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# Vaxtor USDOT *ON CAMERA Version*

## User Manual

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**Version 2.0**



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## 1. Introduction

A USDOT (United States Department of Transport) number is an identifier that is unique to each US company and it allows quick access to a company's safety information.

Commercial vehicles used to transport passengers or haul cargo in interstate commerce, must have the company's USDOT number displayed on every commercial company vehicle. DOT codes are issued by FMCSA (The Federal Motor Carrier Safety Administration) and should follow the FMCSA specifications:

They are usually displayed on the side or door of vans and truck cabs.

***“For commercial trucks, USDOT numbers must be readily legible during the day from a minimum distance of 50 feet (15.2m), with a minimum character height of two inches (5.08cm). These numbers are most often displayed on the doors of the vehicle to meet the requirement that the number is displayed on the power unit, on both sides of the CMV.***

***USDOT Numbers must also be in a high contrast to the rest of the vehicle to ensure visibility. Additionally, CMVs must be marked with the legal name of the business entity controlling the motor carrier operation (or the “doing business as” or DBA name) – the business entity’s name as it appears on the MCS-150 form. As commercial motor vehicles regularly travel in hazardous weather conditions, companies should opt for highly durable data plates, such as Metalphoto® photosensitive anodized aluminum, for reliable transportation asset identification and regulatory compliance.”***

Vaxtor USDOT is an application developed by Vaxtor Recognition Technologies that runs onboard the latest Axis CCTV cameras which will read these standard USDOT codes.

*Note that a separate version is available which will run on Windows-based PCs.*

*Contact Vaxtor for more details.*

The USDOT 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.

USDOT 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 USDOT code read accuracy.

## 2. Requirements for USDOT Code Images

OCR (Optical Character Recognition) is an image processing technology used to locate and read codes printed or sign-written onto vehicles. 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
- Very stylized/designer fonts

The less clear that the USDOT text images are, then the more likely it is that OCR software will report then 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** or 7 processor or later. Most current Axis models have these processors and normally a high resolution capable of reading USDOT 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.

**Note that when using Vaxtor USDOT 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,  $1/250^{\text{th}}$  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

USDOT speed:

- **Stationary**      → Minimum exposure time  **$1/125^{\text{th}}$  sec** (8 milliseconds)
- **Very Slow**      → Minimum exposure time  **$1/250^{\text{th}}$  sec** (4 milliseconds)
- **Slow**              → Minimum exposure time  **$1/500^{\text{th}}$  sec** (2 milliseconds)

Fast moving vehicle USDOT codes 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

USDOT codes are normally painted or printed onto both sides of the truck tractor unit 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 recommended, 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 position the camera at right angles to the direction of the truck.

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

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

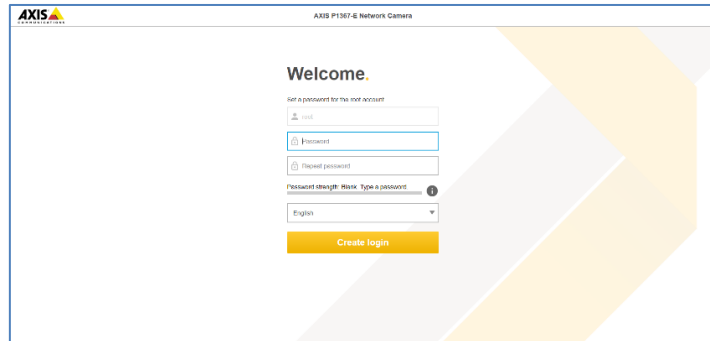
### 4.2 Character pixel height

The software is preset to read characters of between 20 and 60 pixels high which is the optimal size for good recognition.

There is a tool in the App settings to help determine the correct lens to use to attain this height described later in this manual.

## 5. 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).*

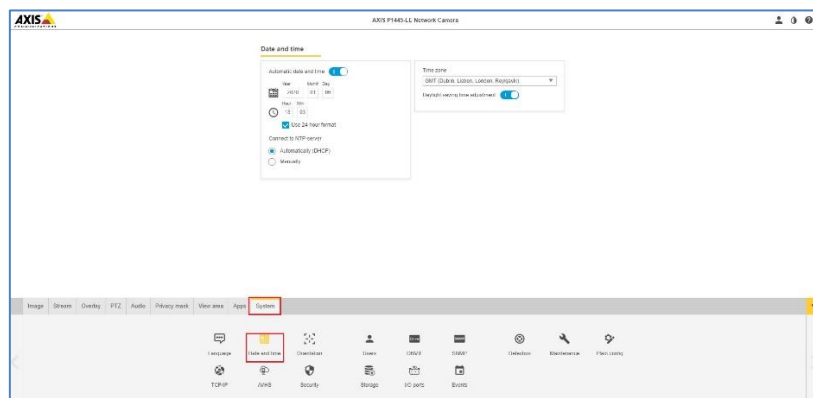


Once logged on, select “Settings” from the bottom right of the window:



### 5.1 Set the date and time of the camera

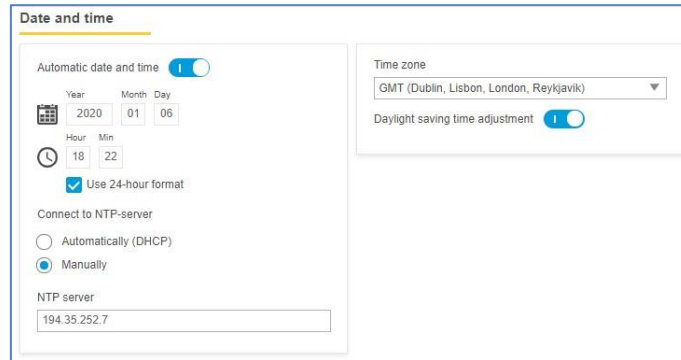
To set the **date and time** within the Axis camera, select the “System” Tab and choose the Date & Time option.



Axis camera setup: System > Date & Time



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



## 5.2 Stream: Setting resolution 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.

**Note: for on-camera use the resolution and frame rate and resolution have no effect. Setting them here just affects any streamed video that you are using for other purposes such as sending to a VMS. The resolution is set up later within the App.**

## 5.3 Set the View Areas.

On some Axis cameras, you can define one or more View Areas.



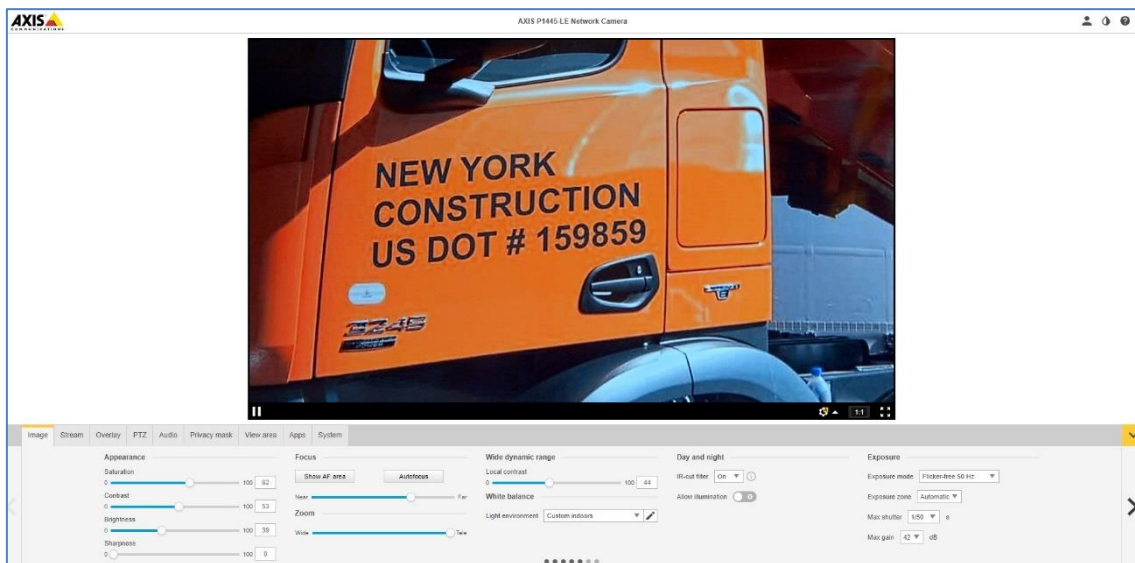
These rectangular areas can be named and are essentially areas of interest which reduces the bandwidth of the data transmitted to a remote recording device and equally saves storage space when video is saved remotely or on the camera's internal SD card if fitted.

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.*

## 5.4 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 color images (to remove IR light interference / color distortion) and this keeps the camera in Day Mode. Note that sufficient white light should be provided to be able to read the USDOT 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 0. 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.*

## 5.5 Configuring the Vaxtor USDOT software

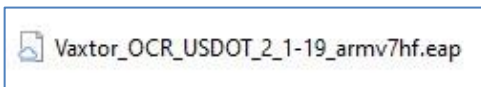
Once the Axis camera is installed and setup, we need to install and configure the Vaxtor USDOT On Camera software. The following steps are recommended:

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

### 5.5.1 Installing the software

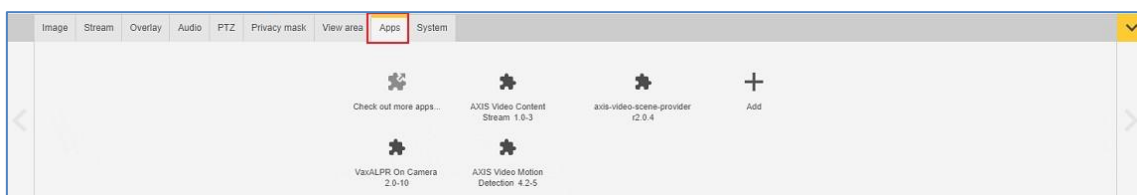
To install the Vaxtor USDOT On Camera software, do the following:

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



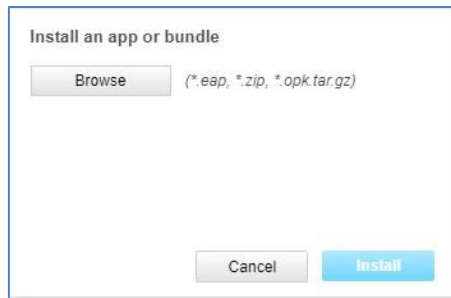
*More recent Axis cameras such as the P1445-LE, P1375-E, Q1700 and Q1785-LE all have ARTPEC 6 processors. The software will also run on the later ARTPEC 7 processor.*

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



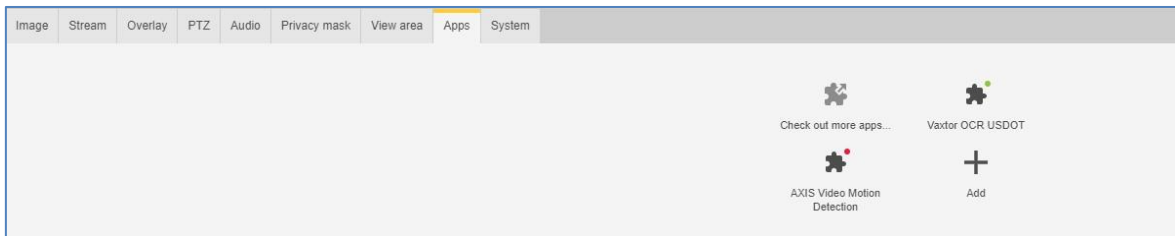
Axis camera setup: Apps > Add

3. Click the + (Add button) and browse for the file **Vax\_OCR\_USDOT\_2\_1-9\_armv7hf.eap**



Axis camera setup: Apps > Add > Browse

4. Click the **Install** button to install the software.
5. After installation the App will appear in the Apps section:



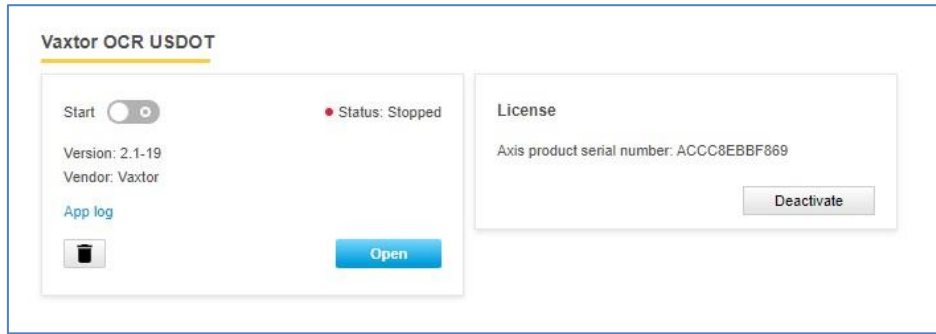
Axis camera setup: Applications > Overview

*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).*

### 5.5.2 Upload the license key

The Vaxtor USDOT 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 Vaxtor USDOT application.
2. **Take note of the Axis product serial number that appears in the License Activation section.**

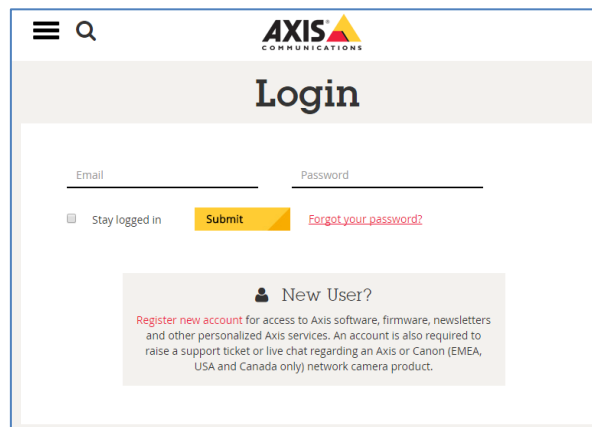


Axis camera setup: Apps > Vaxtor USDOT's On Camera > License

- Using your browser, go to the Axis website:

<https://www.axis.com/global/en/products/camera-applications/license-key-registration#/registration>.

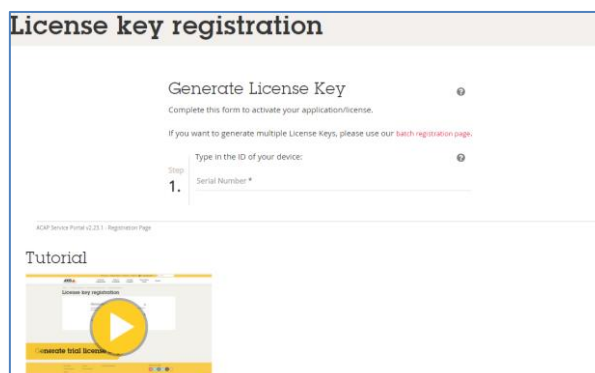
If you already are an Axis user, just log in. Otherwise, register a new account.



Axis website: Log in to download a trial license

- In the License key registration web page, do the following:

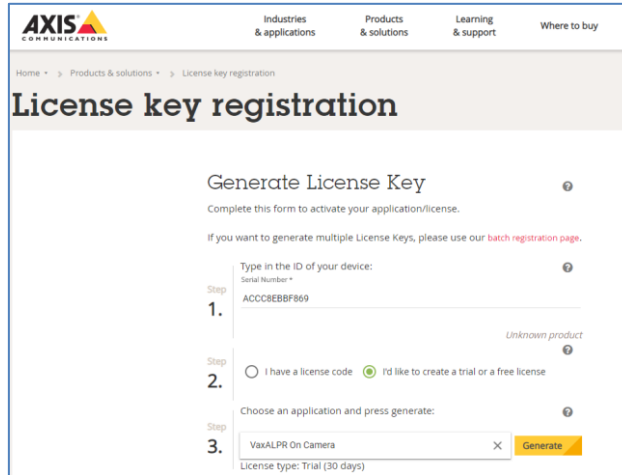
- Type in the ID (Axis product serial number) of your camera.



Axis website: Enter the camera serial number

### To generate a trial license

- Select the corresponding radio button. Select Vaxtor USDOT On Camera as the application name and press the Generate button.



Axis website: Generate a trial license key

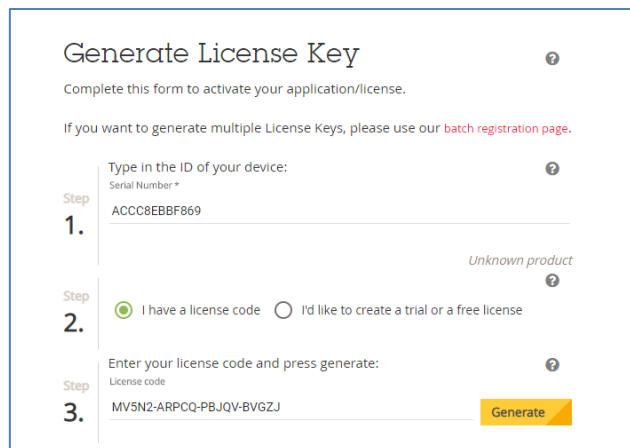
- Download the trial license key to your PC.

**Step 4.** You can download your license key through the following link:  
**Expiration date:** Nov 24, 2018 ●  
[Download license key \( Show the content of the license key \)](#)

Axis website: Download trial license key

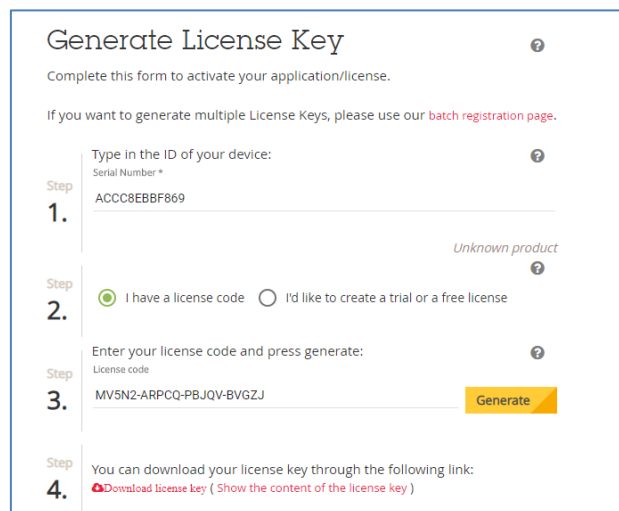
### To generate a permanent license

- 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.



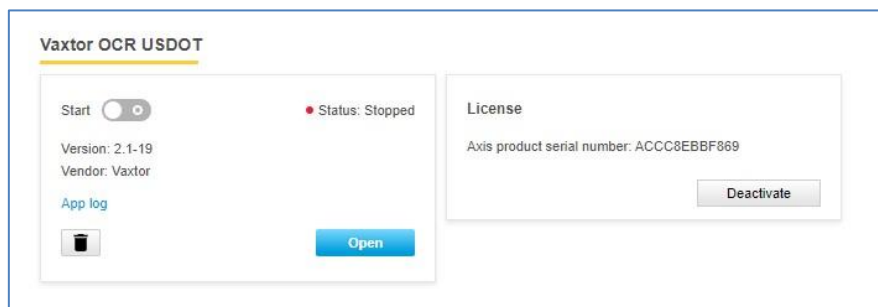
Axis website: Generate a permanent license key

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

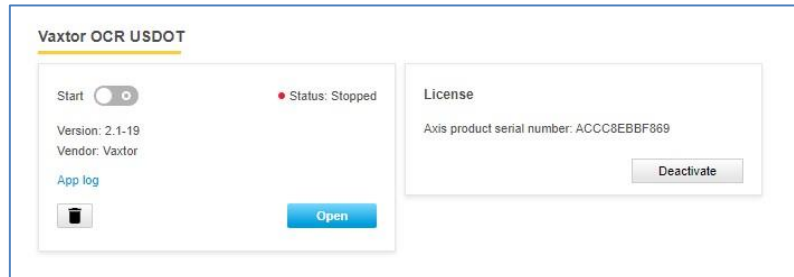


Axis website: Download license key

- Now that you have the license key, go back to the Axis camera's setup and click on the Apps menu. Click on the Vax OCR USDOT On Camera > and in the 'Activate the License' section click 'Install'.



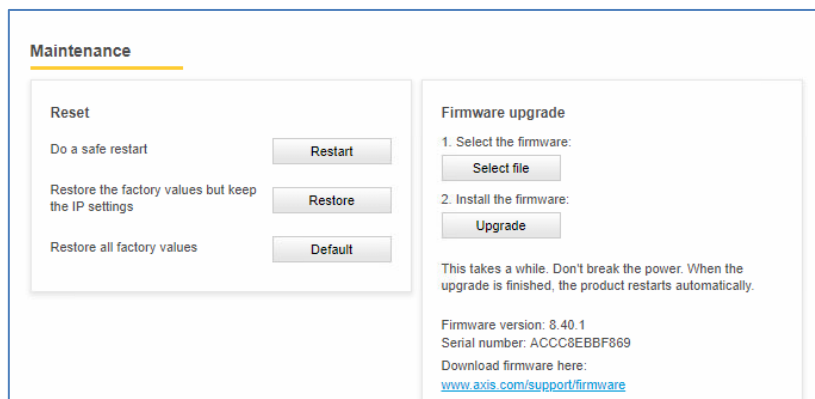
5. A file menu will open appear select 'License option. Click on the Select file button and select the license key file you have just downloaded. Click 'Open'.
6. Next click on the Install button.
7. The permanent license should now be installed correctly.



Axis camera setup: Apps > Vaxtor USDOT On Camera > License

### 5.5.3 Restart the Axis Camera

Once the Vaxtor USDOT 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.

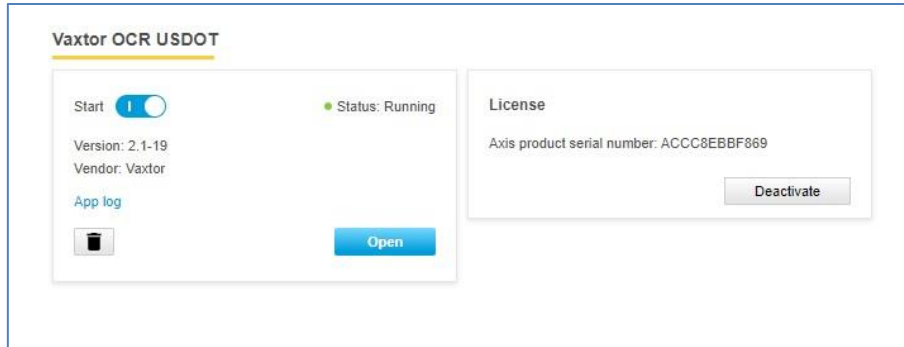


Axis camera setup: System Tab > Maintenance > Restart



#### 5.5.4 Starting the USDOT Recognition software

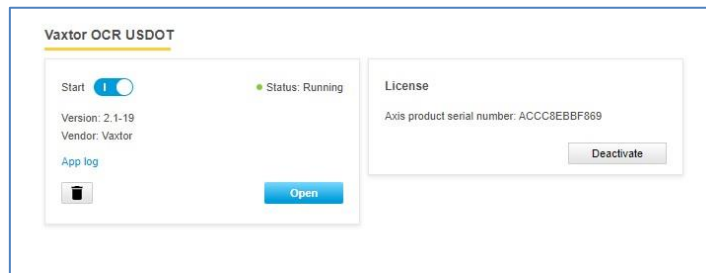
To start the Vaxtor USDOT On Camera software, select the Axis camera's Settings, click on the Apps Tab and select the Vaxtor OCR USDOT App. Use the Start Slider to start the application. The Status should change to 'Running'.



Axis camera setup: Apps > Vaxtor USDOT On Camera

## 6. Configuring the Vaxtor USDOT Application

Once the software is running you can configure the Vaxtor USDOT software by clicking on the blue Open button.



Axis camera setup: Apps > Vaxtor USDOT On Camera

### Vaxtor USDOT Camera user interface

This will open a new window with the Vaxtor USDOT main interface.



Vaxtor USDOT interface

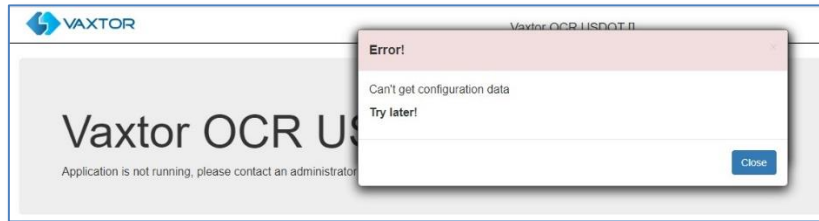
The icon in the top right corner reveals the options menu.

Vaxtor USDOT includes the following options:

- **Plates:** To display a live feed of all the most recent USDOT reads (if configured - *This is covered later in this manual*)
- **Setting:** To configure the Vaxtor USDOT software
- **Reporting:** To configure the various reporting options.  
*Check the VaxALPR On Camera Integration Guide for further details.*
- **Database:** To review and search the list of recorded DOTs (If configured)
- **Blacklist:** To manage a Blacklist (e.g. to sound alarms)
- **Whitelist:** To manage a Whitelist (e.g. to activate a relay)
- **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 Vaxtor USDOT settings from a XML file.
- **Download XML Config:** To export the Vaxtor USDOT settings to a XML file.

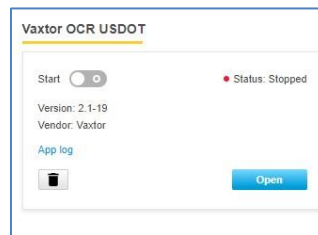
### *Vaxtor USDOT not running*

If the Vaxtor USDOT application is not running correctly, you will see the message:



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

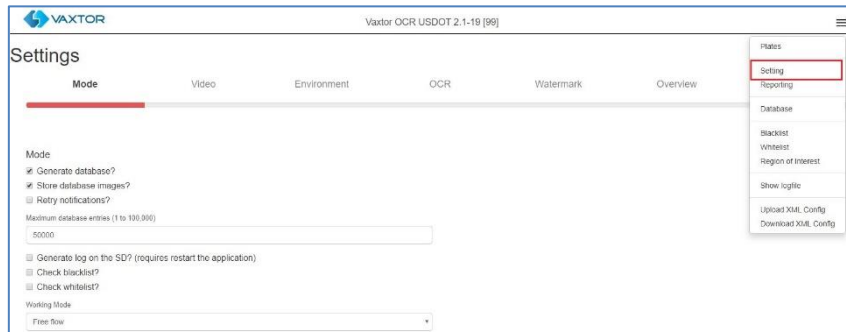
- The date and time of the camera is set correctly.
- A valid license has been uploaded and activated.
- The previous version was uninstalled before installing a new one. If this was not performed the log file in the camera may contain an error message requiring the software to be reinstalled. In this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



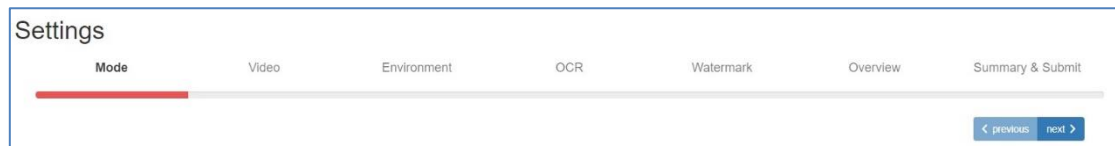
- Shutdown and restart the camera.
- Reinstall the latest version.

## 6.1 Vaxtor USDOT Settings

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

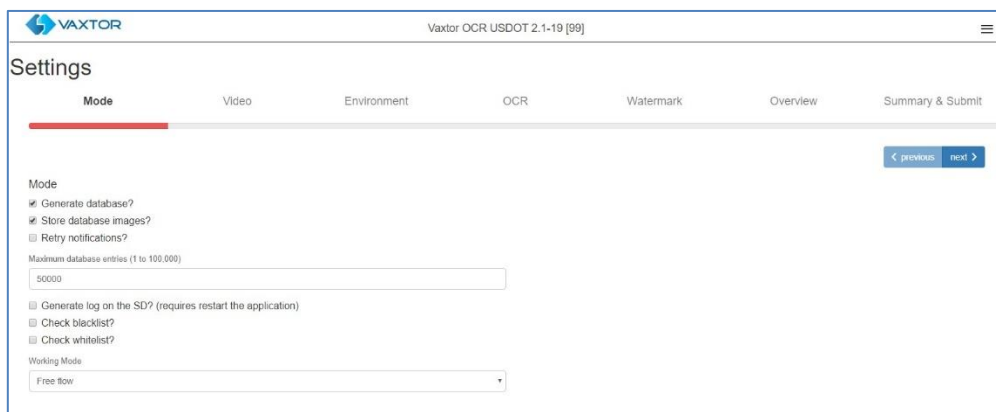


To move between the steps, use the blue previous/next buttons or click on the headers over the red progress bar.



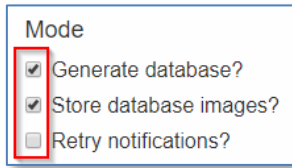
The last step, *Submit*, will save all of the settings to the camera's internal memory. Note that these settings can be uploaded & downloaded for easy copying to other cameras. See later in the manual.

### 6.1.1 Vaxtor USDOT Settings: Mode & Database



**IMPORTANT:** In order to save recorded USDOT 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 USDOTs, 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 USDOT code, select the  'Store database images?' checkbox. These images are automatically deleted when the matching USDOT code is deleted.

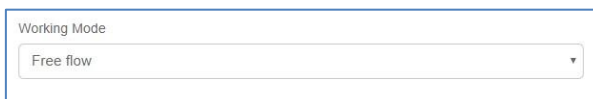
### Retry notifications

- Select this checkbox  to retry any notifications if any fail, for example due to a comms problem. See Vaxtor USDOT Reporting later in this manual. (used when sending reads to a remote server for example)

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 USDOT 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:

Working Mode

Port

Delay (ms)

Virtual Port?

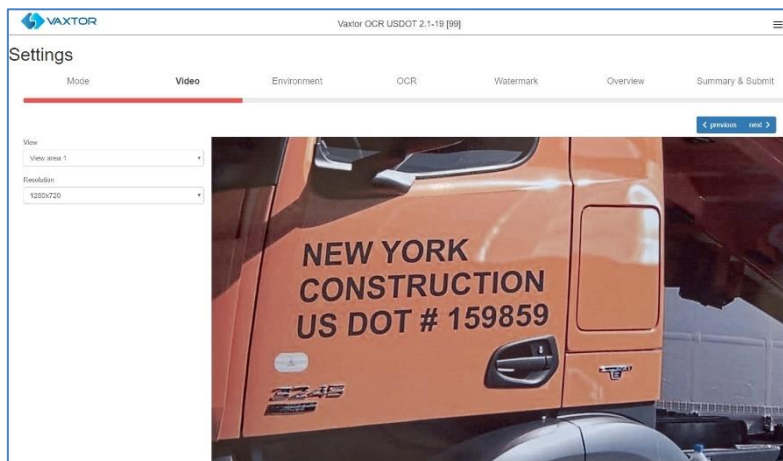
- Specify whether the selected **Port** is virtual or not along with the required delay in milliseconds before attempting to read a code.

There is an additional way to trigger the OCR 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 USDOT table in the database and it is included in the Vaxtor protocol TCP/IP message.

### 6.1.2 Vaxtor USDOT: 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)*

View

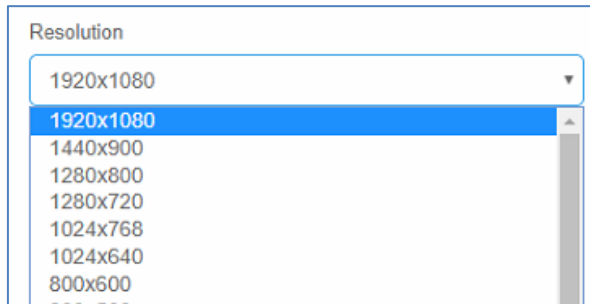
Lane 1

Lane 1

Lane 2

## Resolution

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



## Minimum / Maximum Character Height (20-60 pixels)

This is preconfigured to this range and these are the minimum and maximum heights that a USDOT code's characters should be before being read. If the lens (zoom) is setup correctly then the characters should be between this range in the area of the field of view where they should be read. Smaller characters are more likely to cause misreads.

You can verify these min and max sizes by clicking on the live image (assuming you have a target vehicle present or something to emulate it):



Two rectangles will be displayed in yellow and red showing the required size of characters for recognition. If the characters are not within this range then go to you main Aix camera settings and adjust the zoom accordingly.

### 6.1.3 Vaxtor USDOT Settings: Environment options

Same Plate Delay (seconds) 20	Multiplate recognition timeout (0-10000 milliseconds) 2000
Same Plate Max Chars Distance 2	Multiplate minimum number of occurrences 1
Maximum Slope Angle (0-40 degrees) 20	Multiplate maximum number of occurrences 5
	Plate reported Middle capture

#### Same Plate Delay (seconds)

Same Plate Delay (seconds)

- Set the number of seconds that should elapse before reading the same USDOT code twice. This is to prevent multiple reporting of the same code in situations when the USDOT is moving slowly or is stationary. For example, if a USDOT 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.*

#### Same Plate Max Chars Distance

Same Plate Max Chars Distance

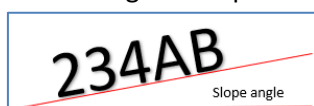
- Set the number of characters that two DOT codes must differ by to be considered different.

The Axis camera is capable of reading a code several times as it passes through the field of view. If one character is misread on one of the reads then by setting this value to 2 then both reads will contribute towards the reported plate text.

#### Maximum Slope Angle (0-40 degrees) (Advanced option – Default 20)

Maximum Slope Angle (0-40 degrees)

- Set the angle of slope of a DOT code that the engine should attempt to read up to.





*NOTE: If you know that the plates will be skewed then by setting this parameter higher you can force the engine to look for plate shapes that are more skewed. However, you should setup your ALPR camera to keep plates as close to the horizontal as possible.*

### Multiplate Recognition Timeout

Multiplate recognition timeout (0-10000 milliseconds)
<input type="text" value="500"/>

- Set the number of milliseconds that the engine should spend analyzing a DOT code.  
(1000 milliseconds = 1 second)

In free-flow mode the engine continuously analyses video frames and reads and reports DOT codes. It makes a final decision on the code read after an interval of time - the maximum recognition timeout period. There is a dedicated time counter for every DOT code which starts counting after the first read. When it reaches the preset timeout it stops, checks the number of samples read of the same DOT code and returns the “best” result. Unless you need to report codes instantly, then you should set this value to at least 1500ms to allow time for multiple reads.

We call the number of times the same DOT code has been read within the maximum recognition period the **multiplate rate**. Several reads of each plate are good and produce better results.

### Multiplate minimum number of occurrences

Multiplate minimum number of occurrences
<input type="text" value="1"/>

- Set the minimum number of times that a DOT code should be read within the Timeout period to be considered a valid DT code.

### Multiplate maximum number of occurrences

Multiplate maximum number of occurrences
<input type="text" value="5"/>

- Set the maximum number of times that a DOT code should be read before being reported (this may happen before the timeout).

## Plate reported

Multiplate maximum number of occurrences	<input type="text" value="5"/>
Plate reported	<input type="text" value="Last capture"/> <ul style="list-style-type: none"> <li><input type="text" value="Last capture"/></li> <li><input type="text" value="First capture"/></li> <li><input type="text" value="Middle capture"/></li> <li style="background-color: #007bff; color: white;"><input type="text" value="Last capture"/></li> </ul>

- Select which DOT code image should be saved from the drop-down list:
  - *First capture.*
  - *Middle capture.*
  - *Last capture*

A DOT code is normally read several times as it passes through the camera's field of view.

### 6.1.4 Vaxtor USDOT Settings: OCR options

Minimum Global Confidence (0-100)	<input type="text" value="53"/>	LPR complexity	<input type="text" value="Medium"/>
Minimum Character Confidence (0-100)	<input type="text" value="48"/>	Plate depth	<input type="text" value="Low"/>

#### Minimum Global Confidence (0-100)

Minimum Global Confidence (0-100)	<input style="border: 2px solid red;" type="text" value="70"/>
Minimum Character Confidence (0-100)	<input type="text" value="50"/>

- Set the minimum confidence level that the whole DOT code must meet in order to be accepted. The global confidence is the average of all individual characters' confidences. The recommended value is 70. Set lower if you see some test in very bad condition but want to read them. (Setting this too low will cause the engine attempt to read other items such as other vehicle signage etc. )

### Minimum Character Confidence (0-100)

Minimum Global Confidence (0-100)	70
Minimum Character Confidence (0-100)	50

- Set the minimum confidence level that a single character must meet in order to be accepted. The recommended value is 50.

### LPR Complexity

LPR complexity	Medium
	Low
	<b>Medium</b>
	High
	Low

- This is the complexity of the analytics to be applied during the OCR Engine's stage of DOT code reading. Set this according to the OCR mode and type of traffic expected. There are three possibilities:
  - *Low*: Recommended for faster moving vehicles (10Km/h = 6mph) where the OCR needs to work faster and our preference is for DOT 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 run slower.*

### Plate depth

LPR complexity	Medium
Plate depth	Low
	<b>Low</b>
	Medium
	High

- This is the complexity of the analytics to be applied during the OCR Engine's stage of plate finding. Set this to one of the following three values:
  - *Low* – apply up to 3 levels
  - *Medium* – apply up to 8 levels
  - *High* – apply up to 12 levels

*NOTE: Always use Low unless you are losing DOT codes because of processing power.*

## 6.1.5 Vaxtor USDOT Settings: Watermark options

<input type="checkbox"/> Insert watermark	<input type="checkbox"/> Perform report crop to 640x480
Watermark template \$date\$ \$plate\$	JPEG quality (1 to 100) 80
Watermark position Left top	Maximum JPEG size (0 is unlimited) 0
Watermark font size 1	

The Axis camera has a built in Overlay option to overlay text onto the video stream including the last read plate details and other dynamic text.

See the *VaxALPR On Camera Axis Software Developer's Guide* for more details.

This feature is useful when video is being sent to a VMS such as Milestone or Axis's own and the overlay text is written onto the video stream. Note however that when still images are transmitted to Helix or some other device using one of the reporting options then the software has no knowledge of the video stream and so this Watermark option should be used instead.

<input checked="" type="checkbox"/> Insert watermark
Watermark template \$date\$ \$plate\$
Watermark position Left top
Watermark font size 1

The watermark template field allows you to insert dynamic text that will be overlaid onto the still image of the captured plate. Choose from the following variables:

- **\$date\$**: Date and Time in ISO 8601 format
- **\$plate\$**: DOT code number
- **\$country\$**: Country of origin of the vehicle
- **\$blacklist\$**: Description of the DOT code the blacklist
- **\$whitelist\$**: Description of the DOT code on the whitelist
- **\$ifblacklist\$ .... \$ifblacklist\$**: If the DOT code is on the blacklist, the text in the 'if clause' will be displayed.
- **\$ifwhitelist\$ .... \$ifwhitelist\$**: If the DOT code is on the whitelist, the text in the 'if clause' will be displayed.
- **\$ifnolist\$...\$ifnolist\$**: If the DOT code is not on a list, the text in the 'if clause' will be displayed.
- **\$confidence\$**: Global confidence of the DOT code (0 – 100)
- **\$processingtime\$**: The time in milliseconds that the OCR takes to process the DOT code

- **\$left\$, \$top\$, \$right\$, \$bottom\$**: The pixel coordinates of the top left corner and the bottom right corner of the DOT code image within the whole image
- **\$absoluteleft\$, \$absolutetop\$, \$absoluteright\$, \$absolutebottom\$**: Coordinates of the top left corner and the bottom right corner of the DOT code image plate within the whole image in absolute format (0... 1).
- **\$width\$**: Width of the image in pixels
- **\$height\$**: Height of the image in pixels
- **\$ip\$**: IP address of the camera
- **\$roid\$**: ROI Id that detected the DOT code
- **\$id\$**: Unique ID for the detected DOT code. *The database option needs to be enabled in the camera.*
- **\$direction\$**: Direction of travel

In the example above we are using the \$plate\$ and \$date\$ fields.

Next select the position of the watermark from the four options available and finally select the font size required. All saved images will now have this information burnt into the still images of the plate capture.



### Crop and JPEG Settings

<input type="checkbox"/> Perform report crop to 640x480
JPEG quality (1 to 100)
<input type="text" value="80"/>
Maximum JPEG size (0 is unlimited)
<input type="text" value="0"/>

- 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. 80 is a good compromise.
- Set a maximum size (in Bytes) if your Back Office has size limitations. Some Back Offices limit images to 25KB – so in this case set to 25000 (Bytes).

- In the case of a restricted size you should use the ‘Perform crop to 640x480’ setting. This will crop an area around the DOT code to apply the compression to. This is better than compressing the whole image which will result in a very low-quality result!

### 6.1.6 VaxALPR Settings: Overview Setup

The Axis cameras have one lens – and this is used in this case for reading DOT codes. It will often be quite zoomed in and you may want to connect a second camera to capture a more wide-angle image of the complete vehicle or even the front of the vehicle when each DOT code is captured. This second color overview or color contextual image can be captured and be associated with the DOT code read.

Overview Url <input type="text" value="Overview Url"/>	Overview Password <input type="text" value="Overview Password"/>
Overview User <input type="text" value="Overview User"/>	

Here we can specify the URL of the associated camera. This second camera must have an ACAP (Application Configuration Access Protocol) that buffers video. When a read is performed the Axis OCR camera requests a single frame (image) from the Overview camera with the exact same timestamp as the DOT code read.

Note: It is very important that both cameras are NTP synchronized.

The OCR camera will then send the overview image with the DOT code read if requested to Helix or other third party receptors.

There is a new `$overviewimage$` and `$overviewimagejpegsize$` to specify this information.

#### Overview URL

- Setup the URL to access the Vaxtor Overview ACAP. The default is:  
**`http://<cameraip>/local/Overview`**

#### Overview User


- The User with admin rights on the Overview camera.

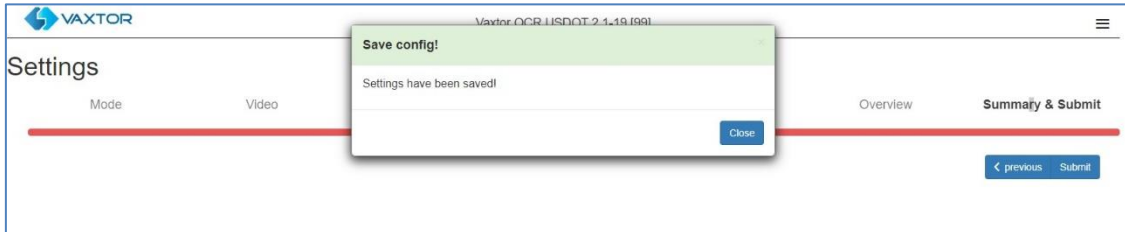
#### Overview Password

- Password for the Overview user.

## 6.1.7 Vaxtor USDOT: Summary & Submit changes

### Submit configuration

1. To save all of the OCR settings, click the  button.
2. Wait for the confirmation (or error) message.



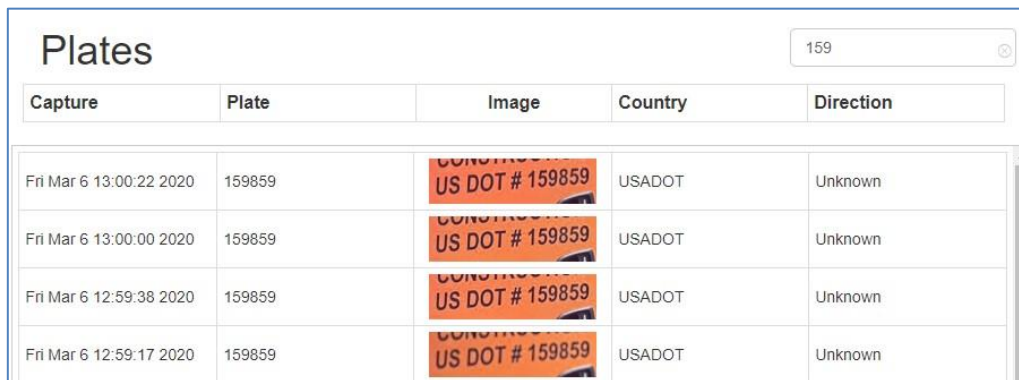
**IMPORTANT:** To avoid unexpected problems, it is recommended that you backup the current configuration to the Axis camera by downloading the configuration XML file (see: [Download XML Config section later in this manual](#)).

## 6.2 Vaxtor USDOT: Plates

The last 20 USDOT code reads are stored in the camera's standard memory and are displayed when the USDOT Plates menu is selected. Select Plates from the drop-down menu.



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.



There is a Search box top right where you can search this short list for partial codes – in this case all codes containing 159. By clicking on one of the records more details of the read are displayed:




For a much more powerful search than is the Database option below.

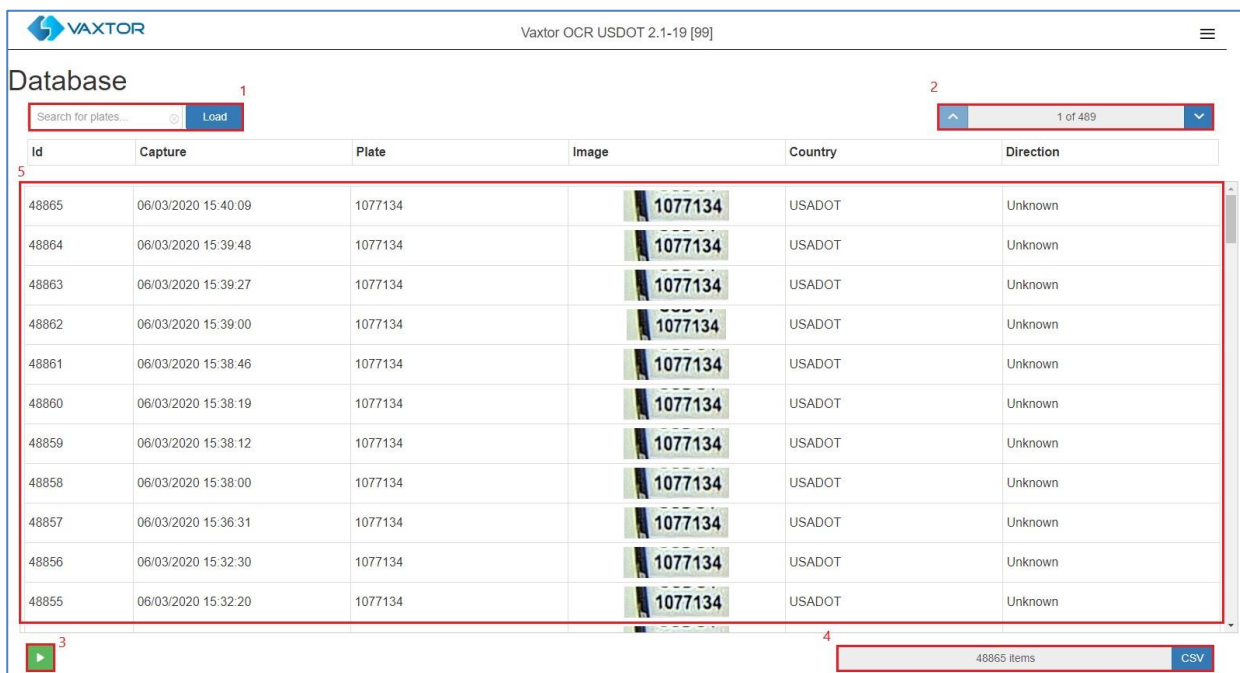


## 6.3 Vaxtor USDOT: Database

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. Select **Database** from the drop-down menu:



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 whilst using the feature. Pressing **Play**  once more catches up any cached reads.

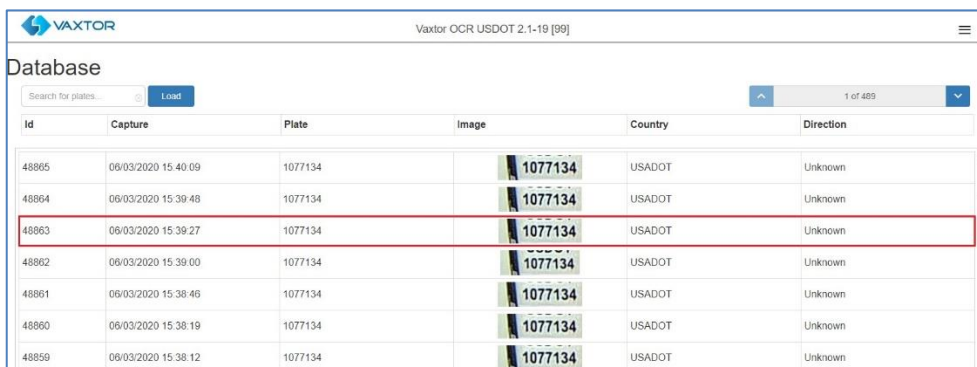


The Database screen comprises:

- (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 USDOT Code list

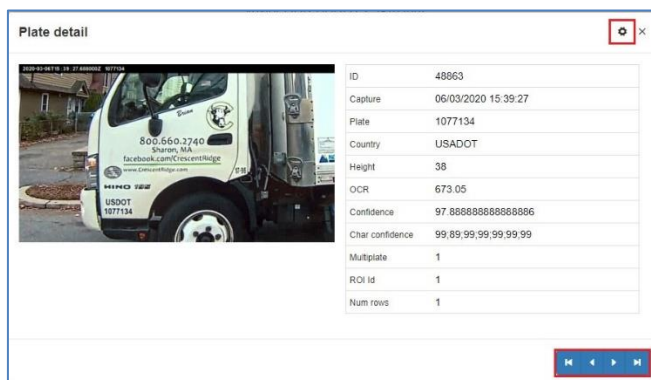
## USDOT Code details

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



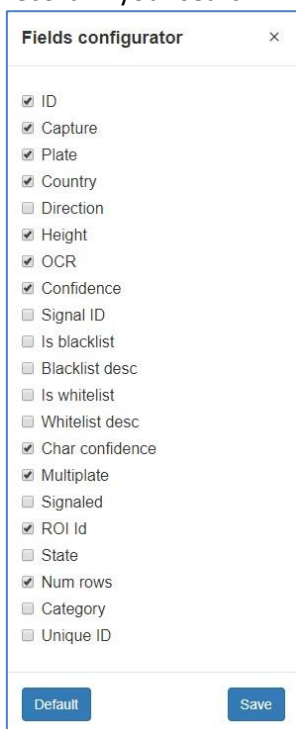
Id	Capture	Plate	Image	Country	Direction
48865	06/03/2020 15:40:09	1077134		USADOT	Unknown
48864	06/03/2020 15:39:48	1077134		USADOT	Unknown
48863	06/03/2020 15:39:27	1077134		USADOT	Unknown
48862	06/03/2020 15:39:00	1077134		USADOT	Unknown
48861	06/03/2020 15:38:46	1077134		USADOT	Unknown
48860	06/03/2020 15:38:19	1077134		USADOT	Unknown
48859	06/03/2020 15:38:12	1077134		USADOT	Unknown

2. A new window appears with the read details.



ID	48863
Capture	06/03/2020 15:39:27
Plate	1077134
Country	USADOT
Height	38
OCR	673.05
Confidence	97.88888888888888
Char confidence	99.89.99.99.99.99.99
Multiplate	1
ROI Id	1
Num rows	1

Use the blue arrows (bottom right) to step between records – or go to the very first or last record in your search.



Field	Selected
ID	<input checked="" type="checkbox"/>
Capture	<input checked="" type="checkbox"/>
Plate	<input checked="" type="checkbox"/>
Country	<input checked="" type="checkbox"/>
Direction	<input type="checkbox"/>
Height	<input checked="" type="checkbox"/>
OCR	<input checked="" type="checkbox"/>
Confidence	<input checked="" type="checkbox"/>
Signal ID	<input type="checkbox"/>
Is blacklist	<input type="checkbox"/>
Blacklist desc	<input type="checkbox"/>
Is whitelist	<input type="checkbox"/>
Whitelist desc	<input type="checkbox"/>
Char confidence	<input checked="" type="checkbox"/>
Multiplate	<input checked="" type="checkbox"/>
Signaled	<input type="checkbox"/>
ROI Id	<input checked="" type="checkbox"/>
State	<input type="checkbox"/>
Num rows	<input checked="" type="checkbox"/>
Category	<input type="checkbox"/>
Unique ID	<input type="checkbox"/>

Buttons: Default, Save

The Settings icon (top right) allows you to select what information is displayed with each record.

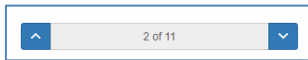
When setting up or fine tuning a system it is quite useful to display data such as:

- OCR - the OCR processing time in milliseconds
- Multiplate - how many reads were made of this code and
- Height – the average height of all the characters read

### 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



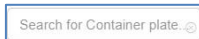
Use the UP and DOWN buttons to scroll 100 codes at a time – or click on the central part of the button (in this case on 2/11) and enter the target page directly and click on GoTo:



### Search and Load USDOT Codes

#### Load USDOT Codes

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



empty and click the **Load** button.

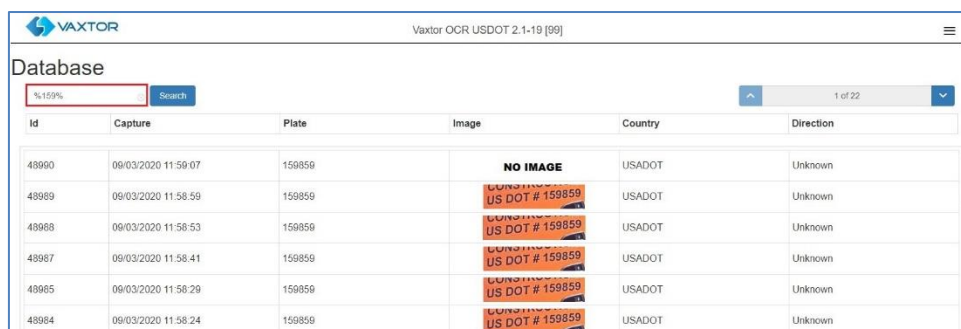
This will refresh the list with the latest captures.

#### Search for USDOT 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 USDOT codes containing the characters: ‘159’.

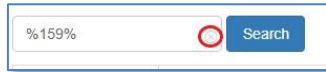
This results in the list being modified as follows:



Id	Capture	Plate	Image	Country	Direction
48990	09/03/2020 11:59:07	159859	NO IMAGE	USADOT	Unknown
48989	09/03/2020 11:58:59	159859	US DOT # 159859	USADOT	Unknown
48988	09/03/2020 11:58:53	159859	US DOT # 159859	USADOT	Unknown
48987	09/03/2020 11:58:41	159859	US DOT # 159859	USADOT	Unknown
48985	09/03/2020 11:58:29	159859	US DOT # 159859	USADOT	Unknown
48984	09/03/2020 11:58:24	159859	US DOT # 159859	USADOT	Unknown

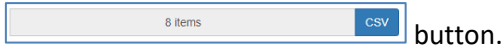
3. To clear search criteria, click  button inside the Search window zone, and click the

 button.



### Download the USDOT Code list.

You can download the current page displayed by clicking on the CSV button:




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

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	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;																								
2	48990;"159859";"USADOT";"98.809090909090907";2020-03-09T11:59:07+0000;false;"";false;"";55;"99;99;99;98;99;99";"2395.9702929998748";1;false;"-1";236;545;895;700;false;"UNKNOWN";1;0;																								
3	48988;"159859";"USADOT";"99";2020-03-09T11:58:59+0000;false;"";false;"";56;"99;99;99;99;99;99";"2430.4275669999188";1;false;"-1";235;544;896;701;false;"UNKNOWN";1;0;																								
4	48988;"159859";"USADOT";"97.181818181818187";2020-03-09T11:58:53+0000;false;"";false;"";56;"99;99;99;79;99;99";"2380.3592129999306";1;false;"-1";236;545;896;701;false;"UNKNOWN";1;0;																								
5	48987;"159859";"USADOT";"96.090909090909093";2020-03-09T11:58:41+0000;false;"";false;"";56;"99;99;99;67;99;99";"2373.6368309999816";1;false;"-1";236;544;896;701;false;"UNKNOWN";1;0;																								
6	48985;"159859";"USADOT";"97.36363636363636";2020-03-09T11:58:29+0000;false;"";false;"";56;"99;99;99;81;99;99";"2501.5320869999705";1;false;"-1";236;544;896;701;false;"UNKNOWN";1;0;																								
7	48984;"159859";"USADOT";"96.818181818181813";2020-03-09T11:58:24+0000;false;"";false;"";56;"99;99;99;75;99;99";"2842.7578429999883";1;false;"-1";236;544;896;701;false;"UNKNOWN";1;0;																								
8	48982;"159859";"USADOT";"96.63636363636364";2020-03-09T11:58:11+0000;false;"";false;"";56;"99;99;99;73;99;99";"2397.1866509999381";1;false;"-1";236;544;896;701;false;"UNKNOWN";1;0;																								
9	48981;"159859";"USADOT";"96.727272727272734";2020-03-09T11:58:05+0000;false;"";false;"";56;"99;99;99;74;99;99";"3006.2200880000601";1;false;"-1";236;544;896;701;false;"UNKNOWN";1;0;																								
10	48980;"159859";"USADOT";"96.181818181818187";2020-03-09T11:57:58+0000;false;"";false;"";55;"99;99;99;68;99;99";"2350.3984280000441";1;false;"-1";237;545;895;701;false;"UNKNOWN";1;0;																								
11	48979;"159859";"USADOT";"94.454545454545453";2020-03-09T11:57:51+0000;false;"";false;"";56;"99;99;99;49;99;99";"2357.6471629999578";1;false;"-1";236;544;896;701;false;"UNKNOWN";1;0;																								
12	48978;"159859";"USADOT";"97.272727272727266";2020-03-09T11:57:45+0000;false;"";false;"";56;"99;99;99;80;99;99";"2347.1383050000299";1;false;"-1";236;545;896;701;false;"UNKNOWN";1;0;																								

The first row contains the field headers.

**NOTE:** You can only download the current page (i.e. 100 records) that you are viewing.

if you need to download the full database from the camera, 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.*

## 6.4 Vaxtor USDOT 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.

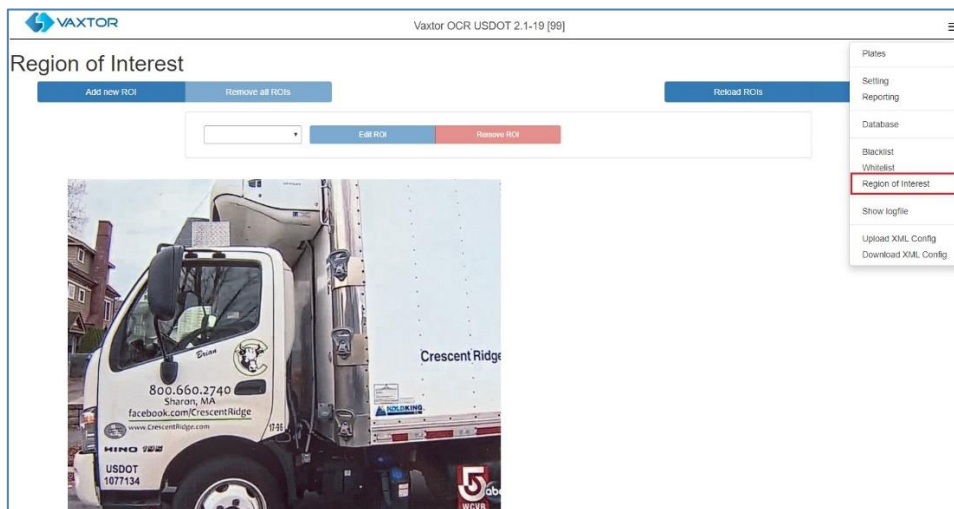
Using an ROI can decrease OCR processing time and also reduce false positives.

So, if the camera is looking across a large stretch of road, the ROI can be used to limit the OCR to the area where the codes are always seen. In this case in the lower 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 USDOT 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.

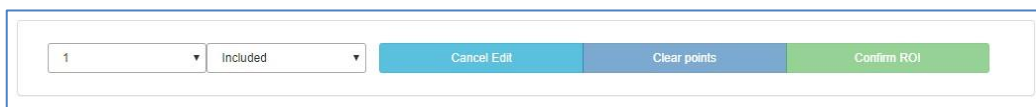
*Note that the USDOT code must be in or out of the ROI to pass the test.*



**IMPORTANT:** ROIs can 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.

### Vaxtor USDOT 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


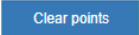


- b. To start again, click on the Clear points button.
  - c. To cancel the new ROI, click Cancel Edit button.
  - d. When you are satisfied with the shape click the Confirm ROI button.
4. Click Add new ROI to add more ROIs as required remembering to select a new ID number.
5. ROIs are not stored on the camera until changes are submitted.

#### **Vaxtor USDOT 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.

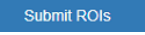
### ***Vaxtor USDOT ROI: Edit an ROI***

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.

### ***Vaxtor USDOT ROI: Save changes***

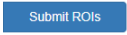
#### **Submit current ROIs**

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**

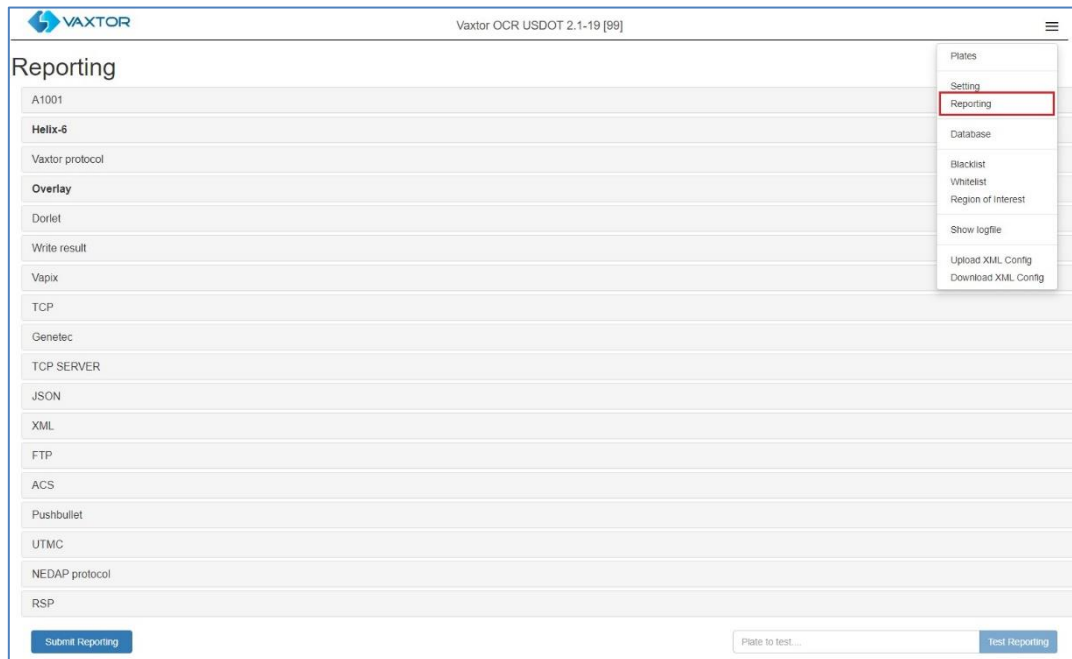
- Delete all of the ROIs individually and then click the  button.
- A confirmation message will appear. Accept to delete all of the stored ROIs and wait for the confirmation message.

### ***Vaxtor USDOT ROI: Reload ROIs***

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

## 6.5 Vaxtor USDOT Reporting

Vaxtor USDOT is able to output all USDOT 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:

**Vaxtor protocol**

Active

Host:  ID:

Port:

Send duplicate images

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: “Vaxtor ALPR On Camera Integration Guide” for more details of Vapix and how to communicate with Axis’s own software.***

***Also see the separate Vaxtor ALPR On Camera Software Developer’s Guide for more detailed information on the reporting options.***

***Contact Vaxtor for details.***

## 6.6 Show Logfile

You can view the application's log file (System Log) by going to the main Axis App screen – selecting the Vaxtor USDOT App and clicking on **App Log**.



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

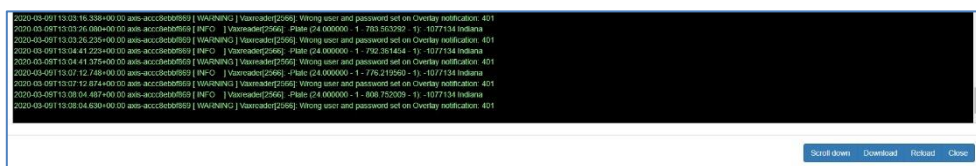
```

2020-03-09T12:46:10.981400:00 axis-acc08bbf869 [ INFO ] Vaxreader[2566]: -Plate (24.000000 - 1 - 811.408982 - 1): -1077134 Indiana
2020-03-09T12:46:10.877400:00 axis-acc08bbf869 [ WARNING ] Vaxreader[2566]: Wrong user and password set on Overlay notification: 401
2020-03-09T13:00:22.159400:00 axis-acc08bbf869 [ INFO ] Vaxreader[2566]: -Plate (23.000000 - 1 - 756.364363 - 1): -1077134 Indiana
2020-03-09T13:00:22.089400:00 axis-acc08bbf869 [ WARNING ] Vaxreader[2566]: Wrong user and password set on Overlay notification: 401
2020-03-09T13:00:54.818400:00 axis-acc08bbf869 [ INFO ] Vaxreader[2566]: -Plate (24.000000 - 1 - 807.105200 - 1): -1077134 Indiana
2020-03-09T13:00:54.918400:00 axis-acc08bbf869 [ WARNING ] Vaxreader[2566]: Wrong user and password set on Overlay notification: 401
2020-03-09T13:03:16.198400:00 axis-acc08bbf869 [ INFO ] Vaxreader[2566]: -Plate (24.000000 - 1 - 794.196950 - 1): -1077134 Indiana
2020-03-09T13:03:16.338400:00 axis-acc08bbf869 [ WARNING ] Vaxreader[2566]: Wrong user and password set on Overlay notification: 401
2020-03-09T13:03:26.080400:00 axis-acc08bbf869 [ INFO ] Vaxreader[2566]: -Plate (24.000000 - 1 - 783.563292 - 1): -1077134 Indiana
2020-03-09T13:03:26.239400:00 axis-acc08bbf869 [ WARNING ] Vaxreader[2566]: Wrong user and password set on Overlay notification: 401
2020-03-09T13:04:41.223400:00 axis-acc08bbf869 [ INFO ] Vaxreader[2566]: -Plate (24.000000 - 1 - 792.361454 - 1): -1077134 Indiana
2020-03-09T13:04:41.375400:00 axis-acc08bbf869 [ WARNING ] Vaxreader[2566]: Wrong user and password set on Overlay notification: 401
  
```

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 down** 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.

## 6.7 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.

## 6.8 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.

## 7. Troubleshooting

Many USDOT 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.
- Forgetting you have an ROI set

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

### 7.1 The Vaxtor USDOT 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.

### 7.2 The Vaxtor USDOT Camera license is valid but a ‘Check license’ message appears.

**Solution:**

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

### 7.3 The Vaxtor USDOT On Camera software is running but not reading codes.

**Solution:**

Check if you can see the USDOT 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 USDOT 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 USDOT 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 click on the image to see the default minimum and maximum character sizes displayed as rectangles overlaid onto the image. Adjust the lens as necessary.
2. In the OCR options, change complexity to High but be mindful of the increase of processor power.
3. In the Region of Interest section, delete any existing **Region of Interests** (ROIs).

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

#### 7.4 The Vaxtor USDOT On Camera software is running but it does not read all of the codes.

**Solution:**

In the Vaxtor USDOT configuration, in the Video options, check the that value of the resolution in the drop-down list is adequate.

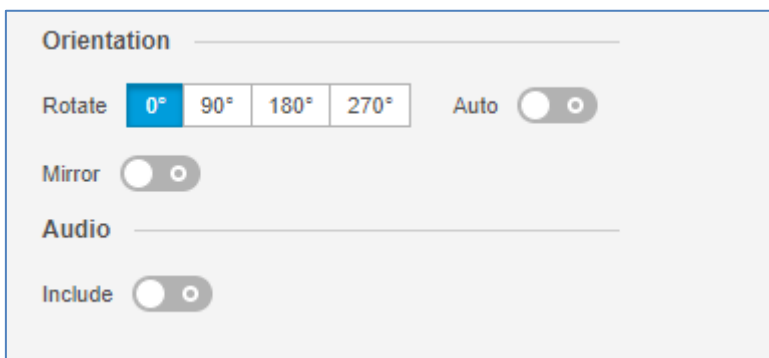
1. In the App's main options on the right – select Show logfile.
2. Scroll to the end of the log file (Scroll bottom) and look for the message:  
*[INFO] Vaxreader[xxxx]: -USDOT 0 (<pixel height> - <milliseconds>): <code>*  
and check the value of the code's character pixel height registered in the log.

#### 7.5 Images of a USDOT appear inverted.

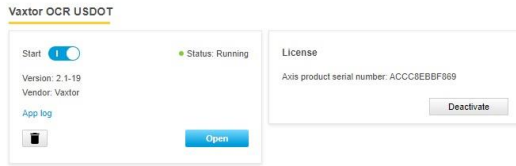
After installing a new Axis camera, sometimes the code patches appear upside down after being read. Note that the camera has an auto-sensor to determine the orientation.

**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 Vaxtor USDOT Application – and all should be well.

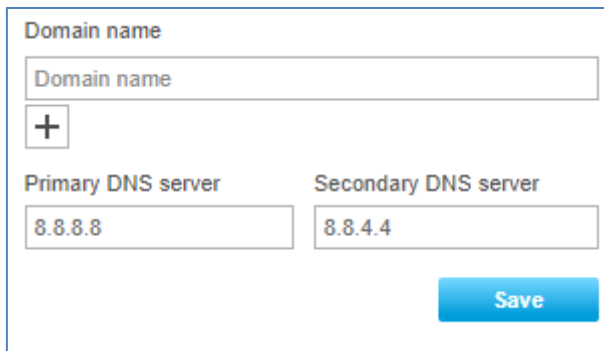


## 7.6 JSON or TCP setup but no codes being received

### 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.



## 8. Changelog

### 8.1 Version

Ends.