ADAPTIVE RECOGNITION

Vidar
User Manual

This manual contains instructions on accessing the web interface, system settings and setup guidelines, and usage and maintenance.

RELEASE DATE
13.05.2024.

VIDAR

USER MANUAL

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Adaptive Recognition **America**
Adaptive Recognition **Hungary**
Adaptive Recognition **Nordic**
Adaptive Recognition **Singapore**
REQUESTINFO@ADAPTIVERECOGNITION.COM
WWW.ADAPTIVERECOGNITION.COM

1. ABOUT THIS MANUAL

The structure of this manual follows the approach of configuring a new camera for its first-time use.

- The camera provides access to all its features through a web interface, its entire configuration control is available using a web browser. No external components need to be installed.
- First, system settings are discussed, so that the device will be operational.
- Next, the user will be guided through the process of setting up the image capturing process, so that the camera will provide good quality images both for internal use and for the video feed streamed with the chosen encoding.
- In the third part, the manual will discuss how to capture events using internal or external triggers, and depending on the model, read, store, and communicate the license plate corresponding to the event.
- In the last section, the tools of camera maintenance (firmware update, logs, etc.) are described.

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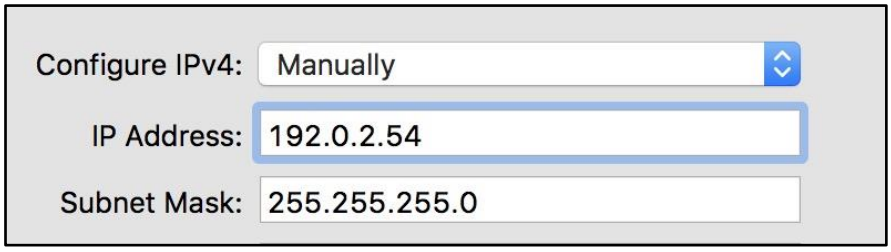
2. ACCESSING THE CAMERA

Note

In order to access the camera, power and network connectors have to be connected appropriately. For more information see the Install Guide. Follow the five steps below:

1. Connect the camera to a computer or a network switch using the Ethernet cable, then power the camera on. Soon both status LEDs (at the camera front) turn on and stay lit while the camera is booting. When the green status LED flashes two times and the red LED turns off the camera is ready for operation.

2. Set your computer's IP address as 192.0.2.x (with x other than 3 or 255, for example 192.0.2.54), with the subnet mask 255.255.255.0



3. Use the ping command to test network connection to the camera
   Windows: c: \ping -t 192.0.2.3
   Linux: [username@mylinux ~]$ ping 192.0.2.3

4. In a couple of second the ping echo package will be received, if not:
   - check the Ethernet link LEDs at the computer or network switch for a physical link
   - check the IP of the computer by pinging its own address (using the example at step #2: ping 192.0.2.54)

5. Start a browser (Firefox, Chrome or Edge) and enter the default IP of the camera: http://192.0.2.3 into the address bar. If the web interface is not accessible, make sure that neither a proxy nor a firewall is blocking access, and that the browser is not in offline mode.

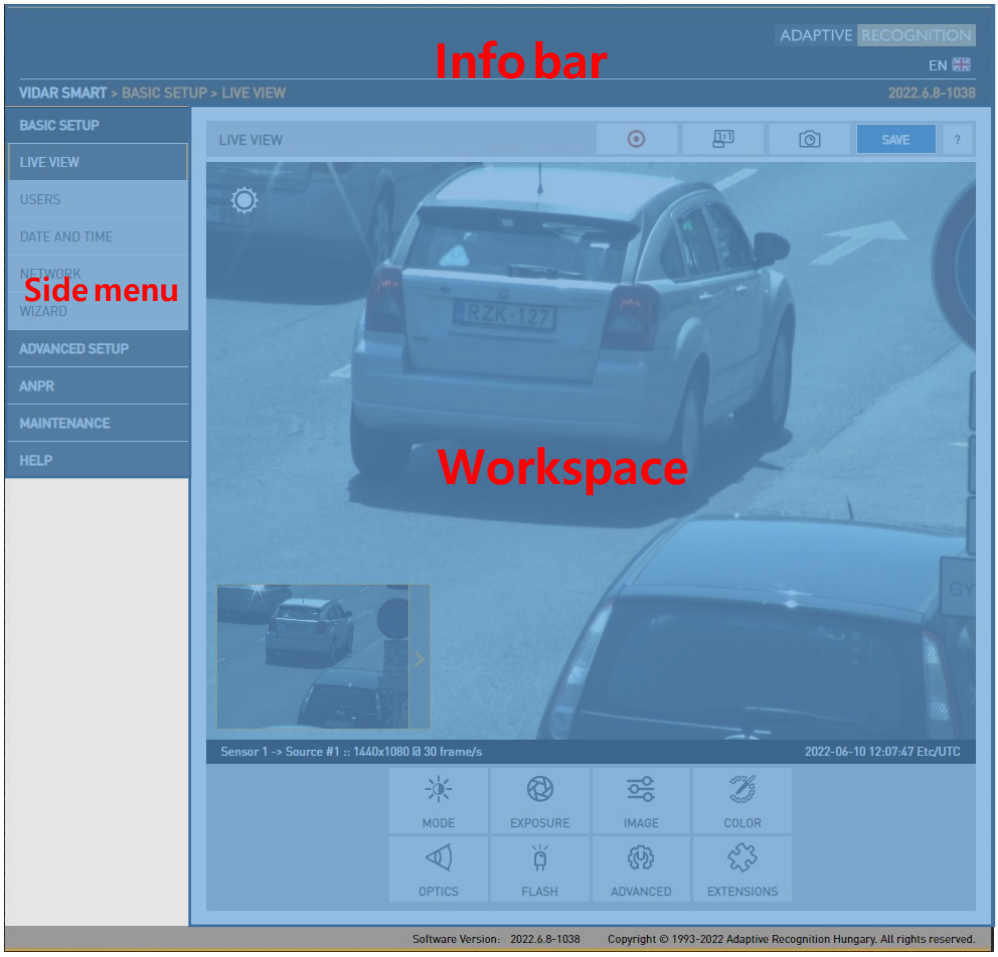
Note

Under recent versions of Firefox (v. 56.0) it might be necessary to disable the feature "Use hardware acceleration when available" to avoid possible browser/machine hangs (Located at: Preferences/Performance/Use Recommended Performance Settings).

3. WEB INTERFACE

Main areas of the camera interface:

Info bar



The information bar displays the menu and the current SW version.

- Adaptive Recognition logo
- Version number
- Camera type, menu points

Side menu

- Basic Setup, advanced Setup, ANPR, Maintenance, Help menu – click to open
- Access camera settings via the navigator. Menu is organized into a tree structure.

Workspace

- Use the workspace for settings. Save your changes, otherwise the previous settings remain in effect.

Hint

Workspace buttons have a popup help. Hover the mouse over the label of the setting to see the tooltip. This function only available at few settings.

Important!

Use the Save button to save settings. All settings will be lost if you leave the page without saving settings. A popup window will remind you to save settings.

Click the ? icon on the workspace to display Help on the page.

Note

Menu subpages can also be addressed via direct links, like http://192.0.2.3/#liveview/, http://192.0.2.3/#eventman, etc.

Important!

For best user experience use a recent edition of Google Chrome, Firefox or Edge.

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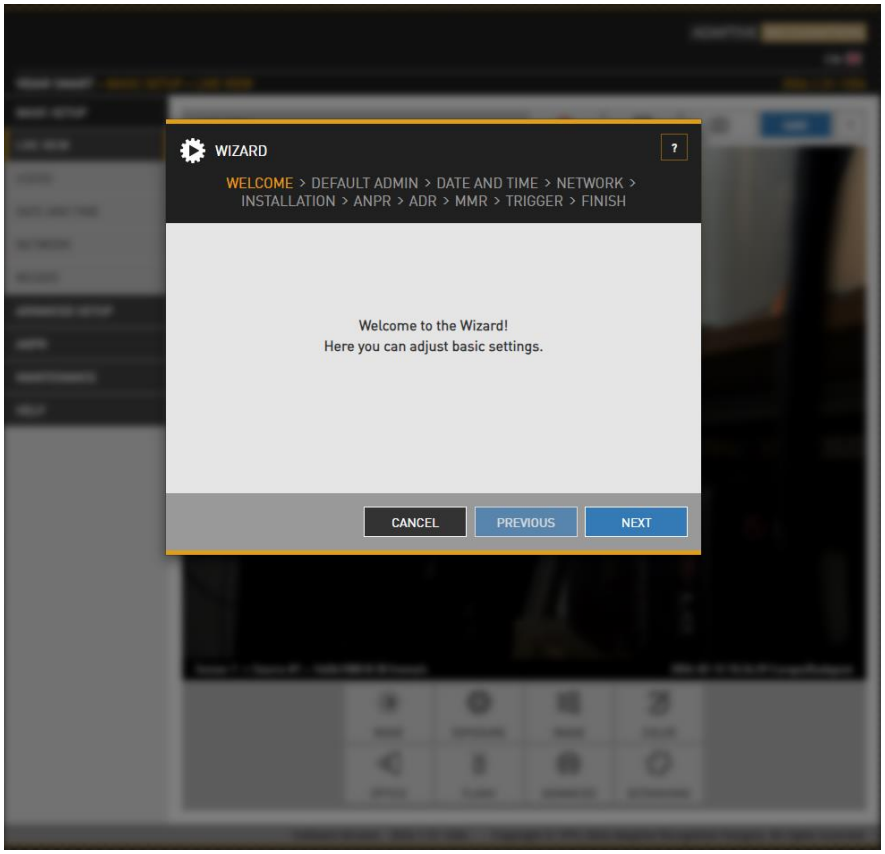
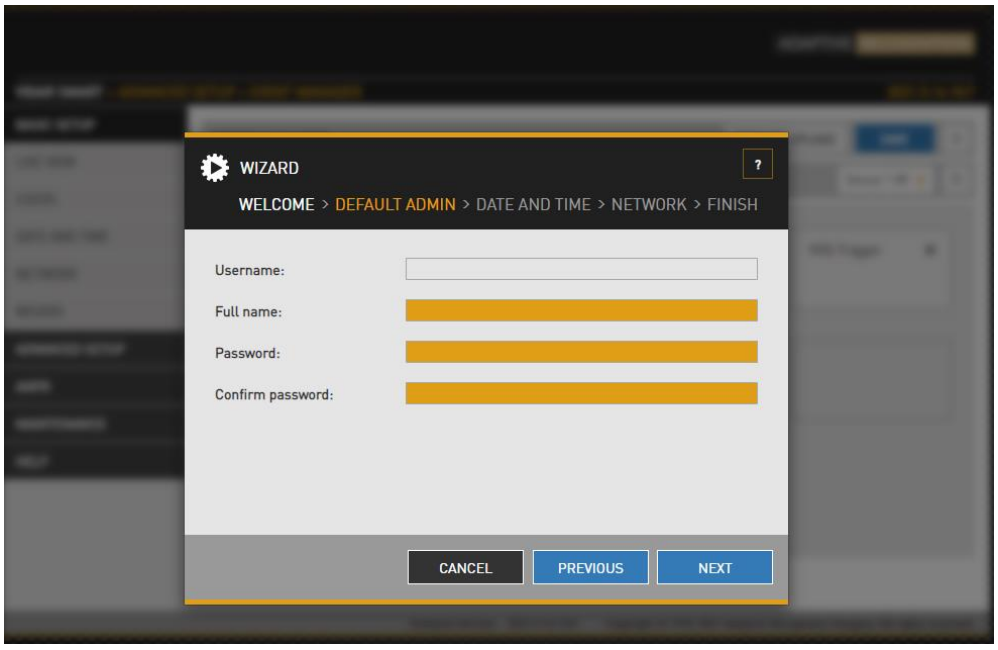
4. FIRST STEPS (WIZARD)

WEB INTERFACE > BASIC SETUP > WIZARD

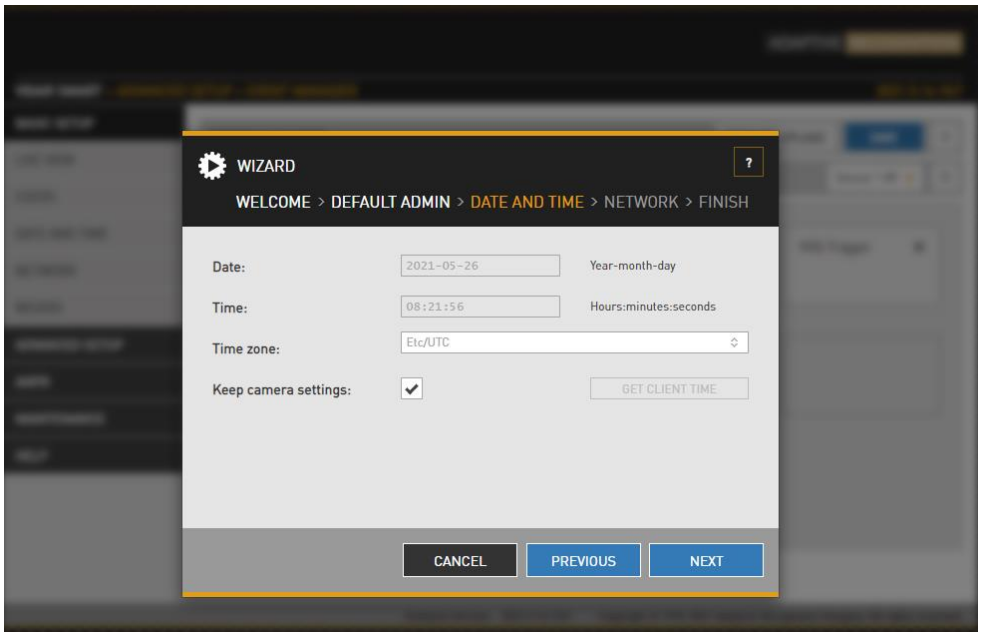
The Wizard will help with the initial configuration of the system settings of the camera. It will guide you through few steps:



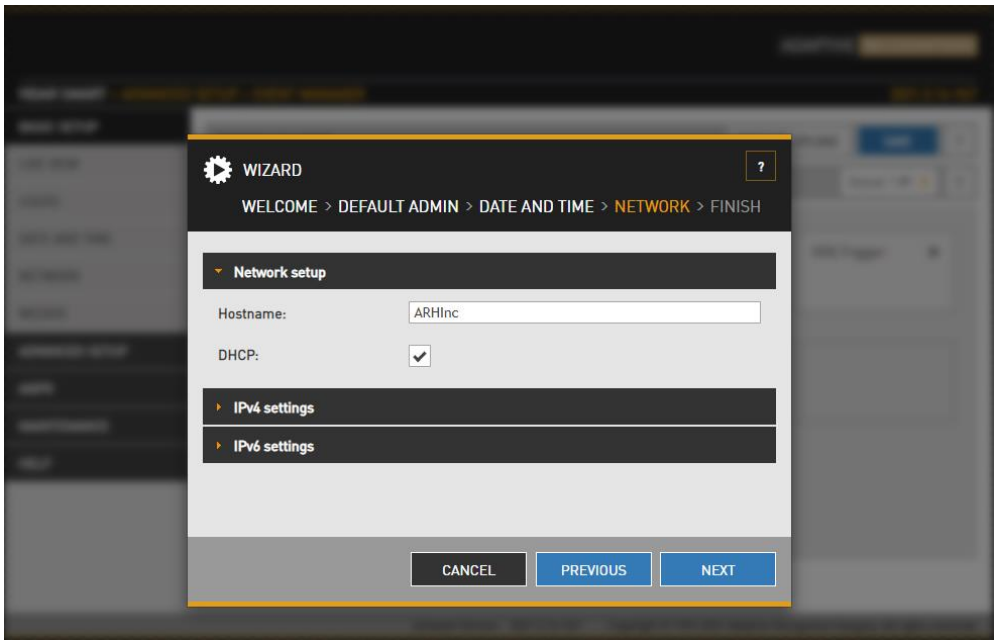
- It will guide you through setting up an administrator user



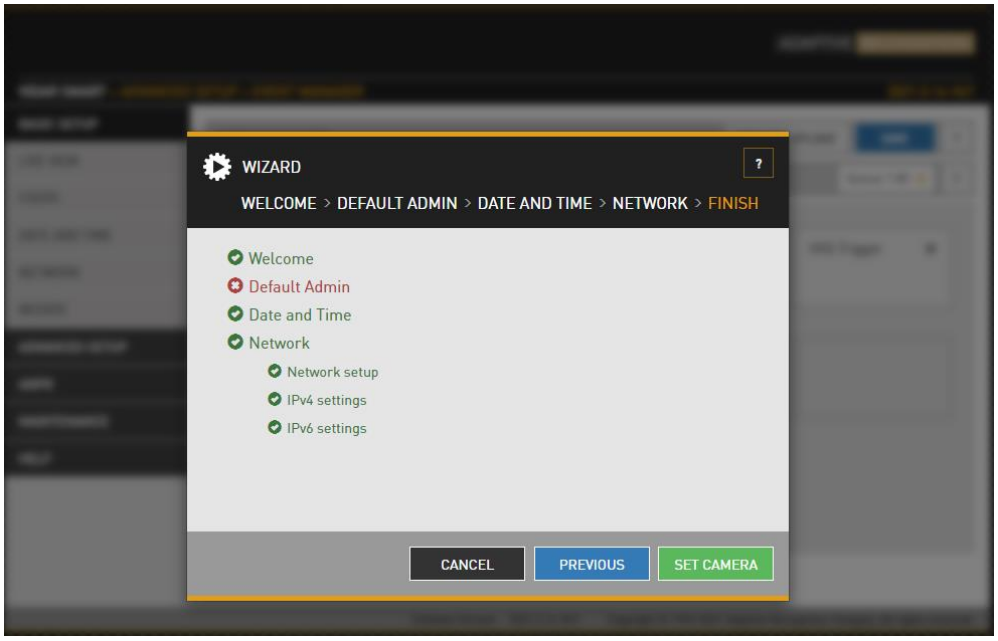
- Set the current date & time



- Set up the network



- Displays a checklist of the settings: a properly configured entry is displayed in green. Entries that need further attention are displayed in red

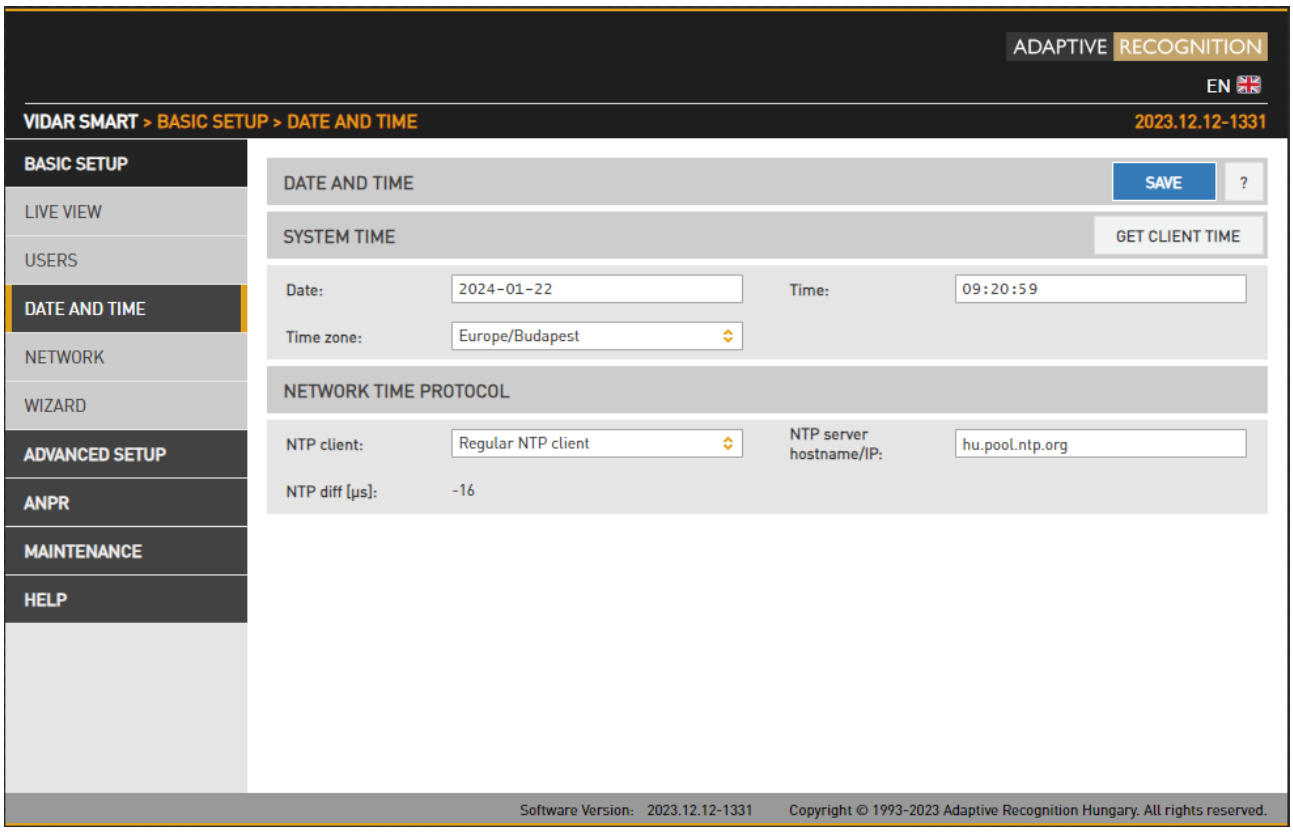


All of these settings are also available as separate configuration pages (see System settings).

5. SYSTEM SETTINGS

5.1. DATE & TIME

WEB INTERFACE > BASIC SETUP > DATE AND TIME



Current date and time and timekeeping settings are managed from this page. Users can set date and time by using a time synchronization protocol (NTP), which will keep time synchronized to a server over network.

Before you set the time, please make sure that your time zone is valid (has the correct continent / Capital City). You can do this by using the Time zone's drop-down list.

> **Note**
>
> Settings are applied after clicking SAVE.

Continuous synchronization is based on NTP (Network Time Protocol). The following settings are available with **NTP client**:

- **Off:** No NTP synchronization
- **Regular NTP client**: Regular NTP synchronization, according to the NTP standard. This is compatible with all NTP servers and network configurations. Approximately one second accuracy is guaranteed.

Important!

To initiate an immediate synchronization to the closest active NTP server, click the Synchronize button. Please note that, if the camera won't find the best and closest server fast enough, the pressing of the button will result in an Error message. This does not affect the parameters settled in the NTP fields, so NTP itself will work without clicking on the Synchronize button!

The following parameters have to be set:

NTP server hostname/IP: The address of the NTP server. (If the NTP server does not run on the default port (123), specify the port in the following format: [hostname/ip]:[port].

NTP diff [µs]: The current deviation of the camera's system time from the time received from the NTP server(s).

To initiate an immediate synchronization to the NTP server, click the GET CLIENT TIME button.

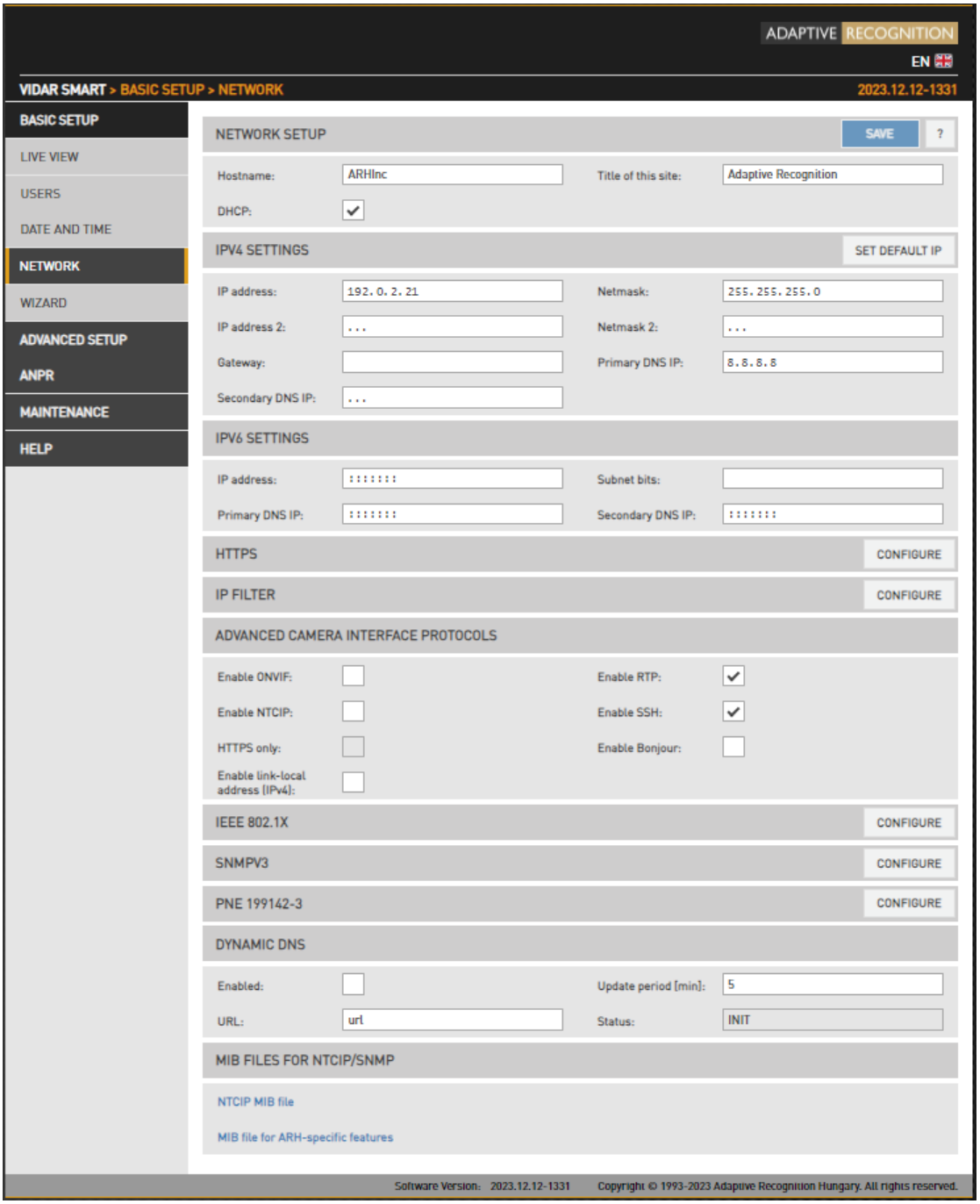
Note

The camera has an internal battery feeding its Real Time Clock (RTC) while the camera is powered off. In a power down state the battery is able to provide power to the RTC for approximately 2 weeks. It takes about 12 hours in a power up state for the battery to completely recharge.

5.2. NETWORK

WEB INTERFACE > BASIC SETUP > NETWORK

This page provides access to the network settings of the camera.



5.2.1. NETWORK SETUP

- Hostname: The name of the device in the network.
- Title of this site: Textual description of the device, for example Adaptive Recognition, that will appear as the title of the browser tab.
- DHCP: Check this checkbox to have the camera to operate in DHCP mode, that is to obtain its.
    - IP address
    - Netmask
    - Gateway
    - Primary and Secondary DNS

  from a DHCP server (DHCP mode).

5.2.2. IP VERSION 4 AND 6

The camera supports IPv4 and IPv6. Both versions can be enabled simultaneously. At most two IPs can be assigned to a device.

- Set default IP: Tis button restore the original IP address of the camera and the corresponding netmask setup.

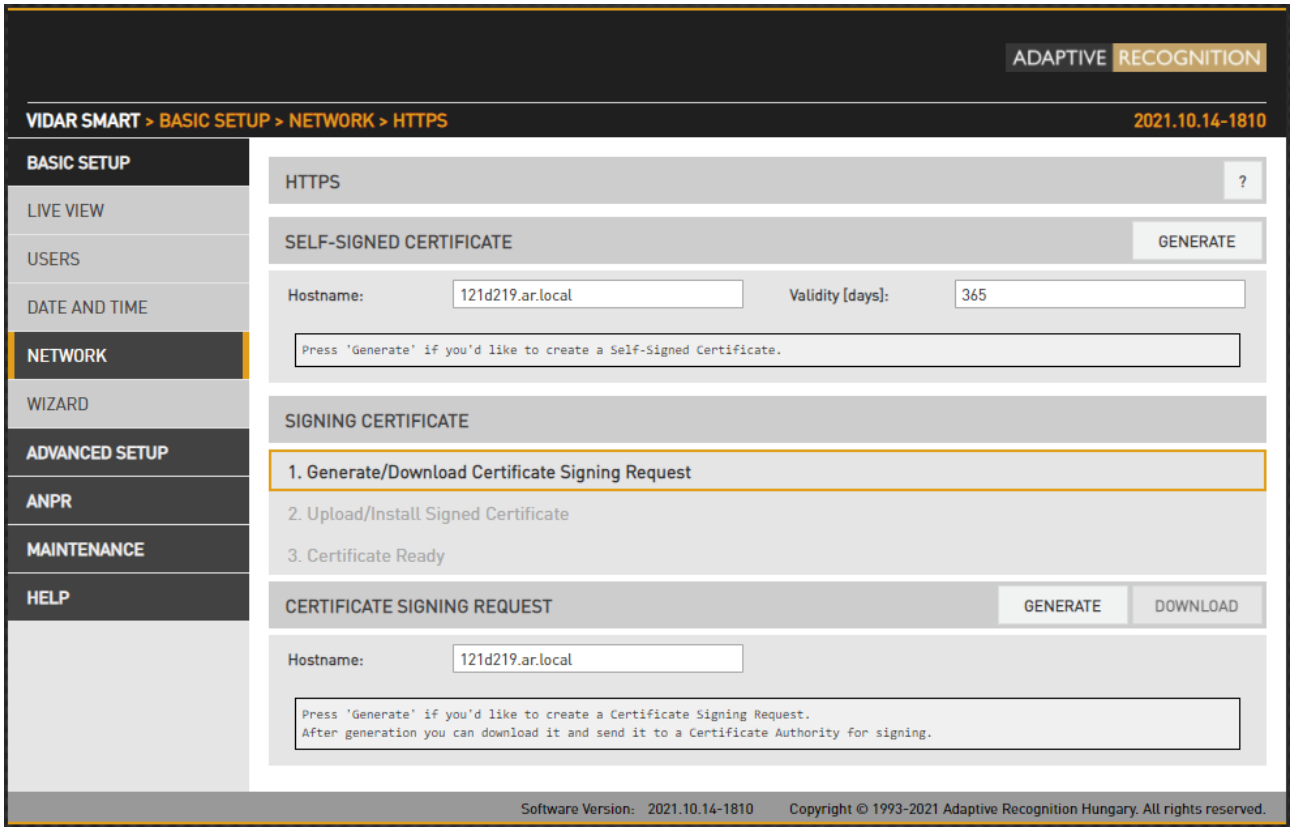
- IPv4: The IP address for the camera can be set
    - Automatically via DHCP (see option above), or
    - Manually, a static IP address.
- IPv6:
    - Only static IP addresses are supported.
    - The /16 option stands for the length of the subnet mask (16 refers to a 8 characters long mask)

5.2.3. HTTPS

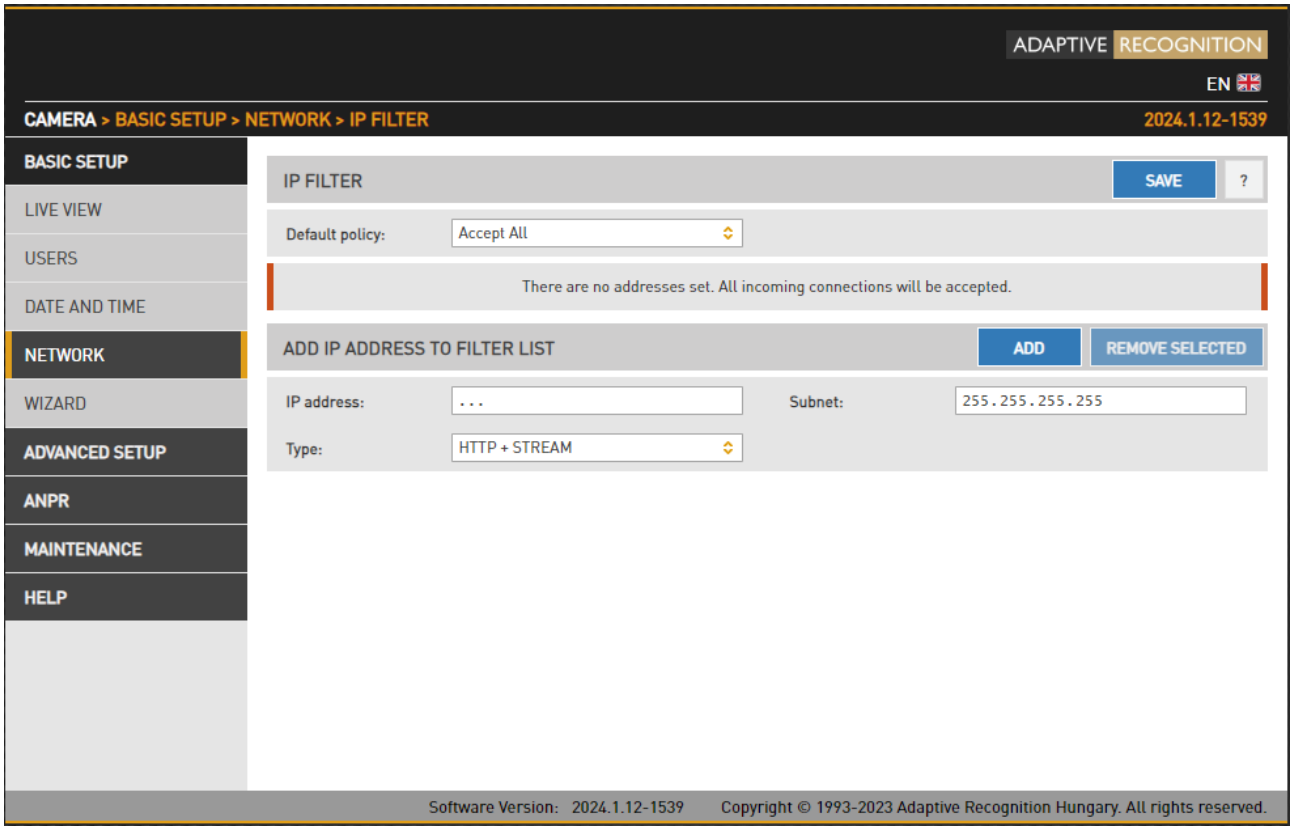
The camera's onboard webserver is capable of running in HTTPS mode, which ensures an encrypted, secure channel between you and the camera.

How to create and install a Signed certificate:

- Set date and time, otherwise the device will not accept the uploaded certificate.
- Generate and download the "Certificate signing request" (.csr extension) file on your device.
- Sign certificate with a Certificate Authority, for instance Symantec, Trustwave… or a self-generated top-level certification, like RootCA.
- After signing, upload it to your device with the public key of the RootCA certificate.
- After installation and restart, your device is available with HTTPS protocol.



5.2.4. IP FILTER



> **Note**
>
> The IP filter module blocks HTTP and stream access only. It does not affect SSH and FTP access.

Default Policy: The policy can be of two types

- Reject All – in this case access is denied to all IPs except those listed
- Accept All – in this case access is granted to all IPs except those listed

The exceptions to the default policy can be added and removed in the **Add IP Address to Filter List** section.

IP address: The system accepts IPv4 and IPv6 addresses as well.

Type: The range of IP filtering

- HTTP+STREAM: the settings are applied to both HTTP and stream requests
- HTTP: the settings are applied to HTTP requests
- STREAM: the settings are applied to stream requests

Subnet: Subnet mask of the IP address being added. This has to be expressed in dot-decimal, just like the address itself. (e.g., 255.255.255.0)

After clicking the Add button, the new exception will appear in the BLOCKED/ACCEPTED ADDRESSES table above the edit fields. The elements of the table can be removed by clicking the check box of the row and then clicking the Remove button. The above settings (default policy, exceptions) will not be applied until clicking the Save button.

Important!

Before clicking the Save button, make sure that all settings are configured correctly, an incorrect setup can block the user from accessing the camera. In this case the R may be applied.

5.2.5. ADVANCED CAMERA INTERFACE PROTOCOLS

Enable ONVIF: Checking this checkbox will enable the ONVIF interface of the camera. Please note that with ONVIF enabled the amount of memory available for image buffering will be smaller.

Enable RTP: Select this option to enable RTP streaming.

Enable NTCIP: Enables the National Transportation Communications for Intelligent Transportation System (ITS) Protocol (NTCIP) which creates a seamless integration into standardized ITS systems. For more information on NTCIP, please check the NTCIP Guide in the HELP menu of the web interface.

HTTPS only: Enables HTTPS protocol which is encrypted using Transport Layer Security (TLS).

Enable SSH: When this box is ticket out, access will be denied through the service port (SSH). When disabled, the Adaptive Recognition Support will have limited tools to recover the camera when inaccessible!

Enable link-local address (IPv4): If the PC is running on a DHCP network, it is possible to revive network communication with improperly configured IP devices to correct the IP address. This can be accomplished using the so-called link-local IPv4 address of the network device.

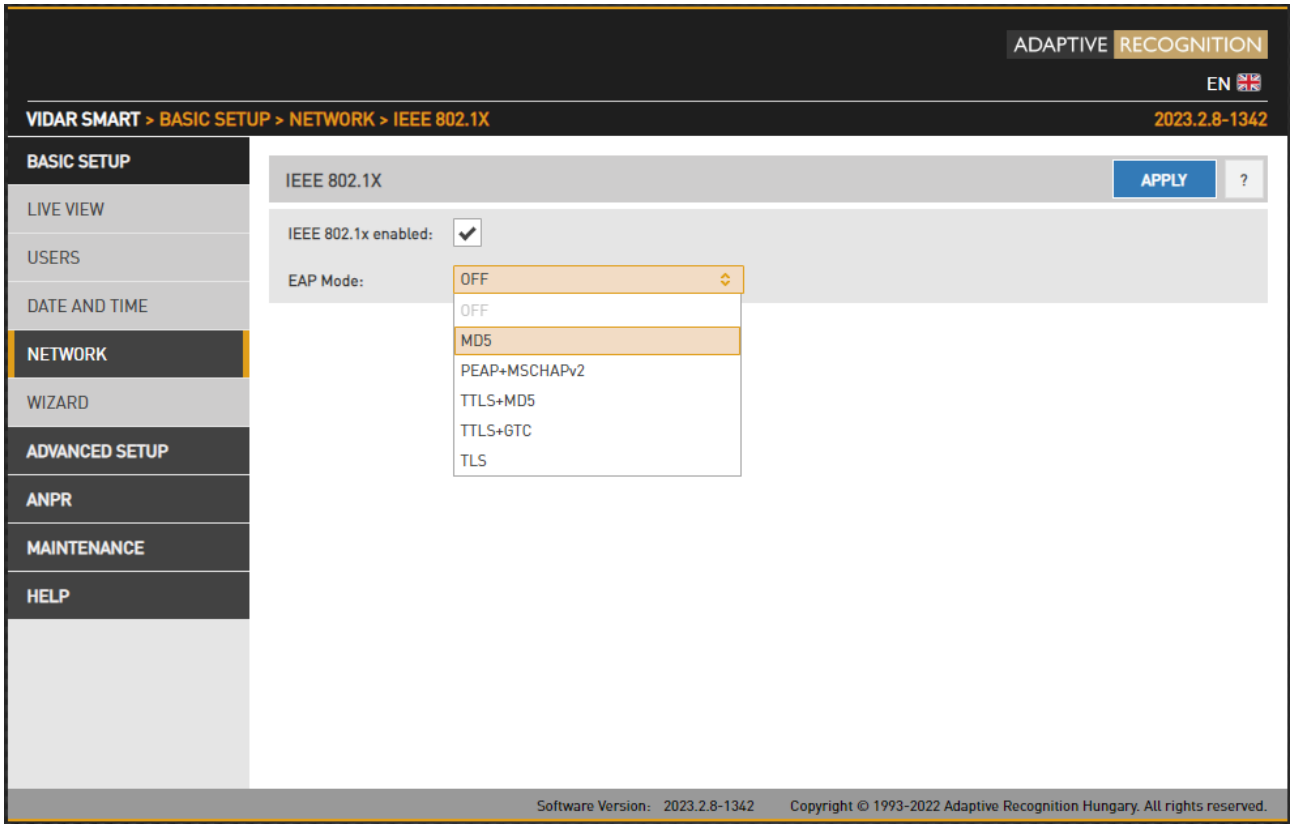
Enable Bonjour: The program is able to detect Adaptive Recognition (VIDAR) cameras on the Ethernet network using the Bonjour protocol.
The program recognizes all devices connected to the network: it can query their IP address (via the Bonjour protocol), but it will only end up fully communicating with those that are configured on the same subnet as the PC.

5.2.6. IEEE 802.1X

The settings on the web interface of the camera is available at BASIC SETUP/NETWORK/IEEE 802.1X. It can be achieved by using the Configure button.

Based on the network created by the network administrator, these are the following options:

EAP Mode = MD5 (Challenge): the user only on the HP V1920 switch configured. Entering a password is mandatory.
EAP Mode= PEAP+MSCHAPv2: the user through a RADIUS server can be entered. Entering a password is mandatory, certificates are optional.
TTLS+MD5: the user can be logged in via a RADIUS server. Entering a password is mandatory, certificates are optional.
TTLS+GTC: the user can be logged in via a RADIUS server. Entering a password is mandatory, certificates are optional.
TLS: the user can be logged in via a RADIUS server. The client uploading the (side) certificate and the private key is mandatory (The private key password must also be entered. If there is no private key password, the previous password can be deleted by entering the minus sign. The camera does not check whether the uploaded private key is encrypted and does not validate the entered password).



Entering a user ID (Identity) is mandatory in all cases. The anonymous identity option is not yet supported, so when logging in a user ID can be interrogated on the network.

The general rule for filling in text fields is that if you leave them blank, the camera takes into consideration a previously specified or default value, although it may not accept it. Some cases, text data can be deleted by entering the minus sign (This can happen if the field is not mandatory, e.g. in case of private key password).

The settings applied only after pressing the Apply button, and if this succeeded, the interface will offer to restart the camera.

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5.2.7. SNMPV3

SNMP (Simple Network Management Protocol) is a network protocols to manage and monitor network elements. SNMP retrieves information and data from cameras on the network. It will also be able to communicate with network devices that know the same standard.

Using SNMP, you can:

- identify devices
- monitor network performance
- monitor changes or query the status of network devices in real time.

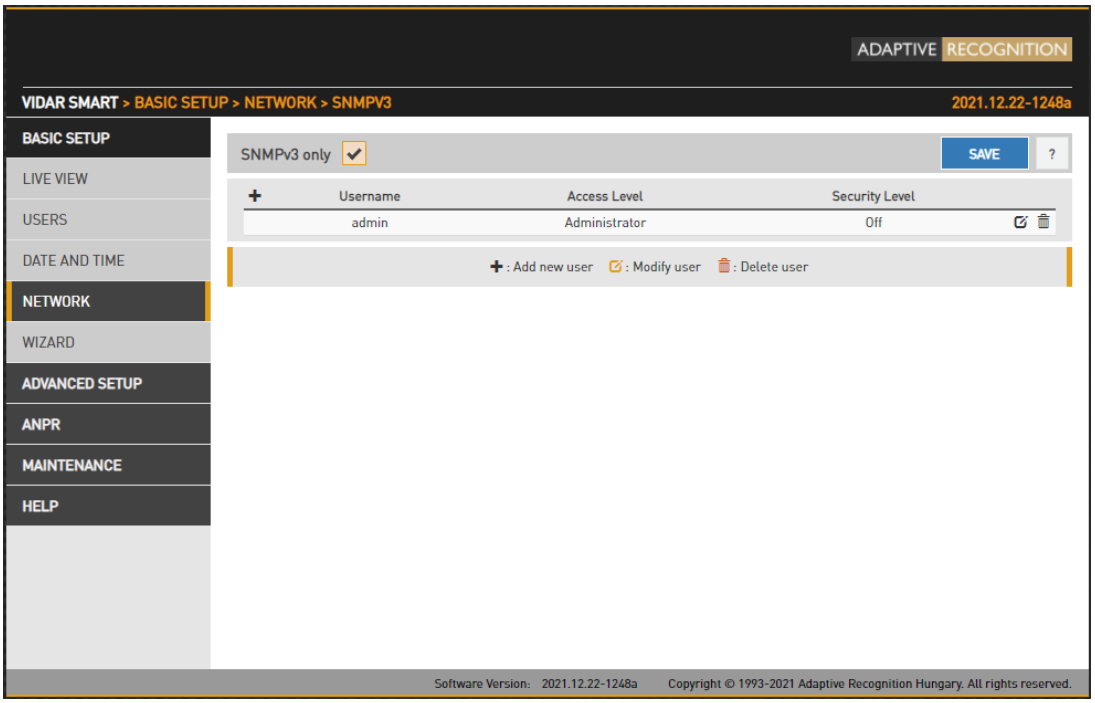
Click on **Configure** button first.

Function can be turned off with the 

checkbox.

After that, you can add a new user: clicking on the plus ('+') button, then a form appears requesting the following fields:

- **Username**
- **Access level** (Normal user, Read-only user, Superuser and Administrator)
- **Security level** (Off, MD5, SHA1, MD5+DES, SHA1+DES, MD5+AES, SHA1+AES)



Note

Settings will be applied only after click on SAVE button.

5.2.8. DYNAMIC DNS

Dynamic DNS services provide a consistent addressing method for devices that change IP address frequently. The host device needs to periodically (**Update Period**, given in minutes) ask for an update at the dynamic DNS service provider (**URL**, as given by the DDNS provider), which will in turn keep the DNS tables (where the domain/host names are translated to the corresponding IP addresses) of the service provider up to date. The current status of the process is shown in **Status**. Please note that network settings such as IP domains, gateway settings, etc. may affect this feature, in short: the DDNS service provider must be accessible from the device.

5.2.9. MIB FILES FOR NTCIP/SNMP

A management information base (MIB) is a formal description of a set of network objects that can be managed using the Simple Network Management Protocol (SNMP). The format of the MIB is defined as part of the SNMP. You are able to download it and open it with any text editor. The function only works if the Enable NTCIP box is checked in the Advanced camera interface protocols menu.

> **Note**
>
> Settings are applied after clicking **SAVE**.

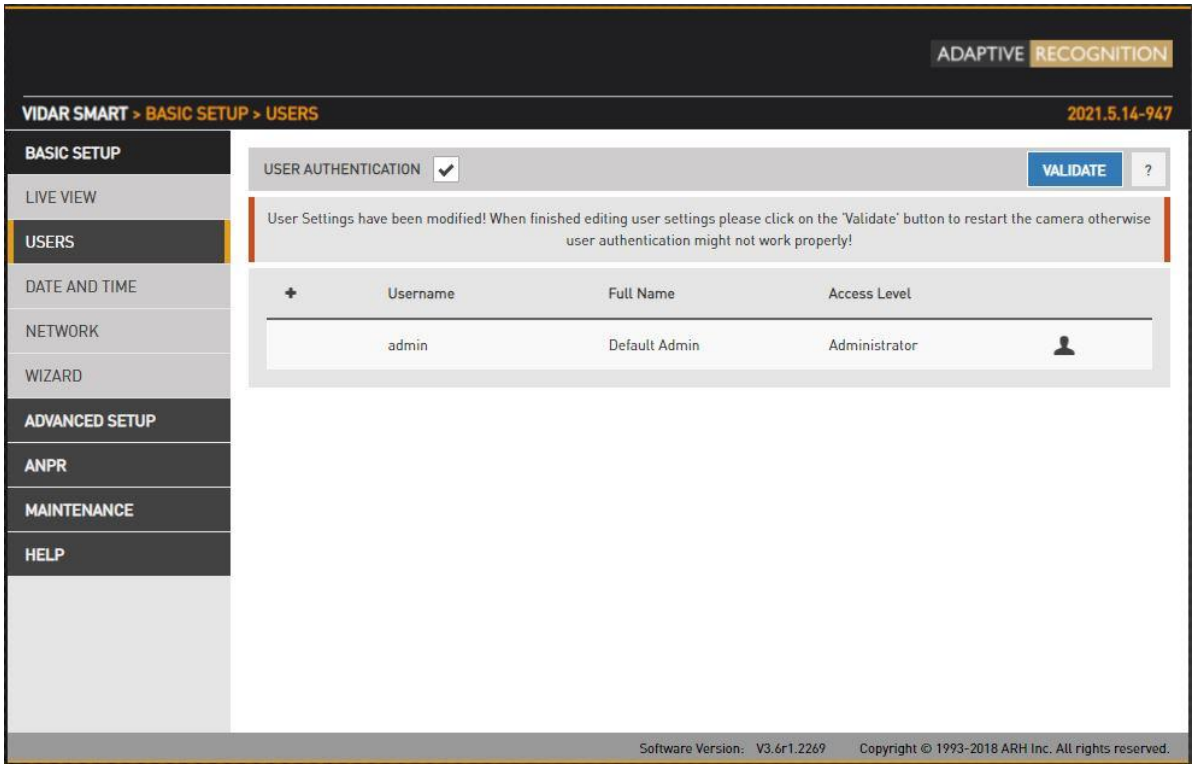
5.3. USERS

WEB INTERFACE > BASIC SETUP > USERS

User management settings are displayed in this page.

If user management is not required, it can be turned off with the USER AUTHENTICATION checkbox. This increases performance. Administrator rights will be granted to all. This is also the factory default state. In order to create new users, a user with 'Administrator' privileges must be created first.

Users can be added , deleted and edited with the corresponding buttons.



Important!

If you enable ‘User authentication’, all connections to the camera will require username and password.

Adding a new user: On clicking the plus ('+') button a form appears requesting the following fields:

- **Name:** The user's name, this will be used to login.

Important!

User name cannot be 'root'. User name must contain only letters of the English alphabet, numbers or underscore ('_') (with regular expression: /^[0-9A-Za-z_]*$/)

- **Full name:** The full name of the user.

Important!

Full name should contain only letters of the English alphabet, numbers, space or the following characters: '.','/','_','+','-',',' (with regular expression: /^[0-9A-Za-z\.\/_\+\- ,]*$/)

- **Password:** Corresponding password.

Important!

Password should contain only letters of the English alphabet, numbers or underscore ('_') (with regular expression: /^[0-9A-Za-z_]*$/)

- **Confirm password:** Confirm the given password to rule out mistyping.

- **Access Level:** Check the table below for the extent of each access level.

Access Level	Privileges
Viewer	Login Live View Help
Normal	Login Basic Setup – Live View Advanced Setup – Motion Detection, Private Zone, Event Manager ANPR - Browse Maintenance – System Information, Camera Log Help
Power	Login Basic Setup – All Menu Items Advanced Setup – All Menu Items (except IP Filter) ANPR – All Menu items Maintenance – System Information, Camera Log, Restart Help
Administrator	Access to every camera feature

- **Edit/Delete:** It is possible to edit user parameters or delete existing users from the system with the exception of the main "admin" user. This user cannot be deleted and its username and access level cannot be modified.

Note

Settings will be applied only after restarting the camera. If you click VALIDATE after modification the camera will automatically restart.

6. IMAGE SETUP

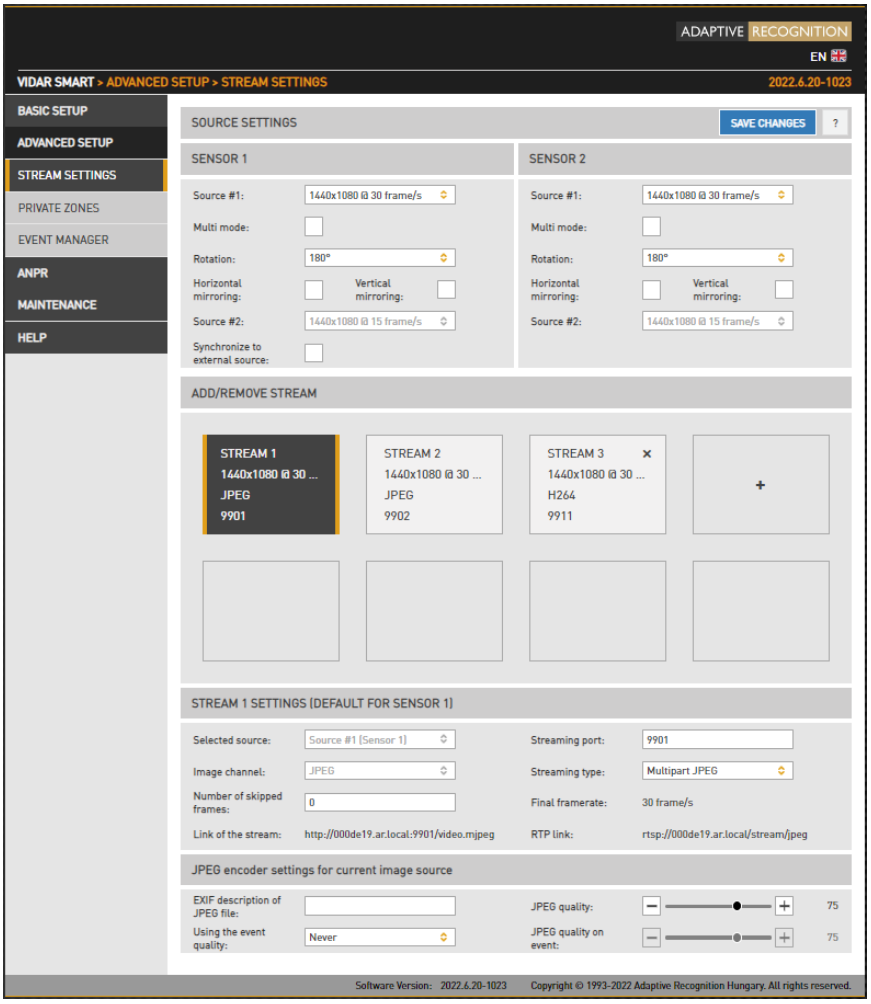
6.1. IMAGING PIPELINE

WEB INTERFACE > ADVANCED SETUP > STREAM SETTINGS

Image capturing process is organized as a pipeline receiving images from the sensor, then processing and buffering the images. There may be more than one pipeline: this mode of operation is called Multi mode. The motivation behind Multi mode can be illustrated with the following examples:

- Provide a low-quality stream to display and store, and simultaneously a high-quality stream for ANPR
- In case of mixed (reflective and non-reflective) license plates, to provide two streams with different intensities of illumination using Parity Flashing likewise
- One ANPR (vehicle underexposed, license plate clearly visible) and one overview stream (vehicle visible, license plate overexposed)

The primary and secondary imaging pipelines are configured in the Stream Settings section.



The primary pipeline is always active. The secondary pipeline is activated by enabling Multi mode. Both pipelines are fed by the same sensor. However, the pipelines can be configured independently, with the following limitations:

- The pixel resolution's upper limit is the max resolution of the imaging sensor, and lower resolutions can only be the power of two fractions of the full resolution (½, ¼, ⅛, etc.)
- With Multi mode enabled even frames are fed into the primary, while odd frames are fed into the secondary pipeline, thus the frame rate of the individual pipelines will be one half of the frame rate of the sensor.
- Sensor settings (such as gain or shutter – adjustable at Live View) and geometric transformations (rotation, mirroring) are shared by the two pipelines.
- Post-processing settings (such as color/grayscale mode, gamma, etc.) are independent for the two pipelines
- Two different intensities of the built-in illumination may be defined for the even/odd frames (Frame Parity Flashing – you can find at Live View as well)
- Pipelines are identified by their source (source#1 for the primary and source#2 for the secondary pipeline)

Both pipelines can feed one or more video stream servers with images. Video servers can stream in various encodings, containers, etc.

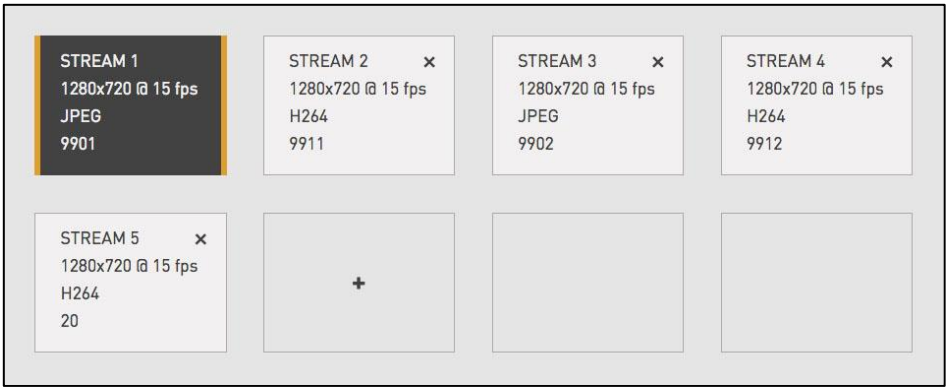
Source settings

- Source#1: The resolution and FPS of the primary imaging pipeline
- Source#2: The resolution and FPS of the secondary imaging pipeline
- Multi Mode: This checkbox enables Multi Mode
- Rotation, Horizontal and Vertical mirroring: Geometric transformations (shared by both pipelines)

> Note
>
> Please note that, when Multi Mode is enabled, Parity Flash is not supported!

Stream X Settings: The settings of the selected stream are listed here

Add/Remove Stream: The output of both the primary and secondary pipelines can be directed into a stream, which is a video feed streamed on a HTTP port. You can add a stream by clicking on the "+" icon at an available (empty) slot. You will be offered a number of presets, which can be custom tailored later.



Selected source: The pipeline which will feed this stream

Streaming port: The HTTP port on which the video will be streamed

Image channel: Encoder used on the stream (JPEG or H264). A special type is also available, "Motion Detecting", which is a special H264 core dedicated to motion detection

Final framerate: Will display the resulting frame rate

Number of skipped frames: Can be used to further reduce the framerate of the stream, because resolution@framerate is already given at "Source#X"

Link of the stream: Will display the link of where the stream will be available. When authentication is enabled, the stream is only accessible if the username and password is specified in the link in the following format:

http://username:password@HOSTADDR:PORT(e.g.,http://admin:admin@192.0.2.3:9901/...)

You will find the links that you can open, for example, with VLC.

RTP link: Another network protocol to reach the stream and can open it with the same way in VLC player as it is written in the 'Link of the stream' section previously. Check the box for **"Enable RTP"** at Network Settings.

Streaming type: The container of the stream, which can be the following:

Image channel:	JPEG	H264	Motion Detecting
Container #1	Multipart JPEG	H264	H264
Container #2	RAW JPEG	MKV (Matroska)	MKV (Matroska)
Container #3	MKV (Matroska)	MP4	–

Encoder settings: Depending on whether an H264 or a JPEG encoder is used, one of the following menus will appear:

- H264 encoder settings for the current image source:
  H264 encoding uses a keyframe (I) followed by a number of predicted frames (P). The frequency of I frames, compression rate and bitrate can be configured flexibly. These settings may also adapt to the image content, for example to provide a higher quality stream in case of an event (motion detected) and lower quality when only the background is visible. It is even possible to limit this higher quality to the part of the image, which depicts the vehicle.

  - I and P frames group size: The group size is the number of I frames plus the number of P frames. For example, 1 keyframe + 15 predicted frames, the group size is 16.

  - H264 compression: Default H264 compression. The larger this number the lower the quality, but with a higher compression rate and vice versa.

  - I-frame handler on event:
  - Uses...: Uses I and P frames group size from above
  - If new...: The first frame of an event (see below) will be an I frame, all others will be P frames
  - All frames...: All frames will be I frames across the entire duration of the event
  - H264 compression on event: During an event this quality will be used instead of H264 compression.

- **Window compression on event:** H264 compression in the event window (image area defined by the event, e.g., where motion was detected).

- **Average bitrate:** Restrict average bitrate to this value.

- **H264 compression delta:** In order to achieve Average bitrate, the quality (H264 compression) may possibly be reduced. This control limits the amount of this reduction.

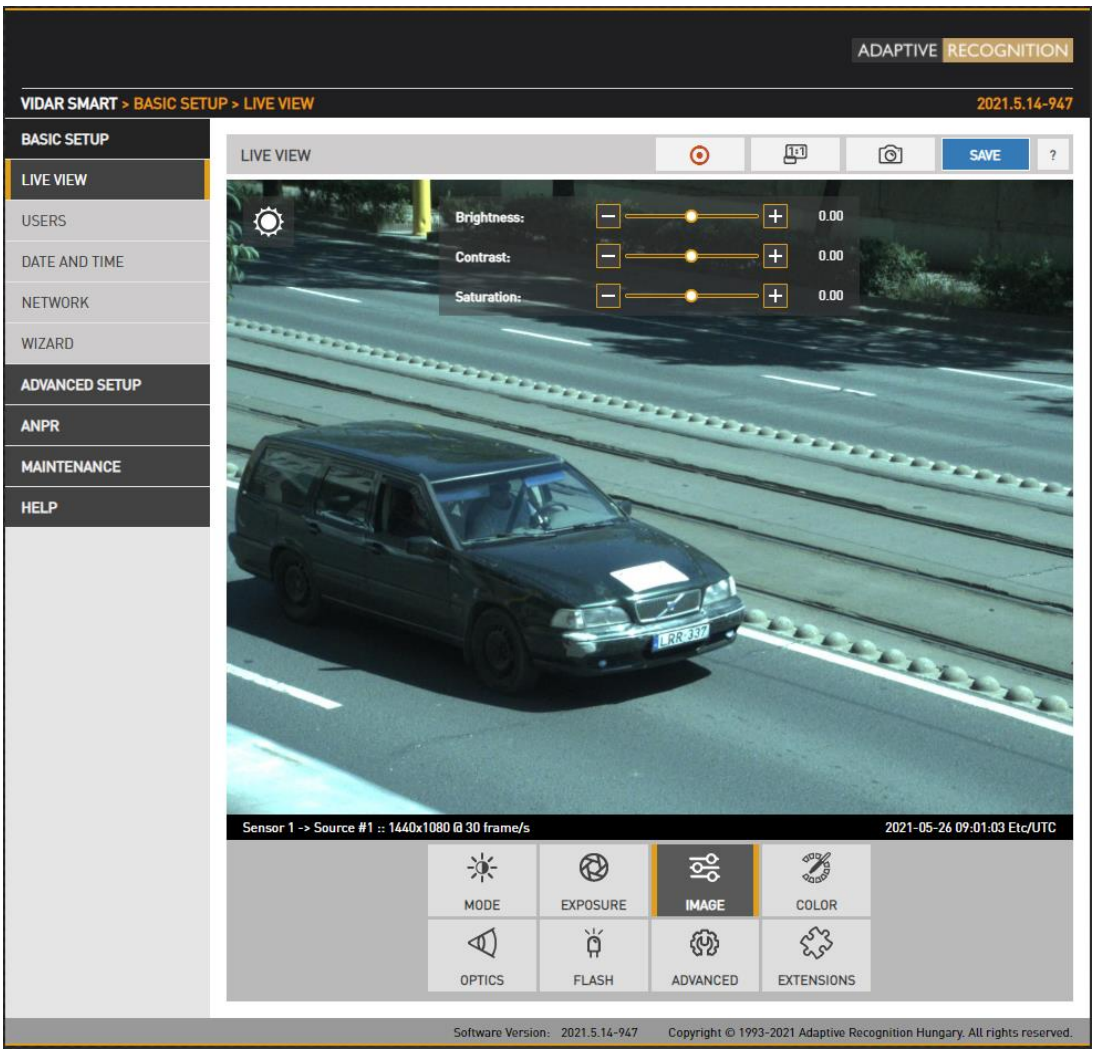
- **Using the event quality:** Definition of what constitutes as an event for H264 quality on event parameter.
- **H264 compression delta on event**: In order to achieve Average bitrate, the event quality (H264 compression on event) may be reduced. This control limits the amount of this reduction.

- JPEG encoder settings for the current image source:
  - **EXIF description of JPEG file:** The description inserted into the header of the file.
  - **Using the event quality:** Definition of what constitutes as an event for JPEG quality on event parameter.
  - **JPEG quality:** Default JPEG quality. The larger this number the better the quality.
  - **JPEG quality on event:** JPEG quality across the duration of an event.

6.2. POST-PROCESSING

6.2.1. IMAGE

WEB INTERFACE > BASIC SETUP > LIVE VIEW > IMAGE

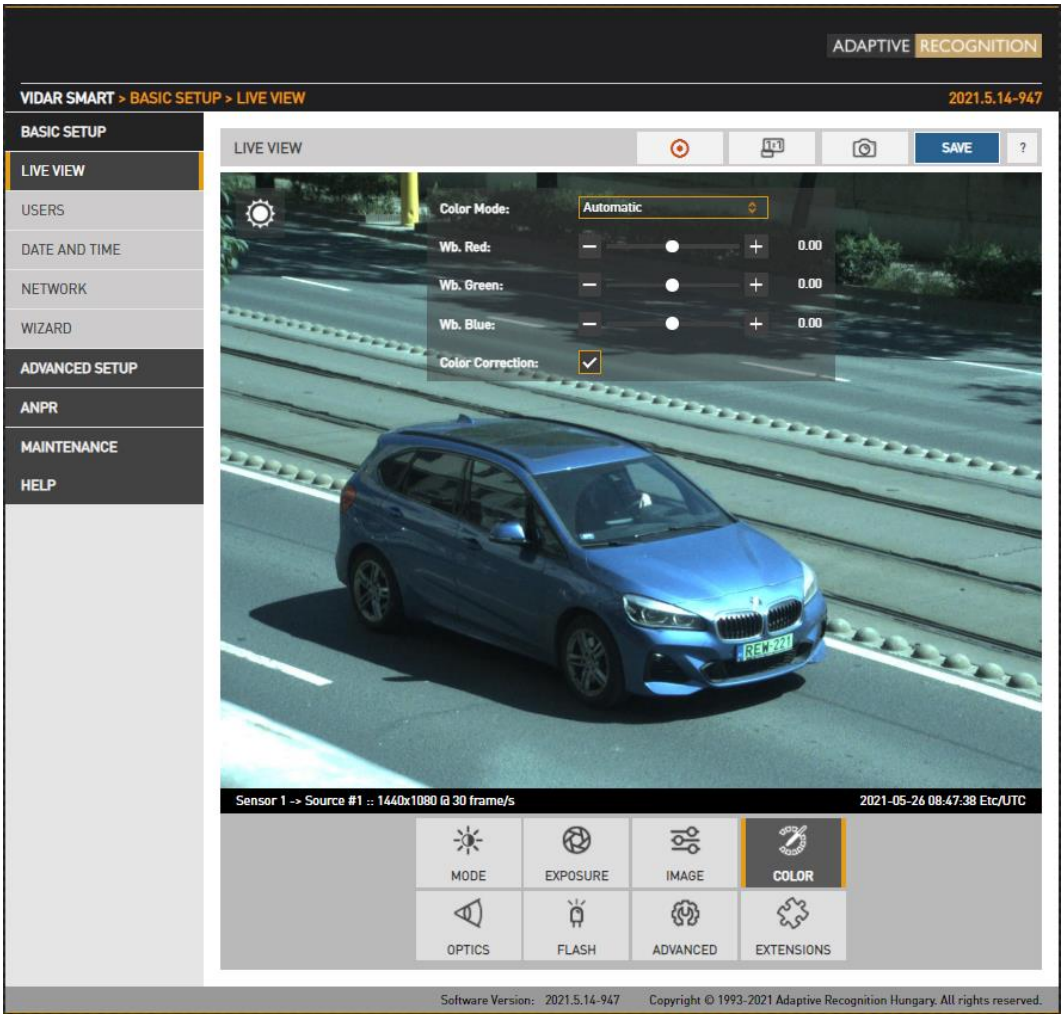


The basic post-processing settings are configured here:

- **Brightness:** Increase/decrease the brightness of the image
- **Contrast**: Increase/decrease the luminance contrast of the image
- **Saturation:** Increase/decrease the chrominance contrast of the image

6.2.2. COLOR

WEB INTERFACE > BASIC SETUP > LIVE VIEW > COLOR



Color settings are configured here:

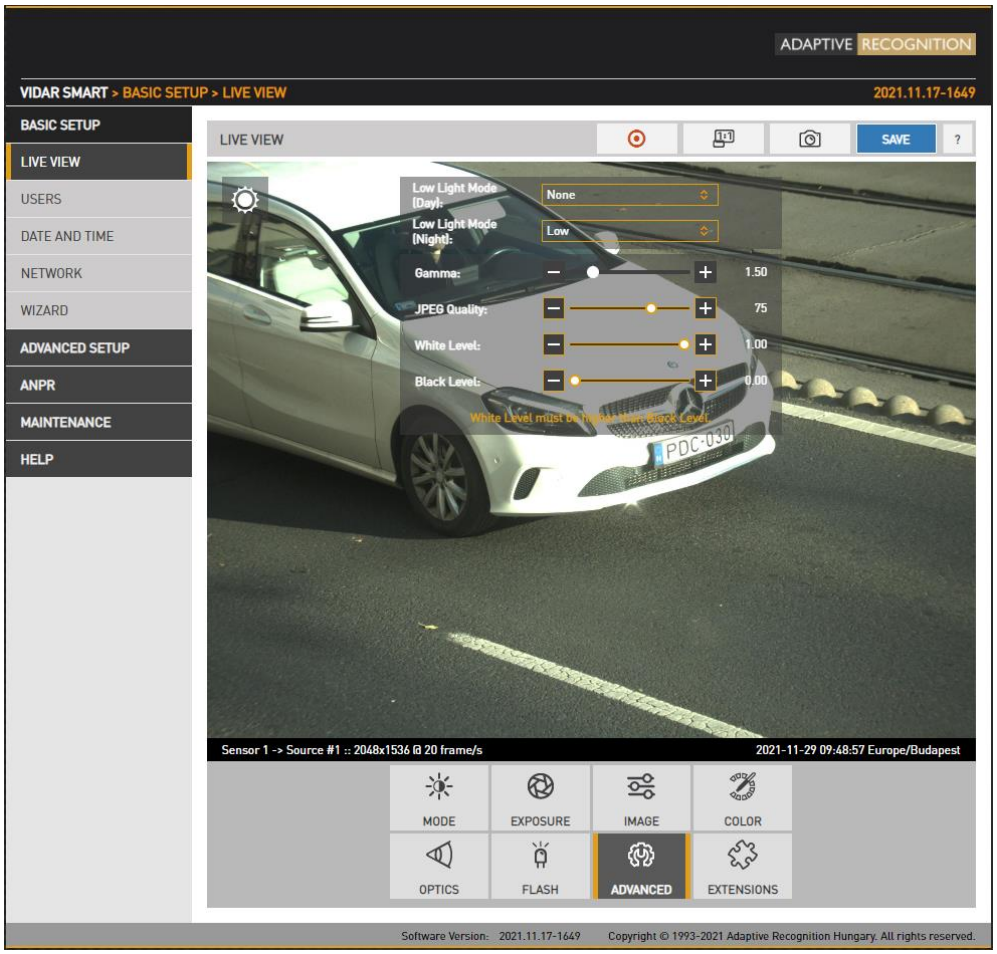
- Color Mode: Automatic/Color/Gray mode
  - Color: Color mode
  - Gray mode: ideal for night time IR mode

- Wb. Red: Red channel gain
- Wb. Green: Green channel gain
- Wb. Blue: Blue channel gain

Color Correction: Automatic compensation for the color of the illumination.

6.2.3. ADVANCED

WEB INTERFACE > BASIC SETUP > LIVE VIEW > ADVANCED

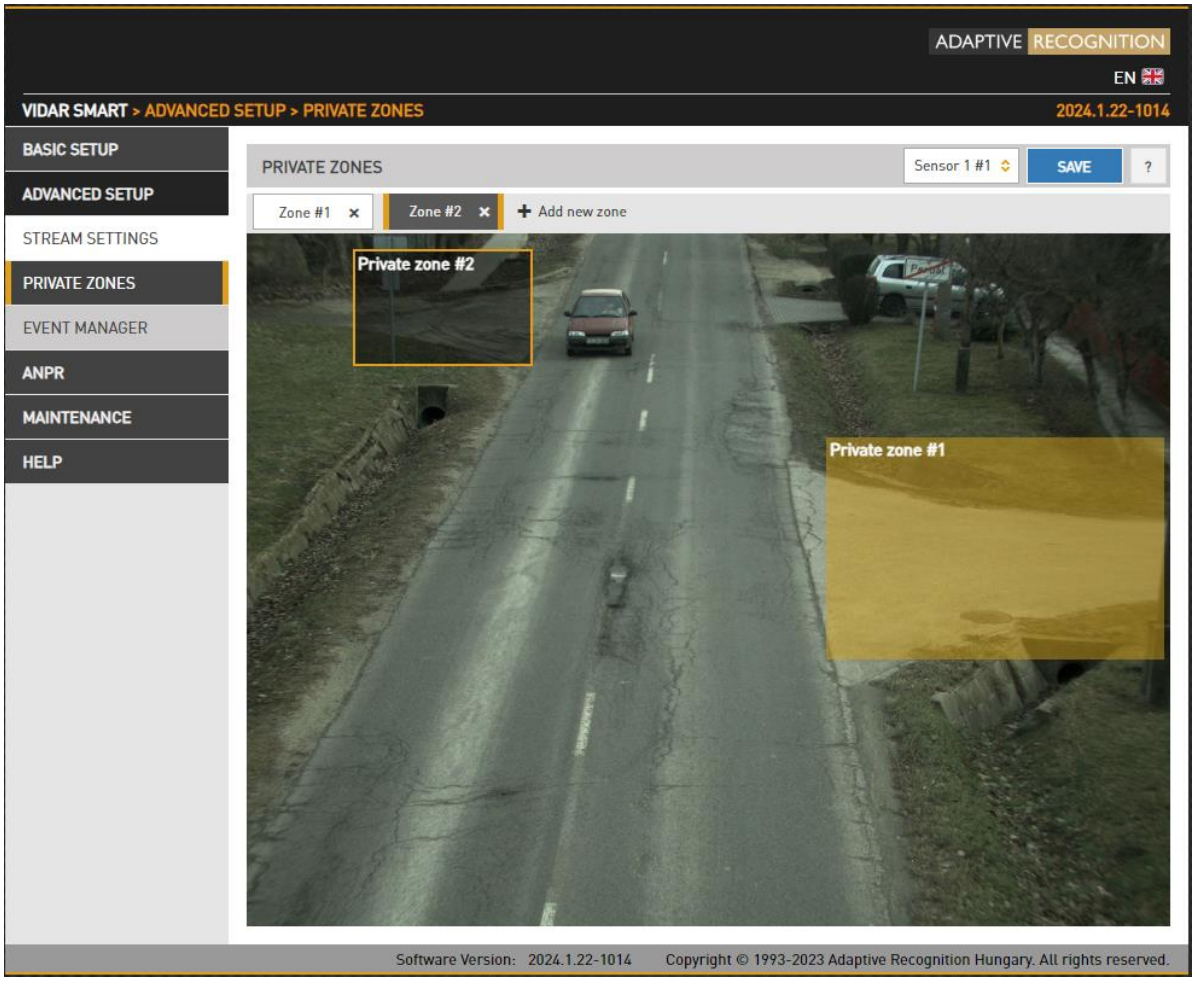


Advanced post-processing settings are configured here:

- Low light mode: Under low illumination conditions an algorithm tunes sensor and post processing parameters to still be able to capture an adequate image. (Note: this is not strictly a post processing step). The level of these settings may be selected from a drop-down menu, featuring none, low, medium, intermediate, and high. The higher the value, the higher the image noise.
- Gamma: Gamma correction of the image
- JPEG Quality: Affects the JPEG compression rate of the image – higher quality setting means lower compression.
- White Level: Defines the pixel value above which all pixels will be mapped to white
- Black level: Defines the pixel value below which all pixels will be mapped to black

6.2.4. PRIVATE ZONES

WEB INTERFACE > ADVANCED SETUP > PRIVATE ZONES

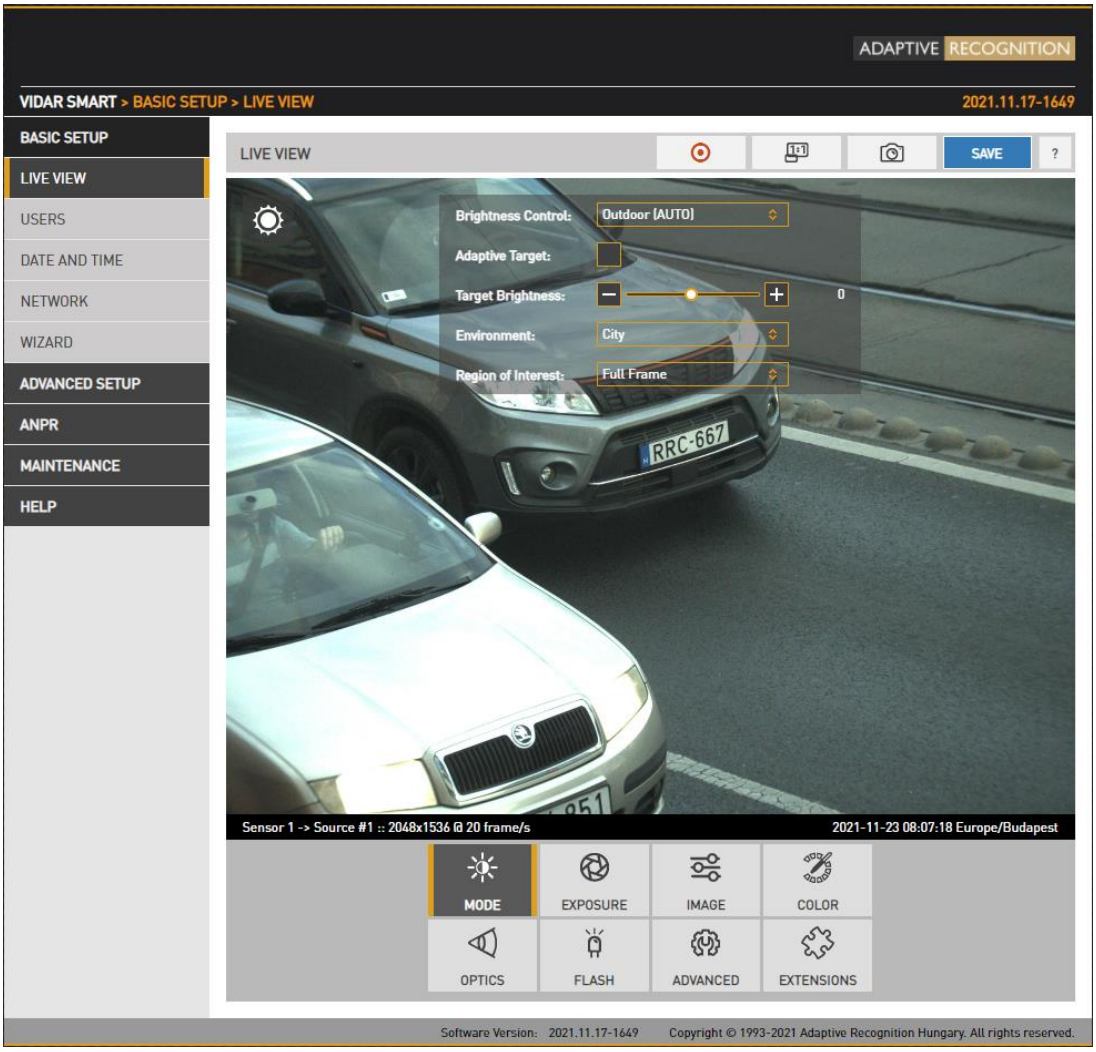


In certain circumstances it may be necessary to cover a part of the image, for instance, a parking place near the monitored lane, where the stationary vehicles should not be in the image, and their license plates should be excluded from processing, or when private property is displayed. These unwanted parts can be covered with a maximum of 3 rectangular zones using the Private zones tool.

Each time an area is added, a rectangular box (with yellow edges) shows up in the left upper corner. This rectangle is resizable and can be positioned on the image field in the required position. After clicking on the SAVE button, the defined area will be filled with black color, which you can be seen on the live view and on the streams as well.

6.3. BRIGHTNESS CONTROL

WEB INTERFACE > BASIC SETUP > LIVE VIEW > MODE



Brightness control will automatically monitor and control the exposure of the image, with license plate reading as a priority.

Brightness control principally adjusts exposure time (shutter) and gain. As ambient light level decreases, both shutter open time and gain may be increased, but only up to a level (Shutter Max. and Gain Max.) because a too long shutter value will result in motion blur, too much gain will result in excessive noise. Brightness control will also switch to night mode (engaging built in LEDs) if illumination levels fall to a level, where capturing a color image is not possible.

The icon top left shows the current state:

 – Manual mode

 – Day mode

 – Night mode

Hovering the mouse over the controls provides more information.

- Brightness Control: In different illumination situations different strategies are required to maintain a balanced exposure level. The camera offers one manual and two automatic strategies:
  - indoor (manual) – For indoor use. In Manual mode Shutter and Gain, and in models equipped with motorized lenses Iris are freely adjusted.
  - outdoor (auto) – For outdoor use.

- Adaptive Target (ATT): The ATT module is disabled by default; it can be activated in the brightness control interface on the GUI.
  The ATT adjusts the brightness control target value. If the license plate is too dark, it increases it, if it is light, it decreases it.

- Target Brightness: This control allows the user to correct the exposure of the image. Larger numbers will result in a brighter image (Please note that limits apply because of Condition).

- Environment: Four conditions are available, each corresponding to a range of the traffic's speed and the type of traffic configuration. Please note that these conditions determine the maximal exposure time, limiting the illumination of the scene, under which night mode will be engaged.

- Region of Interest:
  - **Full frame** – Current image illumination is measured in the complete image.
  - **Manual frame** – Current image illumination is measured in the selected region. You can resize and move the rectangle representing the region of interest.

Outdoor	Max. speed [km/h]	Default Max. Shutter [µs]
Parking	10	5000
City	50	1000
Highway	255	250
Freeway	255	3000

Note

Please note that in mobile mode, Vidar corresponds eventually to a lower speed, as on Freeway the velocity of the camera and the target vehicle is in the same direction, as opposed to Highway use, monitoring oncoming traffic.

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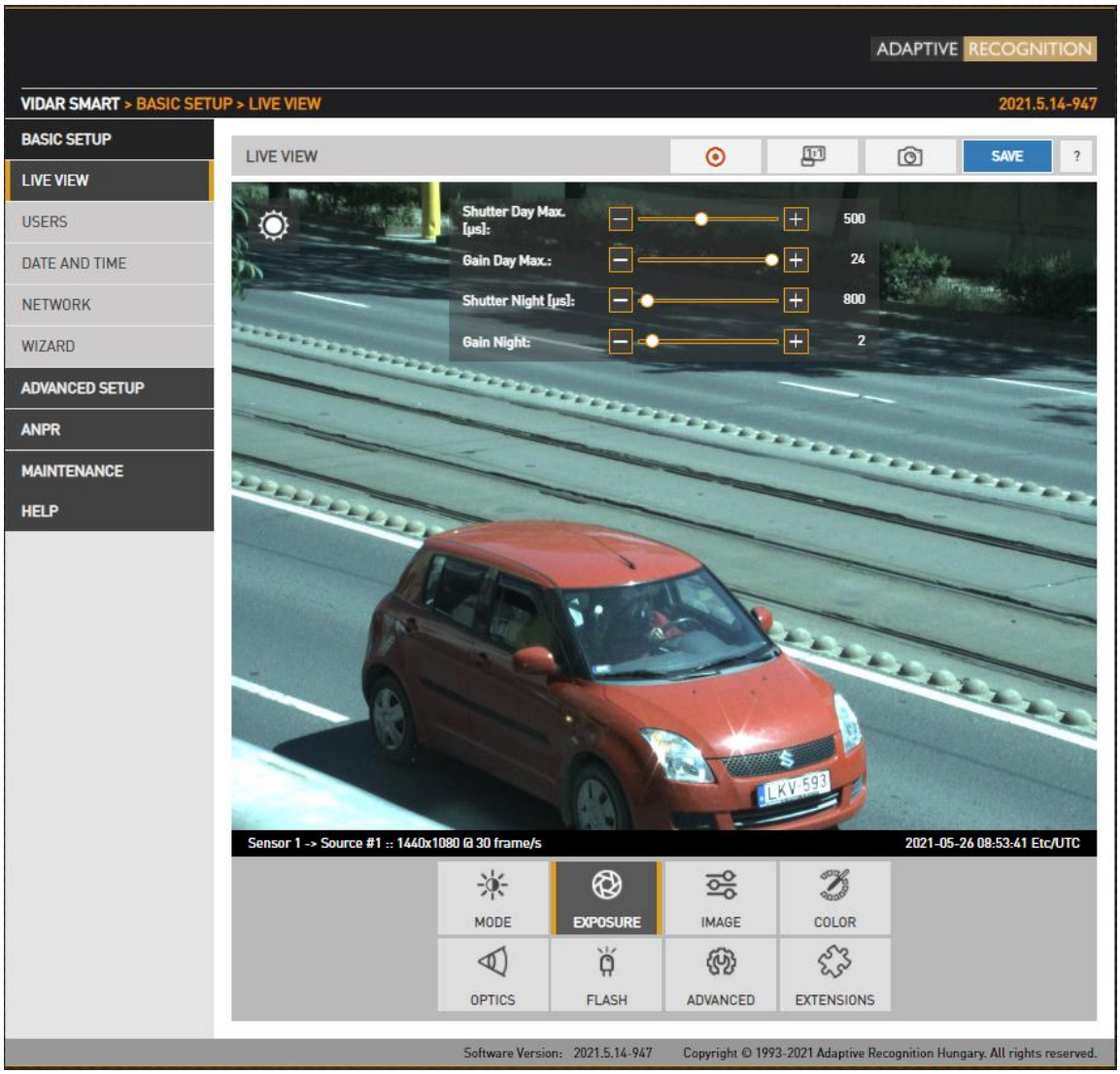
6.4. EXPOSURE CONTROL

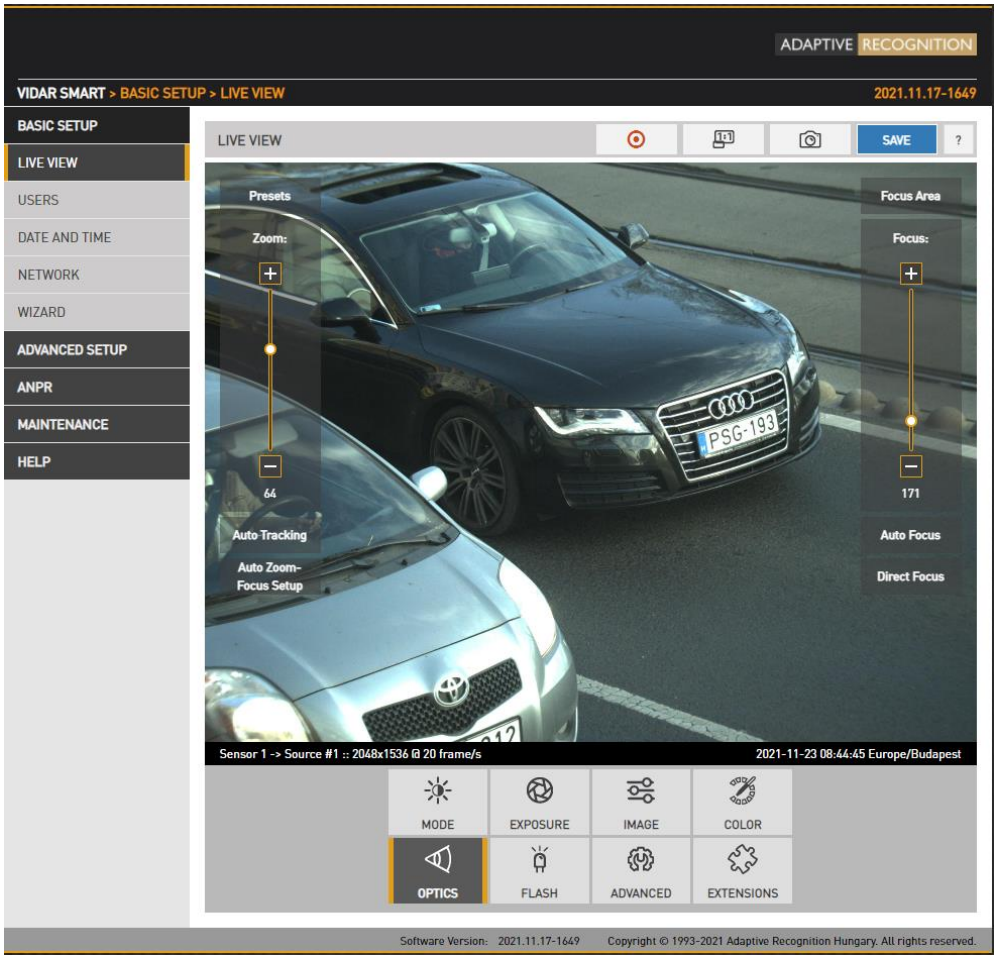
WEB INTERFACE > BASIC SETUP > LIVE VIEW > EXPOSURE



- In **Manual** mode **Shutter** and **Gain** are freely adjusted.
- In **Outdoor** mode both Shutter and Gain are adjusted by the controller. However, their maximum: **Shutter Max**. is adjustable and Gain Max. is available in day/night mode, where a user defined value may be entered. Selecting **Environment** on the **Mode** tab affects these values.

6.5. OPTICS

WEB INTERFACE > BASIC SETUP > LIVE VIEW > OPTICS



Models equipped with motorized lenses will show this menu item. Both lenses can be adjusted individually by switching between the two sensors in the Live view menu. Use the left slider (Zoom) to change the field of view from wide angle (0) to telephoto (100). Use the right slider (Focus) to manually adjust focus from near to far.

Clicking the Auto Focus button will execute one time autofocus performance. It is possible to change between short range and full range options. By clicking the Focus Area button, moving and resizing the yellow rectangle, the area of interest can be defined, and then this part of the image will be sharp after autofocusing.

Auto tracking is enabled by clicking the Auto Tracking button. The essence of this function is to set the zoom to a specific position and then sharpen the image with one of the image sharpening functions. after adjustment, the focus will be adjusted automatically after. It follows from the operation described that if the Auto Tracking function is activated when the image is not in the sharp position, the focus retraction after zooming will also result in a blurred image.

To use auto tracking, an anchor point must be defined, that is the image that needs to be sharp when enabling this function. It is best to set this anchor point (enable auto tracking) with the following conditions met:

- Zoom is at telephoto end
- Iris fully open
- Image is sharp

A number of zoom/focus pairs may be set and recalled as presets using the Presets menu.

> **Note**
>
> Due to the nature of the optics, enabling Auto Tracking at zoom positions close to the wide-angle position may result in inaccurate image refocus at zoom positions close to telephoto.

There are two new buttons on the Live view optics interface: Auto Zoom-Focus Setup and Direct Focus.

Auto Zoom-Focus Setup button:

Its function is to automatically adjust the zoom (appropriate viewing angle) and focus (focusing on a specific subject). Its current operation is trying to determine the distance from the camera to the object in the optical center of the camera, and then adjusting the optics to the appropriate zoom position based on the resulting distance and the desired angle of view. It will then automatically refocus the image according to the specified distance. (Currently, the viewing angle can be specified in Plain config (URL: http://CAM_IP/#plainconfig) in the setup / geometry module with the parameters 'lane_width' and 'lane_count'. Their default values are 3 and 1.)

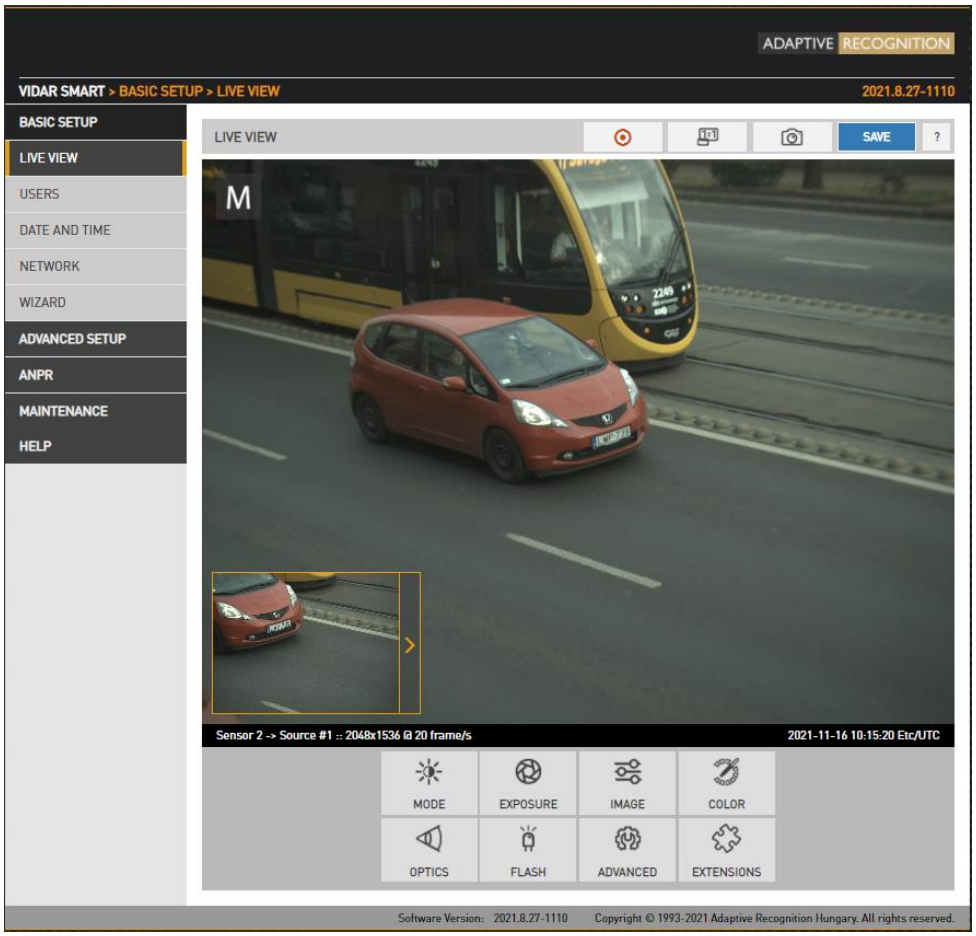
Direct Focus button:

The distance-based focus function can be triggered with the button. By clicking the button, the camera calculates where to focus at a given zoom position so that the image is sharp at the measured or calculated subject distance. Two options are available here:

- Laser+AF: Combined distance-based and fine-tuned auto focus for a fast and accurate focus adjustment.
- Laser only: Fast distance-based focus adjustment using only the built-in laser unit.

> **Important!**
>
> Both function keys are currently only displayed for cameras with LIDAR!

6.6. SECONDARY SENSOR



The live stream of the secondary sensor is shown in the box below (picture in picture). By clicking the live stream box, the main view switches to the secondary sensor, and all settings (Brightness control, Color, Optics etc.) will be applied to the secondary sensor.

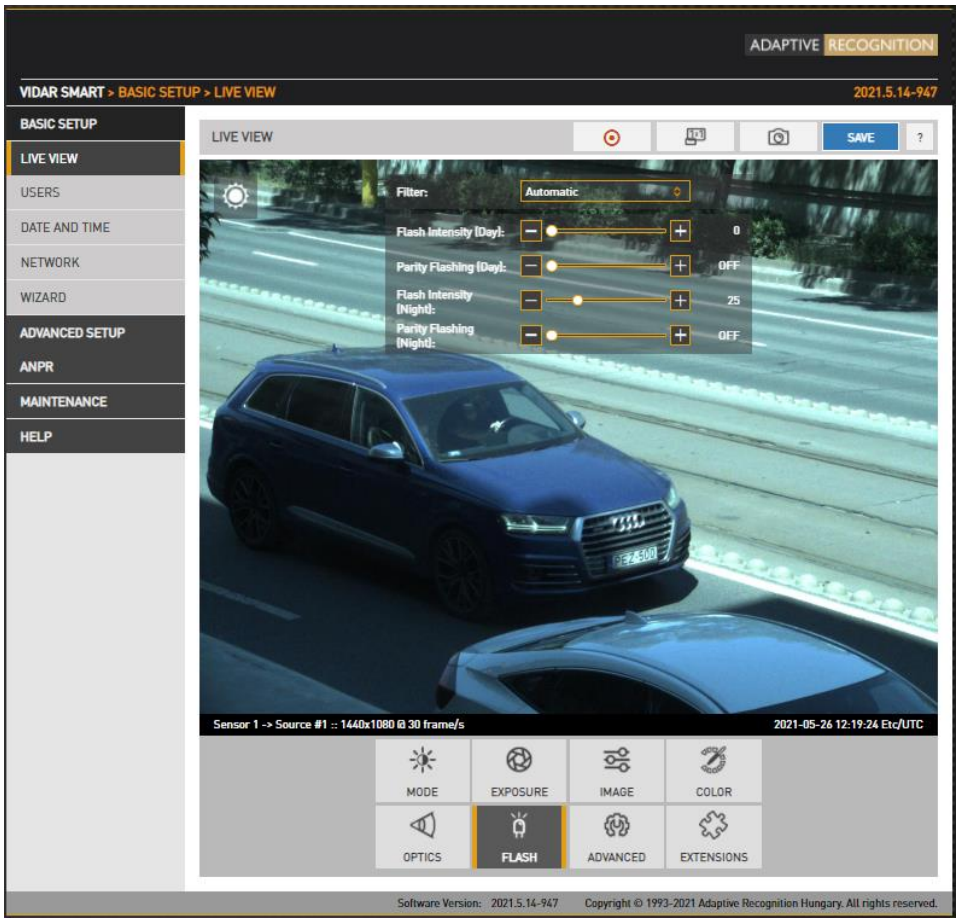
Use the left slider (Zoom) to change the field of view from wide angle (0) to telephoto (100). Use the right slider (Focus) to manually adjust focus from near too far.

Clicking the Autofocus button will execute one time autofocus performance. By clicking the Focus Area button, moving and resizing the yellow rectangle, the area of interest can be defined, and then this part of the image will be sharp after autofocusing.
Auto Tracking, Auto Zoom-Focus Setup and Direct Focus can be adjusted the same method as Sensor 1.
The secondary sensor box will be shown only if none of the on-screen tools are active.

6.7. FLASH CONTROL

WEB INTERFACE > BASIC SETUP > LIVE VIEW > FLASH

The settings of the built-in illuminator and filter exchanger can be managed by clicking in the FLASH button at the Live View menu.



Outdoor mode:

- **Filter:** Switch between the three states: Automatic, All pass and Infra Cut
- **Flash Intensity:** Set the intensity of the built-in illuminator between 0 and 100%
- **Parity Flashing:** If set, odd frames will be illuminated with reduced intensity. For example, if this value is set to 50%, odd frames will be illuminated with 50% of the intensity of the even frames.

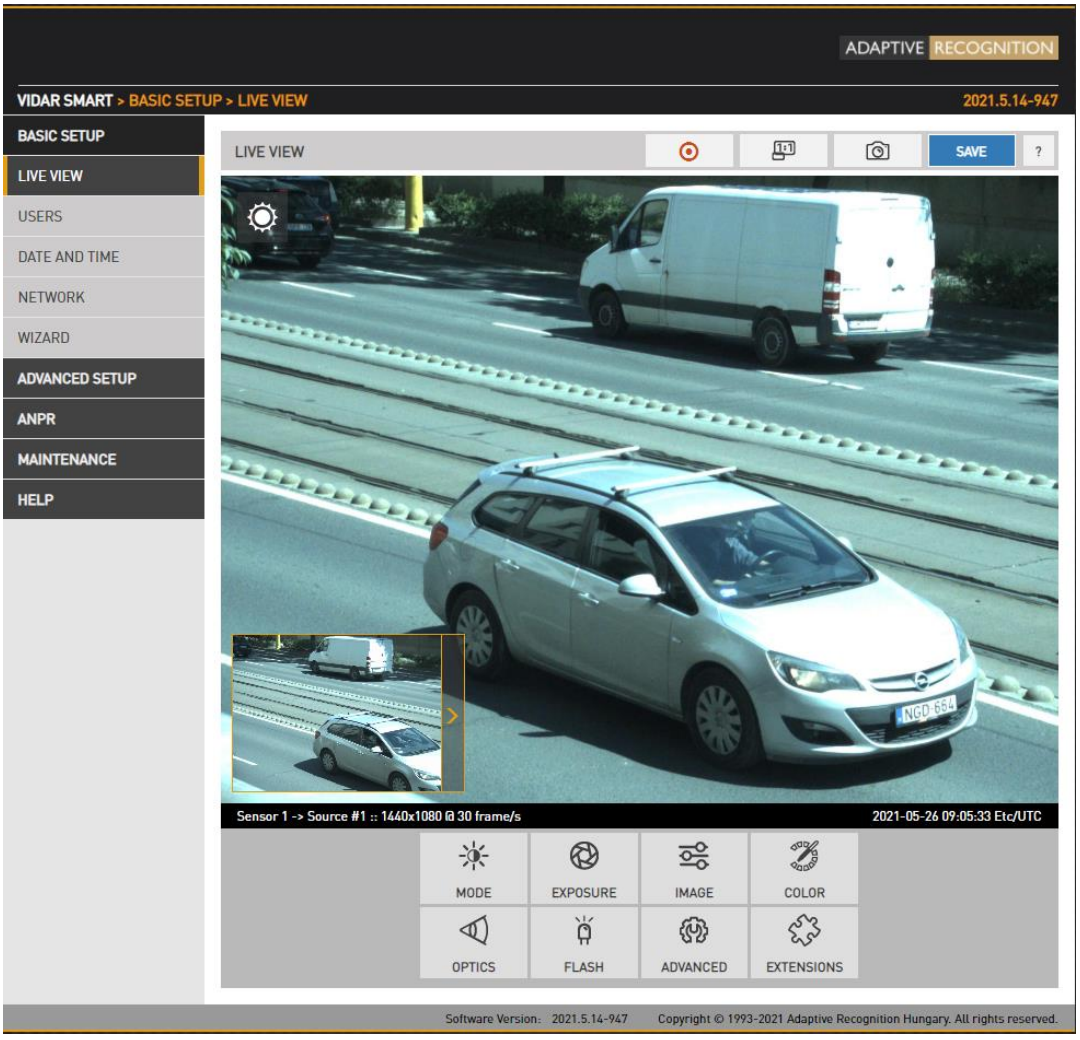
Note

- Both Flash Intensity and Parity Flashing can be defined for day and night mode.
- "Parity Flashing" is expressed as a percentage of "Flash Intensity".

6.8. MISCELLANEOUS

6.8.1. SNAPSHOT, 1:1 VIEW, RECORDING A STREAM

WEB INTERFACE > BASIC SETUP > LIVE VIEW



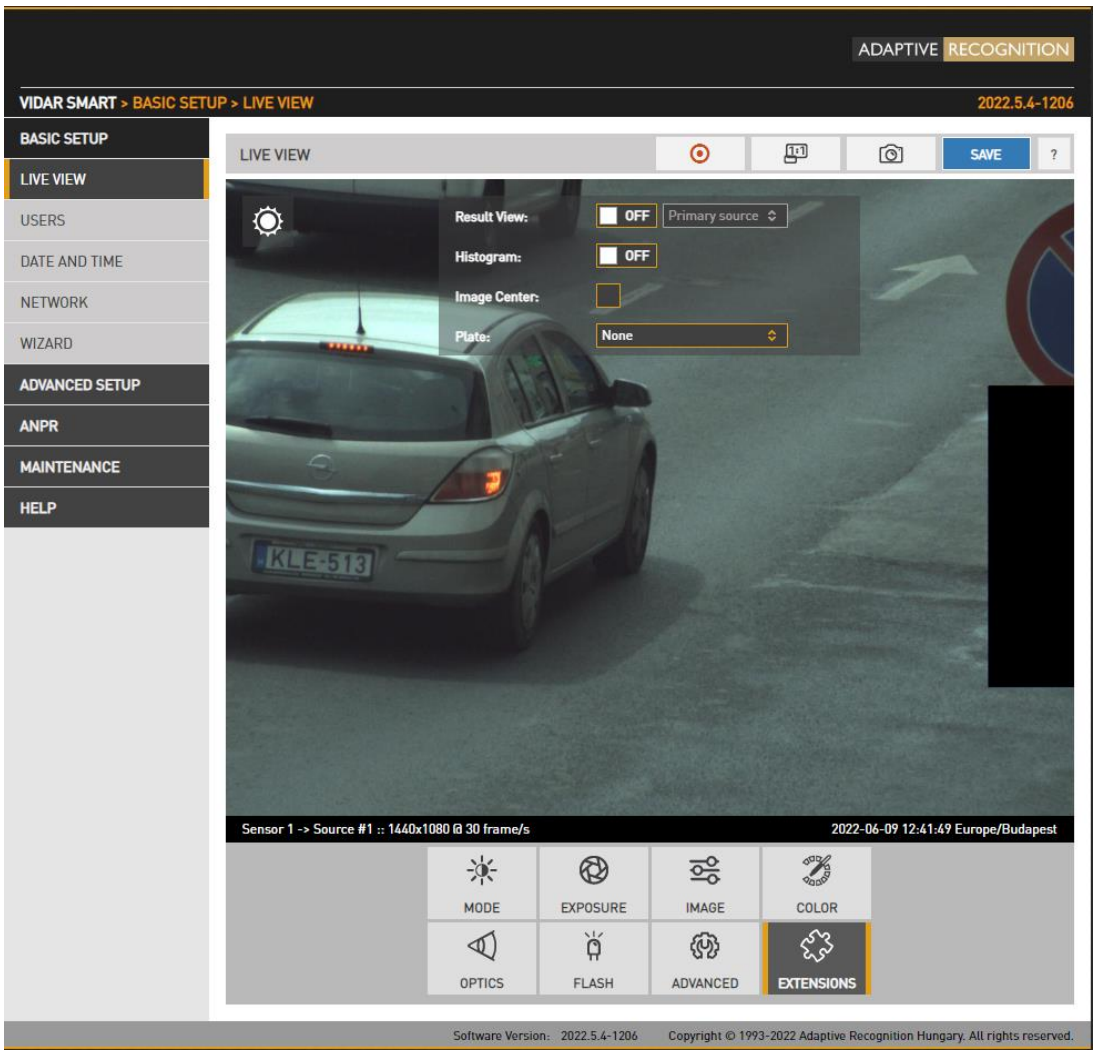
To record the live video stream to a file, click on the  icon in the top menu.

To open a 1:1 live video stream, click on the  icon in the top menu.

To save a snapshot, click on the  icon in the top menu.

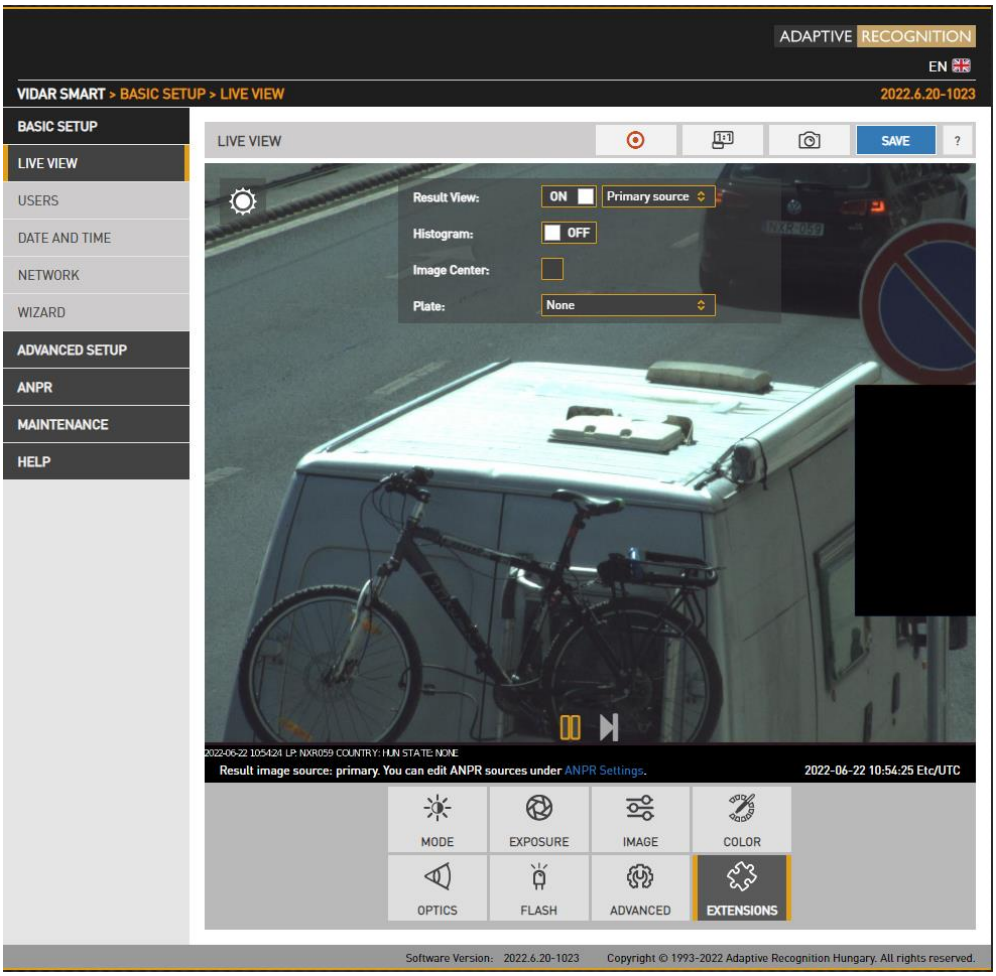
6.8.2. VISUAL AIDS

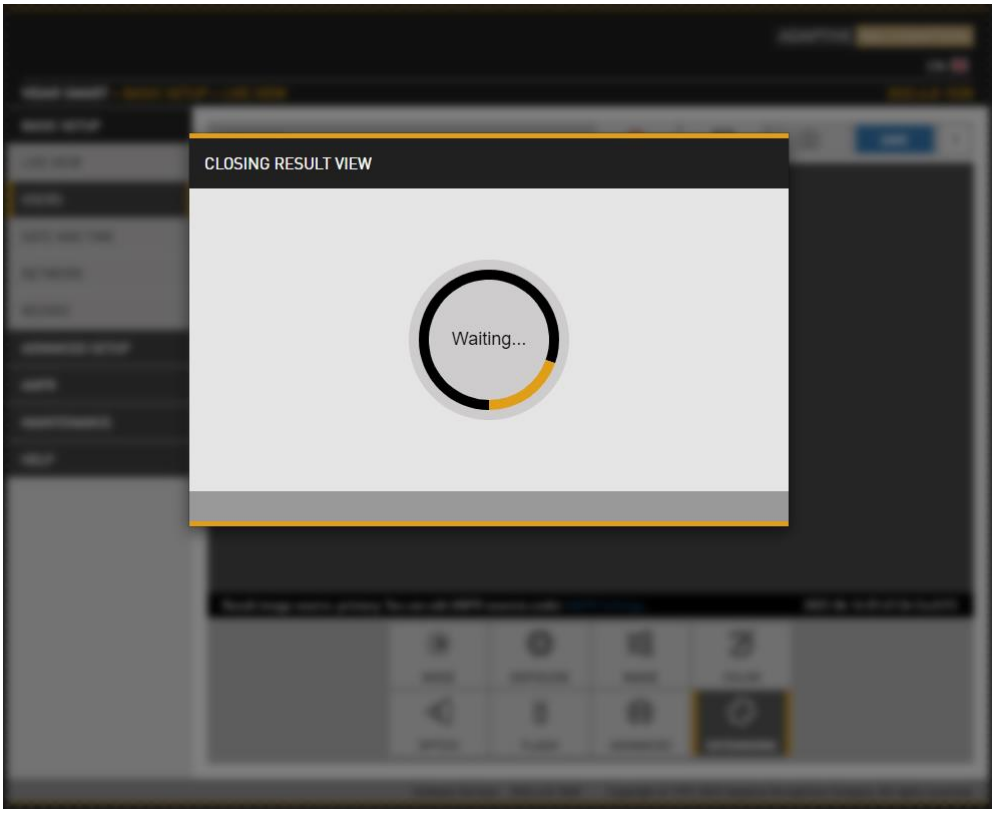
WEB INTERFACE > BASIC SETUP > LIVE VIEW > EXTENSIONS



This menu offers visual aids to set up the camera.

- Result View: When this function is turned on, it always shows the last trigger image of the current event. This feature helps you set the right focus for instance, always making changes to the current event. You can edit ANPR sources under ANPR Settings.
  You can pause and jump between events with the appropriate buttons. You can click between tabs in the Live View menu, but if you click elsewhere in the sidebar, the feature will turn off.


ADAPTIVE RECOGNITION
EN
VIDAR SMART > BASIC SETUP > LIVE VIEW
2022.6.20-1023
BASIC SETUP
LIVE VIEW
USERS
DATE AND TIME
NETWORK
WIZARD
ADVANCED SETUP
ANPR
MAINTENANCE
HELP
LIVE VIEW
SAVE
Result View:
ON
Primary source
Histogram:
OFF
Image Center:
Plate:
None
Result image source: primary. You can edit ANPR sources under ANPR Settings.
2022-06-22 10:54:25 Etc/UTC
MODE
EXPOSURE
IMAGE
COLOR
OPTICS
FLASH
ADVANCED
EXTENSIONS
Software Version: 2022.6.20-1023
Copyright © 1993-2022 Adaptive Recognition Hungary. All rights reserved.


CLOSING RESULT VIEW
Waiting...

> **Note**
>
> It may take some time to stop the Result View function. Wait until “Closing” window is disappearing.

- Histogram: Enable it to draw a luminance histogram on the live video stream

- Plate: There is an optimal character size for license plate recognition. With this visual aid, a frame will be shown (either for Latin or Arabic license plates): if the license plate of the vehicle fits into and fills completely, the frame drawn on the live video stream, the character size will be optimal. Use the mouse to drag the frame on the image field to the required position.

- Image Center: Black cross is positioned to the center of the image.

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7. EVENTS AND ANPR

This chapter explains the mechanism of analysing the video stream, segmenting it to image sequences corresponding to one passing vehicle, then finding, validating, storing and publishing the license plate of said vehicle.

The basic unit of the process is an event, typically consisting of one passing vehicle. In order to segment the video stream into events, an external or internal trigger is needed. A trigger is a pair of time coordinates: a start time stamp and an end time stamp, representing the duration of the event.

An **internal trigger source** may be:

- **Motion Detection:** Image processing algorithm designed to detect motion in a sequence of images
- **Scheduler:** Regular series of triggers, for example every 5 seconds
- **Plate Finder Trigger:** Image processing algorithm designed to detect a license plate inside of a predefined ROI.
- **Laser Trigger (optional):** uses distance measurements taken by the built-in laser device.
- **Object Detection Trigger**: Object detection trigger is an advanced vehicle detector which is specialized to detect and track vehicles.

An **external trigger source** may be:

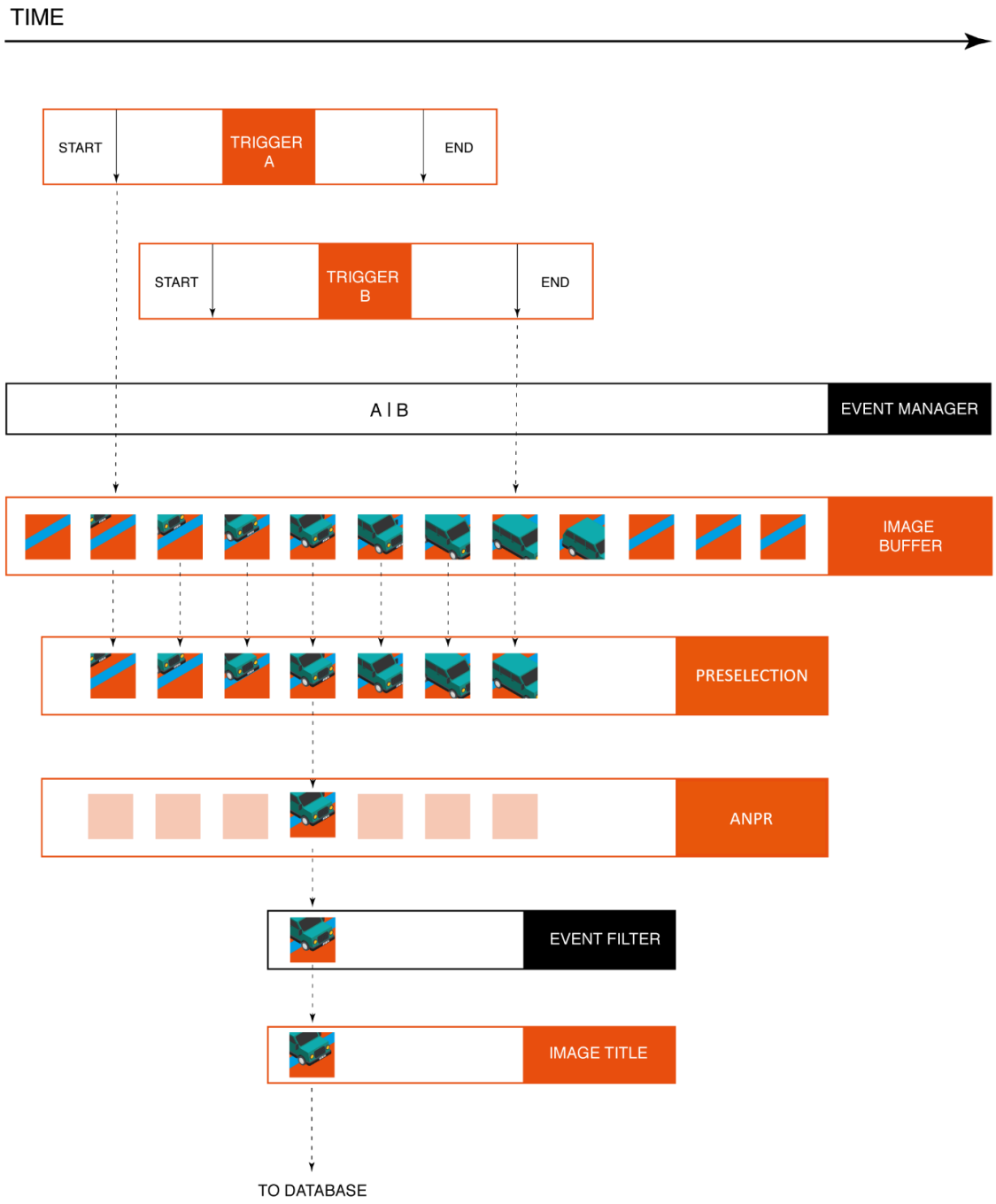
- **GPI:** A TTL level input to the camera (not all models)
- **UART:** A UART (RS232 or RS485 level) input to the camera (not all models)
- **SW:** Direct software-based trigger

The above trigger options cover a wide range of applications, for example:

- Induction loop linked to the GP input
- Radar communicating through the serial port of the camera
- A laser software trigger via Ethernet.

It is possible to combine multiple triggers. An example: license plate recognition is required only during a certain hour of the day: combine Vehicle Detection with an instance of Scheduler set to be asserted during the required hour. This feature is configured in the EVENT MANAGER page.

Upon receiving a trigger event, the Event Manager will locate and mark images in the main image buffer as corresponding to the event. Then, it will either forward them directly to the user (Upload Manager) or to license plate recognition (ANPR).



The above graphic is the schematic overview of trigger events being processed. License plate recognition operates as a multistage pipeline, taking a sequence of images of the same event as input, selecting one image of the vehicle (with the license plate in the best position), license plate and event data (textual form), and a license plate image as an output.

Typically, 3-8 images are first received by a Preselection stage of the pipeline, where a very fast system selects the best image for plate recognition. A preliminary set of license plate data is already available after this stage. The image best representing the event is then forwarded to the ANPR stage, where a slower, but much more thorough analysis determines the final and complete set of license plate data (license plate text, position, nationality, etc.).

The user can configure multiple ANPR stages in series. An example: the first ANPR stage is equipped with an ANPR engine that recognizes only domestic plate types (in a country or a state), thus it is very fast (e.g., an IRL/GBP engine). This stage will recognize the majority of the vehicle plates; the corresponding events will pass through the next stage.

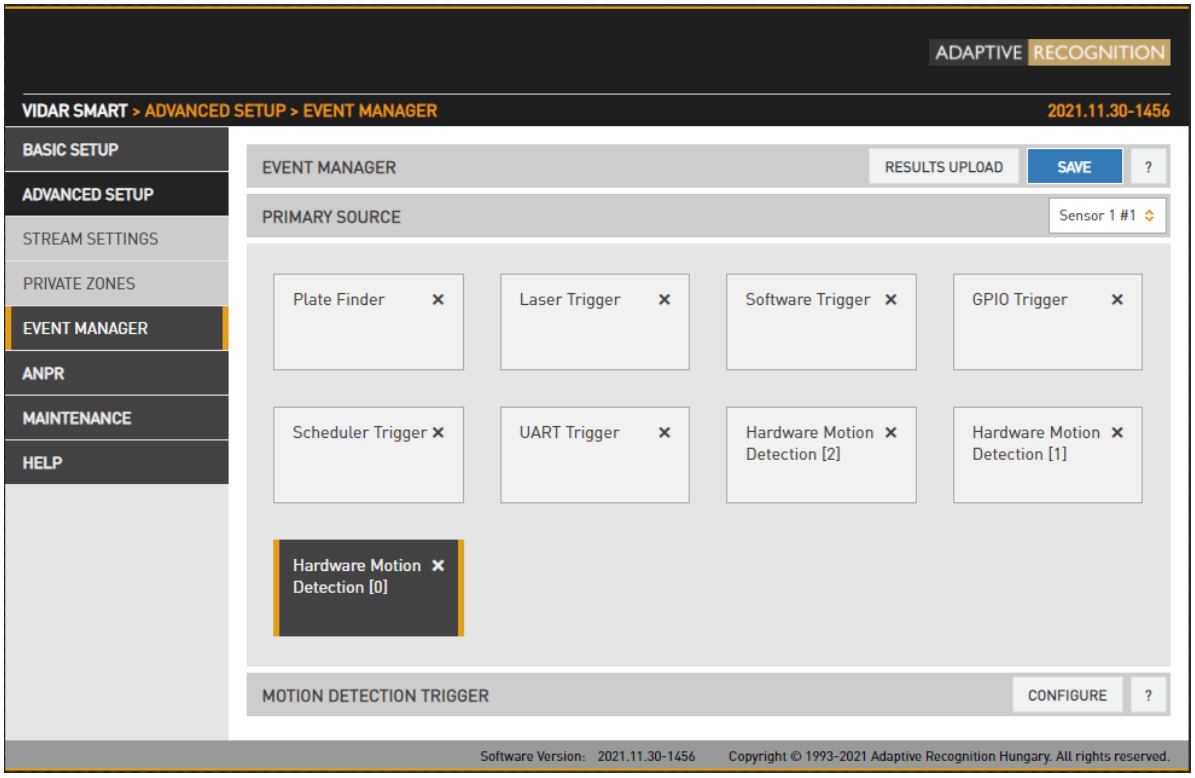
This next, second ANPR stage is equipped with a broader scope engine (e.g., a latin engine), which is less not quite as fast, but will recognize the remaining (not domestic) plates. Also, an MMR stage can be inserted in the pipeline, which adds make and model info to the event. The result is then stored in a database. The database is accessed through a web server, with structured queries in 'Pull' mode. This is demonstrated in the Browse menu. Alternatively, in 'Push' mode, the camera can forward data using a given protocol (HTTP, FTP, SFTP).

This is configured at the RESULT UPLOAD page.

7.1. EVENTS

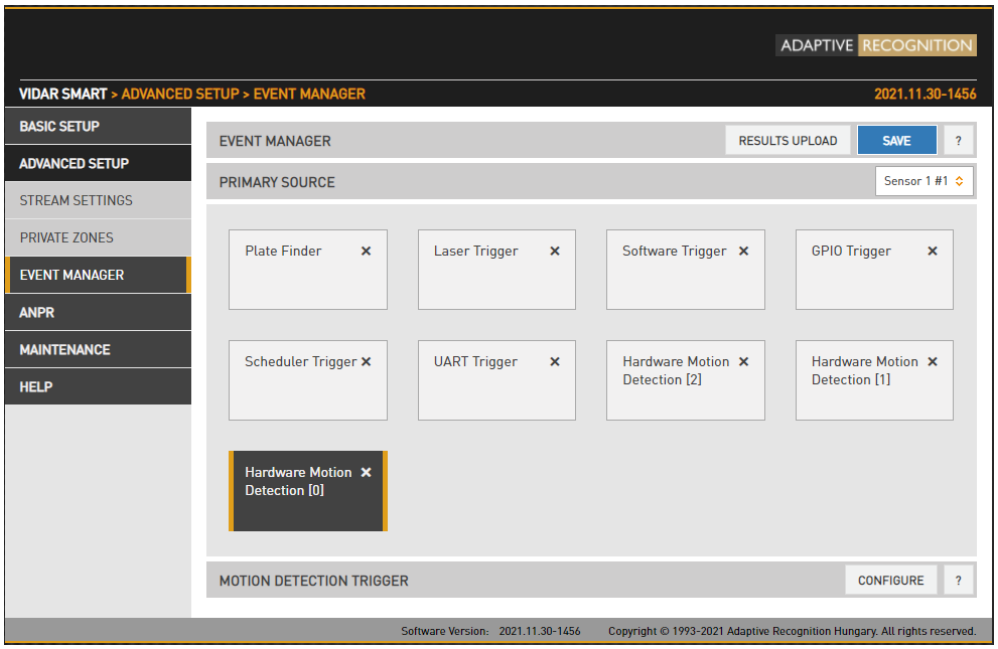
7.1.1. EVENT MANAGER

WEB INTERFACE > ADVANCED SETUP > EVENT MANAGER

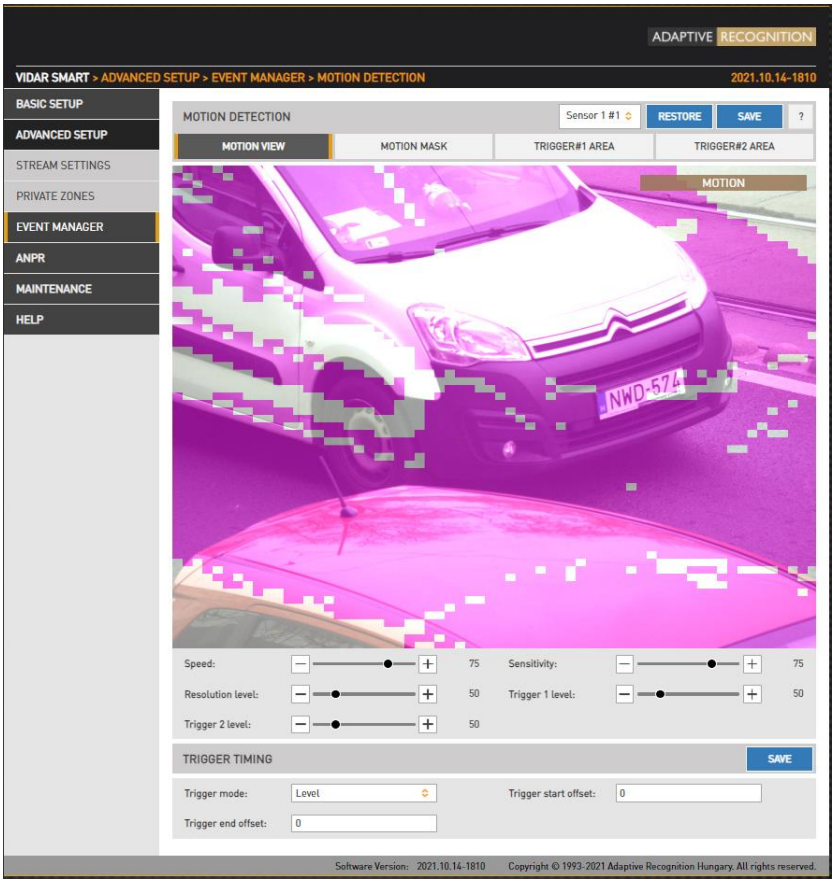


You can add and remove trigger sources in this menu. Clicking the "**+**" icon, you will be presented all available trigger sources. The sources will be connected with an OR conjunction: the trigger will be asserted while any of the trigger sources are active. By selecting a trigger source its configuration will be available at the bottom of the screen.

7.1.2. MOTION DETECTOR



First you need to click on Configure button to guide you to Motion Detection settings. On this page you can set all parameters.



The motion detector can provide three trigger sources:

- Motion #0: Motion detected in the entire image
- Motion detected in trigger area #1: A freehand drawn area may be provided to the camera as a trigger zone. If motion is detected in this zone, motdet trigger #1 will fire
- Motion detected in trigger area #2: Identical to #1, with another trigger zone.

Four views are available:

- Motion View: Blocks with motion detected are shown with a color tone change
- Motion Mask: A freehand drawing tool for a motion mask. Motion inside this mask will be ignored by motion detection. Use the tools to draw the mask.
- Trigger#1 Area: A freehand drawing tool for trigger area #1
- Trigger#2 Area: A freehand drawing tool for trigger area #2

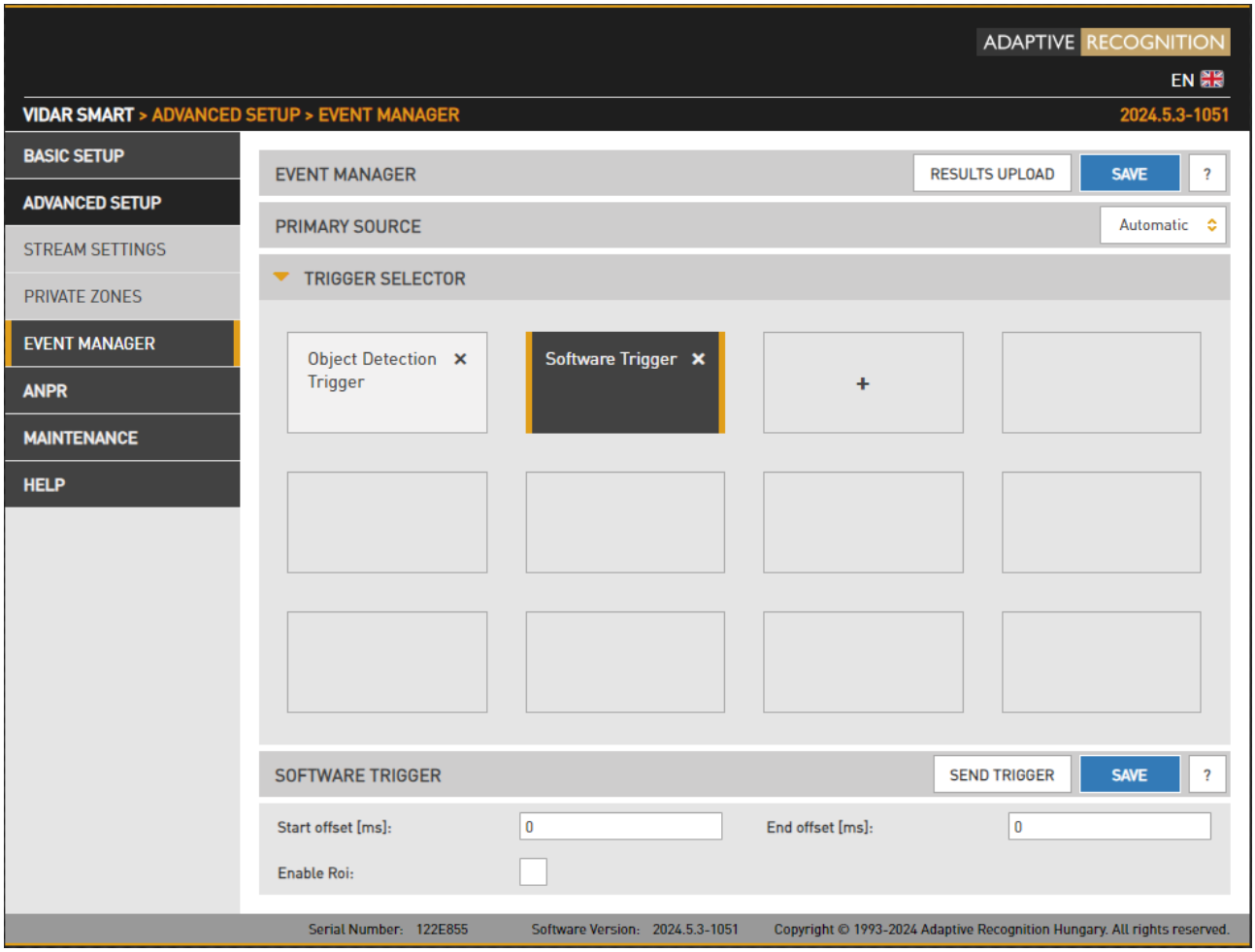
The properties of motion detection are also available:

- Speed: Specifies the minimal rate of change required in the image to be detected as motion. If set too low, changes in ambient light conditions may trigger motion.
- Sensitivity: Specifies the minimal luminance change required in the image to be detected as motion. If set to 0, will not detect any motion on the image. If set 100, it will trigger to any motion.
- Resolution Level: The required minimal number of blocks that must change to be considered as motion in output #0 (entire image)
- Trigger 1 Level: The required minimal number of blocks that must change to be considered as motion in output #1 (trigger area #1)
- Trigger 2 Level: The required minimal number of blocks that must change to be considered as motion in output #2 (trigger area #2)

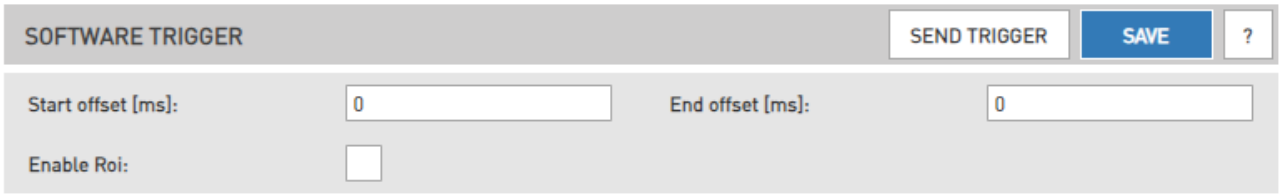
Trigger timing can be setup:

- Trigger mode, Trigger start/end offset: Please check GPIO TRIGGER (Chapter 7.1.4.) where you will find the description of this section!

7.1.3. SOFTWARE TRIGGER

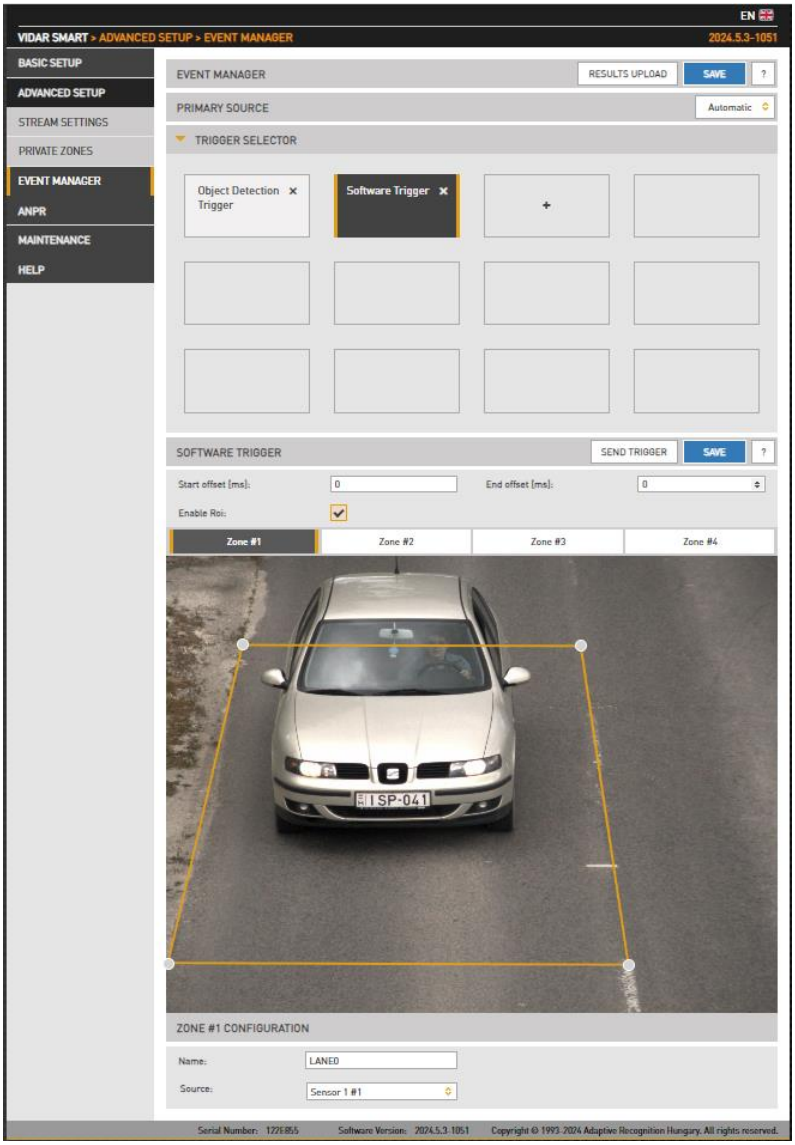


In the Event Manager menu, after selecting the Software Trigger, the settings options for the Software Trigger appear in the lower bar. If the user clicks on the Enabled ROI checkbox, the ROI settings interface will appear.



The only difference compared to the other trigger selectors is that there is no individual enabling option. Only the name of the ROI can be specified. You can set up ROI for 4 lanes, each separately.

By clicking the **Save** button for the Software Trigger, these will be saved in the appropriate sections.



A software trigger is an external trigger sent as a HTTP request.

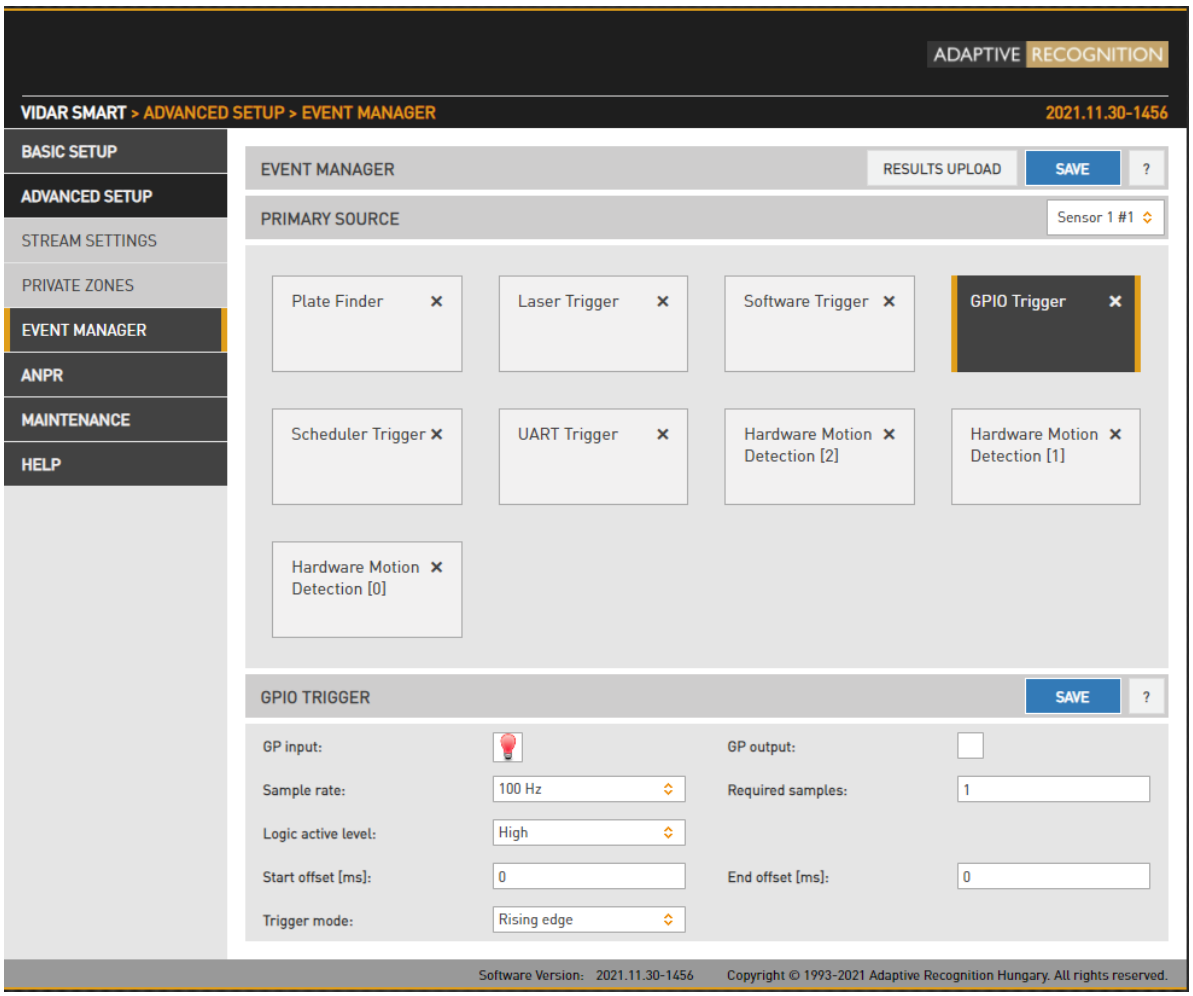
- **Start Offset:** trigger start offset (added to the time stamp of receiving the request)
- **End Offset:** trigger end offset (added to the time stamp of receiving the request)

After you configure the trigger, you can send a trigger signal to the camera using this command: http://cam_ip/trigger/swtrigger?wfilter=1&sendtrigger=1

As an output parameter in the URL, the user receives which ROI the module is working on: http://cam_ip /trigger/swtrigger?wfilter=1&output=2&sendtrigger=1

Here, it is ROI number 3 (indexing starts from 0).

7.1.4. GPIO TRIGGER



GPIO Trigger is a hardware trigger source accepting triggers from one of the General Purpose (GP) Inputs of the device. Please refer to the Install Guide for details of the electric connection.

- Sample Rate, Required samples: The voltage across the GP Input's signal and ground pins is sampled with the sample rate given. With mechanical switches it often takes a while for the voltage level to settle. During this interval both high and low samples will be recorded. The device will consider the input as settled when the number of samples that agree (last n samples are low/high) exceeds the value given in Required samples.
- Logic active level: The voltage level that corresponds to the logic active level. Please note that the trigger will not be asserted until one rising or falling edge is registered, regardless of the value of this setting.
- GP Input: shows the current state of the input.
- GP Output: Is used to toggle the state of the General Purpose Output pin.

Trigger Mode: Four trigger modes are available:

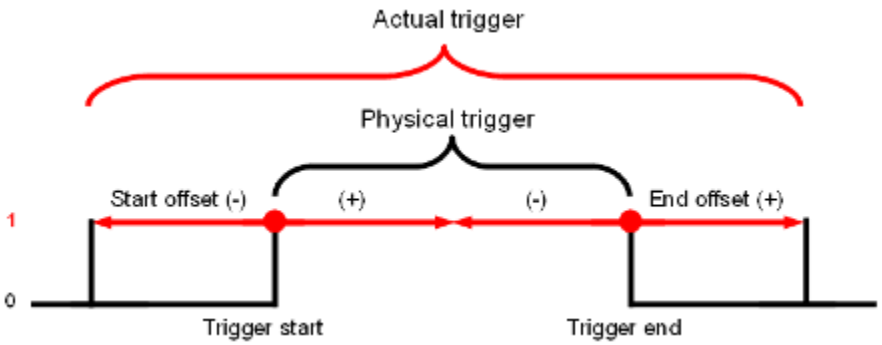
Level: the trigger is asserted while the input is active.

Rising edge: the trigger is asserted only at the rising edge of the input.

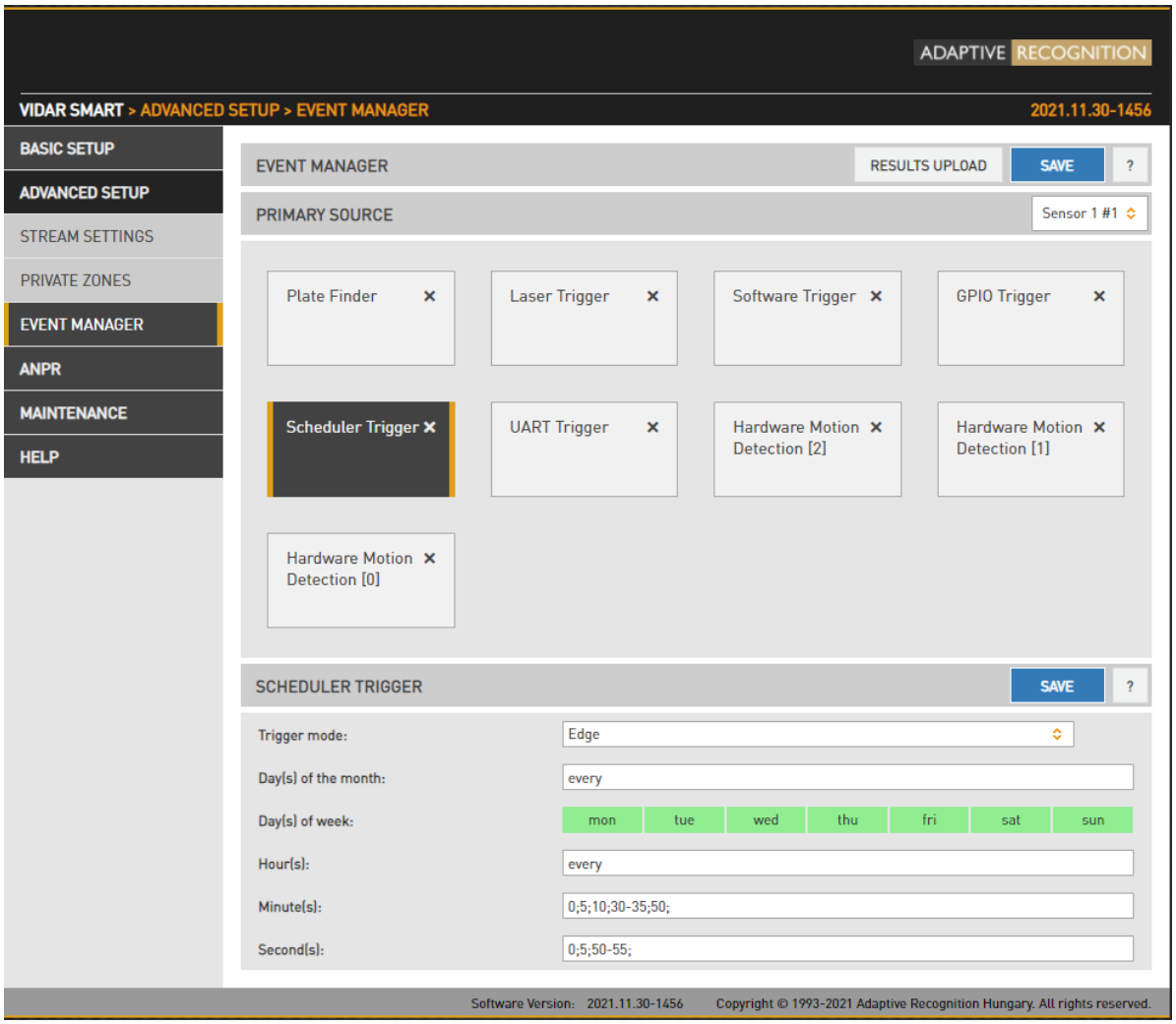
Falling edge: the trigger is asserted only at the falling edge of the input.

Rising/Falling edge: the trigger is asserted both at the rising and at the falling edge of the input.

Start/end offset: the interval during which the trigger is asserted can be extended in both directions with start and end offsets.



7.1.5. SCHEDULER TRIGGER



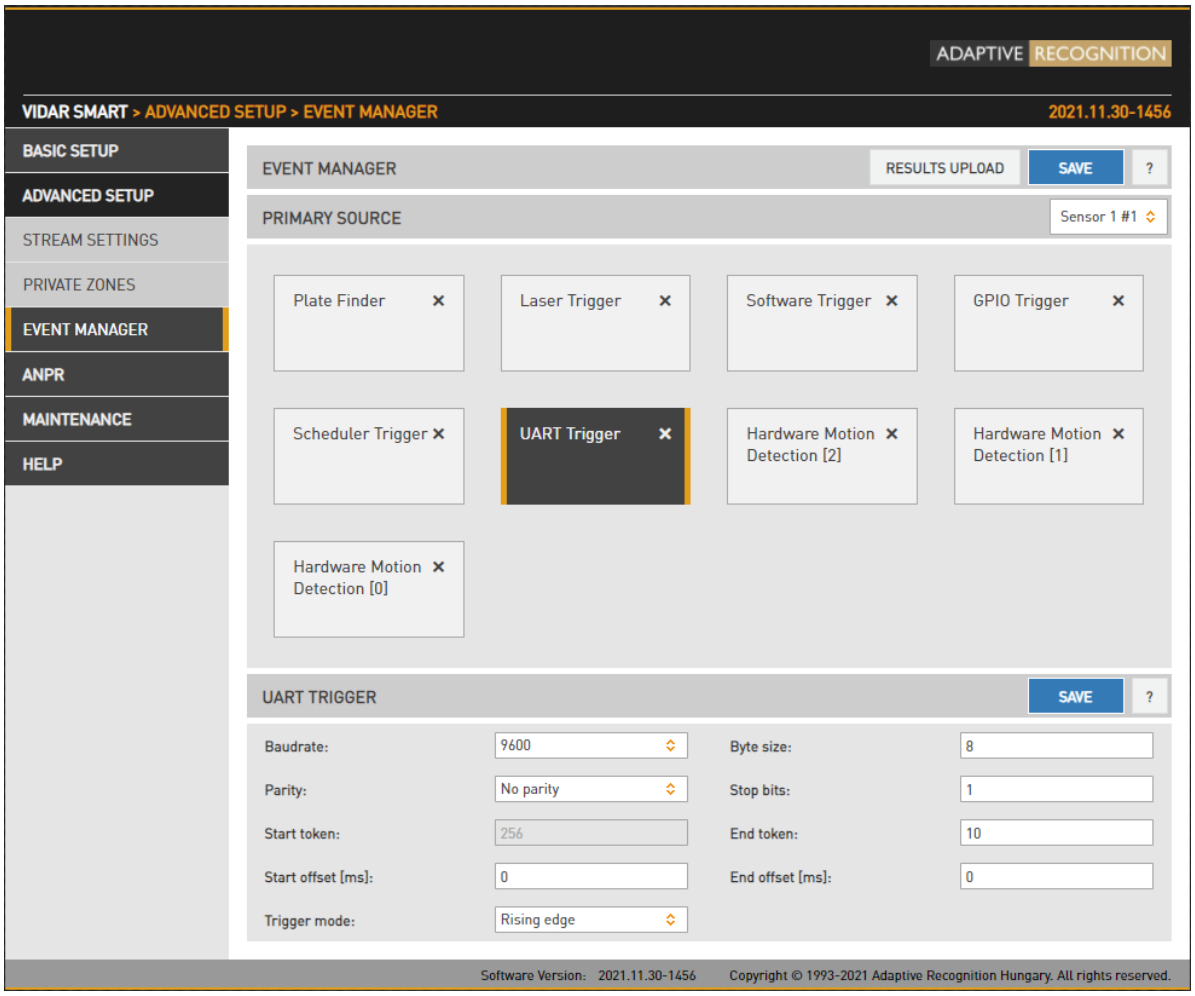
This trigger source provides the user with a timer. Triggers can be scheduled with a precision of one second. Two trigger modes are available:

- Edge: the trigger is asserted at only the start of the specified point in time.
- Level: the trigger is asserted during the specified second/minute/hour.

In the fields – Day(s) of the Month, Hour(s), Minute(s), Second(s) – the following expressions can be used:

- numerals separated by semicolons (e.g., 6;9)
- the word 'every'
- hyphens to express intervals (e.g., 7-9)
- combinations of the above e.g., 6;7;9-11;15

7.1.6. UART TRIGGER



The camera can be triggered through its UART port. Besides the common UART properties (**Baudrate, Byte size**, number of **Parity** bits, and **Stop bits**), the communication protocol can also be specified here. A UART trigger event starts with a Trigger **Start Token** (TST) byte, then maximum of 254 bytes of trigger data may follow, and then it ends with a Trigger **End Token** (TET) byte.

Four **trigger modes** are available:

- **Level:** the trigger is asserted while the input is active (see below)
- **Rising edge:** the trigger is asserted only when TST is received
- **Falling edge:** the trigger is asserted only when TET is received
- **Rising/Falling edge:** the trigger is asserted both when TST and when TET is received

In Level Mode the trigger start timestamp will be the system time at the instant the TST arrives, plus the **Start Offset**, while the trigger end timestamp will be the system time at the instant the TET arrives, plus the **End Offset**. Trigger data (including the TST and TET) will be forwarded to the Event Manager. It is possible to specify the byte value of the TST (e.g., entering 0x0A means the trigger will begin with a '\n' byte) or check 'Start on first byte', which means, whatever byte comes first or follows the last end token will be the trigger start token.

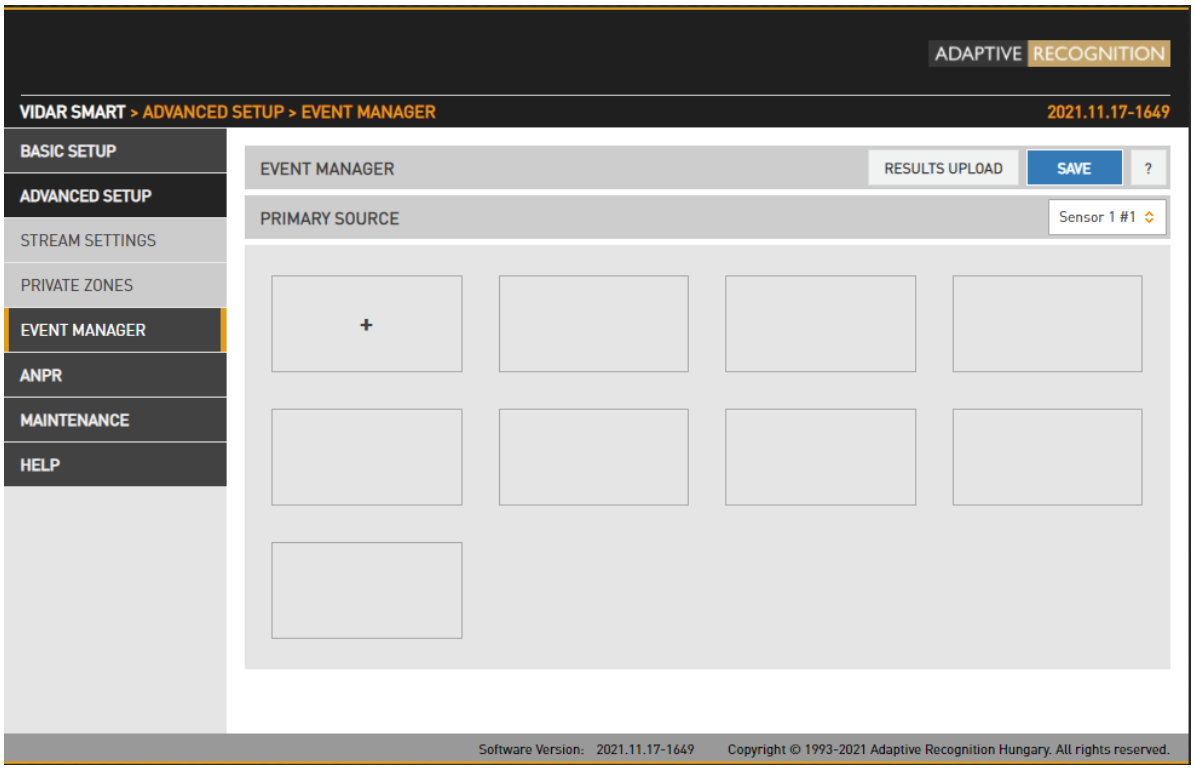
7.1.7. PLATE FINDER TRIGGER

Plate Finder is an advanced license plate detector which is specialized to detect, locate and track available plates.

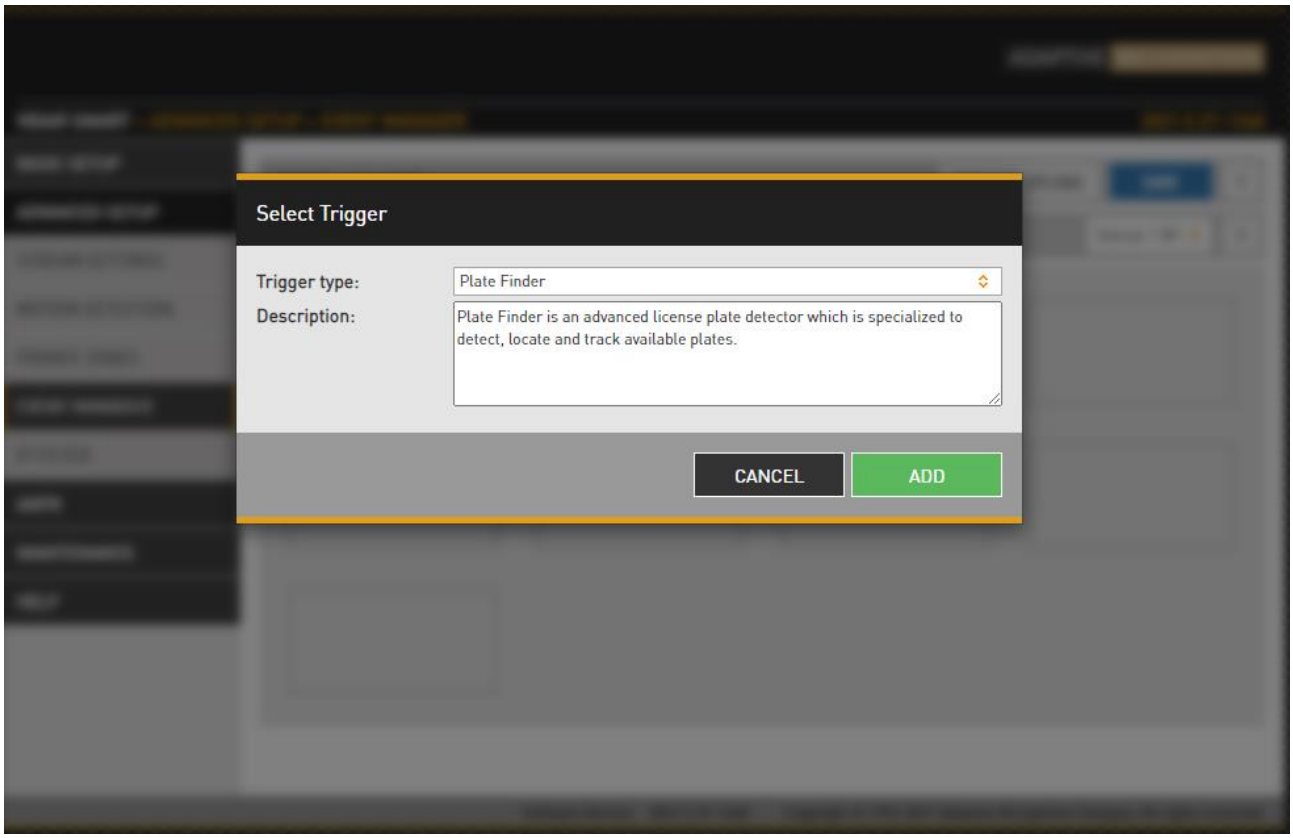
SET PLATE FINDER AS A TRIGGER SOURCE:

As a first step, add Plate Finder as a trigger source. Add the new trigger source to Event Manager as follows:

- Click on "+" to add a trigger source:



- In the drop-down menu, select the Plate Finder Trigger, then click Add.



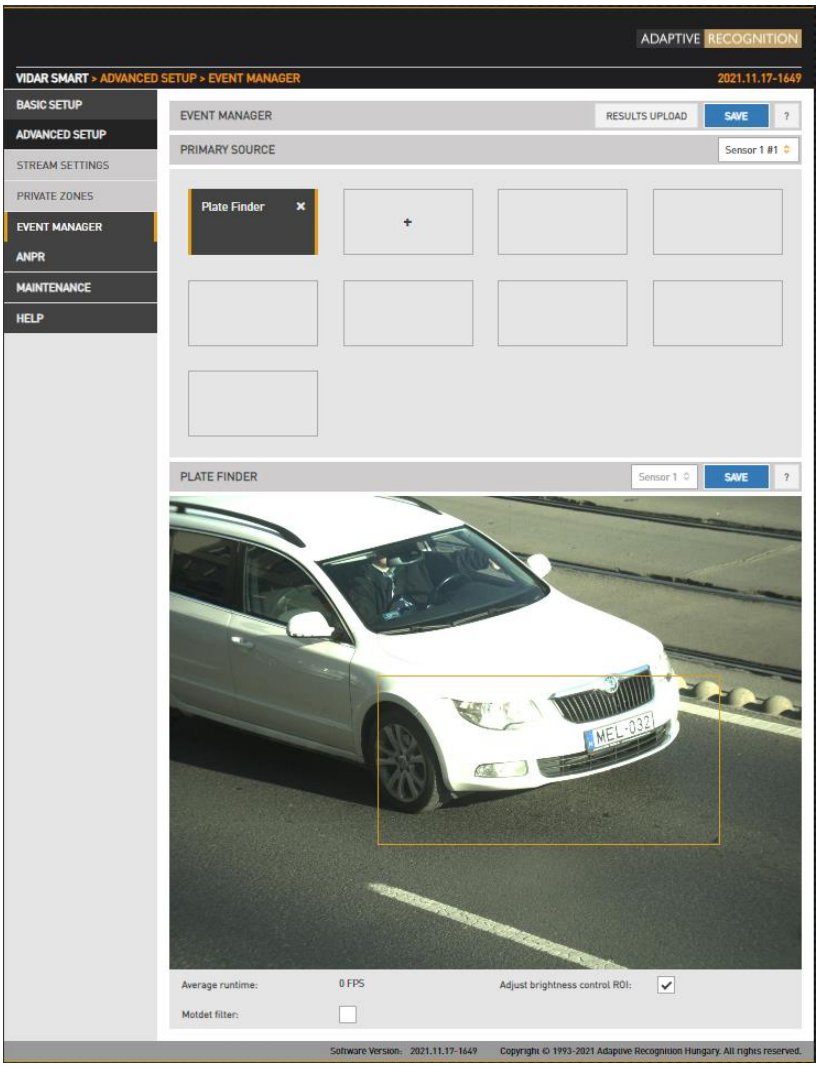
Note

Do not forget to save trigger source(s) by clicking Save.

CONFIGURE PLATE FINDER TRIGGER

After added Plate Finder Trigger in the Advance Setup / Event Manager menu, additional setup needs to be done. Inside of the orange ROI (Region of Interest) happens ANPR with average runtime speed.

ROI's position is variable within the live view image for better result. If a single green rectangle flashes, it means that the license plate was recognized by the module and the corresponding image was forwarded to panel 2 for further ANPR.



> **Note**
>
> Plate Finder Trigger can also return a direction (approaching or leaving) under ideal conditions, and the license plate must remain within the ROI for a specified period of time.

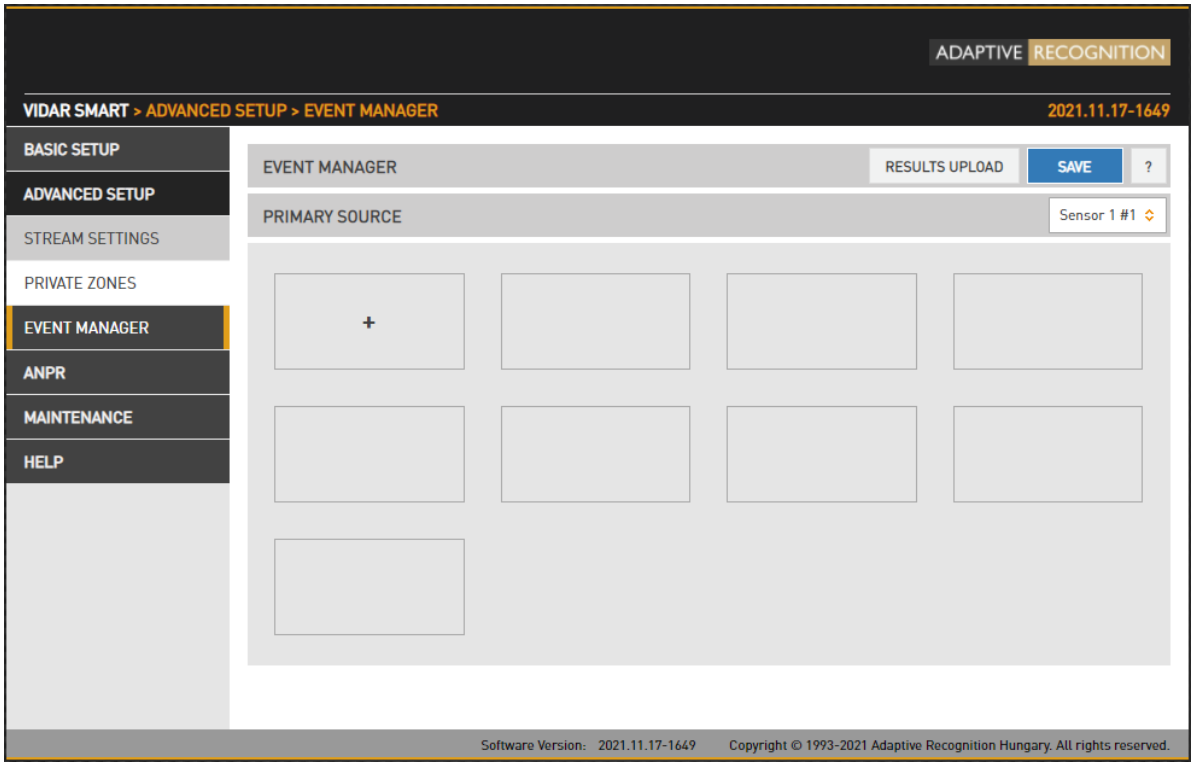
7.1.8. LASER TRIGGER

Laser Trigger uses distance measurements taken by the built-in laser device to generate trigger events.

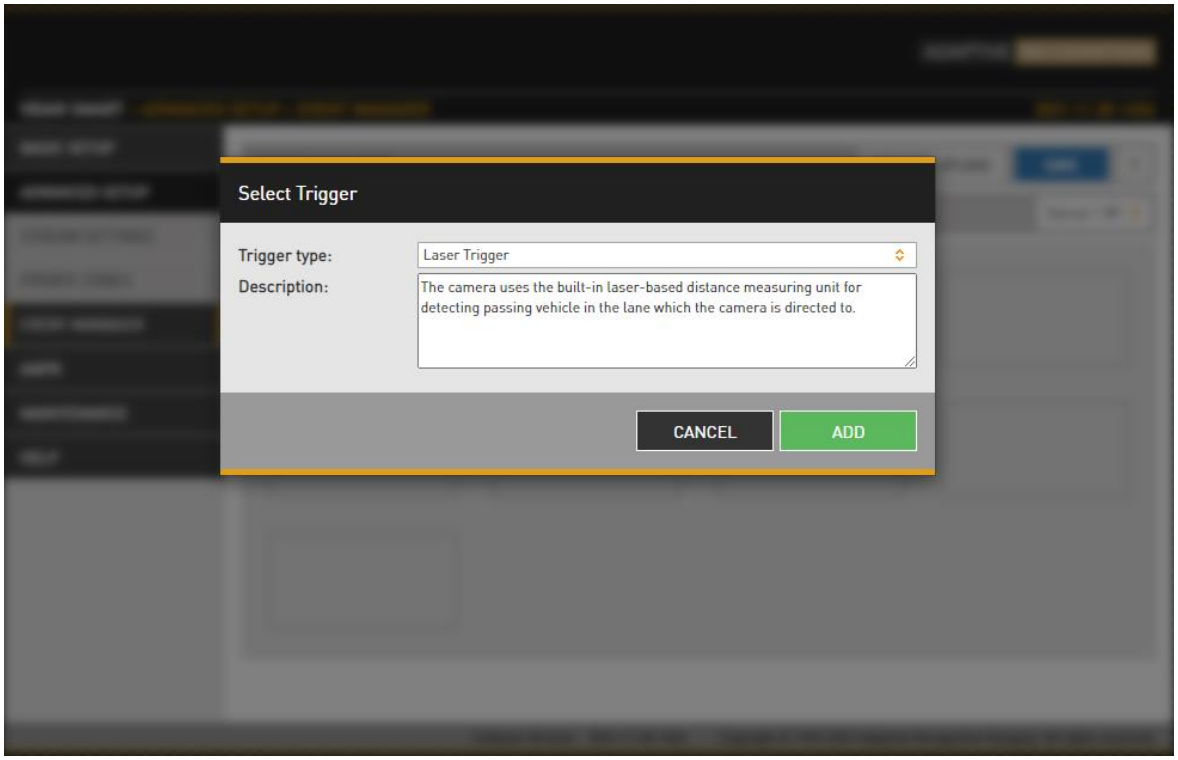
SET LASER AS A TRIGGER SOURCE:

As a first step, add Laser as a trigger source. Add the new trigger source to Event Manager as follows:

- Click on "+" to add a trigger source



- In the drop-down menu, select the Laser Trigger, then click Add.



CONFIGURE LASER TRIGGER

An algorithm filters and separates measured raw distance data into **background** and **foreground (vehicle)**, latter constituting a trigger event.

Background is calculated during a **calibration** phase lasting a couple of seconds. Apart from the common trigger parameters (edge/level mode, offsets), this trigger source has no tuneable properties.

To achieve the proper settings, go to **Live view / Extensions menu**, activate **Image Center** function to see the direction of the laser trigger.

Important!

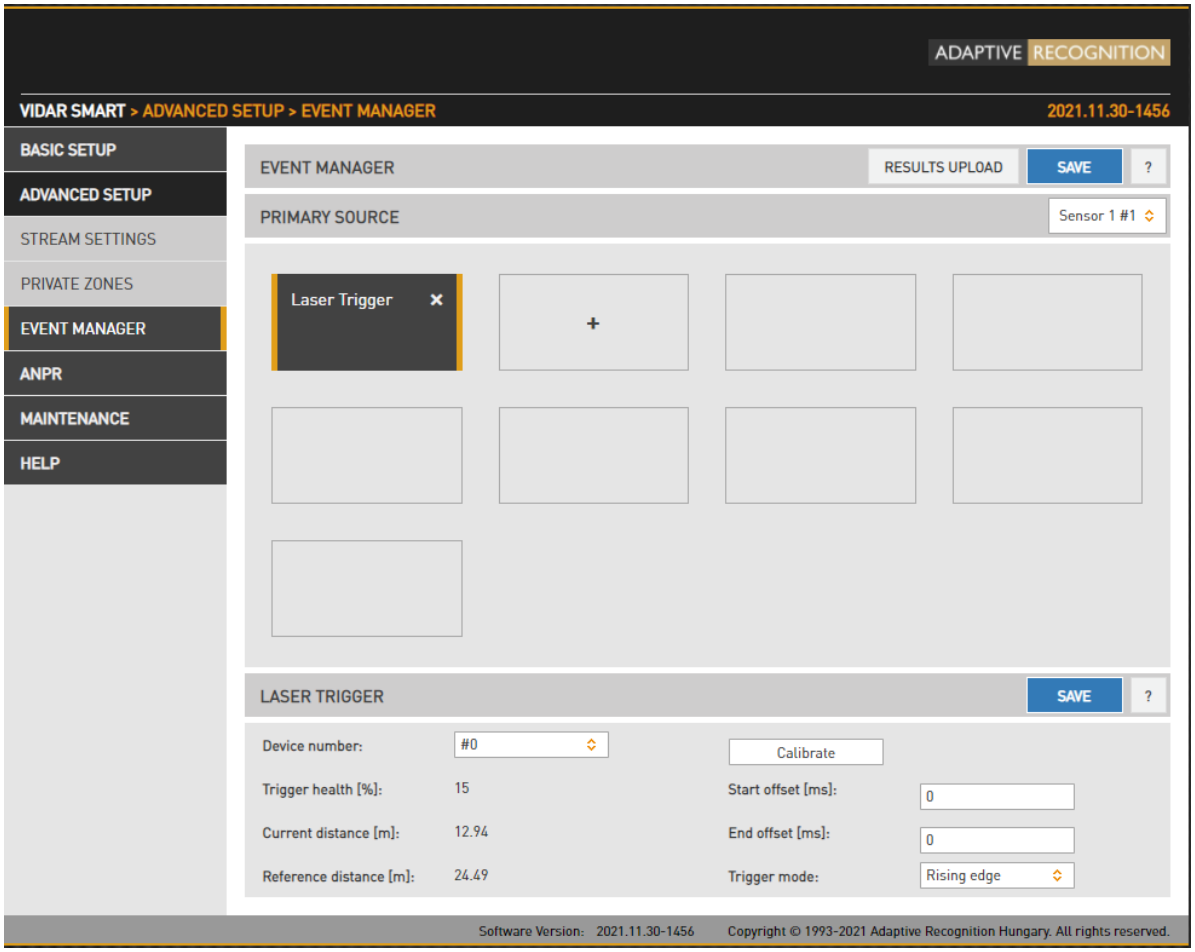
We can conclude from our measurements that it operates reliably up to a maximum distance of 20 meters.

Note

The Trigger health works effectively above 90%, below this value it must be reconfigured!

Calibration can be triggered manually by pushing the **Calibrate** button. The current background distance is shown in the **Reference distance** field. Raw, unfiltered data is shown in the **Current distance** field in meters. It is normal (and taken care by the algorithm) that this value jitters somewhat.

Trigger health reflects the actual quality of measurements taken. In adverse weather conditions (heavy rain, snowfall) this value will indicate if not enough good quality measurements could be taken, thus triggering may underperform.

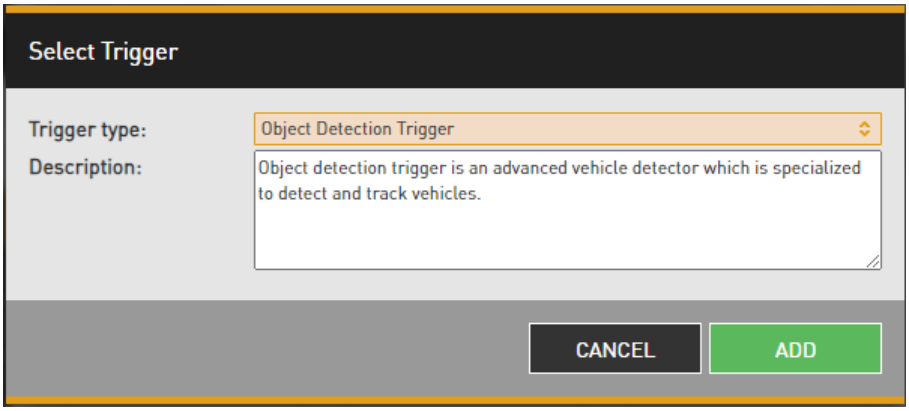


Note

Do not forget to save trigger source(s) by clicking Save.

7.1.9. Object Detection Trigger

Object detection trigger is an advanced vehicle detector which is specialized to detect and track vehicles.



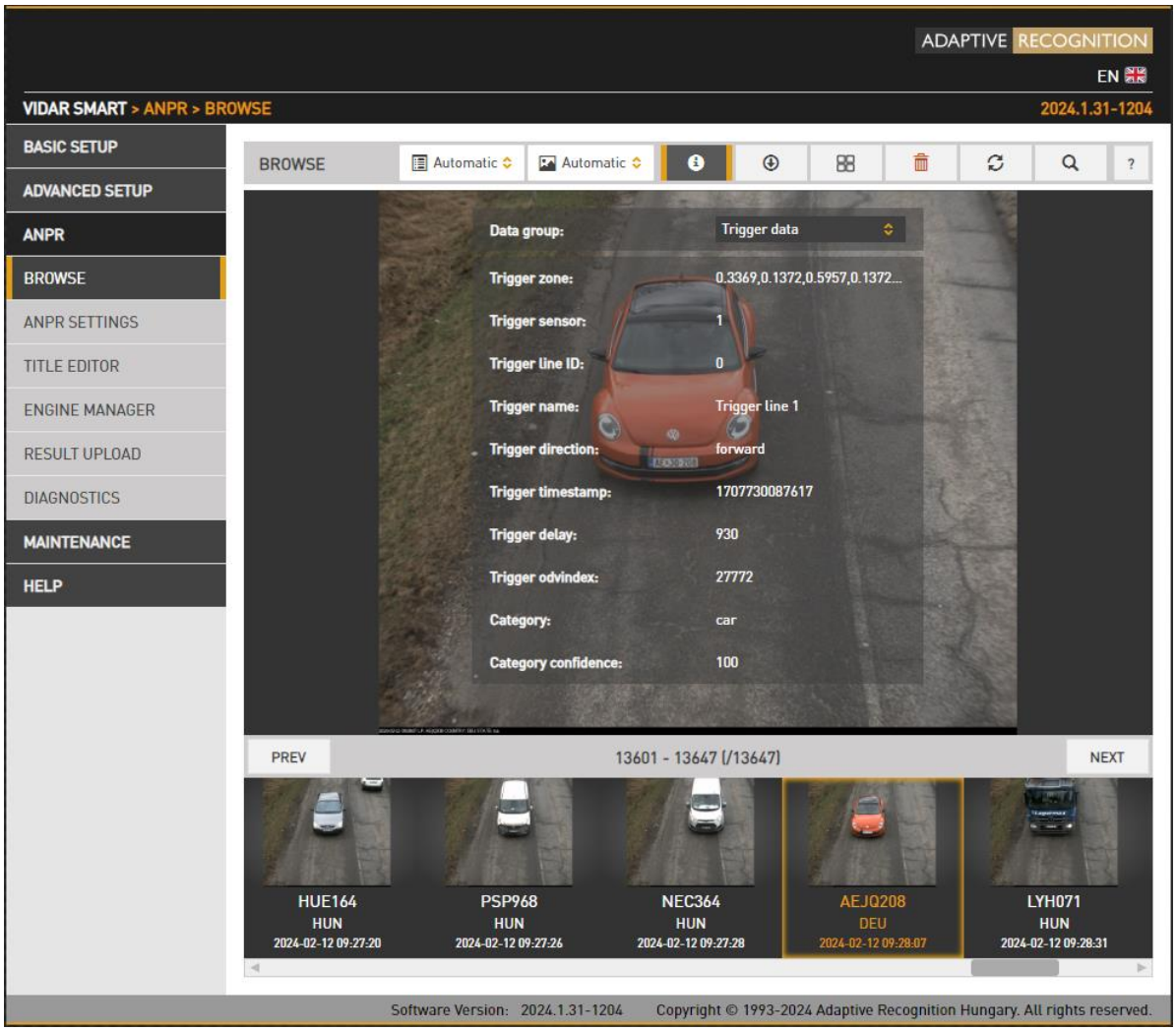
First, by clicking on the + Add new trigger line, we can set where the Object Detection Trigger should trigger on the image. This can be done by adjusting the width of the line with the points at the two ends to match the width of the lane to be measured and using these points to move the line to another position on the image.

The name of this can be changed in the Name field.

The **Trigger direction** specifies the direction of the trigger. Here, we can set the direction of the trigger relative to the arrow. The arrow on the image indicates the direction of the lane. If we set the **"Trigger direction"** to **"Forward"** and the arrow is set in the direction of the lane, then the trigger source detects all vehicles passing in that lane in the appropriate direction. If we set it to **"Backward"** in the same position, the trigger detects vehicles passing in the opposite direction in the lane. If we set it to **"Both"**, then the Object Detection trigger source triggers both cases.
The direction of the arrow can also be reversed by clicking on it.

Start Offset: trigger start offset (added to the time stamp of receiving the request)
End Offset: trigger end offset (added to the time stamp of receiving the request)
Four trigger lines can be set simultaneously.

In the **ANPR** menu, on the **Browse** page, you can view the detected events. If you click on the **Info** button at the top of the image and switch the **Data group** field to **Trigger data**.



You can get the following information about the event:

- Trigger zone: The coordinates are between 0 and 1 and expressed as percentages of the image width and height. The first two values represent the upper left + upper right coordinates, while the second two pairs represent the lower right + lower left coordinates.
- Trigger sensor: the sensor used for this trigger. It is numbered from 0-3.
- Trigger line ID: the number of the added new line trigger.
- Trigger name: the name of the configured trigger, which was set above for that trigger line.
- Trigger direction: the crossing direction of the vehicle, according to the arrow that was set for the trigger line, forward / backward.
- Trigger timestamp: unix timestamp assigned by the camera.
- Trigger delay: the time between triggering and image capture in milliseconds.
- Trigger odvindex: the index assigned by the Object Detection trigger, system starting from 0 at each Object Detection trigger restart.
- Category: the type of vehicle.
- Category confidence: the reliability of the category.

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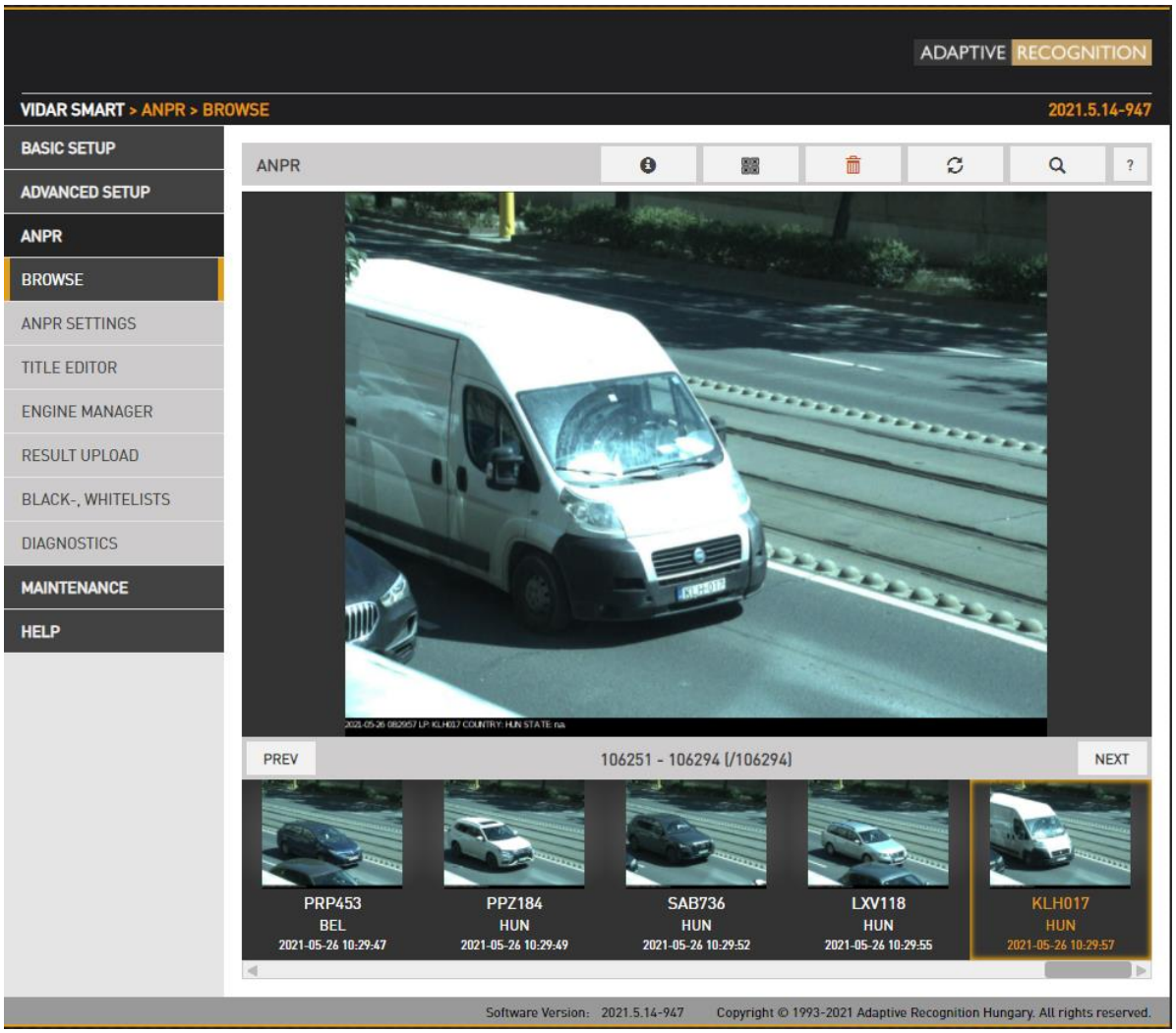
7.2. ANPR

7.2.1. BROWSE

WEB INTERFACE > ANPR > BROWSE



Recorded events are listed on the bottom timeline in ANPR/BROWSE. Use the icons on the top to:

 – List image data

 – Select/unselect all records

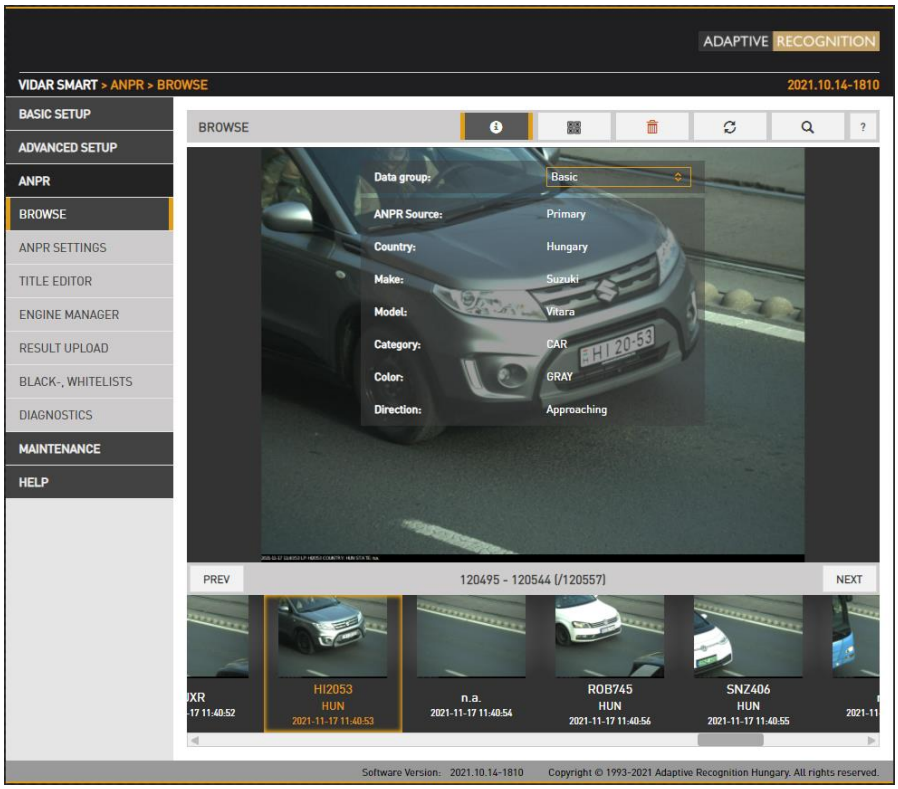
 – Delete record(s)

 – Reload list of entries

 – Search for: timeframe / license plate / vehicle category.

List image data

- Basic Data group:
  - Plate info
  - ADR
  - MMR
  - Direction
- Extended Data group:
  - Event ID
  - Recognition time
  - Confidence

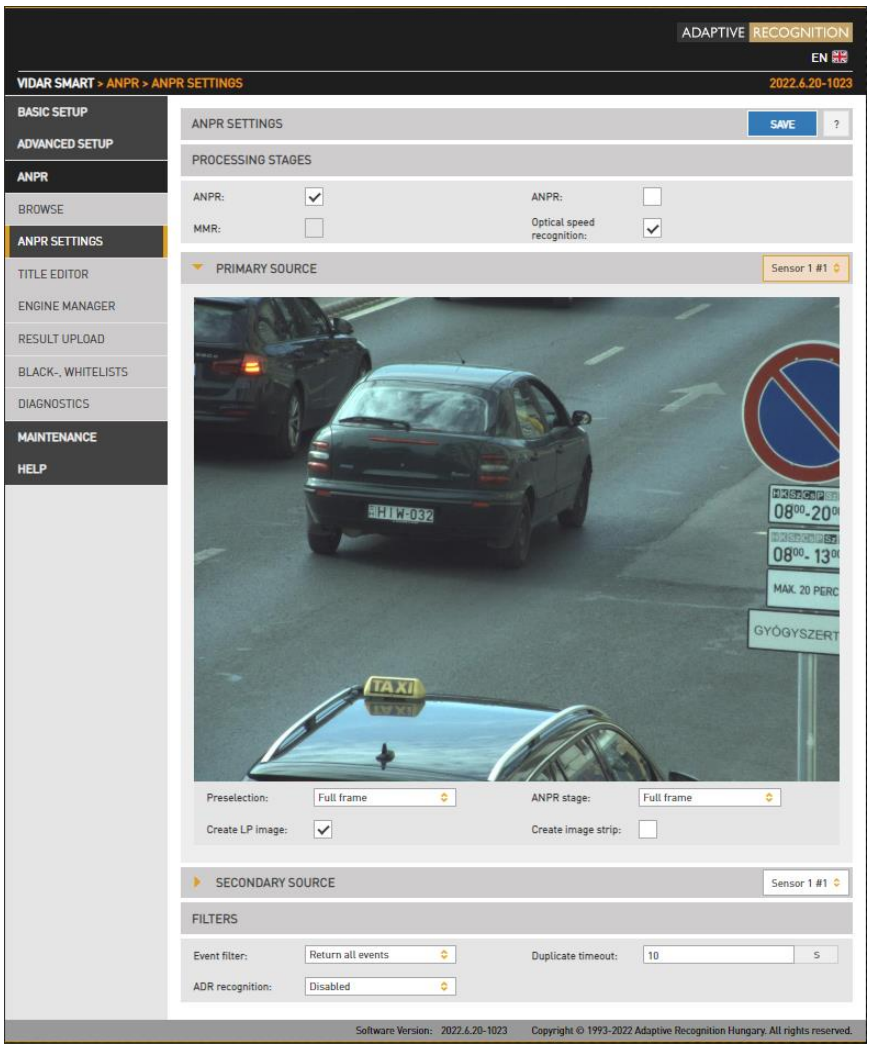


If you hover the mouse over the image, thumbnails will appear in the bottom of the screen, clicking these the main image will switch to:

- Event image: main image in which the license plate was found
- Overview image: the image of the overview sensor
- LP image: the license plate
- Strip image: the index images of the event containing all triggered images

7.2.2. ANPR SETTINGS

WEB INTERFACE > ANPR > ANPR SETTINGS



Processing stages:

You can configure the ANPR pipeline in the following three modes:

ANPR - A single ANPR stage follows the Preselection stage

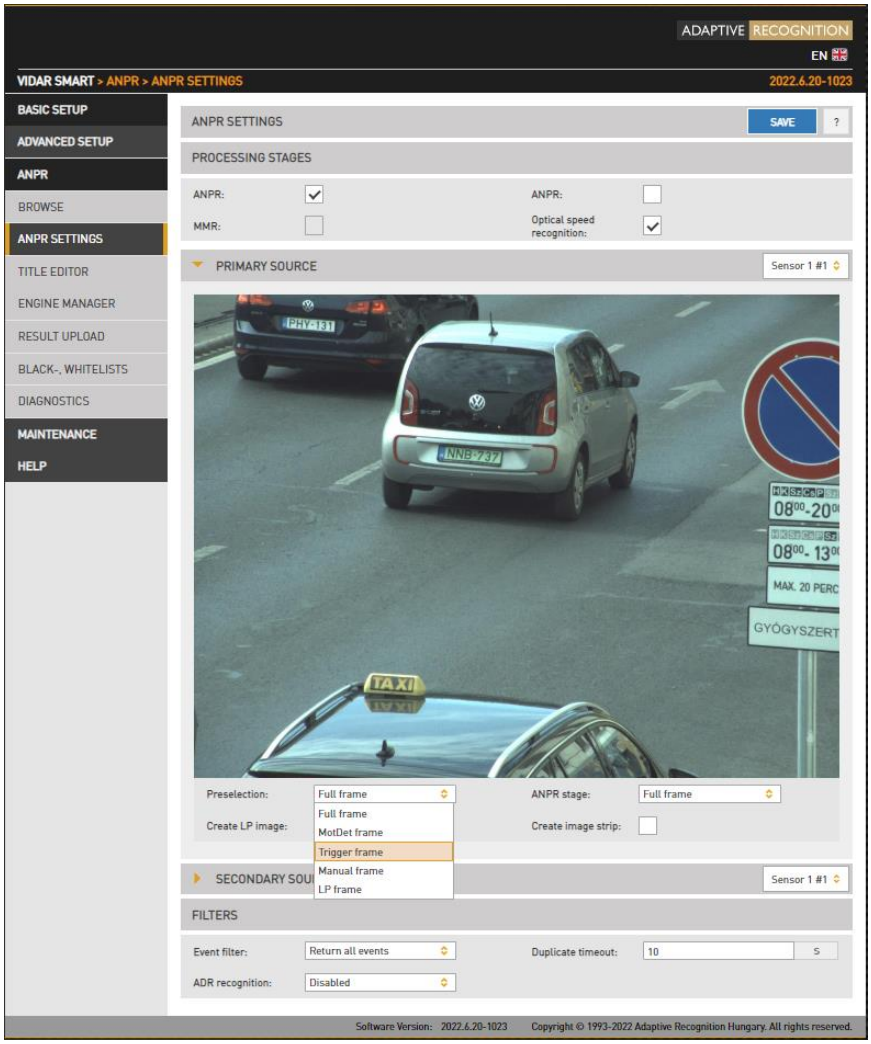
ANPR+MMR - A single ANPR and an MMR stage follows the Preselection stage. The MMR stage adds make and model info to the event. This stage has no configurable parameters. MMR engine updates can be uploaded in the Engine Manager menu, in the same manner as an engine update. Please note that in order to use MMR a corresponding MMR Hardware Key License must be purchased and installed in the device.

ANPR+ANPR - Two ANPR stages follow the Events and ANPR (See Preselection stage for a use case).

OPTICAL SPEED RECOGNITION - By entering multiple license plate frames (Figure 8-10), it calculates the speed of the vehicle based on the movement and the size of the license plate.

The main properties of the license plate recognition pipeline are configured here.
Performance (both accuracy and speed) is higher if license plate recognition is limited to the part of the image in which the vehicle is likely to be found. Vehicle Detection, Motion Detection can provide such a frame, and users can define a manual frame also. Moreover, the preliminary license data provided by the Preselection stage contains a license plate frame which can be used at the ANPR stage.

In devices equipped with two image sensors, you can set up a secondary source functioning as either Overview or ANPR. In ANPR mode, the system will attempt to find a license plate in the secondary image.



- **Preselection engine:** the frame used by the Preselection stage. Select Manual frame to draw a user defined frame.

The Preselection stage will use:

- **Full Frame:** the entire frame
- **Manual Frame:** the frame drawn by the user
- **Motdet Frame:** the frame returned by motion detection
- **Trigger Frame:** the frame returned by other trigger sources
- **LP frame:** the license plate frame as returned by the previous stage

- **ANPR engine:** the frame used by the ANPR stage

The ANPR stage will use:

- **Full Frame:** the entire frame
- **Manual Frame:** the frame drawn by the user
- **Motdet Frame:** the frame returned by motion detection
- **LP frame:** the license plate frame as returned by the previous stage

- **Create LP images:** Create a cropped image containing the license plate only

- **Create image strip:** All triggered images are minified and joined to form an index image, which may help to set up trigger timing.

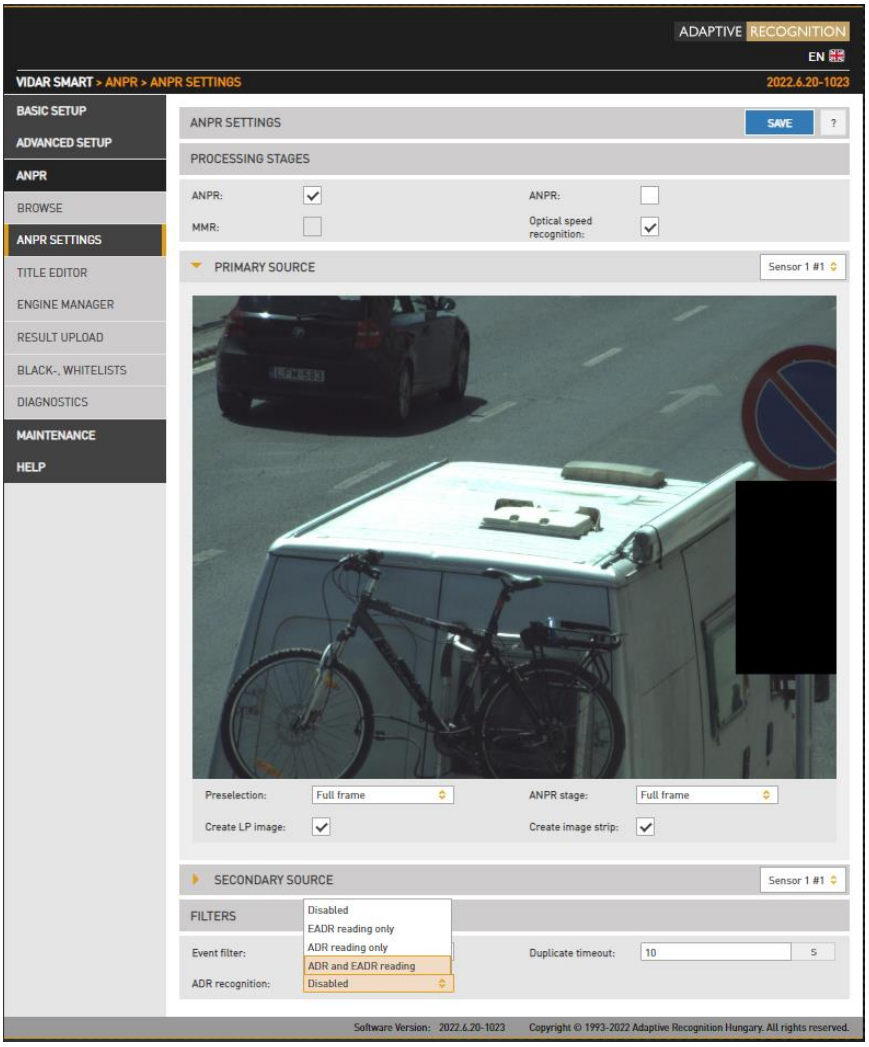
Filtering results can be configured with the following two options:

- **Event filter:**
  - **Return all events:** create a record in the database based on all trigger signals, even if a license plate was not found
  - **Return events with license plate**: Create a record in the database only if a license plate was found
  - **Return events with license plate and type:** Create a record in the database only if both a license plate was found and its nationality was determined.

- **Duplicate timeout:** the time frame in which the same license plate will not be registered again if once read.

- ADR Recognition:
  - Disabled
  - ADR plates reading only
  - EADR plates reading only
  - ADR and EADR plates reading

Open Browse menu and click on Info button to see ADR and EADR plate recognition among the events.

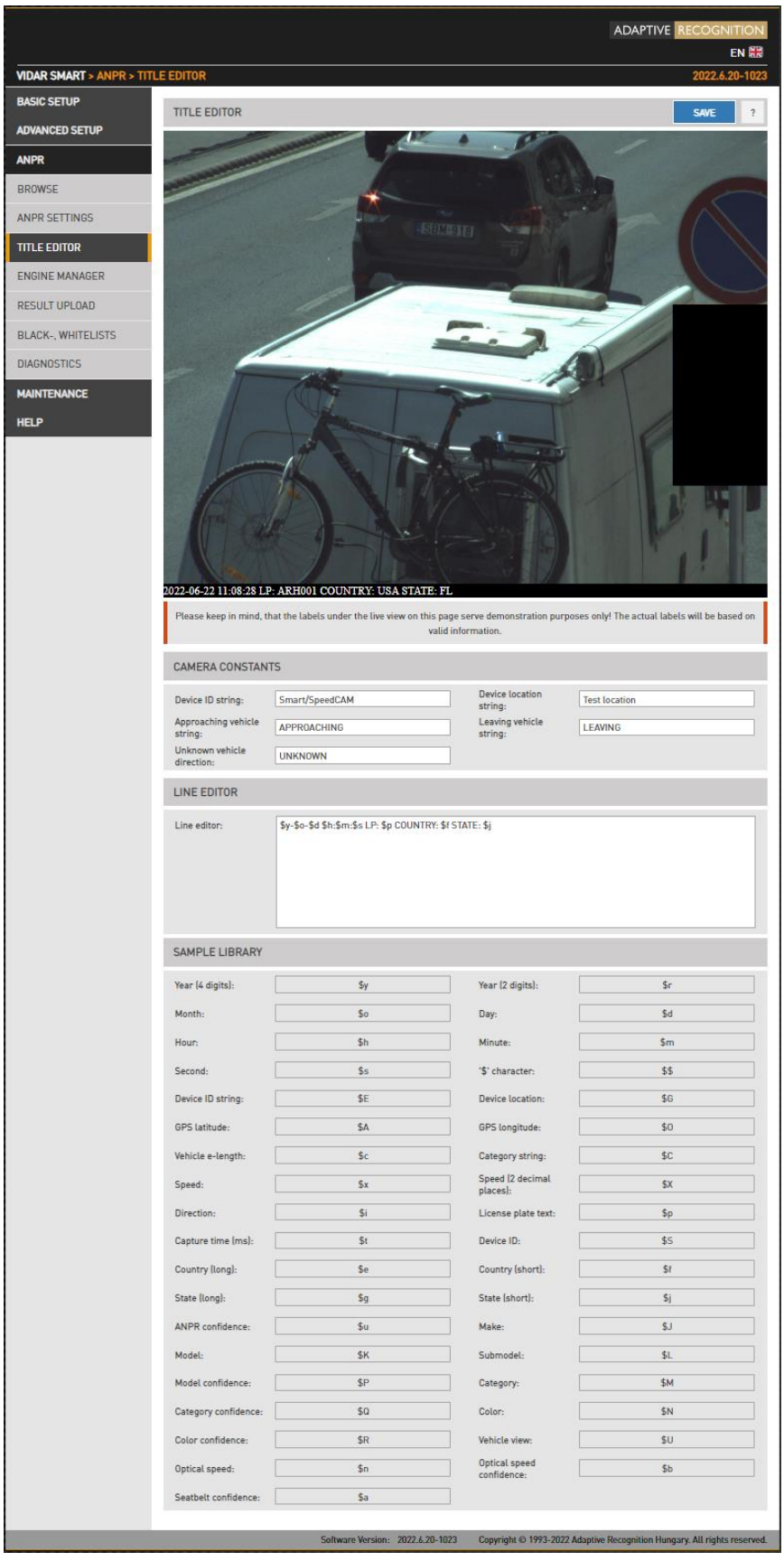


Note

Please note, that the time requirement of reading ADR/EADR plates is comparable to that of reading license plates, thus the net throughput (vehicles processed per seconds) will be affected.

7.2.3. TITLE EDITOR

WEB INTERFACE > ANPR > TITLE EDITOR



The subtitles added to the image are configured here.

In the Camera Constants tab users can assign a string to variables which will be printed according to the value detected.

- Device ID string: Device identifier
- Device location string: Location identifier
- Approaching vehicle string: The string that gets printed in the subtitle when an approaching vehicle is detected (only in models with speed measurement)
- Leaving vehicle string: The string that gets printed in the subtitle when a leaving vehicle is detected (only in models with speed measurement)
- Unknown vehicle direction: The string that gets printed in the subtitle when vehicle direction cannot be determined.

In the Line Editor tab users can customize the subtitle using the wildcards listed below.

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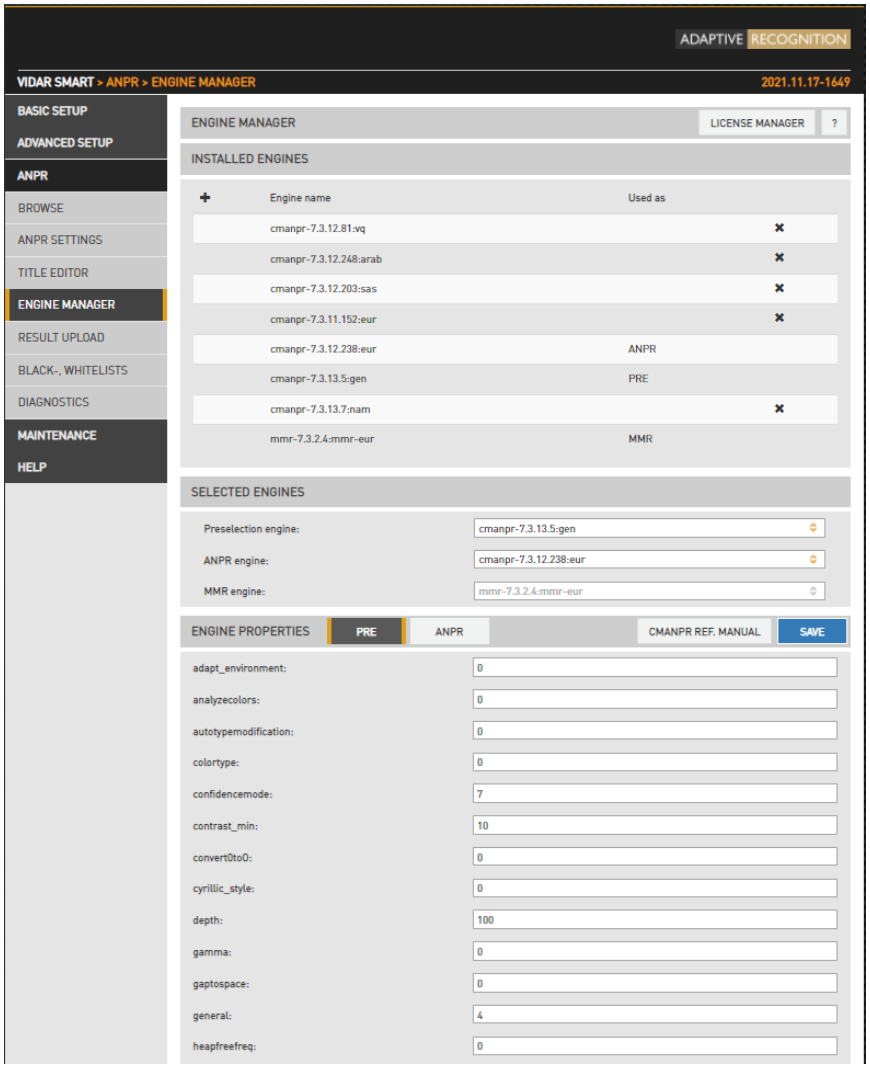
7.2.4. ENGINE MANAGER

This tool allows for installing, removing and configuring the Carmen ANPR engines used in the system. The **Install Engines** tab lists the engines currently installed on the camera. Unused engines can be removed with the "×" icon to the right. A new engine can be installed by clicking on the + icon.

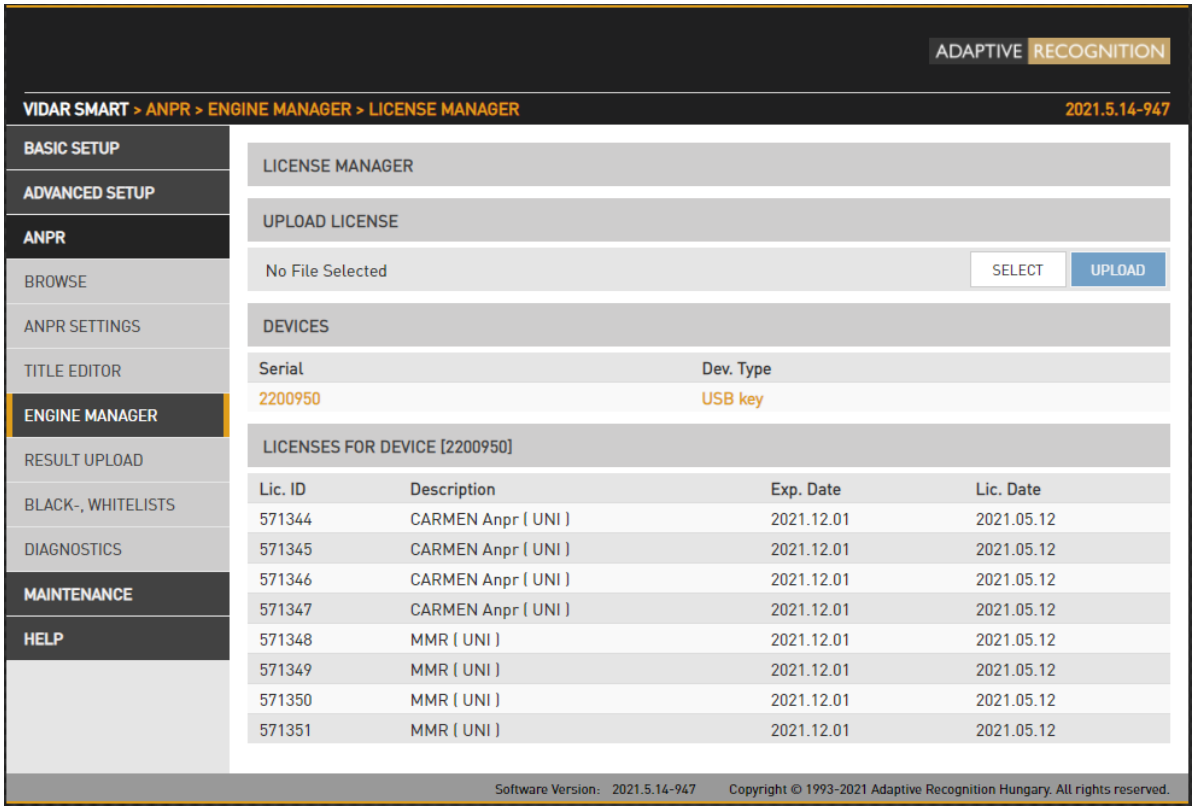
Currently used engines are listed in the **Selected Engines** tab.

Engine properties are configured in the bottom tab. Please check the Carmen ANPR Manual for details.



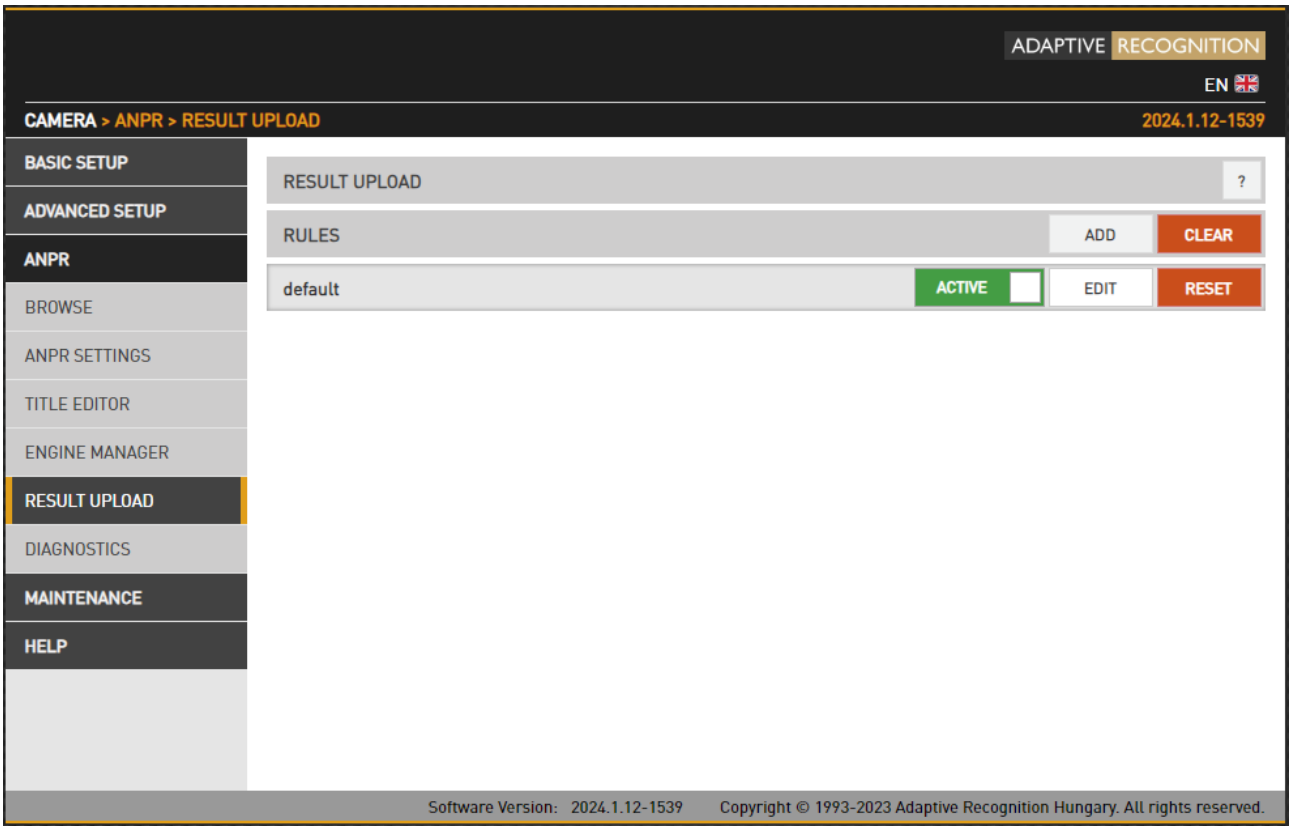
Hardware Key Licenses currently available in the device are listed in the License Manager section. Additional licenses (sold separately) can be installed in the Upload License menu.

Even with expired license your camera will function as previously (will return license plates), but you will be unable to install engines released after the Expiration Date. Therefore, please contact your sales person or write to requestinfo@adaptiverecognition.com and request an update and your latest engine to keep the highest performance!



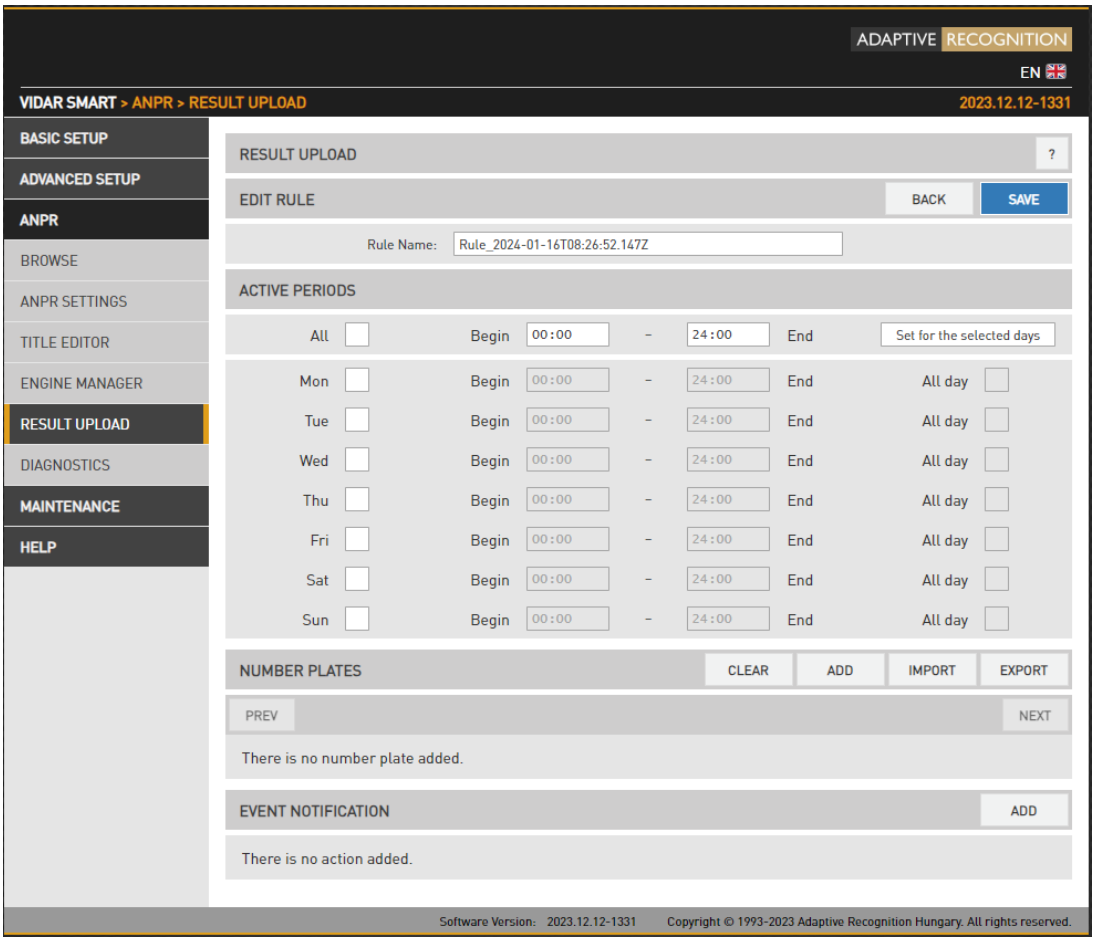
7.2.5. RESULT UPLOAD

WEB INTERFACE > ANPR > RESULT UPLOAD



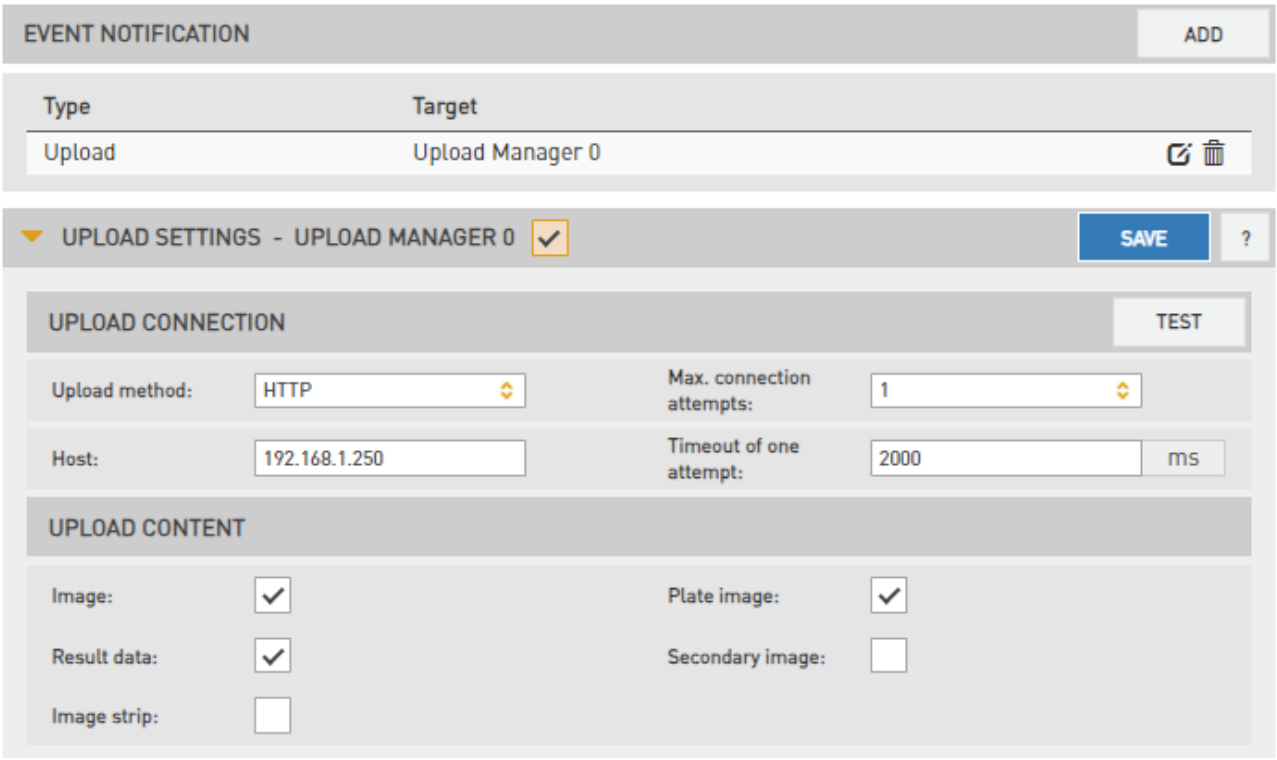
By default, there is a default Rule set. Additionally, multiple Rules can be defined.

As a first step, a Rule needs to be added by pressing the Add button. In the following window, you can set which times the Rule should work.



Under Event Notification, click the Add button, where the Type option will display Upload. Afterward, use the Add button to specify this option.

Press the Edit button to open a window where you can configure the Upload Settings - Upload Manager 0 settings if checked.



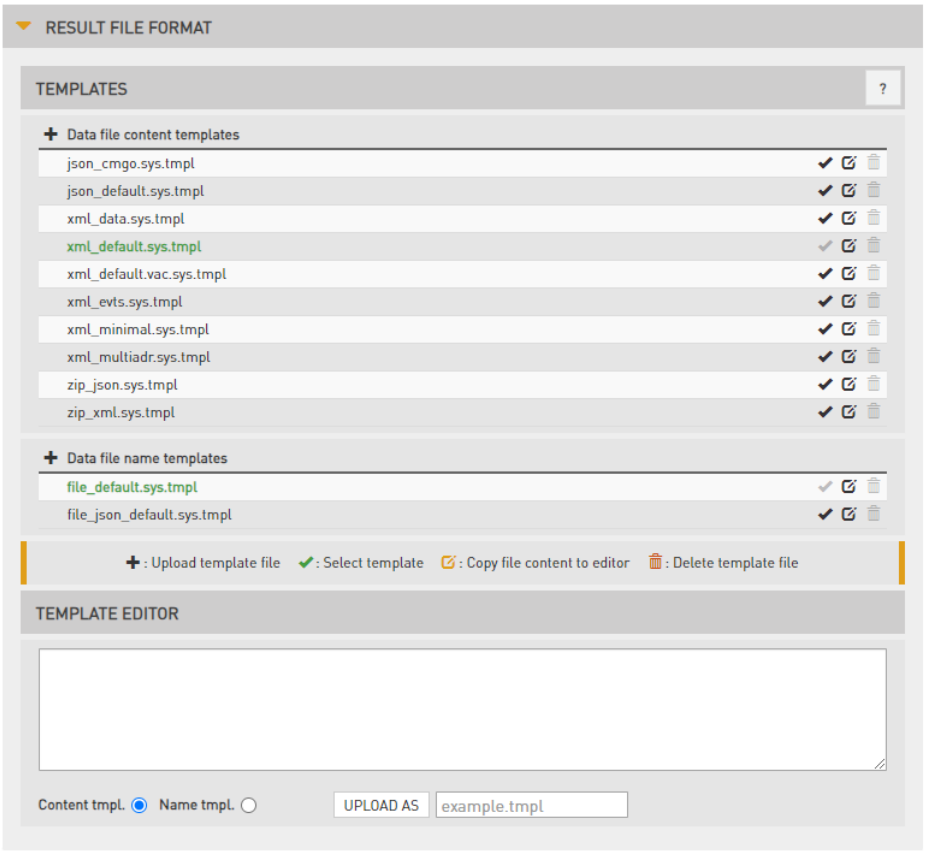
Recognition results can be uploaded using the HTTP, FTP or SFTP and *HTTPS protocol.

- Upload Method: The protocol used
- Max. connection attempts: In case of failure this is the number of repeated upload attempts
- Timeout of one attempt: The maximal duration of an upload attempt
- Host: Upload target host
- Remote directory**: The directory that the files should be uploaded to
- Username and Password*: User credentials

*: use this request to upload using HTTPS protocol:
http://cam_ip/lpr/cff?cmd=setproperty&name=/default/cfs/uplm/http/cert_vfy&value=0
**: only present in FTP, SFTP configuration

Upload Content: The data and images will be uploaded

Result file format: You can edit and check trigger information in a selected format.



The upload button + has been added to the header. First part of the filenames has been separated into filename and content templates.

The pencil button inserts the content into the Template editor filed. Clicking on the pencil button enters the contents of the file into the editor, sets the file type, and enters the file name in the appropriate field. After that it is possible to edit, change, and save it. If you save it under an existing name or change it, you will be asked before it. In case that you want to upload under an inadequate name or modify .sys file, it will not allow.

If you change an active template, it will restart automatically afterwards.

The content of the result data file (and the file name) is customizable using templates. The following short example, which will describe a result formatted as an XML contains all features:

1. <?xml version="1.0" encoding="UTF-8"?>
2. <result>
3. <ID value ="$(ID);"/>
4. <text value="$DB2XML($(ANPR_TEXT));"/>
5. <location value="$(location);"/>
6. <image value="$(normal_img);"/>
7. </result>

Lines #1, #2 and #7 are text only (of course in this example we have to adhere to the XML standard). Line #3 is an example of a database field, line #4 is an example of a function, line 5 and 6 are examples of a property/special field. This template may evaluate to something like:

<?xml version="1.0" encoding="UTF-8"?>
<result>
<ID value ="123456789"/>
<text value="ABC123"/>
<location value="Test Site 34b"/>
<image value="/9j/4AAQSkZJRgABAQAAAQABA[... a base 64 encoded image...]"/>
</result>

The same content in a different format might be:

1. event_id=$(ID);
2. plate_text=$DB2XML($(ANPR_TEXT));
3. camera_location=$(location);
4. vehicle_image=$(normal_img);

which will evalutate to:

1. event_id=123456789
2. plate_text=ABC123
3. camera_location=Test Site 34b
4. vehicle_image=/9j/4AAQSkZJRgABAQAAAQABA[... a base 64 encoded image...

Database fields

The contents of the database can be injected using the following syntax:

$([database field id])

Functions

To format the output the following functions are provided, with the general syntax:

$[function name]([argument1],[argument2],...,[argumentN]);

Plate text formatting:

DB2XML(text,flags:optional)-converts the license plate text *text* from DB to XML format, where flags may be one of the following;

- ARABIC2LATIN-convert all Arabic characters to their latin equivalent
- ENCODE_ALL-encode all characters in 쳌 format

DB2JSON(text,flags:optional)-converts the license plate text *text* from DB to JSON format

DB2UTF8(text,flags:optional)-converts the license plate text *text* from DB to UTF8

Time formatting:

Format Time(timestamp,format_string:optional)- formats timestamp given in milliseconds according to the optional format_string (see the POSIX strftime function). For example:

"$FormatTime($(FRAMETIMEMS),%Y%m%dT%H%M%S%z)" evaluates to "20180419T145713+0200". If the format string is omitted, the same timestamp is evaluated as "2018.04.19 14:57:13.594"

Note

Please note that in the case when special rules apply to using the string compiled from the template (for example a file name template that will be used as a part of an URL of an FTP upload), you need to make sure to adhere to these rules. In the previous example it means that spaces will have to be replaced by '%20', filenames on certain systems can't contain ':', etc.

Special fields

The following keywords are defined:

normal_img - the image representing the event, Base64 encoded

lp_img - the cropped license plate image, Base64 encoded

aux_img - the overview image, Base64 encoded

strip_img - the image strip, Base64 encoded

location - the location string as defined in default/cfs/db/location

cameraid - the camera HW id, may be overridden with default/cfs/db/cameraid

Important!

Special characters: The character '$' must always be escaped with '\'. Within an expression the characters '$', '(', ')', ',' and ';' have to be escaped with a '\'character.

For example the following expression:

();$TEST(a\$a\,,$(LP));

will evaluate as

();a$a,DATA

provided that the function TEST concatenates its arguments and the field LP contains the text 'DATA'.

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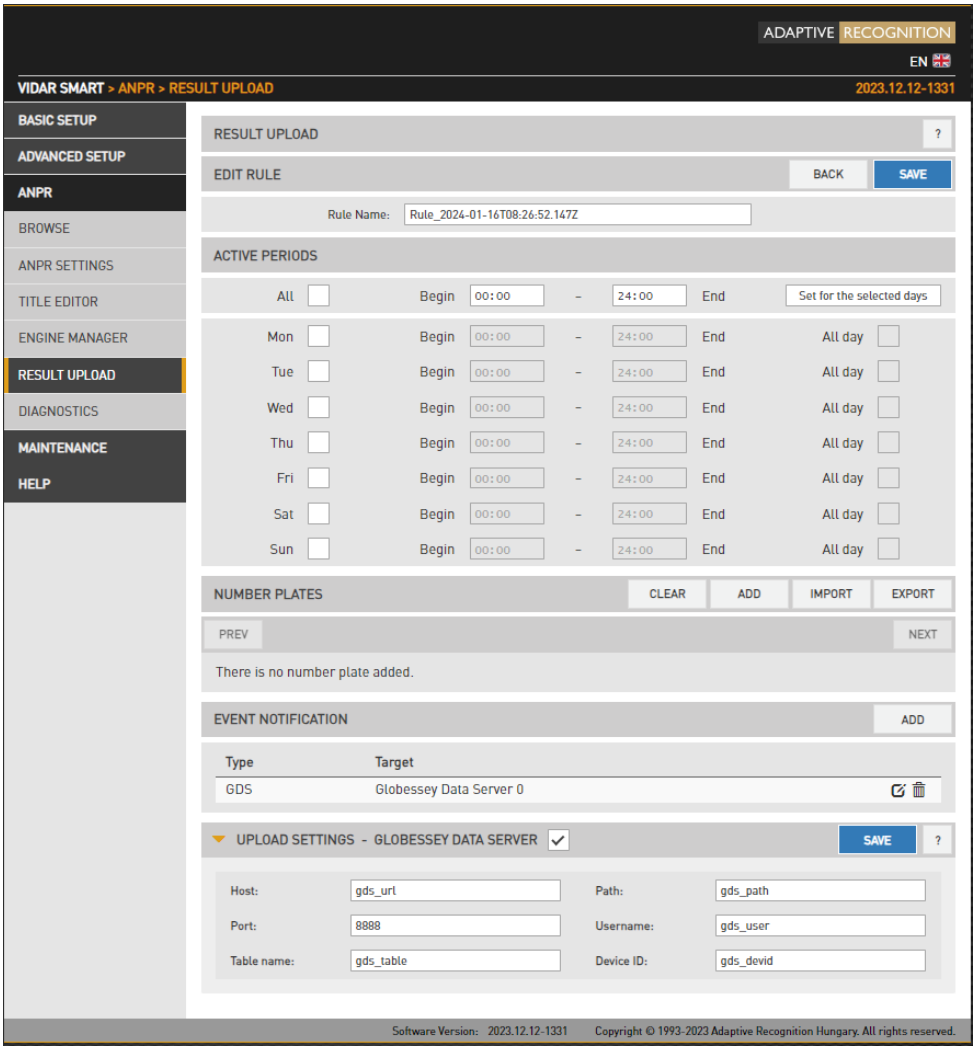
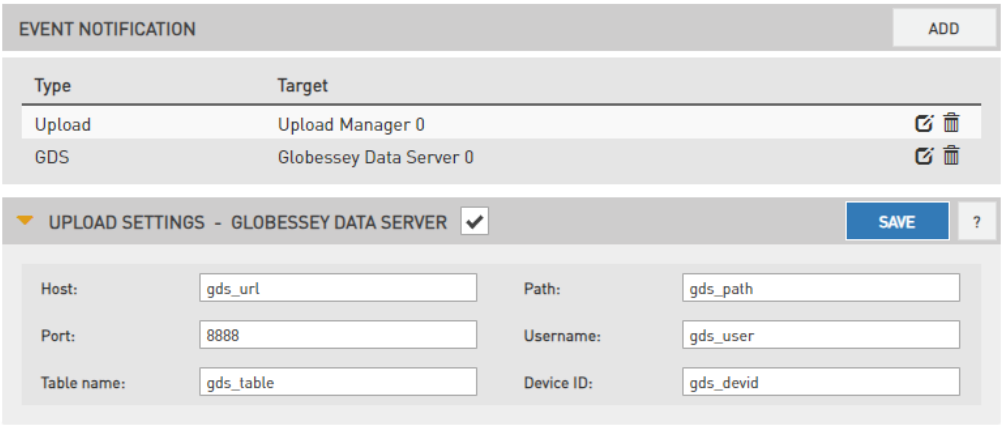
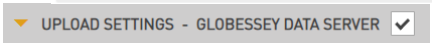
WWW.ADAPTIVERECOGNITION.COM

Globessey Data Server



GDS deals with the most complex traffic management challenge in an effortless manner: simultaneously managing data collection from numerous endpoints and serving queries of various business units.

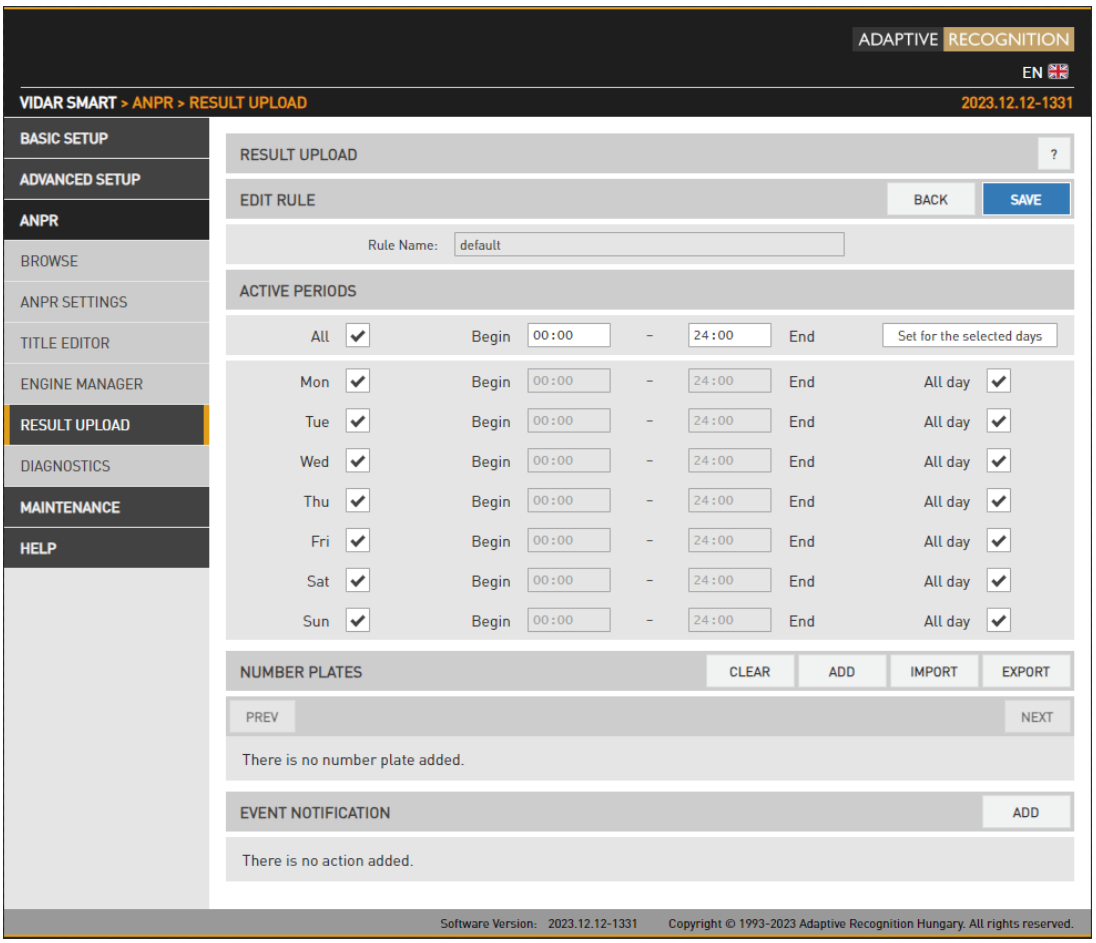


Tick in  checkbox to activate the function.

Under Upload Settings, enter the requested parameters and press the Save button to validate the changes.

7.2.6. Number Plates

WEB INTERFACE > ANPR > RESULT UPLOAD



The purpose of this feature is to execute tasks upon reading a certain license plate.

To enable the Number Plates feature, use the Add button.

> **Note**
>
> If the feature is disabled, the settings under Upload Manager 0 will be applied. That is all license plates will be uploaded if Upload Manager 0 is enabled and configured. This way compatibility is ensured with previous releases.

The Number Plates feature is based on **rules**. Rules consist of a **time condition** (e.g., workdays 9:00-16:00), a **license plate condition** (ABC123 and DEF456) and an **event notification** (pull GP output to high or upload event data to an FTP server). If and only if both the time and license condition is satisfied, then the event notification will be executed.

Rules must have unique names (LP's corresponding to one rule must be unique). A rule can be deactivated, so users don't have to delete/re-enter the rule if they want to temporarily suspend its action. If it exists, a special rule named 'default' will be executed if no other rule applies. You can add/edit a rule by clicking add/edit.

7.2.7. RULES

A rule will be created with an automatically generated name. It is good practice to change this to a more descriptive name. If the rule is named ‘default’, then it will be applied if no other rule can be satisfied.

7.2.8. TIME SETTINGS

The day and time range during which the rule applies can be specified. Alternatively, you can use the **All day** check box.

7.2.9. LICENSE PLATES

License plates can be added manually one by one or imported from a CSV file. A license plate can be removed by hovering over the text and clicking the **Trash bin** icon. Alternatively clicking the Clear button all items will be cleared.

7.2.10. EVENT NOTIFICATIONS

You can add multiple tasks to a rule, each will be executed if the conditions are satisfied. The following actions can be:

- Upload via an Upload Manager
- Execute a GPIO 100msec signal
- Execute an RS232 or GPIO output for Wiegand26 Communication protocol

If a task has any settings, those are available clicking the **Cogwheel icon** beside the event notification task list entry. An entry can be removed by clicking the **Trash bin icon**.

EXAMPLES

7.2.11. Reporting stolen vehicles

Create a rule, select all week/all day and add the license plates and an Upload type Event Notification. The plates on the list will be reported. You can specify up to 8 receiving servers (Upload Manager 0-7), event data will be uploaded to each.

7.2.12. Opening a gate for vehicles

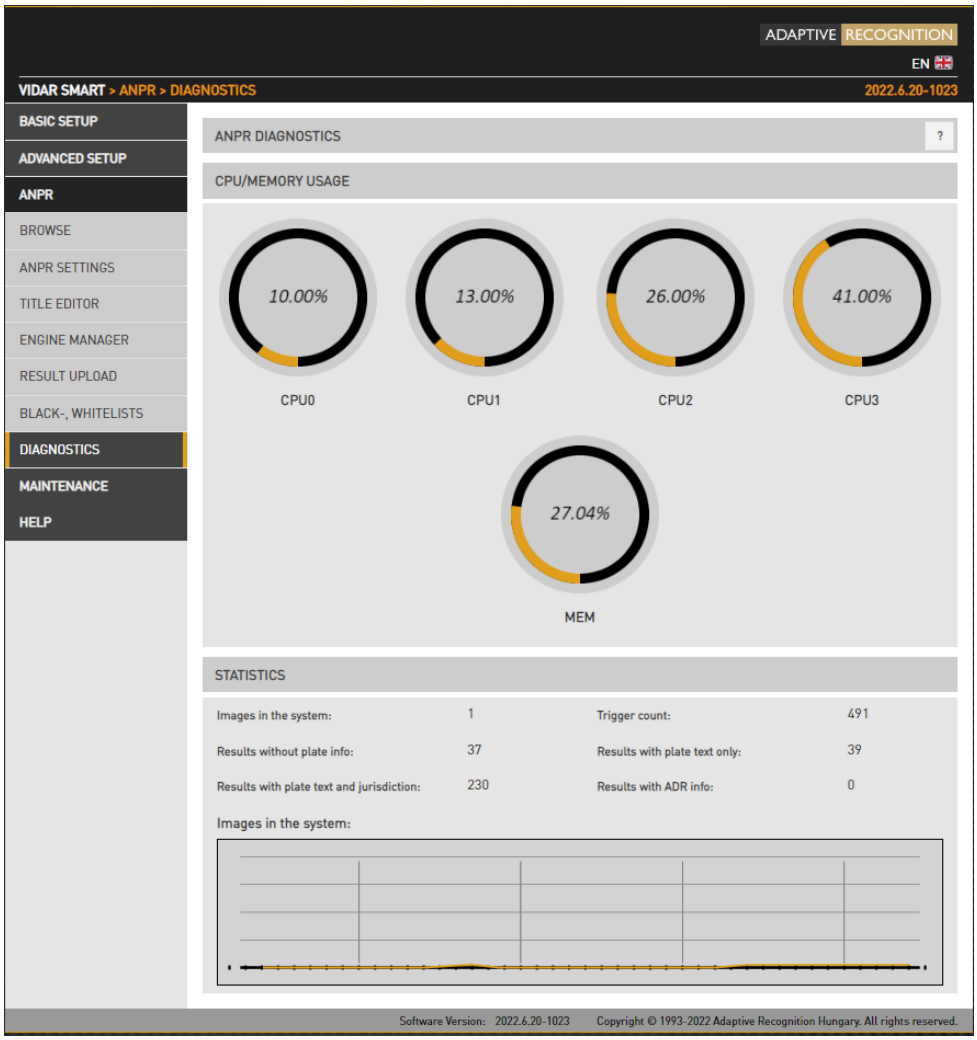
Create a rule, select workdays and add the license plates and an Exec/GPIO type Event Notification. GP output will be triggered when a plate on the list has been read.

7.2.13. Reporting unauthorized use of toll road

Edit the default rule (named 'default'), add an Upload type Event Notification which by default will forward all license plates to the tolling backend. Now create a second rule (named 'exempt'), and add the license plates that are exempt from paying tolls (ambulance, police, road works). Do not add any Event Notifications, consequently those on this list will not be reported via the Upload feature. Edit time/date settings accordingly, for example if tolls apply only on weekdays uncheck Saturday and Sunday in both rules.

7.2.14. DIAGNOSTICS

WEB INTERFACE > ANPR > DIAGNOSTICS



Use this tool to monitor system workload.

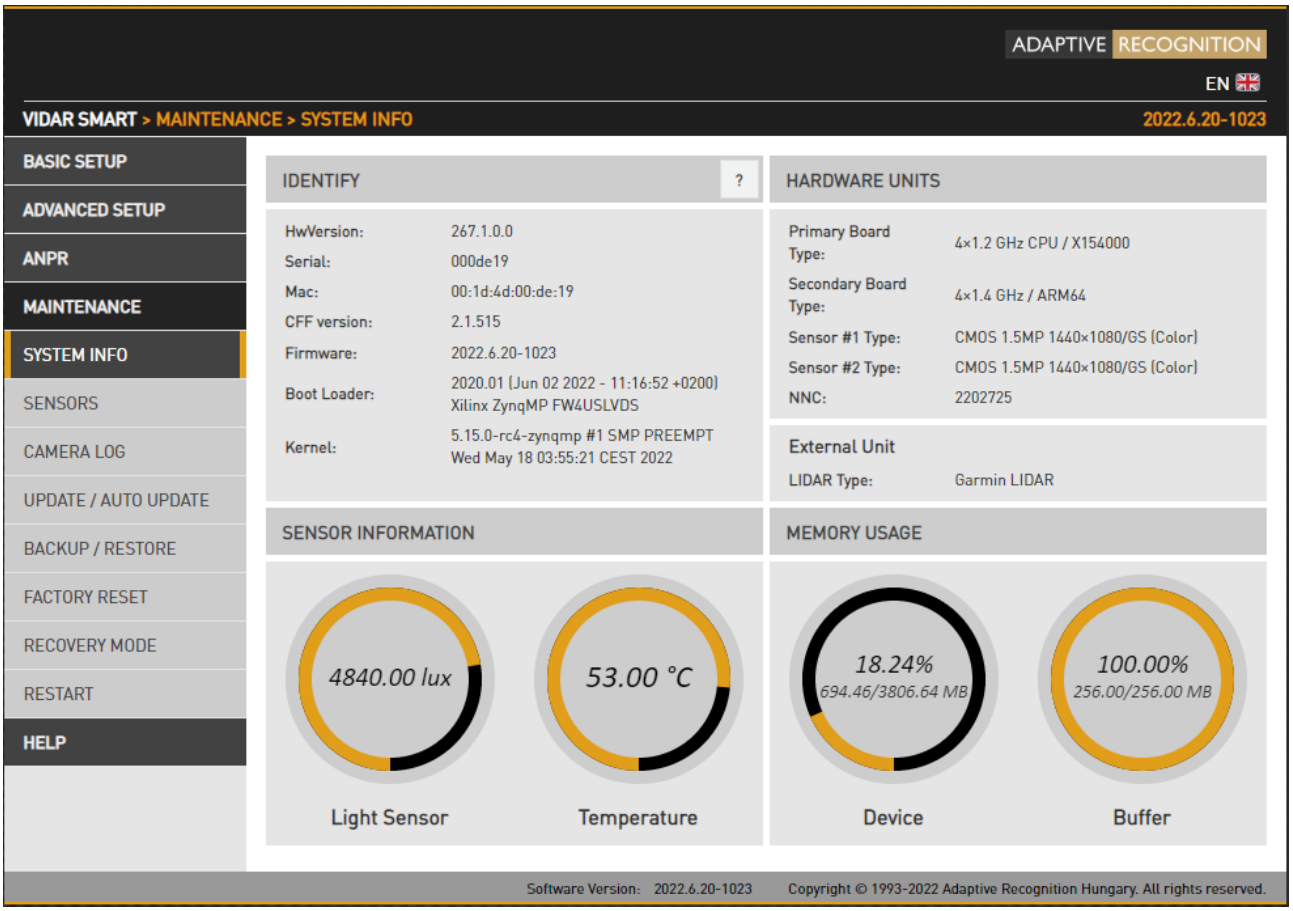
The results in STATISTICS will inform you about current and recent specific tasks like:

- Images in the system: the number of captured images waiting for process.
- Trigger count: the number of triggers received from the trigger sources
- Results without plate info: # of events where no license plate could be recognized
- Results with plate text only: # of events where only the license plate text is available (most likely originating from the Preselection stage)
- Results with plate text and jurisdiction: # of events where complete ANPR info is available
- Results with ADR info: # of events where ADR info is available.

8. MAINTENANCE

8.1. SYSTEM INFO

WEB INTERFACE > MAINTENANCE > SYSTEM INFO

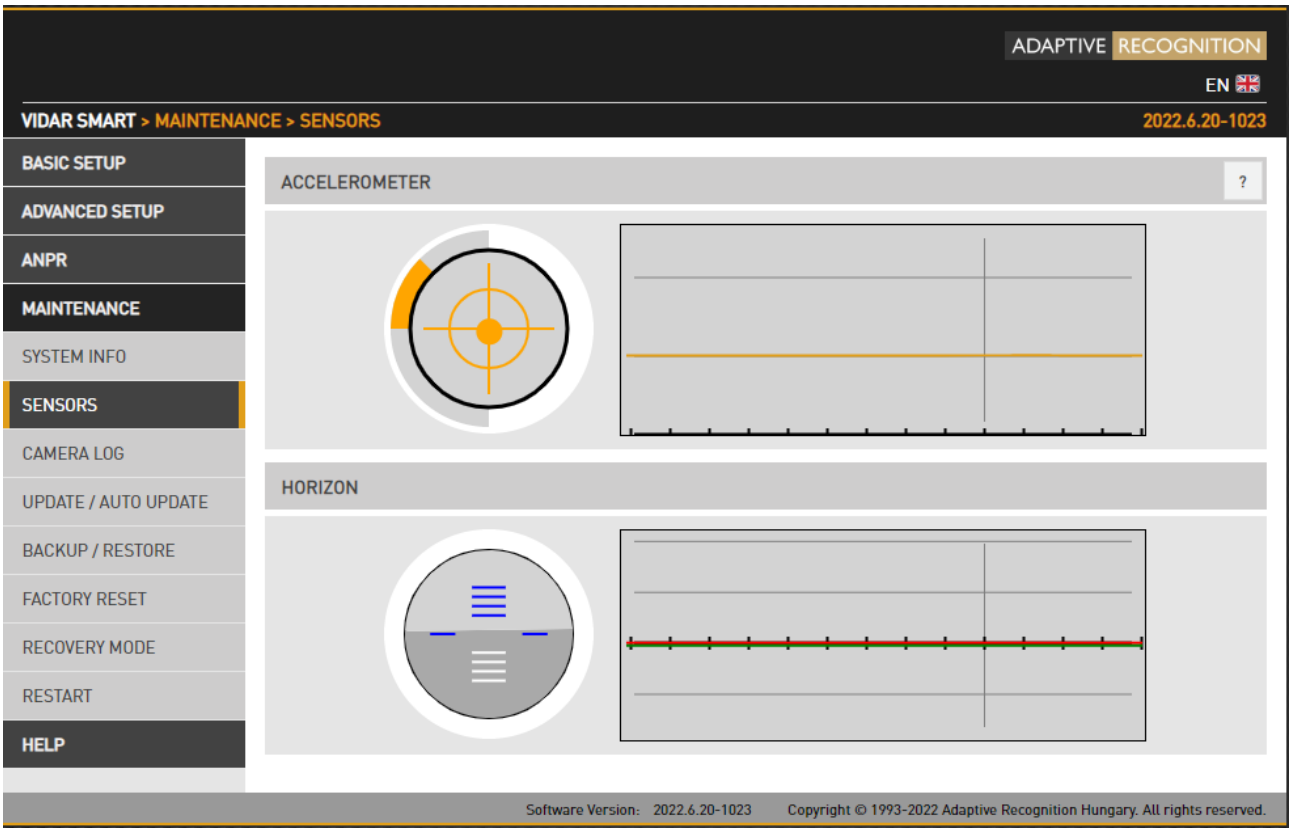


The most important details about the device are listed here.

- IDENTIFY tab lists values identifying the system. Please refer to these values when reporting a bug. Be sure to include your HW Version and the Serial Number.
- HARDWARE UNITS lists the hardware components of the camera.
- SENSOR INFORMATION and MEMORY USAGE provide info about temperature, light levels and memory usage. It is normal to have both memory usage stats at or near to 100 %.

8.2. SENSORS

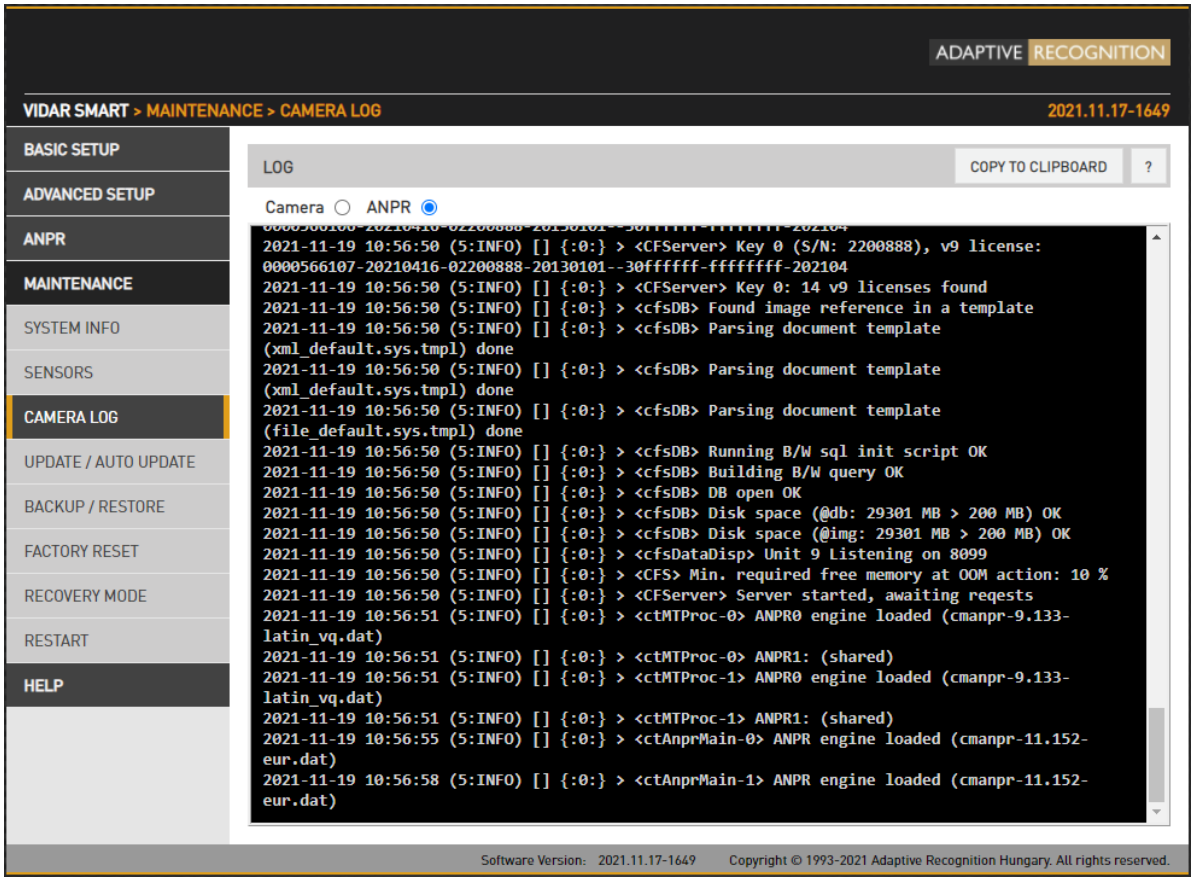
WEB INTERFACE > MAINTENANCE > SENSORS



The built-in accelerometer may provide help aligning the camera.

8.3. CAMERA LOG

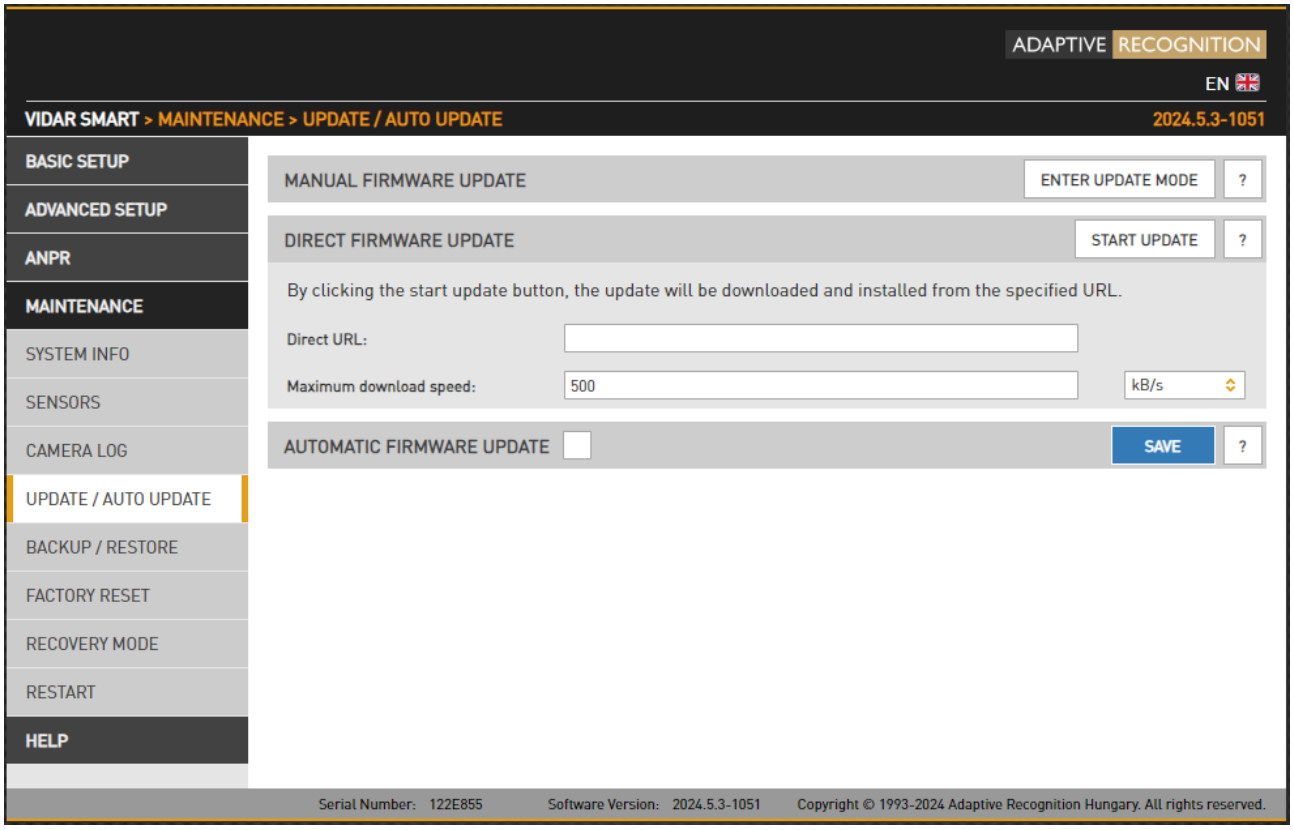
WEB INTERFACE > MAINTENANCE > CAMERA LOG



Camera and ANPR logs provide information about the processes in the camera and the license plate recognition module respectively. Log entries can be copied to the clipboard COPY TO CLIPBOARD and attached to a bug report.

8.4. UPDATE/AUTO UPDATE

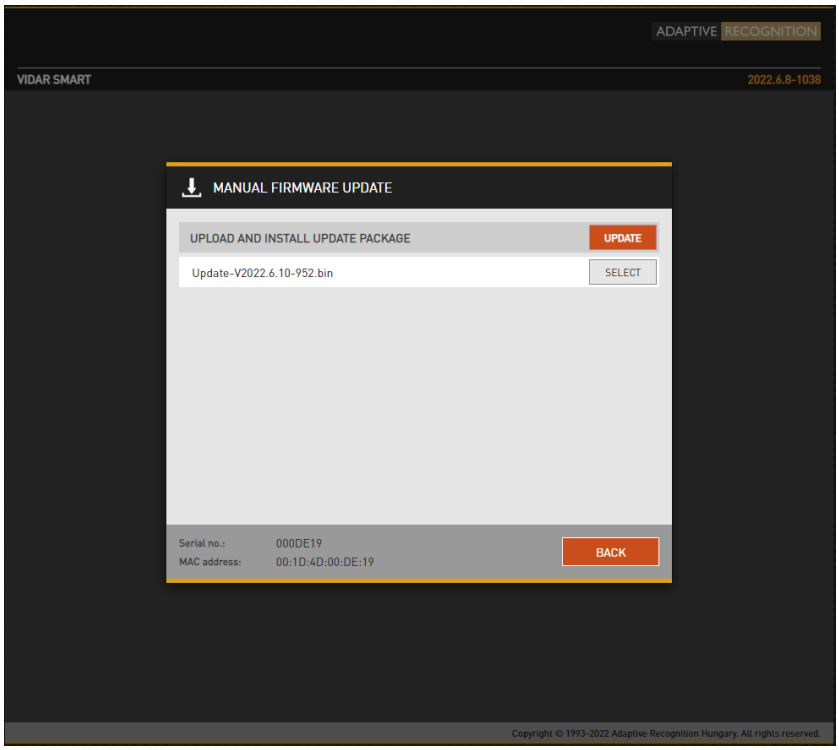
WEB INTERFACE > MAINTENANCE > UPDATE/AUTO UPDATE

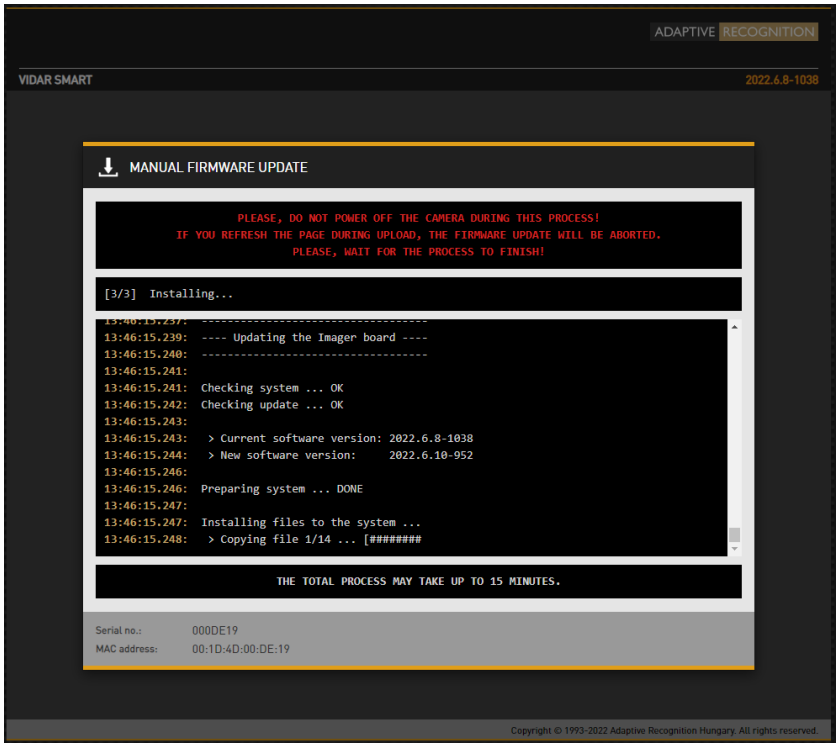


This menu provides tools to manage camera firmware.

Use ENTER UPDATE MODE to upload a new firmware.

First step is to tap „Select” button to choose update package from your computer. When you have loaded, tap „Update” button to start installing the update package.





The total process may take up to 15 minutes.

Important!

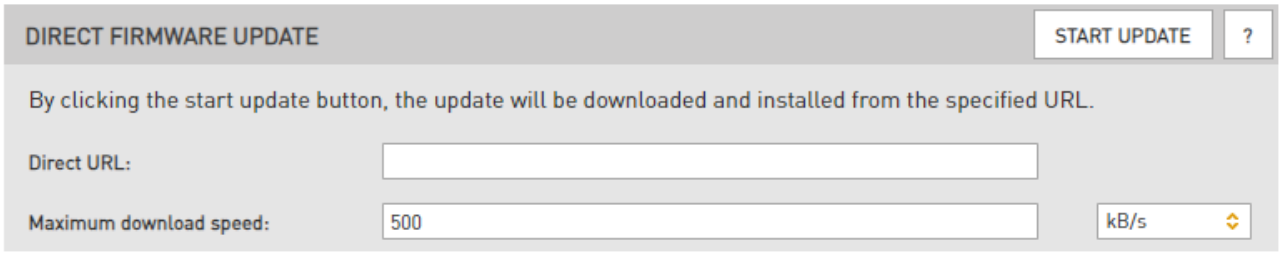
If you power off the camera or refresh the page, the firmware update will be aborted!

Encrypted update

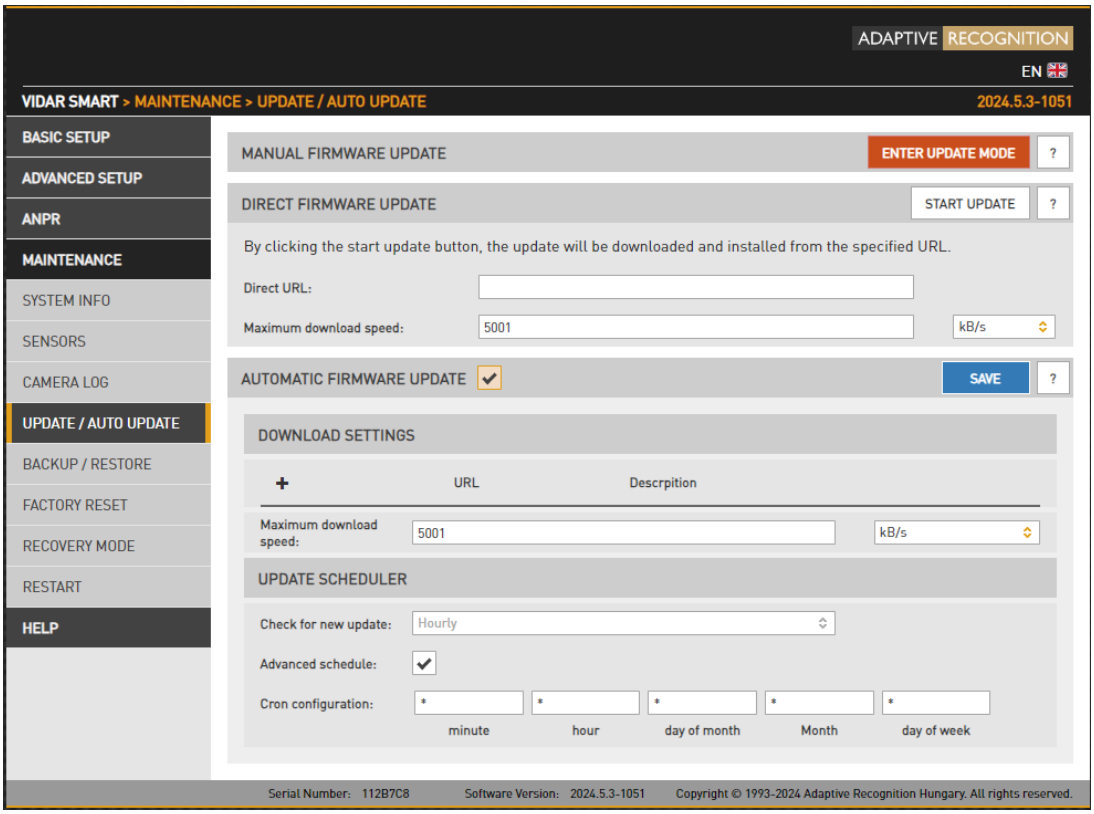
The update can only execute on a camera with firmware version 2021.10.14-1810. For version 2021.10.14-1810, a temporary package called must be installed first.
After that, the operation becomes available. Once the temporary package has been uploaded, it can only be upgraded to later versions than the temporary package.

8.4.1. Direct Firmware Update

The **Maintenance -> Update/Auto update** page has been expanded with a new section called Direct Firmware Update.
Here, you can specify a **URL** (the system checks if the format is correct) from which it tries to download and install the update package.
The download speed is common with the auto-update section; changing one affects the other.
By clicking the **Start Update button**, the values are stored, and the update process starts. The camera starts in update mode, and if the package is not valid, the user receives a notification on that interface.



8.4.2. Auto Update



Auto update function provides to the customer to configure hundreds of cameras updated automatically without install them one by one.

The auto update used in ARH OS is able to retrieve installation packages from a server and automatically install it immediately or on time. By default, it operates in a client-server system.
It can be used to install the following packages:

- Complete firmware update packages
- Smaller patch packages
- License / certificate packages
- Engines
- Configuration packages
- Custom OEM packages, additions

Supported servers:

- HTTP
- HTTPS

Settings:

- Multiple servers can be specified (up to 99), these will go through the list and use the first one that works
- Create a HTTP webserver on your computer
- Copy the actual firmware update package in the folder (.bin, .chk and GET files)
- It contains the update package and a GET file

GET file example:

V1.3|*|*|arm64|*|Update-V2.0.bin|N

Column's description:

- Version number
- Type
- Serial number
- Architecture
- Tag
- Update file
- Flags

The flag field (string) can be several characters long.

Contents:

First character 'N': normal mode, does not start the update process immediately.

'F': force - start immediately the downloaded update package.

If there is no flag field, 'N' is the default value.

Adaptive Recognition **America**
Adaptive Recognition **Hungary**
Adaptive Recognition **Nordic**
Adaptive Recognition **Singapore**
REQUESTINFO@ADAPTIVERECOGNITION.COM
WWW.ADAPTIVERECOGNITION.COM

On the camera web interface:

1. Check 

column to switch on Auto Update.
2. Plus sign  can be used to add the webservers path. The servers will check camera updates for software.
3. The name/description of the server. 

4. Change or delete the current URL. 
5. The maximum adjustable download speed and unit of measure for the software package. This is important because downloading during the periods of high data traffic with too much bandwidth, it can slow down the camera's data transfer. 

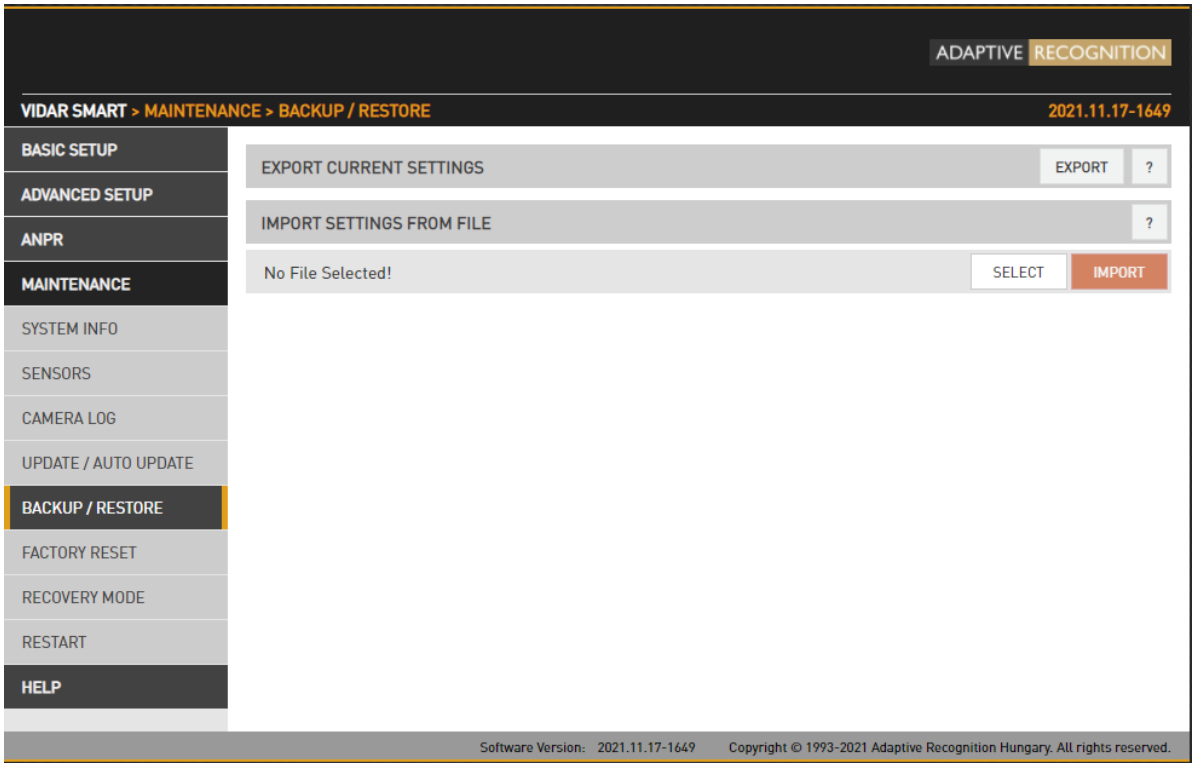
6. If the 

field is not checked, the top input field is active. If it is enabled, the bottom is active. The top field check every hour / day / month that new software version is available on servers (for day and month at midnight). In the Advanced schedule case, Cron configuration can be specified (this is a Linux scheduler, more complicated scheme can be specified as well, like the first day of the month and the middle day, every Wednesday, etc ...)

Note

Do not forget to save settings by clicking Save.

8.5. BACKUP/RESTORE

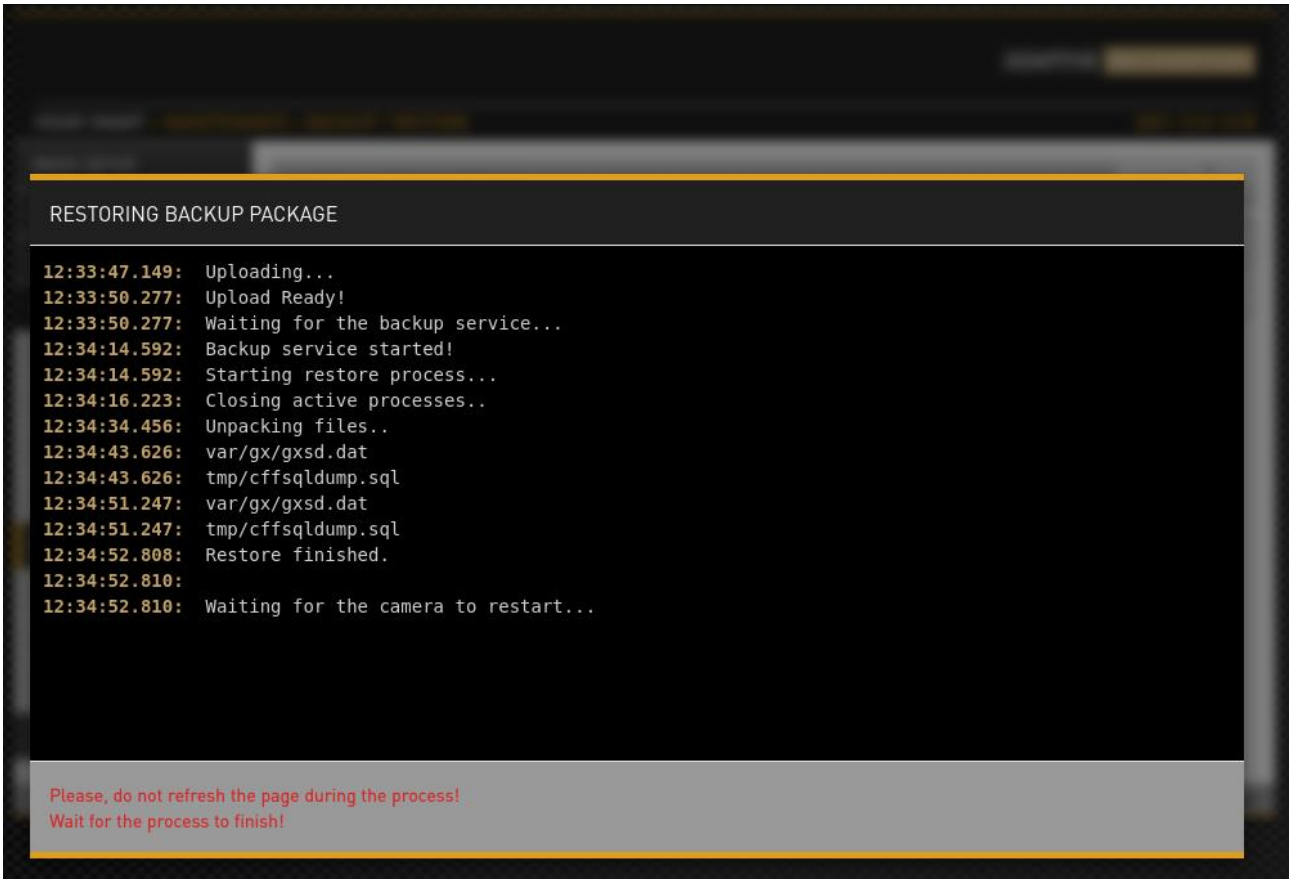


Encrypted backup

In the "Backup / Restore" menu, press the Export button EXPORT to download the backup, which will be encrypted.

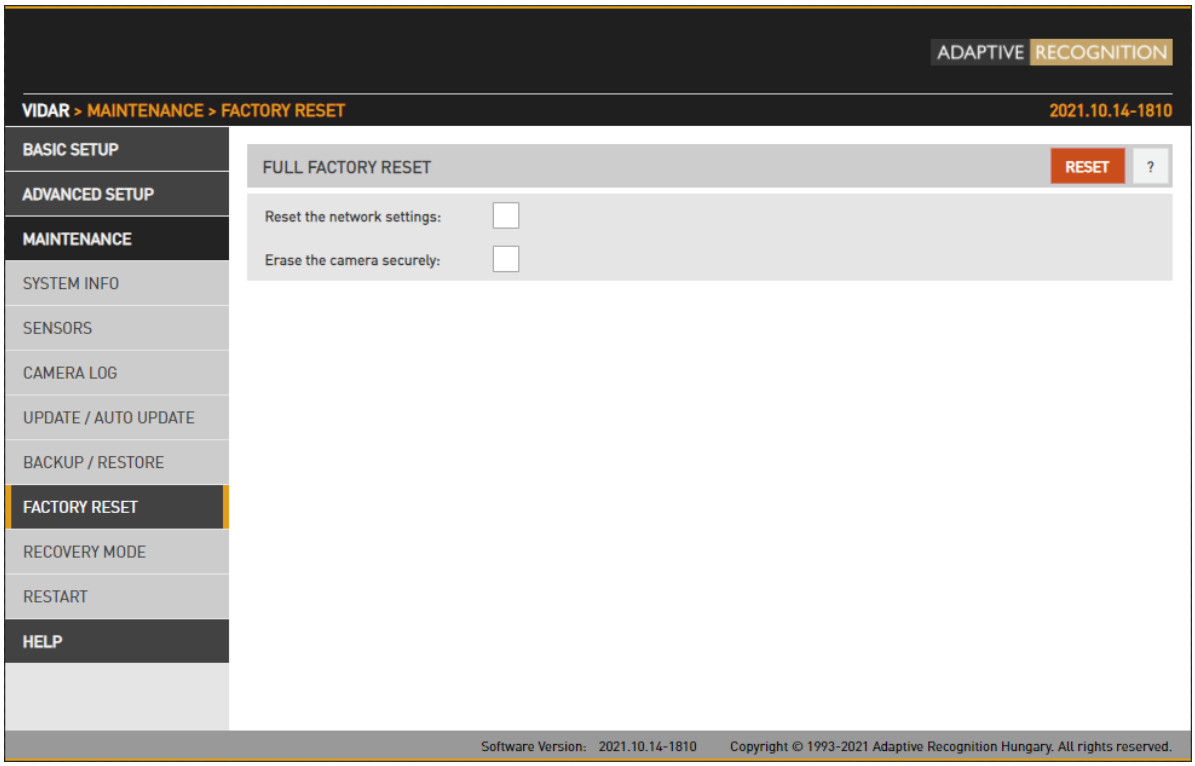
To restore a downloaded backup, first select the backup file you want to restore using the Select button SELECT on the camera's "Backup / Restore" menu, then press the Import button IMPORT and confirm the restore intention in the pop-up window. A backup can only be restored on the same type of camera where the full hardware and software package are the same.

This is the import process when we restore the backup file. Wait until the process is finished.



8.6. FACTORY RESET

WEB INTERFACE > MAINTENANCE > FACTORY RESET

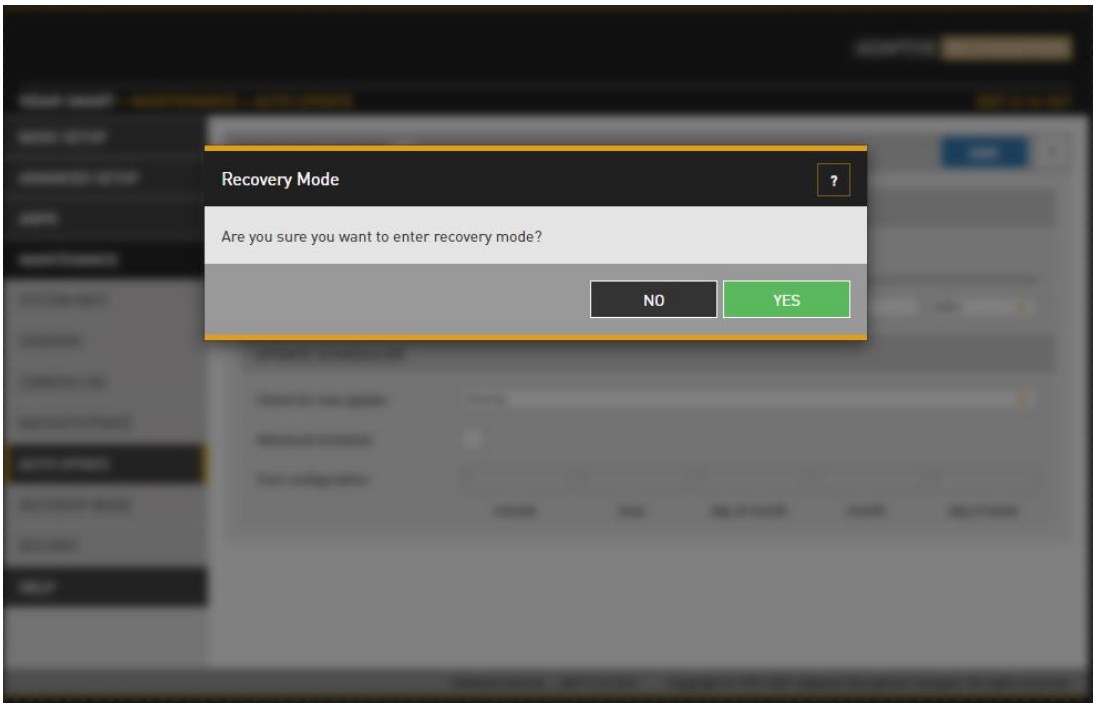


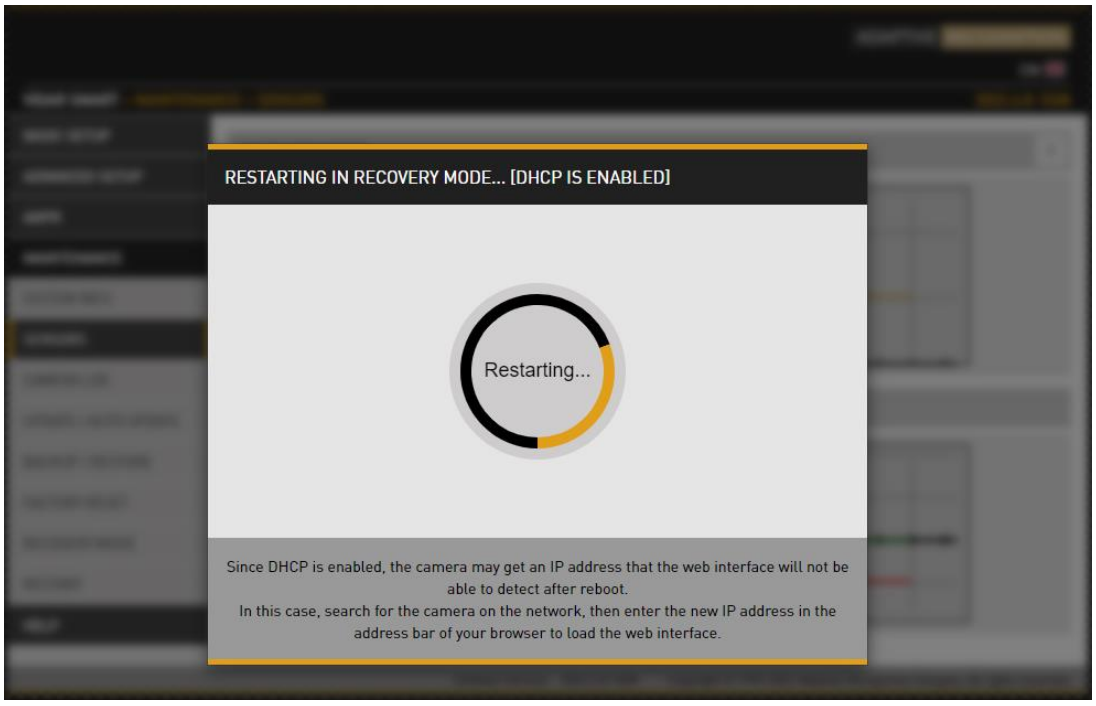
If you click on Reset button RESET without ticking any option below, the camera will restart. When you tick in Reset the network settings: ☑, it will change the IP address. The static IP address of the camera will be 192.0.2.3.

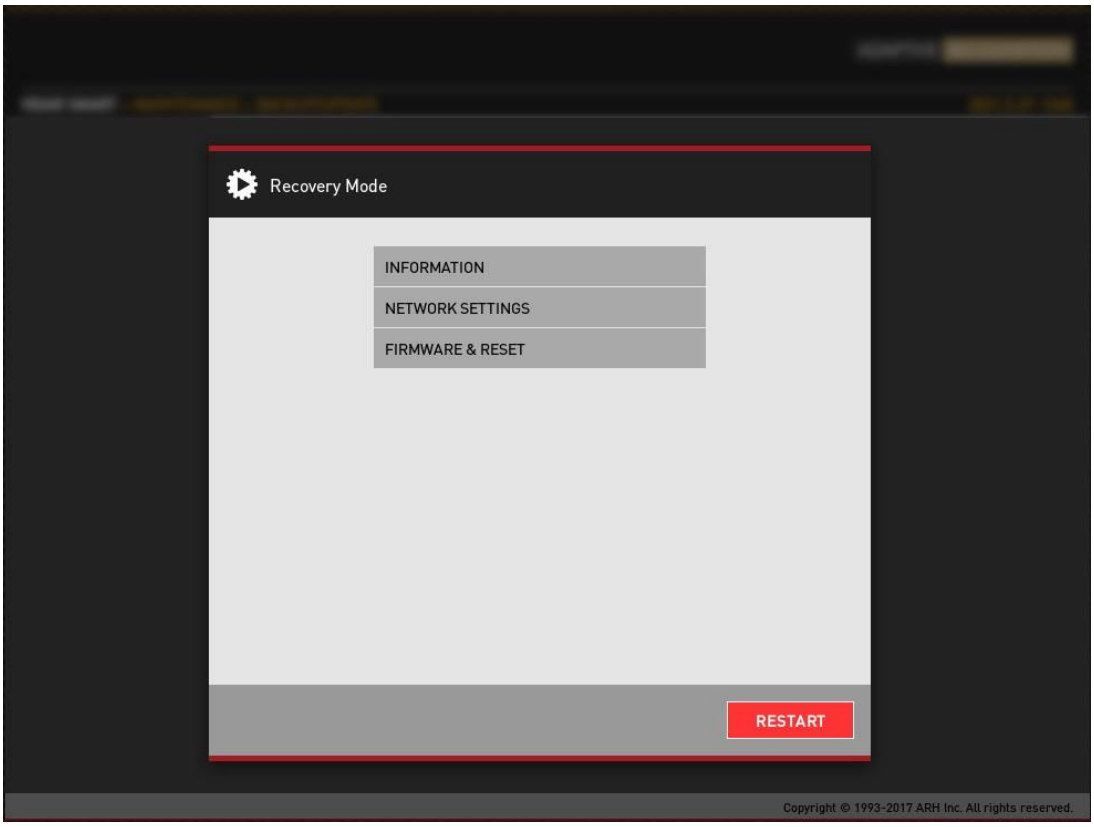
Tick in Erase the camera securely: ☑ the camera will return to default settings. The IP address remains unchanged.

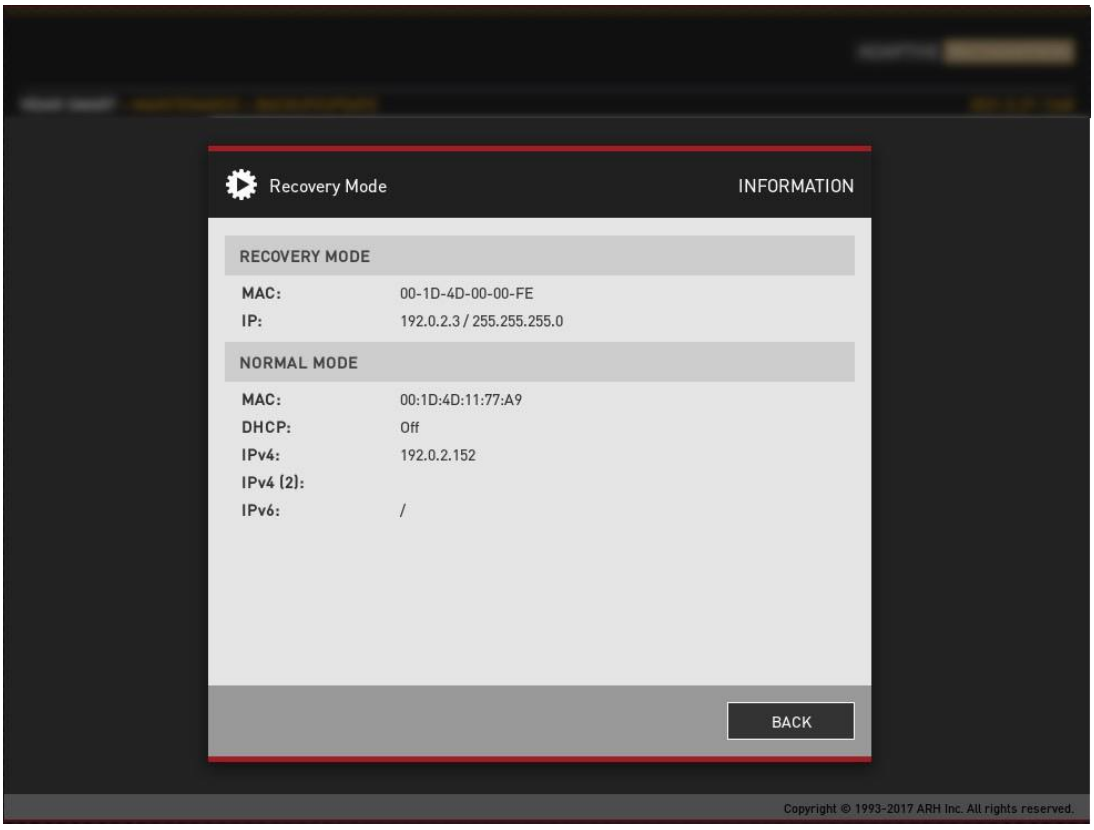
8.7. RECOVERY MODE

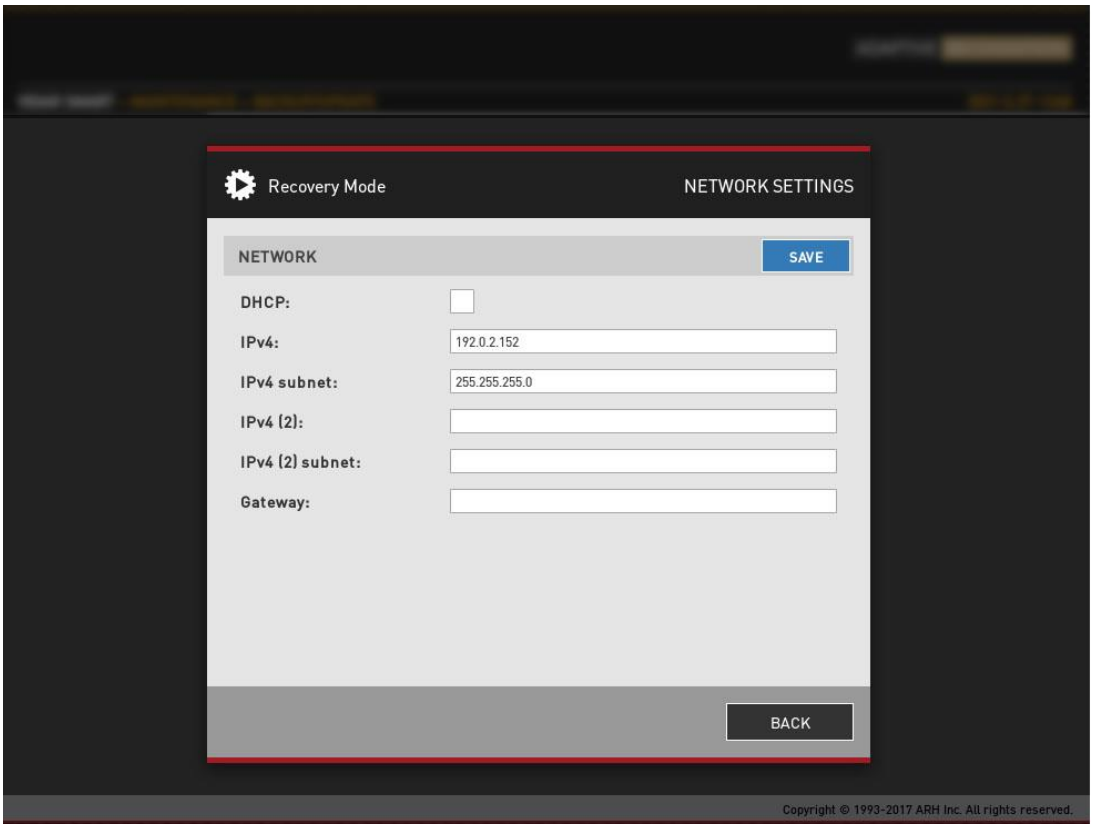
WEB INTERFACE > MAINTENANCE > RECOVERY MODE

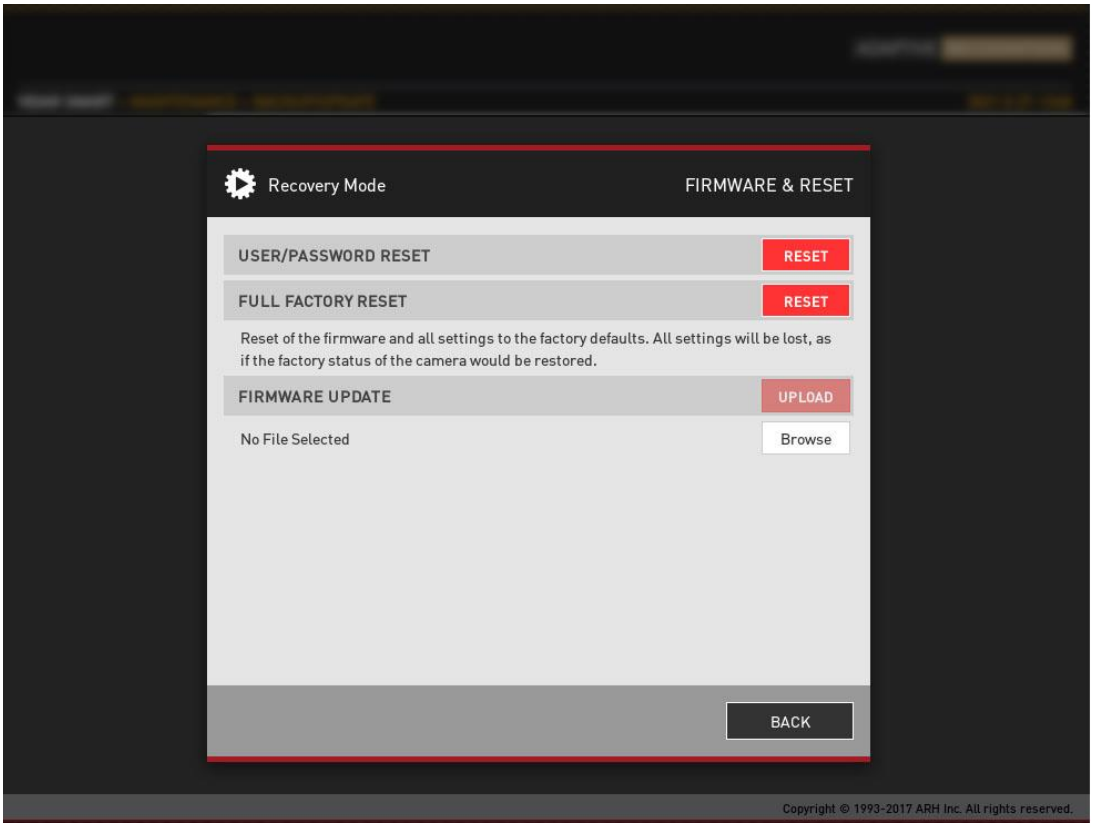





Recovery Mode
INFORMATION
NETWORK SETTINGS
FIRMWARE & RESET
RESTART
Copyright © 1993-2017 ARH Inc. All rights reserved.

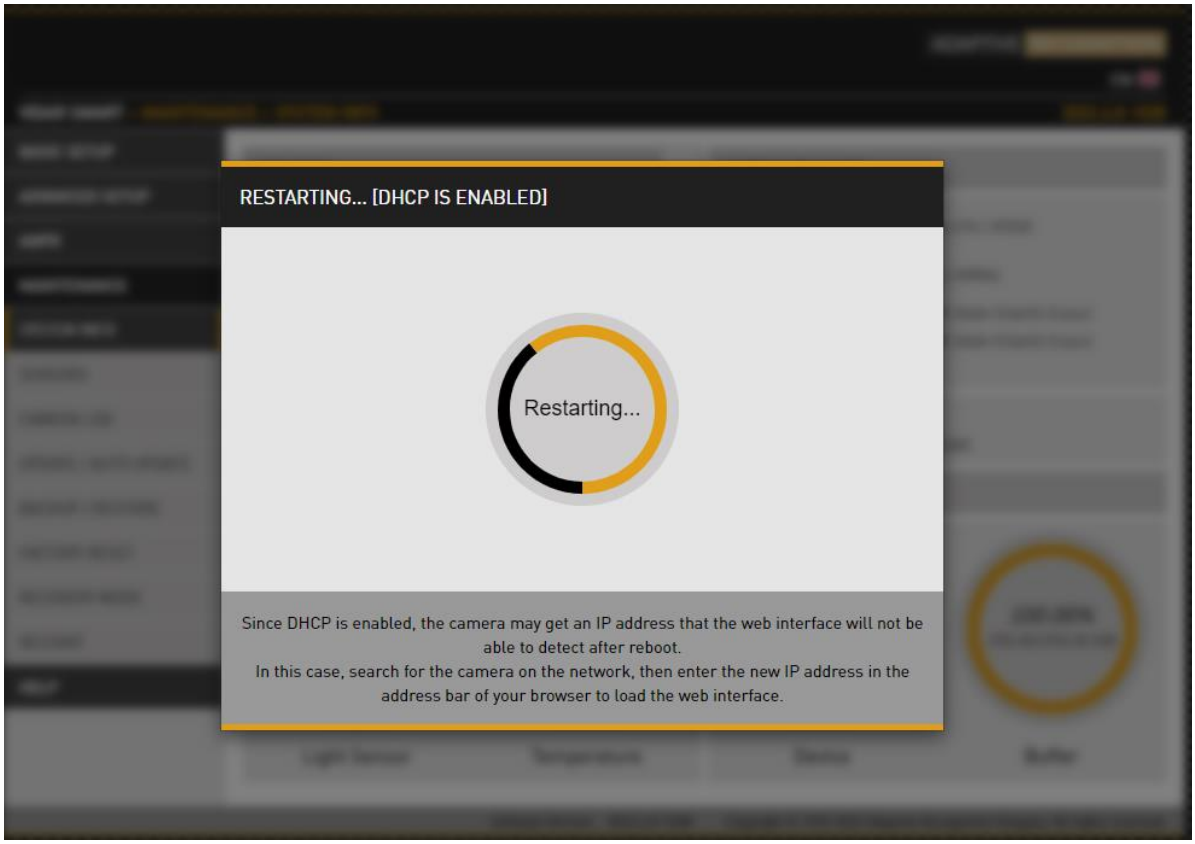

Recovery Mode
INFORMATION
RECOVERY MODE
MAC: 00-1D-4D-00-00-FE
IP: 192.0.2.3 / 255.255.255.0
NORMAL MODE
MAC: 00:1D:4D:11:77:A9
DHCP: Off
IPv4: 192.0.2.152
IPv4 (2):
IPv6: /
BACK
Copyright © 1993-2017 ARH Inc. All rights reserved.

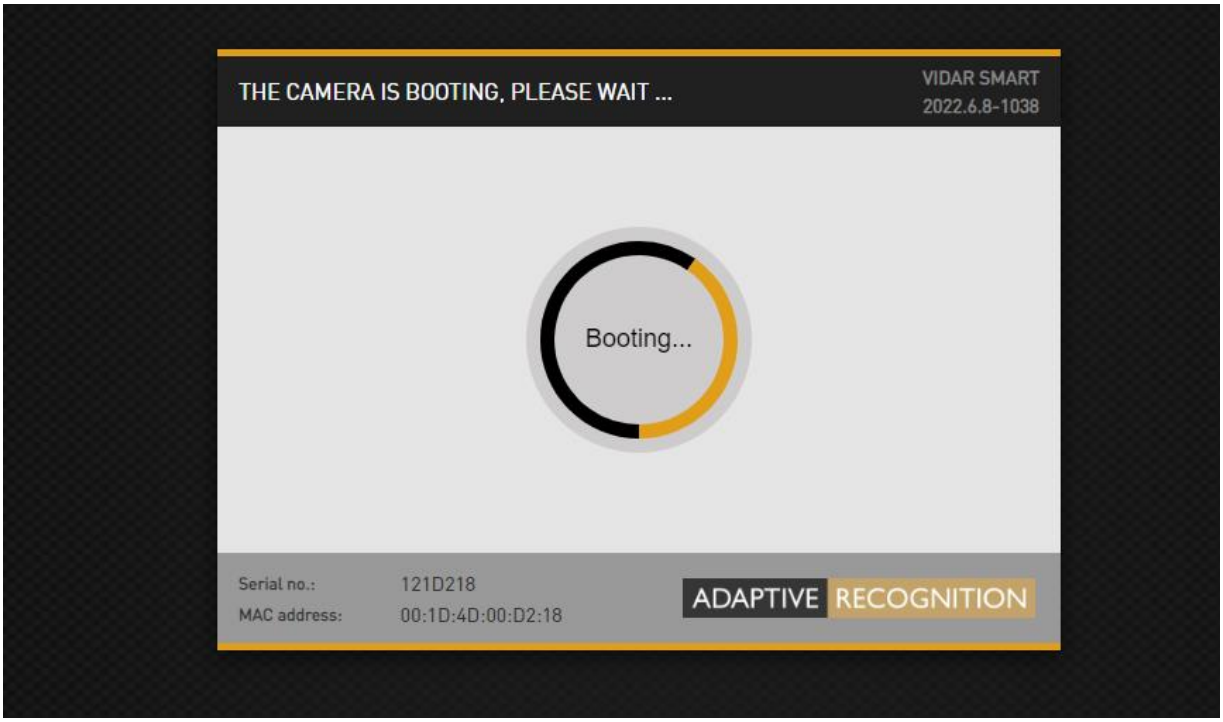

Recovery Mode
NETWORK SETTINGS
NETWORK
SAVE
DHCP:
IPv4:
192.0.2.152
IPv4 subnet:
255.255.255.0
IPv4 (2):
IPv4 (2) subnet:
Gateway:
BACK
Copyright © 1993-2017 ARH Inc. All rights reserved.


Recovery Mode
FIRMWARE & RESET
USER/PASSWORD RESET
RESET
FULL FACTORY RESET
RESET
Reset of the firmware and all settings to the factory defaults. All settings will be lost, as if the factory status of the camera would be restored.
FIRMWARE UPDATE
UPLOAD
No File Selected
Browse
BACK
Copyright © 1993-2017 ARH Inc. All rights reserved.

8.8. RESTART

WEB INTERFACE > MAINTENANCE > RESTART





These menu entries restart the camera in normal or in recovery mode. If the web interface is not functional (for example due to a lost IP), Recovery Mode may also be entered applying the magnetic reset procedure.

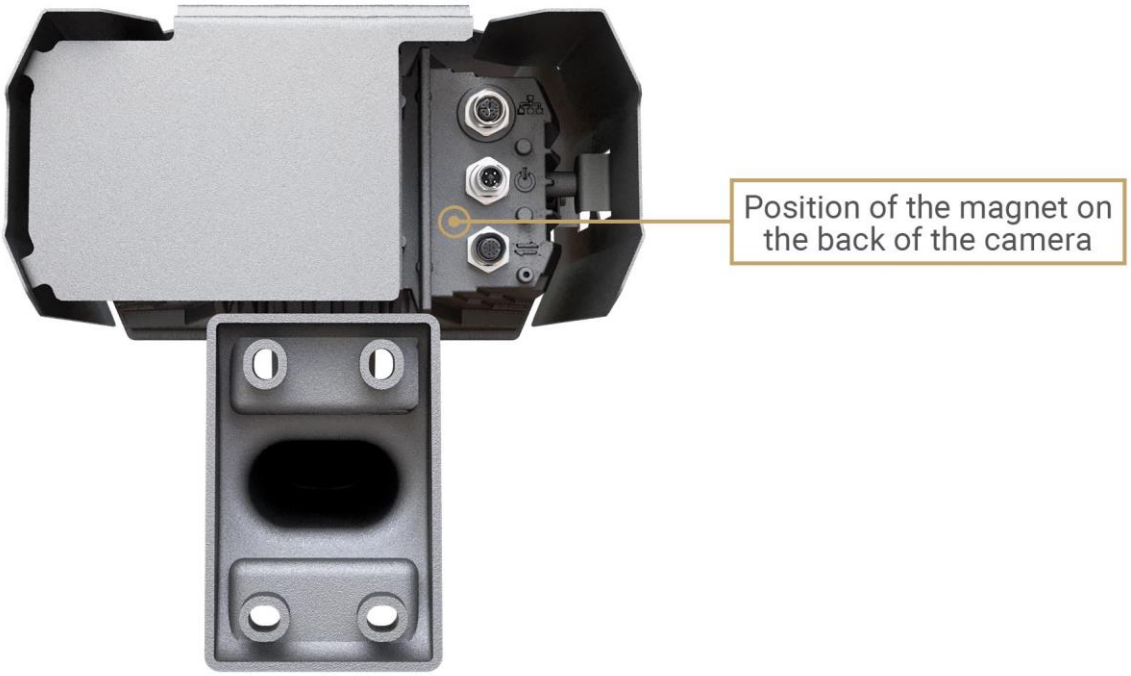
Entering Recovery mode to Vidar camera:

Starting of the Recovery mode can be implemented by magnetization in the following way:

By magnetization:

1. Power off the camera.
2. Touch a magnet (not included) to the back of the camera and hold it in position. See figures below.
3. Power on the camera and wait 5 seconds. If the magnet is in proper position, the green indicator led on the front of the camera will start flashing very fast.
4. Remove the magnet.
5. Reach the camera via its default (192.0.2.3) IP address.

Position of the magnet on the back of the camera (under the shield)



The recommended strength of the magnet is 1210 mT (millitesla).

8.9. COMPLIANCES

CE Certificates:

The AR FreewayCAM4 ANPR digital camera (VIDAR) family complies with the European CE requirements specified in the EMC Directive 2014/30/EU.
The ANPR cameras conform to the following Product Specifications:
Emission and Immunity:
EN 55032:2015, EN 55024:2010+A1:2015

Declaration of RoHS Compliance for Electrical and Electronic Products:

Adaptive Recognition Hungary ("the Company") hereby declares that the VIDAR ANPR camera family placed on the European Community market by the Company after 1st July 2006 are compliant with EC Directive 2002/95/EC on the Restrict of Certain Hazardous Substances in Electrical and Electronic Equipment (commonly known as the EU RoHS Directive.)
Compliance with RoHS means that where the product falls under the scope of the EU RoHS Directive, the product does not contain the following substances:
- Mercury (Hg) 0.1%
- Lead (Pb) 0.1%
- Cadmium (Cd) 0.01%
- Hexavalent Chromium (Cr+6) 0.1%
- Polybrominated Biphenyls (PBB) 0.1%
- Polybrominated Diphenyl Ethers (PBDE) 0.1%

above the indicated maximum concentration values by weight in homogeneous materials unless the substance is subject to an exemption specified in the Directive or in subsequent Commission Decisions.
This declaration represents the Company's best knowledge, which is partially based on information provided by third party suppliers.

Laser safety compliance:

All models of VIDAR ANPR camera which are equipped with a measuring laser module are Class 1 laser products according to the IEC 60825-1:2014 standard.

Federal Communications Commission

The FCC declaration of conformity
47 CFR PART 15 SUBPART B
VIDAR

FCC statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

This device may not cause harmful interference, and

This device must accept any interference received, including interference that may cause undesired operation.

Note: 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.

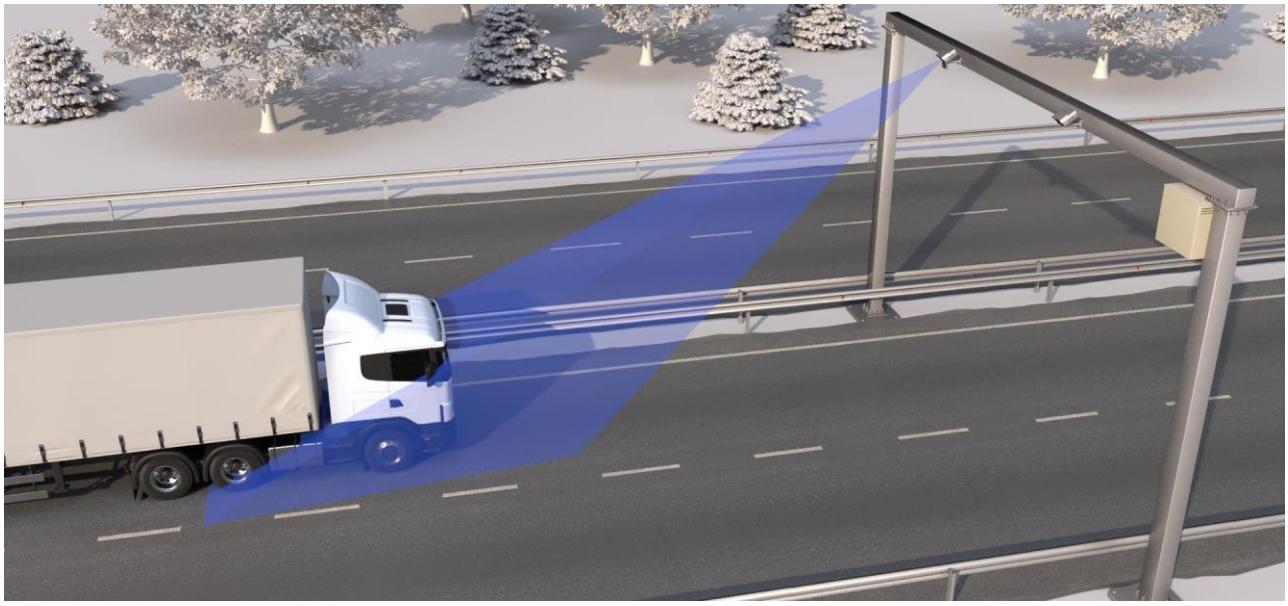
Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment.

Warning: Where shielded interface cables or accessories have been provided with the product or specified additional components or accessories elsewhere defined to be used with the installation of the product, they must be used in order to ensure compliance with FCC. Changes or modifications to product not expressly approved by Adaptive Recognition Hungary could void your right to use or operate your product by the FCC.

9. HOW TO SETUP YOUR VIDAR CAMERA TO GET THE MOST ANPR EVENTS

A good installation site is the basis of reliable operation. This guide is going through step-by-step all crucial point of the menu to help to the user to setup Vidar camera properly for the first time. Parameters setting by hand via web interface of the camera.
The first part of the document contains the general setting parameters, and the second part presents the steps for a specific installation.
For more information, check Vidar Installation Guide!

9.1. RECOMMENDED CAMERA POSITION



A good ANPR engine can read the plates from images taken in various conditions. However, if you want to achieve over 95% recognition rate with short recognition times, you have to calculate the position of the camera accurately. The best position is if the camera is installed on a gentry above the traffic lane (see below).

The distance between the camera and plate is also important. If the camera is too far from the plate, the characters may not be large enough for recognizing them. In this case, zoom-in until you reach the proper size. If the distance is too short it may happen that a part of the plate is over the camera's field of view (when the vehicle is near to the side of the lane or the plate is not at the middle of the vehicle).
From the point of ANPR/LPR the most important is the size of the characters on the image. For Latin characters it is recommended to have **at least 16 pixels** average **character height**, for Arabic or other special characters it is recommended to have 20 pixels height (due to they are more calligraphic than the Latin characters). The too large characters are also not suitable for ANPR, therefore try to avoid settings where the character size is greater than 50 pixels in height. A **line width** of a character on the image should be **at least 2 pixels**.

9.2. SOFTWARE REQUIREMENTS

The cameras are developed to operate without any kind of special software.

Software requirements:

- For network setup, administrator (root) privileges are necessary.
- Web browser: Mozilla Firefox 52, Microsoft Edge, Google Chrome 51.X.X.X or later editions. If it is possible, update your browser (Firefox or Chrome) to the newest available version.

9.3. ACCESSING THE CAMERA

Steps of accessing the web interface of the camera from a browser:

1. Connect the camera to a computer or network switch, then power on the camera. After it is turned on, both status LEDs (red and green on the camera front) are turned on while the camera is booting. After finished, the green status LED flashes two times while the red one turns off signaling that the camera is ready for operation.
2. Enter an alternate IP address (or set your computer's IP) in the 192.0.2.x subnet – where x is an integer number between 1 and 254 except 3 – with the subnet mask of 255.255.255.0.
3. For more information, see Appendix.

4. Use the ping command to test the communication with the camera:

Windows: C: \>ping -t 192.0.2.3
Linux: username@mylinux:~$ ping 192.0.2.3

5. Soon, the ping package returns: Reply from 192.0.2.3. If not:
   - first check the Ethernet LEDs at the PC or the switch side
   - check whether the IP address is set correctly; the own IP address of the PC can be pinged.
   - proxy is set in the browser or the browser is not set to offline.

If these obstacles are checked and there is still no reply, power off then on and enter the previous ping command again.

6. Start a browser then enter the default IP address of the camera into the address bar (http://192.0.2.3). After this, the camera starts with administrator privileges, ready to be set up and configured.

10. USE CASE

For a precise measurement the installation geometry must be determined precisely. Here it is a good example for a proper camera installation example:

Lane	1
Direction	Front
Height	5m
Pan	0°
Tilt	37°
Camera configuration	VIDAR US 2xFHD, ANPR, Laser, IR, Radar

The proper camera settings are the following:

1. Users:

WEB INTERFACE > BASIC SETUP > USERS

First of all, set User Authentication. By default, this function is turned off, but if you tick in the checkbox, it will be turned on.
When finished editing user settings, click on Validate button and the camera will restart.

> **Note**
>
> When this function is off, Administrator privileges are granted to other users as well, and does not ask for a password to log in.

2. Date and Time:

WEB INTERFACE > BASIC SETUP > DATE AND TIME

Current date and time and timekeeping settings are managed in this page.
Set the Time zone first from the drop-down list. For manual time adjustment, either enter date and time in the corresponding fields, or click on **Get Client Time** button to adjust the internal clock of the camera to the PC.

Continuous synchronization is based on NTP (Network Time Protocol). The following settings are available with NTP client:

- **Off**: no NTP synchronization
- **Regular NTP client**: Regular NTP synchronization, according to the NTP standard. This is compatible with all NTP servers and network configurations. Use your local server address. Approx. one second accuracy is guaranteed only.

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3. Network:

WEB INTERFACE > BASIC SETUP > NETWORK

Set the name of your device in the **Hostname** field (default is ARHInc.). Add textual description of the device in the **Title of this site** (default is Adaptive Recognition).
Tick in **DHCP** mode to set your IP address, Netmask, Gateway and DNS (default is off).
Also tick in **RTP** (Real-Time Transport Protocol).

4. Stream Settings:

WEB INTERFACE > ADVANCED SETUP > STREAM SETTINGS

The primary and secondary imaging pipelines are configured at the **Stream Settings** section.
Choose from the scroll-down menu **for Sensor1** and **Sensor2** (both are Source#1 as a primary pipeline) **2048x1536 @ 25 frame/s** resolution.

The output of the primary pipeline can be directed into a stream, which is a video feed streamed on a HTTP port. You can add a stream clicking on the + icon at an available (empty) slot. In this case, at the **Add/Remove Stream** section, add these:

- STREAM1, JPEG SENSOR1
- STREAM2, JPEG SENSOR2
- STREAM3, H264 SENSOR1

5. Event Manager:

WEB INTERFACE > ADVANCED SETUP > EVENT MANAGER

You can add and remove trigger sources in this menu. The primary source is Sensor 1 #1. From the **Trigger Selector** section, choose **Laser Trigger** module, to use the built-in laser-based distance measuring unit for detecting passing vehicle in the lane which the camera is directed to.

6. ANPR Settings:

WEB INTERFACE > ANPR > ANPR SETTINGS

Tick in the first **ANPR** stage and use only one.
At **Primary Source** choose **Full frame** for **Preselection** and **ANPR stage** as well. Both **Create LP image** and **Create image strip** has to ticked in.
At **Secondary source** set **Function** to **Overview**. In the **Filters** section the proper settings are:

- **Event filter**: Return all events
- **ADR recognition:** Disabled
- **Duplicate timeout:** 10 sec

7. Live view:

WEB INTERFACE > BASIC SETUP > LIVE VIEW

Proper settings of the camera stream.

Mode tab:

- **Brightness Control:** Outdoor [AUTO]
- **Adaptive Target:** Do not tick
- **Target Brightness:** -20
- **Environment:** City
- **Region of Interest:** Full Frame

Image tab:

- **Brightness:** 0.00
- **Contrast:** 0.00
- **Saturation:** 0.00

Color tab:

- **Color Mode:** Automatic
- **Color Correction:** Tick in

Optics:

- **Zoom:** 1
- **Focus:** 210 (adjustable if it is not enough sharp)

Flash:

- **Filter:** Automatic
- **Flash Intensity (Day):** 0
- **Parity Flashing (Day):** OFF (Capture retroreflective numberplates only)
- **Flash Intensity (Night):** 20
- **Parity Flashing (Night):** OFF

Advanced:

- **Low Light Mode (Day):** None
- **Low Light Mode (Night):** Low
- **Gama:** 1.5 (It could be up to 1.8 or at extreme low light situation 2.2)
- **JPEG Quality:** 75 (Default is 80)
- **White Level:** 1.0
- **Black Level:** 0.00 (Default is 0.02)

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8. Private Zones:

WEB INTERFACE > ADVANCED SETUP > PRIVATE ZONES

In certain circumstances it may be necessary to cover a part of the image. In this case, it is **not necessary**.

9. Engine Manager:

WEB INTERFACE > ANPR > ENGINE MANAGER

This tool allows for managing the Carmen ANPR engines and Hardware Key Licenses used in the system.
Currently used engines are listed in the **Selected Engines** tab.

- **Preselection engine:** latin_vq (Use a proper engine for your country with _vq extension)
- **ANPR engine:** latest:eur (Use a proper engine for your country)

Engine Properties tab:

- **timeout:** 1000 ms
- **contrast_min:** 8 (Use higher value up to 32 at a good lighting condition)
- **size_min:** 16 pixels
- **size_max:** 32 pixels (Try to use a minimal range ~ 20)

10. Result Upload:

WEB INTERFACE > ANPR > RESULT UPLOAD

Results can be uploaded using the HTTP, FTP or SFTP and HTTPS protocol.

- **Globessey Data Server:** Tick in
- **Host:** IP address or hostname
- **Port:** 8889
- **Table name:** multi_event (Use proper table name as at your server DB table)
- **Path:** gate
- **Username:** primula (Default is primula)
- **Device ID:** Perbal_01_L1_front

11. Title Editor:

WEB INTERFACE > ANPR > TITLE EDITOR

Subtitles added to the image are configured here.

- **Line Editor:** $y-$o-$d $h:$m:$s LP: $p (Use **Line editor** for a proper labelling)

12. Black-, Whitelist:

WEB INTERFACE > ANPR > BLACK-, WHITELISTS

- **Black-, Whitelist:** Tick in (You have to tick it)
- **Rules:** Default (No filter)

Programmer's Guide

11. GENERAL API SPECIFICATION

Every operation on the VIDAR camera is done by setting and getting parameters. Camera functions are implemented by modules, modules are grouped in module groups. Camera parameters are organized in named sections within modules. Parameters are set and get by HTTP queries in the manner detailed in this chapter

11.1. SECTIONS

Querying available parameter sections:

GET:
http://[camera_ip]/[modulegroup]/[modulename]?getsections&wfilter=X
ANSWER:

```
mimetype=text/plain\r\n
sections=default,sectionname1_sectionvalue1,sectionname2_sectionvalue2,..
.\r\n
```

11.2. PARAMETERS

Query of the parameter values:

GET:
http://[camera_ip]/[modulegroup]/[modulename]?get[parameter1_name]&get[parameter2_name]&...&[sectionname]=[sectionvalue]&wfilter=X
ANSWER:

```
...
parameter1_name=parameter1_value\r\n
parameter2_name=parameter2_value\r\n
...
```

Note

- If there is no section, the default section is applied
- One or even more parameters can be queried (if these belongs to one section)

Querying values of all parameters of the default section:

GET:
http://[camera_ip]/[modulegroup]/[modulename]?getall&wfilter=X

ANSWER:

```
mimetype=text/plain\r\n
sections=default\r\n
parametername1=parametervalue1\r\n
parametername2=parametervalue2\r\n
...
```

Querying values of all parameters of the given section:

GET:
http://[camera_ip]/[modulegroup]/[modulename]?getall&[sectionname]=[sectionvalue]&wfilter=X

ANSWER:

```
mimetype=text/plain\r\n
parametername1=parametervalue1\r\n
parametername2=parametervalue2\r\n
...
```

Note

- Only one section can be queried at a time.

Setting parameter values:

GET:
http://[camera_ip]/[modulegroup]/[modulename]?[parametername1]=[parametervalue1]&[parametername1]=[parametervalue1]&...&[sectionname]= [sectionvalue]&wfilter=X

ANSWER:

```
mimetype=text/plain\r\n
ecode=0\r\n
```

ANSWER:

```
mimetype=text/plain\r\n
ecode=-22\r\n
eparams=parametername1,parametername1\r\n
```


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Note

- Add &save to the end of the query to have the parameters saved and thus made permanent, otherwise the changes will be lost upon restarting the camera
- If section is not defined, the default section will be modified
- More parameters (in the same section) can be get/set
- In the answer the following fields will be present:
    - If no error occurred:
      ecode = 0
    - If error occurred:
      ecode= Standard Error Code
      eparams=parametername1,parametername2,...

11.3. PARAMETER ATTRIBUTES

Query of parameter attributes:

GET:
http://[camera_ip]/[modulegroup]/[modulename]?query[parametername1]&query[parametername2]&...&[sectionname]=[sectionvalue]&wfilter=X

Note

- If there is no section defined, the default section is applied
- More parameters (of the same section) can be queried

http://camera_ip/modulegroup/modulename?queryall[&sectionname=sectionvalue]&wfilter=X

Note

- If there is no section defined, the default section is applied

ANSWER:

```
•    B - bound: B[parametername]=mininum,maximum,default,step
•    L - list: L[parametername]=value1,value2,value3,.. (where value1 is
the default value)
•    T - type
```

EXAMPLE

GET:
http://camera_ip/capture/scapture?queryshutter&wfilter=X

EXAMPLE – ANSWER:

```
...
Bshutter=25,33000,1000,0.001\r\n
Tshutter=rw,f,us\r\n
...
```

The bound answer:

bound[parameter_name]=mininum,maximum,default,step

- **minimum** value of the specified property (integer or floating-point number)
- **maximum** value of the specified property (integer or floating-point number)
- **default** (or recommended) value
- the amount of the steps to be set / advisable to set (helpful for programming)

Note

- Some/all of the fields minimum, maximum, default and step may be missing. This means the corresponding value is undefined.

Example for the bound:

- boundshutter=20,10000,1000,1

The value of the shutter can be set between 20 and 10000 in steps of 1, the recommended value is 1000.

- boundshutter=20,10000, ,1

The value of the shutter can be set between 20 and 10000 in steps of 1, there is no recommended value.

- boundshutter=20,10000,1000

The value of the shutter can be set between 20 and 10000, the recommended value is 1000. There are no steps, so in case of integer it is advisable to step one by one.

- boundshutter=20,10000

The value of the shutter can be set between 20 and 10000. There are no recommended value and steps.

The list answer:

L[parameter_name]=value1,value2,value3,.. (where value1 is the default value)

- Possible values in the list (the recommended value should be the first). The values can be integers or floating-point number and strings.

L[parameter_name]=$

- The value of the property is not examined (e.g.: username). Return of property, where neither the bound nor the list can be used.

Example for the list:

- Lifps=22.5,11.25

The set FPS value can be 22.5 and 11.25.
The recommended value is 22.5 (the first).

- Lifps=30,10,20,25,45,50,60

The settable FPS values: may be 10,20,25,30,45,50 and 60.
The recommended value is 30 (the first).

- Lcapture=prev,next,best,local

The prev, next, best or local values can be specified for the capture parameter.

- Lpassword=$

The password parameter can be whatever string (no listing).

The type answer:

T[parameter_name]=access,type,unit,reboot

- access: the mode of the access
  - r: read only
  - w: write only
  - rw: read-write
- type: type of the parameter
  - i8, i16, i32, i64: signed integer 8, 16, 32 and 64 bit type (default value: 32)
  - u8, u16, u32, u64: unsigned integer 8, 16, 32 and 64 bit type (default value: 32, only u is defined)
  - f32, f64: floating-point number (default value: 32, only f is defined)
  - s[number of the characters]: string type with specified character number (if it is not specified, the default will be 32). In case of 0 there are minimum and maximum, which is written in the bound.
  - With all these types a square bracket may be present, which means that an array should be used (e.g.: the i16[4] means 4 x 16-bit integer numbers).
- unit: unit of measurement (optional) - arbitrary string
- reboot: should the system be rebooted after rewriting the parameter

- not specified: no need to restart
- q: quick module restart (see Restart)
- f: complete reboot (see Restart)

Example for the type:

- Tshutter=rw,f,us

The shutter is readable and writable, floating-point type and its unit is microseconds. No restart is needed after rewriting the parameter, because it will be entered immediately.

- Timgshutter=r,f,us

The imgshutter is a read only, floating-point type property and its unit is microseconds.

- Tusername=rw,s32,,f

The username is a readable and writable string type containing 32 characters. It does not have measurement, but the system has to be restarted in case of switching.

11.4. ANSWER DOCUMENT

A HTTP query must be assembled according to the previous chapters. By default, the answer is a multipart document, consisting of a binary and a text part (e.g. an image in the binary and its parameters, like shutter gain, etc. in the textual part). A special parameter 'wfilter' may be used to control this behaviour:

- wfilter=1 only the text part,
- wfilter=2 only the binary part,
- wfilter=3 both parts will be returned by the camera.

The HTTP header gives information about parsing the message. The 'mimetype' field determines the type of the data in the answer.

- mimetype=application/octet-stream: general data
- mimetype=text/plain: standard text type (e.g. parameters)
- mimetype=image/jpeg: JPEG image

```
Parameters are always sent in text/plain format, row by row as
[name]=[value] pairs. Rows are terminated by '\r\n'. For example:
      contrast=1\r\n
      shutter=1000\r\n
      gain=4\r\n
```

Parts in the multipart message are separated by a boundary string, for example:

--------------------------732765942131086840206891966l

After the separator the length and the type of the part will be written:

--------------------------732765942131086840206891966l
Content-Length: 93123
Content-Type: image/jpeg

The boundary will be written at the beginning of the answer, between the parts and at the end of the answer.

11.5. ANSWER ERROR CODES

API calls return with the requested document or with an ecode of 0 in case of success. In case of an error, it may return any POSIX error code (we call external programs, e.g., zip, or hardware components, and libraries, e.g., cURL, SQLite, which can return arbitrary error codes). The most commonly occurring error codes that we directly return include:

Value	Code	Description	Explanation
22	EINVAL	Invalid argument	The most common error code; we return this if the call is invalid (e.g., missing required parameters, etc.).
2	ENOENT	No such file or directory	The record or file we are referring to does not exist.
13	EACCES	Permission denied	Permission problem for the given call.
12	ENOMEM	Out of memory	No memory can be allocated by a function in the library.
110	ETIMEDOUT	Connection timed out	The operation could not be completed within the prescribed time, for example, in communication between the two panels.
61	ENODATA	No data available	We did not receive the expected data, for example, from the first panel.
34	ERANGE	Math result not representable	The parameter values do not fall within the expected range (do not fully match the original description).
5	EIO	Input/output error	In case of any error during communication on the hardware interface.

11.6. USER AUTHENTICATION

Two possible methods are available for user authentication:

- The user is required to request a cookie which can be used throughout all the subsequent requests (the camera will send the required cookie as a response which will allow the user to send further requests via the camera's API without signing in once again) - this can be set by the user through the below HTTP request. This is a thoroughly safe approach, since the user is sending the User/PW combination once:

http://camera-ip/login.html?p_send=1&p_username=USERNAME&p_passw=PASSWORD

- Alternatively, the user can enter the Username/Password combination at the end of every API request. No cookie is involved in this method - every request has to have the following suffix at the end - '&p_urllogin=1&p_username=USER&p_passw=PASSWORD'
  For example:

http://camera-ip/scapture?capture=last&p_urllogin=1&p_username=USER&p_passw=PASSWORD

12. MODULES

12.1. USERS

Module: setup/users
Manual: 5.3

Only administrators have access to this module.

Users are described by the following parameters:

- user id (uid)
- user name (uname)
- full name (ufull)
- access level (ulevel)
- password (passw1,passw2)

Get/Set access level of users without credentials

Parameter: guestlevel
Possible values: 0: Guest, 1: Viewer, 2: Normal, 3: Power, 4: Administrator

Example:
http://camera_ip/setup/users?wfilter=X&getall

Getting the list of users

Example:
http://camera_ip/setup/users?wfilter=X&getall

In the response for 'getall' we get the 'guestlevel' and lists of the user parameters as comma-separated values. Parameter values with the same position/index in the lists belong to the same user. Passwords cannot be obtained.

Response example:

```
guestlevel=0
useridlist=1001,1002
nicknamelist=user00,user01
fullnamelist=,
userlevellist=2,4
```

Add new user

To add a new user 'uid' must be set to 'new'. 'passw1' and 'passw2' must match.
http://camera_ip/setup/users?wfilter=X&getall&uid=new&uname=user00&ufull=&ulevel=2&passw1=x&passw2=x

Modify the parameters of a user

To modify the parameters of a user the corresponding 'uid' must be given with the modified parameters. 'passw1' and 'passw2' parameters can be omitted if we don't want to change the password.
http://camera_ip/setup/users?wfilter=X&getall&uid=1001&uname=user007&ufull=&ulevel=2&passw1=y&passw2=y

Delete user

To delete a user the user id ('uid') and the 'delete' parameter must be given.
http://camera_ip/setup/users?wfilter=X&getall&uid=1001&delete

12.2. IMAGE RESOLUTION

Module: capture/scapture
Manual: 6.1

Get maximum and set resolutions

GET:
http://camera_ip/capture/scapture?getall&wfilter=X[&source=X]

ANSWER:

```
...
imgcapxsize=1280\r\n (maximum)
imgcapysize=960\r\n ...
imgxsize=640\r\n (current)
imgysize=480\r\n
...
```

Note

- The source # 1 is the default (primary image source) if there is no source parameter.
- In this property list, each value is listed twice: with and without the 'img' prefix. The parameter value with the 'img' prefix represents the value of the parameter at the time the image was captured, while the one without it represents the actual value.
- In case of two optical systems, each sensor can be controlled separately with the following optional parameter: & sensor = 1 or 2. If this parameter is not specified, the parameters for the main sensor are controlled.

12.3. SIMPLE RETRIEVAL OF AN IMAGE

Module: capture/scapture
Manual: 6.1

Capture an image

GET:
http://camera_ip/capture/scapture?wfilter=0[&source=X]
http://camera_ip/capture/scapture?capture=best&framemonotimems=98741855&wfilter=0[&source=X
http://camera_ip/capture/scapture?capture=best&frameindex=8390&wfilter=0[&source=X]
http://camera_ip/capture/scapture?sensor=2

Note

- The source # 1 is the default if there are no source parameters (primary image source).
- See also #4.Image/Image Parameter Queries
- In case of two optical systems, each sensor can be controlled separately with the following optional parameter: & sensor = 1 or 2. If this parameter is not specified, the parameters for the main sensor are controlled.

12.4. IMAGE/IMAGE PARAMETER QUERIES

Module: capture/scapture
Manual: 6.1

Get all image parameters

GET:
http://camera_ip/capture/scapture?getall&wfilter=X[&source=X]
http://camera_ip/capture/scapture?queryall&wfilter=X&source=X]
http://camera_ip/capture/scapture?getall&wfilter=X&capture=next[&source=X]

Note

- The source # 1 is the default (primary image source) if there are no source parameters.
- In this property list, each value is listed twice: with and without the 'img' prefix. The parameter value with the 'img' prefix represents the value of the parameter at the time the image was captured, while the one without it represents the actual value.
- In case of two optical systems, each sensor can be controlled separately with the following optional parameter: & sensor = 1 or 2. If this parameter is not specified, the parameters for the main sensor are controlled.

The scapture module returns three parameters for every captured frame: imgframeindex, imgframetimems and imgframemonotimems.

imgframeindex: After camera startup, captured frames are counted. This parameter provides the number of the frame.
imgframetimems: Time elapsed since 1st of January 1970 until the capturing of the frame in milliseconds.
imgframemonotimems: Time elapsed since camera startup until the capturing of the frame in milliseconds.

The above parameters can be used to determine the time of capturing when getting frames/parameters from the scapture module.

Querying the image buffer

capture=last
The camera returns the last captured image/parameter.
GET:
http://camera_ip/capture/scapture?capture=last&wfilter=X

capture=next
It returns the frame/frame's parameter that follows the last returned (queried) one. If this frame is not in the buffer anymore, (too much time has elapsed and it has been rewritten by newer images), it returns the oldest image from the buffer.
The **capture=next** can be used by itself or together with the framemonotimems, imgframetimems and frameindex parameters: In these cases, frames, following the specified number/timestamp are returned (if they are still in the buffer):

GET:
http://camera_ip/capture/scapture?capture=next&framemonotimems=98741855&wfilter=X
http://camera_ip/capture/scapture?capture=next&frameindex=8390&wfilter=X

capture=best
It returns the frame/frame's parameter that is closest (before or after) to the specified timestamp or frame index. If the buffer does not contain such a frame, the oldest one is returned. If the specified timestamp (framemonotimems, imgframetimems) or frameindex value is too high (refers to a yet non-existing frame) then the newest frame from the buffer is returned.

GET:
http://camera_ip/capture/scapture?capture=best&framemonotimems=106964188&wfilter=X
http://camera_ip/capture/scapture?capture=best&frameindex=193390&wfilter=X

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Note

- Use 'wfilter' to get either or both the image and its parameters.

SET:
http://camera_ip/capture/scapture?parametername1=parametervalue1&parametername2=parametervalue2&...&wfilter=X[&source=X]

SAVE:
http://camera_ip/setup/profiles?save_imgparams&wfilter=1[&c_source=X]

12.5. FREQUENTLY USED IMAGE PARAMETERS

Module: capture/scapture
Manual: 6.1

Get image parameters

GET:
http://camera_ip/capture/scapture?getall&wfilter=X[&source=X]

ANSWER:

```
...
imggamma=1.700\r\n
gamma=1.700\r\n
...
```

SET:
http://camera_ip/capture/scapture?gamma=1.0&brightness=0.0&contrast=0.0&jpegquality=75&blacklevel=0.0 &whitelevel=1.0&whitebalance=0.0,0.0,0.0&saturation=0.0&wfilter=1[&source=X]

SAVE:
http://camera_ip/setup/profiles?save_imgparams&wfilter=X[&c_source=1]

12.6. CAPTURE PARAMETERS

Module: capture/scapture
Manual: 6.1

Get and set capture parameters (shutter, gain, etc.)
GET:
http://camera_ip/capture/scapture?getall&source=1&wfilter=X

ANSWER:

```
...
imggain=2.000\r\n
imgshutter=4000.000\r\n
imgllm=3\r\n
...
gain=2.000\r\n
shutter=4000.000\r\n
llm=3\r\n
...
```

SET:
http://camera_ip/capture/scapture?gain=2.5&shutter=2000&wfilter=X

SAVE:
http://camera_ip/setup/profiles?save_imgparams&wfilter=X

12.7. AUTO BRIGHTNESS CONTROL

Module: control/brightnesscontrol
Manual: 6.3

Get/Set Brightness Control Properties

GET:
http://camera_ip/control/brightnesscontrol?getall&wfilter=1
http://camera_ip/control/brightnesscontrol?queryall&wfilter=1
SET:
1. sensor settings:
http://camera_ip/control/brightnesscontrol?enable_0=1&save&wfilter=1
http://camera_ip/control/brightnesscontrol?target_0=-20&save&wfilter=1

2. sensor settings:
http://camera_ip/control/brightnesscontrol?enable_1=0&save&wfilter=1
http://camera_ip/control/brightnesscontrol?target_1=10&save&wfilter=1

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GET/SET Brightness control ROI (Region of Interest)

http://camera.ip/capture/scapture?wfilter=1&sensor=1&source=1&histowinpc=50,50,100,100

The first two values are the coordinates of the upper left corner of the square, the second two values are the coordinates of the lower right corner of the square as a percentage (x1, y1, x2, y2). The position of the origin increases in the upper left corner of the image, with the y axis going down.

12.8. AUTO FOCUS

Module: control/focuscontrol
Manual: 6.5

Get autofocus state and properties

GET:
http://camera_ip/control/focuscontrol?getall&wfilter=1

ANSWER:

```
...
mode=0\r\n
roi=0,0,1280,960\r\n
...
```

SET:
http://camera_ip/control/focuscontrol?roi=0,0,100,200&save&wfilter=1
http://camera_ip/control/focuscontrol?mode=1&wfilter=1

Note

- during focusing mode will equal 1, when the focusing is done resets to 0
- roi: operation area of the autofocus; x1, y1, x2, y2, where x1, y1 the upper left corner of the rectangle and x2, y2 the lower right corner of the rectangle

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12.9. AUTO COLOR COMPENSATION

Module: control/colcorr
Manual: 6.2.2

Get color correction state and properties
GET:
http://camera_ip/control/colcorr?getall&wfilter=1[&sensor=X]

ANSWER:
...
`mode=0\r\n`
...

SET: http://camera_ip/control/colcorr?mode=1&save&wfilter=1[&sensor=X]

where
X=1, sensor 1
X=2, sensor 2

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12.10. OPTICS CONTROL

Module: hwlayer/extopt, control/focuscontrol
Manual: 6.5

Operate motorized optics (zoom, focus, iris, filter exchanger)
GET:
http://camera_ip/hwlayer/extopt?getall&wfilter=1

ANSWER:

```
...
focus_pc=56\r\n
zoom_pc=28\r\n
iris_pc=100\r\n
zfcomovement=1\r\n
filter=0\r\n
...
```

Note

In the case of two optical systems, each optic can be controlled separately with the following optional parameter: & ix = 0 or 1. If this parameter is not specified, the parameters of the optics belongs to the main sensor are controlled.

Add zoom/focus presets
GET:
http://camera_ip/control/focuscontrol?getall&wfilter=1

ANSWER:

```
...
zfc_mode=0\r\n
zfc_pairs=564,327;1120,213;\r\n
...
```

SET:
http://camera_ip/hwlayer/extopt?zoom_pc=10&focus_pc=20&iris_pc=30&zfcomovement=0&filter=1&save&wfilter=1
http://camera_ip/control/focuscontrol?zfc_addpair=1120,213&save&wfilter=1
http://camera_ip/control/focuscontrol?zfc_rmpair=1120,213&save&wfilter=1
http://camera_ip/control/focuscontrol?zfc_mode=2&save&wfilter=1

Note

- extopt/zfcomovement (can be 0,1) is equal to focuscontrol/zfc_mode, recommended to use zfc_mode (can be 0,1,2)

12.11. FLASH CONTROL

Module: hwlayer/cperiph, config/ledpc
Manual: 6.7

Get current settings
GET:
http://camera_ip/config/ledpc?getall&wfilter=1
http://camera_ip/hwlayer/cperiph?getall&wfilter=1

ANSWER:
...
```
mimetype=text/plain\r\n
sections=default,panel_0,panel_1,panel_2\r\n
npanels=3\r\n
```
...
http://camera_ip/config/ledpc?getall&panel=0&wfilter=1

Note

- Index of the internal flash index: panel 0; external illuminators: panel 1, 2, ...
  npanels = 3, in this case 2 external illuminators are connected

ANSWER:
...
```
mimetype=text/plain\r\n
led_diff_pc=-1\r\n
led_pcdose=0\r\n
```
...

SET:
http://camera_ip/config/ledpc?led_diff_pc=20&led_pcdose=10&panel=0&save&wfilter=1
http://camera_ip/config/ledpc?led_diff_pc=-1&led_pcdose=0&panel=0&save&wfilter=1

http://camera_ip/hwlayer/cperiph?flashpwr=2&ftime_even=200&panel=0&ledena=1&wfilter=1
http://camera_ip/hwlayer/cperiph?ftime_odd=100&panel=0&fpfena=1&wfilter=1
http://camera_ip/hwlayer/cperiph?ledena=0&fpfena=0&panel=0&save&wfilter=1

Note

- In case of cameras equipped with rolling shutter sensors the camera illumination can be only enabled or disabled. For enabling: led_pcdose=100

12.12. EVENT MANAGER

Module: trigger/eventman
Manual: 7.1.1

Get available trigger sources

GET:
http://camera_ip/trigger/eventman?getsources&wfilter=1

ANSWER:

```
...
mimetype=text/plain\r\n
sources=__motdet[3](Hardware Motion
Detection),trigger/swtrigger[1](Software
Trigger),trigger/uarttrigger[1](UART Trigger),trigger/gpiotrigger[1](GPIO
Trigger),trigger/scheduler[2](Scheduler Trigger), trigger/vvq (Plate
Finder), trigger/radtrigger (Radar Trigger)\r\n
...
```

General syntax

```
sources=groupname/modulename[numberofoutputs](stringname),groupname/modul
ename[numberofoutputs](stringname),...\r\n
```

Get registered trigger sources and input configuration

http://camera_ip/trigger/eventman?getconfig&wfilter=1

ANSWER:

```
...
mimetype=text/plain\r\n
config=trigger/swtrigger/0:A,__motdet/0:B,trigger/uarttrigger/0:C\r\n
...
```

GENERAL SYNTAX:

```
config=
groupname/modulename/outputindex:assignedletter,groupname/modulename/outp
utindex:assignedletter\r\n
```

Get/set formula

http://camera_ip/trigger/eventman?getformula&wfilter=1

ANSWER:

```
...
mimetype=text/plain\r\n
formula=C\r\n
...
```

Get/set state
http://camera_ip/trigger/eventman?getstate&wfilter=1

ANSWER:

```
...
mimetype=text/plain\r\n
state=1\r\n
...
```

SET:
Register
http://camera_ip/trigger/eventman?register=__motdet/0:A&wfilter=1
http://camera_ip/trigger/eventman?register=__motdet/1:B&wfilter=1
http://camera_ip/trigger/eventman?register=trigger/swtrigger/0:C&wfilter=1
http://camera_ip/trigger/eventman?register=trigger/uarttrigger/0:D&wfilter=1
http://camera_ip/trigger/eventman?register=trigger/gpiotrigger/0:E&wfilter=1
http://camera_ip/trigger/eventman?register=trigger/scheduler/0:F&wfilter=1
http://camera_ip/trigger/eventman?register=trigger/scheduler/1:G&wfilter=1

Note

- The digit ID of each trigger source must be unique during the registration (recommended alphabetically, see above). The system will manage it automatically during registration via web interface.

Start module
http://camera_ip/trigger/eventman?formula=B&state=1&save&wfilter=1

Stop module
http://camera_ip/trigger/eventman?state=0&save&wfilter=1

Reset module
http://camera_ip/trigger/eventman?state=2&save&wfilter=1

12.13. MOTION DETECTION TRIGGER

Module: capture/scapture
Manual: 7.1.2

Get/set motion detection parameters
GET:
http://camera_ip/capture/scapture?queryall&wfilter=X
http://camera_ip/capture/scapture?getall&wfilter=X&follow=0&frame=2

ANSWER:
...
```
mdsensitivity=75\r\n
mdspeed=75\r\n
mdreslevel=50\r\n
mdtriglevel=50,50\r\n
```

SET:
http://camera_ip/capture/scapture?mdsensitivity=80&mdspeed=80&mdreslevel=55&mdtriglevel=55,55&wfilter=X&follow=0&frame=0

SAVE:
http://camera_ip/setup/profiles?wfilter=X&save_motdets

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12.14. SOFTWARE TRIGGER

Module: trigger/swtrigger
Manual: 7.1.3

Get/set software trigger properties
GET:
http://camera_ip/trigger/swtrigger?getall&output=0&wfilter=1

ANSWER:
...
```
start_offs=0\r\n
end_offs=0\r\n
```
...

SET:
http://camera_ip/trigger/swtrigger?sendtrigger=1&wfilter=1
http://camera_IP/trigger/swtrigger?start_offs=-100&end_offs=100&save&output=0&wfilter=1

It is possible to attach max. 256 bytes of data to a software trigger (e.g. a trigger ID, device measurement data, etc.):
http://camera_ip/trigger/swtrigger?sendtrigger=1&trigger_data=TRIGGER_0057&wfilter=1

- This piece of data will be inserted in the uploaded data file (See 18. Upload Manager) with parameter name 'triggerdata'.
- In case of ANPR capable devices, trigger data will be available addressing the database column TRIGGER_DATA (See 21. Database contents)

In both cases, trigger data will be encoded with Base64.

12.15. UART TRIGGER

Module: trigger/uarttrigger
Manual: 7.1.6

Get/set UART trigger properties
GET:
http://camera_ip/trigger/uarttrigger?getall&wfilter=1
http://camera_ip/trigger/uarttrigger?getall&output=0&wfilter=1

SET:
http://camera_ip/trigger/uarttrigger?baudrate=9600&bytesize=8&parity=0&stopbits=1&start_token=256&end_token=10&mode=0&save&wfilter=1

http://camera_ip/trigger/uarttrigger?start_offs=0&end_offs=0&mode=0&save&output=0&wfilter=1

Note

- Start_token=256 means: Start on first byte (decimal value)
- Start/End token can be decimal and hexadecimal (in case of hexadecimal the 0x prefix is needed)
- The website returns the values in decimal

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12.16. GPIO TRIGGER

Module: trigger/gpiotrigger
Manual: 7.1.4

Get/set GPIO trigger properties
GET:
http://camera_ip/trigger/gpiotrigger?getall&wfilter=1
http://camera_ip/trigger/gpiotrigger?getall&output=0&wfilter=1
http://camera_ip/trigger/gpiotrigger?getgpin&wfilter=1
http://camera_ip/trigger/gpiotrigger?getgpout&wfilter=1

SET:
http://camera_ip/trigger/gpiotrigger?gpout=1&wfilter=1
http://camera_ip/trigger/gpiotrigger?gpout=0&wfilter=1
http://camera_ip/trigger/gpiotrigger?gpout=0&samplerate=100&reqsamples=10&act_level=1&save&wfilter=1
http://camera_ip/trigger/gpiotrigger?start_offs=0&end_offs=0&mode=0&output=0&save&wfilter=1

12.17. SCHEDULER TRIGGER

Module: trigger/scheduler
Manual: 7.1.5

Get/set scheduler trigger properties
GET:
http://camera_ip/trigger/scheduler?getall&wfilter=1&output=0
http://camera_ip/trigger/scheduler?getall&wfilter=1&output=1

SET:
http://camera_ip/trigger/scheduler?enabled=1&mode=1&wday=mon;tue;wed;thu;fri;sat;sun;&day=every&hour=every&min=0;5;10;30-35;50;&sec=0;5;50-55;&output=0&save&wfilter=1
http://camera_ip/trigger/scheduler?enabled=0&output=0&save&wfilter=1

12.18. PLATE FINDER

Module: trigger/vvq
Manual: 7.1.7

SET: http://camera_ip/trigger/vvq?roi=10,10,80,80&save&wfilter=1
http://camera_ip/trigger/vvq?enabled=0&save&wfilter=1

GET:
http://camera_ip/trigger/vvq?getenabled=0&getroi&wfilter=1

12.19. LASER TRIGGER

Module: trigger/dsttrigger
Manual: 7.1.8

GET:
http://camera_ip/trigger/dsttrigger?getall&wfilter=1
http://camera_ip/trigger/dsttrigger?getall&device=0&wfilter=1
http://camera_ip/trigger/dsttrigger?getT_health&device=0&wfilter=1

12.20. UPLOAD MANAGER (NON-SMART CAMERAS ONLY)

Module: upload/uploadman
Manual: Hiba! A hivatkozási forrás nem található.

Get log of event upload attempts
GET:
http://camera_ip/upload/uploadman?getlog

ANSWER:

```
...
2,15-13/2221093.jpg,0,1,Couldn't resolve host name;0,15-
13/2331476.jpg,0,0,No error;0x00
...
```

GENERAL SYNTAX:

```
protocol,filenametemplate,include,ecode,estring;...;0x00

protocol: [ftp:0, smtp:1, http:2, gxdctrf:3, invalid:4]
content: [image+data: 0, image: 1, data: 2]
ecode: [0: OK, 1: failed, 2: image OK, data failed]
```

Note

- If no log information exists, 1 byte of data will be returned (0x00)
- At the end there will be one 0x00 byte even if there is log information.

Upload data to FTP server

GET:
http://camera_ip/upload/uploadman?getall&wfilter=X

ANSWER:

```
...
sections=default,protocol_smtp,protocol_ftp,protocol_post\r\n
currentprotocol=0\r\n
...
```

http://camera_ip/upload/uploadman?getall&wfilter=X&protocol=ftp
http://camera_ip/upload/uploadman?content=0&currentprotocol=0&host=testserver&username=&password=&filenametemplate=$d-$h/ms$I&protocol=ftp&save&wfilter=X

Upload Data to SMTP Server (e-mail)

GET:
http://camera_ip/upload/uploadman?getall&wfilter=X

ANSWER:

```
...
sections=default,protocol_smtp,protocol_ftp,protocol_post\r\n
currentprotocol=0\r\n
...
```

http://camera_ip/upload/uploadman?getall&wfilter=X&protocol=smtp
http://camera_ip/upload/uploadman?content=0&currentprotocol=1&host=testserver&username=&password=&from=&to=user1@testserver;user2@testserver&filenametemplate=$d-$h/ms$I&protocol=smtp&save&wfilter=X

Upload Data to HTTP Server

GET:
http://camera_ip/upload/uploadman?getall&wfilter=X

ANSWER:

```
...
sections=default,protocol_smtp,protocol_ftp,protocol_post\r\n
currentprotocol=0\r\n
...
```

http://camera_ip/upload/uploadman?getall&wfilter=X&protocol=post
http://camera_ip/upload/uploadman?content=0&currentprotocol=2&host=testserver&filenametemplate=$d-$h/ms$I&protocol=post&save&wfilter=X

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12.21. SET/GET ANPR PROPERTIES (SMART CAMERAS ONLY)

Module: lpr/cff
Manual: 7.2.1

> **Note**
>
> This module will deliver its response in the binary part either as an XML document or a JPEG file.

Get a property of the License Plate Recognition module

GET:
http://[camera_ip]/lpr/cff?cmd=getproperty&name=[property path]

ANSWER:

```
...
<ans>\r\n
      <property>\r\n
            <[property name] value ="[property value]"/>\r\n
      <property/>\r\n
</ans>
...
```

Set a property of the License Plate Recognition module

GET:
http://[camera_ip]/lpr/cff?cmd=setproperty&name=[property path]&value=[property value]

ANSWER:

```
...
<ans>\r\n
      <ecode value ="0"/>\r\n
</ans>
...
```

Save properties of the License Plate Recognition module

GET
http://[camera ip]/lpr/cff?cmd=saveproperties

ANSWER:

```
...
<ans>\r\n
<ecode value="0"/>\r\n
</ans>...
```


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12.22. BROWSE THE DATABASE (SMART CAMERAS ONLY)

Module: lpr/cff
Manual: 7.2.1

> **Note**
>
> This module will deliver its response in the binary part either as an XML document or a JPEG file.

Get last record ID

GET:
http://camera_ip/lpr/cff?cmd=getid&id=last

ANSWER:

```
...
<ans>\r\n
<ecode value="0"/>\r\n
<id value="1396268058242"/>\r\n
</ans>
...
```

Get data file corresponding to ID

GET:
http://camera_ip/lpr/cff?cmd=getdata&id=last
http://camera_ip/lpr/cff?cmd=getdata&id=1396268058242

ANSWER:

```
...
<result>
      <location value="-"/>
      <cameraid value="00001009"/>
      <ID value="1396306892338"/>
      <image_hash value="D834B424BBE513390F635AD59E8EDED796D978F0"/>
      <capture>
            <frametime value="2014.04.02 3:59:16.733"/>
            <frametimems value="1396403956733"/>
            <frameindex value="0"/>
      </capture>
      <anpr>
            <text value="ARH002"/>
            <type value="111"/>
            <frame value="578,443,734,412,730,445,574,476"/>
            <bgcolor value="16777215"/>
            <color value="0"/>
            <confidence value="94"/>
            <timems value="360"/>
            <resultcnt value="1"/>
      </anpr>
      <motdet>
            <rect value="0,0,1,1"/>
```

```
            <confidence value="100"/>
            <objectid value="22257"/>
            <objectix value="4"/>
      </motdet>
      <trigger>
            <speed value="52.00"/>
            <speed_limit value="1.00"/>
            <direction value="1"/>
            <category value="679"/>
            <vclass value="1"/>
            <timems value="0"/>
      </trigger>
      <misc>
            <gps_lat value="47.4930"/>
            <gps_lon value="19.0234"/>
      </misc>
</result>
```

Get image corresponding to ID

GET:
http://camera_ip/lpr/cff?cmd=getimage&id=last
http://camera_ip/lpr/cff?cmd=getimage&id=1396268058242
http://camera_ip/lpr/cff?cmd=getimage&id=1396268058242 (cropped license plate image, will not exist, if plate was not found)

12.23. DATABASE CONTENTS (SMART CAMERAS ONLY)

The following table lists the data stored to each event

Field	Type	Description
ADR_BGCOLOR	INTEGER	ADR plate background color
ADR_COLOR	INTEGER	ADR plate text color
ADR_CONFIDENCE	INTEGER	ADR plate confidence
ADR_FRAME	TEXT	ADR plate coordinates (x0,y0,...,x3,y3)
ADR_FRAME_X1	INTEGER	ADR frame coordinate x1
ADR_FRAME_X2	INTEGER	ADR frame coordinate x2
ADR_FRAME_X3	INTEGER	ADR frame coordinate x3
ADR_FRAME_X4	INTEGER	ADR frame coordinate x4
ADR_FRAME_Y1	INTEGER	ADR frame coordinate y1
ADR_FRAME_Y2	INTEGER	ADR frame coordinate y2
ADR_FRAME_Y3	INTEGER	ADR frame coordinate y3
ADR_FRAME_Y4	INTEGER	ADR frame coordinate y4
ADR_TEXT	TEXT	ADR plate text
ADR_TYPE	INTEGER	ADR plate type
ANPR_BGCOLOR	INTEGER	License plate background color
ANPR_CATEGORY	TEXT	License plate category (platetypeconf/platetypeinfos/category)
ANPR_COLOR	INTEGER	License plate text color
ANPR_CONFIDENCE	INTEGER	License plate confidence
ANPR_FRAME	TEXT	License plate coordinates (x0,y0,...,x3,y3)
ANPR_FRAME_X1	INTEGER	LP frame coordinate x1
ANPR_FRAME_X2	INTEGER	LP frame coordinate x2

Field	Type	Description
ANPR_FRAME_X3	INTEGER	LP frame coordinate x3
ANPR_FRAME_X4	INTEGER	LP frame coordinate x4
ANPR_FRAME_Y1	INTEGER	LP frame coordinate y1
ANPR_FRAME_Y2	INTEGER	LP frame coordinate y2
ANPR_FRAME_Y3	INTEGER	LP frame coordinate y3
ANPR_FRAME_Y4	INTEGER	LP frame coordinate y4
ANPR_PLATESRC	INTEGER	ANPR source (0 : none, 1 : main, 2 : overview image)
ANPR_RESULTCNT	INTEGER	Number of identical readings
ANPR_TEXT	TEXT	License plate text
ANPR_TIMEMS	INTEGER	Recognition time [ms]
ANPR_TYPE	INTEGER	License plate jurisdiction code
AUXIMG_HASH	TEXT	Overview image hash (SHA1)
BELTIMG_HASH	TEXT	Belt image hash (SHA1)
CMHWAY_BELT_CONF	REAL	Seatbelt detected, confidence
CMHWAY_OPT_SPEED	REAL	Optical speed [km/h]
CMHWAY_OPT_SPEED_CONF	REAL	Optical speed confidence
COUNTRY_LONG	TEXT	License plate jurisdiction/country, textual, long
COUNTRY_SHORT	TEXT	License plate jurisdiction/country, textual, short
CTRL_AGAIN	UNSIGNED SMALLINT	Image analog gain
CTRL_BLACKLEVEL	UNSIGNED SMALLINT	Image blacklevel
CTRL_DGAIN	UNSIGNED SMALLINT	Image digital gain
CTRL_IRIS	UNSIGNED SMALLINT	Image iris
CTRL_SHUTTERMS	UNSIGNED INTEGER	Image shutter [us]

Field	Type	Description
EVENT_LOG	TEXT	Processing log (base64)
EVTS_DATA_ACK_TIME	BIGINT	Deprecated
EVTS_DATA_EXTID	TEXT	Deprecated
EVTS_DATA_IS_ACK	UNSIGNED SMALLINT	Deprecated
EVTS_DATA_IS_FINISHED	UNSIGNED SMALLINT	Deprecated
EVTS_DATA_IS_SENT	UNSIGNED SMALLINT	Deprecated
EVTS_DATA_SEND_TIME	BIGINT	Deprecated
EVTS_DATA_TRYING	UNSIGNED SMALLINT	Deprecated
EVTS_IMG0_ACK_TIME	BIGINT	Deprecated
EVTS_IMG0_EXTID	TEXT	Deprecated
EVTS_IMG0_IS_ACK	UNSIGNED SMALLINT	Deprecated
EVTS_IMG0_IS_FINISHED	UNSIGNED SMALLINT	Deprecated
EVTS_IMG0_IS_SENT	UNSIGNED SMALLINT	Deprecated
EVTS_IMG0_SEND_TIME	BIGINT	Deprecated
EVTS_IMG0_TRYING	UNSIGNED SMALLINT	Deprecated
FRAMEINDEX	UNSIGNED INTEGER	Image frame index
FRAMETIMEMS	BIGINT	Image /event timestamp [ms]
HASH	TEXT	Main image hash (SHA1)
HYD_CONF	INTEGER	HyDetect confidence
HYD_FRAME_X1	INTEGER	HyDetect vehicle bounding rectangle x1
HYD_FRAME_X2	INTEGER	HyDetect vehicle bounding rectangle x2
HYD_FRAME_X3	INTEGER	HyDetect vehicle bounding rectangle x3
HYD_FRAME_X4	INTEGER	HyDetect vehicle bounding rectangle x4

Field	Type	Description
HYD_FRAME_Y1	INTEGER	HyDetect vehicle bounding rectangle y1
HYD_FRAME_Y2	INTEGER	HyDetect vehicle bounding rectangle y2
HYD_FRAME_Y3	INTEGER	HyDetect vehicle bounding rectangle y3
HYD_FRAME_Y4	INTEGER	HyDetect vehicle bounding rectangle y4
HYD_ISVEH	INTEGER	HyDetect vehicle present (1 : yes, 0 : no)
ID	BIGINT	Primary key/Event ID
IMGSIZ_AUX_X	INTEGER	Overview image x size [px]
IMGSIZ_AUX_Y	INTEGER	Overview image y size [px]
IMGSIZ_BELT_X	INTEGER	Belt image x size [px]
IMGSIZ_BELT_Y	INTEGER	Belt image y size [px]
IMGSIZ_LP_X	INTEGER	Plate image x size [px]
IMGSIZ_LP_Y	INTEGER	Plate image y size [px]
IMGSIZ_NORM_X	INTEGER	Main image x size [px]
IMGSIZ_NORM_Y	INTEGER	Main image y size [px]
IMGSIZ_STP_X	INTEGER	Strip image x size [px]
IMGSIZ_STP_Y	INTEGER	Strip image y size [px]
LP_BRG	INTEGER	Deprecated
LP_SRP	INTEGER	Deprecated
LPIMG_HASH	TEXT	Plate image hash (SHA1)
MD_CONFIDENCE	INTEGER	Motion detection confidence
MD_FRAME_BOTTOM	INTEGER	Motion detection frame bottom
MD_FRAME_LEFT	INTEGER	Motion detection frame left
MD_FRAME_RIGHT	INTEGER	Motion detection frame right

Field	Type	Description
MD_FRAME_TOP	INTEGER	Motion detection frame top
MD_OBJECTID	UNSIGNED INTEGER	Motion detection Event ID
MD_OBJECTIX	UNSIGNED INTEGER	Motion detection Image index (nth frame of the event)
MD_RECT	TEXT	Motion frame (left,top,right,bottom)
MISC_GPS_LAT	TEXT	GPS latitude
MISC_GPS_LON	TEXT	GPS longitude
MMR_CATEGORY	TEXT	MMR category
MMR_CATEGORY_CONF	INTEGER	MMR category confidence
MMR_COLOR	TEXT	MMR color
MMR_COLOR_CONF	INTEGER	MMR color confidence
MMR_MAKE	TEXT	MMR make
MMR_MAKE_CONF	INTEGER	MMR make confidence
MMR_MODEL	TEXT	MMR model
MMR_MODEL_CONF	INTEGER	MMR model confidence
MMR_SUBMODEL	TEXT	MMR submodel
STATE_LONG	TEXT	License plate jurisdiction/state, textual, long
STATE_SHORT	TEXT	License plate jurisdiction/state, textual, short
STRIPIMG_HASH	TEXT	Strip image hash (SHA1)
TRIGGER_CATEGORY	INTEGER	Vehicle e-length
TRIGGER_DATA	BLOB	Trigger data (base64)
TRIGGER_DATALEN	INTEGER	Trigger data length
TRIGGER_DIRECTION	SMALLINT	Vehicle heading (1 : approaching, 2 : leaving)
TRIGGER_SOURCE	TEXT	Trigger source

Field	Type	Description
TRIGGER_SPEED	UNSIGNED INT	Vehicle speed
TRIGGER_SPEEDLIMIT	INTEGER	Vehicle speed limit
TRIGGER_TIMEMS	BIGINT	Trigger time [ms]
TRIGGER_VCLASS	INTEGER	Vehicle class (user defined limits)

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12.24. QUERY DATABASE (SMART CAMERAS ONLY)

Module: lpr/cff
Manual: 7.2.1

> **Note**
>
> This module will deliver its response in the binary part either as an XML document or a JPEG file.

Steps of retrieving results from the database:

1. Query IDs with regular SQL commands formulating searching criteria
2. Get image and data of the events corresponding to the returned IDs

(see Browse the database Programmers section)

Executing an SQL query

GET:
http://camera_ip/lpr/cff?cmd=getresultlist&select=WHERE ID>0

ANSWER:

```
<results>
<result_0 value="1633966169774"/>
<result_1 value="1633966169773"/>
<result_2 value="1633966169772"/>
<result_3 value="1633966169771"/>
.
.
.
<result_396 value="1633966169378"/>
<result_397 value="1633966169377"/>
<n_results value="398"/>
</results>
```

> **Note**
>
> - default value of max_record parameter is 1000. This value can be increased using the default/cfs/db/max_record parameter

GET:
http://camera_ip/lpr/cff?cmd=getresultlist&select=WHERE ID>1396465612672 AND ID<1396465612680
http://camera_ip/lpr/cff?cmd=getresultlist&select=WHERE ANPR_TEXT LIKE '%5%'

> **Note**
>
> - use '%25' instead of '%' in the web browser
> ex.: ... LIKE '%255%25'

GET:
http://camera_ip/lpr/cff?cmd=getresultlist&select=WHERE TRIGGER_SPEED>5000

Note

- 'speed' and 'speed limit' values are stored as fixed point numbers (multiplied by 100), thus SQL queries must be formulated accordingly: 50.00 km/h should be entered as 5000

Last Event ID:

http://camera_ip/lpr/cff?cmd=getid&id=last

ANSWER:

```
<ans>
<ecode value="0"/>
<id value="1633966170027"/>
</ans>
```

Details of the last event:

http://camera_ip/lpr/cff?cmd=getdata&id=last

ANSWER:

```
<result>
<location value="Test location"/>
<cameraid value="2200888"/>
<ID value="1633966169894"/>
<image_hash value="09147619822f582f10c75b1ae6b9b2baf12b2e61"/>
<capture>
<frametime value="2021.10.11 15:47:01.260"/>
<frametimems value="1633967221260"/>
<frameindex value="157191"/>
</capture>
<anpr>
<text value="RIU701"/>
<type value="101011"/>
<country value="HUN"/>
.
.
.
```

Details of an event with a specific ID:

http://camera_ip/lpr/cff?cmd=getdata&id=1633966169378

ANSWER:

```
<result>
<location value="Test location"/>
<cameraid value="2200888"/>
<ID value="1633966169378"/>
<image_hash value="3da8434d18fce551c7fd3dc05948a34db5932711"/>
<capture>
<frametime value="2021.10.11 15:28:46.995"/>
<frametimems value="1633966126995"/>
<frameindex value="135305"/>
</capture>
<anpr>
<text value="n.a."/>
<type value="0"/>
<country value=""/>
.
.
.
```

Image for an event with a given ID:

http://camera_ip/lpr/cff?cmd=getimage&id=1633966169378

ANSWER:
<picture>

To retrieve the ID of events where the license plate contains the string "MB":

http://camera_ip/lpr/cff?cmd=querydb&sql=select id from cffresult where anpr_text like '%MB%'

ANSWER:

```
<results>
<row>
<ID value="1633966169787"/>
</row>
<row>
<ID value="1633966170001"/>
</row>
<row>
<ID value="1633966170297"/>
</row>
<n_results value="3"/>
</results>
```

Query the license plates of an event where the trigger speed is greater than 50:

http://camera_ip/lpr/cff?cmd=querydb&sql=select anpr_text from cffresult where trigger_speed > 50

ANSWER:

```
<results>
<row>
<ANPR_TEXT value="ARH001"/>
</row>
<row>
<ANPR_TEXT value="ABC123"/>
</row>
<n_results value="2"/>
</results>
```

Query the ID and FRAMETIMES value of events where the event created between 2021-10-11 16:35:00 and 2021-10-11 16:35:10:

http://camera_ip/lpr/cff?cmd=querydb&sql=SELECT id, frametimems from cffresult where substr(frametimems,1,10) <TIME_COMPENSATION_SEC> BETWEEN cast(strftime('%s','2021-10-11 16:35:00') as int) and cast(strftime('%s','2021-10-11 16:35:10') as int)

Note

The value of <TIME_COMPENSATION_SEC> depends on which time zone the user is. In the ANPR database, the time of events is stored in UTC and the time of the events to be filtered during the query must be shifted according to the geographically valid time zone for the time stored in UTC. For example, in the Europe / Budapest time zone in summertime will be +1 hour plus compared to UTC, so <TIME_COMPENSATION_SEC> will be +3600. The '+' sign with URL encoding is '% 2b' and the '-' sign is '% 2d'.

ANSWER:

```
<results>
<row>
<ID value="1633966169571"/>
<FRAMETIMEMS value="1633966503733"/>
</row>
<row>
<ID value="1633966169572"/>
<FRAMETIMEMS value="1633966505533"/>
</row>
<row>
<ID value="1633966169573"/>
<FRAMETIMEMS value="1633966508033"/>
</row>
<n_results value="3"/>
</results>
```

12.25. TEMPLATES (SMART CAMERAS ONLY)

The content of the result data file (and the file name) is customizable using templates. The following short example, which will describe a result formatted as an XML contains all features:

```
1      <?xml version="1.0" encoding="UTF-8"?>
2     <result>
3          <ID value ="$(ID);"/>
4          <text value="$DB2XML($(ANPR_TEXT));"/>
5          <location value="$(location);"/>
6           <image value="$(normal_img);"/>
7     </result>
```

Lines #1, #2 and #7 are text only (of course in this example we have to adhere to the XML standard). Line #3 is an example of a `database field`, line #4 is an example of a `function`, line 5 and 6 are examples of a `property/special field`. This template may evaluate to something like:

```
<?xml version="1.0" encoding="UTF-8"?>
<result>
<ID value ="123456789"/>
<text value="ABC123"/>
<location value="Test Site 34b"/>
<image value="/9j/4AAQSkZJRgABAQAAAQABA[... a base 64 encoded
image...]"/>
</result>
```

The same content in a different format might be:

```
1     event_id=$(ID);
3     plate_text=$DB2XML($(ANPR_TEXT));
4     camera_location=$(location);
5     vehicle_image=$(normal_img);
```


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which will evalutate to:

```
event_id=123456789
plate_text=ABC123
camera_location=Test Site 34b
vehicle_image=/9j/4AAQSkZJRgABAQAAAQABA[... a base 64 encoded image...]
```

Database fields

The contents of the database (see Chapter ...) can be injected using the following syntax:
`$([database field id])`

Functions

To format the output the following functions are provided, with the general syntax:
`$[function name]([argument1],[argument2],...,[argumentN]);`

Plate text formatting:

DB2XML(*text,flags:optional*) - converts the license plate text *text* from DB to XML format

DB2JSON(*text,flags:optional*) - converts the license plate text *text* from DB to JSON format

DB2UTF8(*text,flags:optional*) - converts the license plate text *text* from DB to UTF8

The following flags are available:
ARABIC2LATIN - which converts arabic numbers to their latin equivalent, and non-numeric arabic to ''.

Time formatting:
FormatTime(*timestamp,format_string:optional*) - formats timestamp given in milliseconds according to the optional format_string (see the POSIX strftime function) For example:
"$FormatTime($(FRAMETIMEMS),%Y%m%dT%H%M%S%z)"
evaluates to "20180419T145713+0200". If the format string is omitted, the same timestamp is evaluated as "2018.04.19 14:57:13.594".

Special fields

The following keywords are defined:
`normal_img` - the image representing the event, Base64 encoded
`strip_img` - image strip Base64 encoded
`lp_img` - the cropped license plate image, Base64 encoded encoded < imagestrip value="$(strip_img);"/ >
`aux_img` - the overview image, Base64 encoded
`location` - the location string as defined in default/cfs/db/location
`cameraid` - the camera HW id, may be overridden with default/cfs/db/cameraid

Note

Special characters

The character '$' must always be escaped with '\'. Within an expression the characters '$', '(', ')', ',' and ';' have to be escaped with a '\' character. For example the following expression:

```
();$TEST(a\$a\,,$(LP));
```

will evaluate as

```
();a$a,DATA
```

provided that the function TEST concatenates its arguments and the field LP contains the text 'DATA'.

Administration

You can upload a template with the `cmd = uploadtemplate` command as an HTTP POST request as multipart / form-data. As a parameter, enter the name you want to reference the template in the `updatefilename` field.
The device template in use and the system template cannot be deleted / overwritten.

The browser sends with this header:

```
Accept: */*

Accept-Encoding: gzip, deflate

Accept-Language: en-US,en;q=0.9

Connection: keep-alive

Content-Length: 889

Content-Type: multipart/form-data; boundary=----
WebKitFormBoundaryCAHOjxAq53NgEqQK

Host: 121d219.ar.local

Origin: http://121d219.ar.local

Referer: http://121d219.ar.local/

User-Agent: Mozilla/5.0 (X11; Fedora; Linux x86_64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/92.0.4515.107
Safari/537.36
```

Form Data:

```
------WebKitFormBoundaryCAHOjxAq53NgEqQK

Content-Disposition: form-data; name="updatefilename";
filename="proba.tmpl"

Content-Type: application/octet-stream

------WebKitFormBoundaryCAHOjxAq53NgEqQK--
```

The list of available templates can be queried with the command `cmd = listtemplates`, the device will give an XML response like this:

```
<ans>
<template0 value="file_default.sys.tmpl"/>
<template1 value="file_json_default.sys.tmpl"/>
<template2 value="json_cmgo.sys.tmpl"/>
<template3 value="json_default.sys.tmpl"/>
<template4 value="xml_data.sys.tmpl"/>
<template5 value="xml_default.sys.tmpl"/>
<template6 value="xml_evts.sys.tmpl"/>
<template7 value="xml_minimal.sys.tmpl"/>
</ans>
```

Templates can be deleted with the cmd = removetemplate command (system templates are not allowed to be deleted), e.g. *`lpr/cff?cmd=removetemplate&name=proba.tmpl".`*

The device generates the output files using the templates specified in the properties under the `/ default / cfs / template` group. The template name want to be used must be entered here.

template - formats the web search (getdata) with this template
user_template - formats the files to be uploaded with this template
filename_template - format the names of the files to be uploaded with this template

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12.26. ENGINE MANAGER (SMART CAMERAS ONLY)

Module: lpr/cff
Manual: 7.2.4

> **Note**
>
> This module will deliver its response in the binary part either as an XML document or a JPEG file.

Pipeline

The pipeline can be built freely, up to 8 elements, in any order. The following example can be configured.

```
<structure>
      <stage0>
         <type value="scapture"/>
         <grp value="capture"/>
      </stage0>
      <stage1>
         <type value="presel"/>
         <grp value="presel"/>
      </stage1>
      <stage2>
         <type value="anpr_main"/>
         <grp value="recognize"/>
      </stage2>
      <stage3>
         <type value="post"/>
         <grp value="postproc"/>
      </stage3>
      <stage4>
         <type value="void"/>
         <grp value="void"/>
      </stage4>
      <stage5>
         <type value="void"/>
         <grp value="void"/>
      </stage5>
      <stage6>
         <type value="void"/>
         <grp value="void"/>
      </stage6>
      <stage7>
         <type value="void"/>
         <grp value="void"/>
      </stage7>
   </structure>
```


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The pipeline will be built from the elements in the specified order (0-7). Several of the same elements can be placed in the pipeline with different settings, in which case it is advisable to use a separate path to store the properties (see below). Note that adding any extra stages (especially analytics) will seriously increase processing time.

The type of stage must be specified in the type field, the following are possible:

scapture - image receiving stage, it is advisable to put at least one at the beginning of the processing
presel - preselector, gets all incoming images, runs ANPR (preferably on a fast vq / vvq engine) and segments the image sequence into passages based on the results
anpr_main - ANPR stage, this is where the type engine will run
cmhway - search for optical speed and seat belt
mmr - Make and Model Recognition
hyd - vehicle detection
post – post-processing (attaching thumbnails, captioning images, etc.)

Each stage has a property group where its settings are stored, this must be specified in the *grp* field. For example, above the *stage3* stage (post) settings are under the *default / cff / postproc* path.

Stages

The following stages can be stitched in any order you like (most of the possible combinations are obviously meaningless, but this is the only way to ensure flexibility).

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Single Capture

Its task is to receive and decompress the images and provide them with an event ID and index.

```
<capture>
    <misc>
       <manual_direction value="0"/>
    </misc>
    <aux>
       <id value="203.0.113.1"/>
       <enabled value="0"/>
       <delayms value="0"/>
    </aux>
    <filter>
       <direction value="0"/>
       <speeding_only value="0"/>
       <min_trg_pulse value="0"/>
    </filter>
    <manual_frame>
       <left value="0"/>
       <top value="0"/>
       <right value="46"/>
       <bottom value="83"/>
    </manual_frame>
    <classes>
       <class00>
          <speed_limit value="100"/>
          <range_min value="10"/>
          <range_max value="499"/>
          <name value="CAR"/>
       </class00>
       <class01>
          <speed_limit value="90"/>
          <range_min value="500"/>
          <range_max value="1299"/>
          <name value="TRUCK"/>
       </class01>
       <class02>
          <speed_limit value="80"/>
          <range_min value="1300"/>
          <range_max value="3999"/>
          <name value="LONG TRUCK"/>
       </class02>
       <class03>
          <speed_limit value="9999"/>
          <range_min value="0"/>
          <range_max value="9"/>
          <name value="OUT OF RANGE (S)"/>
       </class03>
       <class04>
          <speed_limit value="9999"/>
          <range_min value="4000"/>
          <range_max value="999999"/>
          <name value="OUT OF RANGE (L)"/>
       </class04>
    </classes>
    <image_strip>
       <enabled value="0"/>
       <timeout value="6000"/>
       <scale_factor value="33"/>
    </image_strip>
    <gps>
       <enabled value="0"/>
    </gps>
    <proc>
       <fifo_maxitems value="300"/>
       <priority value="-2"/>
       <port value="4444"/>
       <debug value="0"/>
    </proc>
 </capture>
```

misc / manual_direction - Determines the direction of traffic as follows:

- if you force it with the ** manual_direction* property, it will overwrite everything (see the negative values in the table below), otherwise
- if the trigger sends direction, it will be, otherwise
- if it does not send direction but sends speed, then if negative, then leaving, if positive, then approaching, otherwise
- if you do not send a speed, the value of **manual_direction** will be (see the positive values in the table below), otherwise
- it is unknown.

misc/manual_direction value	function
0	does nothing
1	if no direction, ARRIVING
2	if there is no direction, LEAVING
-1	be sure it is ARRIVING
-2	be sure it is LEAVING

- aux / id - Overview camera IP (can't resolve URL)
- aux / enabled - Enable OV camera

aux / enabled value	function
0	none
1	overview only
2	If you do not find a license plate on the image, see the overview as well

- *aux / delayms* - fixed offset between normal and OV image, in milliseconds, requesting a later image as OV
- *filter / direction* - interesting for radar, directional filtering as for radar, 0 - no filtering
- *filter / speeding_only* - interesting for radar, filtering according to the speed limits specified in classes, lower speed events are dropped, 0 – turned off
- *filter / min_trg_pulse* - 0 minimum e-length for radar, under it will be discard
- *manual_frame / left* - manually specified frame in % of the image
- *manual_frame / top* - manually specified frame in % of the image
- *manual_frame / right* - manually specified frame in % of the image
- *manual_frame / bottom* - manually specified frame in % of the image
- *classes / class00 / speed_limit* - 5 classes can be specified, in which the passages can be classified according to e-length, and the speed limit for them
- *classes / class00 / range_min* - the minimum of the class e-length
- *classes / class00 / range_max* - the maximum of the class e-length
- *classes / class00 / name* - the name of the class (eg car, small truck, etc.)
- *image_strip / enabled* - whether to create a series of thumbnails of the passages (help to set up a trigger). IMPORTANT! all images have to be compressed / reduced for this, so it will be very slow if we are in vvq / mx04 performance mode, it is advisable to turn it off!
- *image_strip / timeout* - to close the event thumbnail timeout (in ms), if the trigger end signal does not appear, max. it waits for a given time before closing the thumbnail
- *image_strip / scale_factor* - reduce thumbnail (% of original image)
- *gps / enabled* - whether to read GPS data
- *proc / fifo_maxitems* - storage size, will probably never need to be set
- *proc / priority* - line priority
- *proc / port* - the value of the image receiving port (this should also be used on the sending side if you change it)

Preselection

type: *presel*
Its task is to quickly pre-select the images already grouped by the trigger into a pass, segmenting them into multiple passes if necessary, and selecting the image that best represents the pass, from which the more time-consuming processing steps will be performed later in the pipeline. (The terms "event" and "passage" are used interchangeably.) Of the similar license plates in the passage pictures, the one that best represents the passage should be selected. License plate position, syntax, etc. based on the pictures you get points and the license plate that gets the most points will be the selected picture.

```
<presel>
   <lpr>
      <max_plates value="1"/>
      <lp_filter value="1"/>
      <duplicate>
         <timeout value="10"/>
         <similarity value="100"/>
      </duplicate>
      <lp_pos_limit value="1"/>
      <min_lp_dt value="0"/>
      <max_lpcnt value="4"/>
      <anpr_frame value="0"/>
      <debug value="0"/>
      <anpr0 value="cffengines/presel/engine0"/>
      <anpr1 value="cff_auto"/>
      <def_speed_ix value="2"/>
      <min_frames value="0"/>
      <lrtext value="0"/>
      <use_trg_lpinfo value="0"/>
   </lpr>
   <proc>
      <event_timeoutms value="1000"/>
      <fifo_maxitems value="300"/>
      <event_max_frames value="16"/>
      <priority value="1"/>
   </proc>
   <proc_units>
      <quick_limit value="6"/>
      <nthreads value="2"/>
      <mtinlen value="30"/>
      <mtoutlen value="30"/>
   </proc_units>
   <syntax>
      <syntax_cnt value="0"/>
      <syntax00>
         <syntax value="LLLDDD"/>
         <syntax_weight value="1"/>
      </syntax00>
      <syntax01>
         <syntax value=""/>
         <syntax_weight value="1"/>
      </syntax01>
   </syntax>
   <syntax_grp value="presel/syntax"/>
</presel>
```

- *lpr / max_plates* - Max. search for the license plate in the picture (FindNext () calls, 1 - no FindNext ()),
    - if we look at several license plates in one picture, the frame of the ANPR stage should be an LP frame so that you know where the 2nd, etc. should be search for a license plate, otherwise ANPR will find the one that suits the most.
    - for the same reason, reading the ADR is not possible in this case, there is a detailed explanation in the DR description
- *lpr / lp_filter* - Filter results

lp_filter value	function
0	do not discard, if there is any license plate
1	No filtering
2	discard if there is no type
3	discard if only the license plate found in the preselection stage (this allows us to keep the result, for example, if ANPR Main found it, but no type)

Important: if the *use_trg_lpinfo* flag is set, the license plate number found by the trigger (vvq) will also be considered a license plate number, so even if set to 0, the system will not discard it, since there is no license plate text, *n.a.* will be included instead. If you don't want to keep these, set the filter of the last ANPR stage to 3, which filters such events (only vvq found something on it, not the next ANPRs), it discards.

- *lpr / duplicate / timeout* - Do not return two matching license plates within the specified time. In seconds, the filter is inactive when set to zero.
- *lpr / duplicate / similarity* - In which case we consider the license plates to be identical (in%).
- *lpr / lp_pos_limit* - The minimum distance of the license plate from the edge of the image in pixels, if closer, is ignored. You'll probably never need it.
- *lpr / min_lp_dt* - Millisecond value, if two license plates are closer than this, they will probably match. You'll probably never need it.
- *lpr / max_lpcnt* - If we find so many same license plates, we will not examine the other images of the passage.
- *lpr / anpr_frame* - Limit the location of the license plate search within the image (separate multiple license plates, increase reading speed). Use the full image if the frame is invalid.

anpr_frame value	function
0	ANPR is running in full screen
1	is the motdet frame given by the camera
2	trigger frames (radar, virtual loop, vvq triggers)
3	manually entered frames
4	License plate frame found by previous stages
5	Using a frame found by a vehicle detector (hydet)

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- *lpr / anpr0* - Property path to the ANPR engine.
- *lpr / anpr1* - Property path to the associated ANPR engine. (See *proc_units / quick_limit*)
- *lpr / def_speed_ix* - Help when using radar. We maintain a table in which we record the image of the license plate, grouped by speed. If there is a pass that we could not read, we find out from this table that how many images we 'usually' return at the speeds associated with the pass, and we forward it as a selected image. This is the default value of this index.
- *lpr / min_frames* - examine at least as many images from the passage, don't close it until it's done
- *lpr / lrtext* - reverse the writing direction of Arabic plates
- *lpr / use_trg_lpinfo* - Do not run your own engine, but accept the license plate text and frame from the trigger (typically running vvq on the camera).
- *proc / event_timeoutms* - Refers to the time elapsed since the event was received, in milliseconds. If this is exceeded, the event will be closed / forwarded. This limits, how much time the stage can spend processing a passage.
- *proc / fifo_maxitems* - Stage storage size (in image)
- *proc / event_max_frames* - The maximum number of images per event
- *proc / priority* - Stage line priority
- *proc_units / quick_limit* - If the number of queued images for ANPR exceeds this, we will switch to the faster, associated ANPR engine (lpr / anpr1).
- *proc_units / nthreads* - Number of ANPR processing threads
- *proc_units / mtinlen* - ANPR thread storage size
- *proc_units / mtoutlen* - The size of the ANPR threads
- *syntax_grp* - Location of syntax checking properties.
- *syntax / syntax_cnt* - How many syntaxes have been specified
- *syntax / syntax00 / syntax* - Syntax L - letter, D - digit, pl LLLDDD is the Hungarian license plate.
- *syntax / syntax00 / syntax_weight* - Syntax weight (how many points the license plate gets if it matches the given syntax)

ANPR Main

type: *anpr_main*
It is advisable to do this after the preselection stage. Runs a type engine (ANPR, ADR, etc.) on the incoming image. It is possible to bond several of them in a row, e.g. one *eur* after *hun-local*. In this case, the *eur* does not examine the passes already typed by *hun-local*, it only passes them on, but if there is no type, it runs the slower *eur* engine.

```
<recognize>
   <lpr>
      <anpr_frame value="0"/>
      <lp_filter value="1"/>
      <duplicate>
         <timeout value="10"/>
         <similarity value="100"/>
      </duplicate>
      <anpr0 value="cffengines/recognize/engine0"/>
      <adr value="0"/>
      <lrtext value="0"/>
      <min_confidence value="-1"/>
   </lpr>
   <proc_units>
      <nthreads value="2"/>
   </proc_units>
</recognize>
```

- *lpr / anpr_frame* - See above
- *lpr / lp_filter* - See above
- *lpr / duplicate / timeout* - See above
- *lpr / duplicate / similarity* - See above
- *lpr / anpr0* - See above
- *lpr / adr* - Enable ADR reading

adr value	function
0	none
1	EADR read only
2	ADR read only
3	EADR and ADR readings

The important thing is that you read the ADR in the same frame as the license plate, so if you pass on a license plate frame that has ANPR there and does not contain the ADR table, it will never find it. If you find an ADR table in an image, you are no longer looking for an EADR table on it. If you are looking for more than one license plate in an image (presel / max_plates), the normal ANPR will run on the presel license plate, so you won't find the ADR table. In this case, there would be confusion to which plate belongs to which license plate. (Not not the one you are closer to.)

- *lpr / lrtext* - See above
- *lpr / min_confidence* - Required ANPR confidence, discarding under it. Can be turned off with -1.
- *proc_units / nthreads* - See above

CMHighway

type: *cmhway*
It is able to estimate the speed optically and check the seat belt. Must be done after the ANPR Main stage because it needs (more) ANPR results. The trigger must also be set to send some pictures where you can find some license plates.

```
<cffcmhway>
   <opt_speed_enabled value="1"/>
   <check_belt_enabled value="1"/>
</cffcmhway>
```

- *opt_speed_enabled* - whether to estimate optical speed
- *check_belt_enabled* - whether a seat belt check is required

Make and Model (MMR)

type: *mmr*
Identifies the brand and type of the vehicle. It is only worth doing after the ANPR Main stage, because it needs an ANPR result, it is worth running on the selected image (representing the event). It has no extra settings.

Vehicle Detector

type: *hyd*
This stage can be placed in front of the presel stage as a pre-filter or as a post-filter, e.g. to filter out false positive events after ANPR. This way, we can filter out false license plates (e.g. billboards, graffiti, fences, cornfields, etc.) but do not throw away events that have a vehicle on it but no license plate, or we could not read the license plate.

```
<cffhyd>
   <filter value="0"/>
   <engine value="hydetect-7.2.0.0"/>
   <minsizex value="0.100000"/>
   <maxsizex value="0.900000"/>
   <minsizey value="0.100000"/>
   <maxsizey value="0.900000"/>
</cffhyd>
```

- *filter* - you can filter out events based on the result

filter value	function
0	no filter, it allows everything
1	if there is no vehicle and no license plate, discard the passage
2	if there is no vehicle, discard the passage
3	if there is no vehicle and no standard license plate, discard the passage

- *engine* - the location of the hydetect engine in the property tree
- *minsizex, etc.* - the minimum / maximum x or y object size specified in % of the image size

Postprocessing

type: *post*
Post - processing.

```
<postproc>
   <lp_img_en value="15"/>
   <titler>
      <enabled value="1"/>
      <nlines value="1"/>
      <title_string00 value="$y-$o-$d $h:$m:$s LP: $p COUNTRY: $f STATE: $j"/>
      <title_string01 value=""/>
      <title_string02 value=""/>
      <ID value="Smart/SpeedCAM"/>
      <location value="Test location"/>
      <direction_string00 value="UNKNOWN"/>
      <direction_string01 value="APPROACHING"/>
      <direction_string02 value="LEAVING"/>
      <alt_charset value="0"/>
   </titler>
   <titler_grp value="postproc/titler"/>
</postproc>
```

- *postproc / lp_img_en* - create a cropped license plate image
- *postproc / titler / enabled* - whether to have captions
- *postproc / titler / nlines* - how many lines (max. 8) the caption should be
- *postproc / titler / title_string00* - caption first line
- *postproc / titler / ID* - user ID, this can be added to the caption
- *postproc / titler / location* - user location ID
- *postproc / titler / direction_string00* - for radar, user direction identifier (unknown), this may be added to the caption
- *postproc / titler / direction_string01* - for radar, user direction identifier (approaching), this may be added to the caption
- *postproc / titler / direction_string02* - for radar, user direction identifier (leaving), this may be added to the caption
- *postproc / titler / alt_charset* - caption alternative font
- *postproc / titler / titler_grp* - subtitle property group

12.27. RESULT UPLOAD (ONLY SMART CAMERAS)

Module: lpr/cff
Manual: 7.2.5

> **Note**
>
> This module will deliver its response in the binary part either as an XML document or a JPEG file.

Upload settings can be managed by setting and querying properties with the setproperty and getproperty commands #19.Set/Get ANPR properties

The properties of the upload module reside in the 'default/cfs/uplm' property path:

```
<uplm>
  <general>
    <method value="-1"/>
    <maxtryconnect value="1"/>
  </general>
  <http>
    <host value="192.168.1.250"/>
    <content value="7"/>
    <timeoutms value="2000"/>
  </http>
  <ftp>
    <host value="192.168.1.250"/>
    <content value="7"/>
    <timeoutms value="2000"/>
    <username value="user"/>
    <password value="pass"/>
  </ftp>
</uplm>
```

'general/method': Upload method.

Possible values:

- -1: disabled
- 0: HTTP/HTTPS
- 1: FTP.
- 2: SFTP

'general/maxtryconnect': Max. number of connection attempts. Possible values: 1-10

'content': Bitfield that describes what data should be uploaded. Possible values: 1-7

- bit 0: image (jpg)
- bit 1: plate image (jpg)
- bit 2: result (xml)

example:

```
all data -> content=7 (=0b111),
image+result -> content=5 (=0b101)
```

'timeoutms': Timeout of one attempt in milliseconds.

Examples:
SET 'maxtryconnect':
http://IP/lpr/cff?cmd=setproperty&name=/default/cfs/uplm/general/maxtryconnect&value=5

GET 'maxtryconnect':
http://IP/lpr/cff?cmd=getproperty&name=/default/cfs/uplm/general/maxtryconnect

ANSWER:

```
<ans>
  <property>
    <maxtryconnect value="1"/>
  </property>
</ans>
```

Possible error messages in ANPR LOG:

- UploadMan:: Cannot initialize curl.
- UploadMan:: Upload is disabled.
- UploadMan:: No HTTP host defined.
- UploadMan:: No FTP host defined.
- UploadMan:: No FTP username defined.

12.28. CLEAR DATABASE/REMOVE RECORD (SMART CAMERAS ONLY)

Module: lpr/cff
Manual: 7.2.1

> **Note**
>
> This module will deliver its response in the binary part either as an XML document or a JPEG file.

Clear database or remove record
GET:
http://camera_ip/lpr/cff?cmd=cleardb
http://camera_ip/lpr/cff?cmd=removebyid&id=1396465617988

ANSWER
```
<ans>
<ecode value="0"/>
</ans>
```

12.29. ANPR MODULE RESTART (SMART CAMERAS ONLY)

Module: lpr/cff
Manual: 8.8

> **Note**
>
> This module will deliver its response in the binary part either as an XML document or a JPEG file.

Restart license plate reading module

GET
http://[camera ip]/lpr/cff?cmd=restart

ANSWER:
```
<ans>\r\n
<ecode value="0"/>\r\n
</ans>
```

12.30. SYSTEM INFORMATION

Module: stat/identify, stat/system, hwlayer/cperiph
Manual: 8.1

Get information about system diagnostic values
GET:
http://camera_ip/stat/identify?getall&wfilter=X
http://camera_ip/stat/system?getall&section=memory&wfilter=X
http://camera_ip/hwlayer/cperiph?getcamtemp&panel=0&wfilter=X
http://camera_ip/hwlayer/sensors?getEv&device=lightsensor&wfilter=X

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12.31. CAMERA LOG

Module: logging/logstream
Manual: 8.3

Get camera log

GET:
http://camera_ip/logging/logstream?getfilter&wfilter=X
http://camera_ip/logging/logstream?getlog

Note

- Lines are separated by '\n' (0x0a characters)
- The log will not be empty after the query, so the queried lines will remain even after the next query, unless it was not overwritten

(It is possible to set the already queried rows to be deleted.
See: plainconfig mode parameter)

SET:
http://camera_ip/logging/logstream?filter=uarttrigger&save&wfilter=X
http://camera_ip/logging/logstream?filter=*&save&wfilter=X

Note

- '*' no filtering is applied

Only Smart cameras:

GET:
http://camera_ip/lpr/cff?cmd=getfcontent&name=/mnt/data/cfreeflow/cff.log

Note

- The answer is base64 encoded.

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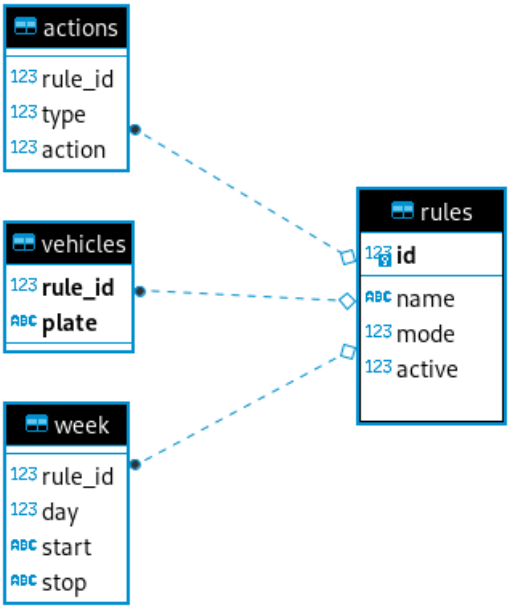
12.32. BLACK/WHITELIST (SMART CAMERAS ONLY)

Black- / Whitelist functionality allows us to perform tasks depending on the time and the license plate read. It can be enabled with the `/ default / cfs / db / bw / enabled` property. Tasks can be:

- Upload (HTTP, FTP, etc.)
- GDS insertion
- run script (eg to pull GP output)
- write to websocket, TCP port
- etc.

Configurable SQL commands are used next to the table structure below.



The *rule* table:

- **id** - rule identifier, the other tables refer to it
- **name**
- **mode** - whether black (0) or white (1) list
- **active** - is the given rule active (1)

The *week* table:

- **rule_id** - which rule the time limit belongs to
- **day** - 0-6 to which of the days of the week it applies (0-Sunday, 1-Monday, ... 6-Saturday)
- **start** - between 0:00 and 24:00 when the active time interval starts
- **end** - between 0:00 and 24:00 when the active time interval ends

The *vehicles* sign:

- **rule_id** - which rule the license plate belongs to
- **plate** - license plate text

The *actions* table:

- rule_id - which rule the action belongs to
- type - what type of event, possible task types:

Type	Name
0	Upload (Upload Manager)
1	Execute script
2	Stream
3	Datadisplay (websocket)
4	GDS Insertion

- action - within which (eg which from several UploadManagers - for example, in case of 3, it uses the Upload Manager configured under `* default / cfs / uplm / extras / uplm3`)

Principle of operation

Read a **license plate** at a **given time**. Look all the rules in the rules table to see if any of them apply to a given time (day and time are correct). If yes, check the vehicles license plate to see if it has the license plate text. After that, depending on whether the rule was recorded in black or whitelist mode, we execute (black) or do not execute (white), the task added to the rule in the action table. If no such rule is found and there is a rule called default, the corresponding action is executed independently of the license plate text.

> **Note**
>
> The mode parameter is only present in newer releases for compatibility, it does nothing, so it can only be used in mode 0. Whitelist functionality can be implemented with rules where we do not assign a task to the listed license plates (whitelist, we do not penalize them, eg ambulance on the highway), and we define a default rule for all others (they can be penalized).

Commands

Tables can be written with SQL commands (cmd = querydb) using the following examples:

- New rule

```
INSERT INTO rules (name) VALUES("[rule name]")
```
(e.g.: http://192.0.2.3/lpr/cff?cmd=querydb&sql=INSERT INTO rules (name) VALUES('example'))

- Activate a rule

```
UPDATE rules SET active="1" WHERE id="[rule ID]")
```

- Add a task to a rule

```
INSERT INTO actions (rule_id,type,action) VALUES ("[rule id]", "[type]", "[action index]")
```

- Add a date to a rule

```
INSERT INTO week VALUES("[rule id]","[weekday]","[start date]","[end date]")
```

- Add a vehicle to a rule

```
INSERT INTO vehicles VALUES("[rule id]","[license plate text]")
```

- Listing the already existing rules (by default the list is empty)

```
SELECT * FROM rules
```
(e.g.: http://192.0.2.3/lpr/cff?cmd=querydb&sql=SELECT * FROM rules)

- Delete a selected rule

```
DELETE FROM rules WHERE id='[rule id]'
```
(e.g.: http://192.0.2.3/lpr/cff?cmd=querydb&sql=DELETE%20FROM%20rules%20WHERE%20id='9')

Bulk filling

There is a `cmd = uploadtable` command that can be used to upload an entire table separated by '\ n', e.g. if you want to add many license plates to a rule. This is how it should look:

```
[table name]
[key (column names listed in parentheses)]
[values 0 (column values separated by commas)
[values 1 (comma-separated column values]
(...)
[values N (column values separated by commas)
```

For example:

```
vehicles
(rule_id,plate)
"2","ABC123"
"2","DEF456"
"2","GHI678"
"2","JKL901"
"2","MNO234"
```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12.33. RESTART

Restart the camera
Manual: 8.8

GET:
http://camera_ip/setup/exit?retcode=1

Note

Return codes (retcode) available:

- 1: restart modules (quick restart)
- 3: reboot camera
- 7: reboot and enter recovery mode

12.34. CAMERA MODULES

List all modules currently loaded
GET:
http://camera_ip/stat/system?getall&section=module&wfilter=X

ANSWER:

```
...
mn00=logging/logstream\r\n
mv00=3.1.0.6,0\r\n
md00=Device Log Streamer\r\n
mn01=maintenance/backup\r\n
mv01=3.1.1.4,2\r\n
md01=Backup System\r\n
...
```

General syntax:

```
mnXX=group of the module/ name of module\r\n
mvXX=version of the module\r\n
mdXX=description of the module\r\n
where XX is the index of the module
```


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DESCRIPTION OF THE PROPERTIES OF THE CMANPR ENGINE HANDLER MODULE

This document describes the properties (user parameters) of the CARMEN® software and the cmAnpr *engine handler* software module.

PROPERTIES OF THE CMANPR ENGINE HANDLER MODULE
anprname

PROPERTIES OF THE CMANPR ENGINES		IMPORTANCE
Properties related to the identification of the current engine	datafile	low
Properties related to processing time	depth	high
	timeout	high
	timeout_wall	medium
	adapt_environment	medium
	contrast_min	medium
	recognitionmode	medium
Properties related to the geometry of plates	size	high
	size_max	high
	size_min	high
	slant	medium
	slant_max	medium
	slant_min	medium
	slope	medium
	slope_max	medium
	slope_min	medium
	xtoyres	low
Properties related to filtering outputs based on license plate characteristics	general	high
	typeweight	medium
	colortype	low
	nchar_max	low
	nchar_min	low
Properties related to customization of results	gaptospace	medium
	autotypemodification	low
	convert0to0	low
	countryname	low
	cyrillic_style	low
	local_character_conversion	low
	unicode_in_text	low
Properties related to color recognition	analyzecolors	low
	whitebalance	low
Properties related to the position of license plates in input images	posfreq	medium
	ROI	medium
	ROU	medium
	posfreqhalflife	low
	posfreqhistxs	low
	posfreqhistys	low
	posfreqweight	low
PROPERTIES OF THE CMANPR ENGINES		**IMPORTANCE**
Properties related to image quality	gamma	low
Properties related to the calculation of the confidence level	confidencemode	medium
	confidencemode_x	low
	plateconf	low
	zeroconfidenceresults	low
Properties related to memory handling	heapfreefreq	low

13. ANPRNAME

NAME OF THE CURRENT ENGINE

The name of the current engine can be altered during runtime. Its value can be set according to the following scheme: “engine module name: property group”. For example: cmanpr-eur-7.3.12.5_20Q2

Possible value: character string

Default value: varies with each engine release

Suggested value: not applicable

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POSSIBLE VALUES OF CMANPR ENGINE PROPERTIES

NAME (in alphabetical order)	POSSIBLE VALUES	DEFAULT VALUE
adapt_environment	{-1,0,1,2,3,4,..8,..16,..32,..64,...127}	engine dependent
analyzecolors	{0,1,2,4,5,8,9}	0
autotypemodification	{0,1}	0
colortype	{0,1,2}	0
confidencemode	{0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15}	7
confidencemode_x	{replace "X" with number 0 - 15}	n/a
contrast_min	[0..255]	engine dependent
convert0to0	{0,1}	0
cyrillic_style	{0,1}	0
datafile	character string	n/a
depth	[0..500]	engine dependent
gamma	{0,1}	0
gaptospace	{0,1,2}	0
general	{0,1,3,4,5,6,7,8,9,10,11,12,13,14,15}	engine dependent
heapfreefreq	{0,1}	0
local_character_conversion	{0,1,2,3}	0
nchar_max	positive integers	engine dependent
nchar_min	positive integers	engine dependent
plateconf	{0,1,2}	2
posfreq	character string	empty string
posfreqhalflife	[0..1048576]	0
posfreqhistxs	[2..64]	16
posfreqhistys	[2..64]	16
posfreqweight	[0..100]	50
recognitionmode	{0,1}	0
ROI	polygon(s)	empty
ROU	polygon(s)	empty
size	positive integers	engine dependent
size_max	positive integers	engine dependent
size_min	positive integers	engine dependent
slant	integer numbers	engine dependent
slant_max	integer numbers	engine dependent
slant_min	integer numbers	engine dependent
slope	integer numbers	engine dependent
slope_max	integer numbers	engine dependent
slope_min	integer numbers	engine dependent
timeout	non-negative integers	1000
timeout_wall	non-negative integers	0
typeweight	string	empty string
unicode_in_text	{0,1,2}	1
whitebalance	[0..100]	100
zeroconfidenceresults	{0,1}	0

DESCRIPTION OF THE PROPERTIES OF THE CMANPR ENGINES

14. DATAFILE

NAME OF THE ENGINE'S DATA FILE

This property specifies the knowledge file (.dat) used by the engine. By default, the name of the datafile corresponds to the name of the engine.

For example, the cmanpr-eur-7.3.12.5_20Q2 engine's datafile is *gxsd-cmanpr-7.3.12.5-eur.dat* . The role of this property is to query the name of the datafile after initialization and to include this information in the application's log.

Possible values: character string

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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PROPERTIES RELATED TO PROCESSING TIME

15. DEPTH

HEURISTIC SENSITIVITY

cmAnpr engines with country/state recognition use more sophisticated algorithms than general ones, which not only provides country/state recognition but also improves text accuracy in most cases. If the recognition time is too long for the application, the depth of search may be lowered using this parameter; although the accuracy of both text and country/state reading will be affected. If the application is not time-sensitive, then the depth value may be increased to get higher recognition accuracy. [1..300]: depth of the heuristic sensitivity.

Possible values:	[1..300].
Default value:	varies with each engine release; default property value can be queried by the `GetProperty()` function
Suggested value:	leave the default value

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16. TIMEOUT

16.1. TIMEOUT

CPU TIME LIMIT

Sets the maximum working time for the CPU in milliseconds in which the module tries to find license plates.
You can always give the module sufficient time by using this timeout. However, this could result in longer runtimes if the system is busy.
The interval starts when cm_findfirst() is called.
At the end of this period, the engine tries to finish searching for new plates and any additional call of cm_findnext() will result no plates found. Zero timeout value means no time limit.
By setting the timeout value before the cm_findnext() call, the timing will be restarted and the evaluation lasts till the newly specified time interval.

Example:
If the value of the timeout is set to 500
The cm_findfirst() returns successfully after 200 ms. In this case after additional cm_findnext() call 300 ms would be available. However, if the timeout is set to 500 after cm_findfirst(), then 500ms would be available for further cm_findnext() calls.

Possible values: non-negative integers
Default value: 1000
Suggested value: 1000 – on servers and desktop computers
5000 – on slower computers with less than 2GHz CPU clock speed

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16.2. TIMEOUT_WALL

REAL TIME LIMIT

Sets the length of the time interval in milliseconds in which the module tries to find license plates.
You can ensure that the module won't run much longer than the desired time by using this timeout_wall property. However, the results could possibly be worse if the system is busy and the timeout_wall is set too low.
The interval starts when cm_findfirst() is called.
At the end of this period, the engine tries to finish searching for new plates and any additional call of cm_findnext() will result no plates found. Zero timeout_wall value means no walltime limit.
By setting the timeout_wall value before the cm_findnext() call, the timing will be restarted and the evaluation lasts till the newly specified time interval.

Example:

If the value of the timeout_wall is set to 500
The cm_findfirst() returns successfully after 200 ms. In this case after additional cm_findnext() call 300 ms would be available. However, if the timeout_wall is set to 500 after cm_findfirst(), then 500ms would be available for further cm_findnext() calls.

Possible values: non-negative integers
Default value: 0
Suggested value: equal or greater values than the value set for timeout

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USAGE

It is possible to use the timeout and the timeout_wall parameters together or just one or the other. If either timeout is reached, the engine tries to finish searching for new plates and any additional call of cm_findnext() will result no plates found. If both parameters are used, the timeout value should always be smaller than the timeout_wall value or equal to it. Otherwise it has no effect.

It can happen that in case of a busy processor the ANPR process takes a long time (2-4 seconds) even if the timeout is set to 1000 ms, because during this 2-4 seconds CARMEN can only use the processor for 1000 ms.

In either case, if Carmen® has found a License Plate close to the set timeout/timeout_wall limit, the process will be finished as quickly as possible. So despite having the timeout and/or the timeout_wall set to (for example) 1000 ms the ANPR process still could take up to 1000-1200 ms.

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17. ADAPT_ENVIRONMENT

ACCELERATED MODE BASED ON PHYSICAL LOCATION AND OTHER CHARACTERISTICS OF THE LICENSE PLATE

This property can substantially boost recognition speeds in case the country/state recognition feature is enabled. The engine is capable of statistically adapting to type, location and geometrics of the license plates on the images.

Possible values:

1. This allows the cmAnpr engine to adapt to its environment by applying a real-time statistical prediction algorithm to quickly assess the physical location of the particular deployment. The engine will begin to anticipate the license plate types of those countries/states that it encounters most frequently. With this feature enabled, it often takes only a few plate recognitions for the software to start delivering results up to twice as fast.

To turn off this feature, set value to 0.

2: This enables posfreq and at the same time, posfreqhalflife is set to 1000. Collection of statistical information is started on the image divided to 16x16 equal sections (if this is not overwritten previously by unique posfreq, posfreqhalflife, posfreqhistxs, posfreqhistys settings) This works as before, as it would have been set individually by those 2 parameters.

4, 8, 16, 32, 64: By setting these values, collection of statistical information and adaptation includes also some geometric parameters and the contrast of the license plates. Continuous runtime adaptation of the engine makes recognition more accurate and faster.
These geometric parameters are: size, size_min, size_max, slant, slant_min, slant_max, slope, slope_min, slope_max, contrast_min parameters. This makes manual setting of those parameters unnecessary.

4: height of the characters
8: width of the characters
16: slant
32: slope
64: contrast
By setting the adapt_environment parameter to **"-1",** all the collection and adaptation of all the information - like license plate location, character size (height, width), slant, slope, contrast is turned on.

Please read the notes on the next page!

!Important

Notes for using adapt_environment:

Timeout: Avoid setting this value too low! Some engines have been trained for a large plate type variety, but a specific deployment may only encounter a few different country/state plates on a regular basis (e.g. Arabic engine used in Bahrain). Although the adapt_environment feature may dramatically improve recognition speeds for those country/state plates that are frequent at a specific location, "infrequent" plate types will still require about the same recognition times as without this feature enabled. Consequently, using a timeout value that is too low (e.g. based on the mean recognition time calculated when this acceleration feature is enabled) may cause the system to skip "infrequent" plates without providing a result, as the recognition cycle would time out before being able to provide a result.

Recognition accuracy: Our tests indicated that enabling the adapt_environment feature does not negatively impact text reading accuracy, while at the same time substantially increasing recognition speeds. However, the accuracy of country/state identification is more sensitive to this feature. Consequently, this feature might present some issues that would require careful selection of an appropriate timeout value or a secondary screening for occasional false positives of country/state identification. For example, no result or misread might be provided for a previously recognized license plate, following a sequence of different plate images. An issue like this, could be the result of either a low timeout value (read previous note), or a unique anomaly, where the internal statistical analysis expected a "frequent" country/state plate at the specific location, while the actual plate was a similar but "infrequent" type.

Error reporting: Using adapt_environment makes it difficult to reproduce errors or misreads, because the engine continuously changes recognition parameters. Before reporting an error, also process the image with this acceleration feature disabled to help identify whether it is an acceleration-related issue.

Possible values: Possible values: {-1,0,1,2,3,4,8,16,32,64 – and all combinations of the positive numbers}

Default value: 3 (1+2) – but varies by engines

Suggested value: -1 – if the images are collected in the same physical location

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18. CONTRAST_MIN

MINIMUM CONTRAST

The minimum difference between the grayscale value of the number plate characters and the plate background.

> **Note**
>
> No license plate result will be returned where the grayscale contrast is smaller than the specified value.

Possible values: [0..255]

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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19. RECOGNITIONMODE

(available from version 7.3.11.242)

Some engines contain more than one recognition possibility. You can check the current engine actual values and options as explained below.

GetProperty() „recognitionmodes”: it will give you back the possible values with its number and name:

0 – Classic

1 – Quick

GetProperty() „recognitionmode”: it will give you back the actual recognition mode name as a string

SetProperty() „recognitionmode”: you can set the recognition mode with this command. You can use number (0,1) and the string (Classic, Quick - case sensitive) as well

Please note that this parameter is not saved into gxsd.dat.

Possible values: {0,1}

Default value: 0

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PROPERTIES RELATED TO THE GEOMETRY OF PLATES

20. SIZE

AVERAGE HEIGHT OF THE CHARACTERS

The average height of the number plate characters in the image in pixels.

Possible values: positive integers (between 10 and 80)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: [20..50] (between 20 and 50), depending on the character heights in the input images

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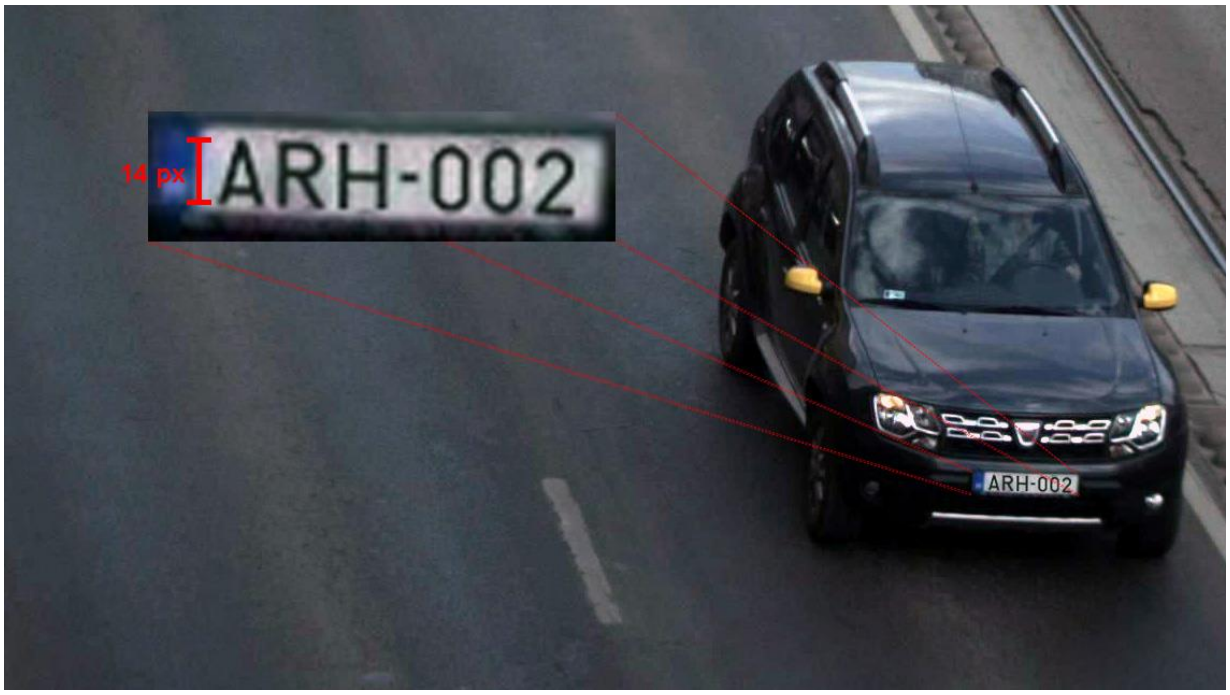

21. SIZE_MAX

MAXIMUM HEIGHT OF CHARACTERS

The maximum height of the number plate characters in the image in pixels.

Possible values: positive integers (between the actual size value and 80)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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22. SIZE_MIN

MINIMUM HEIGHT OF THE CHARACTERS

The minimum height of the number plate characters in the image in pixels.

Possible values: positive integers (between 10 and the actual size value)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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Note

size_min ≤ size ≤ size_max

So, the size value has to be equal to or greater than size_min and equal to or less than size_max otherwise the engine returns no data.

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23. SLANT

AVERAGE SLANT OF THE NUMBER PLATE

The average slant of the number plate characters in the image. This value is represented in percent (%) and it is positive if the vertical axis of the characters slants to the left viewing from bottom to top.

Possible values: integer numbers (between -100 and 100)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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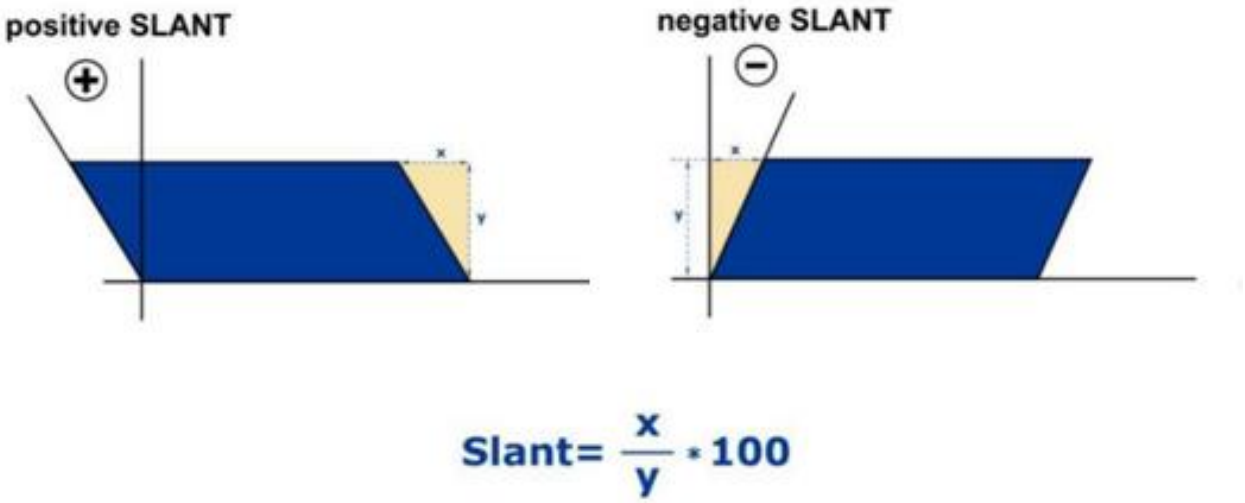

24. SLANT_MAX

MAXIMUM SLANT OF THE NUMBER PLATE

The maximum slant of the number plate characters in the image. This value is represented in percent (%) and it is positive if the vertical axis of the characters slants to the left viewing from bottom to top.

Possible values: integer numbers (between the actual slant value and 100)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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25. SLANT_MIN

MINIMUM SLANT OF THE NUMBER PLATE

The minimum slant of the number plate characters in the image. This value is represented in percent (%) and it is positive if the vertical axis of the characters slants to the left viewing from bottom to top.

Possible values: integer numbers (between -100 and the actual slant value)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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Note

slant_min ≤ slant ≤ slant _max

So, the slant value has to be equal to or greater than slant_min and equal to or less than slant_max otherwise the engine returns no data.

26. SLOPE

AVERAGE SLOPE OF THE NUMBER PLATE

The average slope of the number plate in the image. This value is represented in percent (%) and it is positive if the horizontal axis of the number plate slopes downwards viewing from left to right.

Possible values: integer numbers (between -100 and 100)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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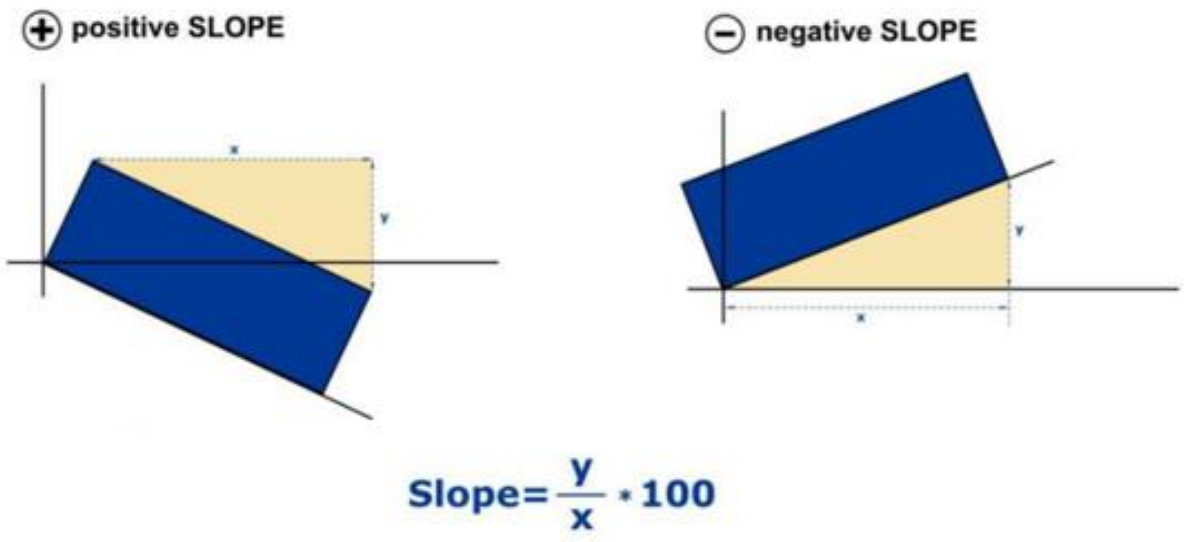

27. SLOPE_MAX

MAXIMUM SLOPE OF THE NUMBER PLATE

The maximum slope of the number plate in the image. This value is represented in percent (%) and it is positive if the horizontal axis of the number plate slopes downwards viewing from left to right.

Possible values: integer numbers (between the actual slope value and 100)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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28. SLOPE_MIN

MINIMUM SLOPE OF THE NUMBER PLATE

The minimum slope of the number plate in the image. This value is represented in percent (%) and it is positive if the horizontal axis of the number plate slopes downwards viewing from left to right.

Possible values: integer numbers (between -100 and the actual slope value)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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Note

slope_min ≤ slope ≤ slope_max

So, the slope value has to be equal to or greater than slope_min and equal to or less than slope_max otherwise the engine returns no data.

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29. XTOYRES

THE RATIO OF HORIZONTAL AND VERTICAL DIMENSIONS OF PLATES

X to Y resolution – only for analog input!

This value is represented in percentages (%). This parameter uses 2 values for calculation: the ratio of horizontal and vertical resolution of the plate in the image and the real life horizontal and vertical size ratio of the plate.

This parameter can be set manually using images that contain plates of the same type. Calculating the average of the ratio *"r"* of the width and the height of the plates on images and by calculating the *"R"* ratio of the real width and height of the actual plate:

xtoyres = [(100*r)/R+0.5]

Example 1 (metric):

Physical dimensions: The width of Hungarian plates is 51 cm, the height is 11 cm, so the ratio of the width and the height is 51/11=4.6363.

Dimensions on images: On 100 images with Hungarian plates, the average ratio of the width and the height of plates is 5.25.

In this case, using the formula:

xtoyres=((100*5.25)/4.6363)+0.5=~114.

Example 2 (imperial):

Physical dimensions: The width of North American standard plates is 12 inches, the height is 6 inches so the ratio of the width and the height is 12/6=2.

Dimensions on images: On 100 images with USA plates, the average of the width and the height of plates is 1.79. In this case, using the formula:

xtoyres=((100*2)/1.79)+0.5=~112.

Note

If you have regular digital camera that does not change the ratio of the width and the height of the objects, simply use 100.

This property has a role only if there is significant distortion in the dimensions of the objects, for example in case of half-frames taken by analog cameras.

Possible values: positive integers

Default value: 100

Suggested value: 100

(Zero value setting of *xtoyres* means automatic re-setting of *xtoyres* to 100.)

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PROPERTIES RELATED TO FILTERING OUTPUTS BASED ON LICENSE PLATE CHARACTERISTICS

30. GENERAL

SELECTING GENERAL OR SPECIAL RESULT DELIVERY MODE

> **Note**
>
> The value of this property has direct effect on the value of the typeweight property. For direct selection of certain countries/states, use typeweight.

This property lets you select the desired reading modes of license plates, ADR plates, EADR plates (Empty ADR, ADR plates without text), and plates with unknown type (type refers to cmNP::type).

This property can filter 4 kinds of LPR results:

1. Text results with unidentified license plate type (type=0)
2. Results with identified license plate type (type range [0..997000])
3. Results with identified ADR plate type (type range [997000..997999])
4. Results with EmptyADR plate type (type=999980..999999)

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The following table shows what kinds of results are returned for each possible value of general property:

	Expected type of the result			
values of general	unidentified license plate type (type=0)	IDENTIFIED license plate type (0<type<997000)	ADR plate (997000<=type<=997999)	EmptyADR plate (999980<=type<=999999)
0		x		
1	x	x		
2 (do not use)				
3	x			
4		x	x	
5	x	x	x	
6			x	
7	x		x	
8		x		x
9	x	x		x
10				x
11	x			x
12		x	x	x
13	x	x	x	x
14			x	x
15	x		x	x

Note

Value 2 is intentionally omitted from the above table. If *general* is set to 2, no result will be returned!

For LPR reading without ADR information, values {0,1,3} should be used.

For ADR or EmptyADR reading, values {4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15} should be used.

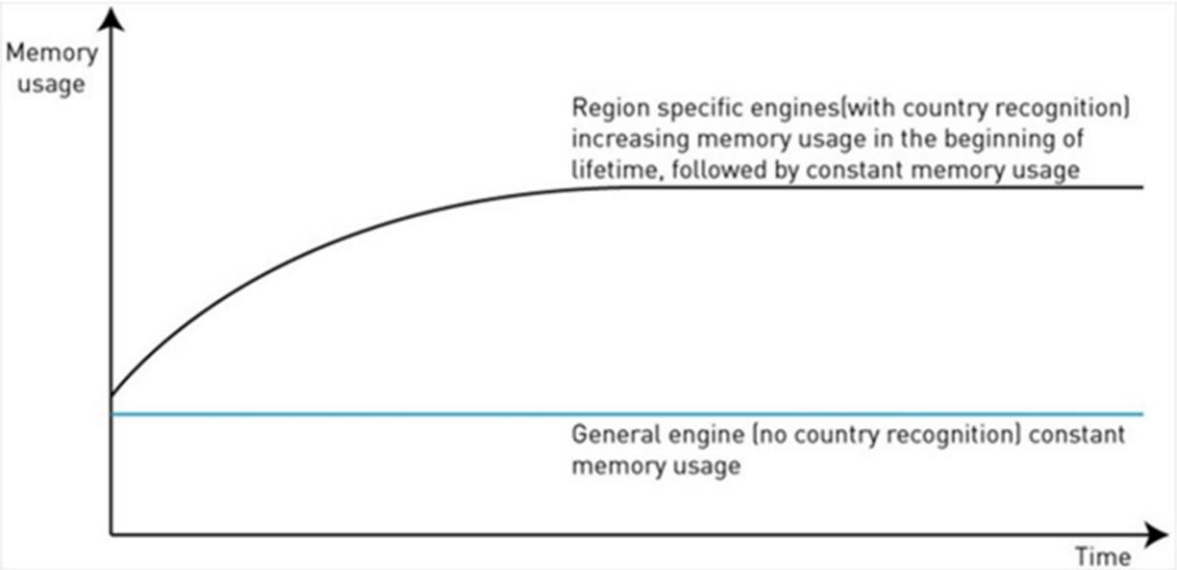
Possible values: {0,1,3,4,5,6,7,8,9,10,11,12,13,14,15}

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: 1

Note

THE RELATIONSHIP OF MEMORY CONSUMPTION AND TIME IN CARMEN® ENGINES



Region specific CARMEN® engines require more memory than the general engine. Each instance uses around 300MB of memory, you can calculate with 500 MB memory for each one. CARMEN® instances do not share the memory area, so this requirement should be multiplied by the number of instances in a system.

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31. TYPEWEIGHT

PRIORITIZING OR OMITTING LICENSE PLATE TYPES OR COUNTRIES/STATES/PROVINCES

(available from version 7.2.8.46)

CARMEN® engines recognize the country based on the so-called license plate types. Two license plates fall into the same type if they differ only in their texts keeping the syntax, layout, font type, delimiters, and all graphical elements. The above implies that each country/state has several different license plate types. Each type is assigned to an ID, and the ID's are arranged into intervals for easier handling of countries/states. These intervals are defined as follows:

From ccode*1000 to ccode*1000+999; where ccode stands for the "country code" or "state code" as listed in chapter "Country and State IDs"

For example:

The country code of Hungary is 101. The valid Hungarian types are between 101000 and 101999. By default, all types are handled equally by the engine when the type (country/state) is recognized. The engines are usually released for certain regions (continents), which may include several countries/states from a larger area. The more countries/states supported by the engine, the more types it needs to handle. If the site where the engine is used is not at a border-crossing point, 90% of known plate types never occur. In order to give users the possibility to handle this, the engine assigns weight values to each type.
By configuring these, the priority of certain types or countries/states can be changed. This leads to a more specific engine configuration, which can perform more efficiently in that site than the general settings.
The default weight is 1000 for each type. The weight values can be integer numbers from minus 10.000 to positive 10.000.

How to enable / disable certain types, countries, or states?

There are two factors of the weight values:

- the absolute value
- and the sign

The absolute value defines the priority of a specific type among the set of all known license plate types. The higher the absolute value, the higher the priority of the type.

The sign defines whether or not the type should be returned by the engine. Negative weights will disable the type, and upon finding, the engine will not return it.

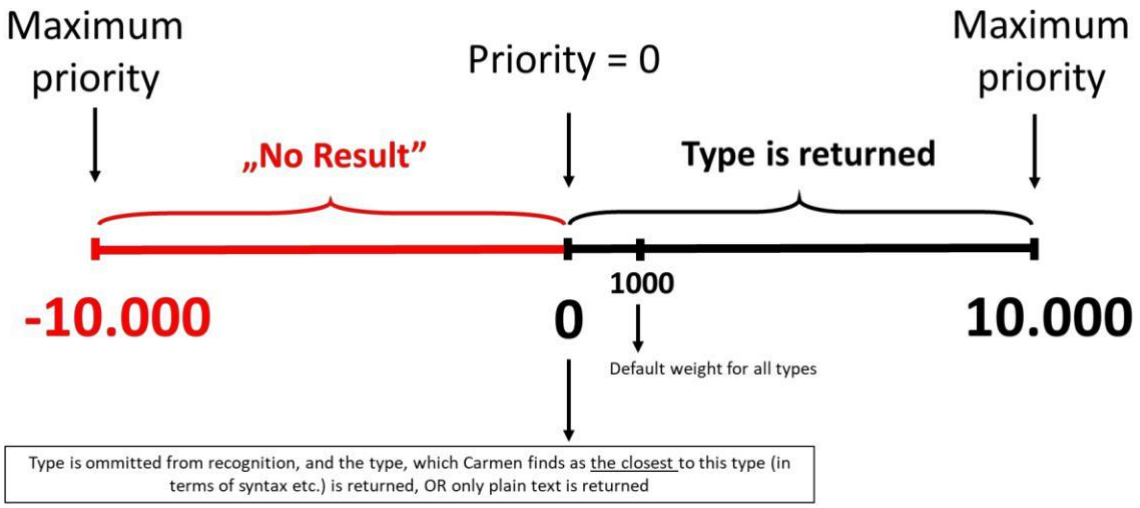
Possible values: string

Default value: empty string – filtering is disabled; all types are considered with the same weight

Suggested value: raise the weight of the desired types, or simply leave the default value to skip this feature

Weight value range: -10.000 to 10.000

Default weight for all type is 1000.



For example:

Assume that in a certain border crossing point the trucks have two license plates, one from each country. The project requires reading only one type, but the engine is trained for both. In this case, a negative value with high absolute value can disable the unwanted type range and prevent them from being returned.

Weight value examples (after OCR part of the process is finished):

"-10000" to "-1": type recognized but result is dropped

"0": omitted from the type set and: matched to closest similar type or plain text returned or no result returned

"1" to "10000" – recognized and returned

Advantages of using typeweight

In case of regions where there are many different license plate types, the engine has to choose the type of the license plates from a large set, even thousands of different versions. By using typeweight, the engine can be configured to be more specific for a smaller area. This can improve both the accuracy and the processing time.

Syntax

The string value of typeweight should contain ordered pairs of type (type ranges) and weight values. For example:

typeweight="101,-1000" disables all license plate types of Hungary
typeweight="1,-1000" disables all license plate types of Europe
typeweight="101,-1000;122,-1000" disables all license plates of Hungary and Germany
typeweight="1,500;101,1000" sets the weight of all Hungarian plates to 1000, and decreases the weight of all other European types to 500
typeweight="123,0" omits all Belgian license plate types from the recognition, meaning the plates that seem to appear as Belgian plates are returned matched with the type closest to the Belgian syntax
typeweight="101,5000" increases the weight of all license plate types of Hungary.

Note

The specified weights are applied one after the other. So in case of typeweight="1,500;101,1000", all European license plates are set with weight of 500, and after that the types of Hungary are set with weight=1000.

Examples

1. European engine used in Germany, for monitoring and categorizing German vehicles. License plates from foreign countries are not relevant.

For an efficient solution, all countries of Europe should be ignored except for Germany. Solution: set the weight of all European types to -1000 and then set a high positive value for Germany:
typeweight="1,-1000;122,1000"

2. USA engine used in Florida, the occurrence of vehicles from neighbour states are expected, but license plates from states and even countries that are far away are very rare. Solution: initialize two instances of the engine, and use one of them as default which can detect FL, SC, GA, AL, MS, LA license plates and the other as secondary which can cope with the rare cases.

For the default configuration:
typeweight="5,0;550,1000;548,1000;549,1000;530,1000;533,1000;532,100"
ignores all USA types except for the above-mentioned states (see state code list)
For the secondary configuration:
typeweight="550,0;548,0;549,0;530,0;533,0;532,0"
ignores the above covered states and therefore the engine can focus on the others

> **Note**
>
> This configuration will ensure higher speed for most of the cases, while the rare license plates can also be detected with a slightly longer extra processing time.

Relation with general

Note that the general property is also related with enabling/disabling certain types of license plates. By changing typeweight, the engine analyzes the new configuration and changes the value of general to keep the consistency. Also, by setting general, the weight of certain type ranges will be changed. In practice, to avoid confusion, either general **or** typeweight should be used (**never both**).

> **Note**
>
> The function *GetProperty()* can return the current value of the **typeweight** property.
>
> By defining a new string for typeweight will reset all previous settings.

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32. COLORTYPE

COLOR SCHEME ON THE PLATE (BACKGROUND VS CHARACTER COLORS)

Module property to exclusively read plates with either standard color schemes, or inverted color schemes, or both. (Background vs character colors)

- 0: Module searches for all plates in the image regardless of the type of color scheme.
- 1: Module searches for plates only with dark characters on light background.
- 2: Module searches for plates only with light characters on dark background. *Possible values:* {0,1,2}

Default value: 0

Suggested value: 0

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33. NCHAR_MAX

MAXIMUM NUMBER OF CHARACTERS IN THE PLATE

The maximum number of characters in the license plate. The engine does not return plates on which the number of characters is more than the nchar_max value **unless** they have an identified type (cmNP::type > 0).

Possible values: positive integers (bigger than nchar_min)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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34. NCHAR_MIN

MINIMUM NUMBER OF THE CHARACTERS IN THE PLATE

The minimum number of characters in the license plate. The engine does not return plates on which the number of characters is less than the nchar_min value **unless** they have an identified type (cmNP::type > 0).

Possible values: positive integers (between 0 and nchar_max)

Default value: varies with each engine release; default property value can be queried by the `GetProperty()` function

Suggested value: leave the default value

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PROPERTIES RELATED TO CUSTOMIZATION OF RESULTS

35. GAPTOSPACE

GAPS BETWEEN CHARACTERS

If this parameter is set to a positive value, the module searches for gaps between characters that can be spaces. Space characters are inserted into these positions in the **text** and **wtext** fields of the result structure. If the value is zero, no spaces will appear in the result.

Meaning of the possible values:

- 0: the text is returned in one block (no spaces will appear in the result)
- 1: spaces are inserted instead of gaps into **text** and **wtext** members of the **cmNP** structure. The cmAnpr engine calculates the positions of the gaps based on the frames of the characters. If the gap is wide enough, spaces are inserted into text and **wtext**
- 2: This feature is only available for engine version 7.2.8.6 and higher. In this case, spaces are inserted into the corresponding positions by default. But by the following parameters, the user can define the mode of the return of the text:

symbolnewrow	beginning of a new row
symbollowcharstart	beginning of the small characters
symbollowcharend	end of the small characters
symbolarms	coat of arms
symbolhyphen	hyphen
symbolspace	space
symbolverticalline	vertical line

First, the engine identifies the country/state of the license plate, which defines the layout of characters and symbols. The symbols are then substituted with the ASCII characters specified in the corresponding property as shown in the table above.

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The following license plate is a sample, which contains the most possible text positions:

If the gaptospace parameter is set to 0 the returned text will be: AB123DF234GH

- if it is set to 1, the text will be: AB 123 DF 234 GH
- if it is set to 2 the text will be the same, but by the following parameters the returned text can be defined more precisely:

```
symbolnewrow=47
symbollowcharstart=40
symbollowcharend=41
symbolarms=42
symbolhyphen=45
symbolverticalline=124
symbolspace=95
```

With these settings the user receives the following text: */AB|(1/2/3)DF_234-GH

Sample gxsd.dat entry:

```
<cmanpr-7.2.8.8>
...
   <gaptospace value="2"/>
   <symbolnewrow value="47"/>
   <symbollowcharstart value="40"/>
   <symbollowcharend value="41"/>
   <symbolarms value="42"/>
   <symbolhyphen value="45"/>
   <symbolverticalline value="124"/>
   <symbolspace value="95"/>
...
</cmanpr-7.2.8.8>
```

Possible values: {0,1,2}

Default value: 0

Suggested value: 2 – if the geometry of the license plate needs to appear in the **text** and **wtext**

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36. AUTOTYPEMODIFICATION

This parameter allows the state recognition purely by plate text (only available in the engines which contains Mexico – CAM, MEX, NAM). The regions are determined by the predefined range of plate types. This overrules the recognised region if any.

Possible values: {0,1}
Default value: 0 (except in CAM, MEX, NAM)

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37. CONVERT0TOO

If this parameter is set to 1 all 0 (zeros) will be converted to "O" – only in case of general engine where no syntax check is available.

Possible values: {0,1}
Default value: 0

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38. COUNTRYNAME

RETRIEVING COUNTRY/STATE NAMES DIRECTLY

(available from engine version 7.3.9.71)

This property enables the user to directly retrieve country and state information from the recognized images.

Possible values: string
Default value: „default" – returns the country information in the form of country codes listed in Appendix.
Suggested value: „default"

Engine versions 7.3.9.70 and earlier, (including all versions 7.2.8.x and 7.2.7.x), returned the country and state information encoded in the type field of the cmNP structure. A full description on country and state information retrieval in earlier engine versions can be found in the Retrieving country names from returned plate type values section.

From version 7.3.9.71, the engine can return the country or state code itself.

The engine will, in the majority of cases, return either an ISO 3166-1 alpha-3 or a 3166-2 code. However, there are some countries and/or regions that the engine can recognize but are not present in the official ISO registry and therefore have no official ISO codes. In these cases, easily identifiable but non-official ISO codes were used. For the complete country code table please see Appendix.

The countryname property can be used to:

- Retrieve country codes.
- Customize country codes.
- Retrieve country codes with type values.

1. RETRIEVING COUNTRY CODES

After successfully processing an image (if a previous call of `cmAnpr.FindFirst` or `cmAnpr.FindNext` returned true), the value of this property will contain the country that issued the recognized license plate.

For example:

```
if (cmAnpr.FindFirst(image))
{ string country = cmAnpr.GetProperty(„countryname”); }
```

The string „country” will contain the code of the country as listed in Appendix

2. CUSTOMIZING AND RESETTING:

Before calling cmAnpr.FindFirst, set the substitution text to a certain country ID by creating a new property name: „countryname_”+country_ID, where country_ID can be anything from the „*Country – State (CountryName)*” column of the table in Appendix

```
cmAnpr.SetProperty(„countryname_US-TX”, „TEXAS”);
```

After this call, in all cases when the recognized plate is from Texas, the engine will return country=”TEXAS” instead of country=”US-TX”.

To reset every previously set custom country name, call:

```
cmAnpr.SetProperty(„countryname”, „default”);
```

3. RETRIEVING COUNTRY CODES FROM TYPE VALUES

With the help of this property it is also possible to retrieve the country code of a certain license plate type if only the information returned in the type field of a cmNP data structure is given.

Suppose that a license plate has the following type value,101112, but you do not know what country it represents. In this case it is possible to feed this value to the engine and it will return the country code:

```
string country = cmAnpr.GetProperty(„countryname_101112”);
```

After this call, the engine will return that the country=”HUN”

> Note
>
> This call is independent from FindFirst and FindNext.

If the specified number does not represent a possible license plate type, the `GetProperty()` call above will return „Invalid type”.

> Note
>
> Another direct retrieval of Country and State text is also available in the SDK through the “`cm_getcountrycode()`.” function and “CC_TYPE enumeration.”. For more information: please see the SDK Programmers Manual.

39. CYRILLIC_STYLE

Successor of this property is local_character_conversion.

This parameter allows the user to show the results in Cyrillic characters. In case of 1, the engine will return the Russian plates in Cyrillic format.

Possible values: {0,1}
Default value: 0

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40. LOCAL_CHARACTER_CONVERSION

This parameter allows the user to show the results in local language characters.

0 – show results with Latin characters
1 – the engine will return the Russian plates in Cyrillic format
2 – the engine will return the Nepali plate results in Nepali characters
3 – 1+2 – both Nepali and Russian plates shown in local language characters

Possible values: {0,1,2,3}
Default value: 0
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41. UNICODE_IN_TEXT

Representation of the non-ASCII characters in the text parameter of the cmNP structure.
Meaning of the possible values:

- 0: The non-ASCII characters are replaced with an exclamation mark ('!')
- 1: Each non-ASCII character is represented with 6 ASCII characters: '(xxxx)', where xxxx is the Unicode code of the character in hexadecimal form including the leading zeros
- 2: Each non-ASCII arabic character is represented with the corresponding latin character

Possible values: {0,1,2}
Default value: 1
Suggested value: 1
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PROPERTIES RELATED TO COLOR RECOGNITION

42. ANALYZECOLORS

COLOR RECOGNITION MODE

This property selects the color recognition mode for license plates, but only when the plate color is an additional distinguishing feature that carries extra information. Meaning of the possible values:

- 0: Color identification is disabled
- 1: cmAnpr engine returns discrete color values – see table below. During processing, the engine reads exact BGR values, and the statistically most probable results are given.

> **Note**
>
> Due to statistical reasons, results based on discrete values may be incorrect in case of plates with previously "unseen" colors (e.g. blue plates will not be identified if there were only red and orange ones available when the `cmAnpr` engine was released).

- 2: cmAnpr engine returns the exact BGR (Blue, Green, Red) values read (further processing may be required by the user in order to define the exact color)
- 3: (not available value)
- 4: In case of certain contemporary Saudi Arabian plates, where the band color is also marked with a symbol (circle, or isosceles triangle pointing to various directions), a discrete color value is returned according to the marker symbol.
- 5: Both color identification and symbol reading are applied to recognize color. Discrete color values are returned such as in case of value 1.
- 6-7 (not available values)
- 8: Color identification based purely on plate text color indication (currently only in case of Thailand plates)
- 9: Color identification based on both plate text color indication and exact color recognition (currently only in case of Thailand plates)

The cmAnpr engine is capable of recognizing the color of a license plate only when the following requirements are fulfilled:

- the country/state recognition feature must be enabled (depth > 0)

Note

Set an adequate timeout value according to instructions in the timeout section above, which will allow full processing of the country/state recognition.

- the engine must correctly identify the country/state since the layout defines the location of the color area
- the `analyzecolors` property has to be set to {1,2,4,5,8,9}

Note

The color recognition feature is defined only for the values listed above. When setting values 4 or 5, color information may be returned from grayscale images as well for the contemporary plate types of Saudi Arabia.

Color codes and names

Color	BGR Code	Decimal (returned value)
White	0xFFFFFF	16777215
Black	0x000000	0
Blue	0xFF0000	16711680
Cyan	0xFFFF00	16776960
Green	0x00FF00	65280
Orange	0x0080FF	33023
Yellow	0x00FFFF	65535
Red	0x0000FF	255

Possible values: {0,1,2,4,5,8,9}
Default value: 0

Suggested value: 5 – in case color recognition is required, otherwise leave the default value

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43. WHITEBALANCE

WHITE BALANCE CORRECTION

When applying color recognition, the white balance is set automatically by the engine. In some special cases (e.g. special camera settings, extreme weather or light conditions) the returned colors may not be correct. To avoid misrecognition of colors the **whitebalance** property can be used.

- If it is set to 0 then white balance correction is not used.
- If it is set to 100 then maximal white balance correction is applied

24/7 use of white balance correction can also be applied. Incorrect results may return only when the camera is used in very different environmental conditions in a very short time (e.g. the camera is used at night with **whitebalance 100**, turned off and then turned on in the morning with the same settings).

Possible values: [0..100]
Default value: 100
Suggested value: 100
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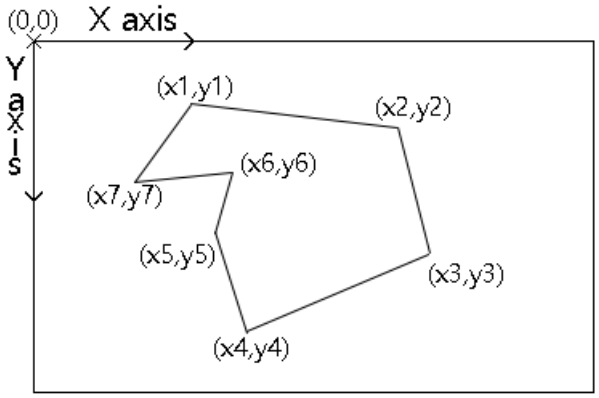
PROPERTIES RELATED TO THE POSITION OF LICENSE PLATES IN INPUT IMAGES

For the below properties we are using polygons as follows:

One Polygon is: P = x_1,y_1; x_2,y_2; x_3,y_3; ...; x_i,y_i; ...; x_n,y_n

Where (x_i,y_i) means one point on a picture in axis parallel coordinate system. The origo (0,0) is the top left corner. On the X axis the values are increasing rightwards, on the Y axis the values are increasing downwards. You have to set the polygon points clockwise.



x1 = 100; y1 = 40
x2 = 250; y2 = 55
x3 = 280; y3 = 130
x4 = 130; y4 = 195
x5 = 110; y5 = 110
x6 = 120; y6 = 80
x7 = 80; y7 = 95

44. POSFREQ

POSITION FREQUENCY

By using the position frequency, certain areas can be specified for the ANPR engine, which are more superior to the others.

With the following parameters, the ANPR algorithm can be set to search for license plates on specific parts of the image. Moreover, some parts can be differentiated according to probability of the license plate occurrence. The essence of the method is that the image is divided into equal zones and each zone is provided with a weight.

The correct value assignment of the weight increases the effectiveness of the searching process. Giving a larger weight of the appointed zone increases the probability of finding the plate and decreases the plate reading time.

The weight assignment is possible in three ways:

- by *uniform distribution*: the weight of each zone will be the same positive number,
- *defining zones*: zones can be defined by the user,
- *defining a polygon*: the polygon should contain all the plates to be read.

The weights may be calculated in a self-adaptive way, as well. In this case, the engine calculates the weights by itself based on the incoming images: each found plate increases the weight of that zone which contains the plate.

The property contains a string of characters. It consists of numbers separated by ',' and ';', where ',' separates the numbers and the ';' stands for the line wrap.

If the string is empty, it initializes the grid with uniform distribution (the weight of each zone will be the same positive number). If there are exactly two numbers and at least three number pairs (two columns and three rows), the string defines a polygon. Otherwise, it defines zones, where the given numbers represent the starting weights of each zone.

The data is invalid if the rows are not the same length or if there are less than two columns, or less than three rows.

Zero-weight zones are omitted from the search for license plates. However, the engine will provide results even for plates partially located in a zero-weight zone, if the other parts of the license plate can be found in a non-zero weight zone.

For example:

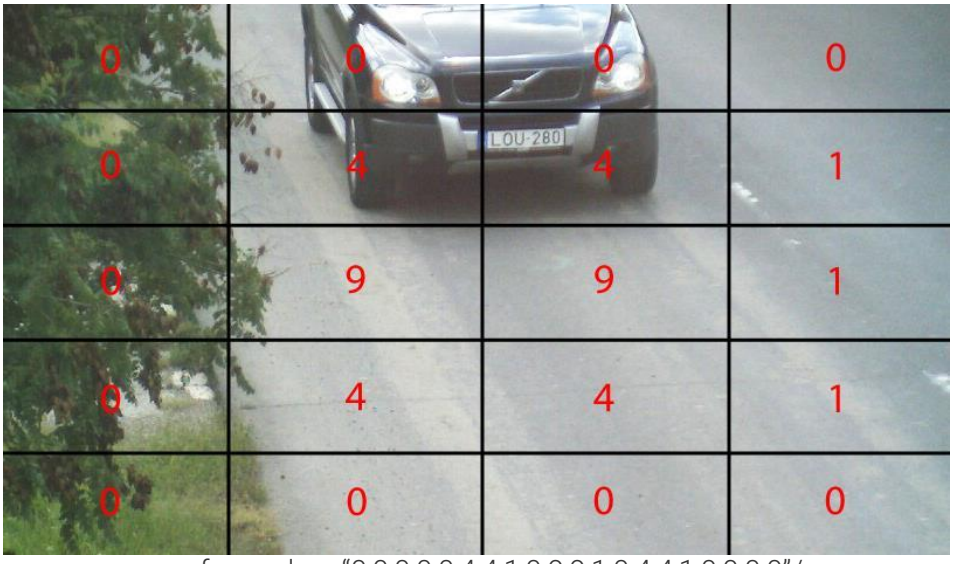
Defining zones:

<posfreq value="1,1,1;4,9,4;1,1,1"/>

The image is divided into 3×3 zone with the given starting weights.

1	1	1
4	9	4
1	1	1

Please check the following sample image, which indicates superior areas in the center of the image:



<posfreq value="0,0,0,0;0,4,4,1;0,9,9,1;0,4,4,1;0,0,0,0"/>

Defining a polygon:

<posfreq value="420,225;985,225;1085,685;300,685">

Note

The order of the coordinates has to be set clockwise (see below). A polygon is designated in the center of the image, on the score of which the algorithm produces the zones (posfreqhistxs*posfreqhistys is the number of zones, 16*16 by default) in such a way that the starting weight of the zones – contained by the polygon – will be maximal. The weight of the zones intersected by the polygon will be lower in proportion to the intersection. Finally, the weight of the outer (untouched by the polygon) zones will be 0. It does not return any character from the zones with 0 weight.

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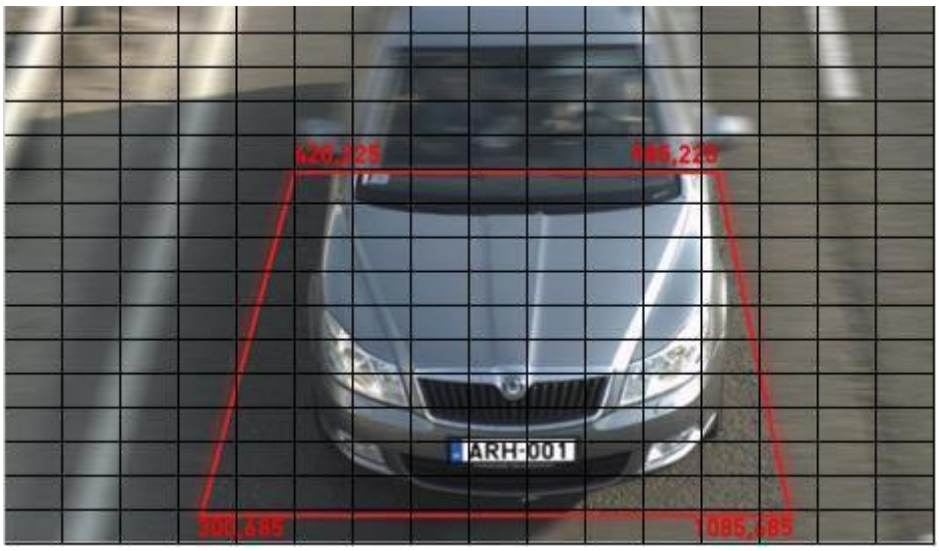
Example for a polygon posfreq setting:



Possible usage of posfreq polygon

(points are represented in pixel coordinates on the 16x16 default grid)

Possible values:	character string
Default value:	"" (empty string)
Suggested value:	leave the default value

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45. ROI/ROU

REGION OF INTEREST / REGION OF UNINTEREST
(available from version 7.3.11.189)

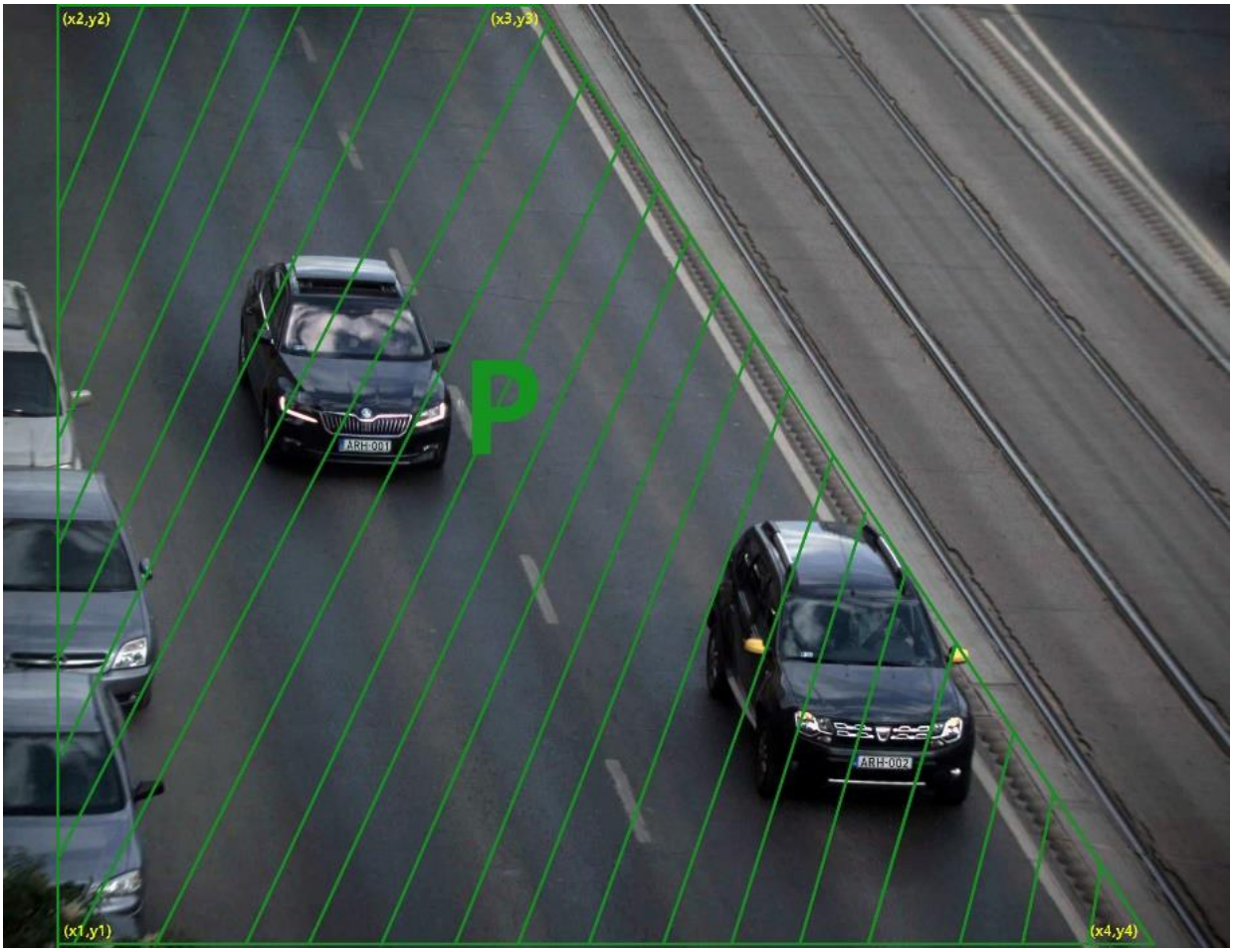
Please check how to define a polygon at the beginning of this section.

45.1. ROI

REGION OF INTEREST

Please check how to define a polygon at the beginning of this section.
You can set, with this property, the polygon(s) where CARMEN® should search for the license plates.
Usage:

- P: CARMEN® will search the LP inside the polygon (delete the previous ROI settings)
- P1 + P2 + … + Pn: set more polygons at the same time (delete the previous ROI settings)
- +P: add one more polygon to the existing ones, it will NOT delete the previous settings
- *del*: delete the previous ROI settings

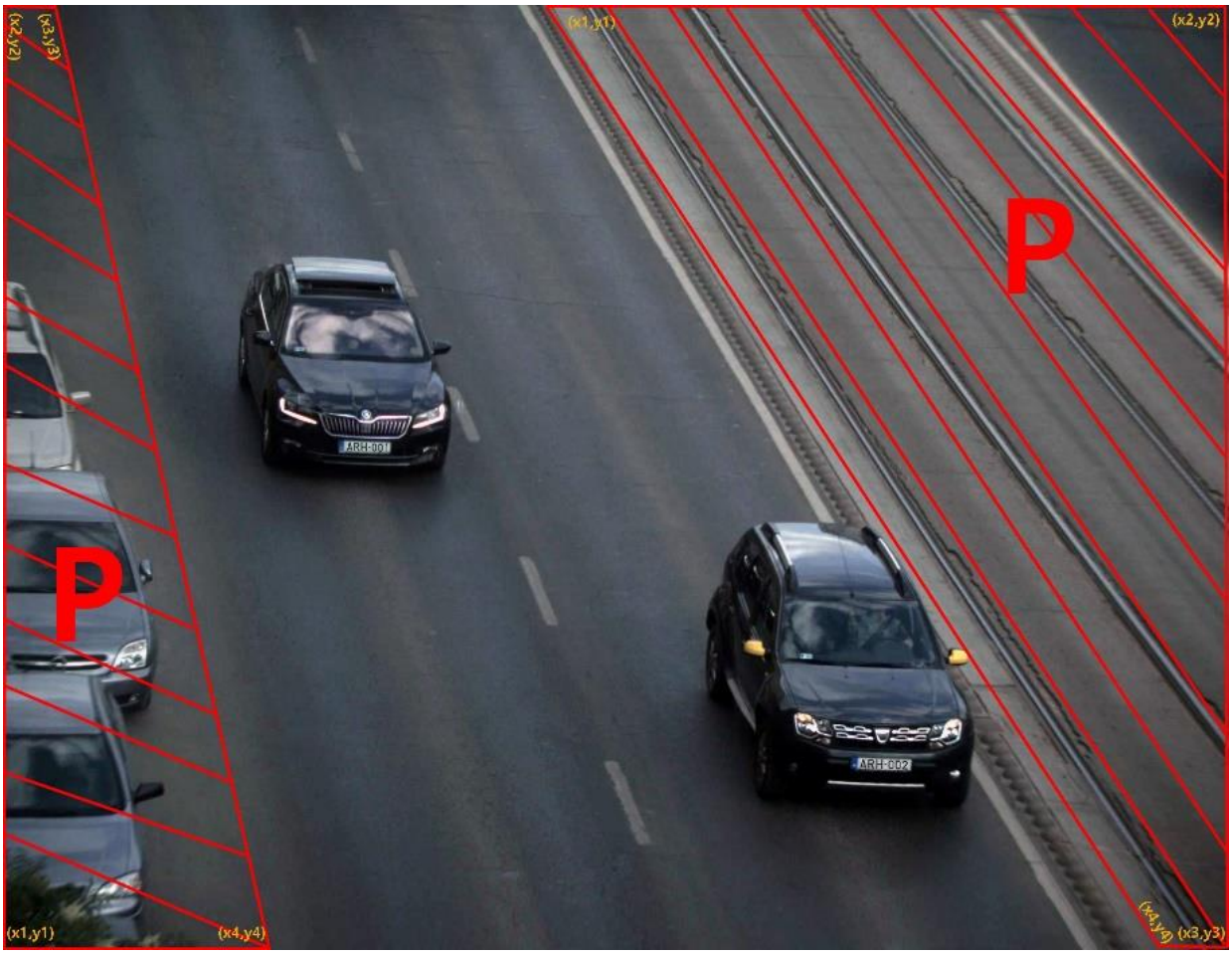


This parameter can be set, get, its values saved into gxsd.dat, and it's readable from there.
If you set ROI only then CARMEN® will search the LP only inside the ROI.

45.2. ROU
REGION OF UNINTEREST

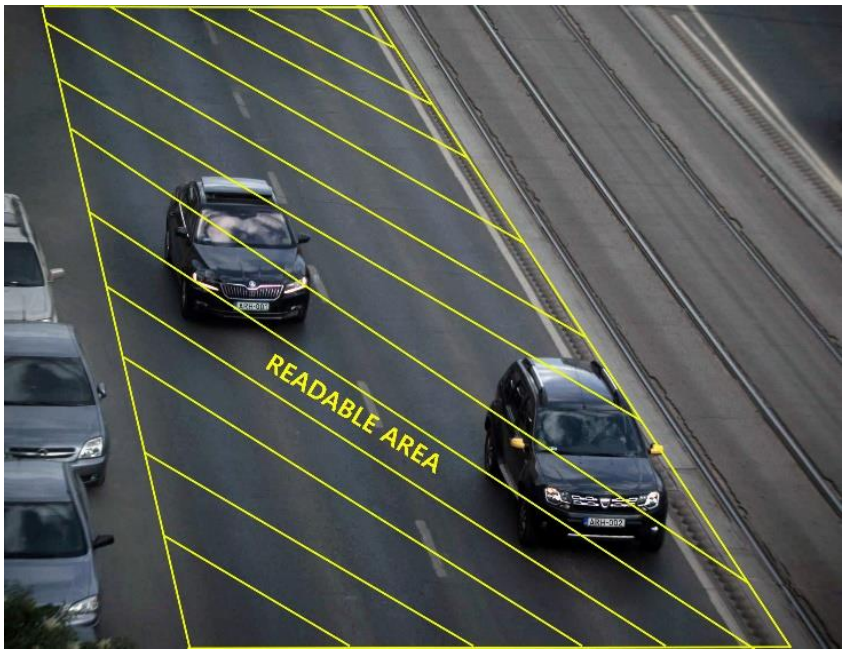
Please check how to define a polygon at the beginning of this section.
You can set with this property the polygon(s) where CARMEN® shouldn't search for the license plates.
Usage:

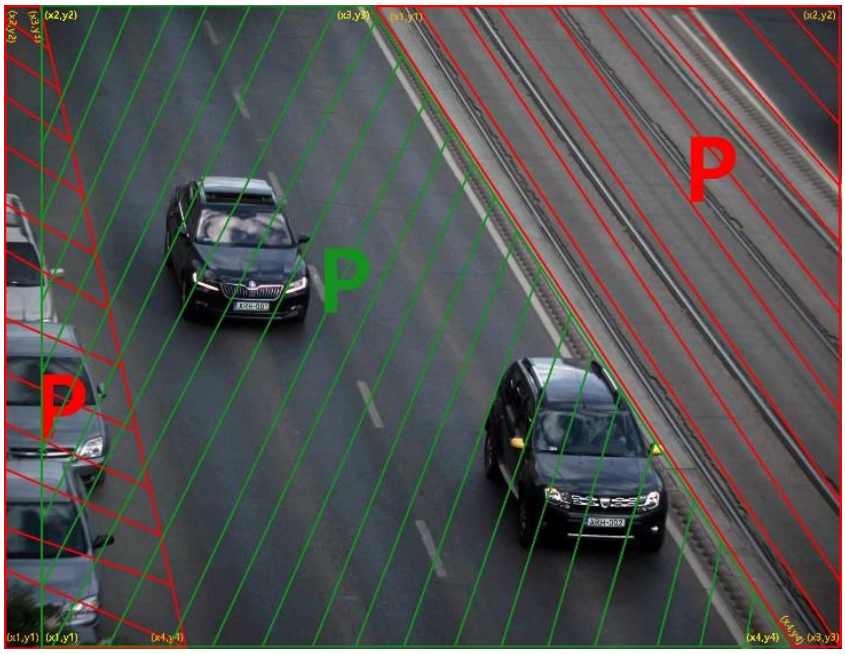
- P: CARMEN® will NOT search the LP inside the polygon
- P1 + P2 + … + Pn: set more polygons at the same time (delete the previous ROU settings)
- +P: add one more polygon to the existing ones, it will NOT delete the previous settings
- *del*: delete the previous ROU settings



This parameter can be set, get, its values saved into gxsd.dat, and it's readable from there.
If you set ROU only then CARMEN® will search LP outside ROU.

If you set ROI and ROU as well then CARMEN® will search LP only inside ROI where there is no ROU, so ROU is the stronger condition.





Note

If you set posfreq as a polygon then it will delete the ROI and ROU and overwrite the ROI with the posfreq polygon.

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Note

We strongly suggest not to use the posfreq and the ROI/ROU parameters simultaneously to avoid future difficulties.

46. POSFREQHALFLIFE

LEVEL OF WEIGHT ADAPTATION

If its value is 0, the weights will not be adapted (it does not learn from the previous cases). It will use the original settings all the time.

Otherwise, after 'posfreqhalflife' number of evaluations, the starting information will be half lapsed and the new information will be half freshened.

Half-life: after the evaluation of so many images, the total weight of the histogram will be twice as much.

Possible values: [0..1048576]

Default value: 0

Suggested value: 0

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47. POSFREQHISTXS

HORIZONTAL RESOLUTION FOR DEFINING POSITION FREQUENCY

In case of setting a polygon or zones, the number of columns can be set by this property.

Possible values: [2..64]

Default value: 16

Suggested value: 16

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48. POSFREQHISTYS

VERTICAL RESOLUTION FOR DEFINING POSITION FREQUENCY

In case of setting a polygon or zones, the number of rows can be set by this property.

Possible values: [2..64]

Default value: 16

Suggested value: 16

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49. POSFREQWEIGHT

WEIGHT FOR THE POSITION OF THE LICENSE PLATES

This parameter defines the extent the system has to take into account the position of the license plates.

If this parameter is 0, the system does not distinguish between the non-0 weight zones. In this case, the searching does not exploit the distribution of the position of license plates.

If this parameter is 100, the system tries to exploit maximally the distribution of the position of license plates.

Possible values: [0..100]

Default value: 50

Suggested value: 50

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PROPERTIES RELATED TO IMAGE QUALITY

50. GAMMA

TURNING ON/OFF GAMMA CORRECTION ON INPUT IMAGES
(available from version 7.2.7.87)

This property provides the option to apply gamma correction, which makes input images brighter.

Meaning of the possible values:

- 0: Gamma correction is disabled.
- 1: Gamma correction is applied with the standard correction value of 2.2, which can result in better recognition rates in case of images with lower contrast.

Image without gamma correction

Image with gamma correction

Possible values: {0,1}
Default value: 0
Suggested value: 0 – image quality issues should be resolved in the camera

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PROPERTIES RELATED TO THE CALCULATION OF THE CONFIDENCE LEVEL

51. CONFIDENCEMODE

CALCULATION OF PLATE CONFIDENCE, (SUCCESSOR OF PLATECONF)

*(available from version 7.2.8.41 – **Confidence modes 8-15 are available from 7.3.10.204**)*

Unlike plateconf, confidencemode has several options to fine-tune the calculation method of the returned overall confidence level. From version 7.2.8.41, use this property instead of plateconf. The possible values and their meanings are listed in the table on the next page.

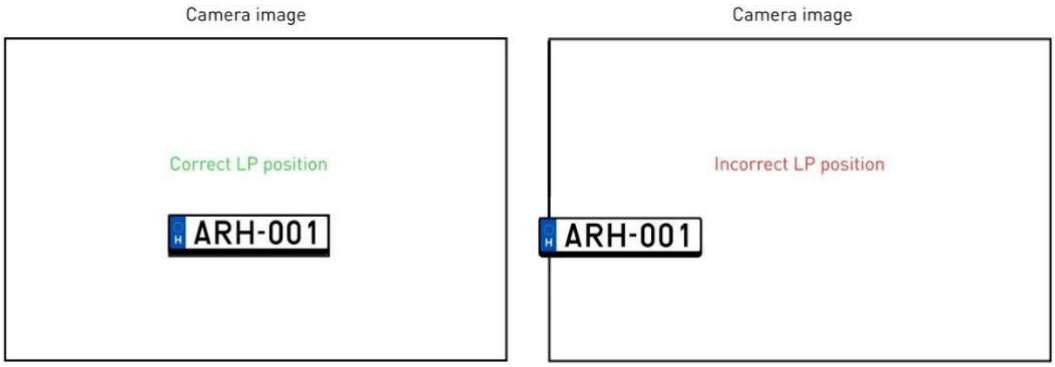
The confidence level can be calculated in several ways but we can choose from two basic principles:

1) Having the product of the factor(s), (text, type and position), as the final confidence level. (Confidence modes 0-7)

OR

2) Having the arithmetic mean, (average), of the factor(s) as the final confidence. (Confidence modes 8-15)

3) The latter will show a higher confidence rate (for the same reading) but will be less scalable.
4) The following image demonstrates the required license plate position on the camera image:



Meaning of the possible values:

confidencemode	Formula for the returned confidence				Equivalent to plateconf value	Comments
	Factors			Formula		
	Text confidence	Type confidence	Position confidence			
0	100			Constant	-	Confidence level calculation is disabled, the engine will always return 100 as overall confidence
1	Qtext			$\prod Qc_n$	0	The text confidence will be returned by multiplying each character's confidence
2		Qtype		Qtype	-	The type confidence will be returned
3	Qtext	Qtype		Qtext * Qtype	1	The product of the text confidence and the type confidence will be returned
4			Qpos	Qpos	-	The position confidence will be returned
5	Qtext		Qpos	Qtext * Qpos	-	The product of the text confidence and the position confidence will be returned
6		Qtype	Qpos	Qtype * Qpos	-	the product of the position confidence and the type confidence will be returned
7	Qtext	Qtype	Qpos	Qtext * Qtype * Qpos	2	The product of the position confidence, the type confidence and the text confidence will be returned

confidencemode	Formula for the returned confidence				Equivalent to plateconf value	Comments
	Factors			Formula		
	Text confidence	Type confidence	Position confidence			
8	100			Constant	-	The engine will always return 100 as overall confidence
9	Qtext			$\overline{Qtext}$	-	The text confidence will be returned by taking the arithmetic mean (average) of the character's confidence
10		Qtype		Qtype	-	The type confidence will be returned
11	Qtext	Qtype		$\frac{(\overline{Qtext} + Qtype)}{2}$	-	The arithmetic mean (average) of the text confidence and the type confidence will be returned
12			Qpos	Qpos	-	The position confidence will be returned
13	Qtext		Qpos	$\frac{(\overline{Qtext} + Qpos)}{2}$	-	The arithmetic mean (average) of the text confidence and the position confidence will be returned
14		Qtype	Qpos	$\frac{(Qtype + Qpos)}{2}$	-	The arithmetic mean (average) of the position confidence and the type confidence will be returned
15	Qtext	Qtype	Qpos	$\frac{(\overline{Qtext} + Qtype + Qpos)}{3}$	-	The arithmetic mean (average) of the position confidence, the type confidence and the text confidence will be returned

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For more information on the above calculation, see the appendix Confidence Level Calculation.

Possible values: {0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15}

Default value: 7

Suggested value: 7

Note

If you set posfreq and confidencemode as well, then that one will take affect which you set later and it is possible that it may overwrite the other value.
For example:

- If confidencemode is set to 4 and later you set plateconf to 2, then confidencemode will be overwritten to 7
- If plateconf is set to 1 and later you set confidencemode to 12, then confidencemode will take affect and plateconf will not be changed

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51.1. CONFIDENCEMODE_X

(available from version 7.3.12.5)

After a successful ANPR you can get additional confidence results. You have to replace „X" with the appropriate number (0 - 15) from the above table. For example, confidencemode_5 will provide you the text confidence and the position confidence multiplied together.
You can only get this property, it is not possible to set it!
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52. PLATECONF

CALCULATION OF THE PLATE CONFIDENCE

(available from version 7.2.7.106)

Successor of this property is confidencemode.

In case of *plateconf* =0 the text confidence (Q_{text}) will be returned.

In case of *plateconf* =1 text and type confidence (Q_{type}* Q_{text}) will be returned.

In case of *plateconf* =2 the overall confidence (Q_{pos}* Q_{type}* Q_{text}) will be returned.

For more information on the above calculation, see the appendix Confidence Level Calculation

Possible values: {0,1,2}

Default value: 2

Suggested value: 2 - Please use the successor parameter: confidencemode.

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Note

If you set posfreq and confidencemode as well, then that one will take affect which you set later and it is possible that it may overwrite the other value.
For example:

- If confidencemode is set to 4 and later you set plateconf to 2, then confidencemode will be overwritten to 7
- If plateconf is set to 1 and later you set confidencemode to 12, then confidencemode will take affect and plateconf will not be changed

53. ZEROCONFIDENCERESULTS

ENABLE ALL RESULTS

In case of dual or 2 level engines, you can turn on this feature to enable all results in case of very **low false positive rate** engines.

For example - **FRQFPO** or **PSTFPO** two-step engines:

value 0 – no result in case of unknown type or text

value 1 – the engine will provide a result (text and type) with 0 confidence value

- you can accept all results (higher than 0 confidence level) to still get the super low false positive results
- and send all 0 confidence level results to manual review or to level 2 engine

Possible values: {0,1}

Default value: 0

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PROPERTIES RELATED TO MEMORY HANDLING

54. HEAPFREEFREQ

During the run of an engine it reserves some memory resource for itself. It can happen that for a large image it reserves a bigger amount of memory (this is a normal behaviour). This may remain reserved for CARMEN® even if later it uses only smaller amount of the memory.
You are able to free up the memory which is allocated to CARMEN® with this property. If you set this property to 30 then it means after every 30 `FindFirst()` calls, it will free up the memory. We suggest you to use this property if you have 2 GB memory or less.

Possible values: {0, every positive integer}
Default value: 0
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Properties related to Make and Model Recognition (MMR)

The CARMEN ANPR products from version v7.3.1.21 are equipped with the new Make and Model Recognition (MMR) feature.
If the CARMEN system contains a typed (not the general) CARMEN engine and an MMR engine (mmr-x.x.x.x.dll on Windows or mmr-x.x.x.x.so on Linux), the CMANPR module can recognize make, model, category and the color of the vehicles.
The CMANPR module can get the MMR information in two ways: auto and manual.
Using the **auto mode** the CMANPR module generate MMR information after every number plate reading (FindFirst, FindNext).
This mode is recommended if you want to recognize every single image (e.g. each image from a video/image sequence, or from multiple standalone images).
The **manual mode** is useful if you have many images or image sequences (e.g. Highway events or video) and you can define the exact image(s) from which the MMR should create a result. In this case you can get MMR information only from the best image of the sequence.
To get the results use the getMMR function of the CMANPR module. You need the image and the number plate reading result (cmNP structure) to call getMMR function.
In both cases (auto and manual) you can get the MMR result trough the properties below.

Available property names to get the MMR result
NOTE: All properties are read only!

- mmr/mm/make: the 'make' from the make&model of the recognized vehicle.
- mmr/mm/model: the 'model' from the make&model of the recognized vehicle.
- mmr/mm/submodel: the 'sub model' from the make&model of the recognized vehicle.
- mmr/mm/fullmm: the 'make model submodel' from the make&model of the recognized vehicle.
- mmr/mm/conf: the confidence of the 'make&model' recognition.
- mmr/category: the 'category' of the recognized vehicle. Three characters code.
  Known categories (full name):
  - unk (unknown)
  - bus (bus)
  - car (car)
  - hvt (heavy truck)
  - lgt (light truck)
  - mtb (motorbike)
  - van (van)
- mmr/category/fullname: the full name of the category
- mmr/category/conf: the confidence of the 'category' recognition.
- mmr/color/code: the 'color' code of the recognized vehicle.

- mmr/color/name: the 'color name' of the recognized vehicle.
  Known colors names:
  - black
  - brown
  - blue
  - purple
  - red
  - green
  - orange
  - yellow
  - gray
  - white
- mmr/color/conf: the confidence of the 'color' recognition.
- mmr/time: the time of the last MMR recognition in msec.

New properties for the CARMEN ANPR products from version v7.3.1.21 (regarding ANPR and MMR engines):

NOTE: All properties are read only except 'anpr/fullname', 'mmr/fullname' and 'mmrmode'!

anpr/fullname: The name of the actual (current) ANPR engine. Same as the anprname property.

anpr/module: The name of the actual (current) ANPR engine's module (cmanpr-x.x.x.x.dll or cmanpr-x.x.x.x.so).

anpr/region: The name of the actual (current) ANPR engine's region (property group from the full name, the string after ':').

anpr/status/code: The status value of the actual ANPR engine.

Available status values:

0 (no status): No status info

1 (valid): The ANPR engine is valid and there is a license for the engine

-1 (no engine): The default ANPR engine isn't defined

-2 (invalid) : 'anprname' or 'anpr/fullname' property defines an invalid ANPR engine

-3 (no license) : The ANPR engine is valid but there is no license for the engine

anpr/status/msg: The ANPR engine status information in string format.

anpr/supportmmr: 1 if the ANPR engine supports the MMR feature.

mmr/fullname: The name of the actual (current) MMR engine. It can be altered during runtime. Its value can be set according to the following: **MMR engine module name : property group.** If there is no specified property group then the cmanpr module handles it as 'default'.

mmr/module: The name of the actual (current) MMR engine's module (mmr-x.x.x.x.dll or mmr-x.x.x.x.so) .

mmr/region: The name of the actual (current) MMR engine's region (property group from the full name, the string after ':').

mmr/status/code: Status value of the actual MMR engine.

Available status values:

0 (no status): No status info

1 (valid): The MMR engine is valid and there is a license for the engine

-1 (no engine): The default MMR engine isn't defined

-2 (invalid) : 'mmr/fullname' property defines an invalid MMR engine

-3 (no license) : The MMR engine is valid but there is no license for the engine

mmr/status/msg: The MMR engine status information in string format.

mmrmode - Set the MMR mode (default value: 0)

Available modes:

0 (off) : no MMR recognizing

1 (auto) : automatic MMR recognizing every Findfirst calling

2 (manual) : MMR recongizing by calling the cm_getmmr (getMMR) function

APPENDICES

CONFIDENCE LEVEL CALCULATION DETAILS AND EXAMPLE

CARMEN® engines return a confidence level value for each result. This confidence level is always an integer from 0 to 100 and is a measure of the correctness of the result. In other words, it represents how sure the engine is that the result is correct. Higher confidence level means a more reliable result. It is important to mention that even if the confidence level is low, the result can be correct.

> **Note**
>
> The confidence level has no correspondence with the recognition rate. The confidence level is always related to one individual OCR result, (either a single character, or a complete license plate, etc.), while the recognition rate, (the percentage of the license plates that are read correctly,) is always related to a set of images and a reference result set.

CARMEN® calculates separate confidence levels for each subtask of the license plate recognition. These are:

- q_i confidence of the ith character (*values 0 to 100*)
- Q_{text} Where Q_{text} = prod(qi), i=1,...,n ***OR*** Q_{text} = avg(qi), i=1,...,n
- Q_{type} confidence of the country/state recognition
- Q_{pos} confidence of the plate position in the image – if it is at the edge of the image, then there is a chance for missing characters
- Q_{all} overall confidence level for the whole license plate – derived from the above

Derive overall confidence level from the separate confidence levels.

Example:

Consider a 6-character license plate with a "C" that is physically damaged (e.g. because of a screw). The recognition of this character is less reliable than of any others, and this weak point should reflect in the overall text confidence.

The formula for calculating the overall confidence level using all possible factors (*confidencemode=7*):

Qall = Qtext * Qtype * Qpos

See also confidencemode, plateconf.

SAMPLE CALCULATION

(CONFIDENCE MODE=7)

returned values

	returned values					
code	A	R	H	0	0	1
confidence	100	99	99	98	99	99
ncharacter	6					

	returned values
text	ARH001 (in ASCII string format)
wtext	ARH001 (in Unicode string format)
type	111 (defines Hungarian EU standard plate)
confidence	90

Text confidence:

Qtext = $\prod_{i=1}^{n} q_i$

$\prod_{i=1}^{n} q_i$)1* q2* q3* q4* q5* q6 – (qi values represent the confidence of the plate characters)

Since these values represent percentages, each q value has to be divided by 100:

=(q1/100)*(q2/100)*(q3/100)*(q4/100)*(q5/100)*(q6/100)

=(100/100)*(99/100)*(99/100)*(98/100)*(99/100)*(99/100)

So: $\prod_{i=1}^{n} q_i$),94

$Q_{text} \approx 94\%$

Overall confidence of the returned plate type

$Q_{all} = Q_{type} * Q_{pos} * Q_{text} = 90$ ('confidence' value above)

$$Q_{type} * Q_{pos} = \frac{Q_{all}}{\prod_{i=1}^{n} q_i} = \frac{Q_{all}}{Q_{text}}$$

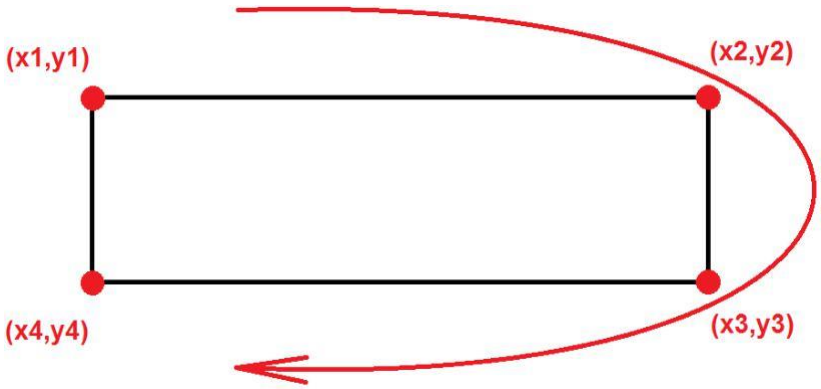
$Q_{type} * Q_{pos} = 90/94$

$Q_{type} * Q_{pos} \approx 95{,}74\%$

CALCULATING THE MINIMAL BOUNDING RECTANGLE OF THE RETURNED LICENSE PLATE

The engine returns a 4-point polygon as the frame of the license plate. This is not necessarily rectangular, and there can be cases **when some points are out of the image** (for example if the license plate is at the very edge of the image), if this happens, **negative numbers will be returned**.

The type of the cmNP::frame is gxPG4. It consists of 4 coordinate pairs (x1,y1; x2,y2; x3,y3; x4,y4), which are situated clockwise on the rectangle starting with the upper left corner:



Therefore, 4 points will be received, each referred by x and y coordinates. The coordinates of the top left and bottom right corners of the minimal bounding rectangle can be calculated, as explained in the following drawing:

Top left corner: x_min=min(max(0,min(x1,x2,x3,x4)),image.xsize)

y_min=min(max(0,min(y1,y2,y3,y4)),image.ysize)

Bottom right corner: x_max=max(0,min(max(x1,x2,x3,x4),image.xsize))

y_max=max(0,min(max(y1,y2,y3,y4),image.ysize))

Based on these formulas, width and height of the bounding rectangle can also be calculated.

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RETRIEVING COUNTRY NAMES FROM RETURNED PLATE TYPE VALUES

This chapter only applies to region-specific engines.

The returned cmNP::type value will be 0 (plate type info is not available) if either of these applies:

- the engine does not include country/state recognition option
- the engine cannot determine the country/state of the plate

The returned cmNP::type value by the engine contains the following information:

- country of the plate
- state information (or province – where applicable)
- subtype of the plate (based on syntax and layout, if detailed information is needed, feel free to contact ARH Support Team)

COUNTRY AND STATE ID'S (FOR ENGINE VERSION 7.2.8.X; 7.3.9.X; 7.3.10.X, 7.3.11.X, 7.3.12.X AND ABOVE)

(e.g. cmanpr-7.2.8.6-latin or cmanpr-eur-7.3.12.5_20Q2)

> **Note**
>
> The following calculation applies only for **engine versions 7.2.8.x** and above (e.g. cmanpr-7.2.8.6-latin).

The type value (T) is a decimal between 100000 and 999999. Divided this type value by 1000 the result is the code of the country (C). The remainder defines the subtype (S) within the country.

Example: USA engine

cmNP::type: 550549

C=550549/1000=550 defines USA-FL as country with the state.

The remainder (S) =549, refers to the above standard, single-row Florida plate format:

'letter number number number letter letter'

Example: Latin engine

cmNP::type: 101011

C=101011/1000=101 defines HUN (Hungary) as country.

The remainder (S) =011, refers to the standard, single-row Hungarian EU-plate

cmNP::type: 122012

C=122012/1000=122 defines DEU (Germany) as country.

The remainder (S) =012, refers to the standard, single-row German EU-plate

Note

NOTES FOR THE BELOW TABLES

1. Rows with **gray background** indicate that although the type code range is pre-reserved, the given country's licence plates are recognized without type codes.

   Upon request, they can be supported with type recognition too. For details contact your sales representative.

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
Europe						
101	101000 - 101999	HUN		HUN	Hungary	HUN
102	102000 - 102999	AUT		AUT	Austria	AUT
103	103000 - 103999	SVK		SVK	Slovakia	SVK
104	104000 - 104999	CZE		CZE	Czech Republic	CZE
105	105000 - 105999	SVN		SVN	Slovenia	SVN
106	106000 - 106999	POL		POL	Poland	POL
107	107000 - 107999	EST		EST	Estonia	EST
108	108000 - 108999	LVA		LVA	Latvia	LVA
109	109000 - 109999	LTU		LTU	Lithuania	LTU
110	110000 - 110999	ROU		ROU	Romania	ROU
111	111000 - 111999	BGR		BGR	Bulgaria	BGR
112	112000 - 112999	HRV		HRV	Croatia	HRV
113	113000 - 113999	BIH		BIH	Bosnia Herzegovina	BIH
114	114000 - 114999	SRB		SRB	Serbia	SRB
115	115000 - 115999	MKD		MKD	North_Macedonia	MKD
116	116000 - 116999	MNE		MNE	Montenegro	MNE
117	117000 - 117999	ALB		ALB	Albania	ALB
118	118000 - 118999	GRC		GRC	Greece	GRC
119	119000 - 119999	TUR		TUR	Turkey	TUR
120	120000 - 120999	NLD		NLD	Netherlands	NLD
121	121000 - 121999	LUX		LUX	Luxembourg	LUX
122	122000 - 122999	DEU		DEU	Germany	DEU
123	123000 - 123999	BEL		BEL	Belgium	BEL
124	124000 - 124699	FRA	FRA	FRA-FRA	France - French	FRA-FRA
124	124700 - 124999	FRA	OT	FRA-OT	France - Overseas territory	FRA-OT
125	125000 - 125999	CHE		CHE	Switzerland	CHE
126	126000 - 126999	ITA		ITA	Italy	ITA
127	127000 - 127999	PRT		PRT	Portugal	PRT
128	128000 - 128999	ESP		ESP	Spain	ESP
129	129000 - 129999	EUR		EUR	European Organization	EUR
131	131000 - 131799	DNK	DNK	DNK-DNK	Denmark - Denmark	DNK-DNK
131	131800 - 131899	DNK	FRO	DNK-FRO	Denmark – Faroe Islands	DNK-FRO
131	131900 - 131999	DNK	GRL	DNK-GRL	Denmark - Greenland	DNK-GRL
132	132000 - 132999	NOR		NOR	Norway	NOR
133	133000 - 133999	SWE		SWE	Sweden	SWE
134	134000 - 134899	FIN	FIN	FIN-FIN	Finland - Finland	FIN-FIN
134	134900 - 134999	FIN	ALA	FIN-ALA	Finland - Aland	FIN-ALA
140	140000 - 140999	GBR	GBR	GBR-GBR	Great Britain - Great Britain	GBR-GBR
141	141000 - 141999	GIB		GIB	Gibraltar	GIB
142	142000 - 142999	IMN		IMN	Isle of Man	IMN
143	143000 - 143999	JEY		JEY	Jersey	JEY
144	144000 - 144999	GGY		GGY	Guernsey	GGY
145	145000 - 145999	ALD		ALD	Alderney	ALD

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
146	146000 - 146999	GBR	NIR	GBR-NIR	Great Britain - Northern Ireland	GBR-NIR
149	149000 - 149999	IRL		IRL	Ireland	IRL
171	171000 - 171999	RUS		RUS	Russia	RUS
172	172000 - 172799	UKR		UKR	Ukraine	UKR
172	172800 - 172899	UKR	LPR	UKR-LPR	Ukraine - Luhansk	UKR-LPR
172	172000 - 172999	UKR	DPR	UKR-DPR	Ukraine - Donetsk	UKR-DPR
173	173000 - 173999	MDA		MDA	Moldavia	MDA
174	174000 - 174999	BLR		BLR	Belarus	BLR
175	175000 - 175999	GEO		GEO	Georgia	GEO
176	176000 - 176999	AZE		AZE	Azerbaijan	AZE
177	177000 - 177999	ARM		ARM	Armenia	ARM
178	178000 - 178999	KAZ		KAZ	Kazakhstan	KAZ
179	179000 - 179999	ABH		ABH	Abkhazia	ABH
180	180000 - 180999	AND		AND	Andorra	AND
181	181000 - 181999	MCO		MCO	Monaco	MCO
182	182000 - 182999	LIE		LIE	Liechtenstein	LIE
183	183000 - 183999	SMR		SMR	San Marino	SMR
184	184000 - 184999	VAT		VAT	Vatican City	VAT
185	185000 - 185999	RKS		RKS	Kosovo	RKS
190	190000 - 190999	ISL		ISL	Iceland	ISL
191	191000 - 191999	MLT		MLT	Malta	MLT
192	192000 - 192799	CYP	SCP	CYP-SCP	South Cyprus	CYP-SCP
192	192800 - 192899	CYP	UCP	CYP-UCP	UN Cyprus	CYP-UCP
192	192900 - 192999	CYP	NCP	CYP-NCP	North Cyprus	CYP-NCP
193	193000 - 193999	SJM		SJM	Svalbard and Jan Mayen	SJM
Middle East and Asia						
201	201000 - 201999	ISR		ISR	Israel	ISR
202	202000 - 202999	PSE		PSE	Palestine	PSE
206	206000 - 206999	SYR		SYR	Syria	SYR
207	207000 - 207999	LBN		LBN	Lebanon	LBN
208	208000 – 208099	IRQ	MIX	IRQ-MIX	Iraq - Iraq MIX	IRQ-MIX
208	208100 – 208149	IRQ	BAG	IRQ-BAG	Iraq - Baghdad	IQ-BG
208	208150 – 208199	IRQ	SAL	IRQ-SAL	Iraq - Salah ad-Din	IQ-SD
208	208200 – 208249	IRQ	DIY	IRQ-DIY	Iraq - Diyala	IQ-DI
208	208250 – 208299	IRQ	WAS	IRQ-WAS	Iraq - Wasit	IQ-WA
208	208300 – 208349	IRQ	MAY	IRQ-MAY	Iraq - Maysan	IQ-MA
208	208350 – 208399	IRQ	ALB	IRQ-ALB	Iraq - Al-Basrah	IQ-BA
208	208400 – 208449	IRQ	BAB	IRQ-BAB	Iraq - Babil	IQ-BB
208	208450 – 208499	IRQ	ALA	IRQ-ALA	Iraq - Al-Anbar	IQ-AN
208	208500 – 208549	IRQ	KIR	IRQ-KIR	Iraq - Kirkuk	IQ-KI
208	208550 – 208599	IRQ	ALK	IRQ-ALK	Iraq - Al-Karbala	IQ-KA
208	208600 – 208649	IRQ	NIN	IRQ-NIN	Iraq - Niniwa	IQ-NI
208	208650 – 208699	IRQ	ANA	IRQ-ANA	Iraq - An-Najaf	IQ-NA
208	208700 – 208749	IRQ	DHI	IRQ-DHI	Iraq - Dhi Qar	IQ-DQ

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
208	208750 – 208799	IRQ	ALQ	IRQ-ALQ	Iraq - Al-Qadisiyyah	IQ-QA
208	208800 - 208849	IRQ	ALM	IRQ-ALM	Iraq - Al-Muthanna	IQ-MU
208	208850 - 208899	IRQ	UNK	IRQ-UNK	Iraq - Unknown	
209	209000 - 209999	JOR		JOR	Jordan	JOR
210	210000 - 210999	SAU		SAU	Saudi Arabia	SAU
211	211000 - 211999	KWT		KWT	Kuwait	KWT
212	212000 - 212099	ARE	GOV	ARE-GOV	United Arab Emirates - Government ARE	ARE-GOV
212	212100 - 212199	ARE	DUB	ARE-DUB	United Arab Emirates - Dubai	AE-DU
212	212200 - 212299	ARE	AD	ARE-AD	United Arab Emirates - Abu Dhabi	AE-AZ
212	212300 - 212399	ARE	AJM	ARE-AJM	United Arab Emirates - Ajman	AE-AJ
212	212400 - 212499	ARE	FUJ	ARE-FUJ	United Arab Emirates - Fujairah	AE-FU
212	212500 - 212599	ARE	SHJ	ARE-SHJ	United Arab Emirates - Sharjah	AE-SH
212	212600 - 212699	ARE	UAQ	ARE-UAQ	United Arab Emirates - Um al-Quwain	AE-UQ
212	212700 - 212799	ARE	RAK	ARE-RAK	United Arab Emirates - Ras al-Khaimah	AE-RK
212	212800 - 212899	ARE	UNK	ARE-UNK	United Arab Emirates - Unknown ARE	ARE-UNK
212	212900 - 212999	ARE	DUB	ARE-DUB	United Arab Emirates - Dubai	AE-DU
213	213000 - 213999	QAT		QAT	Qatar	QAT
214	214000 - 214999	BHR		BHR	Bahrain	BHR
215	215000 - 215999	OMN		OMN	Oman	OMN
216	216000 - 216999	YEM		YEM	Yemen	YEM
217	217000 – 217099	ARE	AD	ARE-AD	United Arab Emirates - Abu Dhabi	AE-AZ
217	217100 – 217199	ARE	RAK	ARE-RAK	United Arab Emirates - Ras al-Khaimah	AE-RK
220	220000 - 220899	IRN	IRN	IRN-IRN	Iran - Iran	IRN-IRN
220	220900 - 220999	IRN	INL	IRN-INL	Iran - International Iran	IRN-INT
221	221000 - 221999	UZB		UZB	Uzbekistan	UZB
222	222000 - 222999	TKM		TKM	Turkmenistan	TKM
223	223000 - 223999	TJK		TJK	Tajikistan	TJK
224	224000 - 224999	KGZ		KGZ	Kyrgyzstan	KGZ
225	225000 - 225999	MNG		MNG	Mongolia	MNG
226	226000 - 226999	AFG		AFG	Afghanistan	AFG
227	227000 - 227999	PAK		PAK	Pakistan	PAK
240	240000 - 240999	CHN		CHN	China	CHN
241	241000 - 241999	HKG		HKG	Hong Kong	HKG
242	242000 - 242999	MAC		MAC	Macau	MAC
243	243000 - 243999	TWN		TWN	Taiwan	TWN
246	246000 - 246999	KOR		KOR	Korea South	KOR
247	247000 - 247999	PRK		PRK	Korea North	PRK
250	250000 - 250999	IND		IND	India	IND
251	251000 - 251999	NPL		NPL	Nepal	NPL
252	25200 - 252999	BTN		BTN	Bhutan	BTN
253	253000 - 253030	BGD	DHK	BGD-DHK	Bangladesh - Dhaka	BD-13
253	253031 - 253060	BGD	NNJ	BGD-NNJ	Bangladesh - Narayanganj	BD-40
253	253061 - 253090	BGD	KHN	BGD-KHN	Bangladesh - Khulna	BD-27
253	253091 - 253120	BGD	GAZ	BGD-GAZ	Bangladesh - Gazipur	BD-18
253	253121 - 253150	BGD	KUS	BGD-KUS	Bangladesh - Kushtia	BD-30
253	253151 - 253180	BGD	NDI	BGD-NDI	Bangladesh - Narsingdi	BD-42

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
253	253181 - 253210	BGD	RNG	BGD-RNG	Bangladesh - Rangamati	BD-56
253	253211 - 253240	BGD	SYL	BGD-SYL	Bangladesh - Sylhet	BD-60
253	253241 - 253270	BGD	BAR	BGD-BAR	Bangladesh - Barisal	BD-06
253	253271 - 253300	BGD	BOG	BGD-BOG	Bangladesh - Bogra	BD-03
253	253301 - 253330	BGD	MYM	BGD-MYM	Bangladesh - Mymensingh	BD-34
253	253331 - 253360	BGD	CHI	BGD-CHI	Bangladesh - Chittagong	BD-10
253	253361 - 253390	BGD	JES	BGD-JES	Bangladesh - Jessore	BD-22
253	253391 - 253420	BGD	SIR	BGD-SIR	Bangladesh - Sirajganj	BD-59
253	253421 - 253450	BGD	BGE	BGD-BGE	Bangladesh - Bagerhat	BD-05
253	253451 - 253480	BGD	BND	BGD-BND	Bangladesh - Bandarban	BD-01
253	253481 - 253510	BGD	BRG	BGD-BRG	Bangladesh - Barguna	BD-02
253	253511 - 253540	BGD	BHO	BGD-BHO	Bangladesh - Bhola	BD-07
253	253541 - 253570	BGD	BRH	BGD-BRH	Bangladesh - Brahmanbaria	BD-04
253	253571 - 253600	BGD	CND	BGD-CND	Bangladesh - Chandpur	BD-09
253	253601 - 253630	BGD	CUA	BGD-CUA	Bangladesh - Chuadanga	BD-12
253	253631 - 253660	BGD	CLA	BGD-CLA	Bangladesh - Comilla	BD-08
253	253661 - 253690	BGD	COX	BGD-COX	Bangladesh - Cox's_Bazar	BD-11
253	253691 - 253720	BGD	DIN	BGD-DIN	Bangladesh - Dinajpur	BD-14
253	253721 - 253750	BGD	FAR	BGD-FAR	Bangladesh - Faridpur	BD-15
253	253751 - 253780	BGD	FEN	BGD-FEN	Bangladesh - Feni	BD-16
253	253781 - 253810	BGD	GAI	BGD-GAI	Bangladesh - Gaibandha	BD-19
253	253811 - 253840	BGD	GOP	BGD-GOP	Bangladesh - Gopalganj	BD-17
253	253841 - 253870	BGD	HAB	BGD-HAB	Bangladesh - Habiganj	BD-20
253	253871 - 253900	BGD	JAP	BGD-JAP	Bangladesh - Jamalpur	BD-21
253	253901 - 253930	BGD	JHA	BGD-JHA	Bangladesh - Jhalakati	BD-25
253	253931 - 253960	BGD	JHE	BGD-JHE	Bangladesh - Jhenaidah	BD-23
253	253961 - 253990	BGD	JOY	BGD-JOY	Bangladesh - Joypurhat	BD-24
253	253991 - 254020	BGD	KGR	BGD-KGR	Bangladesh - Khagrachari	BD-29
254	254021 - 254050	BGD	KIS	BGD-KIS	Bangladesh - Kishoreganj	BD-26
254	254051 - 254080	BGD	KUR	BGD-KUR	Bangladesh - Kurigram	BD-28
254	254081 - 254110	BGD	LAK	BGD-LAK	Bangladesh - Lakshmipur	BD-31
254	254111 - 254140	BGD	LAL	BGD-LAL	Bangladesh - Lalmonirhat	BD-32
254	254141 - 254170	BGD	MAD	BGD-MAD	Bangladesh - Madaripur	BD-36
254	254171 - 254200	BGD	MAG	BGD-MAG	Bangladesh - Magura	BD-37
254	254201 - 254230	BGD	MAN	BGD-MAN	Bangladesh - Manikganj	BD-33
254	254231 - 254260	BGD	MEH	BGD-MEH	Bangladesh - Meherpur	BD-39
254	254261 - 254290	BGD	MOU	BGD-MOU	Bangladesh - Moulvibazar	BD-38
254	254291 - 254320	BGD	MUN	BGD-MUN	Bangladesh - Munshiganj	BD-35
254	254321 - 254350	BGD	NAO	BGD-NAO	Bangladesh - Naogaon	BD-48
254	254351 - 254380	BGD	NRI	BGD-NRI	Bangladesh - Narail	BD-43
254	254381 - 254410	BGD	NAT	BGD-NAT	Bangladesh - Natore	BD-44
254	254411 - 254440	BGD	NAW	BGD-NAW	Bangladesh - Nawabganj	BD-45
254	254441 - 254470	BGD	NET	BGD-NET	Bangladesh - Netrakona	BD-41
254	254471 - 254500	BGD	NIL	BGD-NIL	Bangladesh - Nilphamari	BD-46
254	254501 - 254530	BGD	NOA	BGD-NOA	Bangladesh - Noakhali	BD-47

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
254	254531 - 254560	BGD	PAB	BGD-PAB	Bangladesh - Pabna	BD-49
254	254561 - 254590	BGD	PCG	BGD-PCG	Bangladesh - Panchagarh	BD-52
254	254591 - 254620	BGD	PKH	BGD-PKH	Bangladesh - Patuakhali	BD-51
254	254621 - 254650	BGD	PJP	BGD-PJP	Bangladesh - Pirojpur	BD-50
254	254651 - 254680	BGD	PJB	BGD-PJB	Bangladesh - Rajbari	BD-53
254	254681 - 254710	BGD	RJS	BGD-RJS	Bangladesh - Rajshahi	BD-54
254	254711 - 254740	BGD	RGP	BGD-RGP	Bangladesh - Rangpur	BD-55
254	254741 - 254770	BGD	SKH	BGD-SKH	Bangladesh - Satkhira	BD-58
254	254771 - 254800	BGD	SHP	BGD-SHP	Bangladesh - Shariatpur	BD-62
254	254801 - 254830	BGD	SRP	BGD-SRP	Bangladesh - Sherpur	BD-57
254	254831 - 254860	BGD	SJG	BGD-SJG	Bangladesh - Sunamganj	BD-61
254	254861 - 254890	BGD	TAN	BGD-TAN	Bangladesh - Tangail	BD-63
254	254891 - 254920	BGD	TRG	BGD-TRG	Bangladesh - Thakurgaon	BD-64
254	254921 - 254950	BGD	UNK	BGD-UNK	Bangladesh - Unknown_BGD	BD-UNK
254	254951 - 254999	BGD	OTH	BGD-OTH	Bangladesh - OtherCdGovUn	BD-OTH
260	260000 - 260009	THA	Krabi	THA-K	Thailand - Krabi	TH-81
260	260010 - 260019	THA	KAN	THA-KAN	Thailand - Kanchanaburi	TH-71
260	260020 - 260029	THA	KHO	THA-KHO	Thailand - Khon Kaen	TH-40
260	260030 - 260039	THA	CCH	THA-CCH	Thailand - Chachoengsao	TH-24
260	260040 - 260059	THA	CBU	THA-CBU	Thailand - Chon Buri	TH-20
260	260060 - 260069	THA	CHR	THA-CHR	Thailand - Chiang Rai	TH-57
260	260070 - 260079	THA	CHM	THA-CHM	Thailand - Chiang Mai	TH-50
260	260080 - 260089	THA	TNG	THA-TNG	Thailand - Trang	TH-92
260	260090 - 260099	THA	NPA	THA-NPA	Thailand - Nakhon Pathom	TH-73
260	260100 - 260109	THA	NRA	THA-NRA	Thailand - Nakhon Ratchasima	TH-30
260	260110 - 260119	THA	NST	THA-NST	Thailand - Nakhon Si Thammarat	TH-80
260	260120 - 260129	THA	NSA	THA-NSA	Thailand - Nakhon Sawan	TH-60
260	260130 - 260139	THA	NON	THA-NON	Thailand - Nonthaburi	TH-12
260	260140 - 260159	THA	PAT	THA-PAT	Thailand - Pattani	TH-94
260	260160 - 260169	THA	PNA	THA-PNA	Thailand - Phra Nakhon Si Ayutthaya	TH-14
260	260170 - 260179	THA	PAR	THA-PAR	Thailand - Phetchaburi	TH-76
260	260180 - 260189	THA	PHU	THA-PHU	Thailand - Phuket	TH-83
260	260190 - 260209	THA	YAL	THA-YAL	Thailand - Yala	TH-95
260	260210 - 260219	THA	RAT	THA-RAT	Thailand - Ratchaburi	TH-70
260	260220 - 260229	THA	SAT	THA-SAT	Thailand - Satun	TH-91
260	260230 - 260239	THA	SSM	THA-SSM	Thailand - Samut Songkhram	TH-75
260	260240 - 260249	THA	SBU	THA-SBU	Thailand - Saraburi	TH-19
260	260250 - 260259	THA	SUB	THA-SUB	Thailand - Suphan Buri	TH-72
260	260260 - 260279	THA	SUT	THA-SUT	Thailand - Surat Thani	TH-84
260	260280 - 260289	THA	SUR	THA-SUR	Thailand - Surin	TH-32
260	260290 - 260299	THA	BAT	THA-BAT	Thailand - Batong	
260	260300 - 260319	THA	Bangkok	THA-Ban	Thailand - Bangkok	TH-10
260	260320 - 260339	THA	SOK	THA-SOK	Thailand - Songkhla	TH-90
260	260340 - 260839	THA	UNK	THA-UNK	Thailand - Unknown THA	

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
260	260840 - 260849	THA	CNA	THA-CAN	Thailand - Chai_Nat	TH-18
260	260850 - 260859	THA	CHU	THA-CHU	Thailand - Chumphon	TH-86
260	260860 - 260869	THA	NAR	THA-NAR	Thailand - Narathiwat	TH-96
260	260870 - 260879	THA	BRA	THA-BRA	Thailand - Buri_Ram	TH-31
260	260880 - 260889	THA	PKK	THA-PKK	Thailand - Prachuap_Khiri_Khan	TH-77
260	260890 - 260899	THA	PBU	THA-PBU	Thailand - Prachin_Buri	TH-25
260	260900 - 260909	THA	PAT	THA-PAT	Thailand - Pattani	TH-94
260	260910 - 260919	THA	RET	THA-RET	Thailand - Roi_Et	TH-45
260	260920 - 260929	THA	RAN	THA-RAN	Thailand - Ranong	TH-85
260	260930 - 260939	THA	LOB	THA-LOB	Thailand - Lop_Buri	TH-16
260	260940 - 260949	THA	SNA	THA-SNA	Thailand - Sakon_Nakhon	TH-47
260	260950 - 260959	THA	SPR	THA-SPR	Thailand - Samut_Prakan	TH-11
260	260960 - 260969	THA	SSN	THA-SSN	Thailand - Samut_Sakhon	TH-74
260	260970 - 260979	THA	SAK	THA-SAK	Thailand - Sa_Kaeo	TH-27
260	260980 - 260989	THA	SUB	THA-SUB	Thailand - Suphan_Buri	TH-72
260	260990 - 260999	THA	UDT	THA-UDT	Thailand - Udon_Thani	TH-41
261	261000 - 261019	THA	GOV	THA-GOV	Thailand - Government THA	
261	261020 - 261049	THA	UNK	THA-UNK	Thailand - Unknown THA	
261	261050 - 261069	THA	Bangkok	THA-Ban	Thailand - Bangkok	TH-10
261	261070 - 261079	THA	Krabi	THA-Kra	Thailand - Krabi	TH-81
261	261080 - 261089	THA	KAN	THA-KAN	Thailand - Kanchanaburi	TH-71
261	261090 - 261099	THA	KAL	THA-KAL	Thailand - Kalasin	TH-46
261	261100 - 261109	THA	KAM	THA-KAM	Thailand - Kamphaeng Phet	TH-62
261	261110 - 261119	THA	KHO	THA-KHO	Thailand - Khon Kaen	TH-40
261	261120 - 261129	THA	CNT	THA-CNT	Thailand - Chanthaburi	TH-22
261	261130 - 261139	THA	CCH	THA-CCH	Thailand - Chachoengsao	TH-24
261	261140 - 261149	THA	CBU	THA-CBU	Thailand - Chon Buri	TH-20
261	261150 - 261159	THA	CNA	THA-CNA	Thailand - Chai Nat	TH-18
261	261160 - 261169	THA	CIY	THA-CIY	Thailand - Chaiyaphum	TH-36
261	261170 - 261179	THA	CHU	THA-CHU	Thailand - Chumphon	TH-86
261	261180 - 261189	THA	CHR	THA-CHR	Thailand - Chiang Rai	TH-57
261	261190 - 261199	THA	CHM	THA-CHM	Thailand - Chiang Mai	TH-50
261	261200 - 261209	THA	TNG	THA-TNG	Thailand - Trang	TH-92
261	261210 - 261219	THA	TRA	THA-TRA	Thailand - Trat	TH-23
261	261220 - 261229	THA	TAK	THA-TAK	Thailand - Tak	TH-63
261	261230 - 261239	THA	NNA	THA-NNA	Thailand - Nakhon Nayok	TH-26
261	261240 - 261249	THA	NPA	THA-NPA	Thailand - Nakhon Pathom	TH-73
261	261250 - 261259	THA	NPH	THA-NPH	Thailand - Nakhon Phanom	TH-48
261	261260 - 261269	THA	NRA	THA-NRA	Thailand - Nakhon Ratchasima	TH-30
261	261270 - 261279	THA	NST	THA-NST	Thailand - Nakhon Si Thammarat	TH-80
261	261280 - 261289	THA	NSA	THA-NSA	Thailand - Nakhon Sawan	TH-60
261	261290 - 261299	THA	NON	THA-NON	Thailand - Nonthaburi	TH-12
261	261300 - 261309	THA	NAR	THA-NAR	Thailand - Narathiwat	TH-96
261	261310 - 261319	THA	NAN	THA-NAN	Thailand - Nan	TH-55
261	261320 - 261329	THA	BRA	THA-BRA	Thailand - Buri Ram	TH-31
261	261330 - 261339	THA	PTH	THA-PTH	Thailand - Pathum Thani	TH-13

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
261	261340 - 261349	THA	PKK	THA-PKK	Thailand - Prachuap Khiri Khan	TH-77
261	261350 - 261359	THA	PBU	THA-PBU	Thailand - Prachin Buri	TH-25
261	261360 - 261369	THA	PAT	THA-PAT	Thailand - Pattani	TH-94
261	261370 - 261379	THA	PNA	THA-PNA	Thailand - Phra Nakhon Si Ayutthaya	TH-14
261	261380 - 261389	THA	PYA	THA-PYA	Thailand - Phayao	TH-56
261	261390 - 261399	THA	PNG	THA-PNG	Thailand - Phangnga	TH-82
261	261400 - 261409	THA	PTT	THA-PTT	Thailand - Phatthalung	TH-93
261	261410 - 261419	THA	PCH	THA-PCH	Thailand - Phichit	TH-66
261	261420 - 261429	THA	PTS	THA-PTS	Thailand - Phitsanulok	TH-65
261	261430 - 261439	THA	PAR	THA-PAR	Thailand - Phetchaburi	TH-76
261	261440 - 261449	THA	PAN	THA-PAN	Thailand - Phetchabun	TH-67
261	261450 - 261459	THA	PRA	THA-PRA	Thailand - Phrae	TH-54
261	261460 - 261469	THA	PHU	THA-PHU	Thailand - Phuket	TH-83
261	261470 - 261479	THA	MSA	THA-MSA	Thailand - Maha Sarakham	TH-44
261	261480 - 261489	THA	MUK	THA-MUK	Thailand - Mukdahan	TH-49
261	261490 - 261499	THA	MHS	THA-MHS	Thailand - Mae Hong Son	TH-58
261	261500 - 261509	THA	YAS	THA-YAS	Thailand - Yasothon	TH-35
261	261510 - 261519	THA	YAL	THA-YAL	Thailand - Yala	TH-95
261	261520 - 261529	THA	RET	THA-RET	Thailand - Roi Et	TH-45
261	261530 - 261539	THA	RAN	THA-RAN	Thailand - Ranong	TH-85
261	261540 - 261549	THA	RAY	THA-RAY	Thailand - Rayong	TH-21
261	261550 - 261559	THA	RAT	THA-RAT	Thailand - Ratchaburi	TH-70
261	261560 - 261569	THA	LOB	THA-LOB	Thailand - Lop Buri	TH-16
261	261570 - 261579	THA	LPA	THA-LPA	Thailand - Lampang	TH-52
261	261580 - 261589	THA	LPH	THA-LPH	Thailand - Lamphun	TH-51
261	261590 - 261599	THA	LOE	THA-LOE	Thailand - Loei	TH-42
261	261600 - 261609	THA	SSK	THA-SSK	Thailand - Si Sa Ket	TH-33
261	261610 - 261619	THA	SNA	THA-SNA	Thailand - Sakon Nakhon	TH-47
261	261620 - 261629	THA	SOK	THA-SOK	Thailand - Songkhla	TH-90
261	261630 - 261639	THA	SAT	THA-SAT	Thailand - Satun	TH-91
261	261640 - 261649	THA	SPR	THA-SPR	Thailand - Samut Prakan	TH-11
261	261650 - 261659	THA	SSM	THA-SSM	Thailand - Samut Songkhram	TH-75
261	261660 - 261669	THA	SSN	THA-SSN	Thailand - Samut Sakhon	TH-74
261	261670 - 261679	THA	SAK	THA-SAK	Thailand - Sa Kaeo	TH-27
261	261680 - 261689	THA	SBU	THA-SBU	Thailand - Saraburi	TH-19
261	261690 - 261699	THA	SIB	THA-SIB	Thailand - Sing Buri	TH-17
261	261700 - 261709	THA	SUK	THA-SUK	Thailand - Sukhothai	TH-64
261	261710 - 261719	THA	SUB	THA-SUB	Thailand - Suphan Buri	TH-72
261	261720 - 261729	THA	SUT	THA-SUT	Thailand - Surat Thani	TH-84
261	261730 - 261739	THA	SUR	THA-SUR	Thailand - Surin	TH-32
261	261740 - 261749	THA	NKH	THA-NKH	Thailand - Nong Khai	TH-43
261	261750 - 261759	THA	NBL	THA-NBL	Thailand - Nong Bua Lam Phu	TH-39
261	261760 - 261769	THA	ATH	THA-ATH	Thailand - Ang Thong	TH-15
261	261770 - 261779	THA	UDT	THA-UDT	Thailand - Udon Thani	TH-41
261	261780 - 261789	THA	UTT	THA-UTT	Thailand - Uttaradit	TH-53
261	261790 - 261799	THA	UTH	THA-UTH	Thailand - Uthai Thani	TH-61

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
261	261800 - 261809	THA	UBR	THA-UBR	Thailand - Ubon Ratchathani	TH-34
261	261810 - 261819	THA	AMC	THA-AMC	Thailand - Amnat Charoen	TH-37
261	261820 - 261829	THA	BAT	THA-BAT	Thailand - Batong	THA-BAT
261	261830 - 261849	THA	Bangkok	THA-Ban	Thailand - Bangkok	TH-10
261	261850 - 261859	THA	SOK	THA-SOK	Thailand - Songkhla	TH-90
261	261860 - 261869	THA	PAT	THA-PAT	Thailand - Pattani	TH-94
261	261870 - 261879	THA	NAR	THA-NAR	Thailand - Narathiwat	TH-96
261	261880 - 261889	THA	BUK	THA-BUK	Thailand - Bueng Kan	TH-38
261	261890 - 261899	THA	CHU	THA-CHU	Thailand - Chumphon	TH-86
261	261990 - 261999	THA	OTH	THA-OTH	Thailand - Other	THA-OTH
262	262000 - 262999	MYS		MYS	Malaysia	MYS
263	263000 - 263999	SGP		SGP	Singapore	SGP
264	264000 - 264999	MMR		MMR	Myanmar	MMR
265	265000 - 265049	LAO	GOV	LAO-GOV	Laos - Government LAO	
265	265050 - 265099	LAO	UNK	LAO-UNK	Laos - Unknown LAO	
265	265100 - 265149	LAO	ATT	LAO-ATT	Laos - Attapeu	LA-AT
265	265150 - 265199	LAO	BOK	LAO-BOK	Laos - Bokeo	LA-BK
265	265200 - 265249	LAO	BOL	LAO-BOL	Laos - Bolikhamsai	LA-BL
265	265250 - 265299	LAO	CHA	LAO-CHA	Laos - Champasak	LA-CH
265	265300 - 265349	LAO	HOU	LAO-HOU	Laos - Houaphanh	LA-HO
265	265350 - 265399	LAO	KHA	LAO-KHA	Laos - Khammouane	LA-KH
265	265400 - 265449	LAO	LNA	LAO-LNA	Laos - Luang Namtha	LA-LM
265	265450 - 265499	LAO	LPR	LAO-LPR	Laos - Luang Prabang	LA-LP
265	265500 - 265549	LAO	OUD	LAO-OUD	Laos - Oudomxay	LA-OU
265	265550 - 265599	LAO	PHO	LAO-PHO	Laos - Phongsali	LA-PH
265	265600 - 265649	LAO	SAL	LAO-SAL	Laos - Salavan	LA-SL
265	265650 - 265699	LAO	SAV	LAO-SAV	Laos - Savannakhet	LA-SV
265	265700 - 265749	LAO	VIE	LAO-VIE	Laos - Vientiane Province	LA-VI
265	265750 - 265799	LAO	UVI	LAO-UVI	Laos - Urban Vientiane	LA-VT
265	265800 - 265849	LAO	SAI	LAO-SAI	Laos - Sainyabuli	LA-XA
265	265850 - 265899	LAO	SEK	LAO-SEK	Laos - Sekong	LA-XE
265	265900 - 265949	LAO	XIA	LAO-XIA	Laos - Xiangkhouang	LA-XI
265	265950 - 265999	LAO	XAI	LAO-XAI	Laos - Xaisomboun	LA-XS
266	266000 - 266024	KHM	BAN	KHM-BAN	Cambodia - Banteay Meanchey	KH-1
266	266025 - 266049	KHM	BAT	KHM-BAT	Cambodia - Battambang	KH-2
266	266050 - 266074	KHM	KCM	KHM-KCM	Cambodia - Kampong Cham	KH-3
266	266075 - 266099	KHM	KCG	KHM-KCG	Cambodia - Kampong Chhnang	KH-4
266	266100 - 266124	KHM	KSP	KHM-KSP	Cambodia - Kampong Speu	KH-5
266	266125 - 266149	KHM	KTH	KHM-KTH	Cambodia - Kampong Thom	KH-6
266	266150 - 266174	KHM	KAM	KHM-KAM	Cambodia - Kampot	KH-7
266	266175 - 266199	KHM	KAN	KHM-KAN	Cambodia - Kandal	KH-8
266	266200 - 266224	KHM	KOH	KHM-KOH	Cambodia - Koh Kong	KH-9
266	266225 - 266249	KHM	KEP	KHM-KEP	Cambodia - Kep	KH-23
266	266250 - 266274	KHM	KRA	KHM-KRA	Cambodia - Kratie	KH-10
266	266275 - 266299	KHM	MON	KHM-MON	Cambodia - Mondulkiri	KH-11
266	266300 - 266324	KHM	ODM	KHM-ODM	Cambodia - Oddar Meanchey	KH-22

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266	266325 - 266349	KHM	PAI	KHM-PAI	Cambodia - Pailin	KH-24
266	266350 - 266374	KHM	PHN	KHM-PHN	Cambodia - Phnom Penh	KH-12
266	266375 - 266399	KHM	SIH	KHM-SIH	Cambodia - Sihanoukville	KH-18
266	266400 - 266424	KHM	PVI	KHM-PVI	Cambodia - Preah Vihear	KH-13
266	266425 - 266449	KHM	PUR	KHM-PUR	Cambodia - Pursat	KH-15
266	266450 - 266474	KHM	PVE	KHM-PVE	Cambodia - Prey Veng	KH-14
266	266475 - 266499	KHM	RAT	KHM-RAT	Cambodia - Ratanakiri	KH-16
266	266500 - 266524	KHM	SIE	KHM-SIE	Cambodia - Siem Reap	KH-17
266	266525 - 266549	KHM	STU	KHM-STU	Cambodia - Stung Treng	KH-19
266	266550 - 266574	KHM	SVA	KHM-SVA	Cambodia - Svay Rieng	KH-20
266	266575 - 266599	KHM	TAK	KHM-TAK	Cambodia - Takeo	KH-21
266	266600 - 266649	KHM	GOV	KHM-GOV	Cambodia - Government	
266	266650 - 266699	KHM	UNK	KHM-UNK	Cambodia - Unknown	
266	266700 - 266999	KHM	TBO	KHM-TBO	Tbong Khmum	KH-22
267	267000 - 267999	VNM		VNM	Vietnam	VNM
270	270000 - 270999	IDN		IDN	Indonesia	IDN
271	271000 - 271999	PNG		PNG	Papua New Guinea	PNG
272	272000-272999	TLS		TLS	Timor Leste	TLS
273	273000-273999	BRN		BRN	Brunei	BRN
290	290000-290999	LKA		LKA	Sri Lanka	LKA
291	291000 - 291999	PHL		PHL	Philippines	PHL
292	292000 - 292999	JPN		JPN	Japan	JPN
293	293000 - 293999	MDV		MDV	Maldives	MDV
294	294000 - 294999	CXR		CRX	Christmas Island	CXR
295	295000 - 295999	CCK		CCK	Keeling Islands	CCK
Australia – New Zeland						
300	300000 - 300999	AUS	UNK	AUS-UNK	Australia - Unknown AUS	
301	301000 - 301499	AUS	FIS	AUS-FIS	Australia - Federal-Interstate	
301	301500 - 301999	AUS	GOV	AUS-GOV	Australia - Government AUS	
302	302000 - 302999	AUS	ACT	AUS-ACT	Australia - Australian Capital Territory	AU-ACT
303	303000 - 303999	AUS	NT	AUS-NT	Australia - Northern Territory	AU-NT
304	304000 - 304999	AUS	NSW	AUS-NSW	Australia - New South Wales	AU-NSW
305	305000 - 305999	AUS	QLD	AUS-QLD	Australia - Queensland	AU-QLD
306	306000 - 306999	AUS	SA	AUS-SA	Australia - South Australia	AU-SA
307	307000 - 307999	AUS	TAS	AUS-TAS	Australia - Tasmania	AU-TAS
308	308000 - 308999	AUS	VIC	AUS-VIC	Australia - Victoria	AU-VIC
309	309000 - 309999	AUS	WA	AUS-WA	Australia - Western Australia	AU-WA
310	310000 - 310999	NZL		NZL	New Zealand	NZL
Africa						
401	401000 - 401999	MAR		MAR	Morocco	MAR
402	402000 - 402999	DZA		DZA	Algeria	DZA
403	403000 - 403899	TUN	TUN	TUN-TUN	Tunisia	
403	403900 - 403999	TUN	INT	TUN-INT	International Tunisia	TUN-INT
404	404000 - 404999	LBY		LBY	Libya	LBY
405	405000 - 405999	EGY		EGY	Egypt	EGY
406	406000 - 406999	SDN		SDN	Sudan	SDN
407	407000 - 407999	ETH		ETH	Ethiopia	ETH
408	408000-408999	AGO		AGO	Angola	AGO

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409	409000 - 409999	BEN		BEN	Benin	BEN
410	410000 - 410999	GNB		GNB	Guinea Bissau	GNB
411	411000 - 411999	BFA		BFA	Burkina-Faso	BFA
412	412000 - 412999	BDI		BDI	Burundi	BDI
413	413000 - 413999	COM		COM	Comoros	COM
414	414000 - 414999	TCD		TCD	Chad	TCD
415	415000 - 415999	DJI		DJI	Djibouti	DJI
416	416000 - 416999	GNQ		GNQ	Equatorial Guinea	GNQ
417	417000 - 417999	ERI		ERI	Eritrea	ERI
418	418000 - 418999	GAB		GAB	Gabon	GAB
419	419000 - 419999	GMB		GMB	Gambia	GMB
420	420000 - 420999	GHA		GHA	Ghana	GHA
421	421000 - 421999	GIN		GIN	Guinea	GIN
422	422000 - 422999	CMR		CMR	Cameroon	CMR
423	423000 - 423999	KEN		KEN	Kenya	KEN
424	424000 - 424999	COG		COG	Congo-Brazzaville	COG
425	425000 - 425999	COD		COD	Dem. Rep of Congo	COD
426	426000 - 426999	CAF		CAF	Central African Republic	CAF
427	427000 - 427999	LBR		LBR	Liberia	LBR
428	428000 - 428999	MDG		MDG	Madagascar	MDG
429	429000 - 429999	MWI		MWI	Malawi	MWI
430	430000 - 430999	MLI		MLI	Mali	MLI
431	431000 - 431999	MRT		MRT	Mauritania	MRT
432	432000 - 432999	MUS		MUS	Mauritius	MUS
433	433000 - 433999	NER		NER	Niger	NER
434	434000 - 434999	NGA		NGA	Nigeria	NGA
435	435000 - 435999	RWA		RWA	Ruanda	RWA
436	436000 - 436999	STP		STP	Sao Tome Principe	STP
437	437000 - 437999	SYC		SYC	Seychelles	SYC
438	438000 - 438999	SLE		SLE	Sierra Leone	SLE
439	439000 - 439999	SEN		SEN	Senegal	SEN
440	440000 - 440999	SOM		SOM	Somalia	SOM
441	441000 - 441999	TZA		TZA	Tanzania	TZA
442	442000 - 442999	TGO		TGO	Togo	TGO
443	443000 - 443999	UGA		UGA	Uganda	UGA
444	444000 - 444999	ZMB		ZMB	Zambia	ZMB
445	445000 - 445999	SSD		SSD	South Sudan	SSD
446	446000 - 446999	CPV		CPV	Cape Verde	CPV
447	447000 - 447999	CIV		CIV	Ivory Coast	CIV
448	448000 - 448999	ESH		ESH	Western Sahara	ESH
480	480000 - 480999	ZAF		ZAF	South Africa	ZAF
481	481000 - 481999	NAM		NAM	Namibia	NAM
482	482000 - 482999	BWA		BWA	Botswana	BWA
483	483000 - 483999	ZWE		ZWE	Zimbabwe	ZWE
484	484000 - 484999	MOZ		MOZ	Mozambique	MOZ
485	485000 – 485999	SWZ		SWZ	Swaziland	SWZ
486	486000 - 486999	LSO		LSO	Lesotho	LSO

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
USA-CANADA (North Americas)						
500	500000 - 500999	USA	GOV	USA-GOV	United States of America - Government USA	USA-GOV
501	501000 – 501999	USA	DC	USA-DC	United States of America - Columbia	US-DC
502	502000 – 502999	USA	AK	USA-AK	United States of America - Alaska	US-AK
503	503000 – 503999	USA	WA	USA-WA	United States of America - Washington	US-WA
504	504000 – 504999	USA	OR	USA-OR	United States of America - Oregon	US-OR
505	505000 - 505999	USA	CA	USA-CA	United States of America - California	US-CA
506	506000 – 506999	USA	ID	USA-ID	United States of America - Idaho	US-ID
507	507000 – 507999	USA	NV	USA-NV	United States of America - Nevada	US-NV
508	508000 – 508999	USA	MT	USA-MT	United States of America - Montana	US-MT
509	509000 – 509999	USA	WY	USA-WY	United States of America - Wyoming	US-WY
510	510000 – 510999	USA	UT	USA-UT	United States of America - Utah	US-UT
511	511000 – 511999	USA	AZ	USA-AZ	United States of America - Arizona	US-AZ
512	512000 – 512999	USA	ND	USA-ND	United States of America - North Dakota	US-ND
513	513000 – 513999	USA	SD	USA-SD	United States of America - South Dakota	US-SD
514	514000 – 514999	USA	NE	USA-NE	United States of America - Nebraska	US-NE
515	515000 – 515999	USA	CO	USA-CO	United States of America - Colorado	US-CO
516	516000 – 516999	USA	NM	USA-NM	United States of America - New Mexico	US-NM
517	517000 – 517999	USA	KS	USA-KS	United States of America - Kansas	US-KS
518	518000 – 518999	USA	OK	USA-OK	United States of America - Oklahoma	US-OK
519	519000 – 519999	USA	TX	USA-TX	United States of America - Texas	US-TX
520	520000 – 520999	USA	AR	USA-AR	United States of America - Arkansas	US-AR
521	521000 – 521999	USA	MN	USA-MN	United States of America - Minnesota	US-MN
522	522000 – 522999	USA	WI	USA-WI	United States of America - Wisconsin	US-WI
523	523000 – 523999	USA	IA	USA-IA	United States of America - Iowa	US-IA
524	524000 – 524999	USA	IL	USA-IL	United States of America - Illinois	US-IL
525	525000 – 525999	USA	MO	USA-MO	United States of America - Missouri	US-MO
526	526000 – 526999	USA	MI	USA-MI	United States of America - Michigan	US-MI
527	527000 – 527999	USA	IN	USA-IN	United States of America - Indiana	US-IN
528	528000 – 528999	USA	OH	USA-OH	United States of America - Ohio	US-OH
529	529000 – 529999	USA	KY	USA-KY	United States of America - Kentucky	US-KY
530	530000 – 530999	USA	AL	USA-AL	United States of America - Alabama	US-AL
531	531000 – 531999	USA	TN	USA-TN	United States of America - Tennessee	US-TN
532	532000 – 532999	USA	LA	USA-LA	United States of America - Louisiana	US-LA
533	533000 – 533999	USA	MS	USA-MS	United States of America - Mississippi	US-MS
534	534000 – 534999	USA	ME	USA-ME	United States of America - Maine	US-ME
535	535000 – 535999	USA	VT	USA-VT	United States of America - Vermont	US-VT
536	536000 – 536999	USA	NH	USA-NH	United States of America - New Hampshire	US-NH
537	537000 – 537999	USA	CT	USA-CT	United States of America - Connecticut	US-CT
538	538000 – 538999	USA	MA	USA-MA	United States of America - Massachusetts	US-MA
539	539000 – 539999	USA	RI	USA-RI	United States of America - Rhode Island	US-RI
540	540000 - 540999	USA	NY	USA-NY	United States of America - New York	US-NY

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
541	541000 - 541999	USA	NJ	USA-NJ	United States of America - New Jersey	US-NJ
542	542000 - 542999	USA	DE	USA-DE	United States of America - Delaware	US-DE
543	543000 - 543999	USA	PA	USA-PA	United States of America - Pennsylvania	US-PA
544	544000 - 544999	USA	MD	USA-MD	United States of America - Maryland	US-MD
545	545000 - 545999	USA	VA	USA-VA	United States of America - Virginia	US-VA
546	546000 - 546999	USA	WV	USA-WV	United States of America - West Virginia	US-WV
547	547000 - 547999	USA	NC	USA-NC	United States of America - North Carolina	US-NC
548	548000 - 548999	USA	SC	USA-SC	United States of America - South Carolina	US-SC
549	549000 - 549999	USA	GA	USA-GA	United States of America - Georgia	US-GA
550	550000 - 550999	USA	FL	USA-FL	United States of America - Florida	US-FL
551	551000 - 551999	USA	HI	USA-HI	United States of America - Hawaii	US-HI
552	552000 - 552999	USA	PRI	USA-PR	United States of America - Puerto Rico	US-PR
553	553000 - 553999	USA	GU	USA-GU	United States of America - Guam	US-GU
554	554000 - 554999	USA	AS	USA-AS	United States of America - American Samoa	US-AS
555	555000 - 555999	USA	VIS	USA-VI	United States of America - Virgin Islands	US-VI
556	556000 - 556999	USA	TX	USA-TX	United States of America - Texas	US-TX
557	557000 - 559999	USA	VA	USA-VA	United States of America - Virginia	US-VA
560	560000 - 560999	CAN	FED	CAN-FED	Canada - Federal	CAN-FED
561	561000 - 561999	CAN	BC	CAN-BC	Canada - British Columbia	CA-BC
562	562000 - 562999	CAN	AB	CAN-AB	Canada - Alberta	CA-AB
563	563000 - 563999	CAN	SK	CAN-SK	Canada - Saskatchewan	CA-SK
564	564000 - 564999	CAN	MB	CAN-MB	Canada - Manitoba	CA-MB
565	565000 - 565999	CAN	ON	CAN-ON	Canada - Ontario	CA-ON
566	566000 - 566999	CAN	QC	CAN-QC	Canada - Quebec	CA-QC
567	567000 - 567999	CAN	NS	CAN-NS	Canada - Nova Scotia	CA-NS
568	568000 - 568999	CAN	NB	CAN-NB	Canada - New Brunswick	CA-NB
569	569000 - 569999	CAN	NL	CAN-NL	Canada - Newfoundland Labrador	CA-NL
570	570000 - 570999	CAN	NWT	CAN-NW	Canada - North-West Territories	CA-NT
571	571000 - 571999	CAN	NU	CAN-NU	Canada - Nunavut	CA-NU
572	572000 - 572999	CAN	PEI	CAN-PE	Canada - Prince Edouard Island	CA-PE
573	573000 - 573999	CAN	YU	CAN-YU	Canada - Yukon	CA-YT
580	580000 - 580999	USA	VA	USA-VA	United States of America - Virginia	US-VA
581	581000 - 581999	USA	TX	USA-TX	United States of America - Texas	US-TX
582	582000 - 583999	USA	FL	USA-FL	United States of America - Florida	US-FL
584	584000 - 584999	USA	IL	USA-IL	United States of America - Illinois	US-IL
585	585000 - 585999	USA	NY	USA-NY	United States of America - New York	US-NY
South America						
602	602000 - 602999	GTM		GTM	Guatemala	GTM
603	603000 - 603999	BLZ		BLZ	Belize	BLZ
604	604000 - 604999	SLV		SLV	El Salvador	SLV
605	605000 - 605999	NIC		NIC	Nicaragua	NIC
606	606000 - 606999	HND		HND	Honduras	HND
607	607000 - 607999	CRI		CRI	Costa Rica	CRI
608	608000 - 608999	PAN		PAN	Panama	PAN

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
609	609000 - 609099	CUW		CUW	Curacao	CUW
609	609100 – 609199	ABW		ABW	Aruba	ABW
609	609200 - 609299	SXM		SXM	Sint Maarten	SXM
610	610000 - 610999	MEX	COM	MEX-COM	Mexico - Mexico common	MEX-COM
611	611000 - 611999	MEX	DF	MEX-DF	Mexico - Distrito Federal	MX-DFE
612	612000 - 612999	MEX	FED	MEX-FED	Mexico - Mexico (federal)	MEX-FED
613	613000 - 613999	MEX	AGS	MEX-AGS	Mexico - Aguascalientes	MX-AGU
614	614000 - 614999	MEX	BC	MEX-BC	Mexico - Baja California	MX-BCN
615	615000 - 615999	MEX	BCS	MEX-BCS	Mexico - Baja California Sur	MX-BCS
616	616000 - 616999	MEX	CAMP	MEX-CAM	Mexico - Campeche	MX-CAM
617	617000 - 617999	MEX	CHIS	MEX-CHI	Mexico - Chiapas	MX-CHP
618	618000 - 618999	MEX	CHIH	MEX-CHI	Mexico - Chihuahua	MX-CHH
619	619000 - 619999	MEX	COAH	MEX-COA	Mexico - Coahuila	MX-COA
620	620000 - 620999	MEX	COL	MEX-COL	Mexico - Colima	MX-COL
621	621000 - 621999	MEX	DGO	MEX-DGO	Mexico - Durango	MX-DUR
622	622000 - 622999	MEX	GTO	MEX-GTO	Mexico - Guanajuato	MX-GUA
623	623000 - 623999	MEX	GRO	MEX-GRO	Mexico - Guerrero	MX-GRO
624	624000 - 624999	MEX	HGO	MEX-HGO	Mexico - Hidalgo	MX-HID
625	625000 - 625999	MEX	JAL	MEX-JAL	Mexico - Jalisco	MX-JAL
626	626000 - 626999	MEX	MEX	MEX-MEX	Mexico - Mexico (Etat)	MX-MEX
627	627000 - 627999	MEX	MICH	MEX-MIC	Mexico - Michoacan	MX-MIC
628	628000 - 628999	MEX	MOR	MEX-MOR	Mexico - Morelos	MX-MOR
629	629000 - 629999	MEX	NAY	MEX-NAY	Mexico - Nayarit	MX-NAY
630	630000 - 630999	MEX	NL	MEX-NL	Mexico - Nuevo Leon	MX-NLE
631	631000 - 631999	MEX	OAX	MEX-OAX	Mexico - Oaxaca	MX-OAX
632	632000 - 632999	MEX	PUE	MEX-PUE	Mexico - Puebla	MX-PUE
633	633000 - 633999	MEX	QRO	MEX-QRO	Mexico - Queretaro	MX-QUE
634	634000 - 634999	MEX	QR	MEX-QR	Mexico - Quintana Roo	MX-ROO
635	635000 - 635999	MEX	SLP	MEX-SLP	Mexico - San Luis Potosi	MX-SLP
636	636000 - 636999	MEX	SIN	MEX-SIN	Mexico - Sinaloa	MX-SIN
637	637000 - 637999	MEX	SON	MEX-SON	Mexico - Sonora	MX-SON
638	638000 - 638999	MEX	TAB	MEX-TAB	Mexico - Tabasco	MX-TAB
639	639000 - 639999	MEX	TAMPS	MEX-TAM	Mexico - Tamaulipas	MX-TAM
640	640000 - 640999	MEX	TLAX	MEX-TLA	Mexico - Tlaxcala	MX-TLA
641	641000 - 641999	MEX	VER	MEX-VER	Mexico - Veracruz	MX-VER
642	642000 - 642999	MEX	YUC	MEX-YUC	Mexico - Yucatan	MX-YUC
643	643000 - 643999	MEX	ZAC	MEX-ZAC	Mexico - Zacatecas	MX-ZAC
644	644000 - 644999	MEX	BCF	MEX-BCF	Mexico - Baja California Fronterizo	MEX-BCF
645	645000 - 645999	MEX	CHIHF	MEX-CHI	Mexico - Chihuahua Fronterizo	MEX-CHI
646	646000 - 646999	MEX	SONF	MEX-SON	Mexico - Sonora Fronterizo	MEX-SON
647	647000 - 647999	MEX	TAMPSF	MEX-TAM	Mexico - Tamaulipas Fronterizo	MEX-TAM
651	651000 - 651999	COL		COL	Colombia	COL
652	652000 - 652999	VEN		VEN	Venezuela	VEN
653	653000 - 653999	GUY		GUY	Guyana	GUY

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
654	654000 - 654999	SUR		SUR	Suriname	SUR
656	656000 - 656999	PER		PER	Peru	PER
657	657000 - 657999	BRA		BRA	Brazil	BRA
658	658000 - 658999	ECU		ECU	Ecuador	ECU
659	659000 - 659999	BOL		BOL	Bolivia	BOL
660	660000 - 660999	PRY		PRY	Paraguay	PRY
661	661000 - 661999	CHL		CHL	Chile	CHL
662	662000 - 662999	ARG		ARG	Argentina	ARG
663	663000 - 663999	URY		URY	Uruguay	URY
664	664000 - 664999	MSR		MSR	Montserrat	MSR
665	665000 - 665999	KNA		KNA	St Kitts and Nevis	KNA
666	666000 - 666999	CUB		CUB	Cuba	CUB
667	667000 - 667999	AIA		AIA	Anguilla	AIA
668	668000 - 668999	ATG		ATG	Antigua and Barbuda	ATG
670	670000 - 670999	BHS		BHS	Bahamas	BHS
671	671000 - 671999	BRB		BRB	Barbados	BRB
672	672000 - 672999	BMU		BMU	Bermuda	BMU
673	673000 - 673999	VGB		VGB	British Virgin Islands	VGB
674	674000 - 674999	LCA		LCA	St Lucia	LCA
675	675000 - 675999	DOM		DOM	Dominican Republic	DOM
676	676000 - 676999	DMA		DMA	Dominica	DMA
677	677000 - 677999	VCT		VCT	St Vincent and Grenadines	VCT
678	678000 - 678999	FLK		FLK	Falkland Islands	FLK
679	679000 – 679999	CYM		CYM	Cayman	CYM
680	680000 - 680999	TCA		TCA	Turks and Caicos	TCA
681	681000 - 681999	TTO		TTO	Trinidad and Tobago	TTO
682	682000 - 682999	GRD		GRD	Grenada	GRD
685	683000 – 683999	HTI		HTI	Haiti	HTI
686	684000 - 684999	JAM		JAM	Jamaica	JAM
Pacific						
700	700000 - 700999	MHL		MHL	Marshall Islands	MHL
701	701000 - 701999	COK		COK	Cook Islands	COK
702	702000 - 702999	MNP		MNP	Mariana	MNP
703	703000 - 703999	FJI		FJI	Fiji	FJI
705	705000 - 705999	SLB		SLB	Solomon Islands	SLB
706	706000 - 706999	KIR		KIR	Kiribati	KIR
707	707000 - 707999	WSM		WSM	Samoa	WSM
708	708000 - 708999	FSM		FSM	Micronesia	FSM
709	709000 - 709999	NRU		NRU	Nauru	NRU
710	710000 - 710999	TUV		TUV	Tuvalu	TUV
711	711000 - 711999	NIU		NIU	Niue	NIU
712	712000 - 712999	NFK		NFK	Norfolk Island	NFK

Country Short Code	Range (CountryCode)	Country (short)	State (short)	Country – State (short)	Country – State (long)	Country – State (CountryName)
713	713000 - 713999	PLW		PLW	Palau	PLW
714	714000 - 714999	PCN		PCN	Pitcairn Island	PCN
ADR						
990	990000 - 990999	UNK		UNK	Unknown	NON_LP
997	997000 - 997099	ADR	LADR	ADR-LADR	ADR - LATINADR	ADR-LAT
997	997100 - 997199	ADR	UADR	ADR-UADR	ADR - USAADR	ADR-USA
997	997200 - 997299	ADR	SADR	ADR-SADR	ADR - SAMADR	ADR-SAM
997	997300 - 997399	ADR	CADR	ADR-CADR	ADR - CASADR	ADR-CAS
998	998000 - 998999	UN		UN	UN	UN
999	999000 - 999099	APS		APS	APS	APS
999	999100 - 999499	ILU		ILU	ILU	ILU
999	999500 - 999599	VGN		VGN	Vignette	VGN
999	999980 - 999989	ADR	A	ADR-A	ADR - A PLATES	ADR-A
999	999990 - 999999	ADR	EADR	ADR-EADR	ADR - EMPTYADR	ADR-EADR

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Adaptive Recognition **America**
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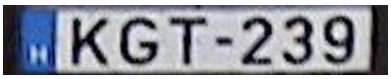
RETRIEVING COUNTRY NAMES FROM RETURNED PLATE TYPE VALUES FOR LEGACY ENGINES

(FOR ENGINE VERSION 7.2.7.X OR BELOW)

I. *This section only applies to region-specific engines that are version 7.2.7.x or below, excluding USA, Canada, and Australia*

(e.g. cmanpr-7.2.7.116-latin)

The type value (T) is a decimal between 100 and 99999. If the type result is divided by 100 the result is the code of the country (C). The remainder defines the subtype (S) within the country. Example: Latin engine



cmNP::type: 111

C=111/100=1 defines HUN (Hungary) as country.

The remainder (S=111 mod 100) =11, refers to the standard, single-row Hungarian EU-plate.

II. This section only applies to region-specific engines of USA, Canada, and Australia that are version 7.2.7.x or below

(e.g. cmanpr-7.2.7.117-usa)

The type value (T) is a decimal, which is greater than 100000 consisting three main components.

T=100000*C+100*F+S

Where:

- C - state code within the USA; C=T/100000
- F - Format -a number between 0 and 999- is built up according to the followings:
  - 0-stands for a number in the plate text
  - 1-stands for a letter in the plate text
  - N-stands for the length of the plate text

(in the formula below 2^N equals to the greatest power of 2 below or equal to F)

  - B: Decimal value of the plate text's binary format created by the previous rules The

B value can be calculated according to the following formula: $F=2^N-2+B$

Subtype (S): Serves to distinct plates with the same format within a state (2-digit decimal between 0 and 99)

Example: USA and Canada engine

cmNP::type: 1121701

T=1121701.

C=T/100000= 1121701/100000=11 defines USA-CA (California).

F=217

Subtype (S)=1,

$F=2^N-2+B$ where N is the greatest power of two below 217, which is 128. $128=2^7$ so N=7

$217=2^7-2+B$

217=126+B

B=91 converted to binary: 1011011, so the format of the plate is the following:

'letter number letter letter number letter letter'

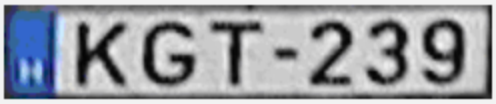
COUNTRY AND STATE ID'S FOR LEGACY ENGINES (FOR ENGINE VERSION 7.2.7.X OR BELOW)

(e.g. cmanpr-7.2.7.117-usa)

Country IDs							
1.	HUN	56.	FIN	112.	KGZ	26.	USA-CT
2.	UKR	57.	EST	113.	FRA	27.	USA-OR
3.	RUS	58.	JOR	128.	GBR	28.	USA-NE
4.	LTU	59.	IRN	136.	IRL	29.	USA-WA
5.	CZE	60.	ARE_CD	140.	ZAF	30.	USA-AZ
6.	LVA	61.	ARE_Dubai	142.	IMN	31.	USA-WY
7.	AUT	62.	ARE_AbuDhabi	143.	JEY	32.	USA-KS
8.	DEU	63.	ARE_Ajman	144.	GGY	33.	USA-AL
9.	ROU	64.	ARE_Fujairah	145.	NZL	34.	USA-AK
10.	SVK	65.	ARE_Sharjah	147.	LBY	35.	USA-AR
11.	POL	66.	ARE_UmmalQuwain	163.	URY	36.	USA-DE
12.	NLD	67.	ARE_RasAlKhaimah	164.	GTM	37.	USA-DC
13.	FRA	68.	ARE_Unknown	166.	SLV	38.	USA-HI
14.	TWN	70.	NOR	167.	HND	39.	USA-ID
15.	BRA	71.	LBN	168.	PRY	40.	USA-LA
16.	KOR	72.	ARG	175.	PER	41.	USA-MS
17.	ITA	73.	MCO	176.	MAR	42.	USA-MT
18.	CHL	74.	LIE	180.	CHN	43.	USA-NV
19.	SVN	75.	KAZ	181.	CHN	44.	USA-NH
20.	MLT	76.	MAR	184.	VAT	45.	USA-NM
21.	ESP	77.	SYR	185.	VEN	46.	USA-ND
22.	SGP	78.	HKG	186.	ANT	47.	USA-RI
23.	BIH	79.	GIB	187.	IND	48.	USA-SC
24.	SMR	80.	CHN	188.	VNM	49.	USA-SD
25.	CHE	81.	CHN	189.	BOL	50.	USA-UT
26.	SWE	82.	KOR	208.	IRQ	51.	USA-VT
27.	BEL	83.	EGY	227.	PAK	52.	USA-WV
28.	GBR	84.	KOS	700.	USR	60.	CAN-ON
29.	DNK	85.	ISR	**USA State IDs**		61.	CAN-QC
30.	AND	86.	CRI			62.	CAN-BC
31.	HRV	87.	AUT_OLD	1.	USA-GOV	63.	CAN-MB
32.	SRB	88.	DEU_OLD	2.	USA-IL	64.	CAN-NS
33.	GRC	89.	FRA_NEW	3.	USA-IN	65.	CAN-AB
34.	LUX	90.	MDA	4.	USA-MI	66.	CAN-SK
35.	MYS	91.	MNE	5.	USA-WI	67.	CAN-NB
36.	IRL	92.	TKM	6.	USA-OH	73.	CAN-FED
37.	PRT	93.	MNG	7.	USA-ME	**Australian State IDs**	
38.	THA	94.	BWA	8.	USA-TN		
39.	MEX	95.	NAM	9.	USA-MN	1.	AUS-FIS
40.	ZAF	96.	SWZ	10.	USA-PA	2.	AUS-ACT
41.	MKD	97.	ADR	11.	USA-CA	3.	AUS-NT
42.	BGR	98.	UN	12.	USA-FL	4.	AUS-NSW
43.	ALB	99.	UNKNOWN	13.	USA-VA	5.	AUS-QLD
44.	ISL	100.	DEU_TEMP	14.	USA-NY	6.	AUS-SA
45.	NZL	101.	DEU_TEST	15.	USA-TX	7.	AUS-TAS
46.	QAT	102.	DEU_OLDTIMER	16.	USA-IA	8.	AUS-VIC
47.	BLR	103.	DEU_SEASON	17.	USA-OK	9.	AUS-WA
48.	DZA	104.	DEU_TEMP_OLD	18.	USA-CO		
49.	TUR	105.	DEU_TEST_OLD	19.	USA-KY		
50.	GEO	106.	DEU_OLDTIMER_OLD	20.	USA-MO		
51.	COL	107.	DEU_SEASON_OLD	21.	**USA-NJ**		
52.	SAU	108.	MOZ	22.	**USA-GA**		
53.	OMN	109.	LSO	23.	**USA-MD**		
54.	KWT	110.	ZWE	24.	**USA-NC**		
55.	BHR	111.	AZE	25.	**USA-MA**		

RESULT STRUCTURE EXAMPLES (FOR ENGINE VERSION 7.3.9.X AND ABOVE)

SAMPLE #1 - NUMBER PLATE TYPE FROM HUNGARY



CMANPR RESULT				RESULT FROM
PLATE TYPE	101011			cmNP: type
	RETURNED VALUE DECIMAL	CONVERTED TO BGR HEXADECIMAL	COLOR NAME	
CHARACTER COLOR	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR	16777215	0xFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR	16777215	0xFFFFFF	white	cmNP:color (anpr.GetColor())

NUMBER PLATE TEXT RESULTS			RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1	
NUMBER PLATE (ASCII VERSION)	KGT239	KGT239	cmNP::text
NUMBER PLATE (UNICODE VERSION)	KGT239		cmNP::wtext

SAMPLE #2 - NUMBER PLATE TYPE FROM CROATIA

CMANPR RESULT				RESULT FROM
PLATE TYPE:	112001			cmNP: type
	RETURNED VALUE DECIMAL	CONVERTED TO BGR HEXADECIMAL	COLOR NAME	
CHARACTER COLOR:	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR:	16777215	0xFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	16777215	0xFFFFFF	white	cmNP:color (anpr.GetColor())

NUMBER PLATE TEXT RESULTS			RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1	
NUMBER PLATE (ASCII VERSION)	V!360GC	V(017D)360GC	cmNP::text
NUMBER PLATE (UNICODE VERSION)	VŽ360GC		cmNP::wtext

SAMPLE #3 - NUMBER PLATE TYPE FROM CHINA

CMANPR RESULT				RESULT FROM
PLATE TYPE:	240334			cmNP: type
	RETURNED VALUE DECIMAL	CONVERTED TO BGR HEXADECIMAL	COLOR NAME	
CHARACTER COLOR:	16777215	0xFFFFFF	white	cmNP::CHR color
CHARACTER BACKGROUND COLOR:	255	0x0000FF	blue	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	255	0x0000FF	blue	cmNP:color (anpr.GetColor())

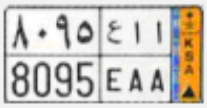
NUMBER PLATE TEXT RESULTS			RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1	
NUMBER PLATE (ASCII VERSION)	!N719N0	(4eac)N719N0	cmNP::text
NUMBER PLATE (UNICODE VERSION)	京N719N0		cmNP::wtext

SAMPLE #4 - A NUMBER PLATE TYPE FROM OMAN

CMANPR RESULT				RESULT FROM
PLATE TYPE:	215006			cmNP: type
	RETURNED VALUE DECIMAL	CONVERTED TO BGR HEXADECIMAL	COLOR NAME	
CHARACTER COLOR:	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR:	65535	0x00FFFF	yellow	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	65535	0x00FFFF	yellow	cmNP:color (anpr.GetColor())

NUMBER PLATE TEXT RESULTS			RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1	
NUMBER PLATE (ASCII VERSION)	2219RS	2219RS	cmNP::text
NUMBER PLATE (UNICODE VERSION)	2219RS		cmNP::wtext

SAMPLE #5 - NUMBER PLATE TYPE FROM SAUDI ARABIA



CMANPR RESULT				RESULT FROM
PLATE TYPE:	210009			cmNP: type
	RETURNED VALUE DECIMAL	CONVERTED TO BGR HEXADECIMAL	COLOR NAME	
CHARACTER COLOR:	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR:	16777215	0xFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	42495	0x0080FF	orange	cmNP:color (anpr.GetColor())

NUMBER PLATE TEXT RESULTS				RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1	If unicode_in_text=2	
NUMBER PLATE (ASCII VERSION)	!!!!!!	(0668)(0660)(0669) (0665)(0639)(0627) (0627)	8095EAA	cmNP::text
NUMBER PLATE (UNICODE VERSION)	٨٠٩٥ ٤١١			cmNP::wtext

SAMPLE #6 - ADR PLATE TYPE

CMANPR RESULT				RESULT FROM
PLATE TYPE:	997001			cmNP: type
	RETURNED VALUE DECIMAL	CONVERTED TO BGR HEXADECIMAL	COLOR NAME	
CHARACTER COLOR:	0	0x000000	black	cmNP::CHR color
CHARACTER BACKGROUND COLOR:	16777215	0xFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	16777215	0xFFFFFF	white	cmNP:color (anpr.GetColor())

ADR PLATE TEXT RESULTS			RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1	
ADR PLATE (ASCII VERSION)	331203	331203	cmNP::text
ADR PLATE (UNICODE VERSION)	331203		cmNP::wtext

SAMPLE #7 - ADR PLATE TYPE				
				
CMANPR RESULT				RESULT FROM
PLATE TYPE:	999999			cmNP: type
	RETURNED VALUE DECIMAL	CONVERTED TO BGR HEXADECIMAL	COLOR NAME	
CHARACTER COLOR:				cmNP::CHR color
CHARACTER BACKGROUND COLOR:	16777215	0xFFFFFF	white	cmNP::CHR bkcolor
DEDICATED AREA COLOR:	16777215	0xFFFFFF	white	cmNP:color (anpr.GetColor())
ADR PLATE TEXT RESULTS				RESULT FROM
	If unicode_in_text=0	If unicode_in_text=1		
ADR PLATE (ASCII VERSION)				cmNP::text
ADR PLATE (UNICODE VERSION)				cmNP::wtext

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ABBREVIATIONS

ANPR

Automatic Number Plate Recognition

ALPR

Automatic License Plate Recognition

LPR

License Plate Recognition

ADR

Hazardous Material Identification Code for dangerous goods (also known as Kemler Code). It is an abbreviation derived from the name of the treaty that established it (European Agreement Concerning the International Carriage of Dangerous Goods by Road).

EADR

Empty ADR plate, which is an ADR plate without text

CARMEN®

The brand name of the ARH optical character recognition software family

CARMEN® FreeFlow

ARH license plate recognition software for free-flowing traffic applications and server applications

CARMEN® Parking Digital (can also be referred to as CPD)

ARH license plate recognition software for access control and slow-moving traffic applications

CPD

See CARMEN® Parking Digital

BGR

(Blue, Green, Red) Color code system, it displays pixel layout

RGB

(Red, Green, Blue) Color code system, it displays pixel layout

ASCII

American Standard Code for Information Interchange, character-encoding scheme

API

Application Programming Interface, software library including a set of routines, protocols, and tools for building software applications.

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DEFINITIONS

general engine

Recognition engine without country/state identification. Outputs are pure OCR results, where the type (cmNP::type) is always zero (unidentified).

region-specific engine

Recognition engine with country/state identification. Each engine is tuned to a certain geographic region. Outputs contain a country/state identification value in the cmNP::type member of the result structure. Non-zero type indicates that the country of the license plate was successfully identified during the process. Type=0 refers to an unidentified country or state.

current engine

Recognition engine currently selected to process input images. It is possible to install multiple engines concurrently on the same system/server, and you can designate any one of those for processing during runtime.

default engine

Recognition engine selected to process input images by default. It is possible to install multiple engines concurrently on the same system/server, and you can designate any one of those as default.

engine-dependent value

Property value that may be different for each engine release. Obtain the value of the given property by calling the GetProperty() function.

SYMBOLS

{0,1,2,4,5} braces mean that the property can only assume one of the discrete values listed inside [16..25] brackets mean that the property can assume one of the integer values within the listed range

cmNP

Output structure of the cmAnpr development library

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Adaptive Recognition Hungary Technical Support System (ATSS) is designed to provide you the fastest and most proficient assistance, so you can quickly get back to business.

Information regarding your hardware, latest software updates and manuals are easily accessible for customers via our Documents Site (www.adaptiverecognition.com/doc) after a quick registration.

New User

If this is your first online support request, please contact your sales representative to register you in our Support System. More help here (www.adaptiverecognition.com/support)!

Returning User

All registered ATSS customers receive a personal access link via e-mail. If you previously received a confirmation message from ATSS, it contains the embedded link that allows you to securely enter the support site.