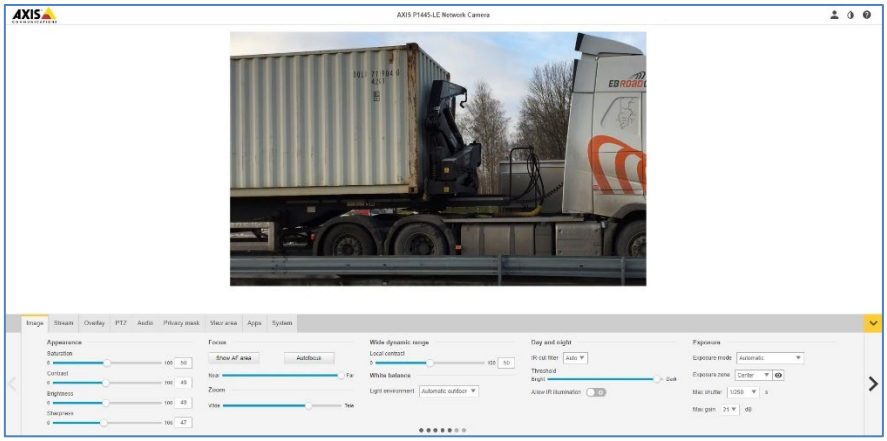
Often containers are moved by cranes at ports etc. By locating Axis camera on the crane or lifting device then the relative speed of the container is zero or very low as it is used which is another good application of this technology.

6. Setting up the Axis Camera

Once the Axis camera has been installed on site it must be set up and configured. Use a web browser to logon to the camera using its IP address. *(refer to the Axis documentation for the default IP address. The default username and password are normally: root / root).*

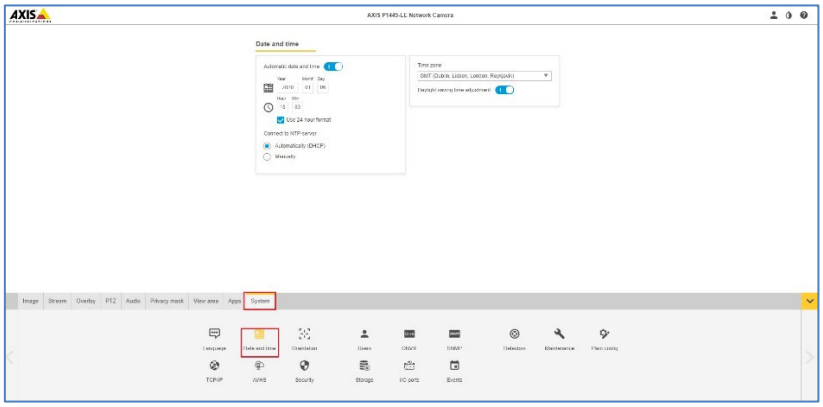


Once logged on, select “Settings” from the bottom right of the window:



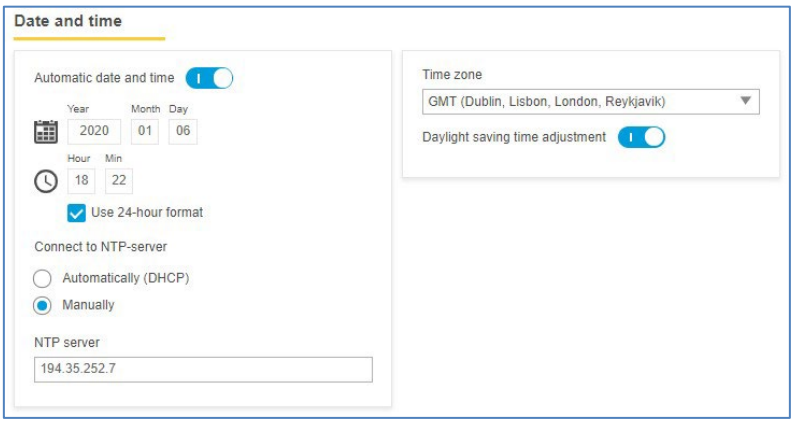
6.1 Set the date and time of the camera

To set the **date and time** within the Axis camera, select the “System” Tab and choose the Date & Time option.



Axis camera setup: System > Date & Time

In this example we are using one of the UK Stratum 1 NTP Servers:

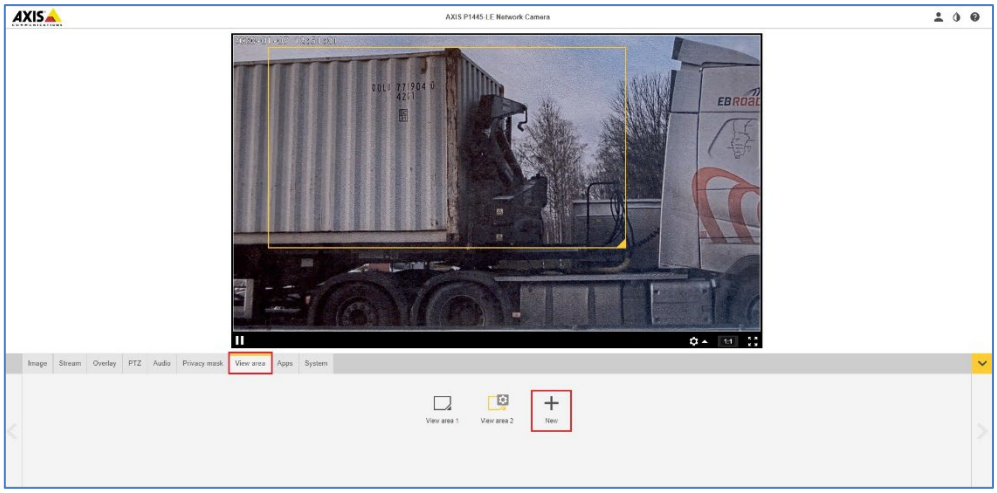


6.2 Set the resolution, shutter speed and frame rate

Different frame rates, shutter speeds and resolutions should be setup depending on where the camera is to be placed. See section 3 for shutter speed recommendations and note that for on-camera use the frame rate has no effect.

6.3 Set the View Areas.

Within the Axis camera's normal operation, you can define one or more View Areas.



These rectangular areas can be named and are essentially areas of interest which reduces the bandwidth of the data transmitted to a remote recording device and equally saves storage space when video is saved remotely or on the camera's internal SD card if fitted.

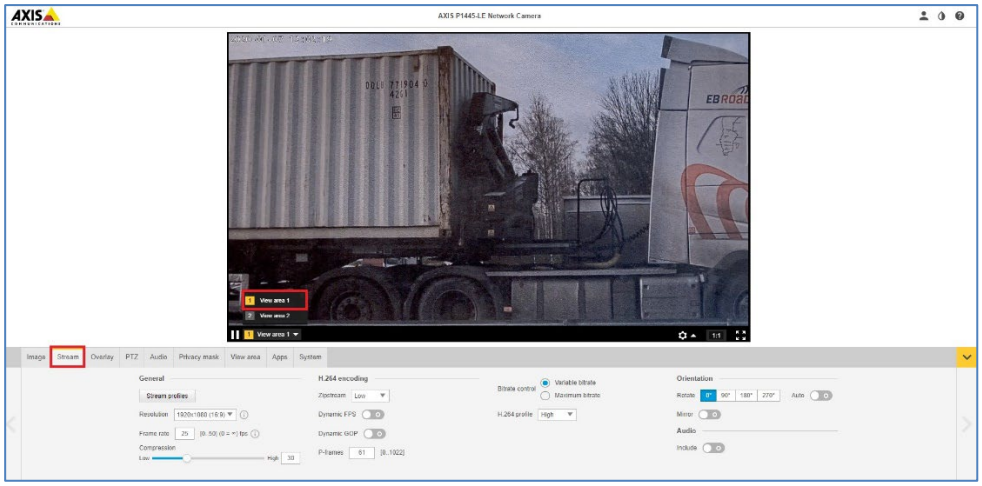
In this example only the area bounded in yellow will be sent to any recording equipment – and only this part of the video image will be passed onto the OCR engine for OCR processing.

Note that you can also set multiple Regions of Interest (ROI) within the OCR App which can be defined as polygons and the bounded areas can be included or excluded from the OCR processing. See later in this manual.

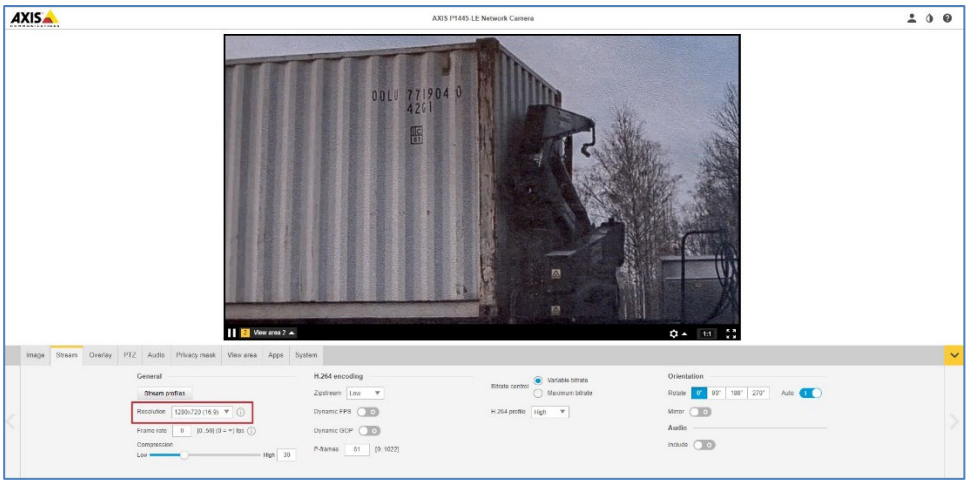
6.4 Set the frame rate and resolution

For each rectangular View Area set the **frame rate (max)** and **resolution** in the Axis camera.

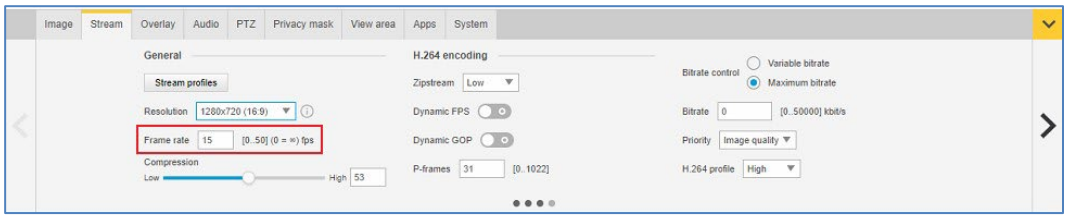
- Click on the Stream Tab and choose the appropriate View Area:



- Next, select a suitable resolution.
  Tip: do not select a resolution that is more than is needed for the OCR:

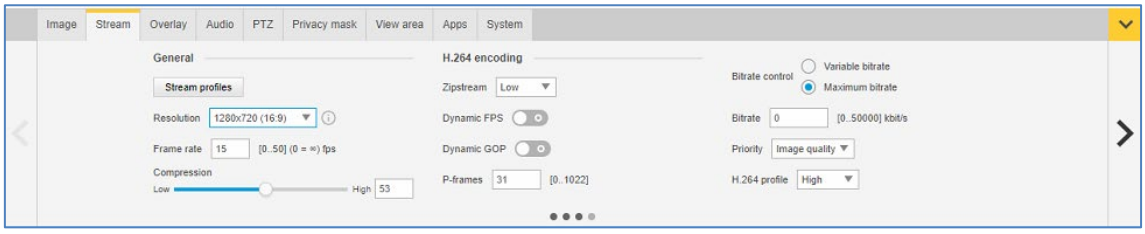


  - Set the Frame rate according to the speed of traffic. See section 3.2.



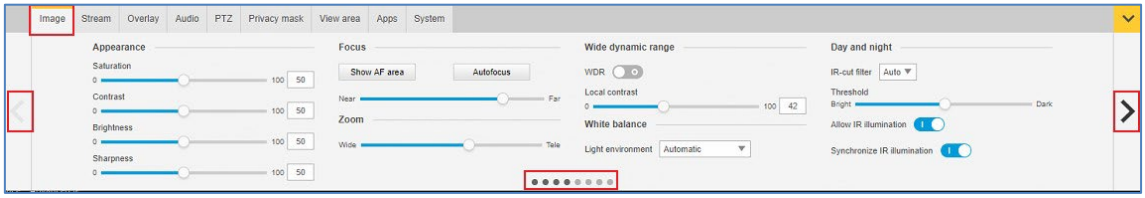
When using the On-Camera App you do not need to set this. It will always send at 25fps.

- All the other Stream options have no effect on the On-board OCR.



6.5 Setting the shutter speed and other important image settings

To set the **shutter speed (minimum exposure time)** and other important settings in the Axis camera, we need to click on the Image Tab. The following window is displayed:



Note that these menus have side-scrolling arrows to the left and right to scroll through all the Image setting options.

Set the following:

- **Maximum Shutter speed (maximum exposure time). See Section 3.2**
- Do not enable **Wide Dynamic Range**.
- Set the **IR-cut filter** to **On** in the Day and Night section. This causes the filter to be present on colour images (to remove IR light interference / colour distortion) and this keeps the camera in Day Mode. Note that sufficient white light should be provided to be able to vide the container code text at night without the need for excessive gain whilst maintaining a high shutter speed.
- Set the **Max gain** to 12dB or below to reduce noise on the images.
- Deselect the **Enable IR Illumination** checkbox in the IR Illumination section.

Other settings

In Appearance, it is advisable to set **Sharpness** to midway. You do not want the camera altering the pixels in any way by enhancing edges.

Target aperture – this controls the iris and should normally be midway. A smaller iris (towards closed) will increase the depth of field but cut down the light received.

Exposure level – this setting will attempt to lighten or darken the resulting image – subject to the gain, iris and shutter settings. Normally leave midway.

Blur-noise trade-off – Low noise means shutter priority, Low motion blur means gain priority. Leave these midway as your maximum shutter speed will determine when the aperture will start to change.

Note that a P1445 has a motorized varifocal lens and will therefore need re-focusing after a zoom change. A Q1700 has a true motorized zoom lens that should maintain its focus.

6.6 Configuring the VaxOCR Containers software

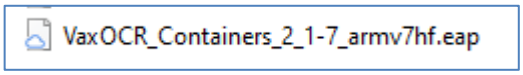
Once the Axis camera is installed and setup, we need to install and configure the VaxOCR On Camera software. The following steps are recommended:

1. Install the software
2. Upload the license key
3. Restart the Axis Camera
4. Start the software
5. Configure the software. VaxOCR Configuration

6.6.1 Installing the software

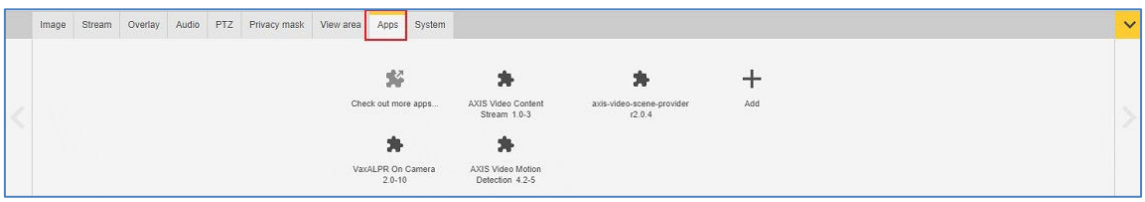
To install the VaxOCR Containers On Camera software, do the following:

1. Contact Vaxtor for the latest version of the VaxOCR Containers software for Axis cameras. It should look something like:



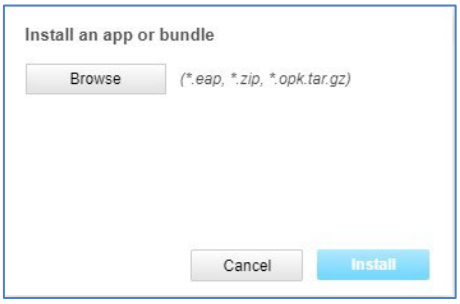
More recent Axis cameras such as the P1445-LE, P1375-E, Q1700 and Q1785-LE all have ARTPEC 6 processors. The software will also run on the later ARTPEC 7 processor.

2. In the Axis camera´s settings section, click on the Applications (Apps) tab.



Axis camera setup: Apps > Add

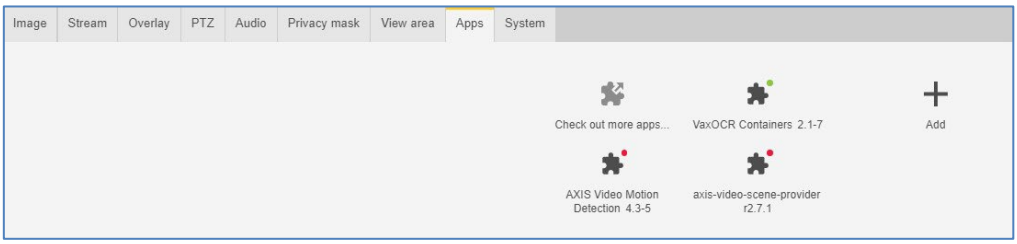
3. Click the + (Add button) and browse for the file **VaxOCR_Containers_2_1-7_armv7hf.eap**



Axis camera setup: Apps > Add > Browse

4. Click the **Install** button to install the software.

5. After installation the App will appear on screen.



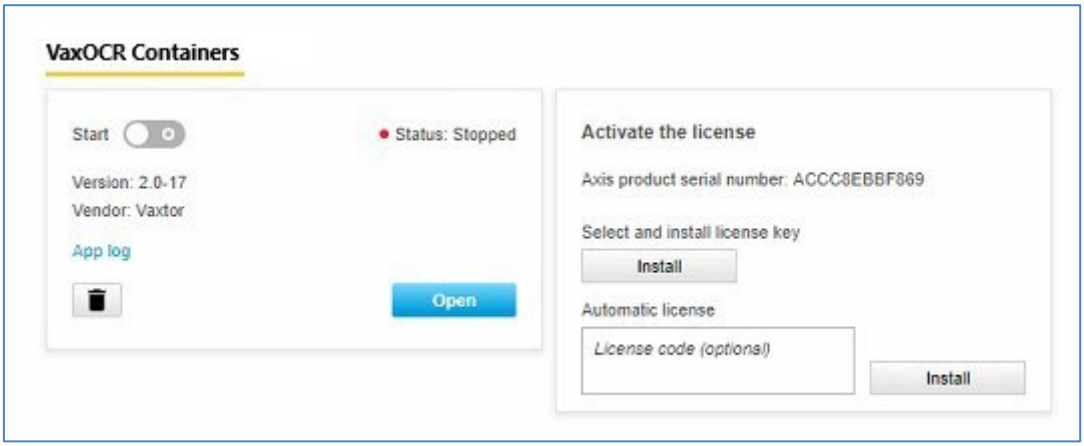
Axis camera setup: Applications > Overview

NOTE: If you encounter any issue whilst installing the software, upgrade the Axis camera firmware to the latest version available for your specific product model (the minimum version required is 5.70).

6.6.2 Upload the license key

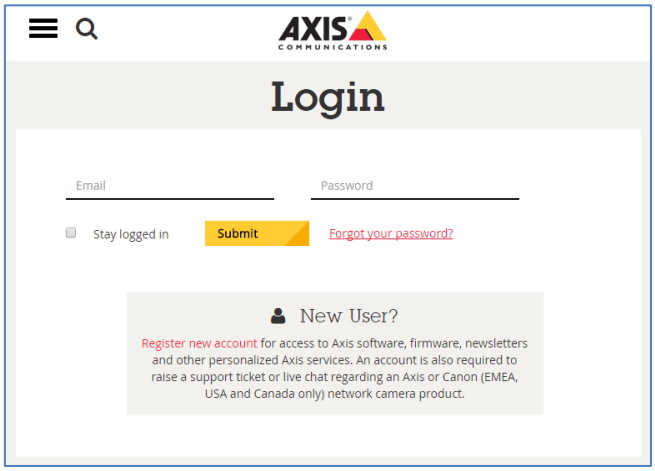
The VaxOCR Containers On Camera software requires a license key. Whether you need a trial license (30 days) or already have a paid-for permanent license code, do the following steps and select the appropriate option.

1. From the Axis camera's setup screen, and click on the Apps menu. Then click on the VaxOCR Containers application. **Take note of the Axis product serial number that appears in the License Activation section.**



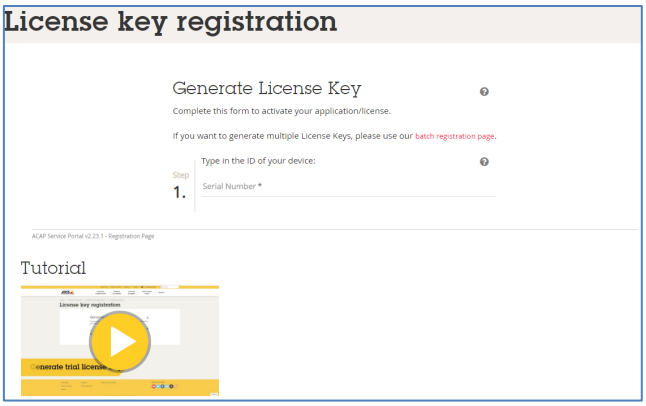
Axis camera setup: Apps > VaxOCR Containers On Camera > License

2. Using your browser, go to the Axis website: https://www.axis.com/global/en/products/camera-applications/license-key-registration#/registration.
   If you already are an Axis user, just log in. Otherwise, register a new account.



Axis website: Log in to download a trial license

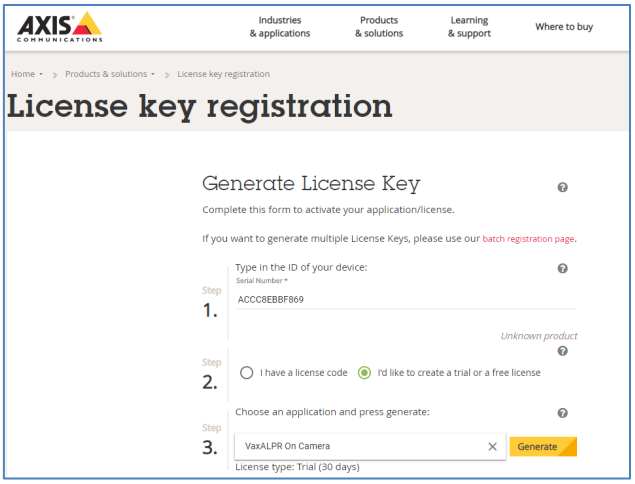
3. In the License key registration web page, do the following:
   - Type in the ID (Axis product serial number) of your camera.



Axis website: Enter the camera serial number

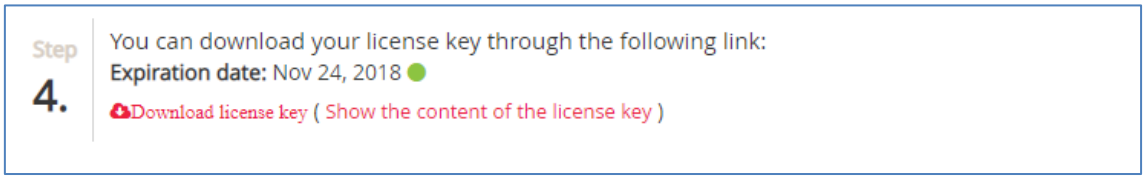
To generate a trial license

- Select the corresponding radio button. Select VaxOCR Containers On Camera as the application name and press the Generate button.



Axis website: Generate a trial license key

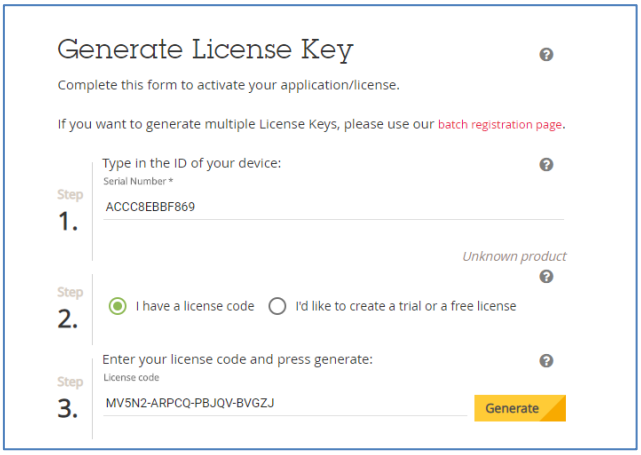
- Download the trial license key to your PC.



Axis website: Download trial license key

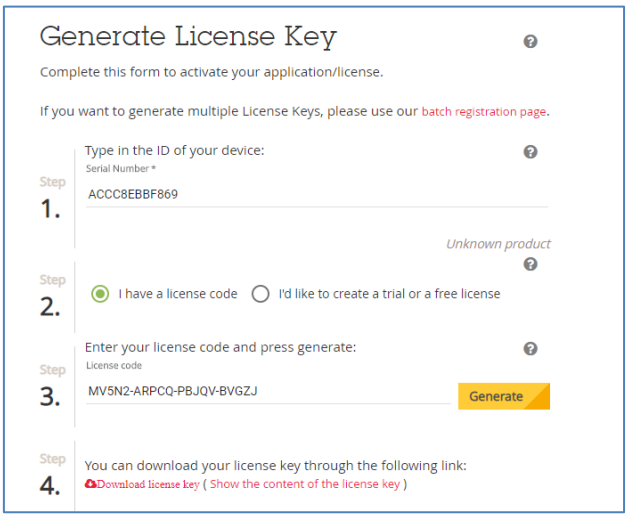
To generate a permanent license

- To purchase your permanent license, contact Vaxtor and send us your Product Serial number along with your order. When this process is completed you will be sent a License code.
- Select the corresponding radio button ('I have a license code') and enter your code and press the Generate button.



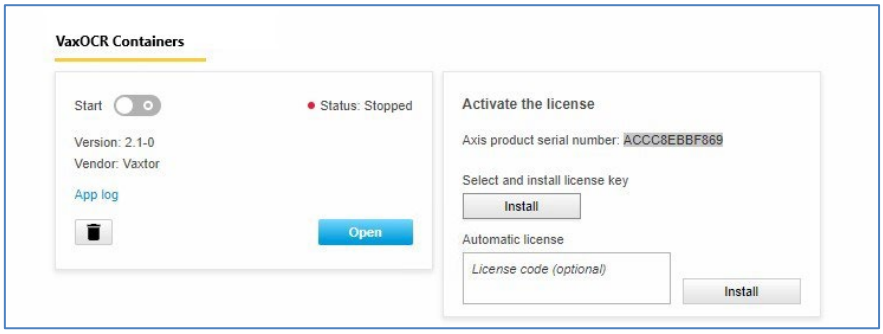
Axis website: Generate a permanent license key

- Download the permanent license key using the link shown in red.



Axis website: Download license key

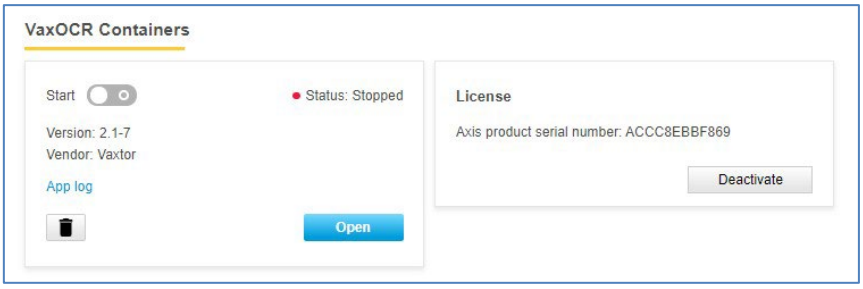
4. Now that you have the license key, go back to the Axis camera's setup and click on the Apps menu. Click on the VaxOCR Containers On Camera > and in the **'**Activate the License' section click 'Install'.



5. A file menu will open appear select 'License option. Click on the Select file button and select the license key file you have just downloaded. Click 'Open'.

6. Next click on the Install button.

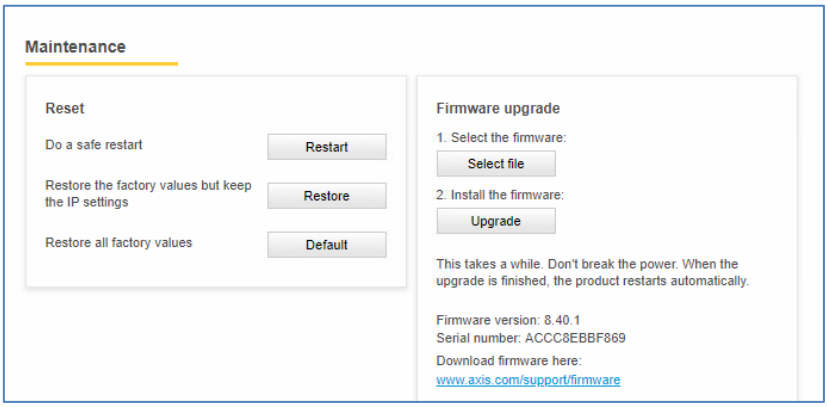
7. The permanent license should now be installed correctly.



Axis camera setup: Apps > VaxOCR Containers On Camera > License

6.6.3 Restart the Axis Camera

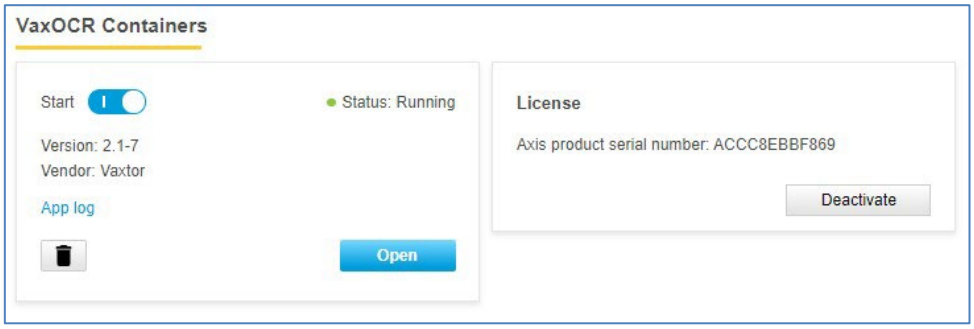
Once the VaxOCR Containers On Camera software is installed and the license key is uploaded, you should restart the Axis Camera. Do this by selecting the 'System' tab and click on the 'Maintenance' icon. Select the '**Restart'** button.



Axis camera setup: System Tab > Maintenance > Restart

6.6.4 Starting the Container Recognition software

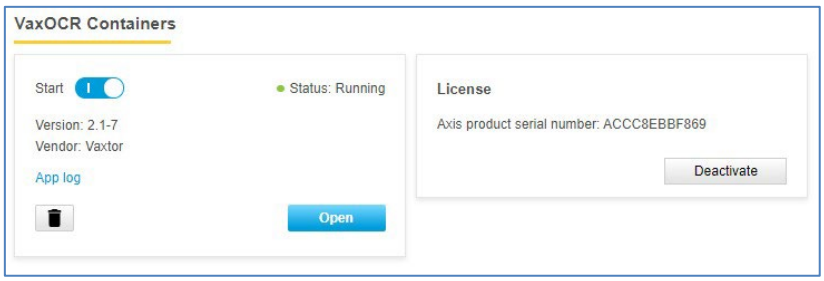
To start the VaxOCR Containers On Camera software, select the Axis camera's Settings, click on the Apps Tab and select the VaxOCR Containers App. Use the Start Slider to start the application.
The Status should change to 'Running'.



Axis camera setup: Apps > VaxOCR Containers On Camera

7. Configuring the VaxOCR Containers Application

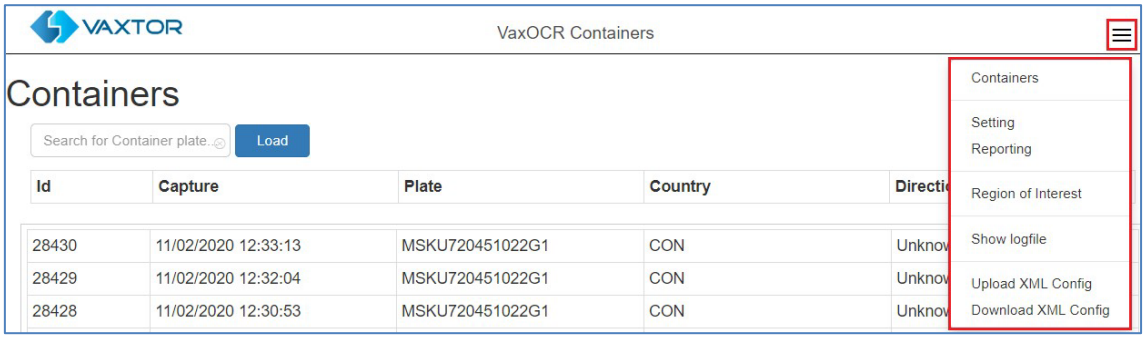
Once the software is running you can configure the VaxOCR Containers software by clicking on the blue Open button.



Axis camera setup: Apps > VaxOCR Containers On Camera

VaxOCR Containers Camera user interface

This will open a new window with the VaxOCR Containers main interface.



VaxOCR Containers interface

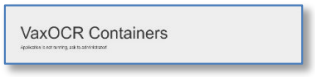
The icon in the top right corner reveals the options menu.

VaxOCR Containers includes the following options:

- Containers: To display a live feed of all the most recent containers read (if configured - *This is covered later in this manual)*
- Setting: To configure the VaxOCR Containers software
- Reporting: To configure the various reporting options.
  Check the VaxALPR On Camera Integration Guide for further details.
- Region of Interest: To add/edit ROIs to include or exclude in the OCR analysis.
- Show logfile: Displays the internal logfile to show tech details of reads etc.
- Upload XML Config: To import the VaxOCR Containers settings from a XML file.
- Download XML Config: To export the VaxOCR Containers settings to a XML file.

VaxOCR Containers not running

If the VaxOCR Containers application is not running correctly, you will see the message:



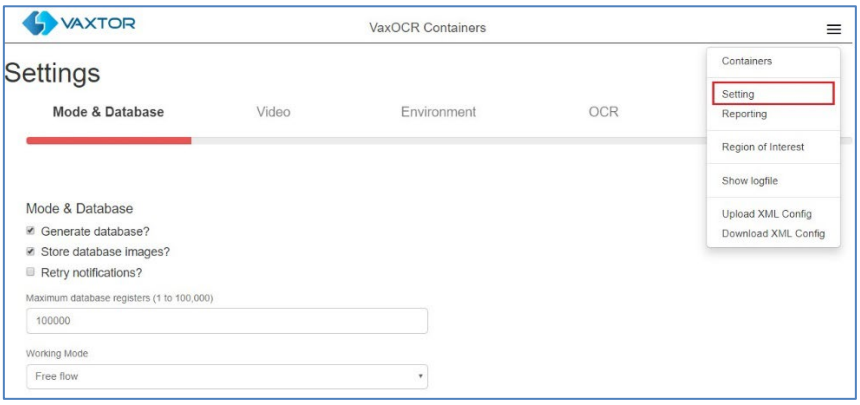
If the software is not able to run correctly, please ensure that:

- The date and time of the camera is set correctly.
- A valid license has been uploaded and activated.
- The previous version was uninstalled before installing a new one. If this was not performed the log file in the camera may contain an error message requiring the software to be reinstalled. In this case
    - Uninstall the current version by clicking the Bin icon below the App Log button.

    - Shutdown and restart the camera.
    - Reinstall the latest version.

7.1 VaxOCR Containers Settings

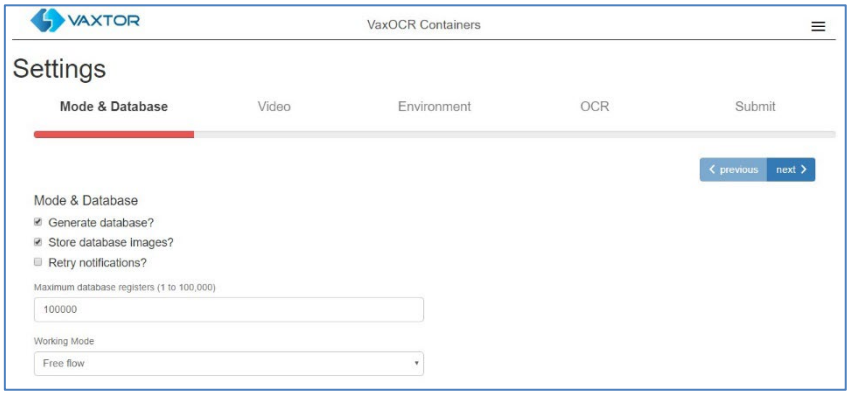
In the **VaxOCR Setting page** it is possible to configure all of the OCR parameters. The settings are divided into four different sections and a Summary section.



To move between the steps, use the blue previous/next buttons or click on the headers over the red progress bar.

The last step, *Submit*, will save all of the settings to the camera's memory.

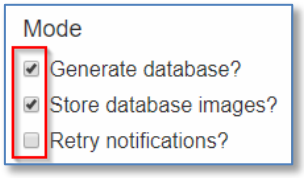
7.1.1 VaxOCR Containers Settings: Mode & Database



***IMPORTANT**: In order to save recorded container codes in the camera's storage for later retrieval or viewing, you must install and configure an appropriate SD card in the camera.*

There is a Storage icon in the Axis main setting area where you can also setup shared network storage.

The system does not check for available space on the SD card and if it becomes full the database functions will stop working.



Generate database

- To generate an on-board database (log file) of detected containers, select the ☑ '*Generate Database*' checkbox. A maximum of 100,000 records may be stored in the database.

Store database images

- To also store images of each container code, select the ☑ '*Store database images?*' checkbox. These images are automatically deleted when the matching container code is deleted.

Retry notifications

- Select this checkbox ☑ to retry any notifications if any fail, for example due to a comms problem. See VaxOCR Reporting later in this manual.

Next set the maximum database size to the desired level.

Working mode selection

Working mode

- Select the appropriate option from the drop-down list. There are two options:
    - *Free flow*: The system continuously analyzes the video and reports container codes when detected.
    - *Signaled*: The system only analyzes the video when the defined port changes its state from disabled to enabled.
- If ***Working Mode*** selected is set to '*Signaled*', a port must be specified that will be used to trigger the OCR:

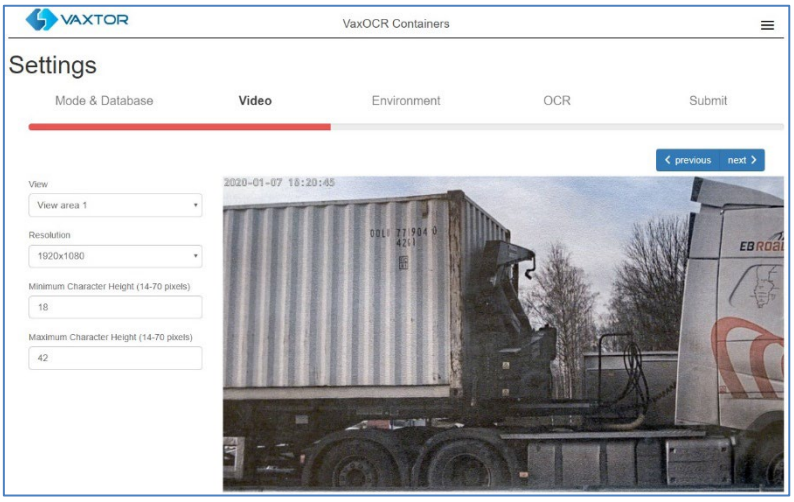
- Specify whether the selected **Port** is virtual or not.

There is an additional way to trigger the LPR in Signaled Mode:

http://CAMERA_IP/local/Vaxreader/trigger.cgi?id=12345AbcdE

..where `id` is optional and can be any string. This will trigger the LPR and links the image with the id. This id will be stored in the containers table in the database and it is included in the Vaxtor protocol TCP/IP message.

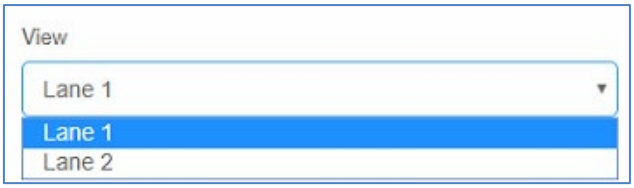
7.1.2 VaxOCR Containers: Video Options



This section displays real-time video based on the current settings.
When some parameters are edited, the changes are immediately reflected in the video stream.

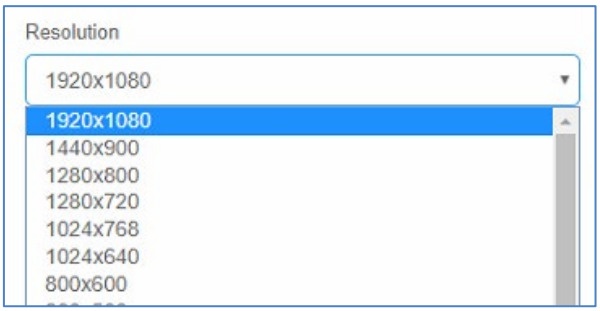
View

- Select a View area from any available in the drop-down list.
  (These are previously set up in the main Axis camera settings. You may setup several View areas from the same camera)



Resolution

- Select the desired *Resolution* from the drop-down list. Any changes will immediately be shown on the live display.



Minimum Character Height (14-70 pixels)

This is the minimum height that a container code's characters should be before being read. If the lens (zoom) is setup correctly then the characters should be about 20-30 pixels high in the area of the field of view where they should be read. Small characters will cause misreads.

- Set the minimum height of the container code's characters in pixels.

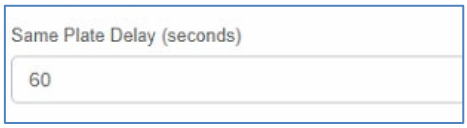
NOTE: The recommended difference between the min and max heights is about 10 pixels.

Maximum Character Height (14-70 pixels)

- Set the maximum height of the container code's characters in pixels.

7.1.3 VaxOCR Containers Settings: Environment options

Same Plate Delay (seconds)



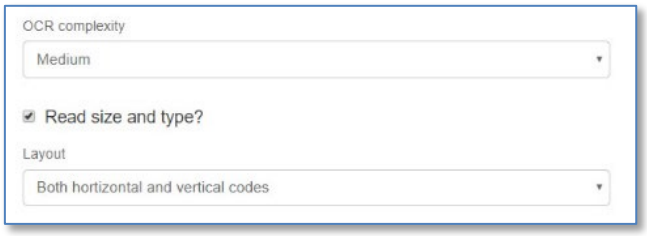
- Set the number of seconds that should elapse before reading the same container code twice. This is to prevent multiple reporting of the same code in situations when the container is moving slowly or is stationary. For example, if a container truck stops at a weighbridge and the code is reported but the vehicle doesn't move for 40 seconds, then this delay should be set to say 60 seconds or more to prevent a duplicate read.

NOTE: When using signaled (triggered) mode, it is recommended that you set this delay to 0 seconds.

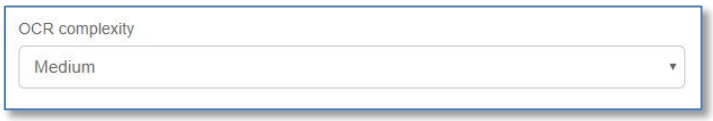
JPEG compression quality

- Select the required compression ratio for the saved images. The lower the number, the higher the compression ratio but the quality of images will be lower.

7.1.4 VaxOCR Containers Settings: OCR options



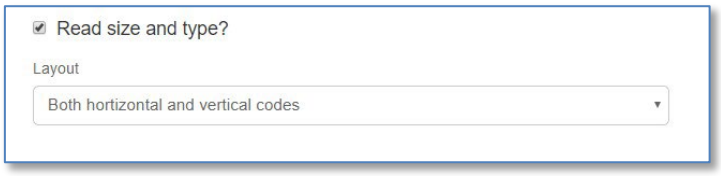
OCR Complexity



- This is the complexity of the analytics to be applied during the OCR Engine's stage of code reading. Set this according to the OCR mode and type of traffic expected.
  There are three possibilities:
  - *Low*: Recommended for higher-speed traffic where the OCR needs to work faster and our preference is for code detection over perfect recognition.
  - *Medium* (Default): Recommended when the OCR mode is set to free-flow.
  - *High*: Recommended when the OCR mode is set to signaled (triggered.)

NOTE: Higher complexities give more accurate reading but also make the OCR engine work slower.

Read size and type



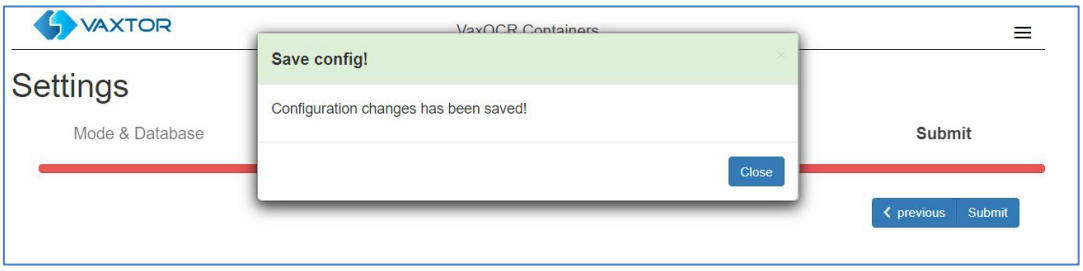
- This is where you define the expected orientation of the container code text.
  Set this to one of the following three values:
  - *Horizontal codes* – the most common option
  - *Vertical codes*
  - *Both horizontal and vertical codes – this will run slower and therefore only suitable for stationary or very slow-moving containers*

7.1.5 VaxOCR Containers: Submit changes

Submit configuration

1. To save all of the OCR settings, click the Submit button.

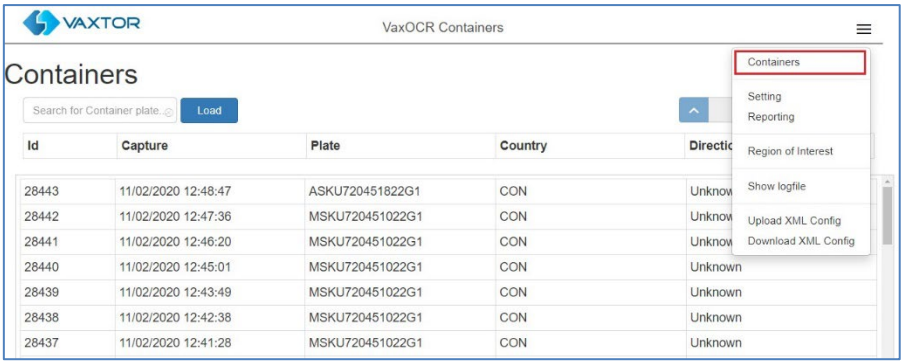
2. Wait for the confirmation (or error) message.



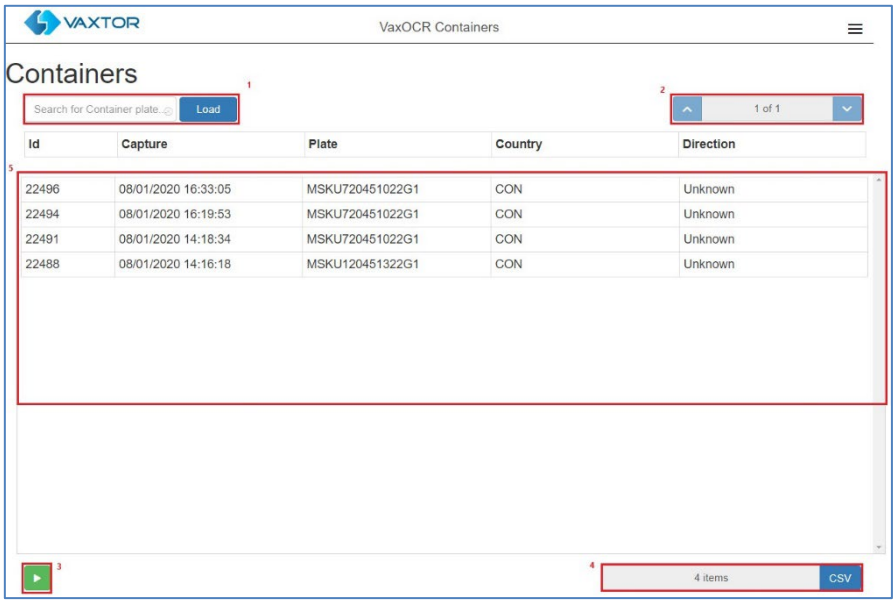
***IMPORTANT**: To avoid unexpected problems, it is recommended that you backup the current configuration to the Axis camera by downloading the configuration XML file (see: Download XML Config section later in this manual).*

7.2 VaxOCR: Containers Database

The last 20 container code reads are stored in the camera's standard memory and are displayed when the Containers menu is selected.



If the camera has a SD card installed, it is possible to store the OCR activity in a local database which can store up to 100,000 records. Once this limit is reached, new code reads will replace the oldest ones. There is a Pause / Play button at the bottom of the screen for preventing any new codes being added to the list for a short period. Pressing Play once more catches up any cached reads.

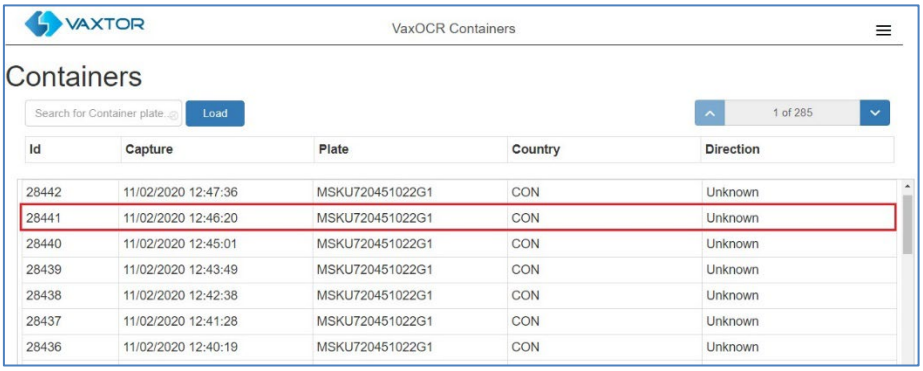


The Database screen comprises:

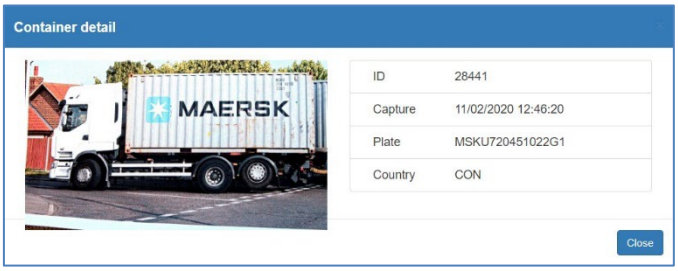
(1) Search and Load area
(2) Page display control
(3) Play / Pause updating the database with new reads
(4) Total items stored and CSV download
(5) Main Container Code list

Container Code details

1. To show item details, click on a container code record.



2. A new window appears with the read details.



Page Control

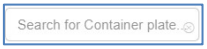
If there are more than 100 stored reads, the camera will paginate the results.

1. Use the Page Control box to navigate through the pages

Use the UP and DOWN buttons to scroll 100 codes at a time – or click on the central part of the button (in this case on 2/11) and enter the target page directly and click on GoTo:

Search and Load Container Codes

Load Container Codes

1. To load all the detected container codes stored in camera, keep the Search input zone 

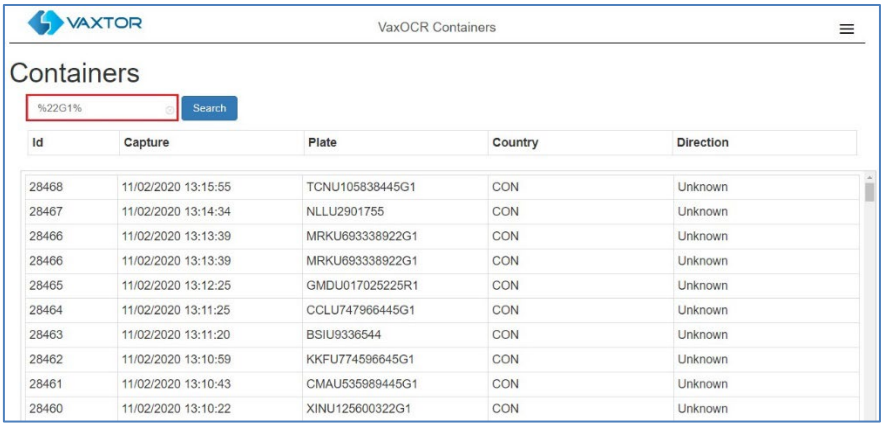
empty and click the

button.
This will refresh the list with the latest captures.

Search for Container Codes

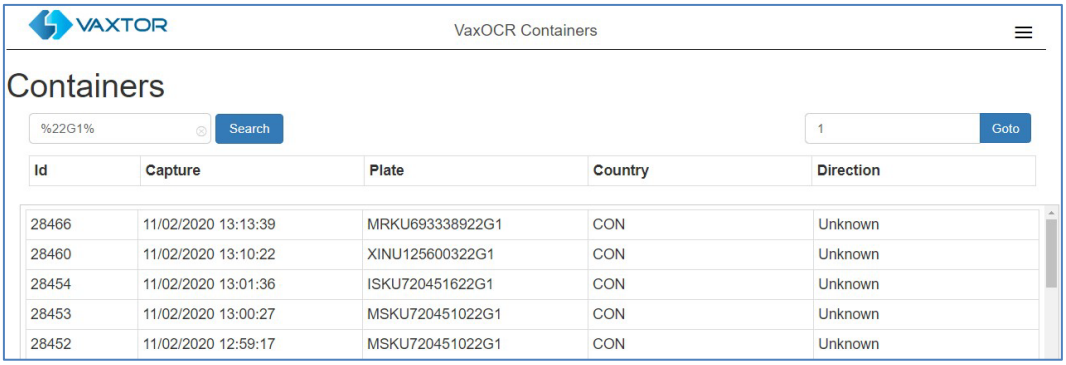
1. To search for a specific code or partial code stored in camera, enter the characters in the Search box and click the Search button. Use the symbol "%" as a wildcard character.

2. Example of searching for all container codes containing the characters: '22G1'



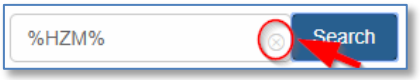
Id	Capture	Plate	Country	Direction
28468	11/02/2020 13:15:55	TCNU105838445G1	CON	Unknown
28467	11/02/2020 13:14:34	NLLU2901755	CON	Unknown
28466	11/02/2020 13:13:39	MRKU693338922G1	CON	Unknown
28466	11/02/2020 13:13:39	MRKU693338922G1	CON	Unknown
28465	11/02/2020 13:12:25	GMDU017025225R1	CON	Unknown
28464	11/02/2020 13:11:25	CCLU747966445G1	CON	Unknown
28463	11/02/2020 13:11:20	BSIU9336544	CON	Unknown
28462	11/02/2020 13:10:59	KKFU774596645G1	CON	Unknown
28461	11/02/2020 13:10:43	CMAU535989445G1	CON	Unknown
28460	11/02/2020 13:10:22	XINU125600322G1	CON	Unknown

This results in the list being modified as follows:



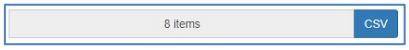
Id	Capture	Plate	Country	Direction
28466	11/02/2020 13:13:39	MRKU693338922G1	CON	Unknown
28460	11/02/2020 13:10:22	XINU125600322G1	CON	Unknown
28454	11/02/2020 13:01:36	ISKU720451622G1	CON	Unknown
28453	11/02/2020 13:00:27	MSKU720451022G1	CON	Unknown
28452	11/02/2020 12:59:17	MSKU720451022G1	CON	Unknown

3. To clear search criteria, click ⊗ button inside the Search window zone, and click the Load button.



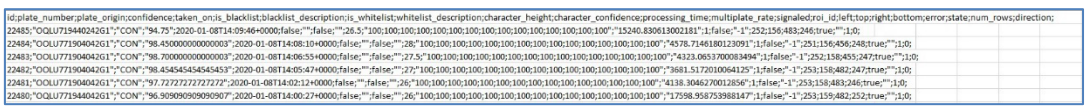
Download the Container Code list.

You can download the current list by clicking on the CSV button:



button.

The resulting .csv file will be saved in your downloads folder and appears as follows:



```
id;plate_number;plate_origin;confidence;taken_on;is_blacklist;blacklist_description;is_whitelist;whitelist_description;character_height;character_confidence;processing_time;multiplate_rate;signaled;roi_id;left;top;right;bottom;error;state;num_rows;direction;
22485;"OQLU71944024G1";"CON";"94.75";2020-01-08T14:09:46+0000;false;"";false;"";26.5;"100;100;100;100;100;100;100;100;100;100;100;100;100";"15240.830613002181";1;false;"-1";252;156;483;246;true;"";"";1;0;
22484;"OQLU77190404 2G1";"CON";"98.450000000000003";2020-01-08T14:08:10+0000;false;"";false;"";28;"100;100;100;100;100;100;100;100;100;100;100;100;100";"4578.714618012309 1";1;false;"-1";251;156;456;248;true;"";"";1;0;
22483;"OQLU77190404 2G1";"CON";"98.700000000000003";2020-01-08T14:06:55+0000;false;"";false;"";27.5;"100;100;100;100;100;100;100;100;100;100;100;100;100";"4323.065370008 3494";1;false;"-1";252;158;455;247;true;"";"";1;0;
22482;"OQLU77190404 2G1";"CON";"98.454545454545453";2020-01-08T14:05:47+0000;false;"";false;"";27;"100;100;100;100;100;100;100;100;100;100;100;100;100";"3681.517201006 4125";1;false;"-1";253;158;482;247;true;"";"";1;0;
22481;"OQLU77190404 2G1";"CON";"97.727272727272727";2020-01-08T14:02:12+0000;false;"";false;"";26;"100;100;100;100;100;100;100;100;100;100;100;100;100";"4138.304627001 2856";1;false;"-1";253;158;483;246;true;"";"";1;0;
22480;"OQLU77194404 2G1";"CON";"96.909090909090907";2020-01-08T14:00:27+0000;false;"";false;"";26;"100;100;100;100;100;100;100;100;100;100;100;100;100";"17598.958753988147";1;false;"-1";253;159;482;252;true;"";"";1;0;
```

The first row contains the field headers.

NOTE: In this example only 8 items were in the search list which were then downloaded successfully. if you need to download the full database, then this must be downloaded page by page, 100 records at a time.

Do this by Pausing the live reads and then selecting each page in turn and downloading.

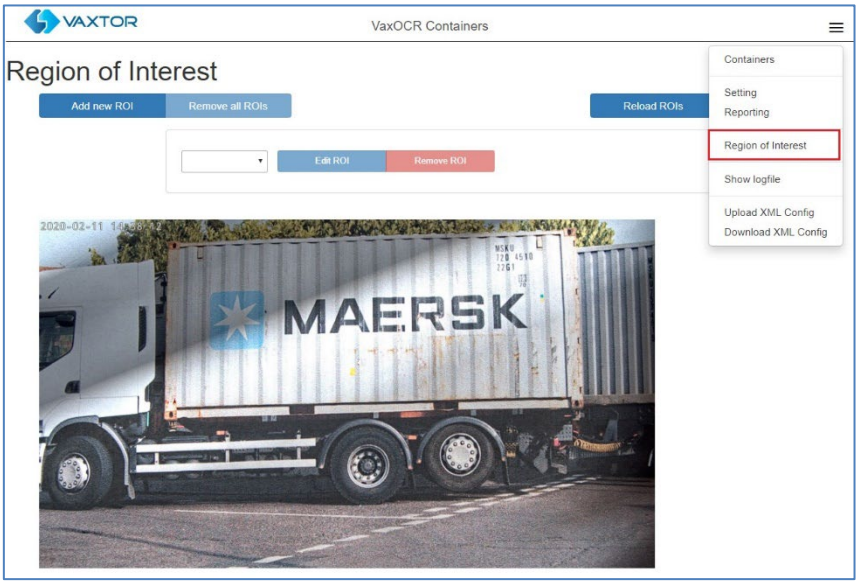
If you need to see all of the camera reads then it is recommended that you send all the code reads as they happen to a back office such as Helix. The program contains many reporting protocols and methods, - see the Reporting section.

7.3 VaxOCR Region of Interest

A Region of Interest (ROI), sometimes known as the Crop Zone, is used to define an area within the video frame where the OCR analytics takes place. The user can define a polygon and choose whether the area to look for codes Inside or Outside this region. The user can set multiple ROIs in complex situations although this is rare.

Using an ROI can decrease OCR processing time and also reduce false positives.
So, if the camera is looking across a large stretch of road as in the example below, the ROI can be used to limit the OCR to the area where the codes are always seen. In this case in the top half of the field of view - thus reducing the processor load.

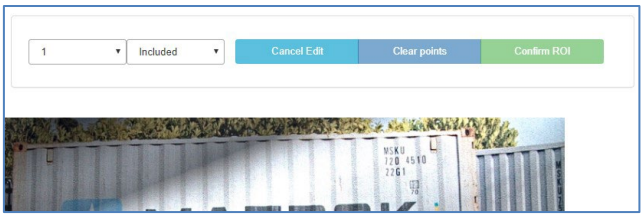
If say a road sign is within the camera's field of view and keeps getting mistaken for a container code, then these false positives can be eliminated by creating a crop zone to exclude this part of the image.
Each ROI must be given a unique numeric Identifier from the dropdown list.
Note that the container code must be in or out the ROI to pass the test.



***IMPORTANT**: ROIs con be configured to either include the areas defined from the OCR – or exclude them. If multiple ROIs are added they must all be of the same type.*

VaxOCR ROI: Add ROIs

1. To add a new ROI, click the main Add new ROI button:
2. Then, use the pop-down to allocate an ID number to the ROI that you are adding and if this is the first ROI, then specify the ROI Type between: *Included* or *Excluded.*



3. Draw points:
    a. Add points: Click on the live image to add new points to define the polygon.

***NOTE**: Each ROI must have at least 3 points but can also be quite complex*

    b. To start again, click on the Clear points button.

    c. To cancel the new ROI, click Cancel Edit button.

    d. When you are satisfied with the shape click the Confirm ROI button.

4. Click Add new ROI to add more ROIs as required remembering to select a new ID number.
5. ROIs are not stored on the camera until changes are submitted.

VaxOCR ROI: Remove ROIS

1. To remove all of the ROIs click Remove all ROIs button.

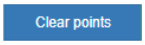
NOTE: This only deletes them in the local web interface. If they have been saved to the camera then you will need to Submit ROIs once more.

VaxOCR ROI: Edit an ROI

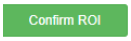
1. To edit an existing ROI, select the *ROI Id* from the list and click

button:

2. Move any points as required:
    a. Add an extra point to last point added by moving the cursor and mouse click.

    b. Or, clear all existing points 

and start again.

3. To confirm changes by clicking the 

button.

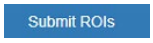
4. To reject any changes, click the

button.

VaxOCR ROI: Save changes

Submit current ROIs

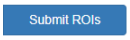
Once the ROIs have been setup, they **must** be saved into memory in the Axis camera.

- To save all ROIs, Click on the 

button and wait for the confirmation message.

Note: Once deleted, an ROI cannot be recovered. To avoid unexpected problems, it is recommended that you periodically backup the ROI configuration by downloading the current configuration XML file
(see: Download XML Config section later in this manual).

Delete all the current saved ROIs in the Camera

- Delete all of the ROIs individually and then click the 

button.
- A confirmation message will appear. Accept to delete all of the stored ROIs and wait for the confirmation message.

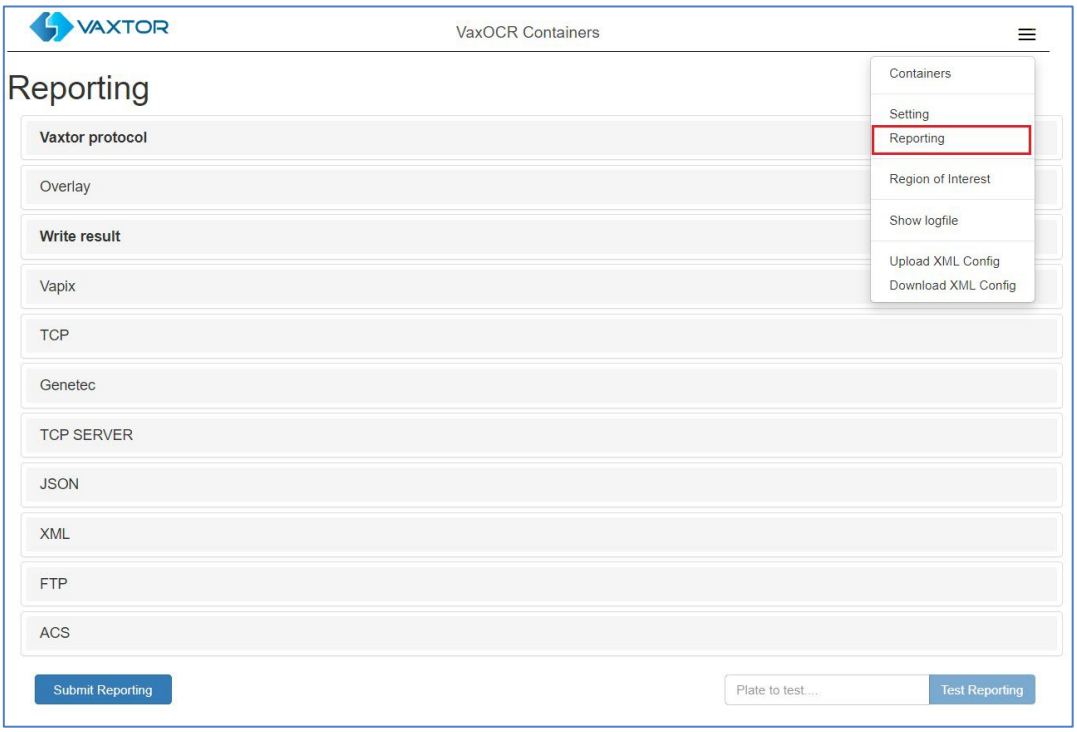
VaxOCR ROI: Reload ROIs

1. To reload *ROIs* from the camera into the web interface for editing, click the

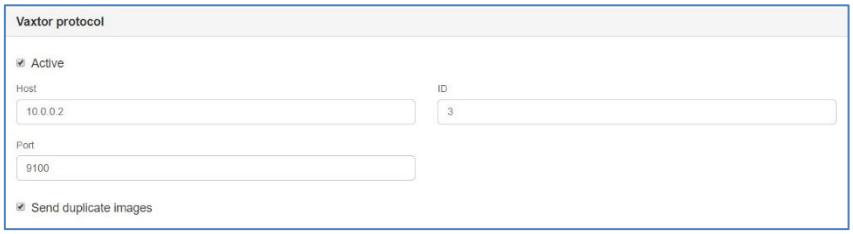
button.

7.4 VaxOCR Reporting

VaxOCR Containers is able to output all container code reads in real time using a variety of standard protocols to that the code reads can be accepted remotely by a variety of programs including Vaxtor's powerful Back Office - Helix, which can accept and store code reads in real time from hundreds of Axis cameras.



By selecting one of the listed protocols, a sub-menu will appear with fields for setting up parameters such as remote IP addresses etc. In the case of sending reads to Helix, select **Vaxtor protocol** and enter the IP address of the receiving PC, the port number to be used and the Lane ID to be sent:



Send duplicate images is used in cases where a vehicle is stationary for some time in the field of view. Note that the user can set 'Same plate delay' (seconds) to specify a time to wait before attempting to read the same code again (see earlier in this manual). However, here the user can instruct the reporting software to never send duplicate images of the same code by unticking the box - or it may be that the user wants to see how long the vehicle is present in the field of view for and so DOES want duplicate images of the vehicle sent every n seconds.

Note that this list of protocols is always being updated, contact Vaxtor for details.

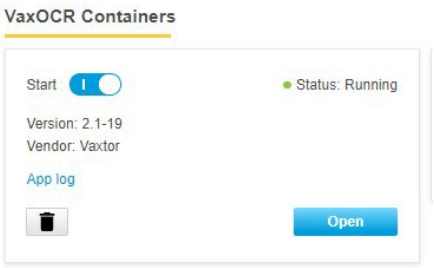
See the separate manual: "VaxALPR On Camera Integration" for more details of Vapix and how to communicate with Axis's own software.

Also see the separate VaxALPR On Camera Axis Software Developer's Guide for more detailed information on the reporting options.

Contact Vaxtor for details.

7.5 Show Logfile

You can view the application's log file by going to the main Axis App screen – selecting the VaxOCR Containers App and clicking on **App Log**.

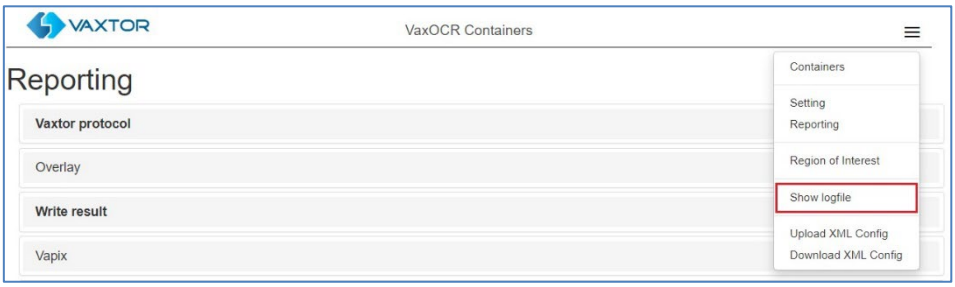


This will display a list of internal actions including any comms problems.

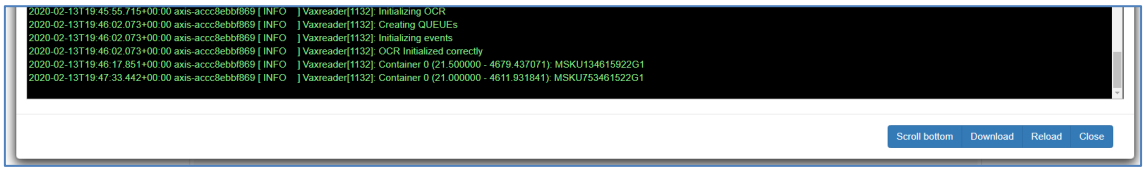
```
2020-02-13T19:26:46.117+00:00 axis-accc8ebbf869 [ INFO    ] Vaxreader[1132]: Container 0 (21.500000 - 4228.550714): ISKU753461022G1
2020-02-13T19:26:48.578+00:00 axis-accc8ebbf869 [ WARNING ] Vaxreader[1132]: Error on connect: Connection refused
2020-02-13T19:28:38.812+00:00 axis-accc8ebbf869 [ INFO    ] Vaxreader[1132]: Container 0 (21.500000 - 4186.080299): MSKU153461822G1
2020-02-13T19:28:40.199+00:00 axis-accc8ebbf869 [ WARNING ] Vaxreader[1132]: Error on connect: Connection refused
2020-02-13T19:30:19.306+00:00 axis-accc8ebbf869 [ INFO    ] Vaxreader[1132]: Container 0 (22.750000 - 6241.663986): ZIGJ72045102G1
2020-02-13T19:30:19.499+00:00 axis-accc8ebbf869 [ WARNING ] Vaxreader[1132]: Error on connect: Connection refused
2020-02-13T19:31:10.669+00:00 axis-accc8ebbf869 [ INFO    ] Vaxreader[1132]: Container 0 (21.500000 - 4263.515468): ISKU134615422G1
2020-02-13T19:31:11.983+00:00 axis-accc8ebbf869 [ WARNING ] Vaxreader[1132]: Error on connect: Connection refused
```

is

Now you can access this log from inside the App.



Select **Show Logfile** and a window will open showing the current logfile.



The software will write up to five logfiles of 10MB each before overwriting the earliest one and is very useful in seeing if there are any problems or for examining the reads in detail.

Use the **Scroll bottom** button look at the last items written.

Selecting **Reload** will refresh the display and show the latest entries to the log.

Download will save the current log in your Downloads folder on the PC that you are using to remotely access the camera.

Select **Close** when finished.

7.6 Download XML Config

Once all your App settings are complete you can use this feature to save all of these settings as a backup into your downloads folder.

The data is saved as an .xml file and may be viewed as a standard text file or even edited.

7.7 Upload XML Config

Having saved one or more .xml backups – they may be reloaded by selecting this option.

Note that these two functions are very useful if you have a lot of cameras to configure. Remember that you still might have to make small changes to each one if the camera views are different (maybe different ROIs) – and maybe the Camera ID if the cameras are all transmitting to a centralized Back Office such as Helix.

8. Troubleshooting

Many container code reading issues are caused due to:

- Incorrect positioning of the camera
- Incorrect camera lens (or zoom setting)
- Insufficient illumination
- Incorrect camera settings - e.g. shutter speed
- Incorrect settings of the App.

In this section, we will study the most common of these issues and how to fix them.

8.1 The VaxOCR Containers On Camera software starts and then stops suddenly.

Solution:

Check that you have uploaded the license key and check that the date and time of the Axis camera is set correctly.

8.2 The VaxOCR Containers Camera license is valid but a 'Check license' message appears.

Solution:

Check that the date and time of the Axis camera is set correctly.

8.3 The VaxOCR Containers On Camera software is running but not reading codes.

Solution:

Check if you can see the container code in the image and that the image is of good quality, not under or over exposed. As a general rule, if you as a human being can't easily read the codes - then the software won't be able to read them either!
Image is everything so first try to adjust the camera lens to zoom in or out. Failing that, check if the camera itself can be repositioned closer or further from the reading point. The captured image should show the area around the desired container codes. This however depends on the resolution that the camera has been set to.

If the video quality looks good then go to the camera's settings and ensure that the shutter speed is set high enough. (See earlier in this manual for a guide to shutter speeds)

If you CAN see the container code clearly in the image and the software is not reading anything, try changing following parameters in the settings section of the App to be more tolerant:

1. In the Video options, change the **Minimum Character Height** to 14 pixels.
2. In the Video options, change the **Maximum Character Height** to 70 pixels.
3. In the OCR options, change complexity to High but be mindful of the increase of processor power.
4. In the Region of Interest section, delete any existing **Region of Interests** (ROIs).

Once you can see the container code image and the software is now reading, change these settings back one by one.

8.4 The VaxOCR Containers On Camera software is running but it does not read all of the codes.

Solution:
In the VaxOCR Containers configuration, in the Video options, check the that value of the resolution in the drop-down list is adequate.

1. In the App's main options on the right – select Show logfile.

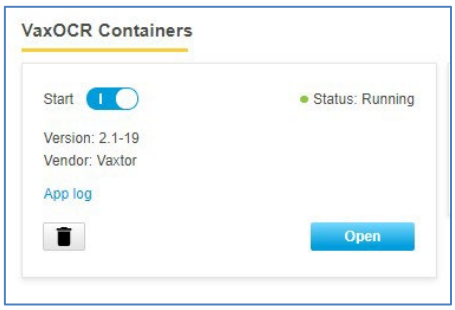
2. Scroll to the end of the log file (Scroll bottom) and look for the message:
   [INFO] Vaxreader[xxxx]: -Container 0 (<pixel height> - <milliseconds>): <code>
   and check the value of the code's character pixel height registered in the log.

8.5 Images of a container appear inverted.

After installing a new Axis camera, sometimes the code patches appear upside down after being read. Note that the camera has an auto-sensor to determine the orientation.

Solution:
Set the correct orientation required in the Axis Camera Settings/ Stream section:

After changing this (or any other settings in the camera) you should stop start and restart In the VaxOCR Containers Application – and all should be well.

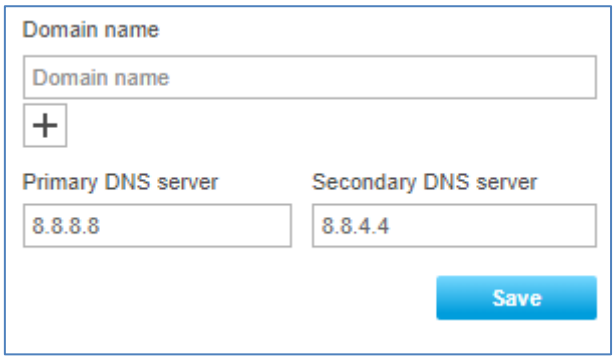


8.6 JSON or TCP setup but no codes being received

Solution

If you are using a remote URL to receive the data, check that a DNS server has been selected in the main Axis setup.
Go to the main Axis setting menu and select System and TCP/IP. Select a DNS server such as:

8.8.8.8 with a secondary server of say 8.8.4.4. These are free Google DNS servers which will map your URL names.



9. Words Available for Dynamic Text Replacement

- **$timestamp$:** yyyy-MM-ddTHH:mm:sszzz
- **$date$**: Timestamp in ISO8601 format
- **$ocrtime$:** Ocr analytic time in milliseconds
- **$digitheight$**: Average digit height
- **$left$:** Left coordinate for the text frame on the image (pixels).
- **top:** Top coordinate for the plate on the image (pixels).
- **$right$**: Right coordinate for the plate on the image (pixels).
- **$bottom$**: Bottom coordinate for the plate on the image (pixels).
- **$readconfidence$:** Global confidence value
- **$confidencecode$:** validation digit. (1 = UNVERIFIED, 2 = OWNER VERIFIED, 3 = OWNER AND CD VERIFIED)
- **$containercode$:** Container code number
- **$controldigit$:** Container Code Control digit
- **ip:** Camera IP address
- **$numdigits$:** Number of digits in the code
- **$ownercity$:** City of where the container's owner is listed
- **$ownercode$:** Allocated code of the owner
- **$ownercompany$:** Owner company name
- **$readconfidence$:** Confidence of the result - percentage 1:100
- **$serialcode$:** Container Serial Code
- **$sizetypecode$:** Container size type code
- **$imagesizeinbytes$:** Size of saved complete image
- **$image$:** JPEG encoded in base64
- **$patchsizeinbytes$:** Size of the image of the recognised text (the patch image)
- **$patch$** JPEG of the patch image encoded in base64

10. Changelog

10.1 Version 2.2.27-07/2020

- ✓ Added no report flag on manual triggers (To allow testing communication with the software without sending a result to third parties see On-Camera s/w devt manual)
- ✓ Added ip to OcrContainers templates
- ✓ Add /delplate.cgi endpoint to delete plates from the camera DB
- ✓ Split $confidence$ on $confidencecode$ and $readconfidence$ for OcrContainers. $confidencecode$ is the validation digit $readconfidence$ is the global confidence value
- ✓ Ocr update.

Ends.