Guideline

MOBOTIX Vaxtor Aircraft Identification Number Recognition App

BeyondHumanVision

MOBOTIX

V1.02_10/27/2021, Order Code: Mx-APP-VX-AIN

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Before You Start

This section contains the following information:

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

Special Export Regulations!

Cameras with thermal image sensors ("thermal cameras") are subject to the special export regulations of the U.S.A. and including the ITAR (International Traffic in Arms Regulation):

- According to the currently applicable export regulations of the U.S.A. and the ITAR, cameras with thermal image sensors or parts thereof must not be exported to countries embargoed by the U.S.A., except if a special permit can be presented. At present, this applies to the following countries: Crimea region of Ukraine, Cuba, Iran, North Korea, Sudan, and Syria. The same export ban applies to all persons and institutions listed in "The Denied Persons List" (see www.bis.doc.gov, "Policy Guidance > Lists of Parties of Concern"; https://www.treasury.gov/resource-center/sanctions/sdn-list/pages/default.aspx).
- Under no circumstances must the camera itself or its thermal image sensors be used in the design, the development or in the production of nuclear, biological or chemical weapons or in the weapons themselves.

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 > Certificates & Declarations of Conformity**.

RoHS Declaration

The products of MOBOTIX AG are in full compliance with European Unions Restrictions of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS Directive 2011/65/EC) as far as they are subject to these regulations (for the RoHS Declaration of MOBOTIX, please see www.mobotix.com, **Support > Download Center > Documentation > Brochures & Guides > Certificates**).

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.

FCC Disclaimer

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

About Vaxtor Aircraft Identification Number Recognition App

Recognition of ICAO- and FAA-issued identification numbers (AIN)

The certified Vaxtor Aircraft Identification Number Recognition App recognizes, based on deep learning processes AIN codes (Aircraft Identification Number) which adhere to the International standard. The OCR engine takes advantage of many current integrations and publishing capabilities that have been developed over many years.

- Recognition of ICAO- and FAA-issued identification numbers
- Identification and tracking in real-time during parking, take-off and landing
- On-site infrastructure expansion possible without having to interfere with existing air traffic processes and operations (covers speed levels up to 50 km/h)
- MOBOTIX events via MxMessageSystem
- Consolidated event search via MxManagementCenter Smart Data Interface and / or MOBOTIX HUB
- meta data transfer through generic transmission protocols and / or pre-defined 3rd party interfaces
- Two lists for individual actions (e.g. access granted/denied, alarm, etc.)
- Free flow and signaled mode

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.

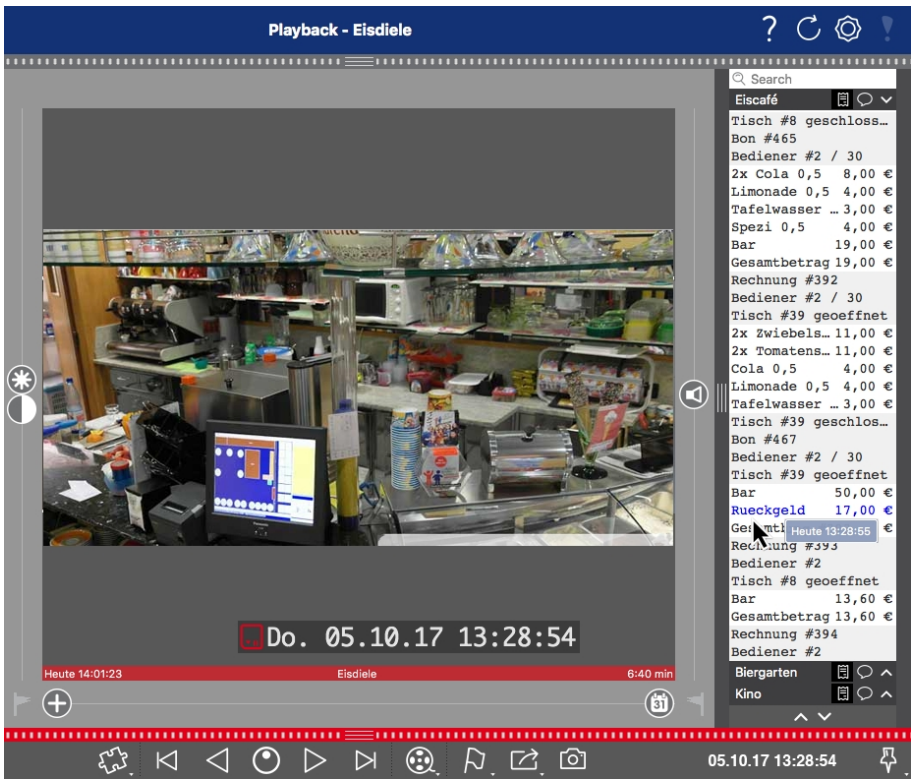

Fig. 1: : Smart Data Bar in MxManagementCenter (Example: POS System)

Guideline

Product Information

Product Name	Vaxtor Aircraft Identification Number Recognition App
Order Code	Mx-APP-VX-AIN
Supported MOBOTIX Cameras	Mx-M73A, Mx-S74A
Minimum Camera Firmware	v7.3.0.x
MxManagementCenter compatibility	■ min. MxMC v2.5.3 ■ Configuration: Advanced Config license required ■ Event Search: Smart Data Interface license included
MOBOTIX HUB compatibility.	■ min. MOBOTIX HUB version: 2021 R1 ■ min. MOBOTIX HUB license level (Analytics Events): L2 ■ min. MOBOTIX HUB license level for Event Search Plug-In : L4

Product Features

App Features	■ Recognition of ICAO- and FAA-issued identification numbers ■ Operations up to a speed of 50 km/h ■ 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 recognition areas	1
Maximum number of enrolled AIN codes	5000 per list
Meta Data / Statistic formats	JSON, XML
Trial License	30-day trial license pre-installed
MxMessageSystem supported	Yes

Integration Interfaces	■ MxMC Smart Data ■ IP Notification ■ Milestone X-Protect (Analytics Events, Transmission Plug-In) ■ Network Optix NxWitness ■ Vaxtor Helix ■ Genetec Security Center (Custom Events, Bookmarks) ■ generic 3rd party integration through FTP and / or XML / JSON via HTTP(S) ■ compare supported camera's interfaces
MOBOTIX Events	Yes
ONVIF Events	Yes (Generic Message event)

Supported Aircraft Identification Numbers

Supported Aircraft Identification Numbers	ICAO- and FAA-issued identification numbers

Scene Requirements

Character Height	20px - 50px
Maximum Vertical Angle	30°
Maximum Horizontal Angle	< 25°
Maximum Tilt Angle	< 25°

Technical App Specifications

Synchronous / Asynchronous App	asynchronous
Simultaneous execution of other apps	No
Accuracy	min. 99% (considering scene requirements)
Processed frame rate	typ. 10 fps
Detection time	typ. 300 ms per number

Licensing Certified Apps

The following licenses are available for the Vaxtor Aircraft Identification Number Recognition App:

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

The usage period begins with activation of the app interface (see)

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**.

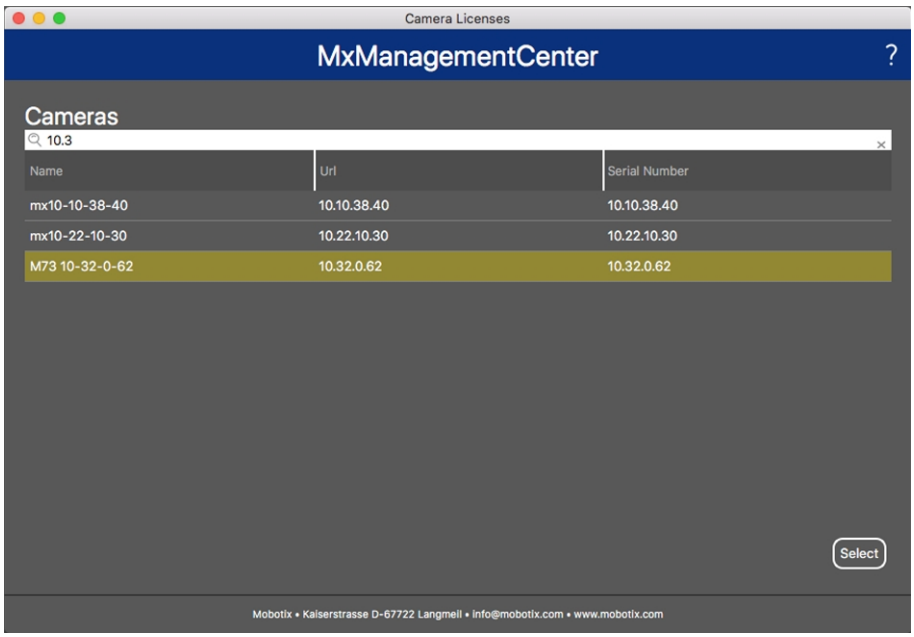

Fig. 2: Overview of Camera App Licenses in MxManagementCenter

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**.

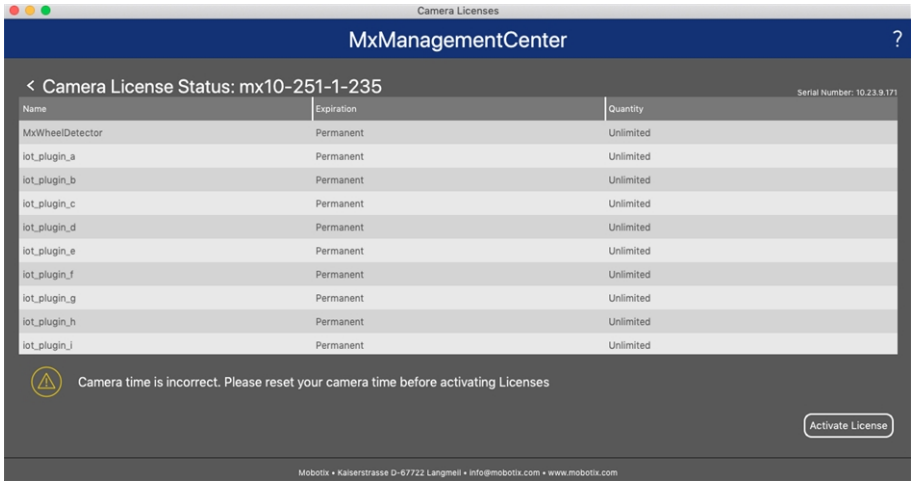

Fig. 3: Overview of the licenses installed on the camera

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.

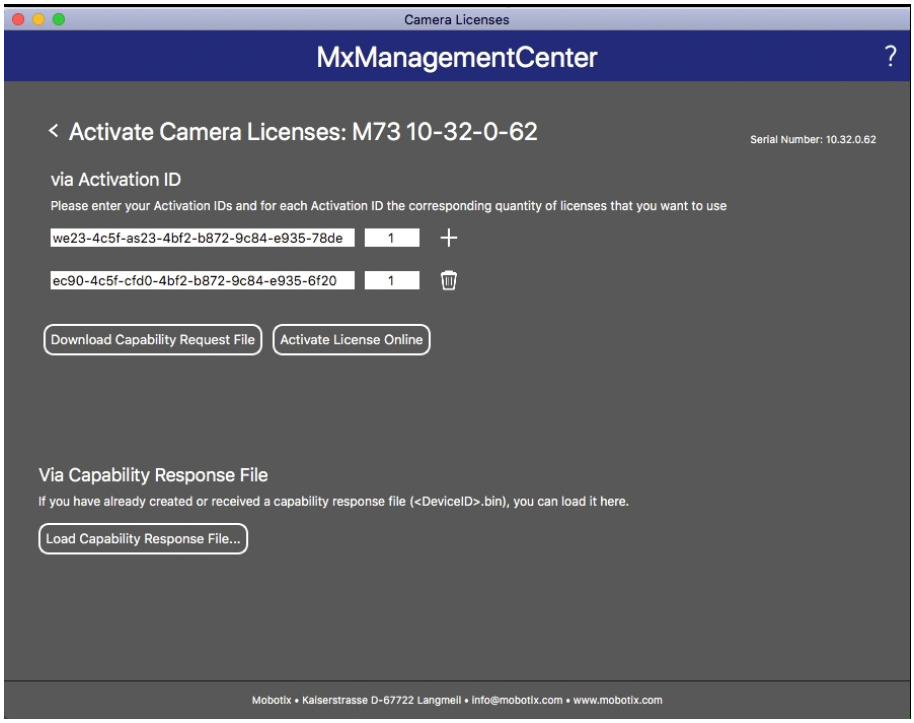

Fig. 4: Adding licenses

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. 12).

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**.

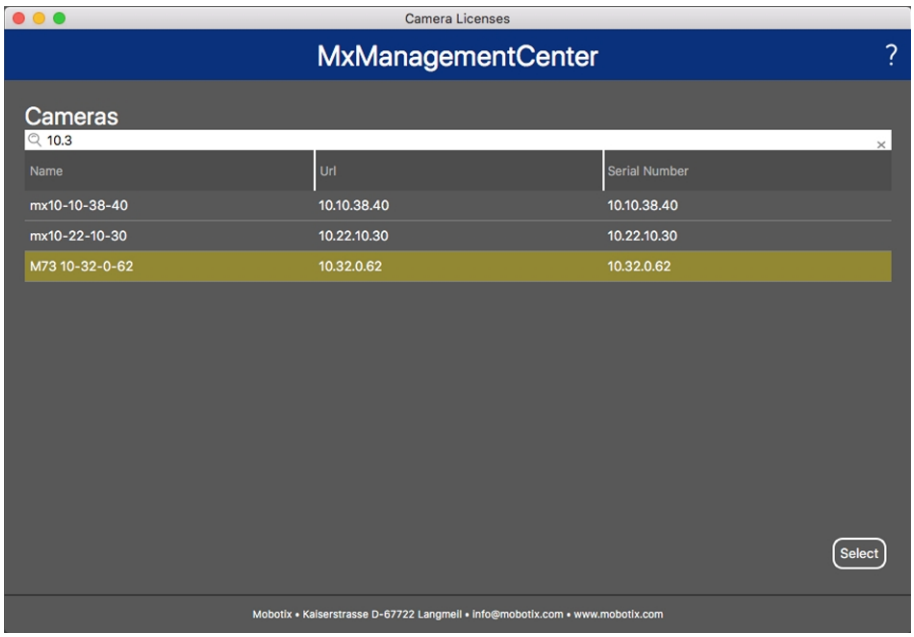

Fig. 5: Overview of Camera App Licenses in MxManagementCenter

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**.

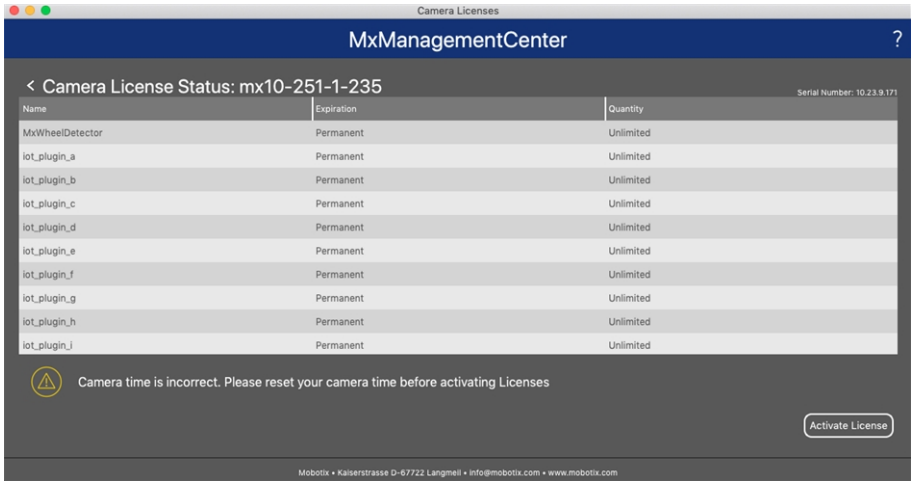

Fig. 6: Overview of the licenses installed on the camera

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.

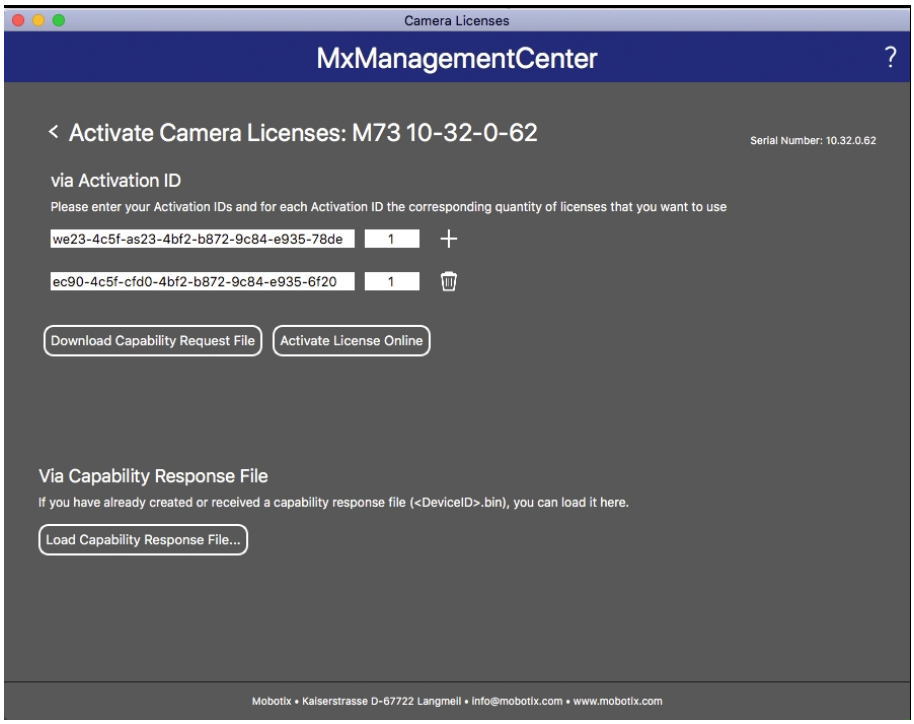

Fig. 7: Adding licenses

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**.

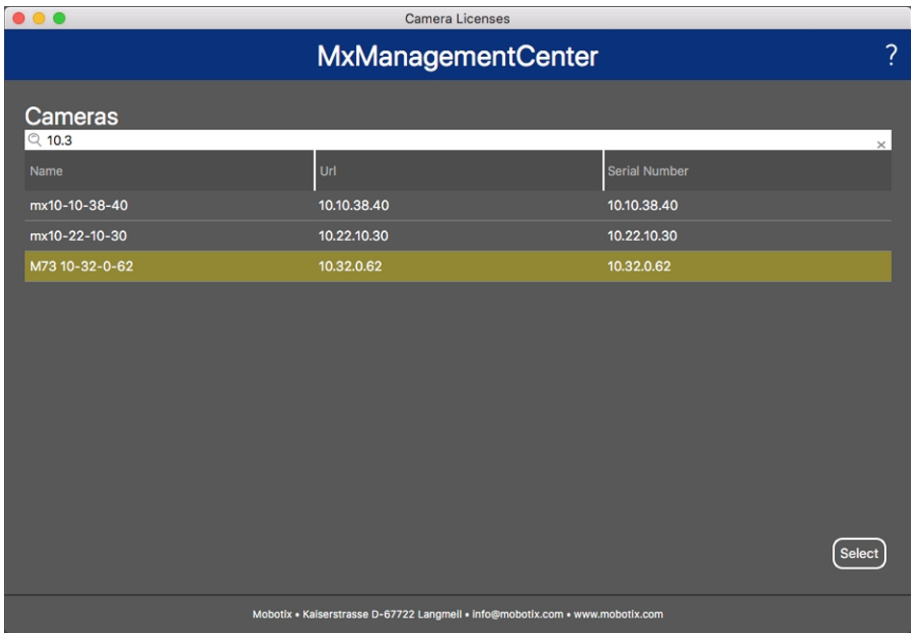

Fig. 8: Overview of Camera App Licenses in MxManagementCenter

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

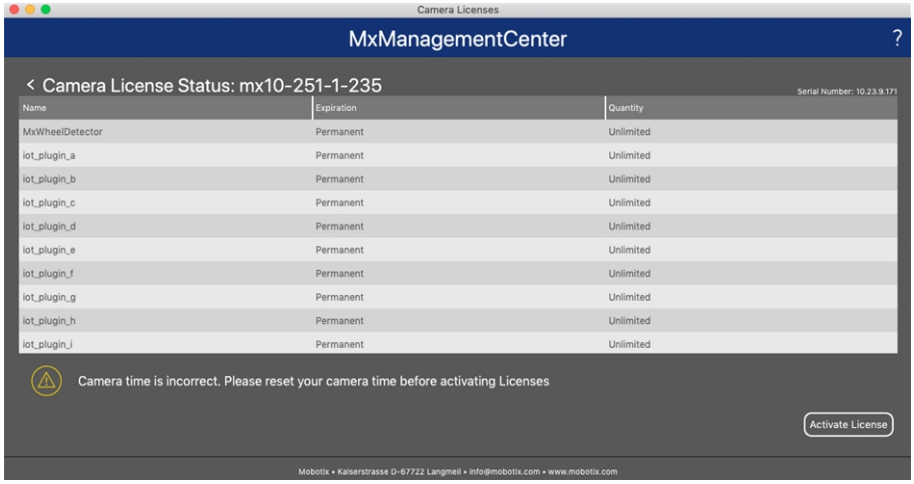

Fig. 9: Overview of the licenses installed on the camera

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 engine. Therefore the following pre-requisites must be fulfilled for the scene:

Quality of the AIN code to be captured in the image

- The AIN code must be high-contrast and clearly legible, i.e. as clean as possible, without dents or holes and well illuminated.
- The code must comply with the AIN standard
- Character height
  - To reliably recognize the code in the best possible quality, the height of the characters in the image must be between 20 px and 50 px.

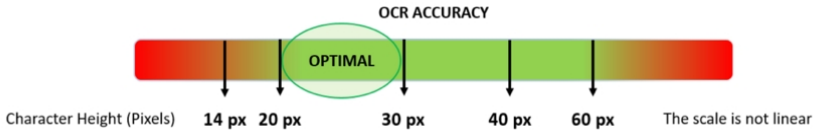

Fig. 10: Minimum character height

- Maximum rotation angle:
  - Vertical: **< 25°**
  - Slope: **< 15°**
  - Horizontal: **< 25°**

Example of clearly recognizable AIN code

Fig. 11: Correct angle minimizes the risk of false recognition

Frame rate

The selection of the correct frame rate influences the recognition quality significantly.

Recommended frame rate: 10 fps

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, $1/250^{th}$ means one two-hundred-and-fiftieth of a second or four milliseconds.

(1 second = 1000 milliseconds)

Examples for recommended exposure times

Airplane speed	minimum exposure time (sec)
Stationary	$1/125^{th}$ (8 milliseconds)
Very slow	$1/500^{th}$ (2 milliseconds)
Slow	$1/1000^{th}$ (1 milliseconds)

NOTE! AIN codes are always read perpendicular to the camera and across the field of view, so that higher shutter speeds are required than, for example, for vehicles moving towards the camera. Fast-moving airplanes can therefore not be read.

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.

Recommended resolution: max. 1920 x 1080 px

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.

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.

Illumination

AIN Codes are normally painted on to the wagons and are not reflective. Therefore sufficient ambient lighting must be used to adequately illuminate the text so that it can be read at a reasonably fast shutter speed without the camera adding too much gain to brighten the image. (a maximum gain of about 12 is advised).

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

Recommendations on mounting and adjusting

- 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 container code 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 code is facing a direct sunlight consider using a lens with auto iris mode.
- If mounting a camera on a roadside or trackside pole check how the pole reacts to heavy cars or a convoy of cars. Some poles have tangible tremor, this could make container code 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 container code. 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 container code(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.
  - 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 container code is better.

Troubleshooting

Correct OCR-based reading of codes printed on rail wagons is difficult or impossible if the captured images have any of the following characteristics:

- Over- or under exposed
- Blurred or distorted
- Unevenly lit
- Acute camera angle
- Low contrast
- Damaged or badly painted text
- Bad weather conditions like fog, snow or heavy rain

Activation of the Certified App Interface

CAUTION! The Vaxtor Aircraft Identification Number Recognition 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.

Activation of Certified Apps and events

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

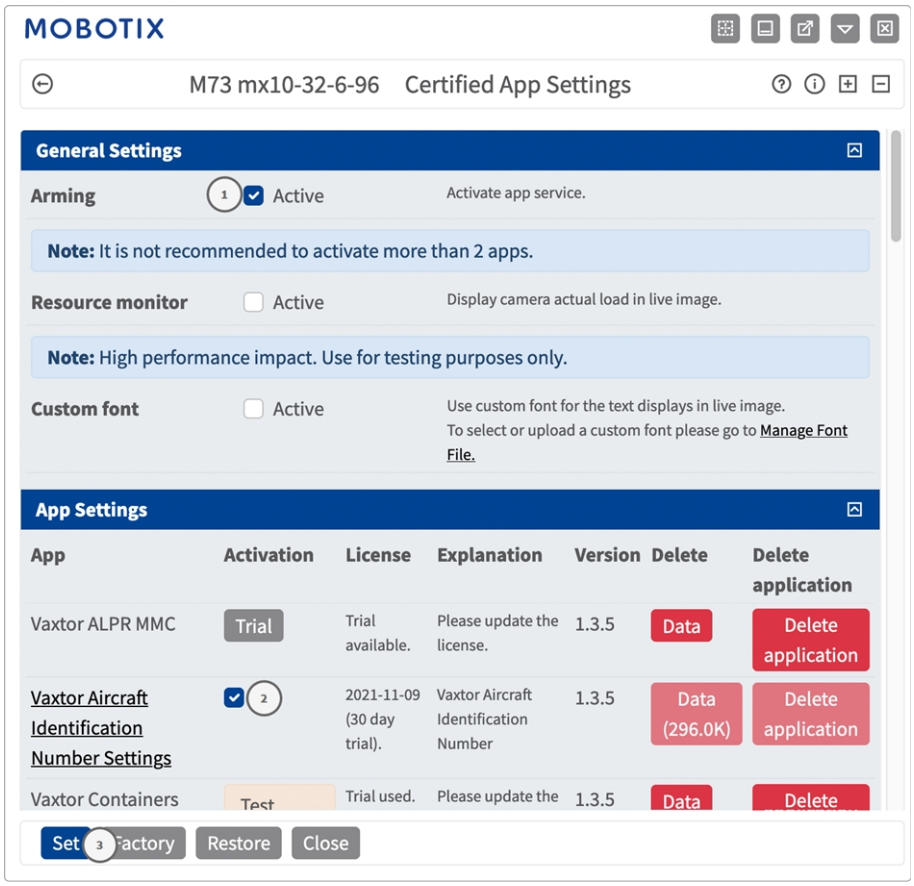

Fig. 12: Activation of Certified Apps

2. Under **General Settings** activate the **Arming** ① of the app service.
3. Under **App Settings** check the **Active** option ② 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 Aircraft Identification Number Recognition App, S. 1.

Configuration of Vaxtor Aircraft Identification Number Recognition App

NOTE! For best performance and results in AIN code processing make sure to have scene set up to meet the Camera, image and scene requirements.

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).
2. Click on the name of the **Vaxtor Aircraft Identification Number Recognition App**.

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

VAXTOR AIN - Basic Settings

The following configurations should be taken into account:

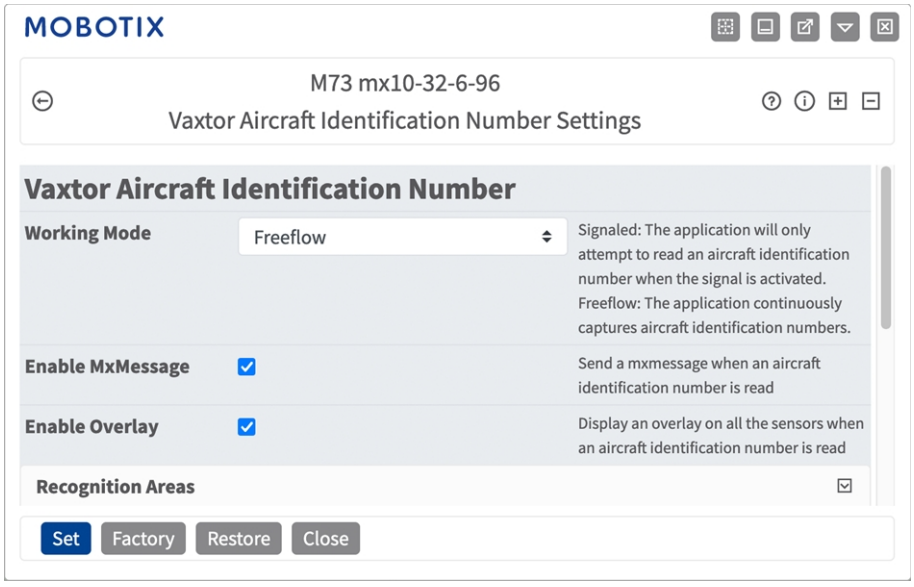

Fig. 13: Basic settings

Working mode: The following modes are available:

Free flow: The application continuously captures AIN codes.

Signaled: The application will only attempt to read an AIN code when a signal is triggered accordingly.

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

Enable MxMessage: Check to enable the processing of AIN code events in the MxMessageSystem..

Enable Overlay: Check to enable the display of the AIN code recognition result in the live view.

Recognition Areas

A Recognition Area is 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 Areas can decrease OCR processing time and also reduce false positives. The whole AIN code must be in or out the Recognition Area to pass the test.

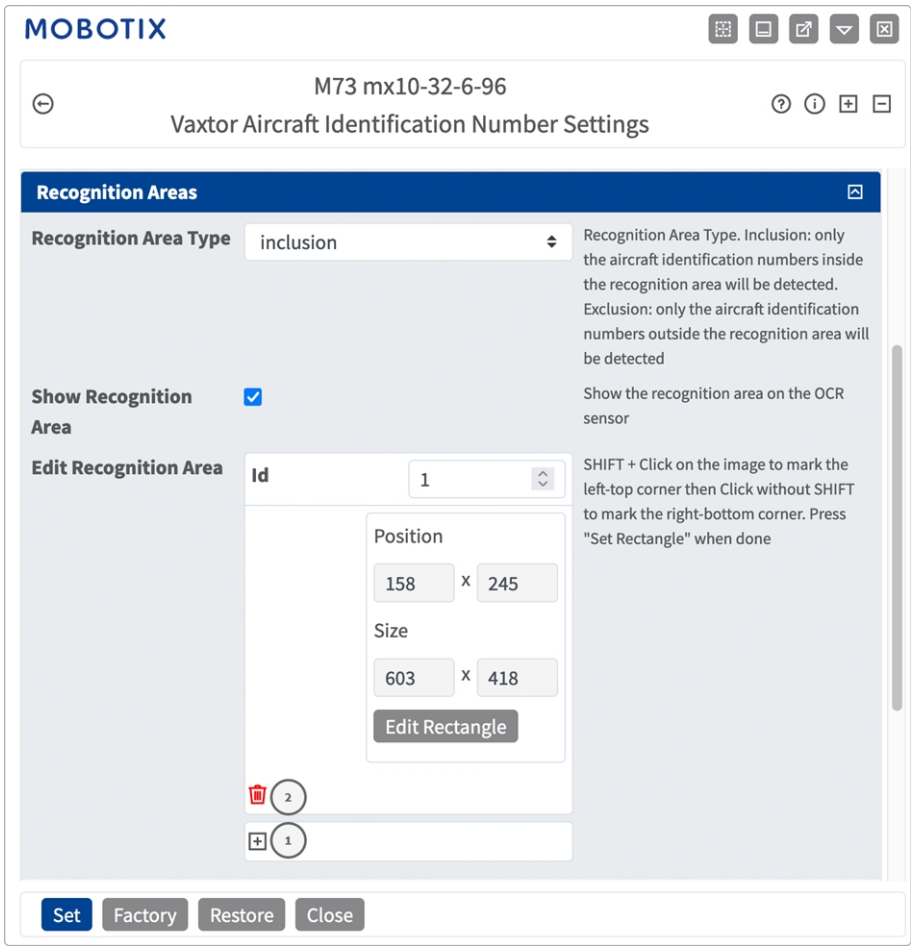

Fig. 14: Recognition Areas

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 in the camera image.

Edit Recognition Area: Click the **plus** icon ① to define a new recognition area. The following options are available:

ID: Enter or select a unique value to identify the recognition area

Position: The coordinates of the upper right corner point of the rectangular recognition area.

Size: The size in pixels of the rectangular recognition area.

Edit Rectangle: Click to switch into the live view, where you can draw a recognition area.

Delete: Click the **bin** icon ② to delete the recognition area.

Drawing a Recognition Area in the Live View

1. In the live view simply click and drag a rectangular recognition area.
2. Drag the corner points to refine the recognition area.
3. In the top right corner of the live view click **Submit** to adopt the coordinates of the rectangle.

List Management

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

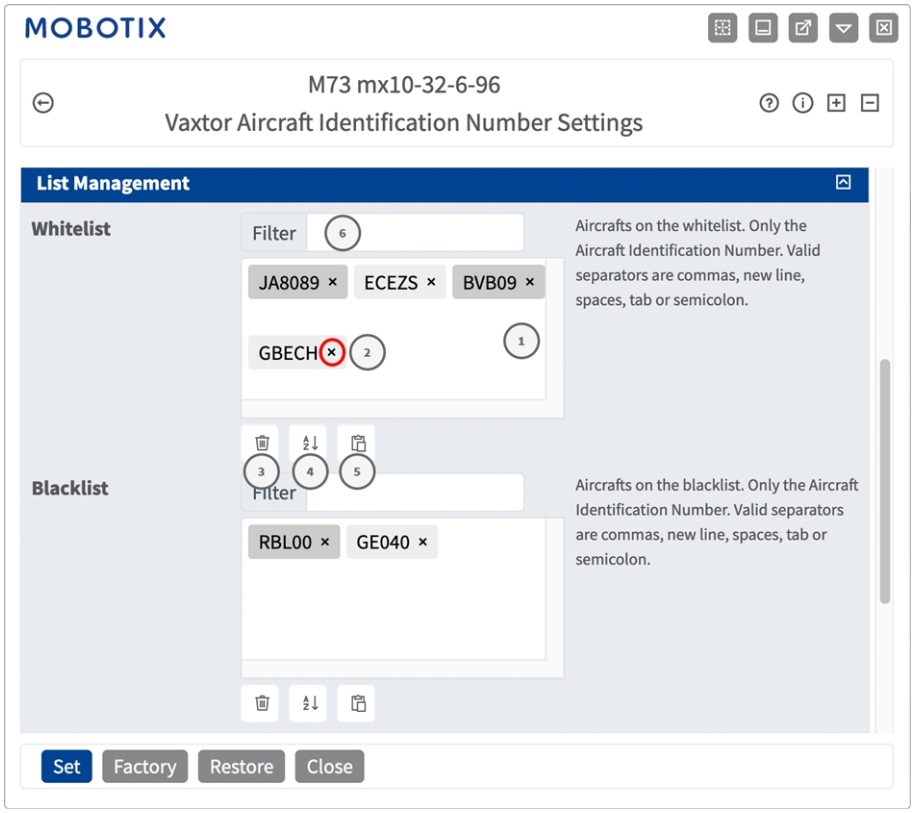

Fig. 15: Black and white lists

Adding an AIN code to a list

1. Enter the AIN code text into the text field ① and click **Enter**.

Adding multiple AIN codes from a text file

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

Deleting an AIN code from a list

1. Click on the small **x** ② to the right of the AIN code.

Deleting all codes from a list

1. Click the trash icon ③ .

Sorting all AIN codes from a list alphabetically

1. Click the sort icon ④ .

Copy all codes from a list to the clip board

1. Click the copy to clipboard icon ⑤ .

Filtering AIN codes

1. Enter the AIN code or parts of it into the filter text field ⑥ . Only codes containing the filter text are displayed accordingly

Video

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

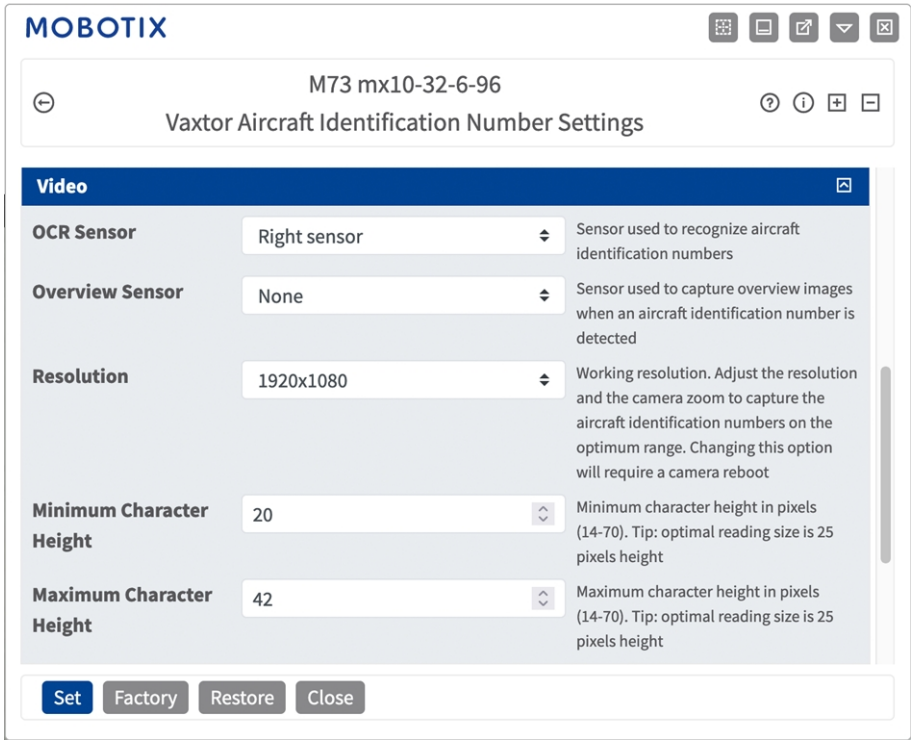

Fig. 16: Video

OCR sensor: Select the camera sensor to be used for AIN code recognition.

NOTE! Changing this option requires a camera reboot.

Overview Sensor: Optionally select a sensor used to capture overview images when an AIN code is detected.
Resolution: Set the working resolution (current maximum is 1080p). Adjust the resolution and the camera zoom to capture the codes on the optimum range.

NOTE! Changing this option requires a camera reboot.

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

Aircraft Identification Number

Here you can specify the length of the AIN codes to be captured

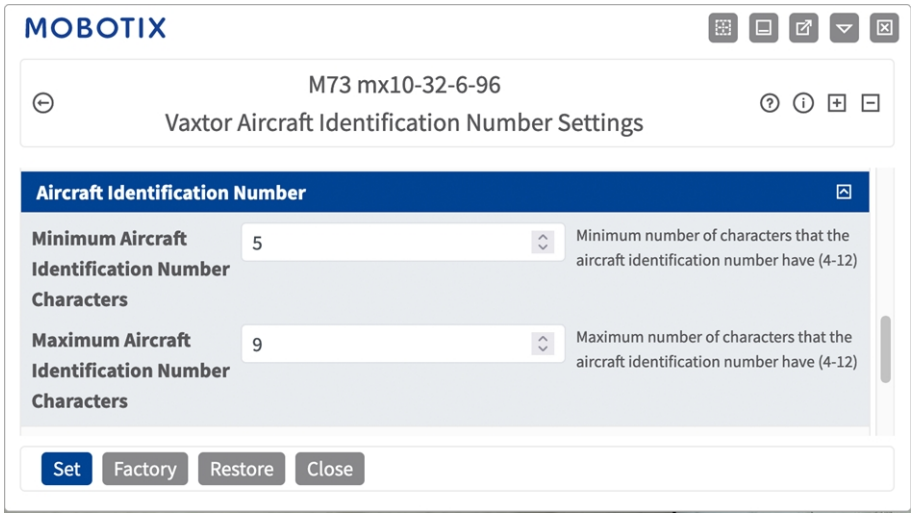

Fig. 17: Aircraft Identification Number

Minimum Aircraft Identification Number Characters: Minimum number of characters that the aircraft identification number has (4-12).

Maximum Aircraft Identification Number Characters: Maximum number of characters that the aircraft identification number has (4-12).

Environment

Here you can adjust the settings that are significantly influenced by the environmental conditions.

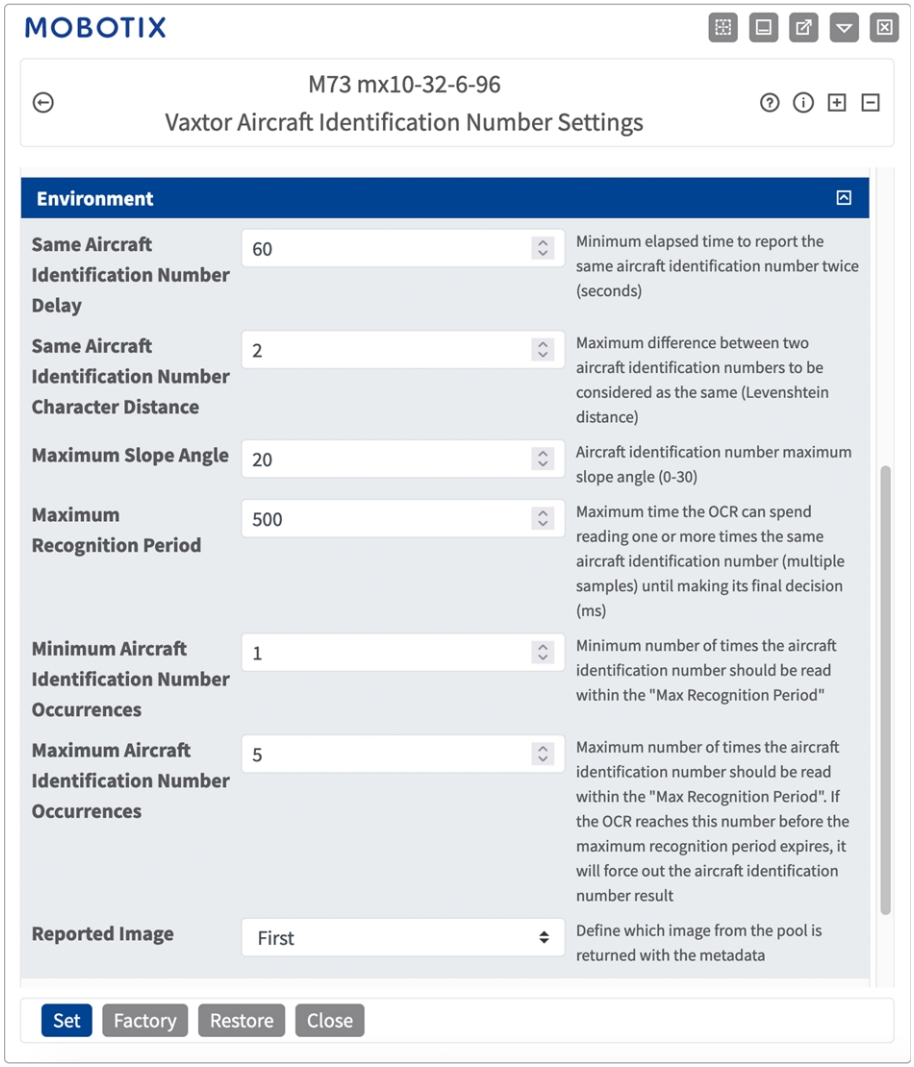

Fig. 18: Aircraft Identification Number

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

> **Example:** If an aircraft stops and the AIN is reported but the aicraft 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 Aircraft Identification Number Character Distance: Set the number of characters that two readings of the same AIN must differ by to be considered different. The camera is capable or reading a AIN 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 AIN text.
Maximum Slope Angle: Set the angle of slope of an AIN 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 AIN (multiple samples) until making its final decision (ms).

Minimum Aircraft Identification Number Occurrences: Minimum number of times the AIN should be read within the "Max Recognition Period" before being reported.
Maximum Aircraft Identification Number Occurrences: Set the maximum number of times that an AIN 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. An AIN 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 aircrafts and the first image for aircrafts moving away from the camera.

OCR

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

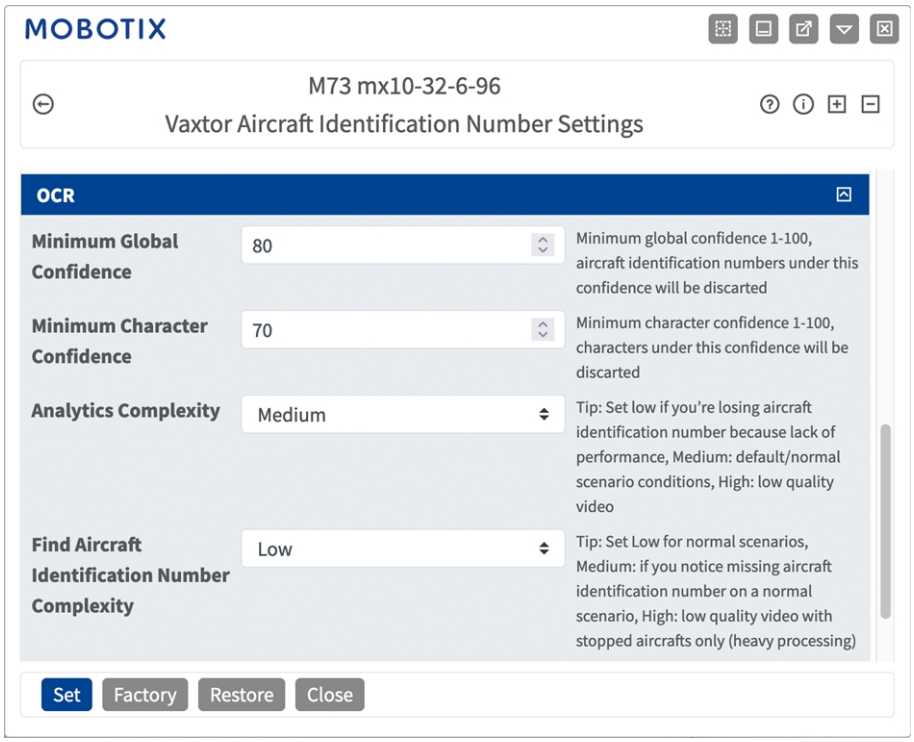

Fig. 19: OCR

Minimum Global Confidence: Set the minimum confidence level that the whole AIN 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! Higher values mean a lower probability of false positives and a lower probability of missing AIN.

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 fast moving aircrafts where the OCR needs to work faster and your preference is for AIN 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 Aircraft Identification Number Complexity: This is the complexity of the analytics to be applied during the ALPR Engine's stage of AIN 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.

Reporting

Vaxtor Aircraft Identification Number Recognition 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.

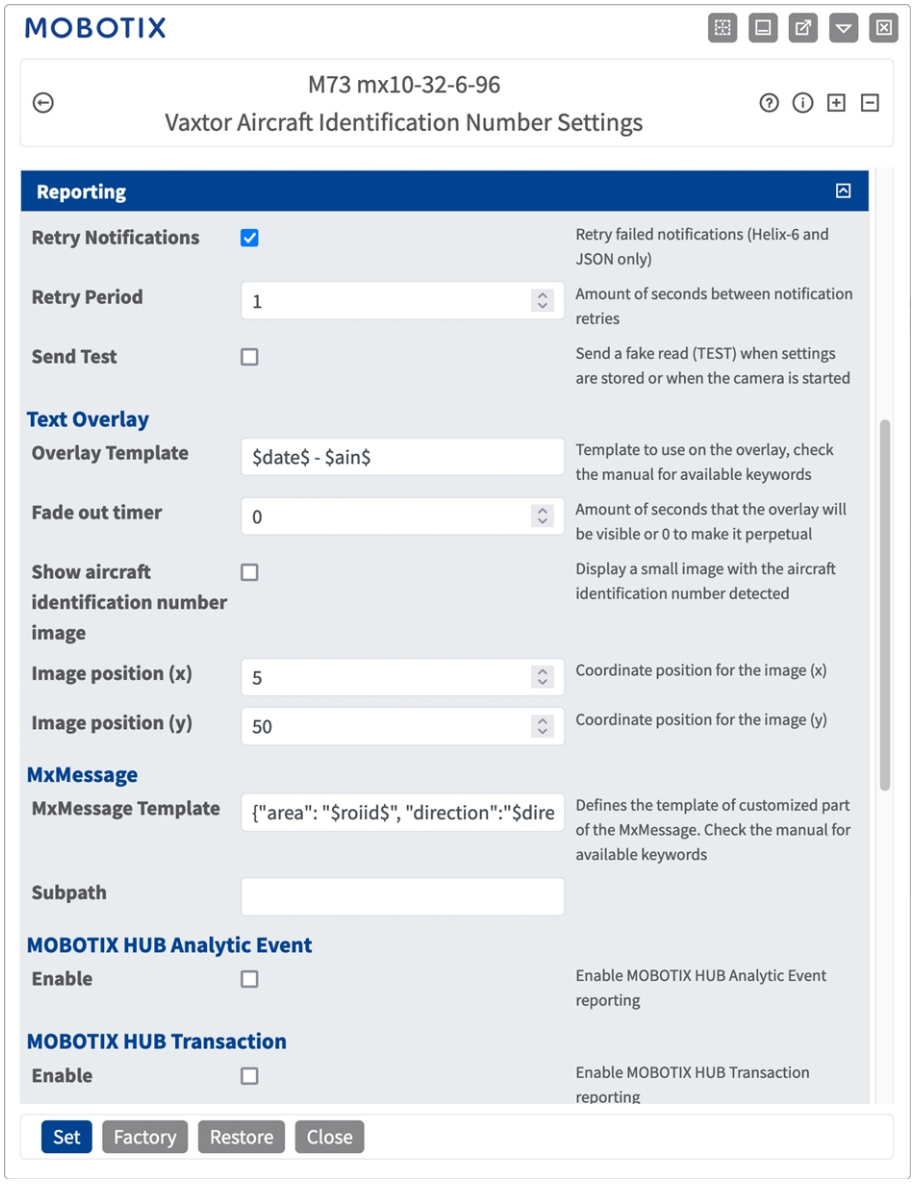

Fig. 20: Reporting

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

Retry period: Amount of seconds between notification retries

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

Text Overlay

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

Fade out timer: Set the amount of seconds that the overlay will be visible or 0 to make it perpetual.

Show aircraft identification number image: Check to display a small image with the AIN code detected.

Image position (x): x coordinate position for the image.

Image position (y): y coordinate position for the image.

MxMessage

MxMessage Template: Define template of customized part of the MxMessage . Check the Template fields, p. 33 for available keywords.

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

MOBOTIX HUB Analytic Event : With the Analytics Events feature it is possible to send events to the MOBOTIX HUB event server over TCP/IP.

Enable : Check to enable MOBOTIX HUB Analytic Event reporting.

MOBOTIX HUB Transactions : With the Transactions Events feature it is possible to send events to the MOBOTIX HUB event server over TCP/IP.

Enable : Check to enable MOBOTIX HUB Transaction Event reporting.

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.

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

Enable : Enable XML HTTP/HTTPS POST reporting

Milestone Analytic Event : With the Analytics Events feature it is possible to send MAD (Milestone Alert Data) formatted alerts to the Milestone XProtect event server over TCP/IP.

Enable : Enable analytic event reporting

TCP Server:

Enable : Enable TCP server reporting

Template fields

AIN only reserved variables

Template field	Description
$confidencecode$:	
$controldigit$	
$countrycode$	AIN Country code
$direction$	(0: unknown, 1: left, 2: right)
$directionstr$	(Unknown, Left, Right)
$serialnumber$	AIN Serial number
$aincode$	
$vehicletype$	

Shared reserved variables

Template field	Description
$absolutebottom$	
$absoluteleft$	
$absoluteright$	
$absolutetop$	
$blacklist$	If the AIN code is on the blacklist, the text in the ‘if clause’ will be displayed
$bottom$	Bottom coordinate for the AIN code on the image (pixels)
$charheight$	Average charheight (pixels)
$codeimage$	
$codeimagesize$	
$confidence$	Global confidence (0-100)
$date$	Timestamp in ISO8601 format
etx	
$country$:	3 letter country code
$height$	OCR image height
$image$	JPEG encoded in base64
$imagesize$	Size of saved complete image
$left$	Left coordinate for the AIN code on the image (pixels)
$nolist$	If the AIN code in not on a list, the test in the ‘if clause’ will be displayed
$overviewimage$	Overview JPEG image encoded in base64
$overviewimagesize$	Overview image size in bytes
$processingtime$	Processing time in milliseconds
$right$	Right coordinate for the AIN code on the image (pixels)
$sensor$	Sensor (0, 1)
$signalid$	
stx	
$timestamp$	yyyy-MM-ddTHH:mm:sszzz

Template field	Description
top	Top coordinate for the AIN code on the image (pixels)
$width$	OCR image width
$whitelist$	If the AIN code is on the whitelist, the text in the ‘if clause’ will be displayed

Advanced

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

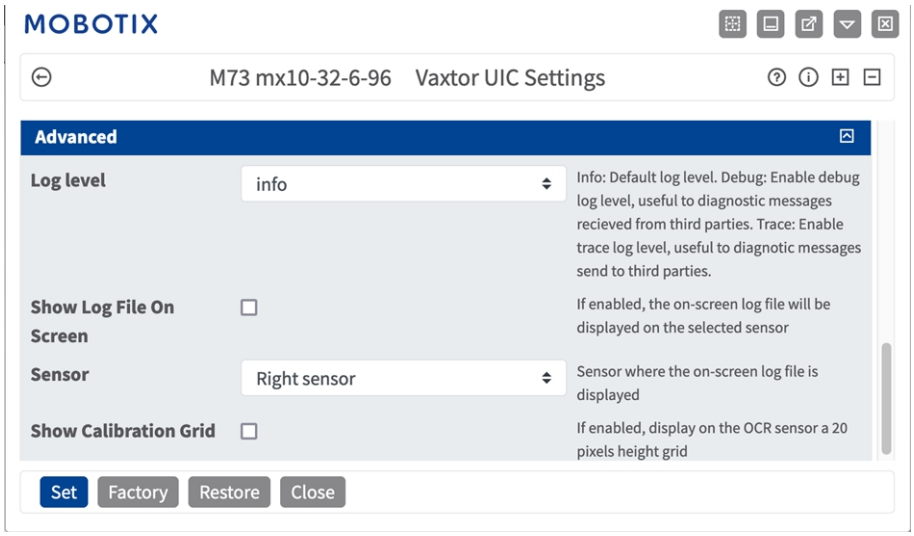

Fig. 21: Advanced

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

Show Calibration Grid: Check to display on the OCR sensor a 20 pixels height grid

Storing the Configuration

To store the configuration you have the following options:

Fig. 22: 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.

Basic configuration: Processing the automatically generated app events

Checking automatically generated app events

NOTE! After successfully activating the app (see Activation of the Certified App Interface, p. 21), 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. VaxOCRAircraft).

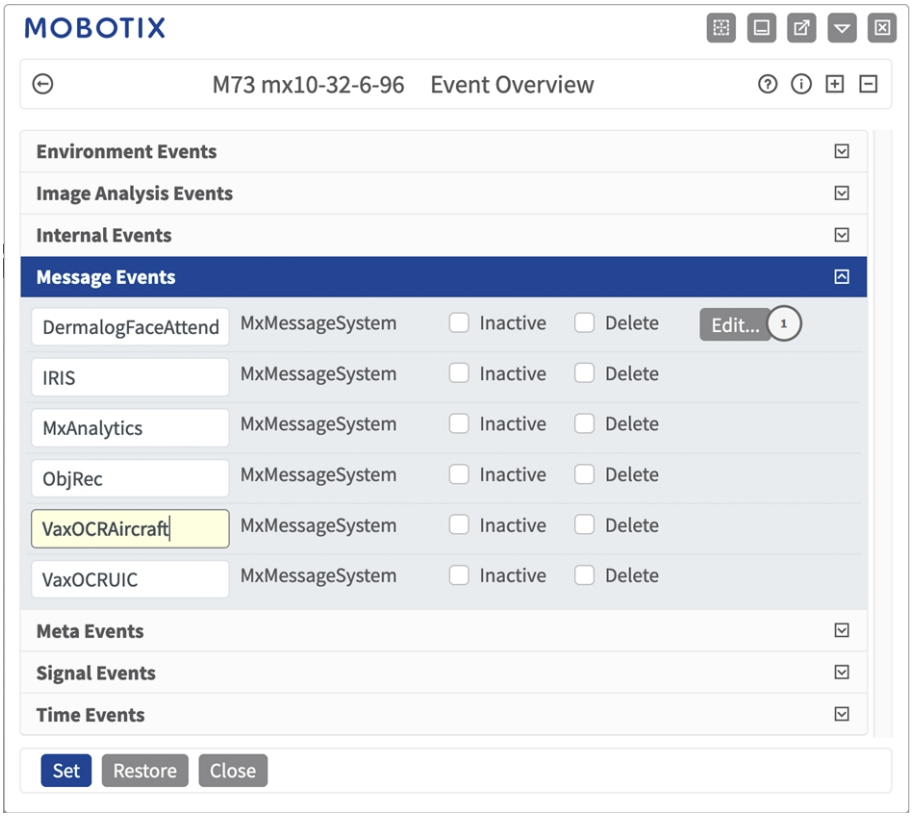

Fig. 23: Example: Generic message event from Vaxtor Aircraft Identification Number Recognition App

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

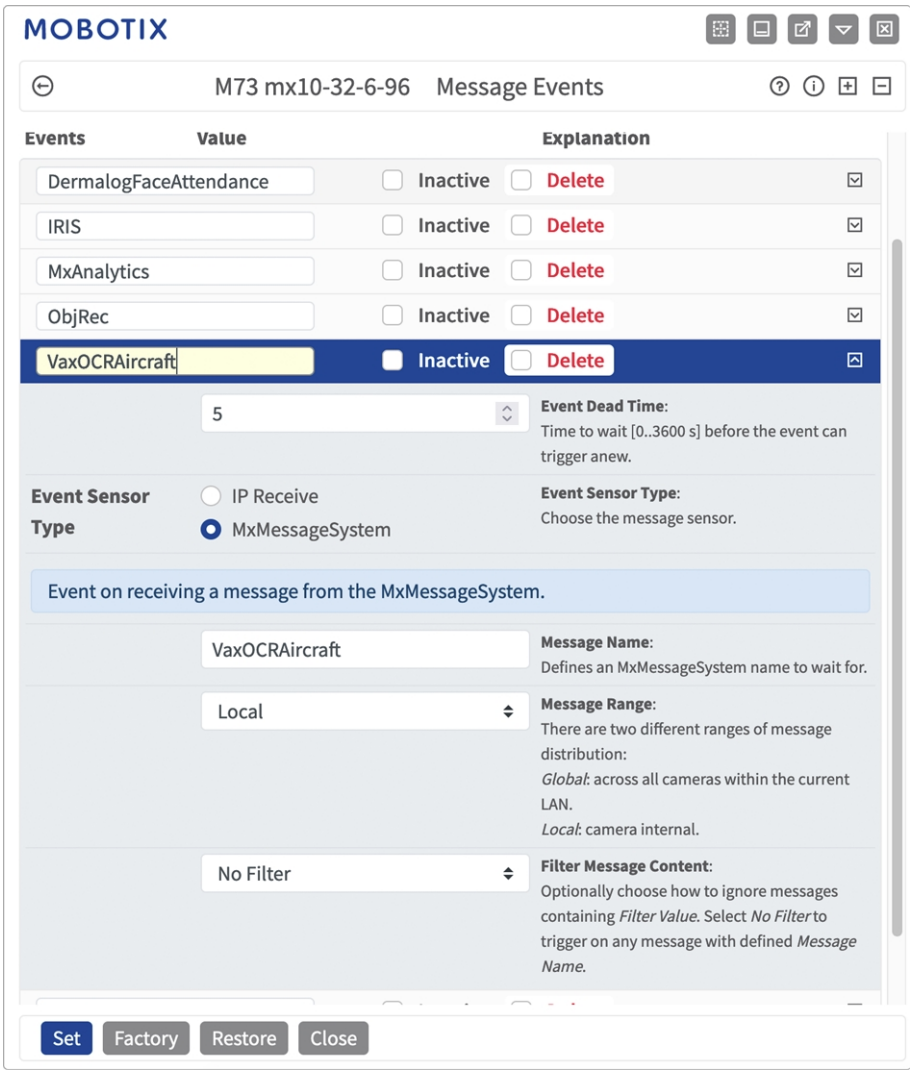

Fig. 24: Example: Generic message event details - no filter

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 Aircraft Identification Number Recognition App event.

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

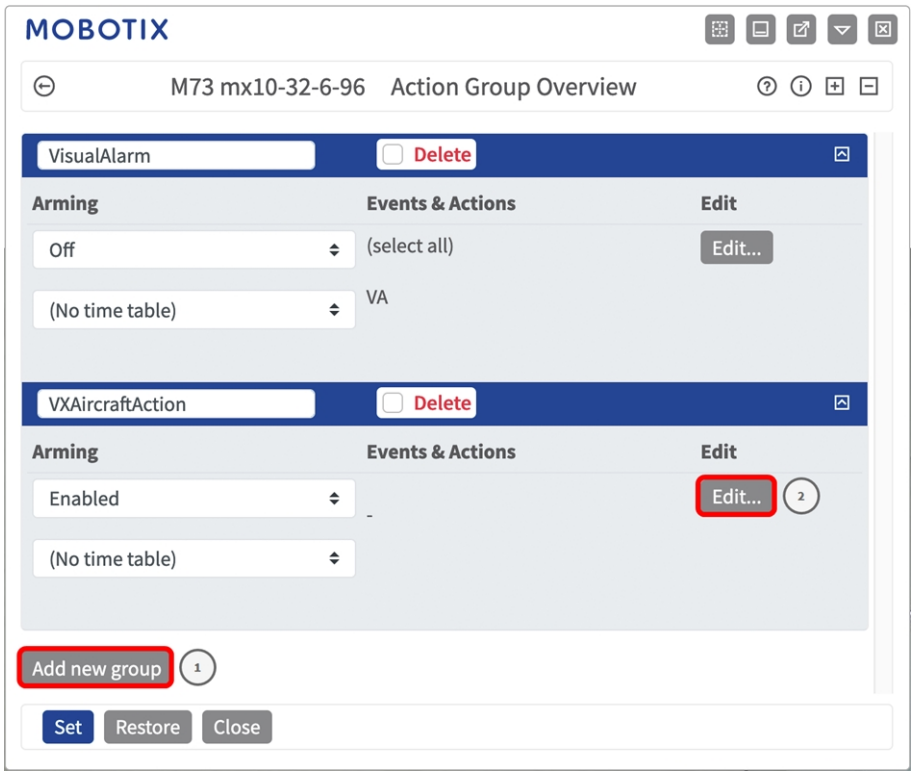

Fig. 25: Defining Action Groups

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

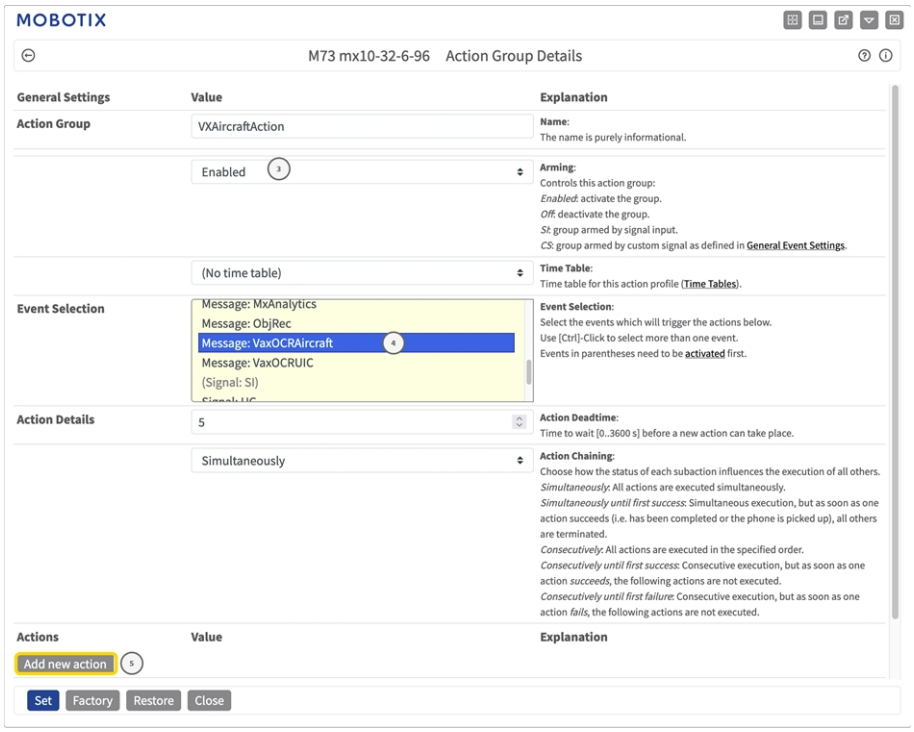

Fig. 26: Configuring an Action Group

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

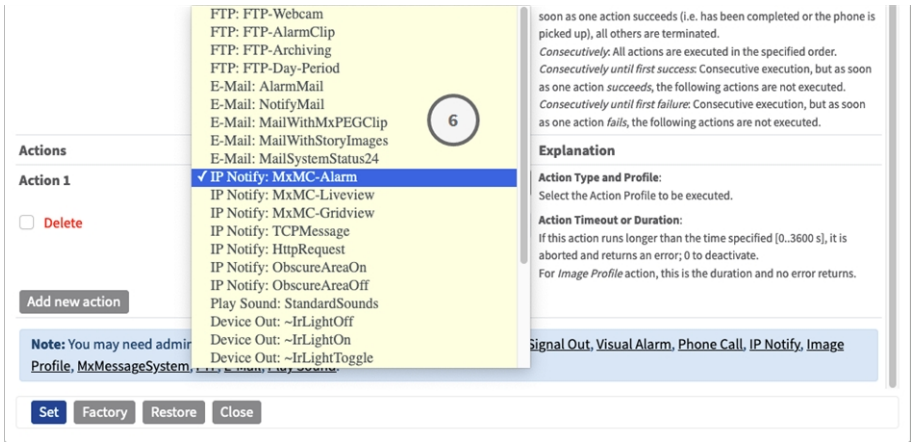

Fig. 27: Select Action Type- and Profile

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** 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).

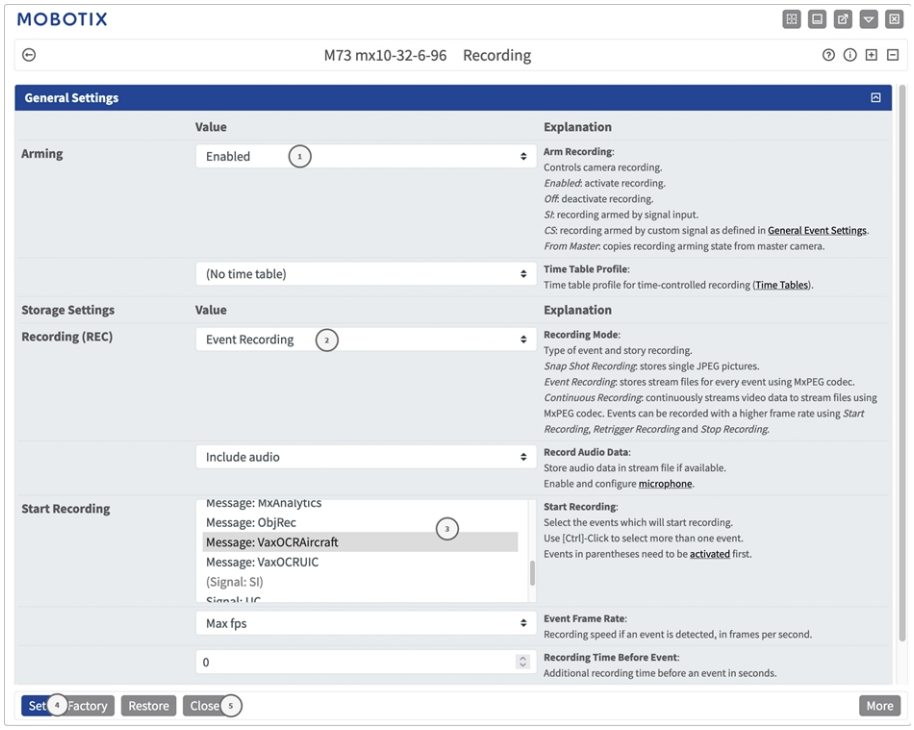

Fig. 28: Configuration of camera recording settings

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. 29: Aircraft number (AIN) on a plane

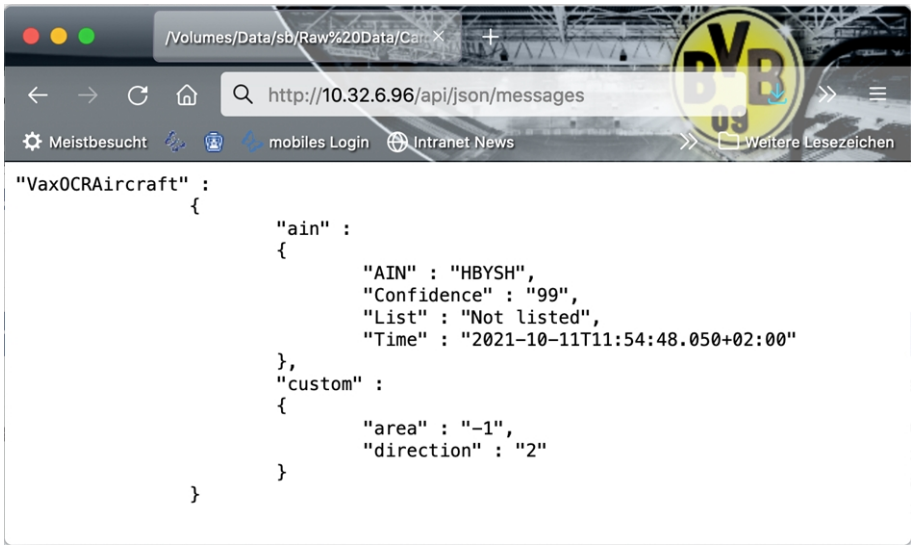

Fig. 30: Example: Meta data transmitted within an MxMessage of the Vaxtor Aircraft Identification Number Recognition App

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. VaxOCRAIN).

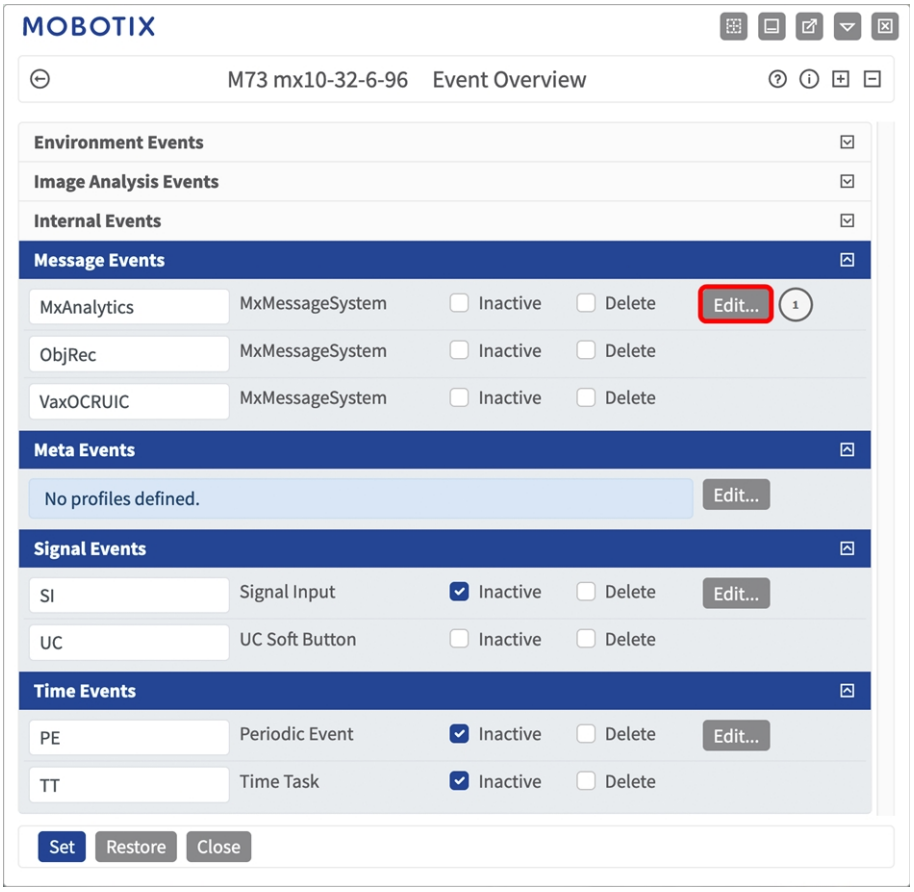

Fig. 31: Example: Generic message event from Vaxtor Aircraft Identification Number Recognition App

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

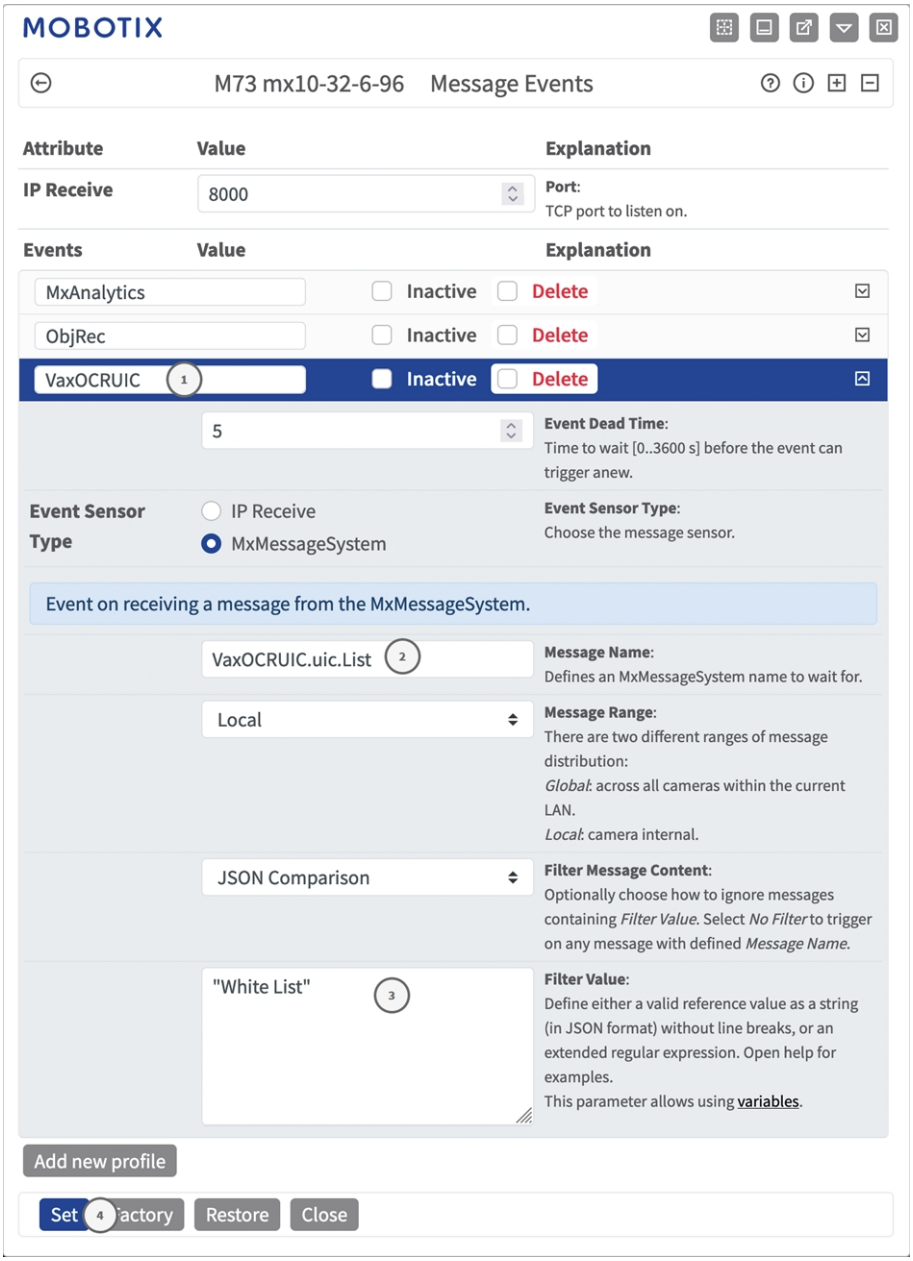

Fig. 32: Example: List message event

3. Click on the event (e. g. VaxOCRAIN) ① to open the event settings.
4. Configure the parameters of the event profile as follows:

   - **Message Name:** Enter the "Message Name" ② according to the event documentation of the corresponding app (see Examples for message names and filter values of the [%=CameraApps.ProductName)
   - **Message Range:**
     - Local: Default settings for the Vaxtor Aircraft Identification Number Recognition 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: ③ see Examples for message names and filter values of the [%=CameraApps.ProductName.

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 **Set** ④ at the end of the dialog box to confirm the settings.

Examples for message names and filter values of the Vaxtor Aircraft Identification Number Recognition App

	MxMessage-Name	Filter value
Generic Event	VaxOCRAIN	
Whitelist Event	VaxOCRAIN.ain.List	“White list”
Blacklist Event	VaxOCRAIN.ain.List	“Black list”
Not listed Event	VaxOCRAIN.ain.List	“Not listed”
Unique identifaction number event	VaxOCRAIN.ain.AINCode	AIN code as “STRING” e.g. “33 85 4956626-7 (compare Meta data transferred within the MxMessageSystem)

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BeyondHumanVision

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