Guideline

Vaxtor LPR incl. Vehicle Make, Model, Color and Class App

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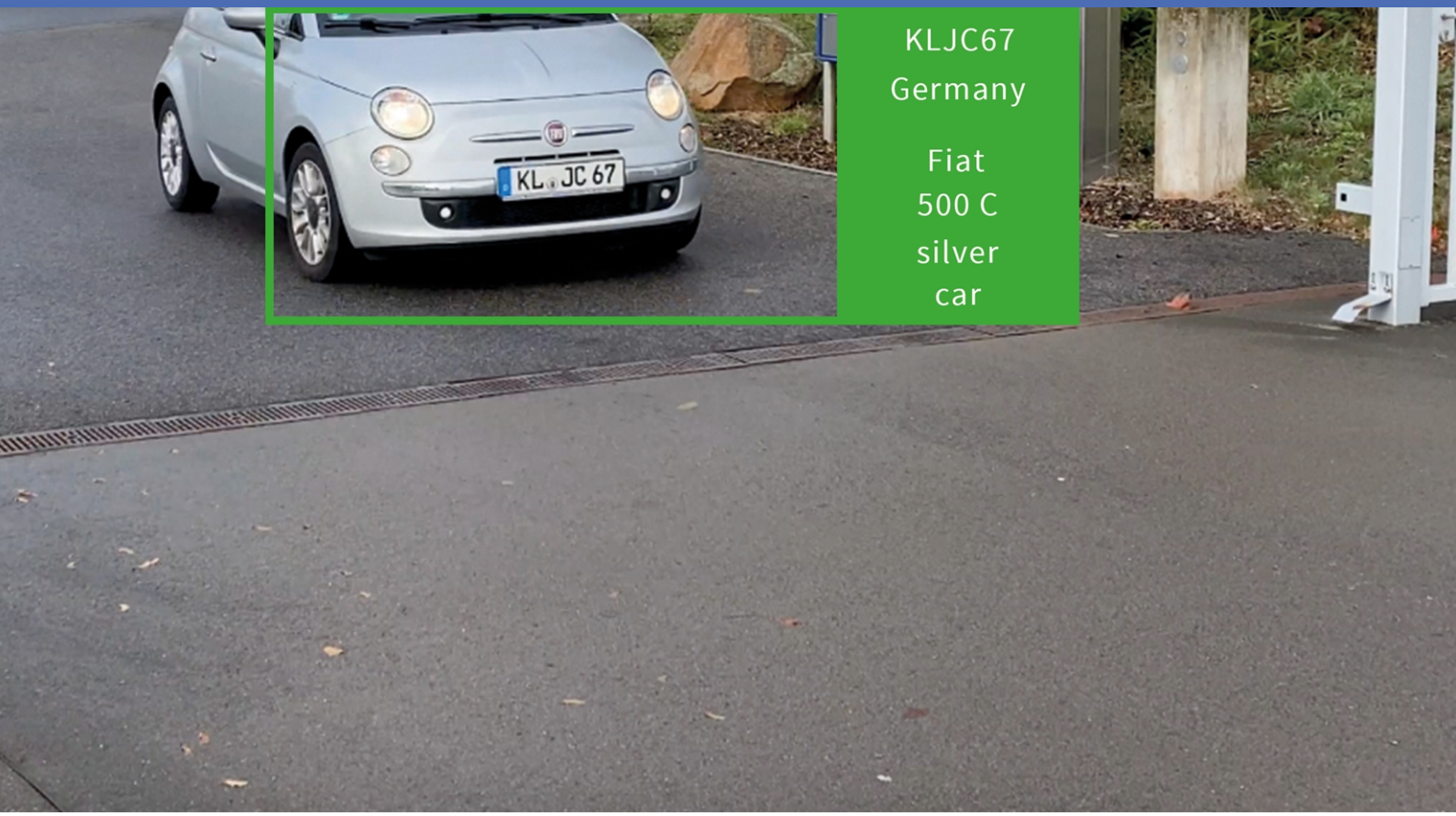

BeyondHumanVision

MOBOTIX

V2.08_6/1/2022, Order Code: Mx-APP-VX-MMC

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Before You Start

This section contains the following information:

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Support

If you need technical support, please contact your MOBOTIX dealer. If your dealer cannot help you, he will contact the support channel to get an answer for you as quickly as possible.

If you have internet access, you can open the MOBOTIX help desk to find additional information and software updates. Please visit:

www.mobotix.com > Support > Help Desk

Legal Notes

Legal Aspects of Video and Sound Recording

You must comply with all data protection regulations for video and sound monitoring when using MOBOTIX AG products. Depending on national laws and the installation location of the cameras, the recording of video and sound data may be subject to special documentation or it may be prohibited. All users of MOBOTIX products are therefore required to familiarize themselves with all applicable regulations and to comply with these laws. MOBOTIX AG is not liable for any illegal use of its products.

Declaration of Conformity

The products of MOBOTIX AG are certified according to the applicable regulations of the EC and other countries. You can find the declarations of conformity for the products of MOBOTIX AG on www.mobotix.com under **Support > Download Center > Marketing & Documentation > Certificates & Declarations of Conformity**.

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Disposal

Electrical and electronic products contain many valuable materials. For this reason, we recommend that you dispose of MOBOTIX products at the end of their service life in accordance with all legal requirements and regulations (or deposit these products at a municipal collection center). MOBOTIX products must not be disposed of in household waste! If the product contains a battery, please dispose of the battery separately (the corresponding product manuals contain specific directions if the product contains a battery).

Disclaimer

MOBOTIX AG does not assume any responsibility for damages, which are the result of improper use or failure to comply to the manuals or the applicable rules and regulations. Our General Terms and Conditions apply. You can download the current version of the **General Terms and Conditions** from our website at www.-mobotix.com by clicking on the corresponding link at the bottom of every page.

About Vaxtor LPR incl. Vehicle Make, Model, Color and Class App

Worldwide usable vehicle identification

Based on deep learning processes the certified Vaxtor LPR incl. Vehicle Make, Model, Color and Class App recognizes license plates as well as vehicle's make, model, color and class (MMC). The app can be used at maximum speeds of up to 160 km/h (LPR only) and 100 km/h (plus MMC) on two lanes and by an extremely high hit probability of over 99 percent.

Via blocking or permission lists, authorized, blocked or searched vehicles can be defined specifically. For example, a gate or barrier in an access road can open or be blocked automatically.

- Subject to license, single payment for unlimited use
- Recognition of license plates with global country coverage
- Recognition of make, model, color and class
- Over 99% accuracy and high-speed performance
- Use of blocking and permission lists possible
- App-integrated Smart Data Data Interface for data retrieval with MxManagementCenter version 2.4 or higher

CAUTION! Thermal sensors are not supported by this app.

Smart Data Interface to MxManagementCenter

This app has a Smart Data interface to MxManagementCenter.

With the MOBOTIX Smart Data System, transaction data can be linked to the video recordings made at the time of the transactions. Smart Data source can be e.g. MOBOTIX Certified Apps (no license required) or general Smart Data sources (license required) like POS systems or license plate recognition systems.

The Smart Data System in MxManagementCenter enables you to quickly find and review any suspicious activities. The Smart Data Bar and the Smart Data View are available for searching and analyzing transactions. The Smart Data Bar provides a direct overview of the most recent transactions (from the last 24 hours) and for this reason it is convenient to use it for reviews and searches.

NOTE! For information on how to use the Smart Data System, see the corresponding online help of the camera software and MxManagementCenter.

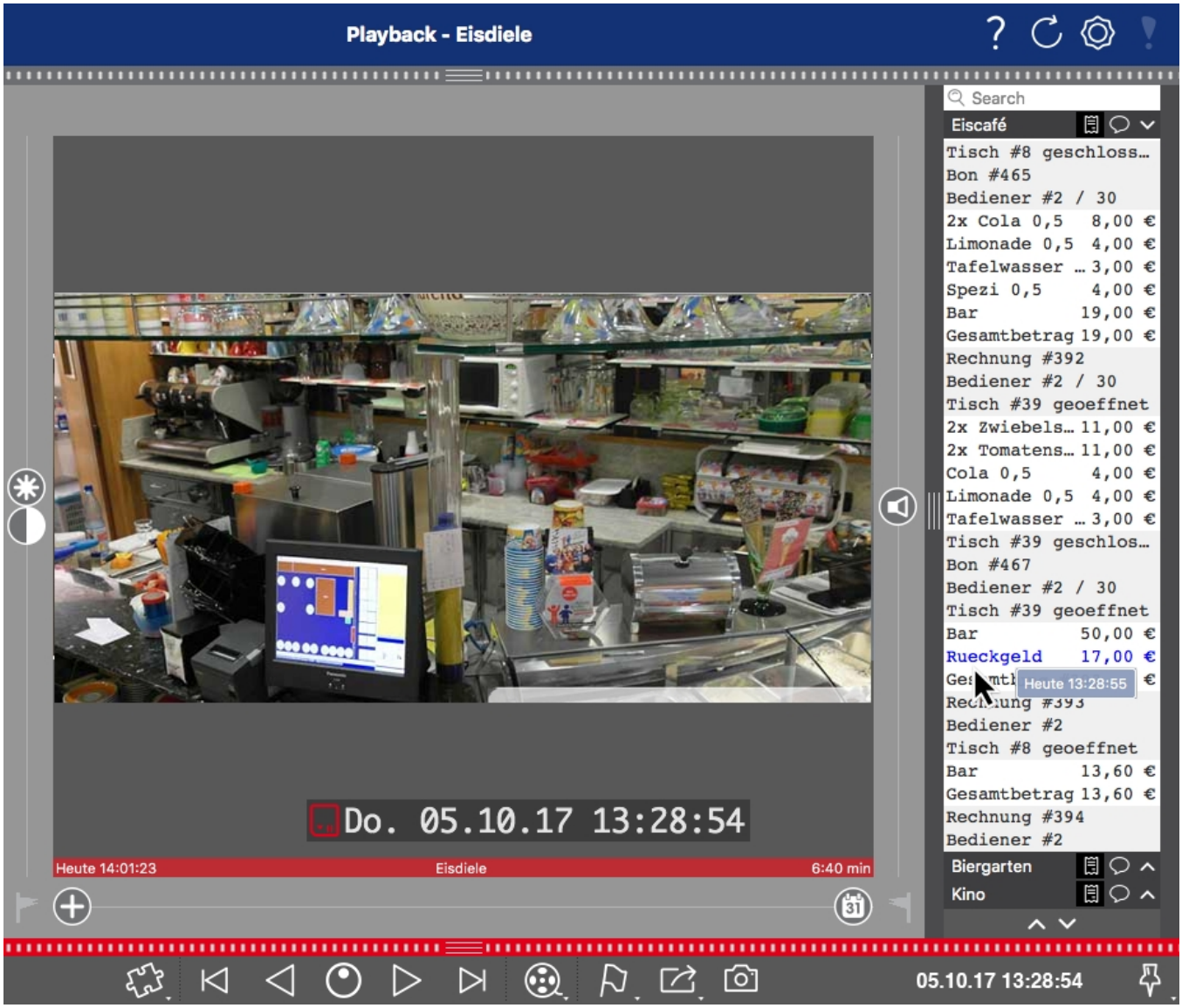

Fig. 1: : Smart Data Bar in MxManagementCenter (Example: POS System)

Technical Specifications

Product Information

Product Name	Vaxtor LPR incl. Vehicle Make, Model, Color and Class App
Order Code	Mx-APP-VX-MMC
Supported MOBOTIX Cameras	Mx-M73A, Mx-S74A
Minimum Camera Firmware	V7.1.3.15
MxManagementCenter Integration	■ min. MxMC v2.4.4 ■ Configuration: Advanced Config license required ■ Recognition Log & Forensic Search: Smart Data Interface license included

Product Features

App Features	■ License plate recognition of one- and two-line license plates ■ Support of latin, hebrew and arabic characters for global application ■ Additional recognition of vehicle make, model, color and class ■ Recognition log (Smart Data / Event Search via MxManagementCenter) ■ MOBOTIX events via MxMessageSystem ■ Two lists for individual actions (e.g. access granted/denied, alarm, etc.) ■ Free flow and Signaled mode
Maximum number of lanes	2
Maximum number of enrolled license plates	1000 per list
Meta Data / Statistic formats	JSON
Trial License	30-day trial license pre-installed
MxMessageSystem supported	Yes

Interfaces	■ MxMC Smart Data ■ IP Notification ■ Milestone X-Protect ■ Vaxtor Helix ■ generic 3rd party integration via XML ■ compare supported camera's interfaces
MOBOTIX Events	Yes
ONVIF Events	Yes (Generic Message event)

Supported Vehicles

No. of supported Car Makes	> 470
No. of supported Car Models	> 7500
Supported Vehicle Colors	Black, White, Grey, Blue, Red, Green, Brown, Beige, Gold, Yellow, Violet, Orange
Supported Vehicle Classes	Car, Van, Truck, Bus, Motorcycle

Supported Countries

Supported license plates / countries	https://community.mobotix.com/t/vaxtor-lpr-app-supported-license-plates-countries

Scene Requirements

Character Height	20px - 50px (depending on the plate type)
Maximum Vertical Angle	30°
Maximum Horizontal Angle	< 25°
Maximum Tilt Angle	< 25°

Technical App Specifications

Synchronous / Asynchronous App	Asynchronous
Simultaneous execution of other apps	Yes (considering performance requirements)

Accuracy	Min. 99% (considering scene requirements)
Processed number of frames per second	Typ. 10 fps
LPR Detection time	Typ. 100 – 120 ms
Classification time	Typ. 100 - 120 ms
Classification & MMC	Typ. 250 ms

Licensing Certified Apps

The following licenses are available for the Vaxtor LPR incl. Vehicle Make, Model, Color and Class App:

- **30-day test license** pre-installed
- **permanent commercial license**

The usage period begins with activation of the app interface (see Activation of the Certified App Interface, p. 25)

NOTE! For buying or renewing a license, contact your MOBOTIX Partner.

NOTE! Apps are usually pre-installed with the firmware. In rare cases, apps must be downloaded from the website and installed. In this case see **www.mobotix.com > Support > Download Center > Marketing & Documentation**, download and install the app.

License Activation of Certified Apps in MxManagementCenter

After a test period commercial licenses must be activated for use with a valid license key.

Online-Activation

After receiving the activation IDs, activate them in MxMC as follows:

1. Select from the menu **Window > Camera App Licenses**.
2. Select the camera on which you want to license apps and click **Select**.

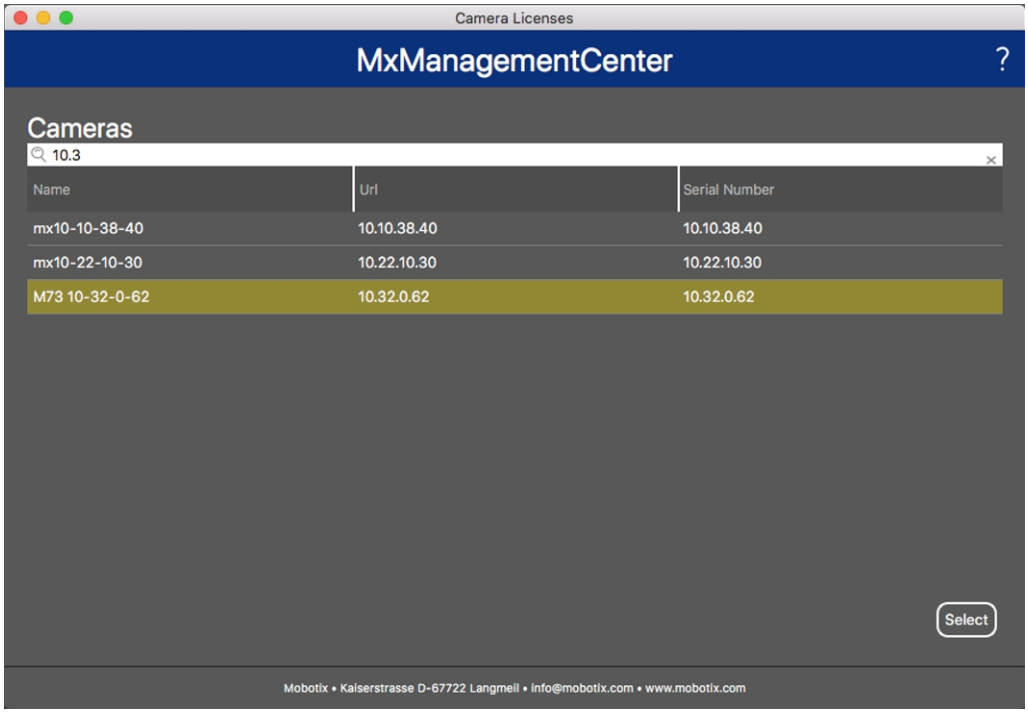

Fig. 2: Overview of Camera App Licenses in MxManagementCenter

NOTE! If necessary, correct the time set on the camera.

1. An overview of the licenses installed on the camera may be displayed. Click **Activate License**.

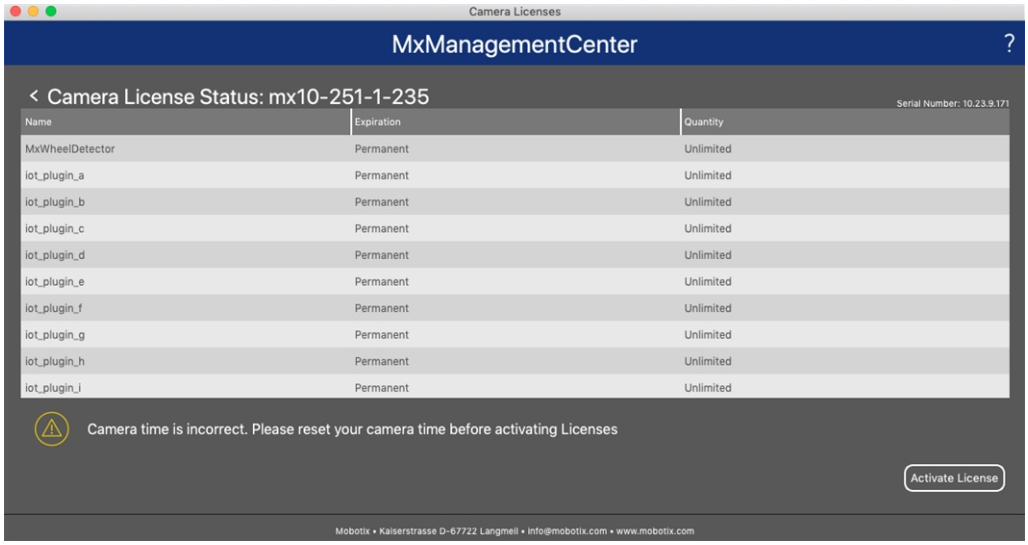

Fig. 3: Overview of the licenses installed on the camera

NOTE! If necessary, correct the time set on the camera.

2. Enter a valid Activation ID and specify the number of licenses to install on this computer.
3. If you want to license another product, click on . In the new row, enter the appropriate Activation ID and the number of licenses you want.

4. To remove a line click .
5. When you have entered all Activation IDs, click **Activate License Online**. During activation, **MxMC** connects to the license server. This requires an Internet connection.

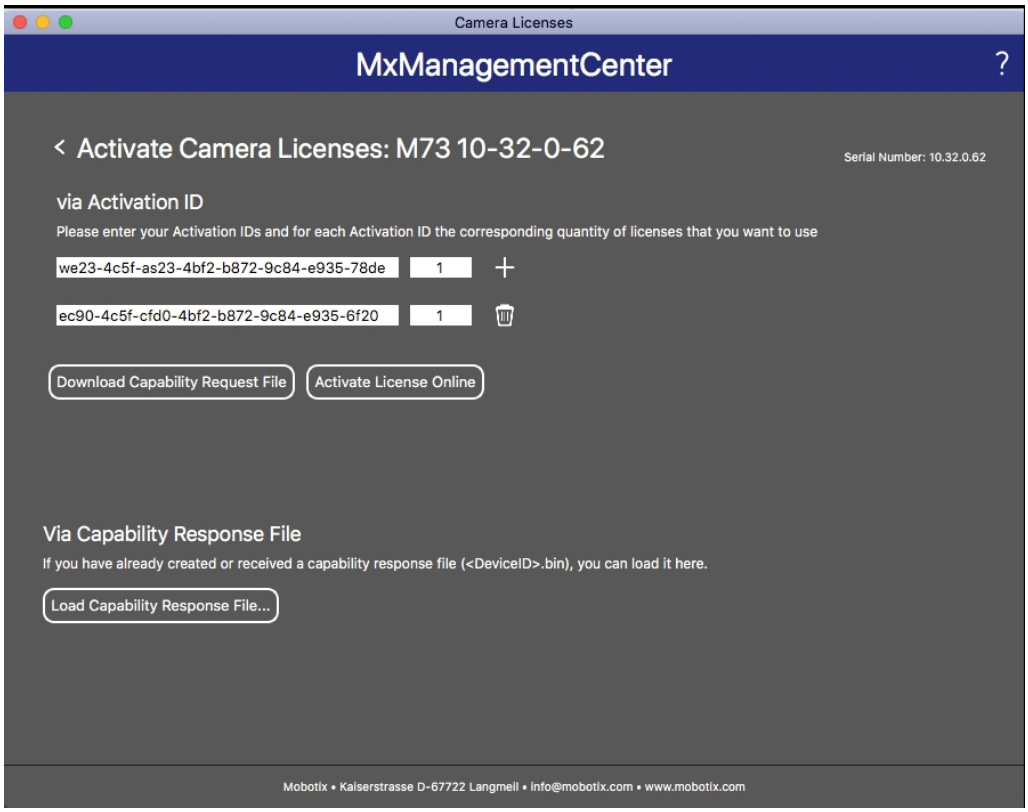

Fig. 4: Adding licenses

Successful activation

After successful activation, a new log in is required to apply the changes. Alternatively, you can return to license management.

Failed activation (missing internet connection)

If the license server cannot be reached, e.g. due to a missing internet connection, apps can also be activated offline. (see Offline Activation, p. 15).

Offline Activation

For offline activation, the partner/installer from whom you purchased the licenses can generate a capability response (.bin file) on the license server to activate their licenses.

1. Select from the menu **Window > Camera App Licenses**.
2. Select the camera on which you want to license apps and click **Select**.

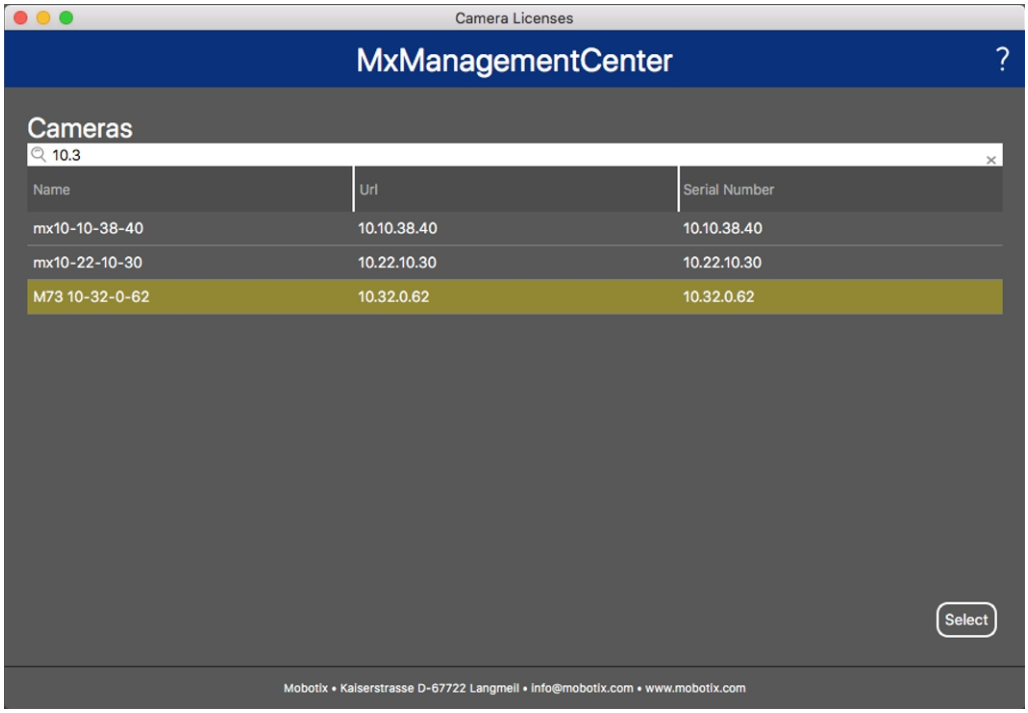

Fig. 5: Overview of Camera App Licenses in MxManagementCenter

NOTE! If necessary, correct the time set on the camera.

3. An overview of the licenses installed on the camera may be displayed. Click **Activate License**.

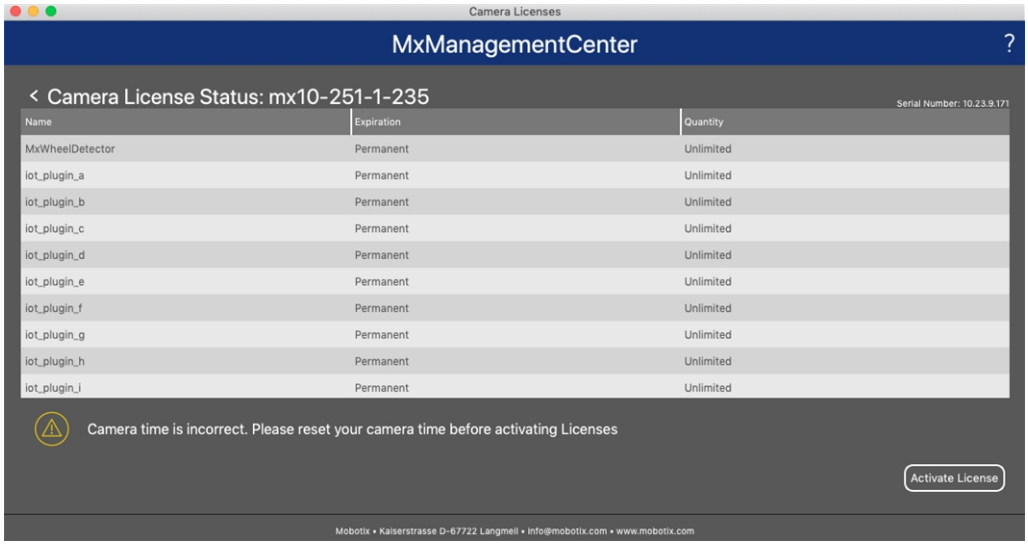

Fig. 6: Overview of the licenses installed on the camera

NOTE! If necessary, correct the time set on the camera.

4. Enter a valid Activation ID and specify the number of licenses to install on this computer.
5. If you want to license another product, click on . In the new row, enter the appropriate **Activation ID** and the number of licenses you want.
6. If necessary, click to remove a line.
7. When you have entered all Activation IDs, click **Download Capability Request File (.lic)**. and send it to your partner/installer.

NOTE! This file allows the partner / installer from whom you purchased the licenses to generate a capability response file (.bin) on the license server.

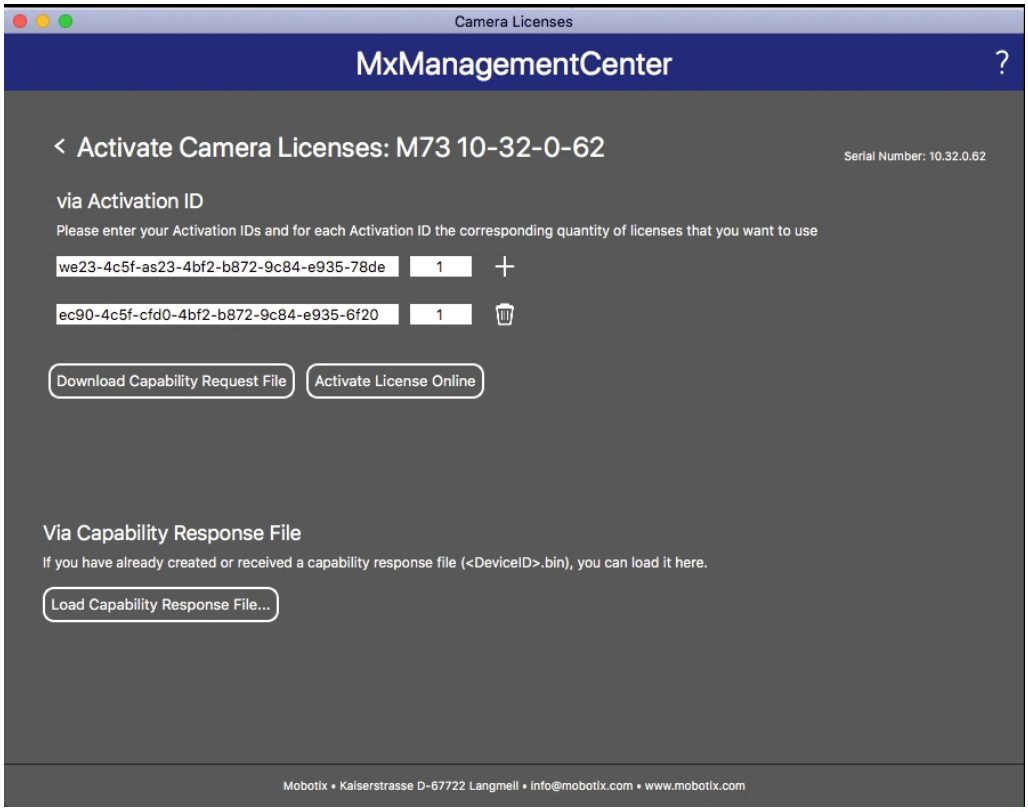

Fig. 7: Adding licenses

8. Click Load Capability Response File and follow the instructions.

Successful activation

After successful activation, a new log in is required to apply the changes. Alternatively, you can return to license management.

Managing Licenses in MxManagementCenter

In MxManagementCenter you can comfortably manage all licenses that have been activated for a camera.

1. Select from the menu **Window > Camera App Licenses**.
2. Select the camera on which you want to license apps and click **Select**.

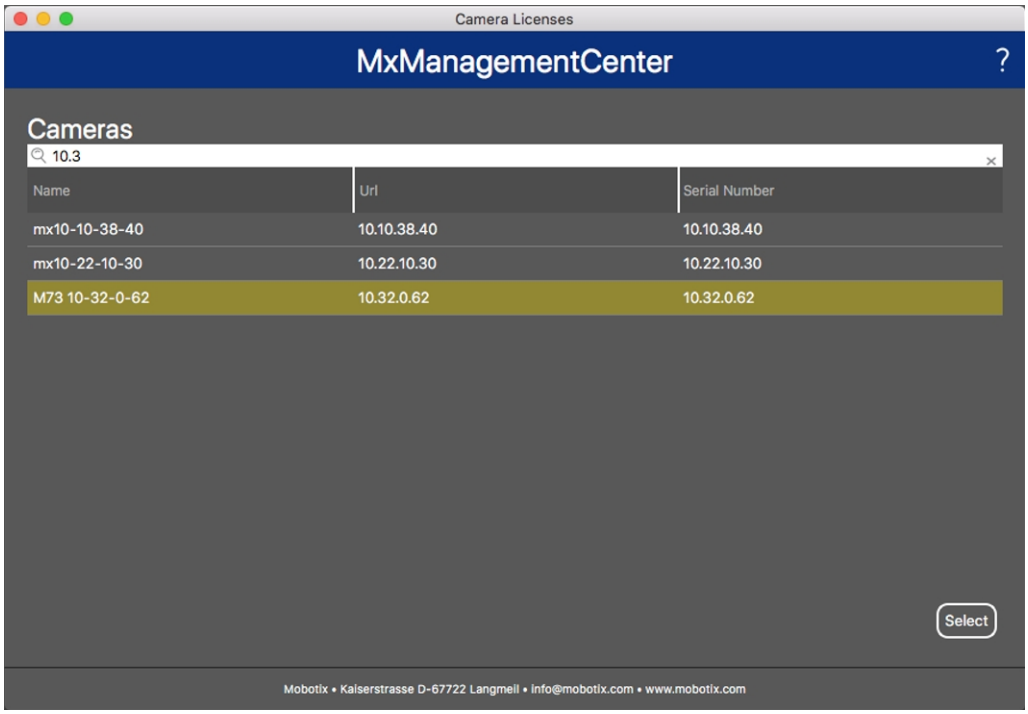

Fig. 8: Overview of Camera App Licenses in MxManagementCenter

An overview of the licenses installed on the camera may be displayed.

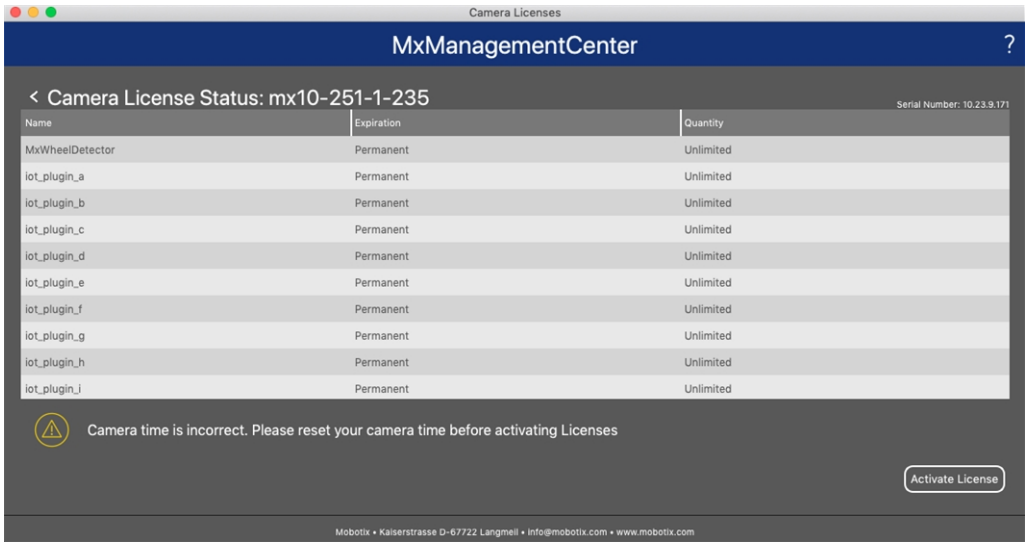

Fig. 9: Overview of the licenses installed on the camera

NOTE! If necessary, correct the time set on the camera.

Column	Explanation
Name	Name of the licensed app
Expiration	the time limit of the license
Quantity	Number of licenses purchased for a product.
Serial Number	Unique identification determined by MxMC for the device used. If problems occur during licensing, please have the device ID ready.

Synchronize licenses with server

When the program starts, there is no automatic comparison of the licenses between the computer and the license server. Therefore, click **Update** to reload the licenses from the server.

Update licenses

To update temporary licenses, click **Activate Licenses**. The dialog for updating/activating licenses opens.

NOTE! You need administrator rights to synchronize and update licenses.

Camera, image and scene requirements

The camera should be setup so that the combination of the distance, the lens's focal length and the camera's resolution provide an image that can be accurately analyzed by the OCR. Therefore the following pre-requisites must be fulfilled for the scene:

Quality of the license plate to be captured in the image

- The license plate must be high-contrast and clearly legible, i.e. as clean as possible, without dents or holes and well illuminated.
- The license plate should be rectangular
- Minimum character height
  - The objective of an ALPR system is to capture an image with a good readable plate. In order to achieve this the characters on the plate should have a height between 20 and 30 pixels for larger plate formats (e.g. EU 50cm plates) and about 25-35 pixels for USA–style plates which are physically smaller and have a narrow character stroke width in many states.)
  - Certain Middle East and Arabic plates are smaller still and will need an even greater character pixel height of say 30-40 pixels. For example, in Abu Dhabi the small characters next to or above the main characters are only 3cm high and may require a much higher camera resolution.

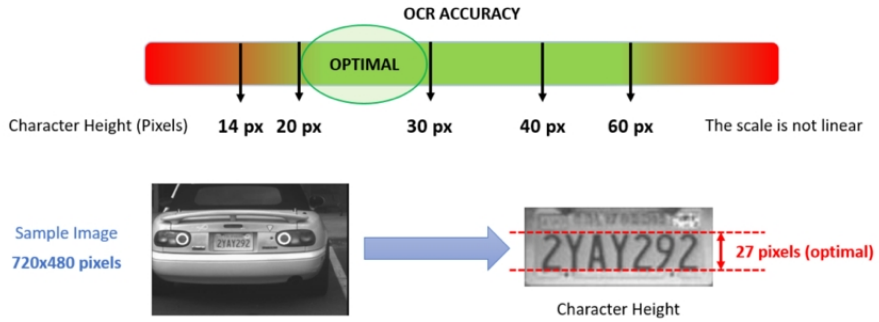

Fig. 10: Minimum character height

- Maximum rotation angle:

Fig. 11: Maximum rotation angle

- Vertical: **< 30°**
- Slope: **< 25°**
- Horizontal: **< 25°**

Frame rate

The selection of the correct frame rate influences the recognition quality significantly. For ALPR cameras, the following frame rates are recommended:

Examples for recommended frame rates

Scene (Street type)	minimum frame rate (fps)
Barrier or Gate	5
Normal city street	15
Fast city streets	20
Freeway	25

Shutter Speed (Exposure time)

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)

Examples for recommended exposure times

Scene (Street type)	minimum exposure time (sec)
Barrier or Gate	1/250th (4 miliseconds)
Normal city street	1/500th (2 miliseconds)
Fast city streets	1/1000th (1 miliseconds)
Freeway	1/1000th (1 miliseconds)

NOTE! he exposure time must be adjusted according to the light conditions.

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:

- 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.
- The resolution of the camera's electronics. Most CCTV cameras can support a minimum of 1920 x 1080 – but may be set to a lower resolution if not needed.
- 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.
- The quality of the images can be influenced by factors such as the type of lighting used.

Examples for recommend resolutions

Scene (Street type)	minimum resolution
Barrier or Gate	800 x 600 px
Roadside Deployment	1280 x 720

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 defines 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.

Examples for recommended focal length

Scene (Street type)	Distance between camera and license plate (m)	recommended lens
Barrier or Gate	2 - 6 m	2 - 8 mm or similar
Highway, road or street	15 - 30 m	15 - 50 mm or similar

NOTE! The lens should be **IR corrected** to avoid out of focus images. IR Corrected lenses should be used on both day/night and monochrome cameras in all lighting conditions in order to achieve a crisp sharp image.

Infrared illumination

Infrared (or IR) illuminators are designed to provide additional illumination that the camera can see but humans normally cannot. In low light conditions, an IR illuminator is used as a spotlight to facilitate 24-hour recognition. It can penetrate darkness and to a lesser extent fog, rain and snow and it eliminates the inconsistency of ambient light.

Infrared illuminators add light across the camera's field of view to produce the desired image quality, lighting up the area and reflecting the plate.

For ALPR, it is recommended that the camera always has an infrared illuminator. This can be built into the camera or added as an external unit providing that it is placed very close to the camera lens.

Recommendations on mounting and adjusting.

- If you want to recognize license plates on multiple lanes it is generally recommended to mount the camera on a crossbar.
- Use an IR Led to recognize license plates at night or under low light conditions.
- Shutter speed must be high enough to cut the light from car's headlights at night (usually it's about 1/1000). Keep in mind, that too high shutter speed may obscure the edges of the lines (especially shadows).
- Depth of focus is a very important parameter. If you are using a camera with a CS-mount lens, use a fixed lens. Fixed lens are better for license plate recognition due to greater depth of focus. Megapixel lens is also strongly recommended.
- Respect changing light conditions (e. g. due to sunrises and sunset) when choosing the place of mounting. Direct sunlight beams can distort a picture. If the cars facing a direct sunlight consider using a lens with auto iris mode.
- If mounting a camera on a roadside pole check how the pole reacts to heavy cars or a convoy of cars. Some poles have tangible tremor, this could make license plate recognition almost impossible.

- It is recommended to turn down WDR and BLC. In most cases, they will make the picture more pretty, but at the cost of smudging details like an edges of letters in the license plate. For the same reason keep digital noise reduction as low as possible.
- On certain rare conditions there may be a cases of false detections e. g. because of recognizing image parts that structurally or semantically look similar to a license plate(e. g. fences or ads). To minimize this:
  - Adjust the region of interest accordingly. It may be a good idea to make it smaller, or change it’s shape, omitting the parts, which potentially may be false detected.
  - Adjust the min and max license plate settings according to upper instructions do not leave a default 130 - 300.
  - There may be cases, when the best performance will occur by changing angle of lens or moving the camera. In some cases, shooting a front license plate is better.

Activation of the Certified App Interface

CAUTION!
The Vaxtor LPR incl. Vehicle Make, Model, Color and Class App does not consider obscure areas defined for the live image. Therefore there is no pixelation in obscure areas while configuring the app and during image analysis by the app.

NOTE!
The user must have access to the setup menu (http(s)://<Camera IP address>/control). Therefore check the user rights of the camera.

1. In the camera web interface, open: **Setup Menu / Certified App Settings** (http(s)://<Camera IP address>/control/app_config).

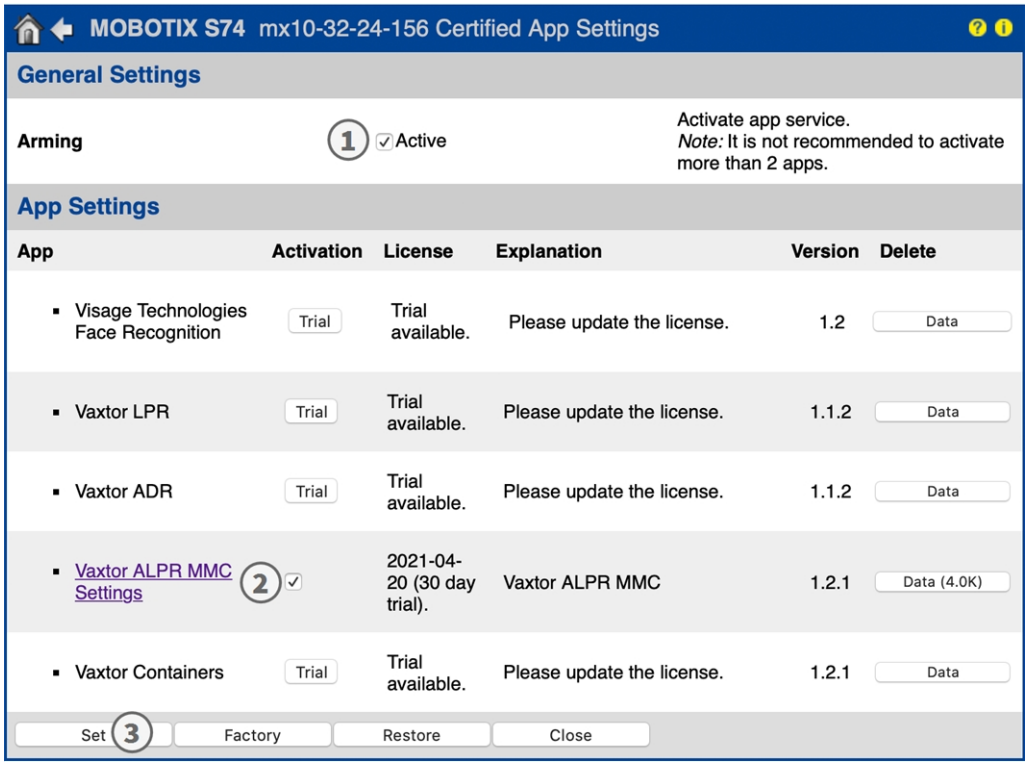

Fig. 12: Activation of Certified Apps

2. Under **General Settings** activate the **Arming** ① of the app service (see screenshot).
3. Under **App Settings** check the **Activation** ② option and click **Set** ③ .
4. Click on the name of the App to be configured to open the Apps user interface.
5. For configuration of the App see Configuration of Vaxtor LPR incl. Vehicle Make, Model, Color and Class App, p. 26

Configuration of Vaxtor LPR incl. Vehicle Make, Model, Color and Class App

NOTE! For best performance and results in LPR and ADR processing make sure to have scene set up to meet the Camera, image and scene requirements, p. 20.

CAUTION! The user must have access to the setup menu (http(s)://<Camera IP address>/control). Therefore check the user rights of the camera.

1. In the camera web interface, open: **Setup Menu / Certified App Settings** (http(s)://<Camera IP address>/control/app_config).
2. Click on the name of the **Vaxtor LPR incl. Vehicle Make, Model, Color and Class App**.

The configuration window of the app appears with the following options:

Basic Settings

Multiple countries can be selected from more to less probability of occurrence. Therefore the following configurations should be taken into account:

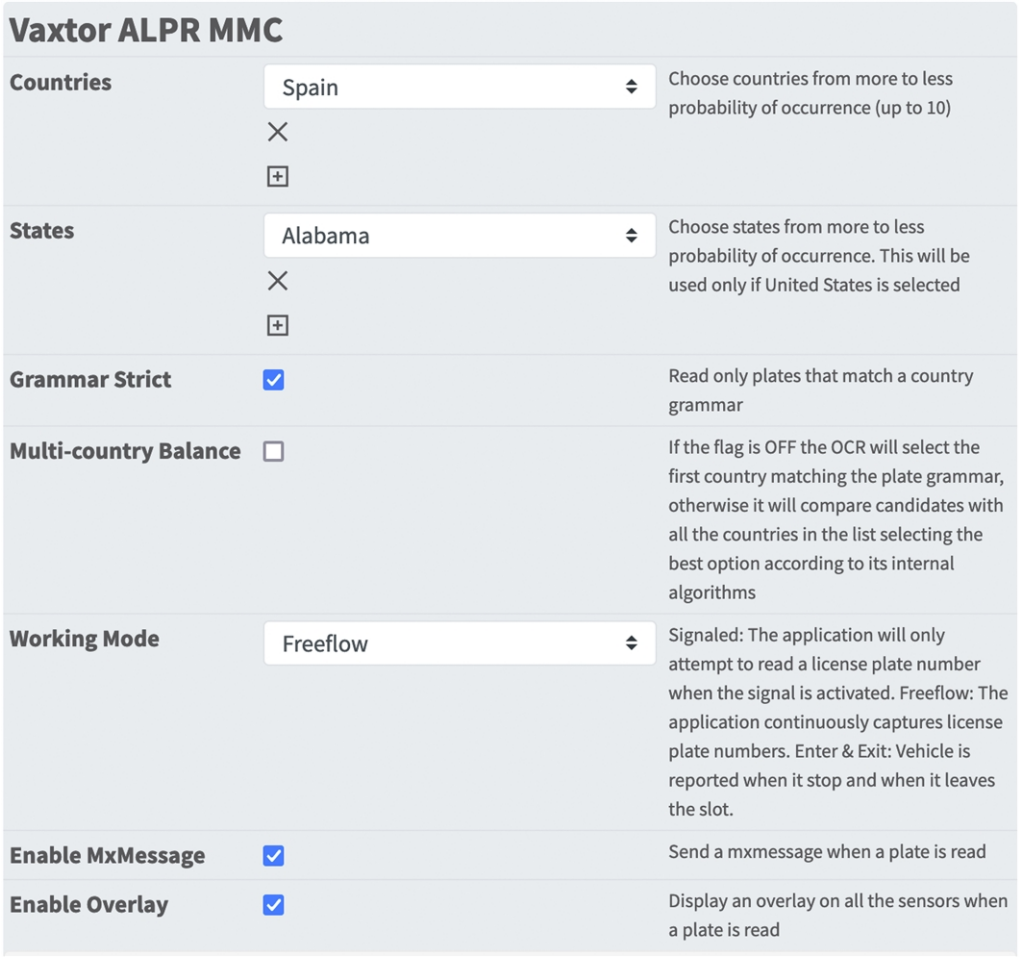

Fig. 13: Recognition zones

Countries: Select at least one country and ensure that you select in the more to less probability of occurrence.

To add country select it and click the **+** button.

To remove a country click on the **x** button beside it.

States:*This will be used only if United States is selected!* Select at least one country and ensure that you select in the more to less probability of occurrence.

NOTE! The same neural engine (used for matching character shapes) is used for all of the Americas Selecting the state simple loads the possible syntax (grammar) for those states to help with the letter O and zero for example. Other states not in the list will still be recognized.

Grammar strict: Check to force the Engine to only use the syntax from countries or states that you have selected. Plates that do not match these rules will not be reported. This is the recommended option for using ALPR for access control where exact matches are required

> **NOTE!** In the USA, the same license plates of various other states can be on the road in one state and thus be detected. The recommended setting is OFF.

Multi country balance: This option only applies when more than one country is defined in the selected countries list. If the flag is OFF (default) the OCR will select the first country matching the plate grammar, otherwise it will compare candidates with all the countries in the list selecting the best option according to its internal algorithms.

> **NOTE!** Keep this set to OFF unless there is a high probability of having plates from different countries in equal numbers. e.g. on the border between two countries.

Working mode: The following modes are available:
Free flow: The application continuously captures license plate numbers.

Signaled: The application will only attempt to read a license plate number when the signal (trigger) is activated.

> **NOTE!** In signaled mode an signal ID will be sent with the signal event.

MxMessage: Check to enable the processing of LPR (MMC) events in the MxMessageSystem.

Enable Overlay: Check to enable the display of the license plate recognition result in the live view.

Recognition Areas

A Recognition Area, an area within the video frame where the OCR analytics takes place. You can draw a polygon and choose whether the area to look for plates in Inside or Outside this region. You can set multiple areas to respect complex situations.

> **NOTE!** Using Recognition Area can decrease OCR processing time and also reduce false positives. The whole license plate must be in or out the Recognition Area to pass the test.

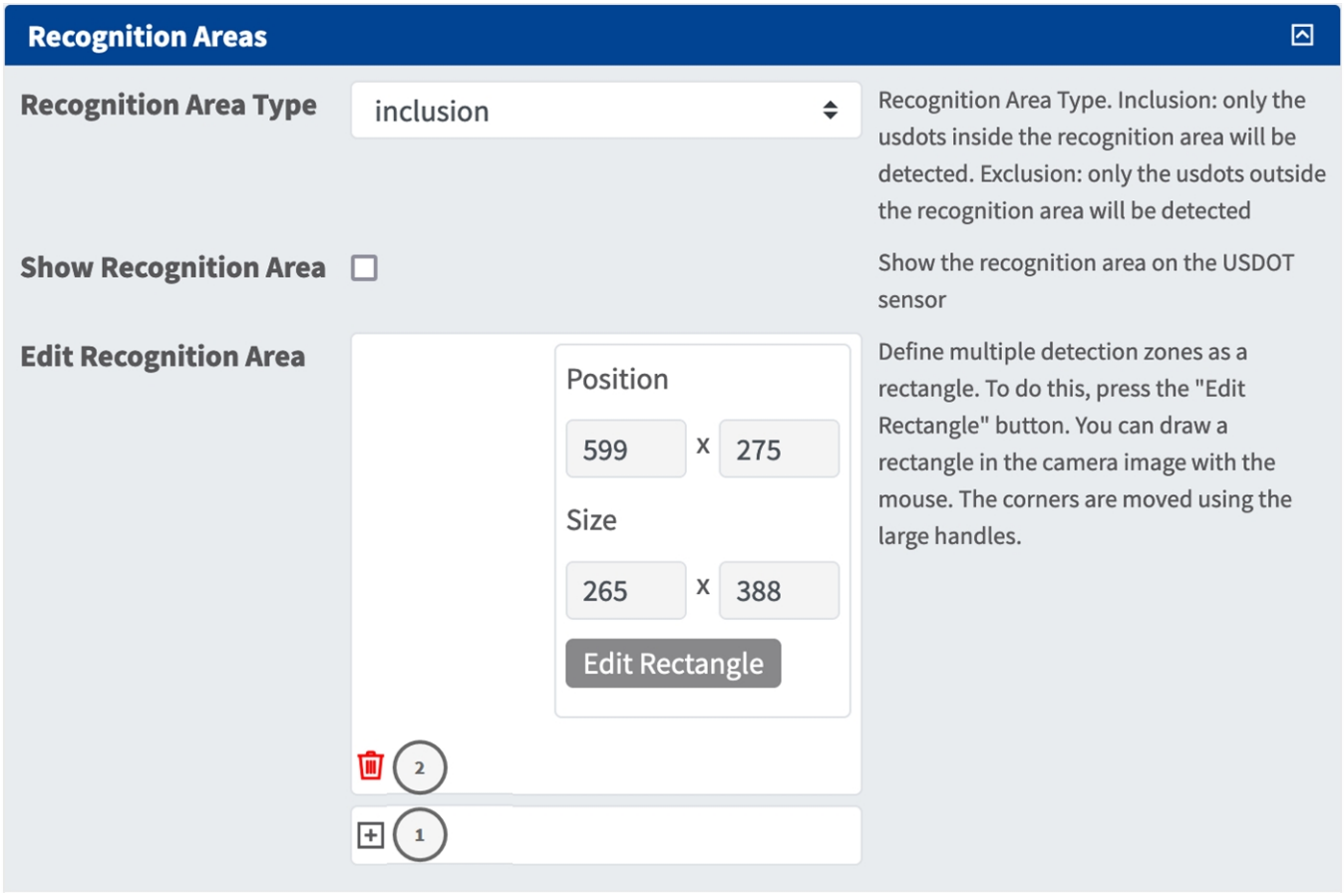

Fig. 14: Recognition Areas

Recognition Area Type: Check to activate the sending of events according to the following configuration

Inclusion: only the plates inside the recognition area will be detected.

Exclusion: only the plates outside the recognition area will be detected.

Show Recognition Area: Check to display the recognition area on the LPR sensor.

Drawing a Recognition Area

1. In the live view hold the **Shift** key and click the upper left corner point of the recognition area.
2. Release the **Shift** key and click on the lower right corner point of the recognition area.
3. In the configuration interface click **Set Rectangle** to adopt the coordinates of the rectangle.
4. Optionally click the **plus** icon to ads another recognition area.
5. Optionally click the **bin** icon to delete a recognition area.
6. Check Draw **Set Rectangle** to activate the recognition areas.

List Management

You can define a black list and a white list with up to 1000 license plates per list. If a license plate from one of the lists is recognized, a corresponding event is .sent within the MxMessageSystem of the camera.

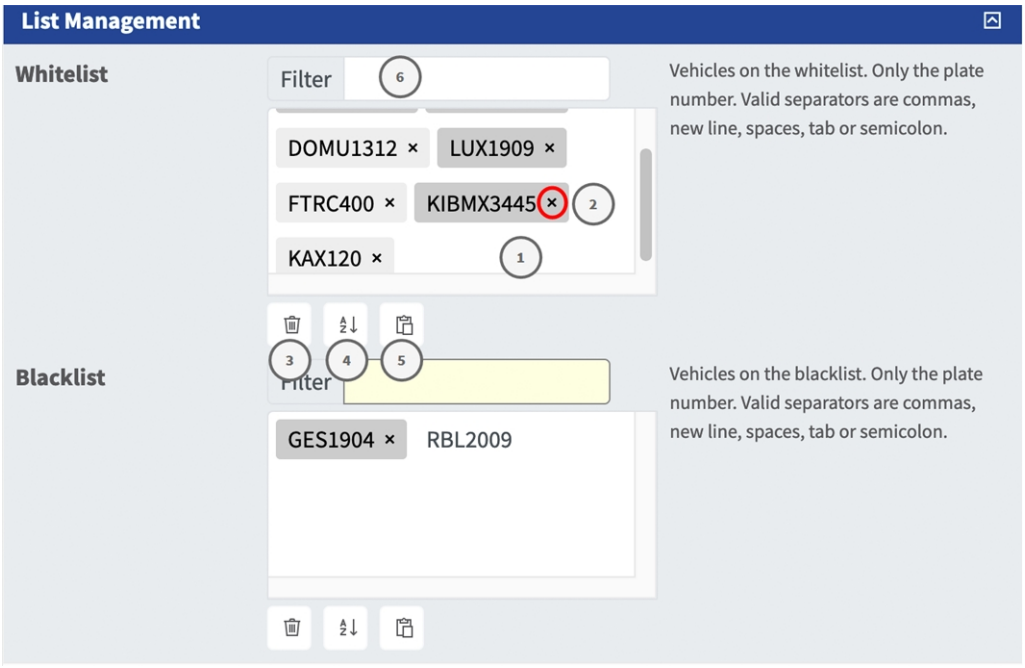

Fig. 15: Black and white lists

Adding a license plate to a list

1. Enter the license plate text into the text field ① and click **Enter**.

Adding multiple license plates from a text file

1. Make sure that your text file contains one license plate per line.
2. Copy the relevant license plates from the text file and paste them into the text field ① .

Deleting a license plate from a list

1. Click on the small x ② to the right of the license plate number.

Deleting all license plates from a list

1. Click the trash icon ③ .

Sorting all license plates from a list alphabetically

1. Click the sort icon ④ .

Copy all license plates from a list to the clip board

1. Click the copy to clipboard icon ⑤ .

Filtering license plates

1. Enter the license plate or parts of it into the filter text field ⑥ . Only license plates containing the filter text are displayed accordingly.

Video

In the video tab you can specify video quality of the video to be analyzed.

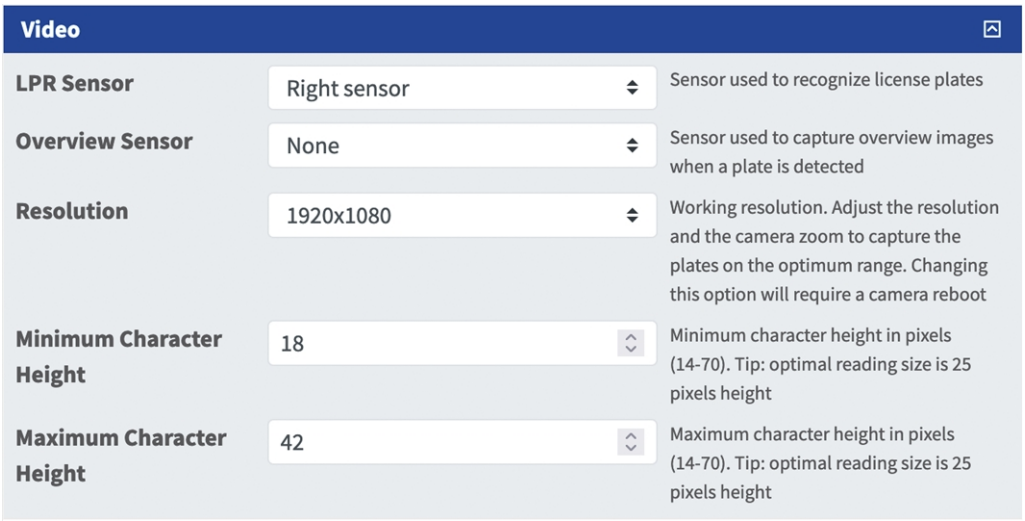

Fig. 16: Video

LPR sensor: Select the camera sensor to be used for License plate recognition.

NOTE! Changing this option requires a camera reboot.

Overview Sensor: Optionally select a sensor used to capture overview images when a plate is detected.
Resolution: Set the working resolution (current max = 1080p). Adjust the resolution and the camera zoom to capture the plates on the optimum range.

NOTE! Changing this option requires a camera reboot.

Minimum Character Height: the minimum height that a license plate's characters should be before being read. The characters should be about 20-30 pixels high.

> **NOTE!** For small license plates, e. g most Arabic plates or plates with additional small characters e.g. Costa Rica a minimum character height of 30 pixels is recommended.
> The recommended difference between the min and max heights is about 10 pixels

Maximum Character Height: the maximum height is about 20-30 pixels.

> **NOTE!** The recommended difference between the min and max heights is about 10 pixels.

License Plates

In the License Plates tab you can refine the settings for the license plates to be analyzed.

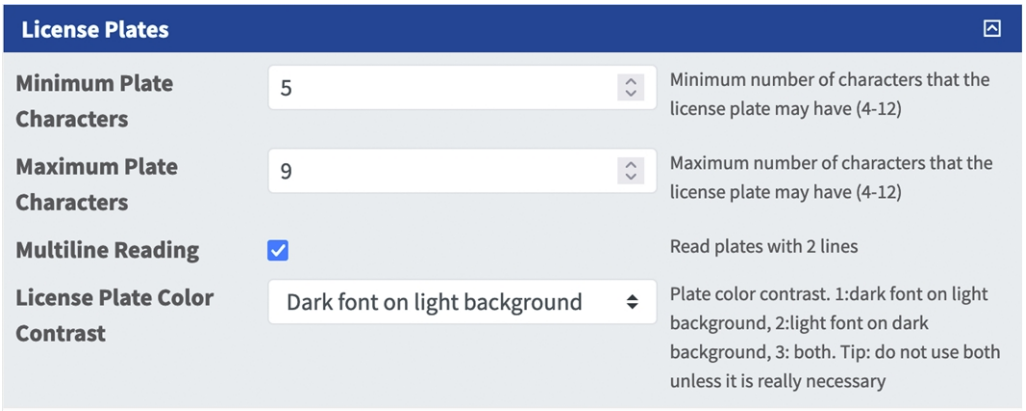

Fig. 17: License Plates

Minimum Plate Characters: Minimum number of characters that the license plate may have (4-12).
Maximum Plate Characters: Maximum number of characters that the license plate may have (4-12).
Multiline Reading: set if license plates with 2 lines should be read.
Maximum Character Height: the maximum height is about 20-30 pixels.
License Plate Color Contrast: The following options are available:

dark font on light background
light font on dark background
both

> **NOTE!** Do not use both unless it is really necessary.

Environment

In the Environment tab you can set parameters in respect the environmental situation the license plates are to be analyzed.

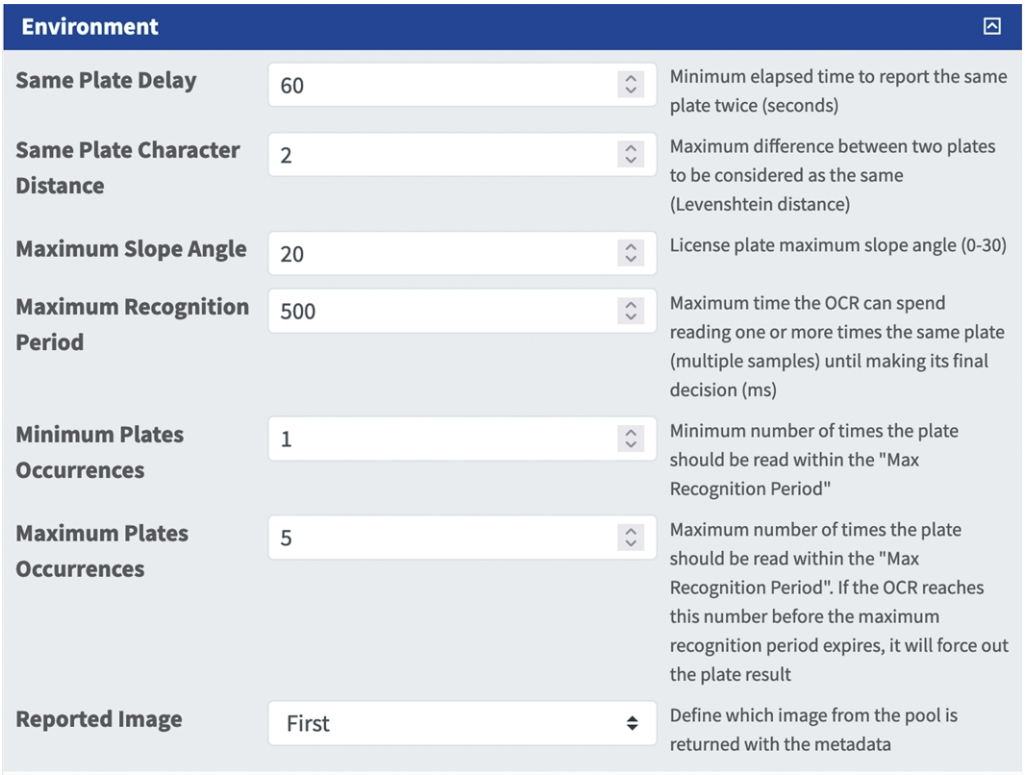

Fig. 18: Environment

Same Plate Delay: Minimum elapsed time in seconds to report the same plate twice. This is to prevent multiple reporting of the same plate in situations when the traffic is slow or stationary.

NOTE! If a vehicle stops at a barrier and the plate is reported but the car doesn't move for 30 seconds, then this delay should be set to say 60 seconds or more to prevent a duplicate read.

NOTE! When using triggered mode, it is recommended that you set the delay to 0 seconds.

Same Plate Character Distance: Set the number of characters that two readings of the same license plate must differ by to be considered different. The camera is capable or reading a plate 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: Set the angle of slope of a plate that the engine should attempt to read up to (0-30°).
Maximum Recognition Period: Maximum time the OCR can spend reading one or more times the same plate (multiple samples) until making its final decision (ms)
Minimum Plates Occurrences: Minimum number of times the plate should be read within the "Max Recognition Period" before being reported.
Maximum Plates Occurrences: Set the maximum number of times that a plate should be read before being reported (this may happen before the timeout).

Reported Image: Define which image from the pool is returned with the meta data. A plate is normally read several times as it passes through the camera's field of view. You may want to use the largest (Last) image for oncoming traffic & the First image for vehicles moving away from the camera.

OCR

In the OCR (Optical Character Recognition) tab you can set parameters to ensure the best possible recognition results.

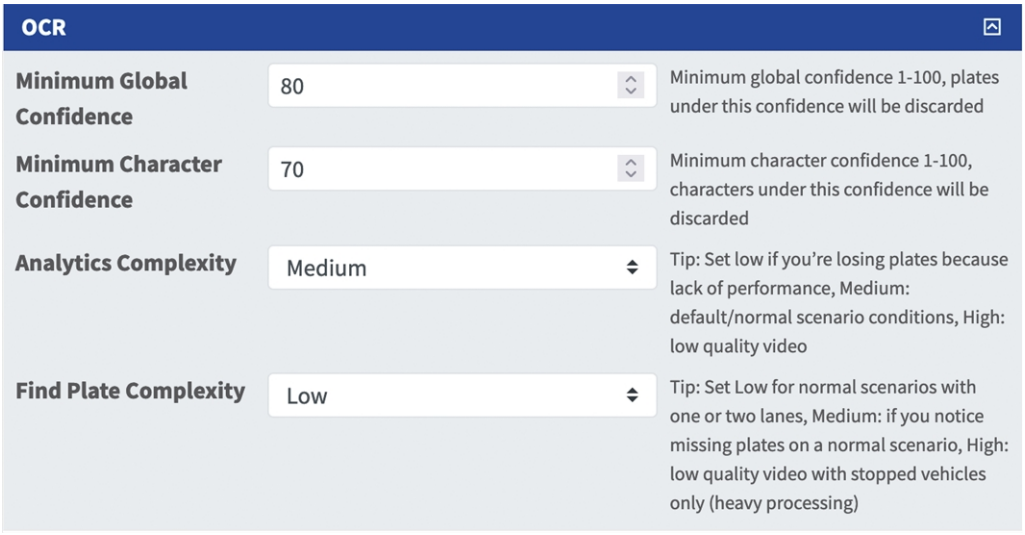

Fig. 19: OCR

Minimum Global Confidence: Set the minimum confidence level that the whole license plate read 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 plates in very bad condition but want to read them.

NOTE! Setting the Minimum Global Confidence too low will cause the OCR engine attempt to read other items such as vehicle signage etc.

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

NOTE! In regions with open grammars such as the USA keep these two values high, e.g. 90-80 respectively. Higher values mean a lower probability of false positives and a lower probability of missing plates.

Analytics Complexity: This is the complexity of the analytics to be applied during the ALPR Engine's stage of plate reading. Set this according to the OCR mode and type of traffic expected. There are three options.

Low: Recommended for very high-speed traffic where the OCR needs to work faster and your preference is for plate 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 signal (triggered).

CAUTION! Higher complexities give more accurate reading but make the ALPR engine run slower.

Find Plate Complexity: This is the complexity of the analytics to be applied during the ALPR 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

CAUTION! Higher complexities give more accurate reading but make the ALPR engine run slower.

MMC

In the MMC (Make, Model, Color) tab you can set parameters to define the detection results.

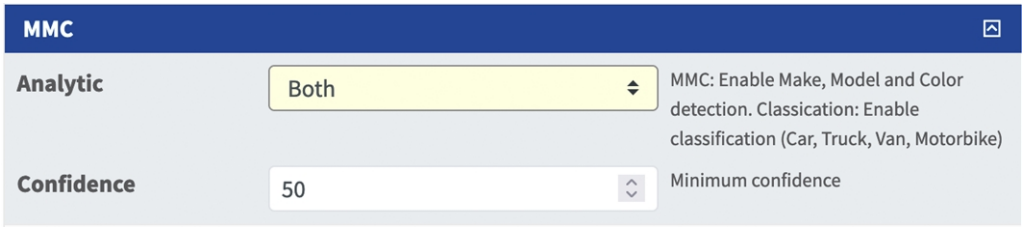

Fig. 20: OCR

Analytic: The following options are available

None: Select to disable MMC and Classification

MMC: Select to enable Make, Model and Color detection.

Classification: Select to enable classification (Car, Truck, Van, Motorbike)

Both(Default) Select to enable enable MMC and Classification

Confidence: Set the minimum confidence level that the MMC and Classification analysis must meet in order to be accepted. The recommended value is 50 (default). Set lower if you see some vehicles in bad environment conditions but want to read them.

Reporting

Vaxtor LPR incl. Vehicle Make, Model, Color and Class App is able to output all plate reads in real time using a variety of standard protocols so that the plate reads can be accepted remotely by a variety of programs including Vaxtor’s powerful Back Office - Helix, which can accept and store plate reads in real time from hundreds 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.

Reporting

Retry Notifications	☑	Retry failed notifications (Helix-6 and JSON only)
Retry Period	1	Amount of seconds between notification retries
Send Test	☐	Send a fake read (TEST) when settings are stored or when the camera is started

Text Overlay

Overlay Template	$date$ - $plateutf8$	Template to use on the overlay, check the manual for available keywords
Fade out timer	0	Amount of seconds that the overlay will be visible or 0 to make it perpetual
Show plate image	☐	Display a small image with the plate number detected
Image position (x)	5	Coordinate position for the image (x)
Image position (y)	50	Coordinate position for the image (y)

MxMessage

MxMessage Template	{"area": "$roiid$", "direction":"$direc	Defines the template of customized part of the MxMessage. Check the manual for available keywords
Subpath		

MOBOTIX HUB Analytic Event

Enable	☐	Enable MOBOTIX HUB Analytic Event reporting

MOBOTIX HUB Transaction

Enable	☐	Enable MOBOTIX HUB Transaction reporting

Vaxtor Helix-6

Enable	☐	Send all results to the configured Helix-6 server

JSON

Enable	☐	Enable JSON HTTP/HTTPS POST reporting

XML

Enable	☐	Enable XML HTTP/HTTPS POST reporting

Milestone Analytic Event

Enable	☐	Enable analytic event reporting

TCP Server

Enable	☐	Enable TCP server reporting

FTP

Enable	☐	Enable FTP reporting

Network Optix

Enable	☐	Enable Network Optix reporting

Genetec Security Center

Enable	☐	Enable Genetec reporting

Genetec LPR Plugin

Enable	☐	Enable Genetec LPR Plugin reporting

UTMC

Enable	☐	Enable UTMC reporting

Fig. 21: Reporting

Retry notifications: Check to retry failed notifications (Helix-6 and JSON only).

Send test: Check to send a fake read (TEST) when settings are stored or when the camera is started.

Text Overlay

Overlay Template: Define template to use on the overlay. Check the Template Fields for available keywords.

MxMessage

MxMessage Template: Define template of customized part of the MxMessage . Check the Template Fields for available keywords.

Subpath: Define a subpath for the MxMessage. Check the Template Fields for available keywords.

Vaxtor Helix-6 : Helix-6 protocol is an encrypted version of the Vaxtor protocol.

Enable : Check to send all results to the configured Helix-6 server.

JSON : JSON is a compact data format in an easy-to-read text form for data exchange between applications.

Enable : Check to enable JSON HTTP/HTTPS POST reporting.

Variables / Template fields

Vaxtor LPR incl. Vehicle Make, Model, Color and Class App only reserved variables

Variable	Explanation
$category$	License plate category for countries that support it
$country$:	3 letter country code
$direction$	Enumerate with the vehicle direction (0: Unknown, 1: Towards, 2: Away, 3: Stopped)
$multiplate$	Amount of times that the license plate has been read before reporting
$plate$:	License plate text / number
$plateimage$	Plate crop JPEG image encoded in base64
$platejpegsize$	JPEG size in bytes
$plateutf8$:	License plate text / number in UTF8 format
$processingtime$	Processing time in milliseconds
$roiid$	Recognition Area ID where the li censeplate number is found
$state$	License plate state (for US license plates only)

Shared reserved variables

Variable	Description
$absolutebottom$	Absolute bottom position of the code 0..1 with 2 decimal places
$absoluteleft$	Absolute left position of the code 0..1 with 2 decimal places
$absoluteright$	Absolute right position of the code 0..1 with 2 decimal places
$absolutetop$	Absolute top position of the code 0..1 with 2 decimal places
$blacklist$	If the code is on the black list, the text in the ‘if clause’ will be displayed
$bottom$	Bottom coordinate for the code on the image (pixels)
$charheight$	Average charheight (pixels)
$codeimage$	Code cropped image
$codeimagesize$	Code cropped image size in bytes
$confidence$	Global confidence (0-100)
$date$	Timestamp in ISO8601 format
etx	
$country$:	3 letter country code
day	UTC day
$height$	OCR image height
$hour$	UTC hour
$image$	JPEG encoded in base64
$imagesize$	Size of saved complete image
ip	Camera IP address
$left$	Left coordinate for the code on the image (pixels)
$localday$	Camera local time day
$locahour$	Camera local time hours
$localmin$	Camera local time minutes
$localmonth$	Camera local time month
$localsec$	Camera local time seconds
$localyear$	Camera local time year
min	UTC minute

Variable	Description
$month$	UTC month
$nolist$	If the code is not on a list, the test in the ‘if clause’ will be displayed
$ocrtime$	OCR analytic time in milliseconds
$overviewimage$	Overview JPEG image encoded in base64$month$
$overviewimagesize$	Overview image size in bytes
$patch$	JPEG of the plate crop image encoded in base64
$patchsizeinbytes$	Size of the image of recognised text (the patch image)
$processingtime$	Processing time in milliseconds
$readconfidence$	Global confidence value
$right$	Right coordinate for the code on the image (pixels)
sec	UTC seconds
$sensor$	Sensor (0, 1)
$signalid$	ID string specified when a read is triggered via http request
stx	Character control STX in HEX for Start of Text (02)
$timestamp$	yyyy-MM-ddTHH:mm:sszzz
top	Top coordinate for the code on the image (pixels)
$width$	OCR image width
$whitelist$	If the code is on the white list, the text in the ‘if clause’ will be displayed
$year$	UTC year

Advanced

In this section you find useful tools for calibration and trouble shooting.

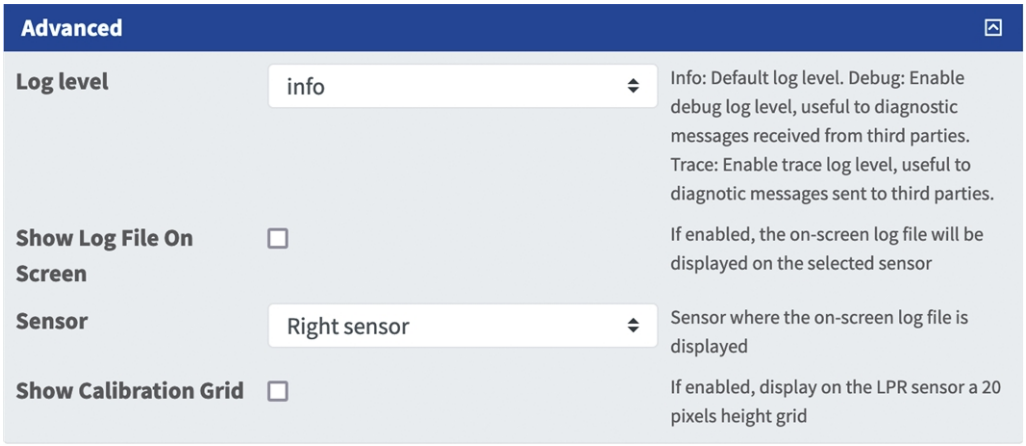

Fig. 22: Advanced

Log level: Select a debug level to generate a log file, which can be helpful e.g. for trouble shooting.

Info: Default loge level

Trace: Select e. g. for diagnostic messages received from third parties

Debug: Select for complete log files for debug purposes

Show log file on screen: Check to display the on-screen log file on the selected sensor

Sensor: Select the sensor on which the on-screen log file is displayed.

Storing the Configuration

To store the configuration you have the following options:

Fig. 23: Storing the configuration

- Click on the **Set** button to activate your settings and to save them until the next reboot of the camera.
- Click on the **Factory** button to load the factory defaults for this dialog (this button may not be present in all dialogs).
- Click on the **Restore** button to undo your most recent changes that have not been stored in the camera permanently.
- Click on the **Close** button to close the dialog. While closing the dialog, the system checks the entire configuration for changes. If changes are detected, you will be asked if you would like to store the entire configuration permanently.

After successfully saving the configuration, the event and meta data are automatically sent to the camera in case of an event.

MxMessageSystem

What is MxMessageSystem?

MxMessageSystem is a communication system based on name oriented messages. This means that a message must have a unique name with a maximum length of 32 bytes.

Each participant can send and receive messages. MOBOTIX cameras can also forward messages within the local network. This way, MxMessages can be distributed over the entire local network (see Message Area: Global).

For example, a MOBOTIX 7 series camera can exchange an MxMessage generated by a camera app with an Mx6 camera that does not support certified MOBOTIX apps.

Facts about MxMessages

- 128-bit encryption ensures privacy and security of message content.
- MxMessages can be distributed from any camera of the Mx6 and 7 series.
- The message range can be defined individually for each MxMessage.
  - **Local:** Camera expects an MxMessage within its own camera system (e.g. through a Certified App).
  - **Global:** the camera expects an MxMessage that is distributed in the local network by another MxMessage device (e.g. another camera of the 7 series equipped with a certified MOBOTIX app).
- Actions that the recipients are to perform are configured individually for each participant of the MxMessageSystem.

MxMessageSystem: Processing the automatically generated app event

Checking automatically generated app events

NOTE! After successfully activating the app (see Activation of the Certified App Interface, p. 25), a generic message event for this specific app is automatically generated in the camera.

1. Go to **Setup-Menu / Event Control / Event Overview**. In section **Message Events** the automatically generated message event profile is named after the application (e. g. VaxALPRMMC).

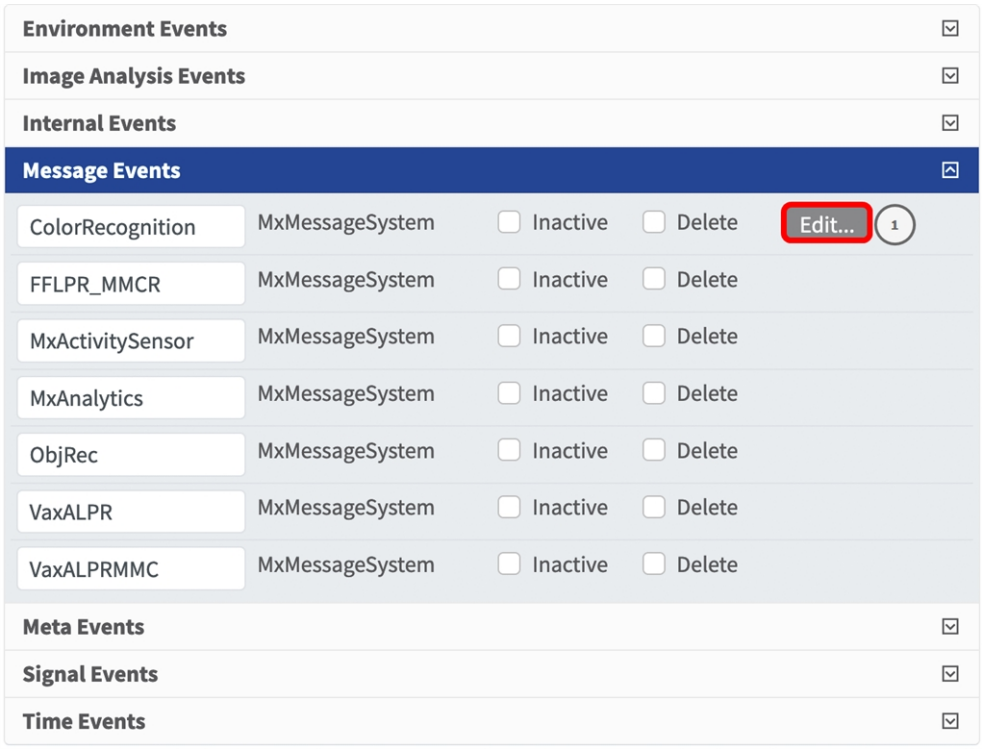

Fig. 24: Example: Generic message event from Vaxtor LPR incl. Vehicle Make, Model, Color and Class App

2. Click **Edit**① to display a selection of all configured message events.

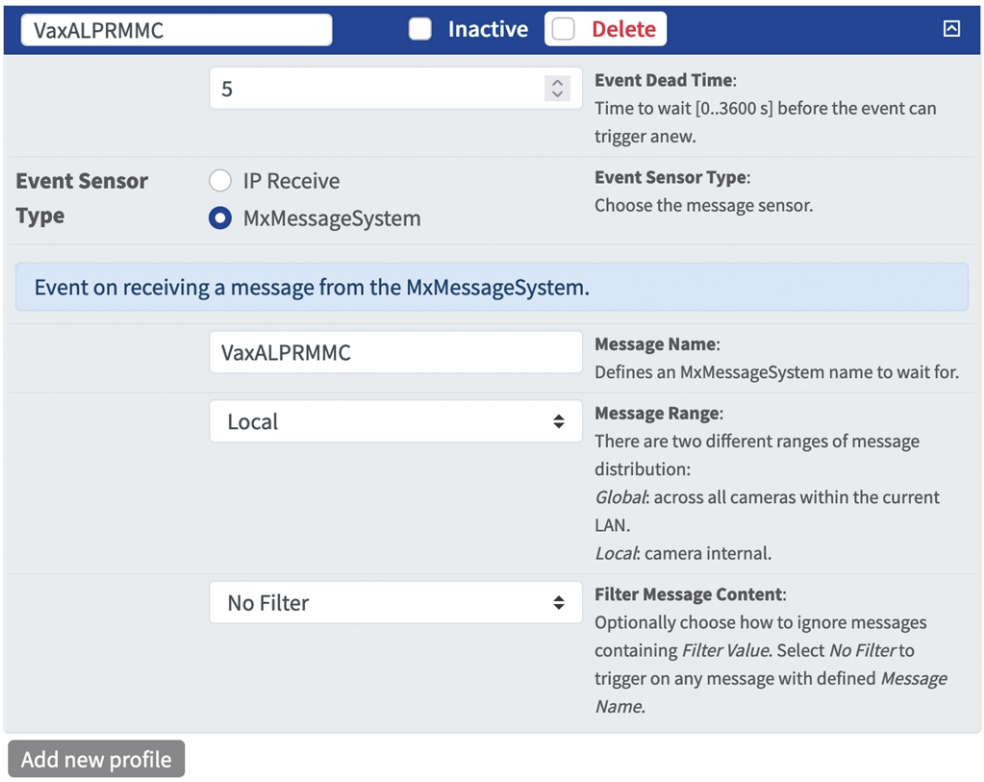

Fig. 25: Example: Generic message event details - no filter

Action handling - Configuration of an action group

CAUTION!
To use events, trigger action groups or record images the general arming of the camera must be enabled (http(s)/<Camera IP address>/control/settings)

An action group defines which action(s) is (are) triggered by the Vaxtor LPR incl. Vehicle Make, Model, Color and Class App event.

1. In the camera web interface, open: **Setup Menu / Action Group Overview** (http(s)://<Camera IP address>/control/actions).

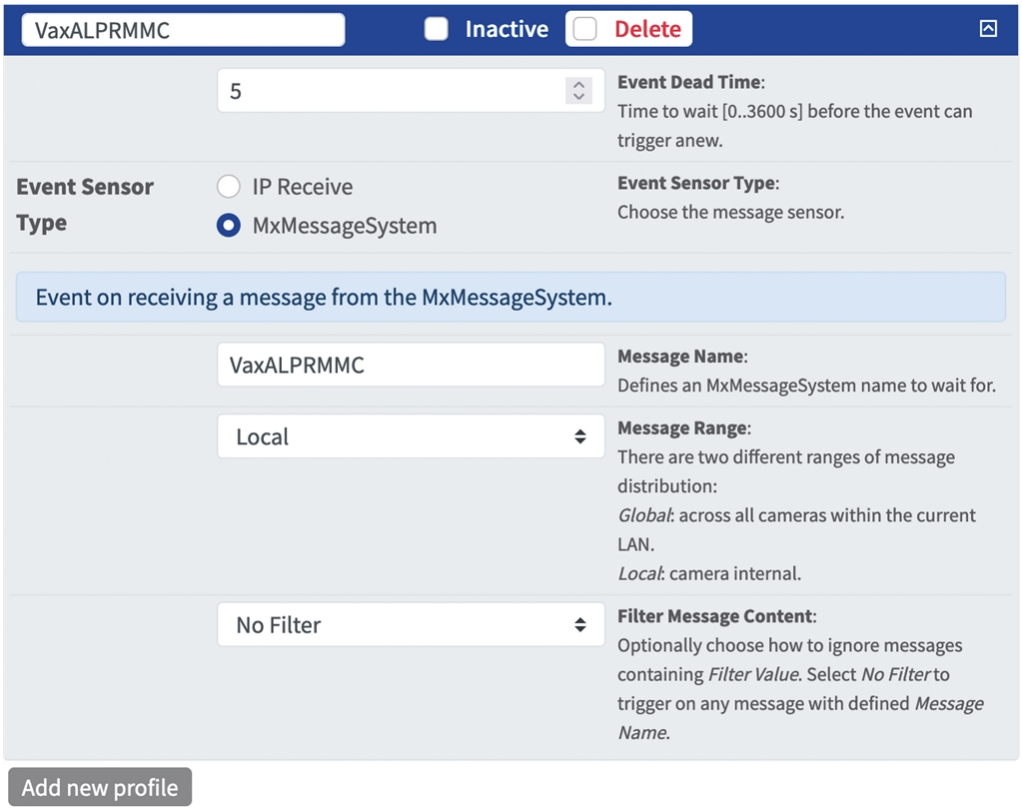

Fig. 26: Defining Action Groups

- Click **Add new group** and give a meaningful name.
- Click **Edit**, to configure the group.

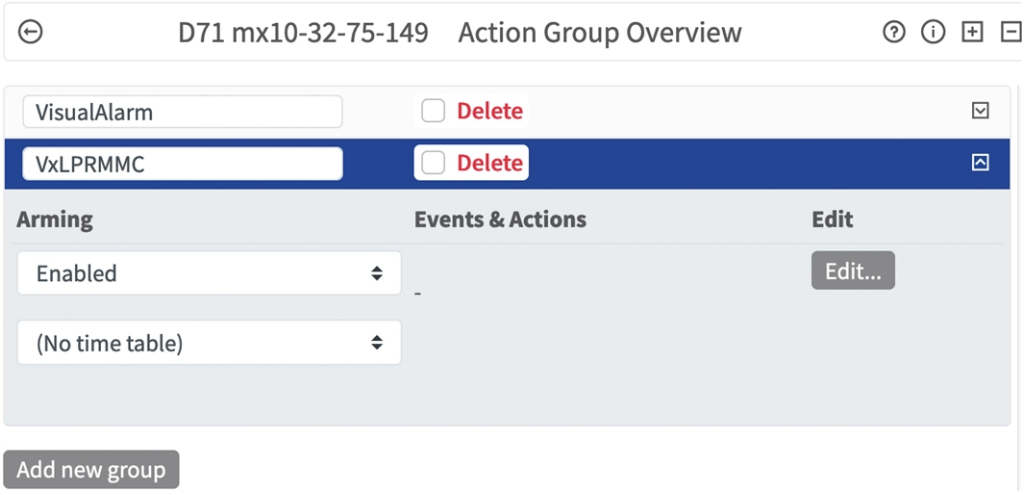

Fig. 27: Configuring an Action Group

1. Enable **Arming** of the Action Group.
2. Select your message event in the **Event selection** list. To select multiple events, press the shift key.
3. Click **Add new Action**.
4. Select a proper action from list **Action Type and Profile**.

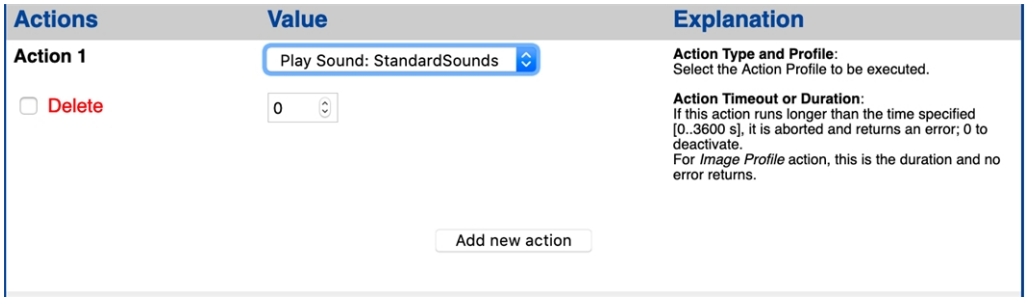

Fig. 28: Select Action Type- and Profile

NOTE!
If the required action profile is not yet available, you can create a new profile in the Admin Menu sections "MxMessageSystem", "Transfer Profiles" and "Audio and VoIP Telephony".

NOTE!
If necessary, you can add further actions by clicking the button again. In this case, please make sure that the "action chaining" is configured correctly (e.g. at the same time).

5. Click on the **Set** button at the end of the dialog box to confirm the settings.

Action settings - Configuration of the camera recordings

1. In the camera web interface, open: **Setup Menu / Event Control / Recording**(http(s)/<Camera IP address>/control/recording).

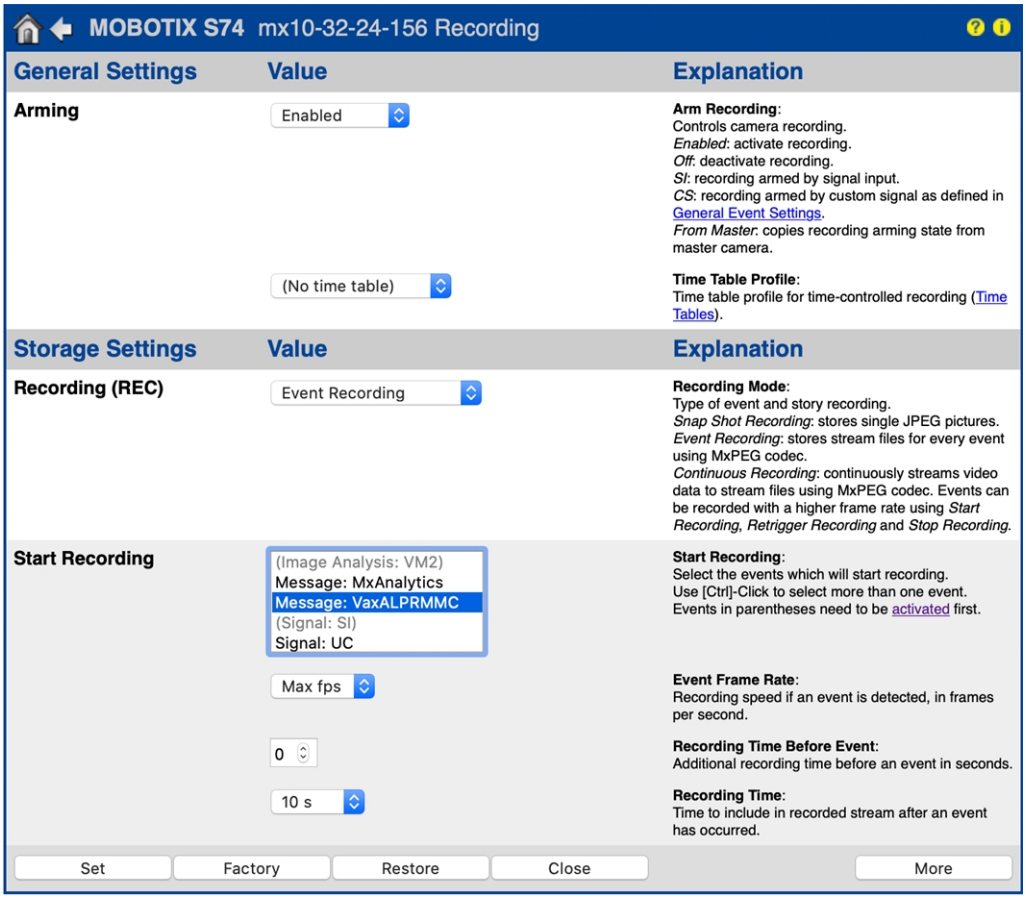

Fig. 29: Configuration of camera recording settings

2. Activate **Arm Recording**.
3. Under **Storage Settings** / **Recording (REC)** select a **Recording mode**. The following modes are available:
   - Snap Shot Recording
   - Event Recording
   - Continuous Recording
4. In list **Start recording** select the message event just created.
5. Click on the **Set** button at the end of the dialog box to confirm the settings.
6. Click on **Close** to save your settings permanently.

NOTE!
Alternatively, you can save your settings in the Admin menu under Configuration / Save current configuration to permanent memory.

Action handling - Configuration of an action group

CAUTION! To use events, trigger action groups or record images the general arming of the camera must be enabled (http(s)/<Camera IP address>/control/settings)

An action group defines which action(s) is (are) triggered by the Vaxtor LPR incl. Vehicle Make, Model, Color and Class App event.

1. In the camera web interface, open: **Setup Menu / Action Group Overview** (http(s)://<Camera IP address>/control/actions).

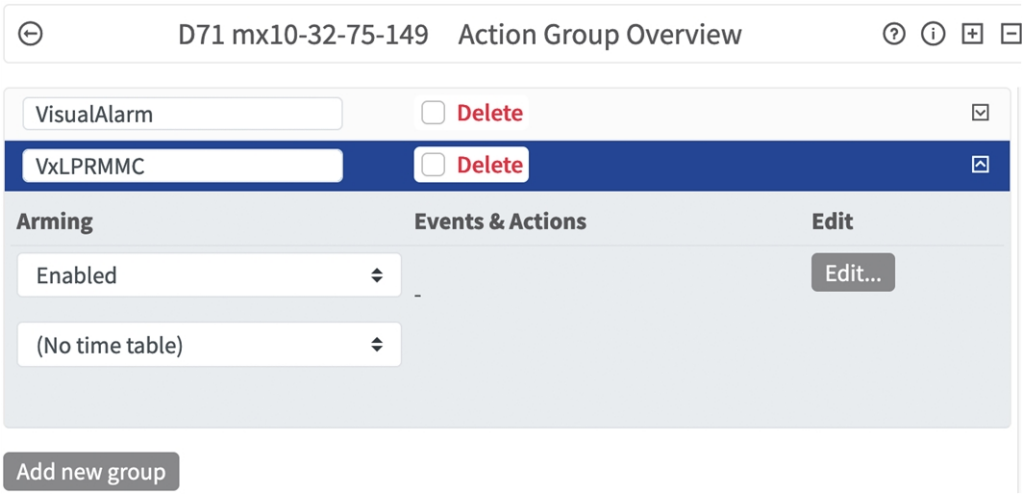

Fig. 30: Defining Action Groups

2. Click **Add new group**① and give a meaningful name.
3. Click **Edit**② , to configure the group.

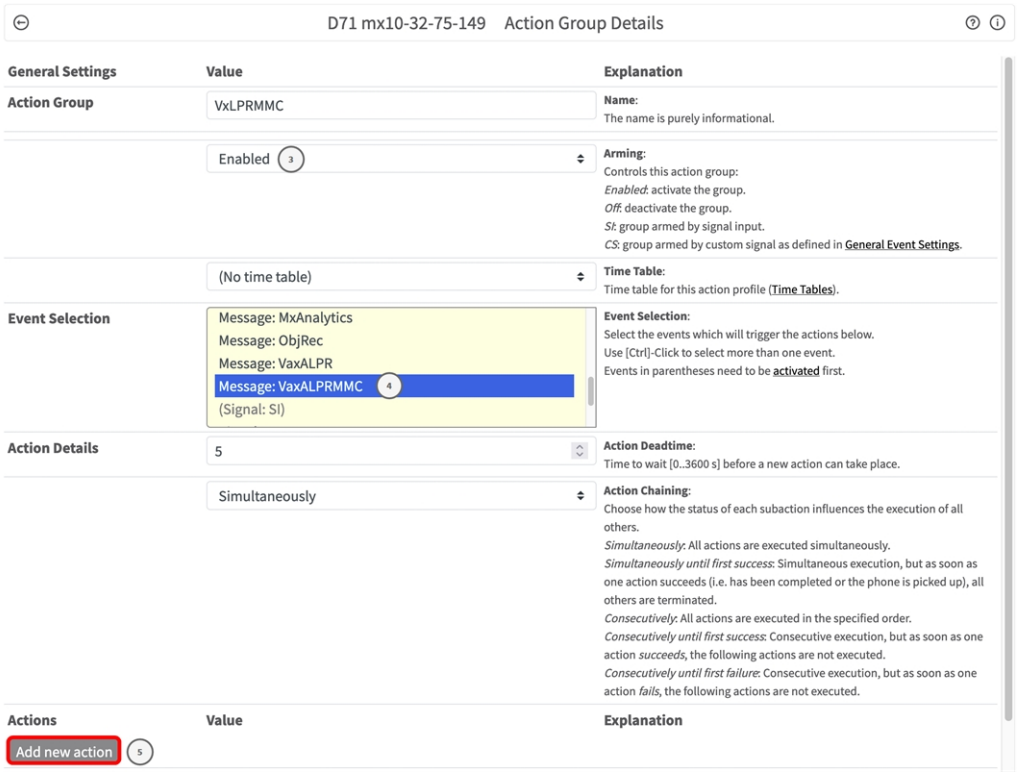

Fig. 31: Configuring an Action Group

4. Enable **Arming** ① of the Action Group.
5. Select your message event in the **Event Selection** list ② . To select multiple events, hold the shift key.
6. Click **Add new Action** ③ .
7. Select a proper action from list **Action Type and Profile** ④ .

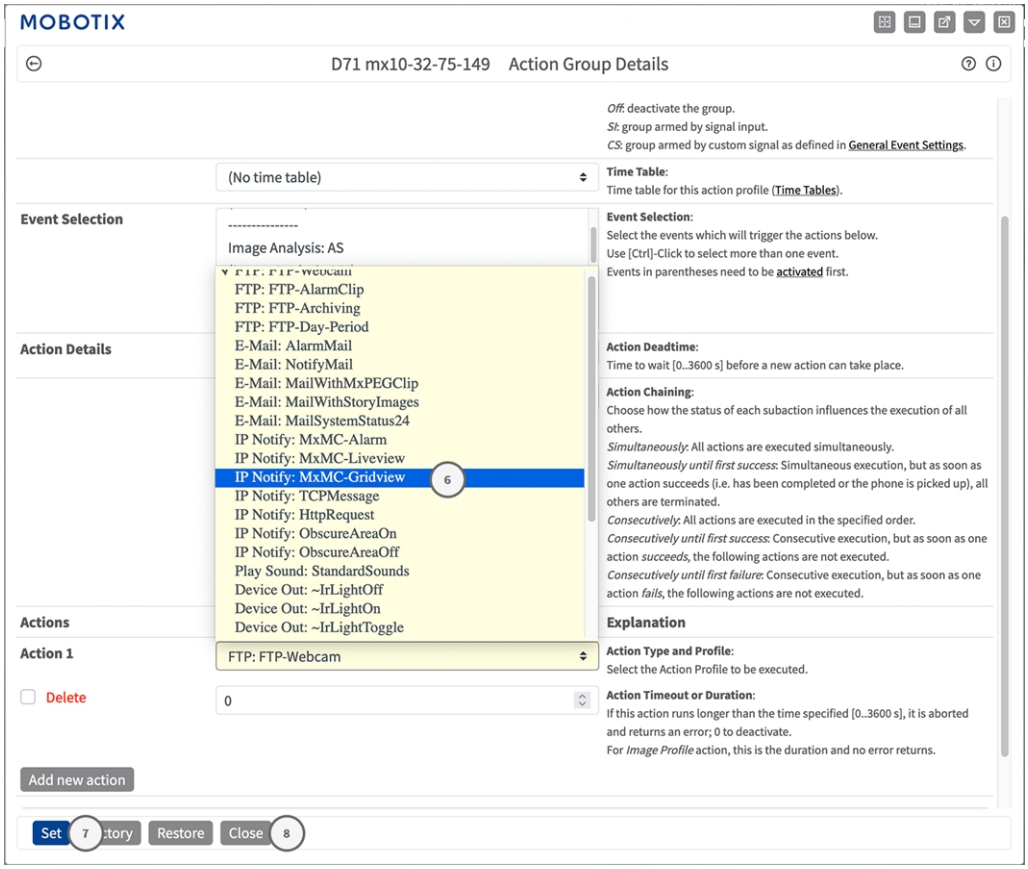

Fig. 32: Select Action Type- and Profile

NOTE! If the required action profile is not yet available, you can create a new profile in the Admin Menu sections "MxMessageSystem", "Transfer Profiles" and "Audio and VoIP Telephony".

If necessary, you can add further actions by clicking the button again. In this case, please make sure that the "action chaining" is configured correctly (e.g. at the same time).

8. Click on the **Set** ⑦ button at the end of the dialog box to confirm the settings.
9. Click on **Close** ⑧ to save your settings permanently.

Action settings - Configuration of the camera recordings

1. In the camera web interface, open: **Setup Menu / Event Control / Recording** (http(s)/<Camera IP address>/control/recording).

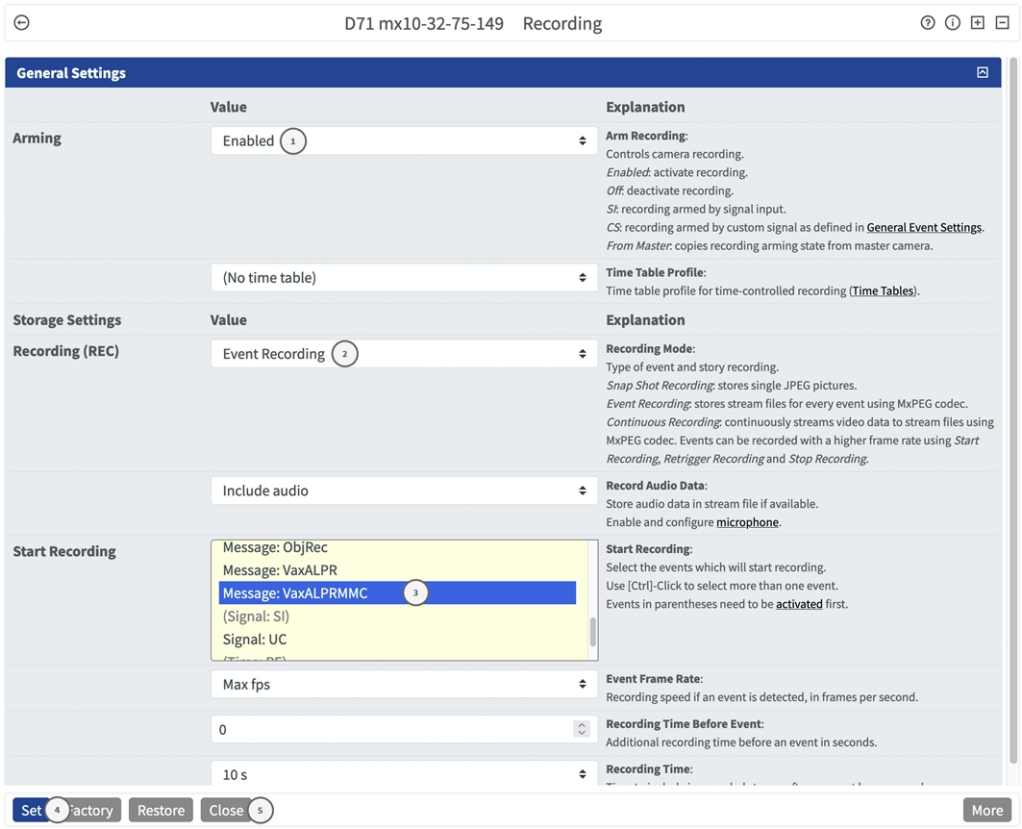

Fig. 33: Configuration of camera recording settings

2. Activate **Arm Recording**① .
3. Under **Storage Settings** / **Recording (REC)** select a **Recording mode**② . The following modes are available:

   - Snap Shot Recording
   - Event Recording
   - Continuous Recording

4. In list **Start recording**③ select the message event just created.
5. Click on the **Set**④ button at the end of the dialog box to confirm the settings.
6. Click on **Close**⑤ to save your settings permanently.

NOTE! Alternatively, you can save your settings in the Admin menu under Configuration / Save current configuration to permanent memory.

Advanced Configuration: Processing the meta data transmitted by apps

Meta data transferred within the MxMessageSystem

For each event, the app also transfers meta data to the camera. This data is sent in the form of a JSON schema within an MxMessage.

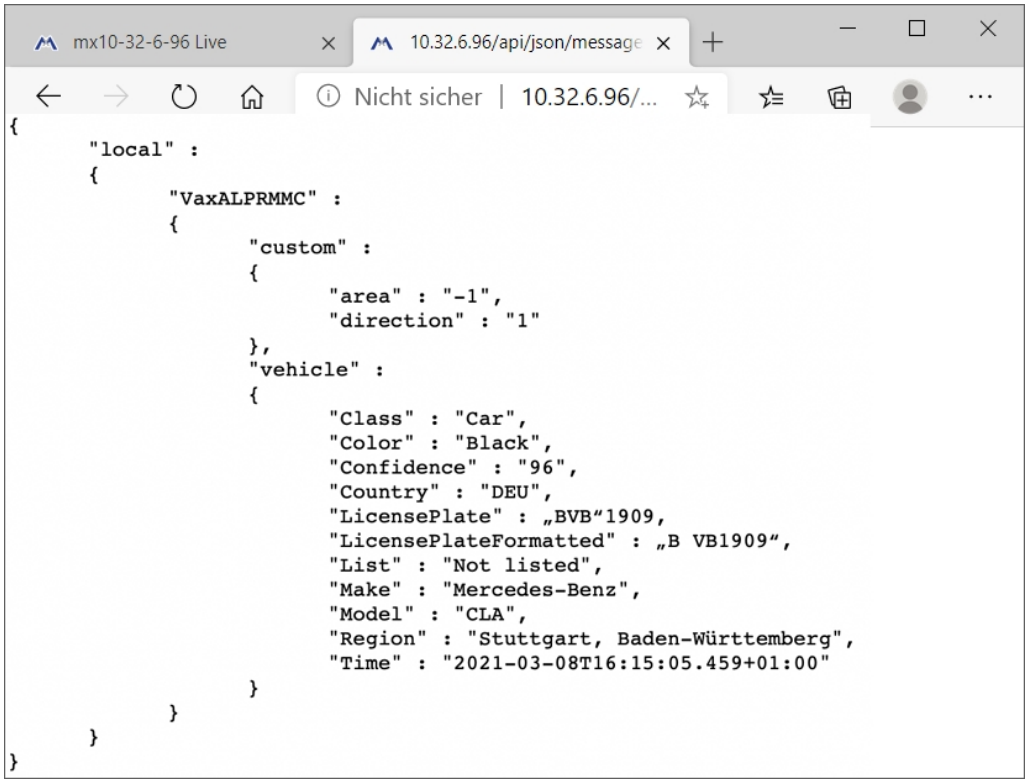

Fig. 34: Example: Meta data transmitted within an MxMessage of the Vaxtor LPR incl. Vehicle Make, Model, Color and Class App

NOTE! To view the meta data structure of the last App event, enter the following URL in the address bar of your browser: http(s)/IPAddresseOfYourCamera/api/json/messages

Creating a Custom Message Event

1. Go to **Setup-Menu / Event Control / Event Overview**. In section **Message Events** the automatically generated message event profile is named after the application (e. g. VaxLPRMMC).

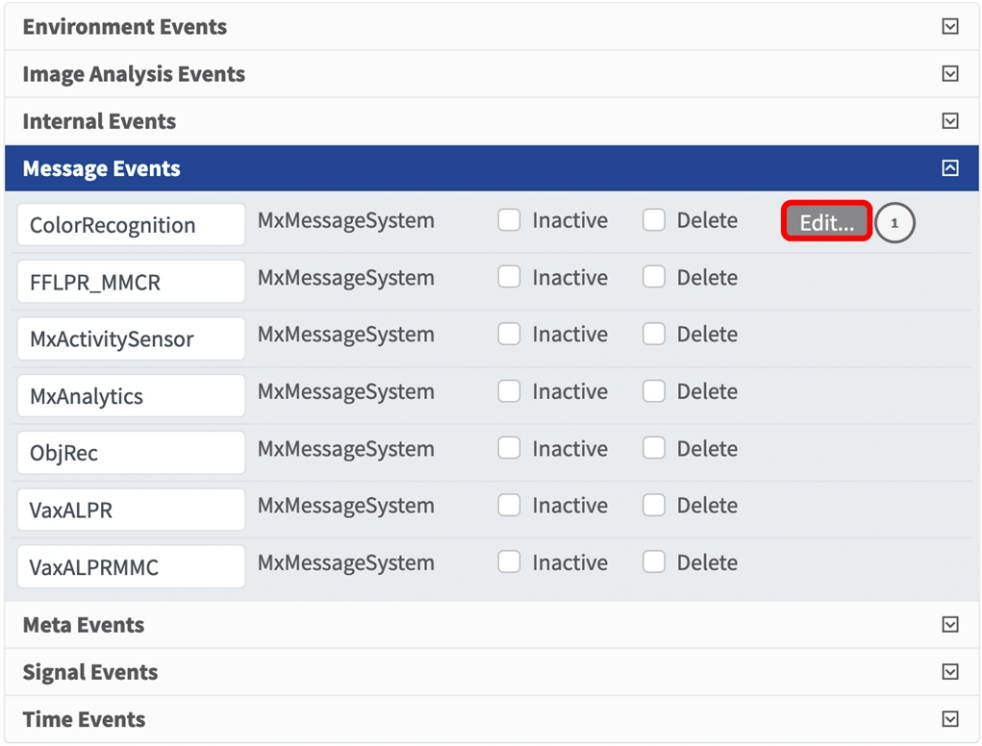

Fig. 35: Example: Generic message event from Vaxtor LPR incl. Vehicle Make, Model, Color and Class App

2. Click **Edit** ① to display a selection of all configured message events.

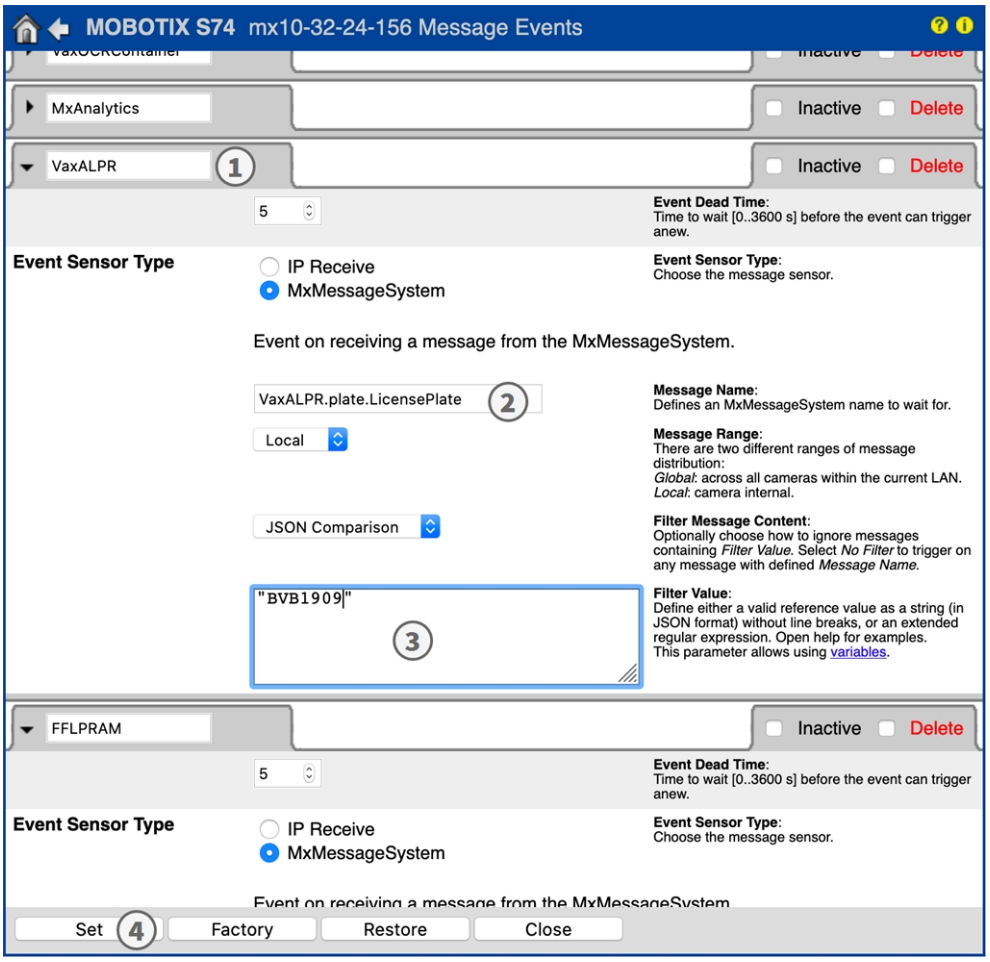

Fig. 36: Example: Unique license plate event

3. Click on the event (e. g. VaxALPRMMC) s to open the event settings.
4. Configure the parameters of the event profile as follows:

- **Profile Name:** Enter a meaningful profile name that illustrates the purpose of the profile.
- **Message Name:** Enter the "Message Name" according to the event documentation of the corresponding app (see Examples for message names and filter values of the Vaxtor LPR incl. Vehicle Make, Model, Color and Class App, p. 55).
- **Message Range:**
  - Local: Default settings for the Vaxtor LPR incl. Vehicle Make, Model, Color and Class App
  - Global: (MxMessage is forwarded from another MOBOTIX camera in the local network.
- **Filter Message Content:**
  - Generic Event: “No Filter”
  - Filtered Event: “JSON Equal Compare”

  Filter Value: see Examples for message names and filter values of the Vaxtor LPR incl. Vehicle Make, Model, Color and Class App, p. 55

CAUTION!
“Filter Value“ is used to differentiate the MxMessages of an app / bundle. Use this entry to benefit from individual event types of the apps (if available).
Choose “No Filter” if you want to use all incoming MxMessages as generic event of the related app.

2. Click on the **Set** button at the end of the dialog box to confirm the settings.

Examples for message names and filter values of the Vaxtor LPR incl. Vehicle Make, Model, Color and Class App

	MxMessage-Name	Filter value
Generic Event	VaxALPRMMC	
LPR White list Event	VaxALPRMMC.vehicle.List	“White list”
LPR Black list Event	VaxALPRMMC.vehicle.List	“Black list”
LPR Not listed Event	VaxALPRMMC.vehicle.List	“Not listed”
Unique license plate event	VaxALPRMMC.plate.LicensePlate	License plate code as “STRING”; e.g. “BVB1909” (compare Meta data transferred within the MxMessageSystem, p. 52)
Country Event	VaxALPRMMC.vehicle.Country	Country Code e.g. “DEU” for Germany
Incoming Vehicle Event	VaxALPRMMC.custom.direction	"1"
Outgoing Vehicle Event	VaxALPRMMC.custom.direction	“2”

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