FREEWAYCAM3/SMARTCAM3/ SPEEDCAM3

DIGITAL (IP) LPR CAMERA

INSTALL GUIDE

WWW.ARH.HU

FREEWAYCAM3

USER MANUAL

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Federal Communications Commission

THE FCC DECLARATION OF CONFORMITY

47 CFR PART 15 SUBPART B

FREEWAYCAM-03

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 ARH Inc., Inc could void your right to use or operate your product by the FCC.

USER MANUAL

1. ABOUT THIS MANUAL

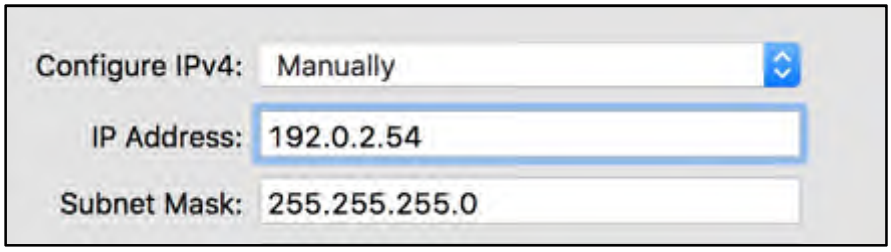
The structure of this manual follows the approach of configuring a new camera for its first-time use.
All of the camera features are accessible through the web interface, using a web browser. No external components need to be installed.
First, system settings are discussed, so that the device will be 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 - like license plate recognition - and for the video feed streamed with the chosen encoding.
In the last section the tools of camera maintenance (firmware update, logs, etc.) are described.

2. ACCESSING THE CAMERA

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

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.

Note down your computer's current IP address and settings.
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



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`

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)

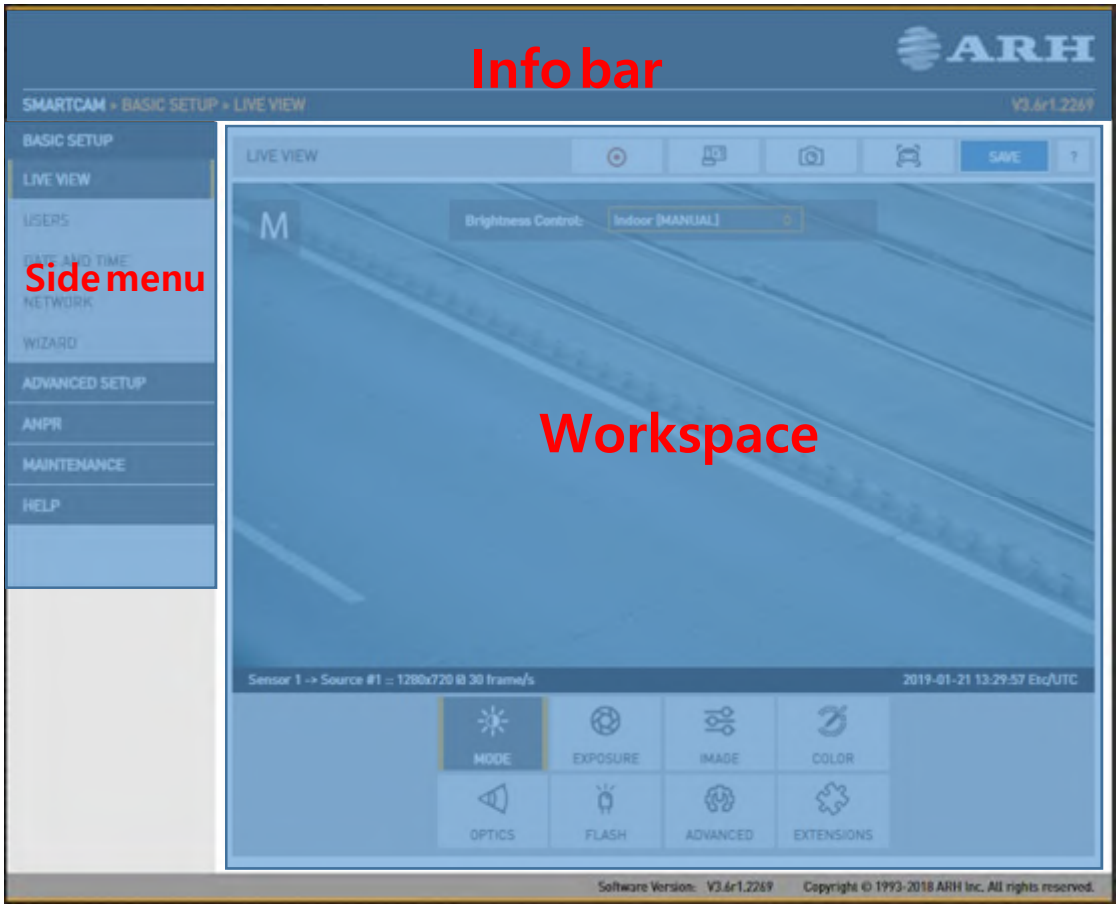
Start a browser and enter the default IP of the camera: http://192.0.2.3 into the address bar. The camera's user interface starts up with administrator privileges, ready to be set up and configured. If the web interface is not accessible, make sure that neither a proxy nor a firewall is blocking access, 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.

- ARH logo
- Version number
- Camera type, menu points

Side menu

- Basic, 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 button to see the tooltip.

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.

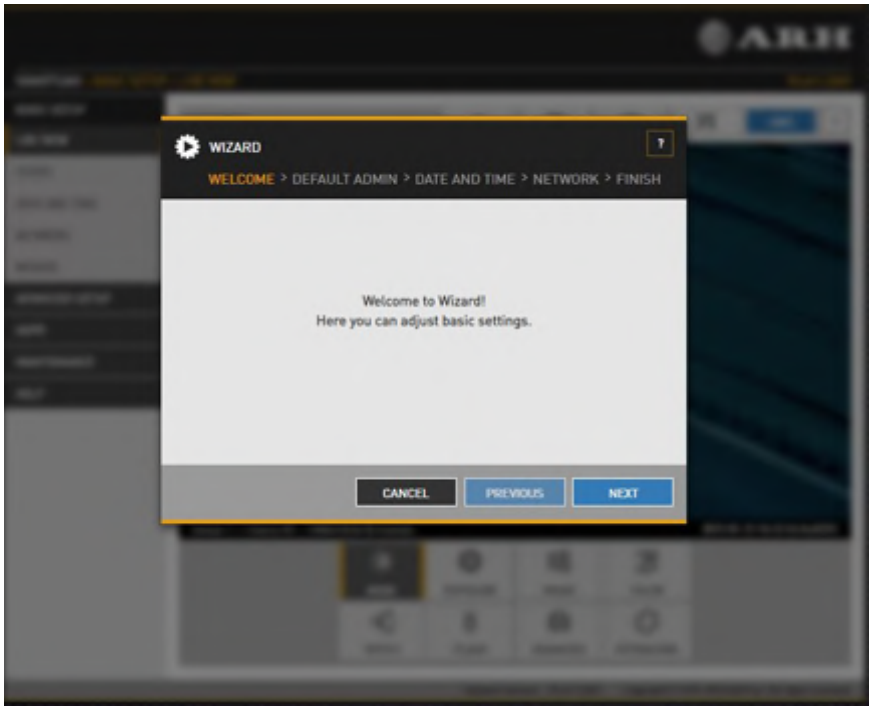
Note

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

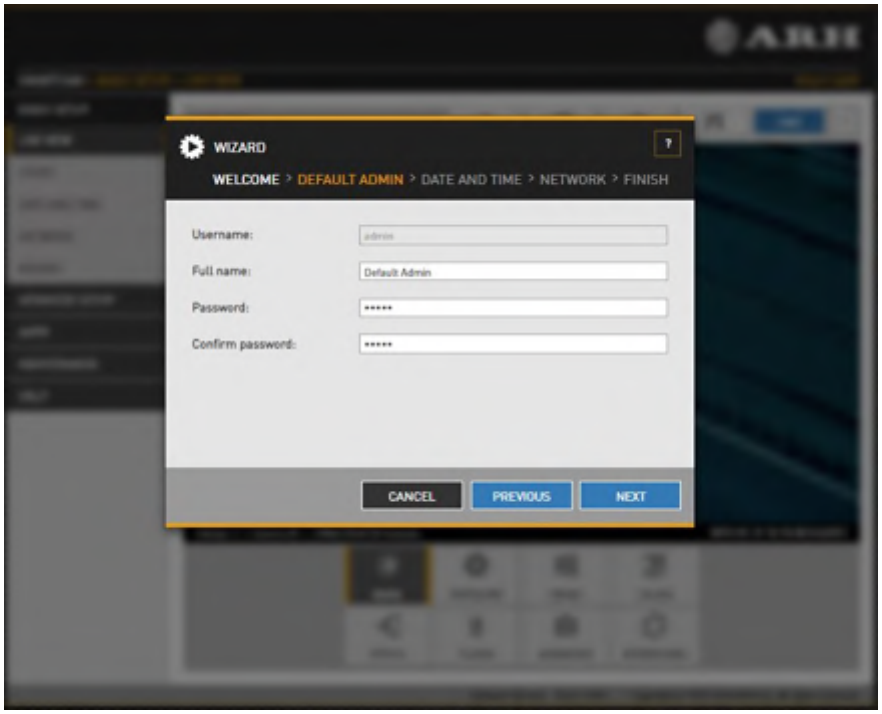
4. FIRST STEPS (WIZARD)

WEB INTERFACE > BASIC SETUP > WIZARD

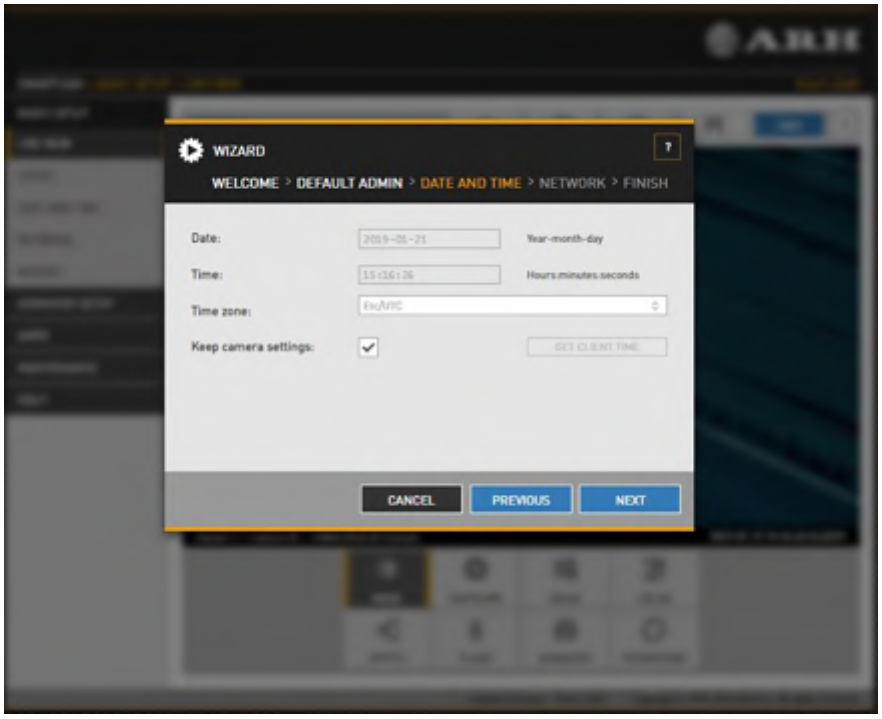
The Wizard will help with the initial configuration of the system settings of the camera. It will guide you through:



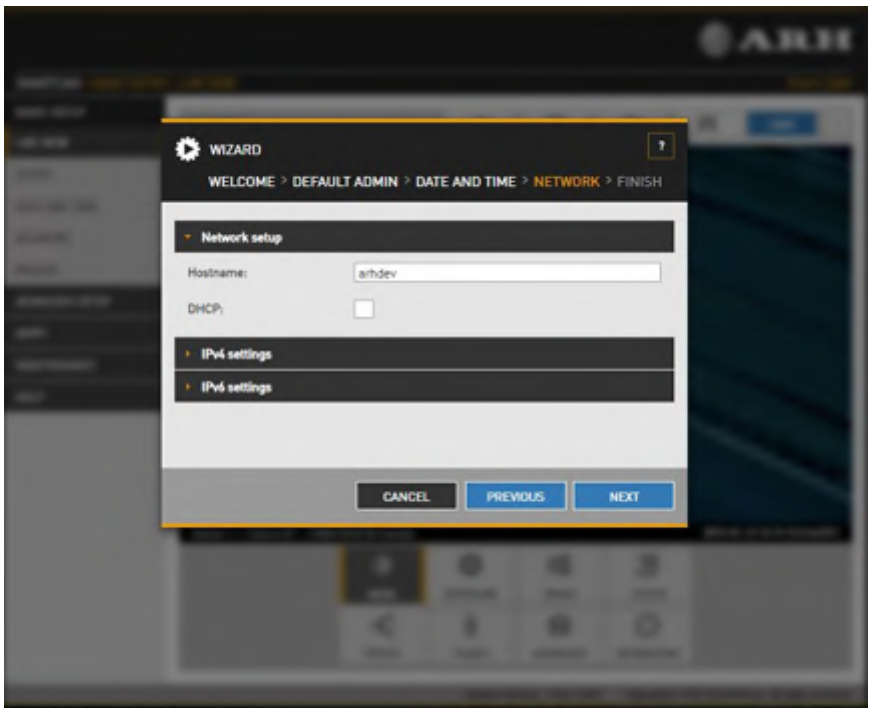
It will guide you through setting up an administrator user.



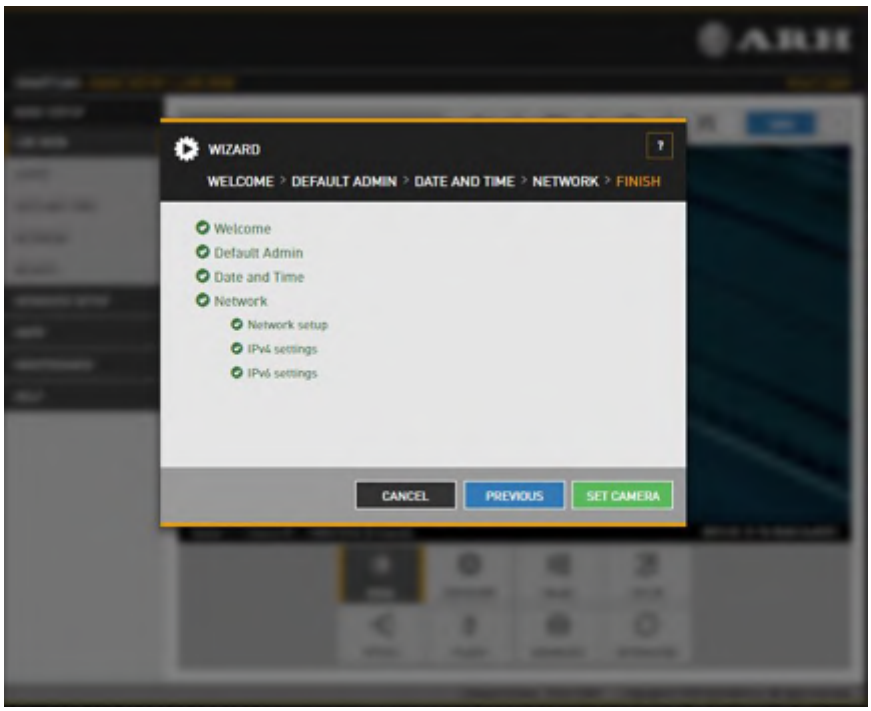
Set the current date & time.



Set up network.



It will give you feedback if something went wrong (line would be red). If all settings were proper, each line would be green.



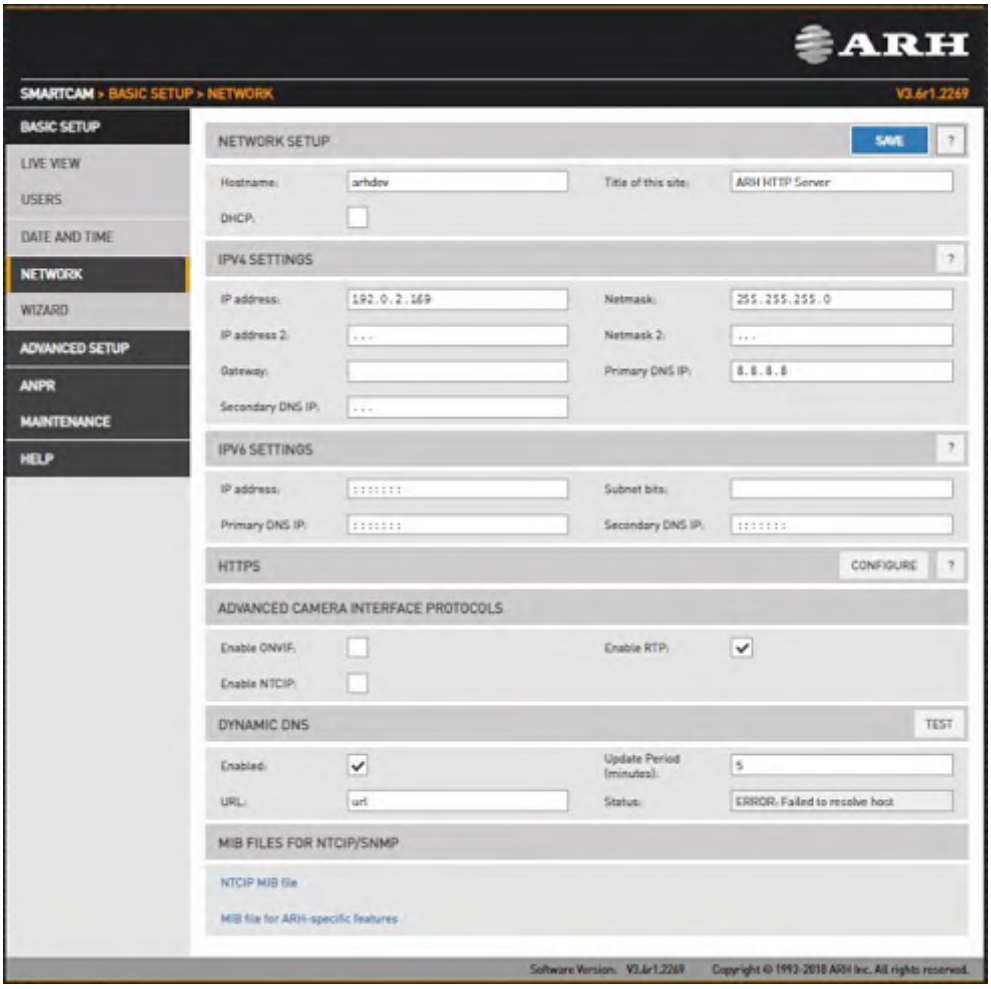
All these settings are also available as separate configuration pages (see System settings).

5. SYSTEM SETTINGS

5.1. NETWORK

WEB INTERFACE > BASIC SETUP > NETWORK

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



NETWORK SETUP

Hostname: The name of the device in the network.

Title of this site: Textual description of the device, for example CameraFrontRight, 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).

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.

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.

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 8 characters long mask)

HTTPS

The camera's onboard webserver is capable to run in HTTPs mode. It means that you will have an encrypted, secure channel between you and the camera. Please note that while the communication towards the camera is secured (HTTPs requests, web interface), but it is your responsibility to protect the communication channel (e.g. with VPN) between the camera and the data server for result upload.

To set up the HTTPs connection click CONFIGURE
GENERATE a Certificate Signing request by setting up the hostname and hit GENERATE.
Upload/Install your Signed Certificate (which you have from the 3rd party certification provider)
ACTIVATE the HTTPs

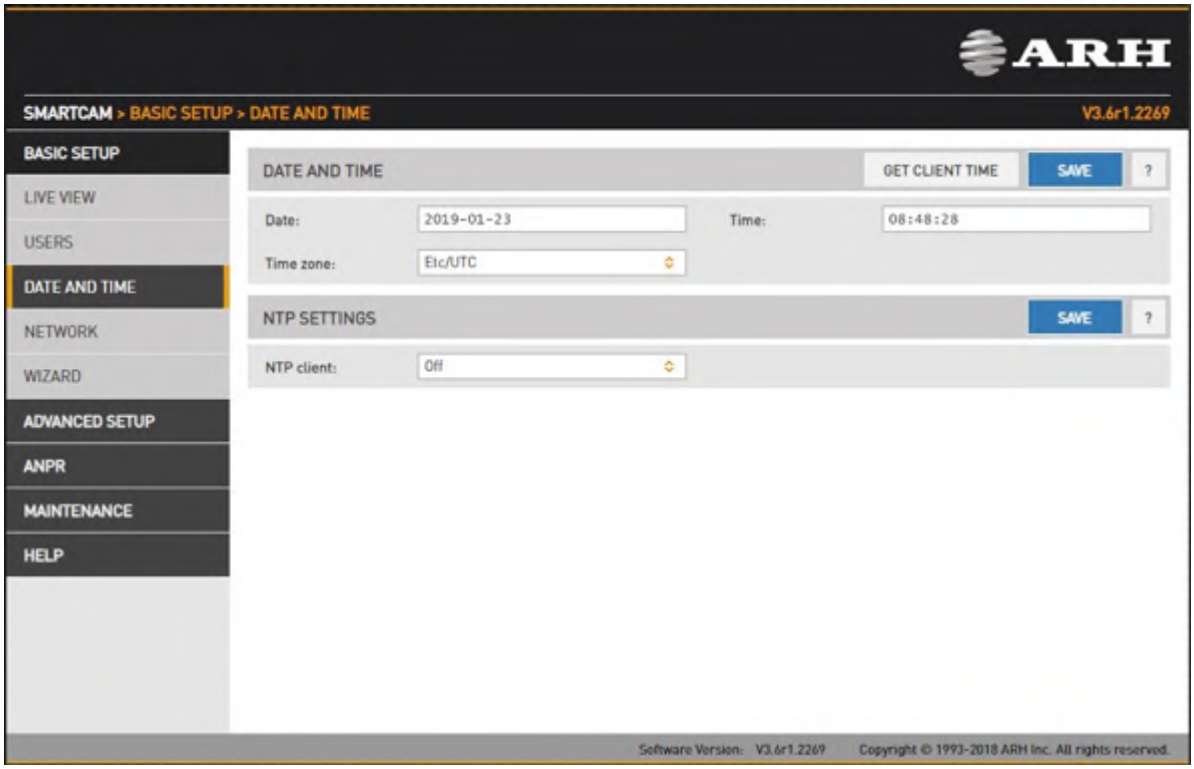
Enable RTP: select this option to enable RTP streaming.

Enable NTCIP: enables the National Transportation Communications for Intelligent Transportation System (ITS) Protocol (NTCIP) which creates a seamless integration into standardized ITS systems.

Settings are applied after clicking SAVE.

5.2. DATE & TIME

WEB INTERFACE > BASIC SETUP > DATE AND TIME



Current date and time and timekeeping settings are managed in this page. Users can choose to set date and time manually once or to use 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.

For manual time adjustment, either enter date and time in the corresponding fields, or click GET CLIENT TIME to adjust the internal clock of the camera according to the PC's clock. Please note that the latter is a one-time adjustment only, it will not keep the camera synchronized to the client 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. Approx. one second accuracy is guaranteed only.

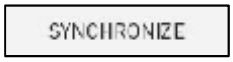
- **Local network NTP client:** Works only if the camera and the NTP server is on the same local network, but guarantees higher accuracy than the standard NTP client. Also places a higher load on the NTP server.

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].

Max. I/O time: Maximal duration of a query-answer cycle between the camera and the NTP server, before the answer is dropped. This influences the accuracy. Best practice is to set it to 10000 µs on a local network.

Log: If it is enabled, the current state of synchronization can be monitored at the Maintenance / Camera log page.

To initiate an immediate synchronization to the NTP server, click the 

button.

Note

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

5.3. USERS

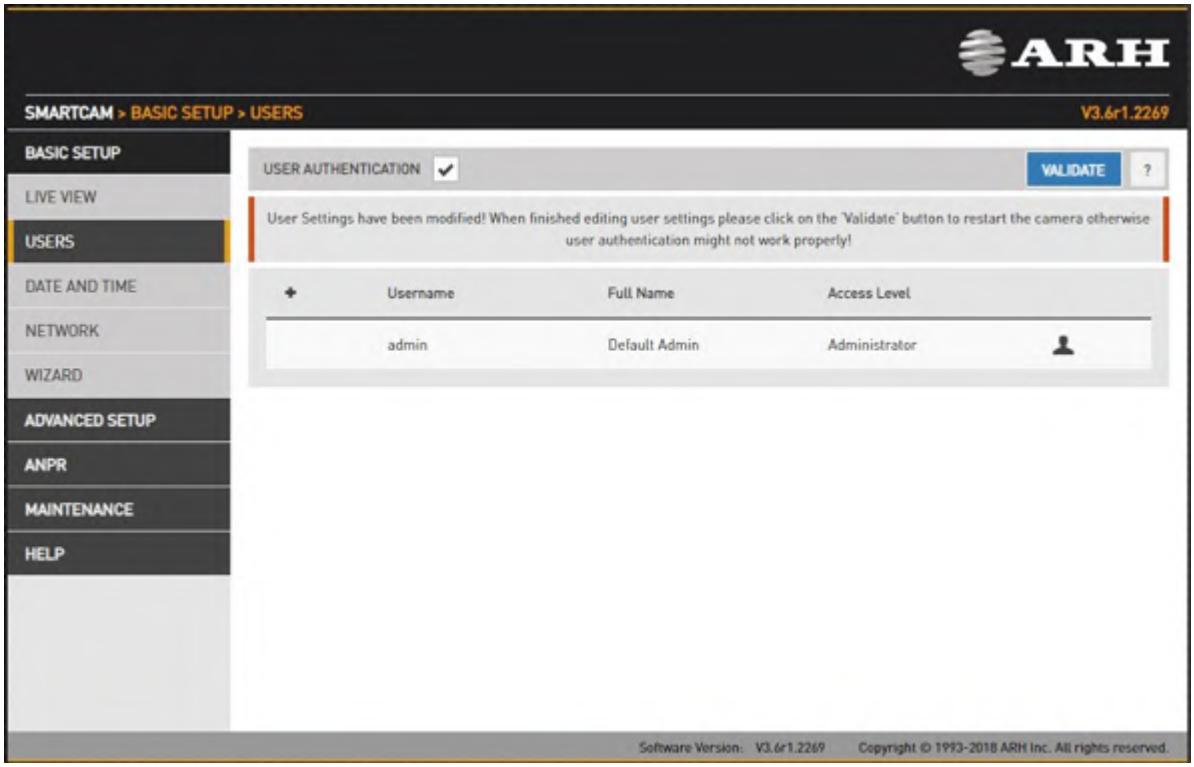
WEB INTERFACE > BASIC SETUP > USERS

User management settings are displayed in this page.

If user management is not required, it can be turned off with the 

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.



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

Name: the user name, this will be used to login.

!Important

User name cannot be 'root' and must contain only letters of the English alphabet, numbers or underscore.

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

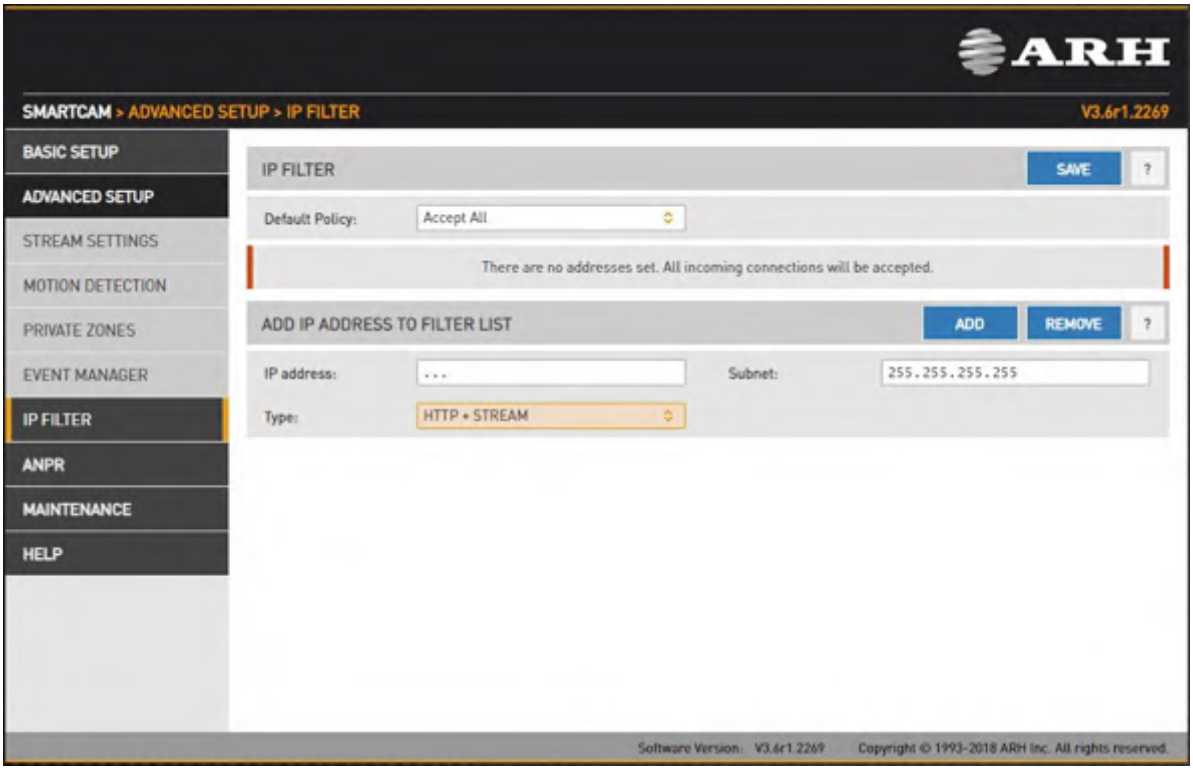
Edit/Delete: It is possible to edit user parameters or delete existing users from the system with the exception of the main "admin" user. This user cannot be deleted and its username and access level cannot be modified.

Note

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

5.4. IP FILTER

WEB INTERFACE > ADVANCED SETUP > IP FILTER



Note

The IP filter module affects only HTTP and stream communication, it does not restrict the 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: the settings are applied to HTTP requests
- STREAM: the settings are applied to stream requests
- HTTP+STREAM: the settings are applied to both HTTP and stream requests

Netmask: 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.

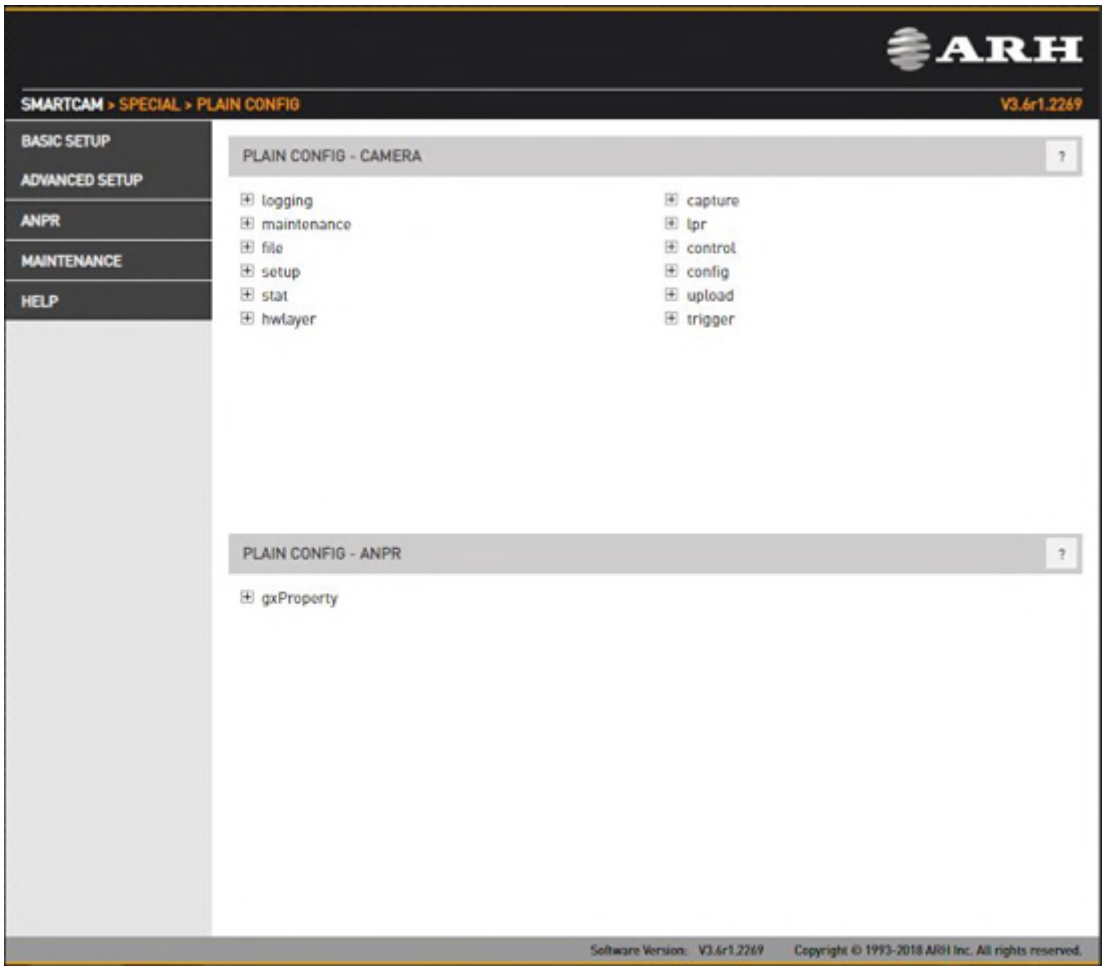
!Important

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 recovery procedure may be applied.

5.5. PLAIN CONFIG

This page is reachable on the following URL: http://CAM_IP/#plainconfig

All configuration settings are available in this menu, organized as a property tree.
Please note that this is an "experts only" feature.



6. IMAGE SETUP

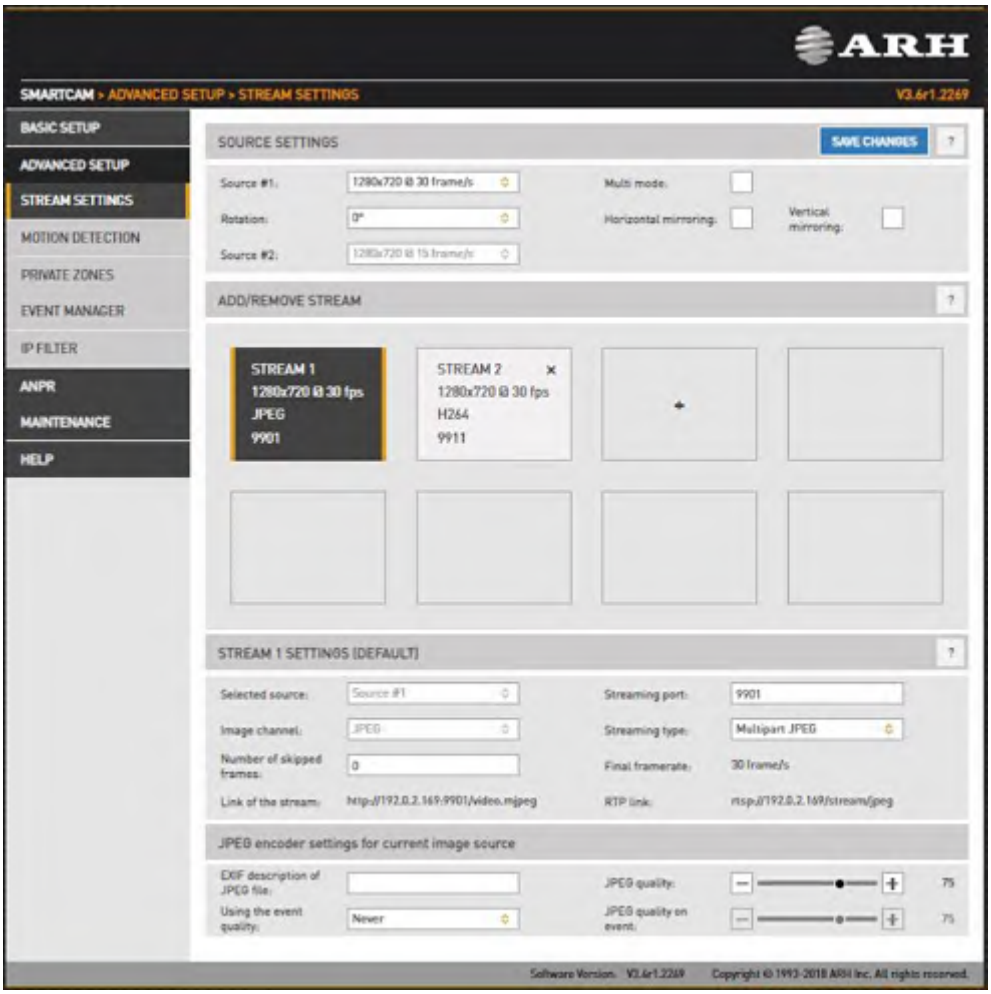
6.1. IMAGING PIPELINE

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 intensity 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 (or external) 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

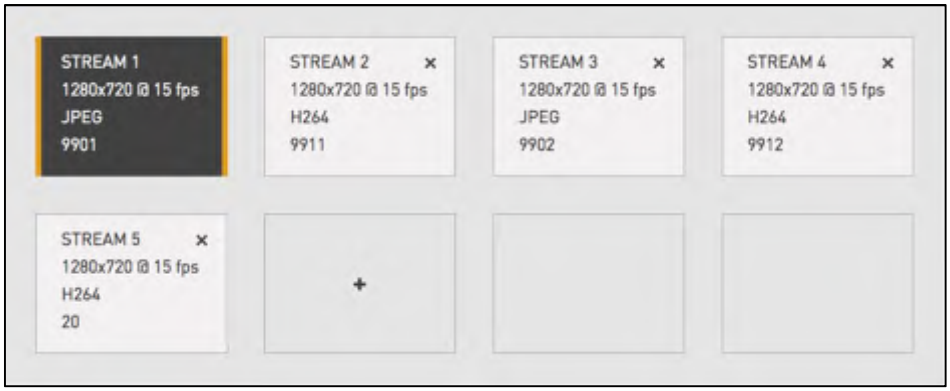
Source#2: The resolution and FPS of the secondary imaging pipeline

Multi mode: This checkbox enables Multi Mode

Rotation, Horizontal and Vertical mirroring: Geometric transformations (shared by both pipelines)

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 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 in question

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/...)

RTP link: Another network protocol to reach the stream. Tick in Enable RTP at Networks 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.

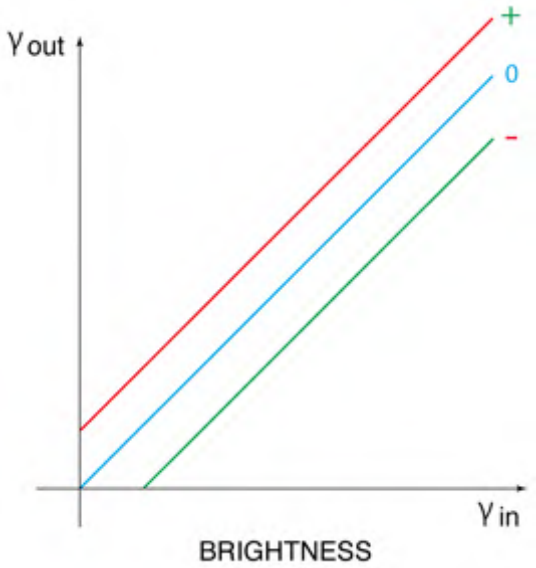
6.2. POST-PROCESSING

6.2.1. IMAGE

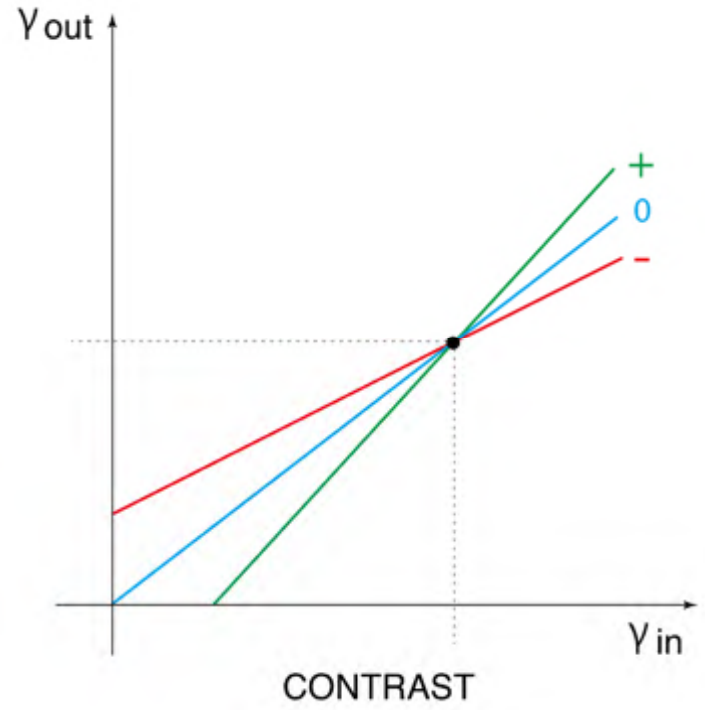
WEB INTERFACE > BASIC SETUP > LIVE VIEW > IMAGE

The basic post-processing settings are configured here:

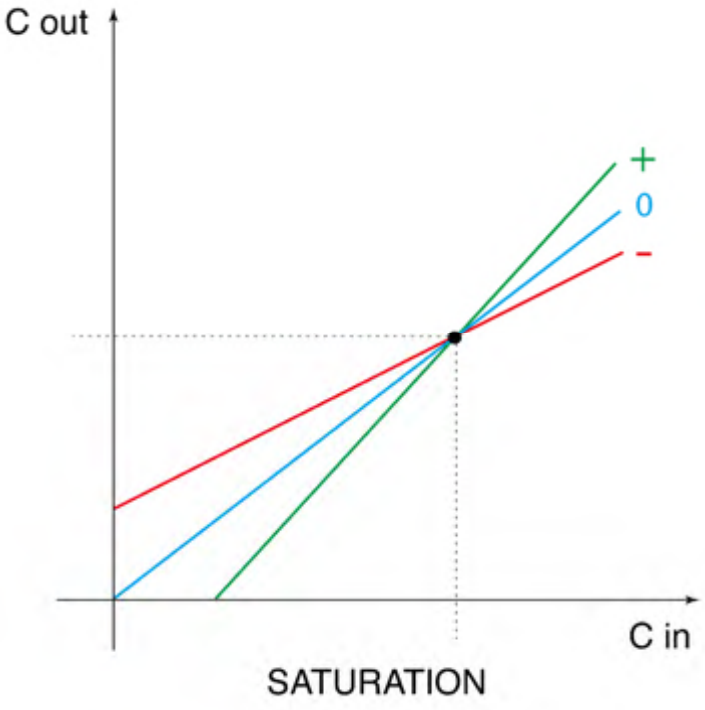
Brightness: Increase/decrease the brightness of the image



Contrast: Increase/decrease the luminance contrast of the image

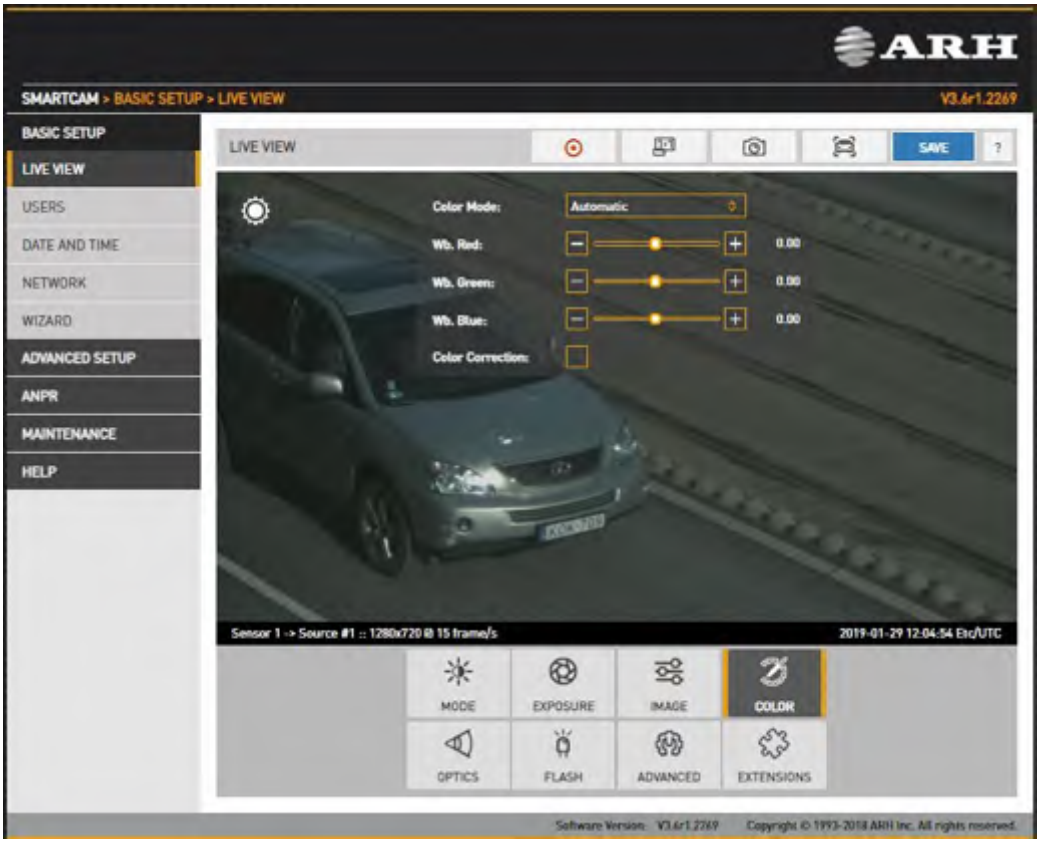


Saturation: Increase/decrease the chrominance contrast of the image



6.2.2. COLOR

WEB INTERFACE > BASIC SETUP > LIVE VIEW > COLOR



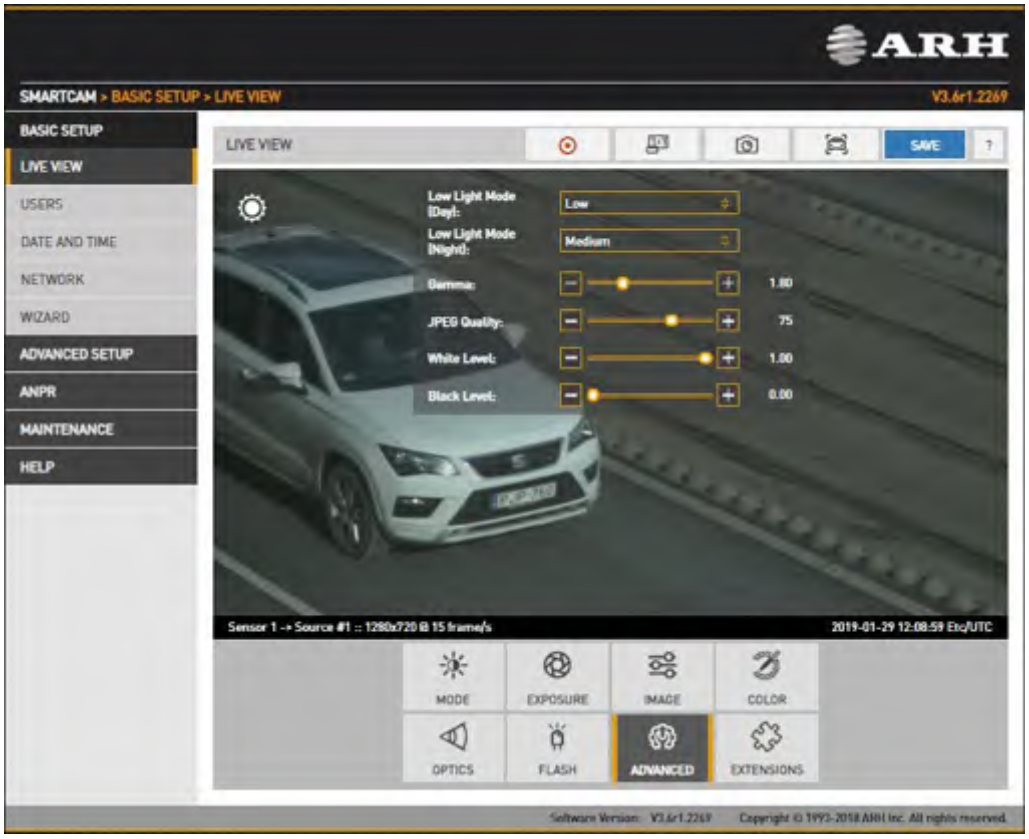
Color settings are configured here:

- **Color mode:** Color/grayscale mode
  - **Color:** Color mode
  - **Black&White, IR-day,Blur:** Grayscale mode, ideal for daytime IR mode.
  - **Black&White, IR-night,No blur:** Grayscale mode, ideal for night time IR mode, when the only light source is the built-in narrowband IR LEDs. The spatial resolution will double in both x and y directions, because each individual (color) pixel is used as luminance channel. When used with a broadband illumination (such as daylight), or a wavelength different than with which the device is calibrated, a checkerboard pattern will emerge.

- **Wb. Red:** Red channel gain
- **Wb. Green:** Green channel gain
- **Wb. Blue**: Blue channel gain
- **Color correction:** Automatic compensation of the color of the illumination.

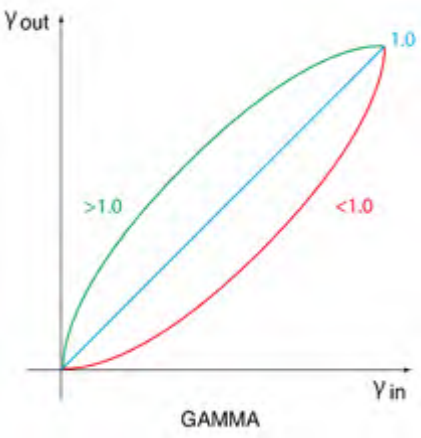
6.2.3. ADVANCED

WEB INTERFACE > BASIC SETUP > LIVE VIEW > ADVANCED



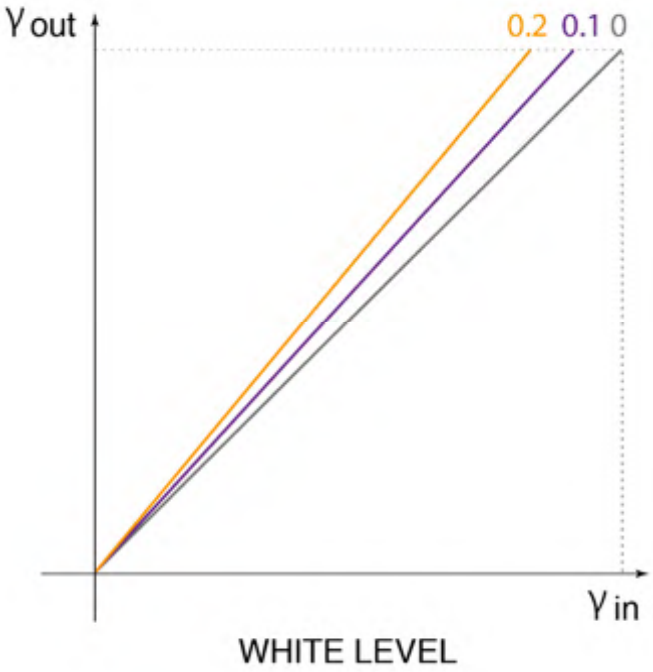
Advanced post-processing settings are configured here:

- **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 brighter the image.
- **Gamma:** Gamma correction of the image



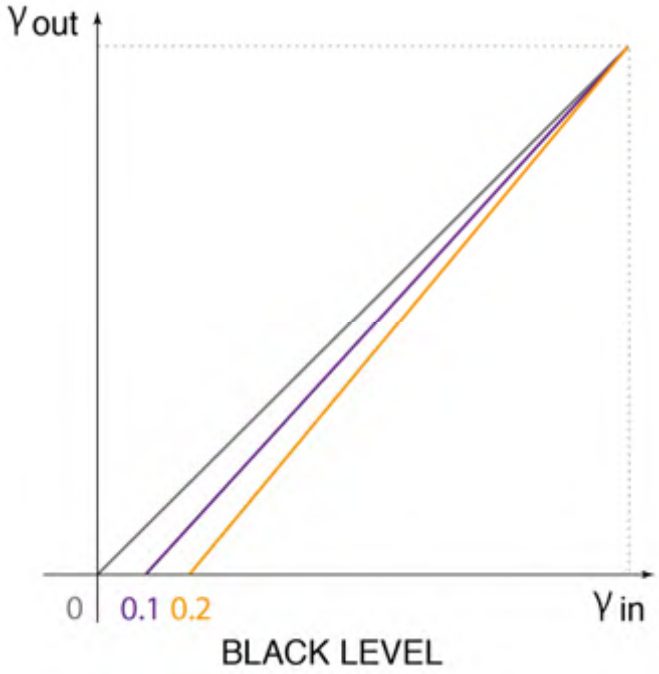
JPEG Quality: Affects the JPEG compression rate of the image – higher quality setting means lower compression.

White Level: Defines the pixel value above which all pixels will be mapped to white



WHITE LEVEL

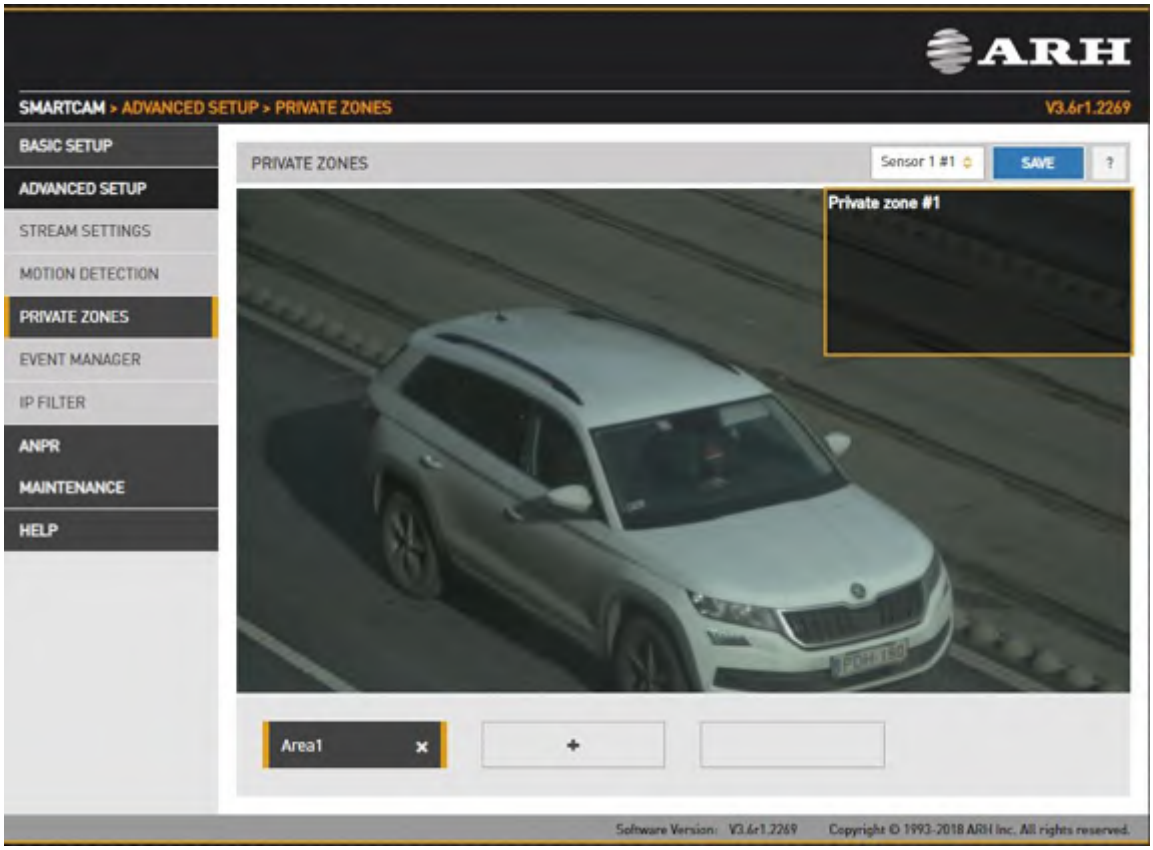
Black level: Defines the pixel value below which all pixels will be mapped to black



BLACK LEVEL

6.2.4. PRIVATE ZONES

WEB INTERFACE > ADVANCED SETUP > PRIVATE ZONES

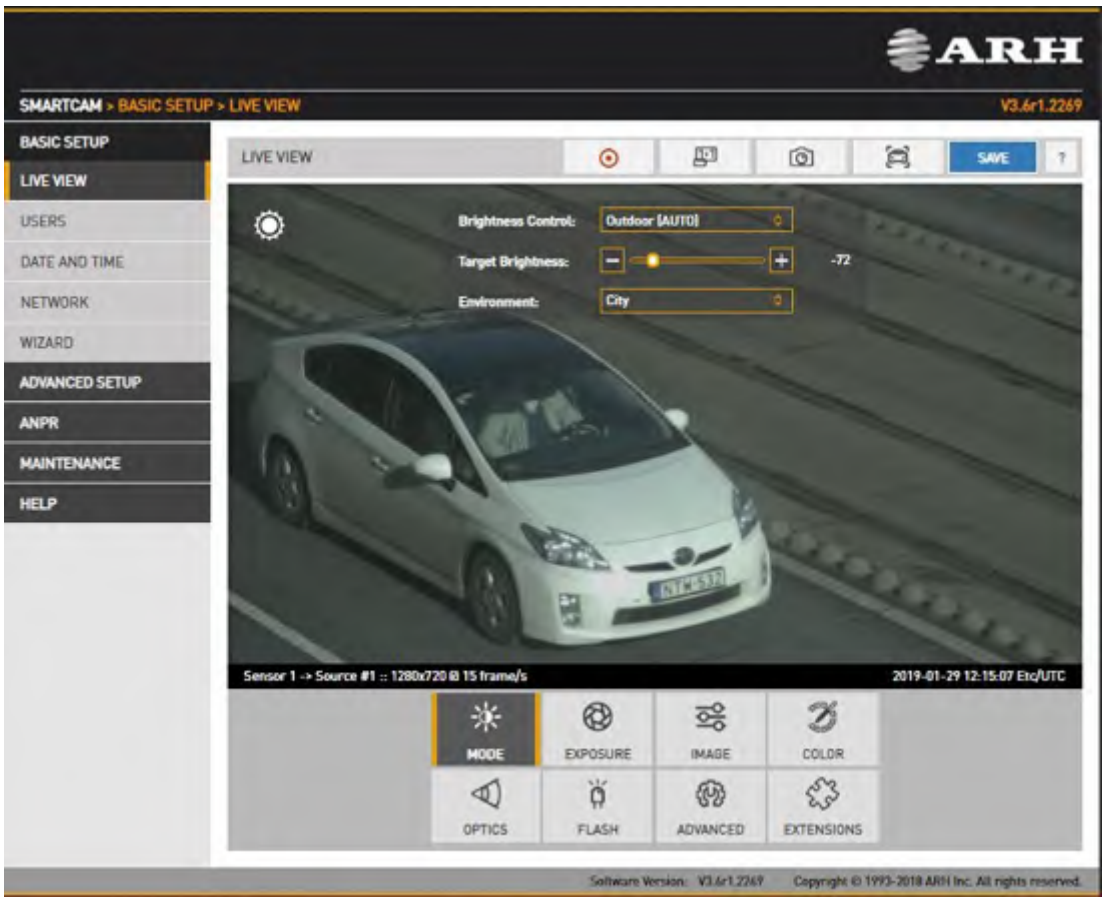


In certain circumstances it may be necessary to cover a part of the image, for instance, a parking place near the monitored lane, where the stationary vehicles should not be in the image, and their license plates should be excluded from processing, or when private property is displayed. These unwanted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

Each time, when 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 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, and gain that is set too high will result in 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, in case of slowly changing light conditions.

- **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 of Condition apply).

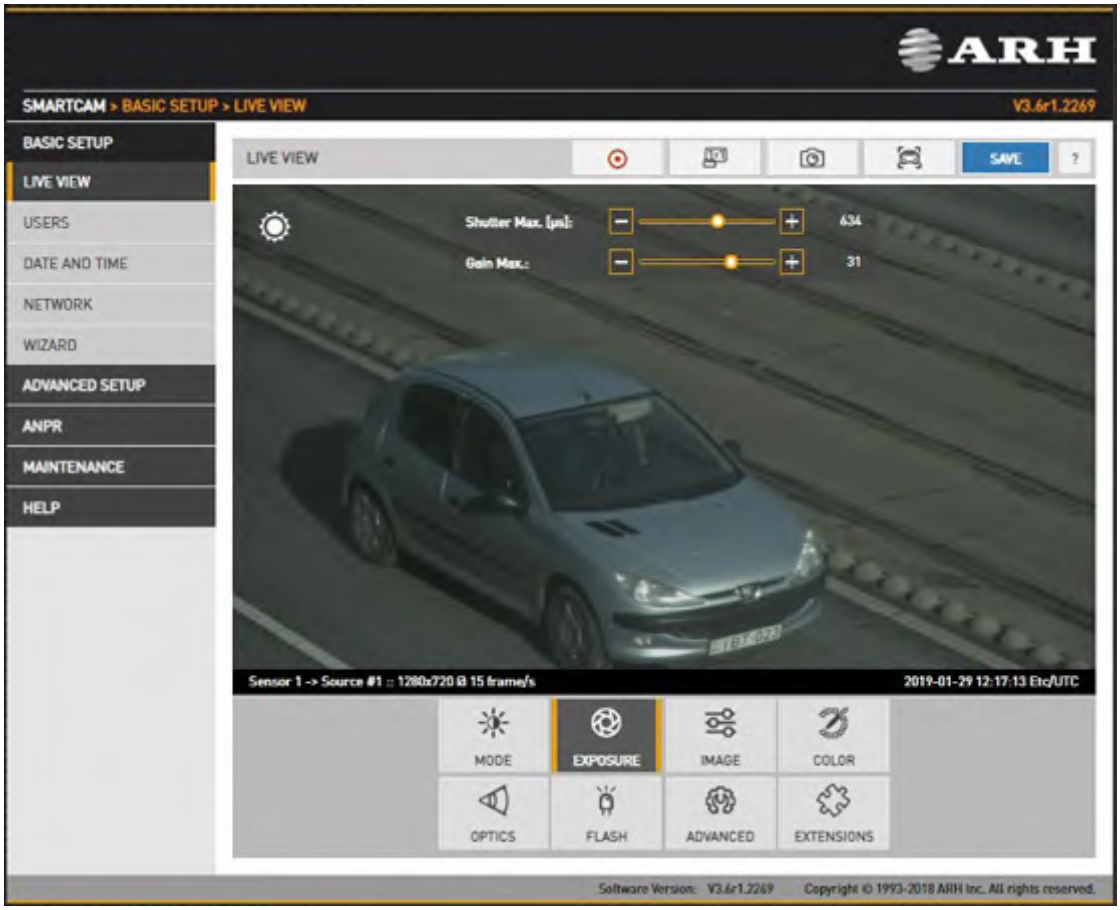
- **Environment**: Four conditions are available, each corresponding to a range of traffic speed and configuration. Please note that these conditions determine the maximal exposure time, limiting the illumination of the scene, under which night mode will be applied.

Outdoor	Max. speed [km/h]	Default Max. Shutter [µs]
Parking	10	5000
City	50	1000
Highway	255	250
Freeway	25	3000

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

6.4. EXPOSURE CONTROL

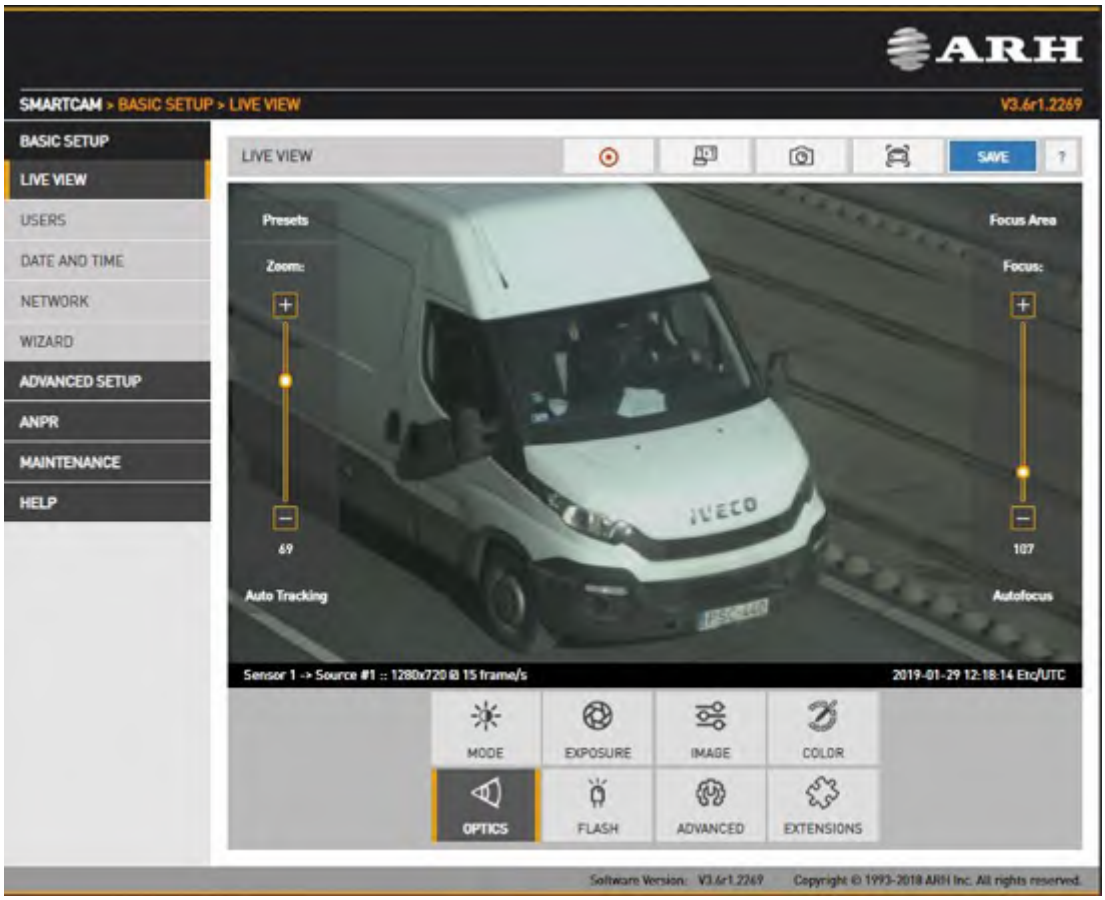
WEB INTERFACE > BASIC SETUP > LIVE VIEW > EXPOSURE



- In **Manual** mode **Shutter** and **Gain** are freely adjusted.
- In Outdoor mode both shutter and gain are adjusted by the controller software. However, their maximum value: **Shutter Max**. is adjustable and Gain Max. is available in 3 predefined steps or Custom, where a user defined value may be entered. Selecting a **Condition** on the Mode tab affects these values.
- In Quick mode a read only **Shutter Max.** is displayed.

6.5. OPTICS

WEB INTERFACE > BASIC SETUP > LIVE VIEW > OPTICS



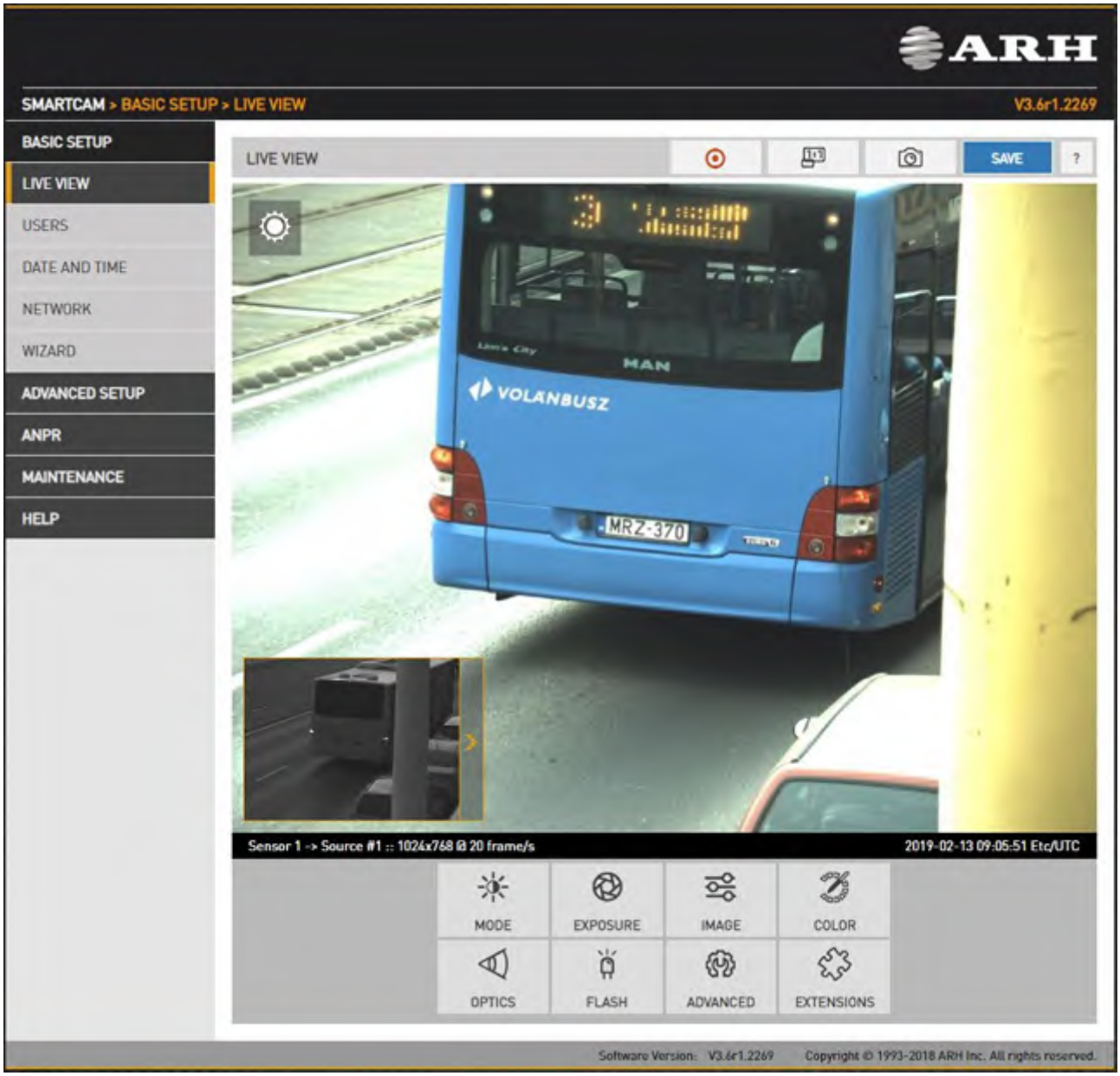
Models equipped with motorized lenses will show this menu item. Use the left slider (Zoom) to change the field of view from wide angle (0) to telephoto (100). Use the right slider (Focus) to manually adjust focus from near too far.
Clicking the **Autofocus** button will execute one shot autofocus. By clicking the **Focus Area** button, moving and resizing the yellow rectangle the area of interest can be defined, this part of the image will be sharp after autofocusing.

Auto tracking is enabled by clicking the **Auto Tracking** button. To use auto tracking, an anchor point must be defined, that is the image 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.

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, etc.) will be applied to the secondary sensor.

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 clicking the FLASH 

button at the Live View 

menu.

Indoor mode: (can be selected in Mode menu at Brightness Control)

- **IR Filter:** switch between the two states Infra_Cut and All_Pass
- **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.

Outdoor mode:

- Both Flash Intensity and Parity Flashing can be defined for day and night mode.
- IR Filter will be set automatically.

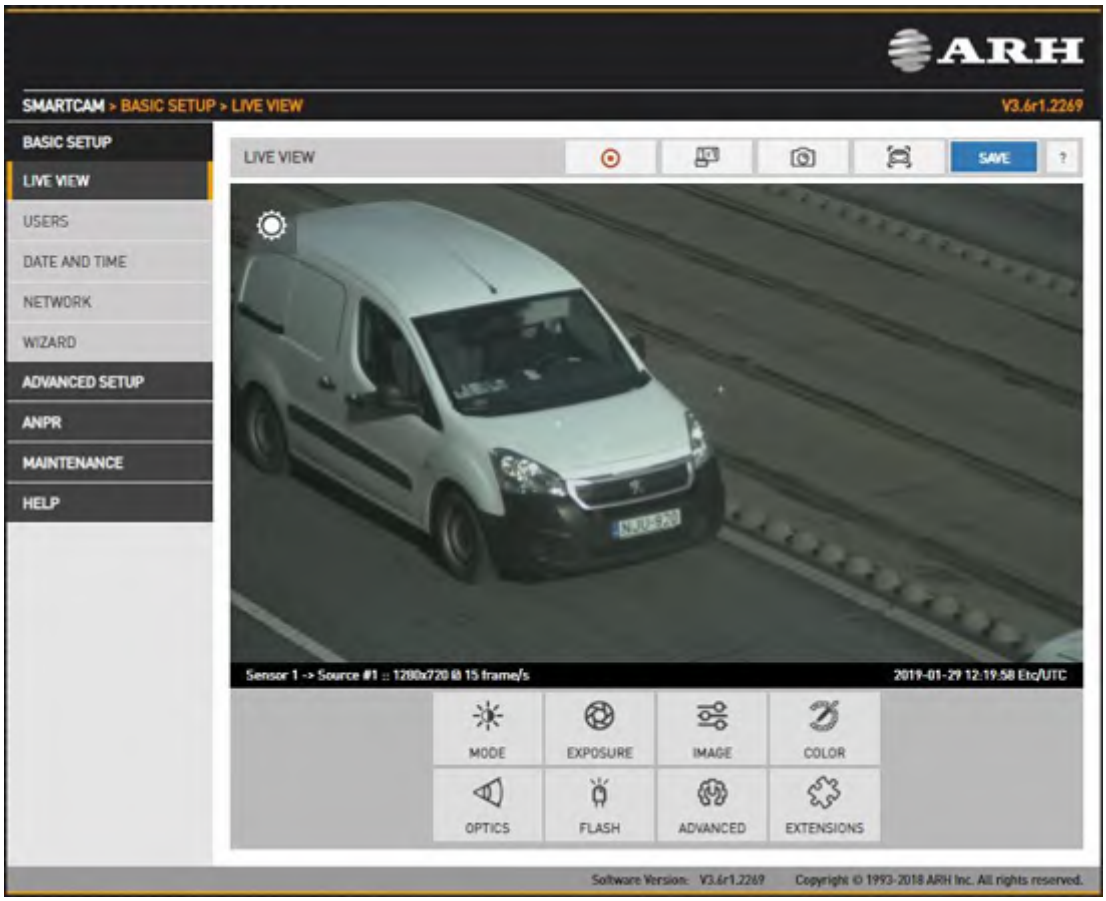
Note

"Parity Flashing" does not use and is not measured by the same scale as "Flash Intensity". Instead, "Parity Flashing" is expressed as a percentage of and relative to the calibration for "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.

To switch on Vehicle detection frame, 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.

- **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.

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:

- **Vehicle Detection:** an image processing algorithm designed to detect a vehicle in the given image
- **Motion Detection:** an image processing algorithm designed to detect motion in a sequence of images
- **Scheduler:** regular series of triggers, for example every 5 seconds

An **external trigger source** may be:

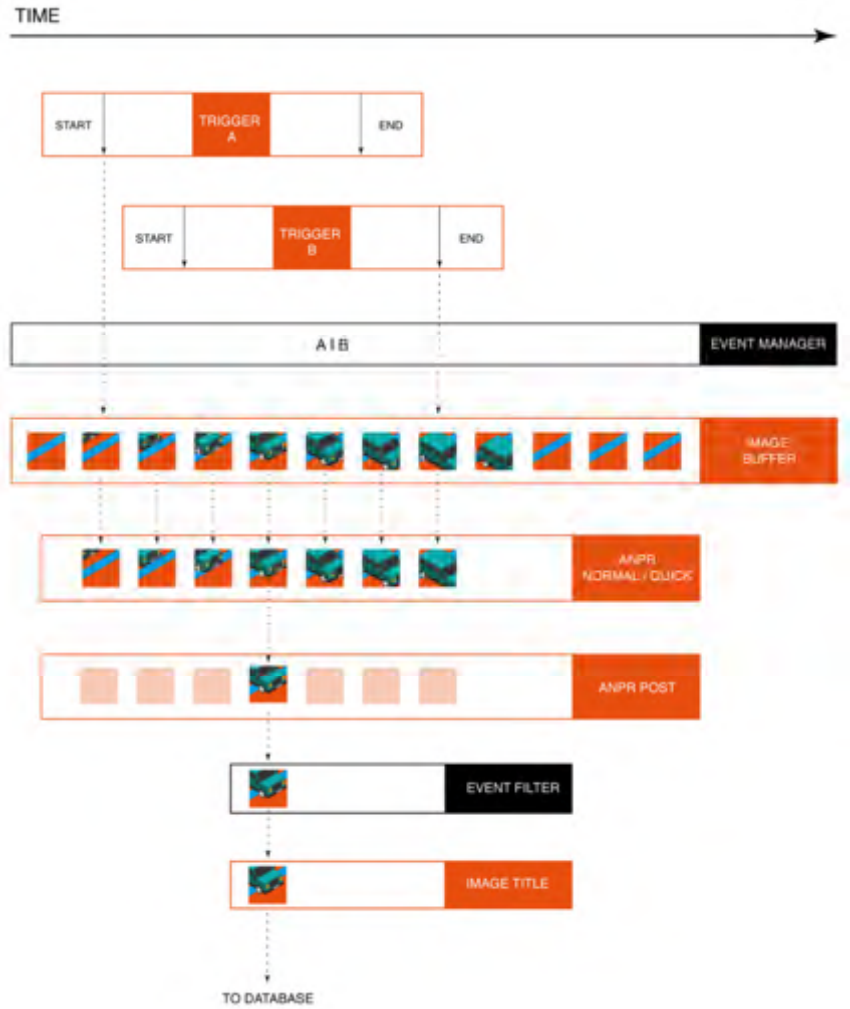
- **GPI:** a TTL level input to the camera (not all models)
- **UART:** an UART (RS232 or RS485 level) input to the camera (not all models)
- **SW:** direct software-based trigger

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, in a way that for example all of them need to be asserted to create an event. 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 under „ADVANCED SETUP", on the Event Manager page.

On a trigger, 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).



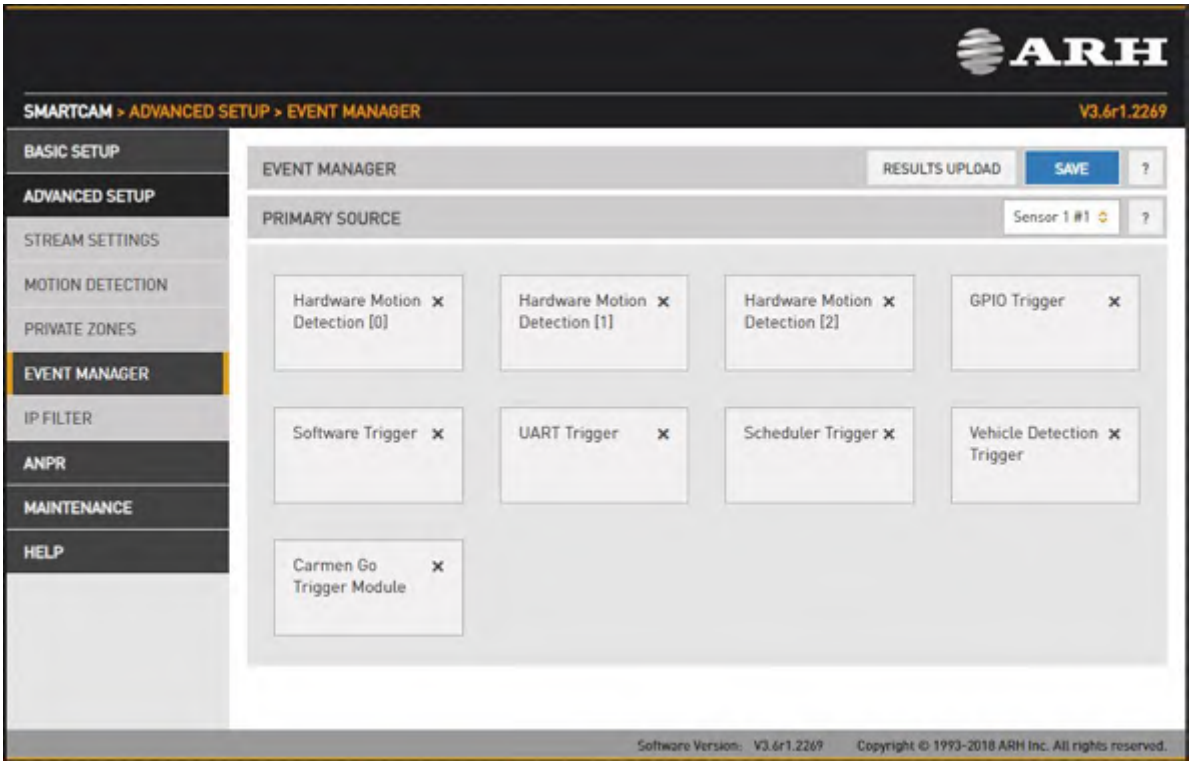
The above graphic is the schematic overview of trigger events being processed. License plate recognition operates as a multistage pipeline, taking a sequence of images of the same event as input, producing one image of the vehicle (with the license plate in the best position), license plate and event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

Typically, 3 - 8 images are first received by a Normal/Quick 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 Post stage, where a slower, but much more thorough analysis determines the final and complete set of license plate data (license plate text, position, jurisdiction, etc.). 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

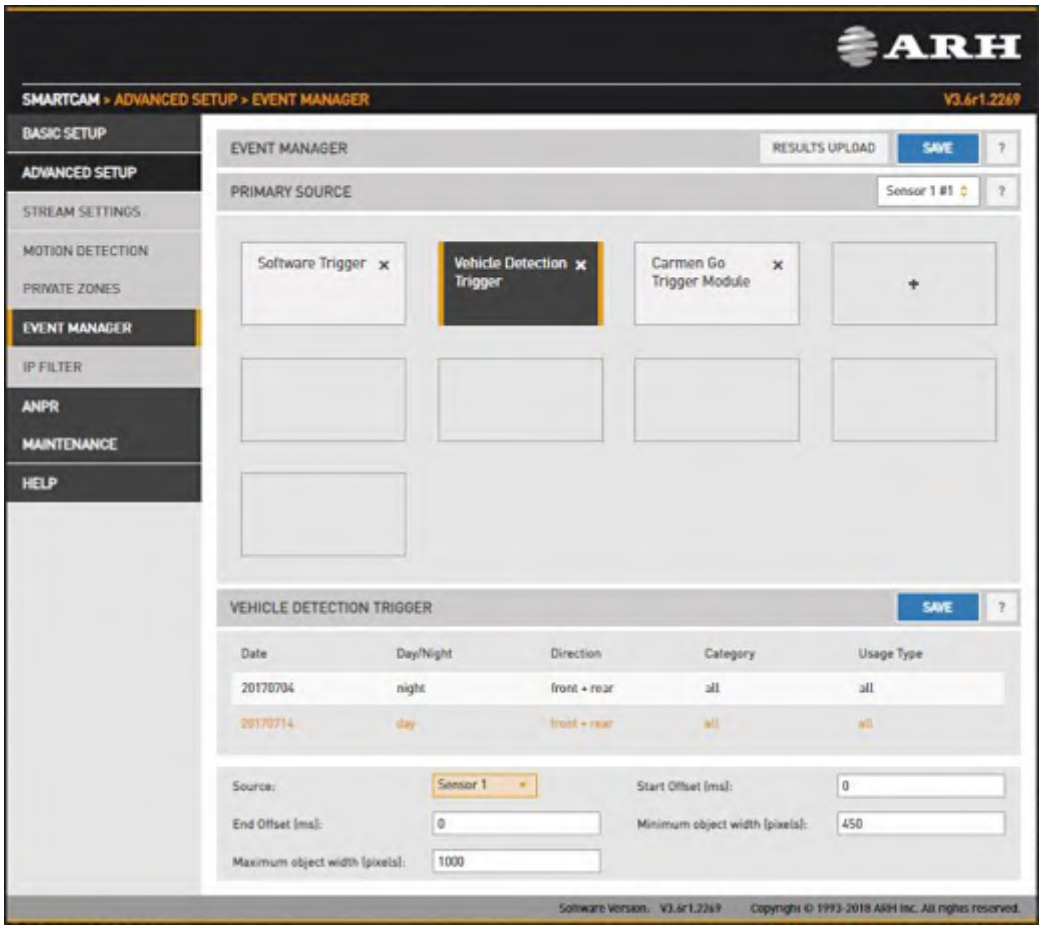
7.1.1. EVENT MANAGER

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. Selecting a trigger source its configuration will be available at the bottom of the screen.

7.1.2. VEHICLE DETECTION TRIGGER



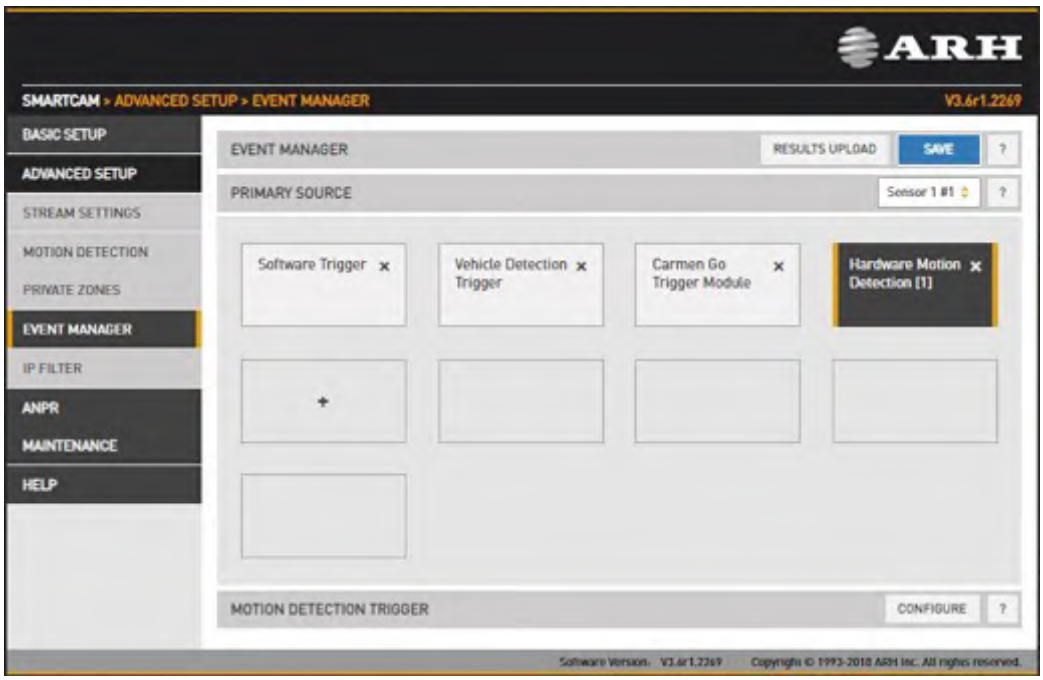
The Vehicle Detector is an image processing algorithm capable of detecting and tracking a vehicle in a stream of images. You can monitor detected vehicles at the Live View menu by clicking the  button.

The detector relies on files containing algorithmic data. These descriptors will be shown with their date, mode (day or night), vehicle direction and category, and geometry.

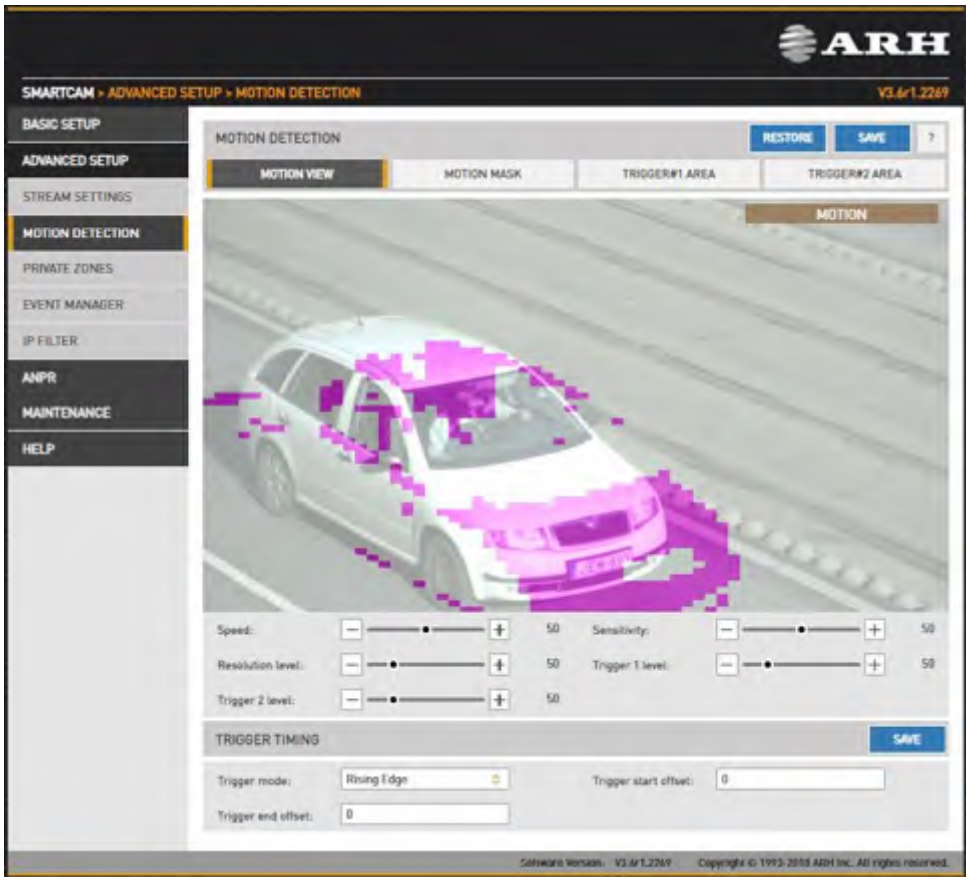
You can adjust the settings individually by choosing one of the sources of the camera. (Sensor 1, Sensor 2)

- **Minimal object width:** The minimal detected vehicle width in pixels
- **Maximal object width:** The maximal detected vehicle width in pixels

7.1.3. MOTION DETECTOR



First you need to click on Configure button to guide you to Motion Detection menu. 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

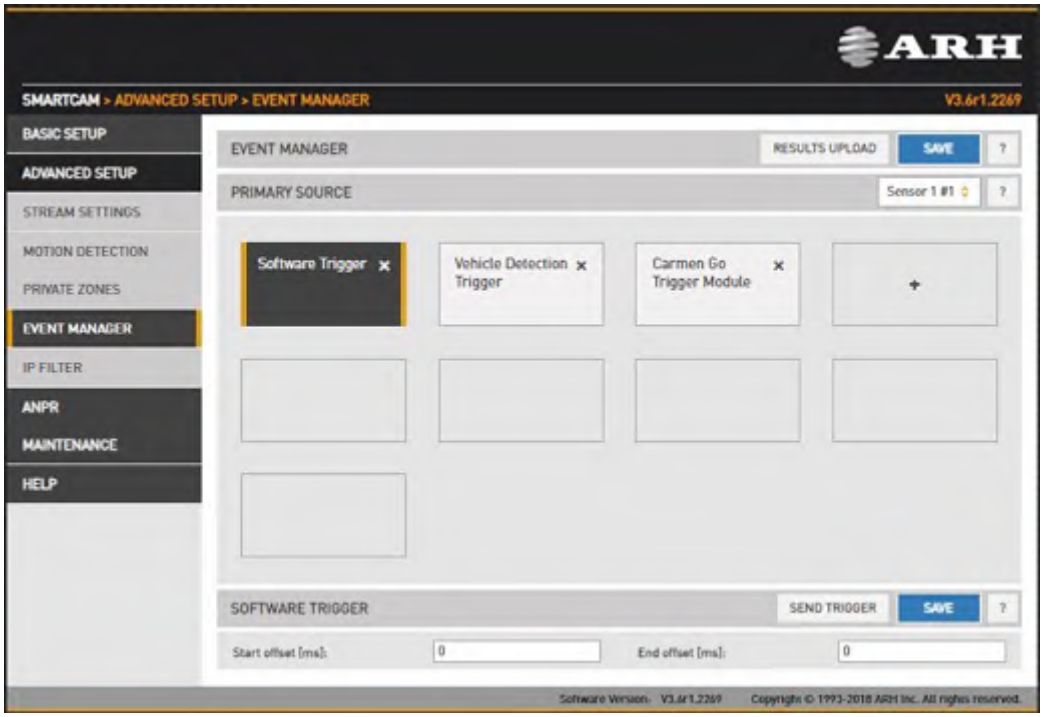
The properties of motion detection are also available:

- **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 too low, noise may trigger motion.
- **Resolution Level:** The required minimal number of blocks changing to be considered as motion in output #0 (entire image)
- **Trigger 1 Level:** The required minimal number of blocks changing to be considered as motion in output #1 (trigger area #1)
- **Trigger 2 Level:** The required minimal number of blocks changing 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 7.1.5.) where you will find the description of this section!

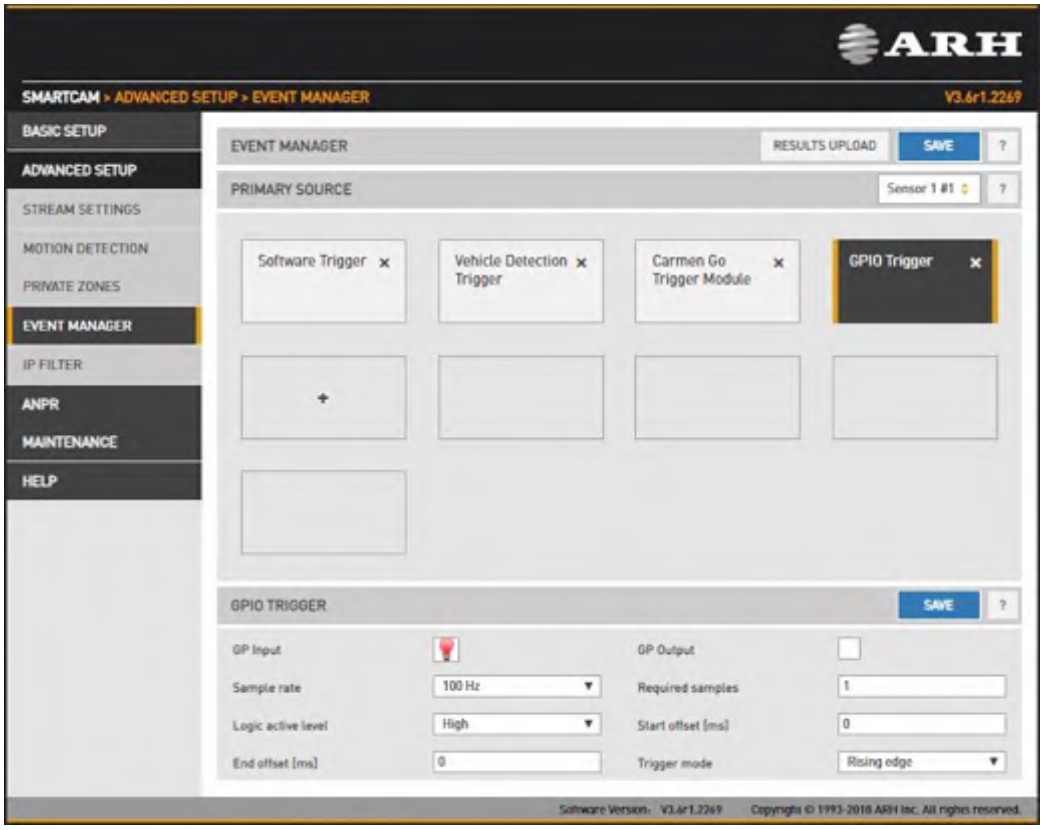
7.1.4. SOFTWARE TRIGGER



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)

7.1.5. 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:

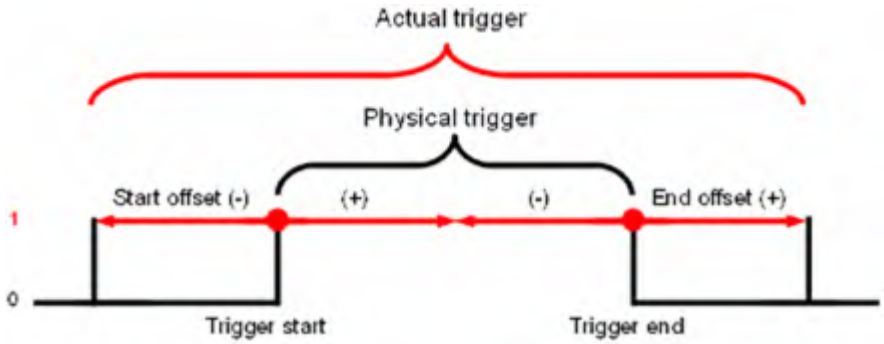
Level: the trigger is asserted while the input is active.

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

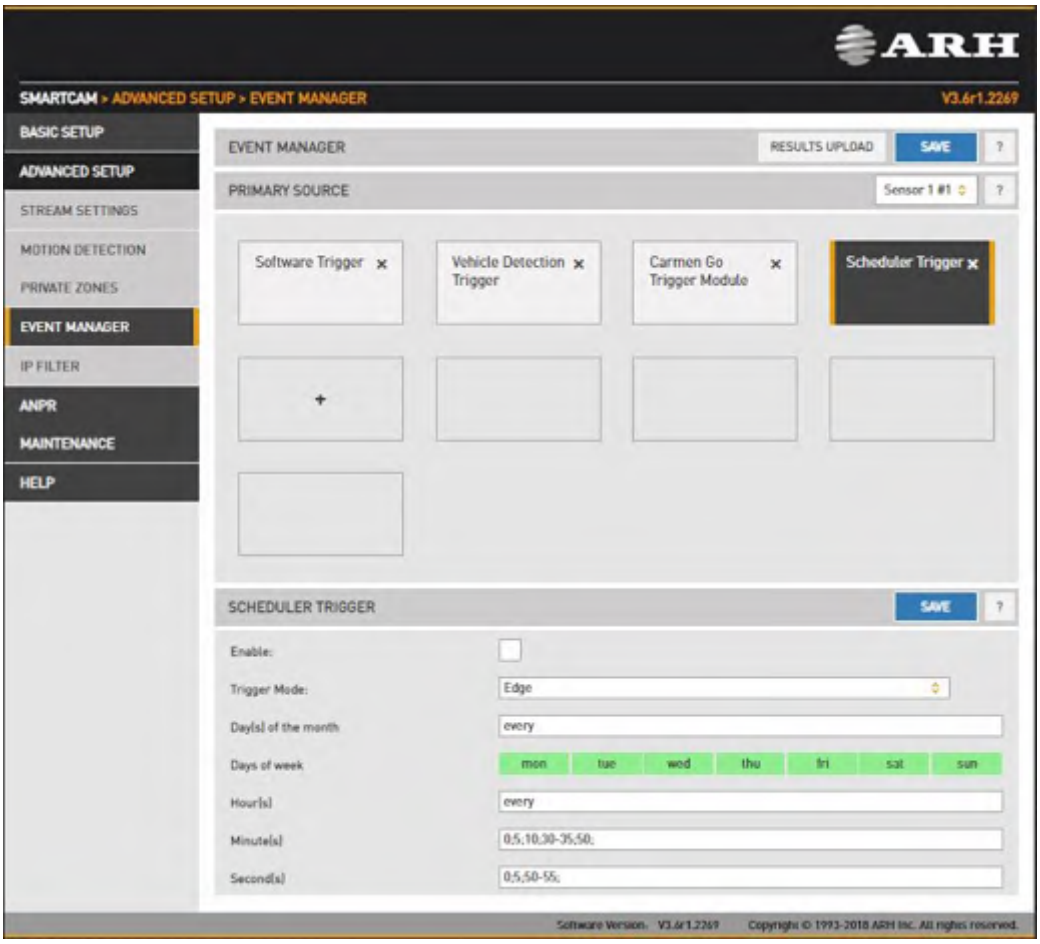
Falling edge: the trigger is asserted only at the falling edge of the input.

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.



7.1.6. SCHEDULER TRIGGER



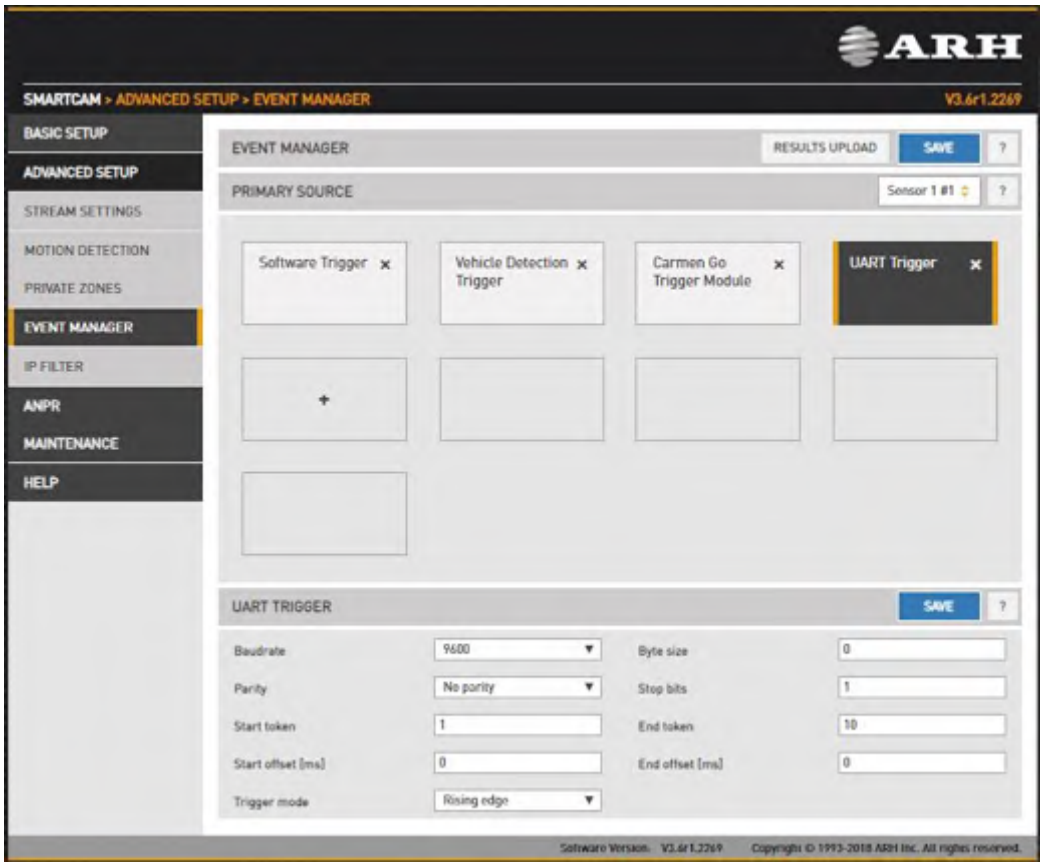
This trigger source provides the user with a timer. Triggers can be scheduled with a precision of one second. Two trigger modes are available:

- **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

7.1.7. 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 max. 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

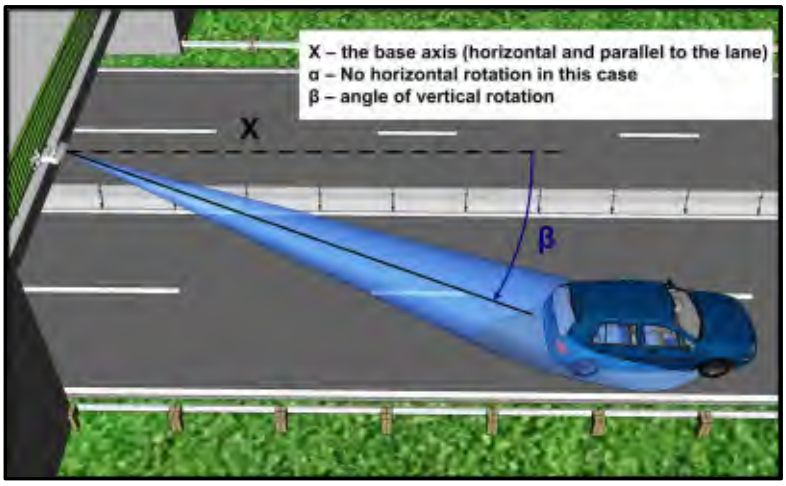
In Level Mode the trigger start timestamp will be the system time at the instant the TST arrives, plus the **Start Offset**, while the trigger end timestamp will be the system time at the instant the TET arrives, plus the **End Offset**. Trigger data (including the TST and TET) will be forwarded to the 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.

7.1.8. RADAR TRIGGER

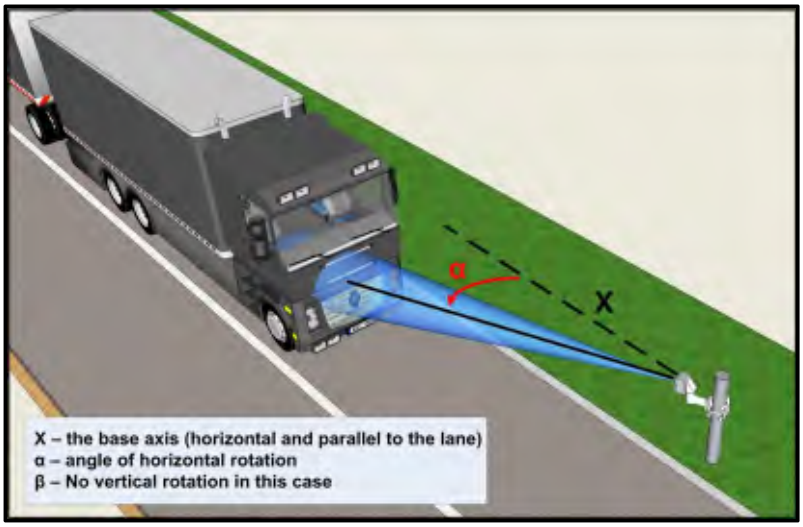
> **Note**
>
> This function is only available at SpeedCam camera.

Radar trigger combines exact triggering with speed and vehicle category (e-length) measurement. The built-in radar device is a Doppler radar with a 11° beam angle.
Basically, three measurement geometries can be differentiated:

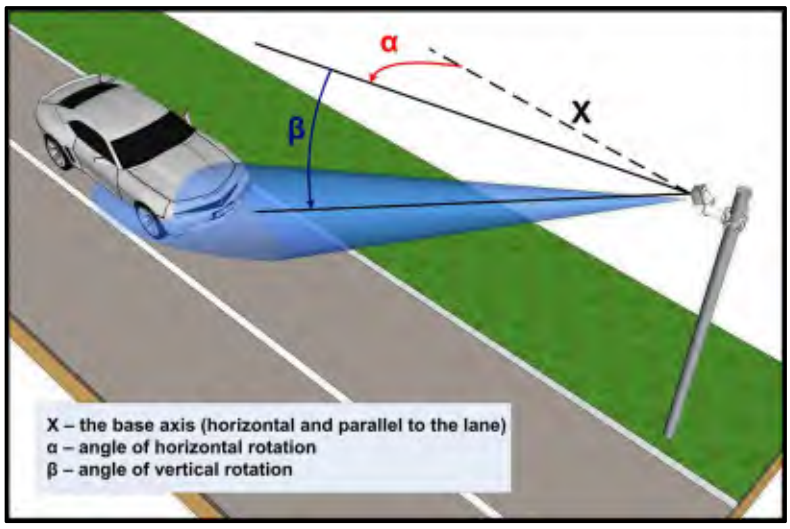
- **Overhead** when the device is installed above the lane (approx. 5-6 meters high) in the center (for example on an overpass or gantry, etc.). Typical field of application: fixed installation on a highway.



- **Lateral** when the device is placed near the traffic lane (A distance of 2-5 meters from the lane) directed to the lane in a relatively low position (approx. 1-1,5 meters high). Typical field of application: mobile (tripod) installation on road and highway.



- **Transversal** when the device is installed on a pole near the road and it has to be directed to the vehicles only by panning and tilting (approx. a distance of 2-5 meters from the road and 5-6 meters high). Typical field of application: fixed installation on a road.



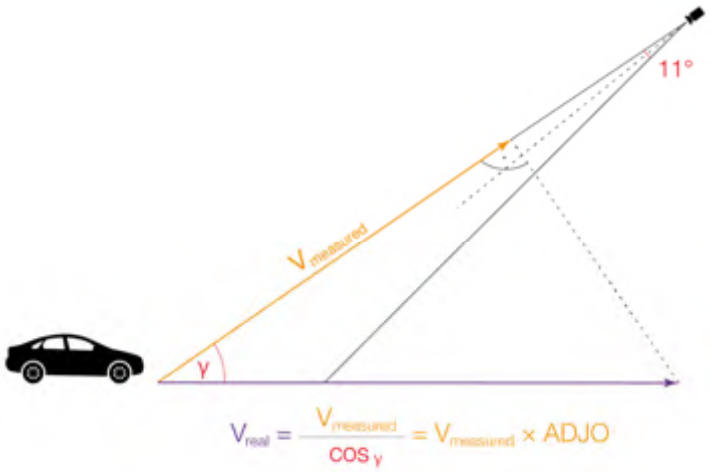
In these geometries, different settings are required:

- In case of **Skip config file** settings on the radar will apply (Use with a device sealed read only)
- **Direction** by setting this parameter the radar can be set to measure the speed of the arriving, leaving and even vehicles travelling in both directions. Can be set in the menu.
- **SENS** by this parameter the sensitivity of the radar can be set (1-16).
- **Vmin** this parameter defines the measurement of the minimum speed (1-255 km/h).
- **Vmax** this parameter defines the measurement of the maximum speed (1-255 km/h).
- **ADJO** the angle correction value, that can be determined for the arriving vehicles.
- **ADJL** the angle correction value, that can be determined for the leaving vehicles.

Note

- By increasing the sensitivity above SENS=11 the 11° beam angle will increase.
- Angle correction value: a multiplier compensating for the angle between the direction of the vehicle and the direction of the measurement.

Angle correction and Cosine error: The device measures only the parallel (to the radar beam) component of the speed. This is always less or equal than the real speed of the vehicle.



However, the actual speed can be calculated if the pan and tilt angles of the device are known (see images above). The measured speed can be corrected if the two parameters above (ADJO and ADJL) are determined on the basis of the angles.

Calculation of the angle correction value: As the radar does not emit the beam pointwise but emits an 11° × 11° angle (pyramid like) beam, the speeds of the arriving and leaving vehicles have to be corrected separately with two different values. The ADJO (arriving) and ADJL (leaving) parameters serve for this purpose.

In case of oncoming vehicles (ADJO): **Vreal = Vmeasured / (cos (α - (δ/2)) * cos (β - (δ/2)))**
In case of leaving vehicles (ADJL): **Vreal = Vmeasured / (cos (α + (δ/2)) * cos (β + (δ/2))),**

where:
Vreal the real speed of the vehicle
Vmeasured the uncorrected speed measured by the radar
α the angle of the horizontal rotation (pan)
β the angle of the vertical rotation (tilt)
δ angle of the beam (11°)

Recommended settings:

- **Overhead:** Panning angle (α) will be zero, because the radar will be mounted above the lane and it should only be tilted. The recommended setting in case of legally valid measurement: β = 25°. Recommended setting in counting mode: β = 35°.

- **Lateral:** Tilting angle (β) will be zero, because the radar will be mounted using only panning. The recommended setting in case of legally valid measurement: α = 20-25°. Recommended setting for vehicle counting: α = 35°.

- **Transversal:** In case of this setting both angles are non-zero. Recommended on-site installation: approx. 2 meters from the edge of the road, approx. 6 meters high.

Note

- The parameters can vary considerably depending on the on-site conditions. The recommended setting in case of legally valid measurement (to cover one lane) constrains the above by: α = 10-14° and β = 20° (α depends on the width of the lane).
- Recommended setting for vehicle counting:
  - in case of covering one lane: α = 17° and β = 25°,
  - in case of covering two lanes: α = 14° and β = 15°.

Important

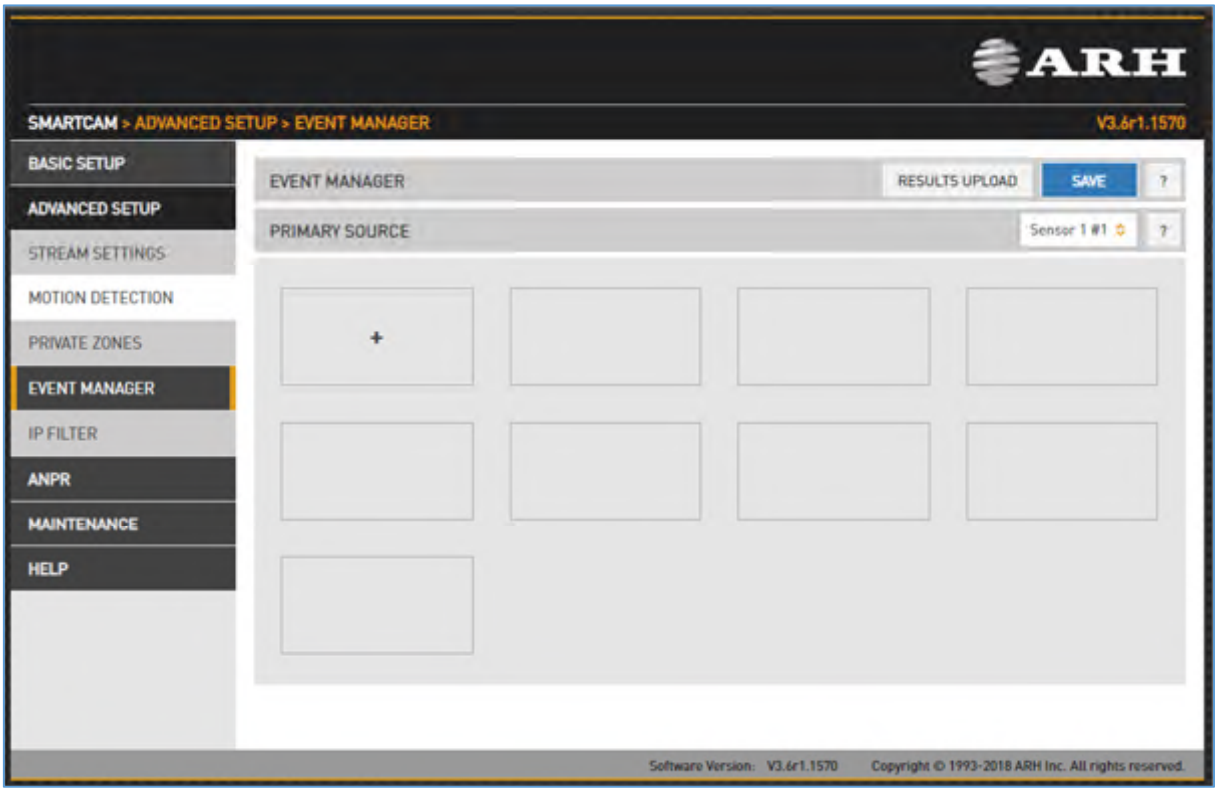
A device intended to be suitable for legally valid measurements may be sealed read-only after configuring its parameters. In this case "Skip config file" must be checked to prevent the system from modifying the parameters, as this will always fail, resulting in dramatically increased boot time. The "Radar device is sealed read-only" WARNING will appear in the log.

7.1.9. CARMEN GO TRIGGER MODULE

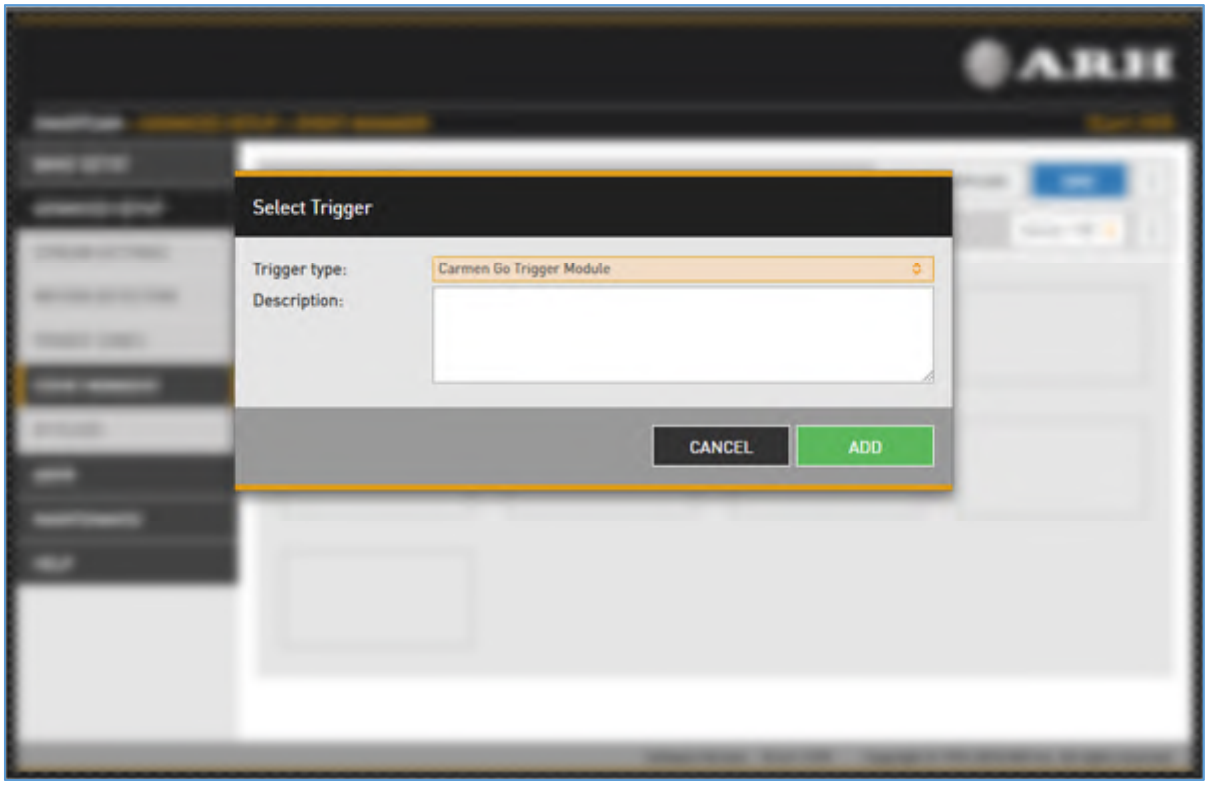
SET CARMEN GO AS A TRIGGER SOURCE:

As a first step, add CARMEN GO as a trigger source. Add this to Event Manager as follows:

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



- In the drop-down menu, select the Carmen Go Trigger Module, then click Add.

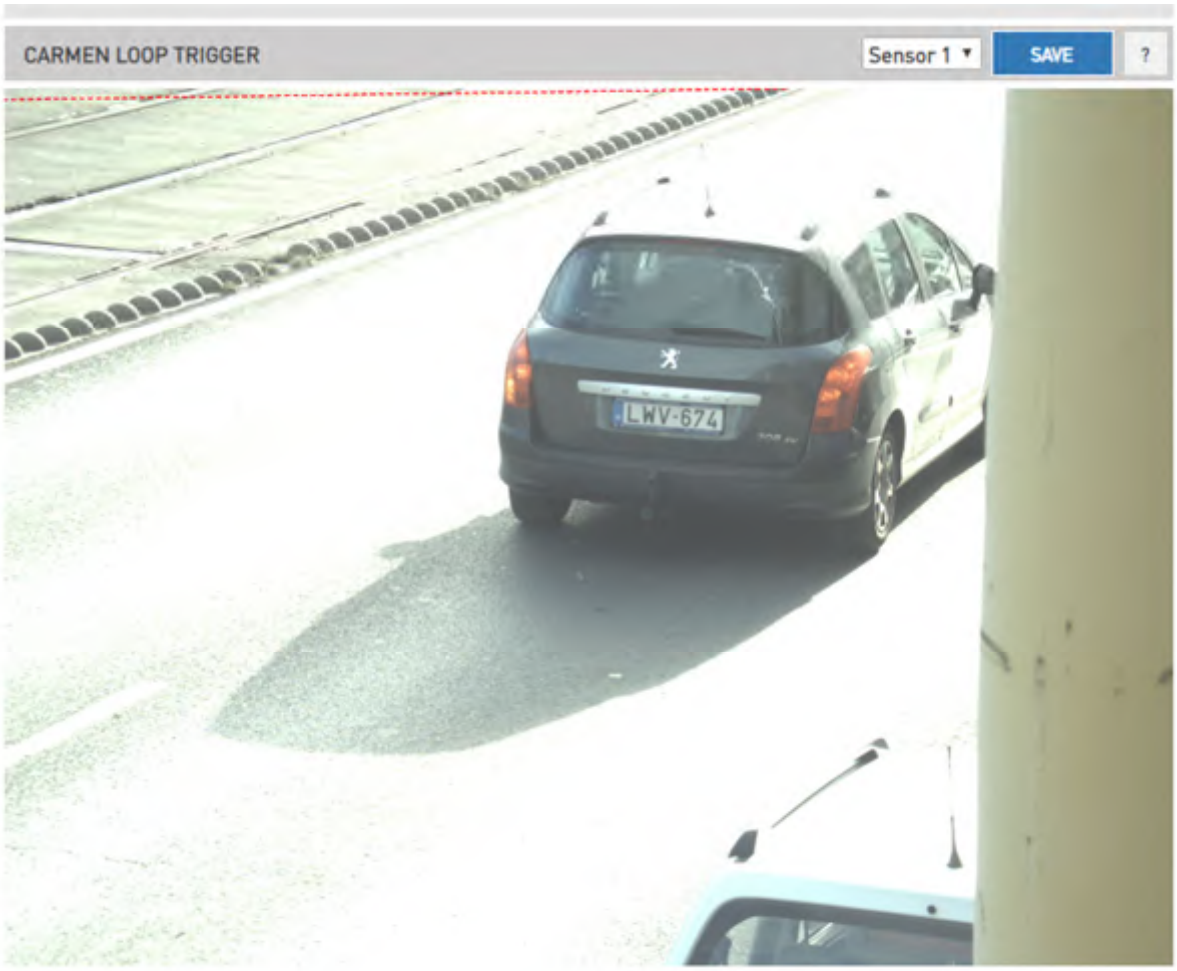


Note

Do not forget to press the Save button to save the trigger sources!

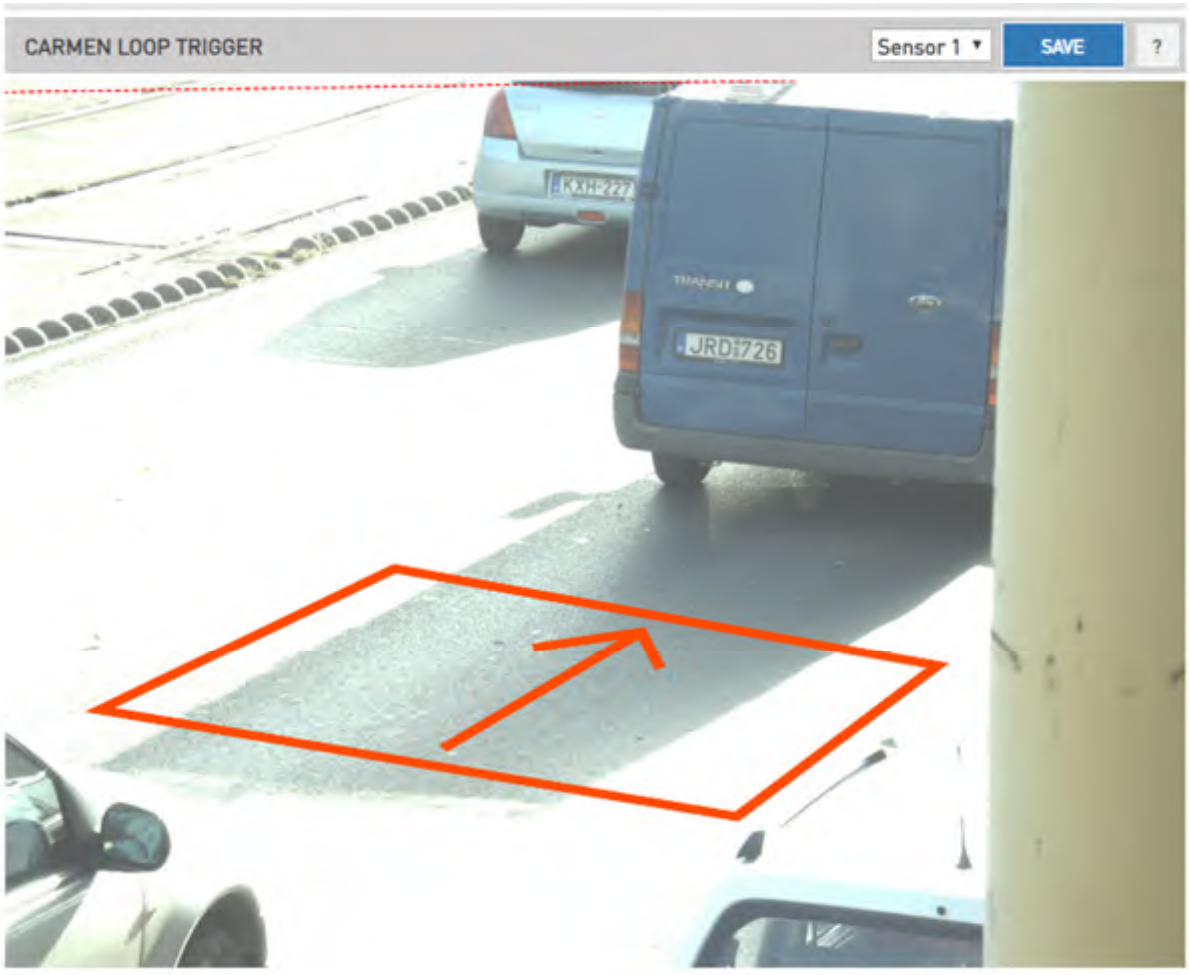
SET ROI:

You will see a setting surface below where you can specify roi(s) for the CARMEN GO module and the ANPR engine.



CONFIGURE CARMEN GO ROI:

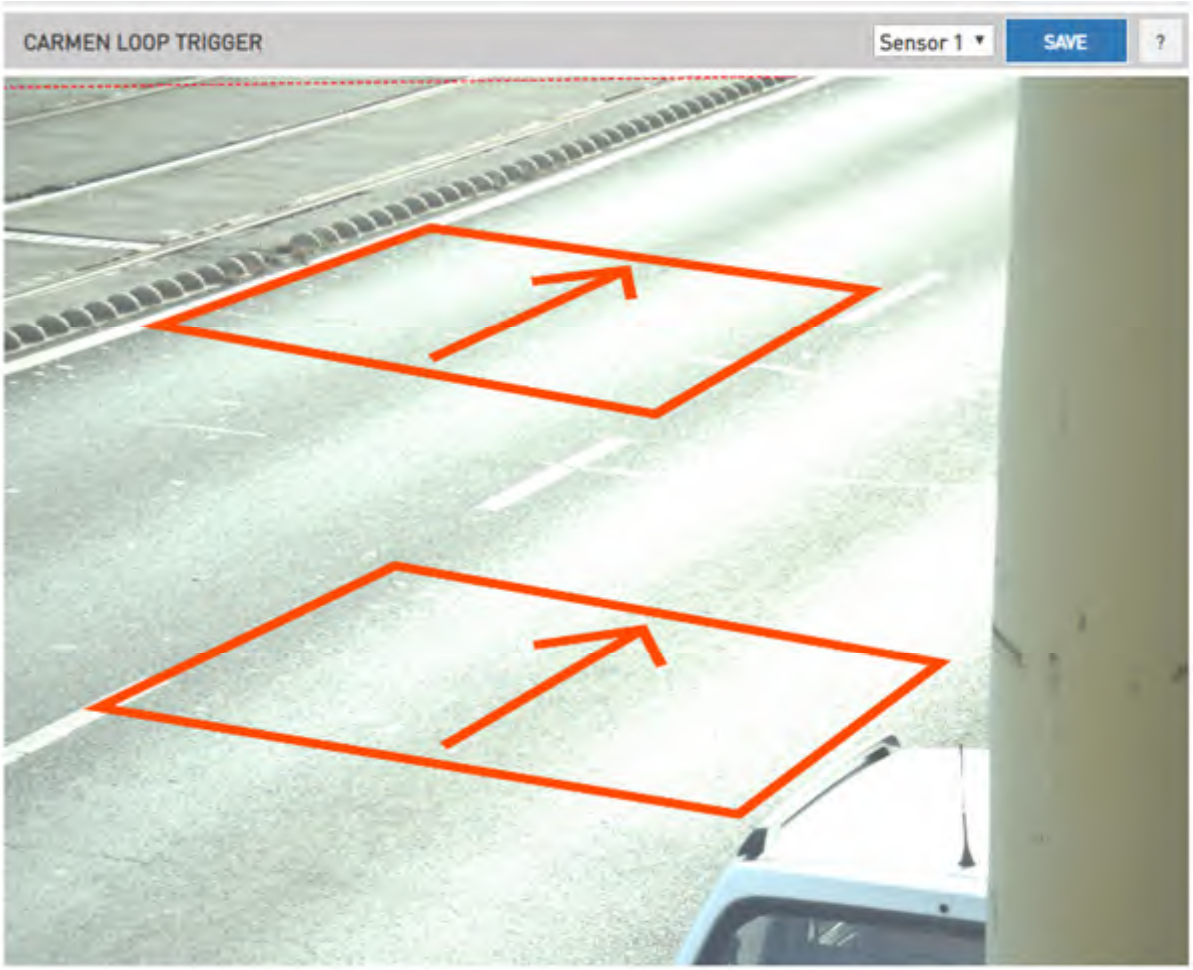
For the correct operation of the CARMEN GO module, you need to take a square in the picture that is in the plane of the pavement and the cars are passing through it. To do this, **click left mouse button to drop the first ROI point.** Between the first point and the mouse pointer there is a line that can be fixed by pressing the left mouse button again. Repeat this 3x times, until you have drawn a rectangle that looks something like this:



The arrow in the rectangle must show the direction of the passing cars. **If the arrow is not moving towards the direction of the cars, use the left mouse button to click the rectangle to rotate the arrow.**

To move the rectangle elsewhere, **right-click on the rectangle. This will delete the rectangle.**

You can also add 2 ROIs by clicking the left mouse button next to the squares already added to add a new ROI. You can draw the second ROI in the usual way:



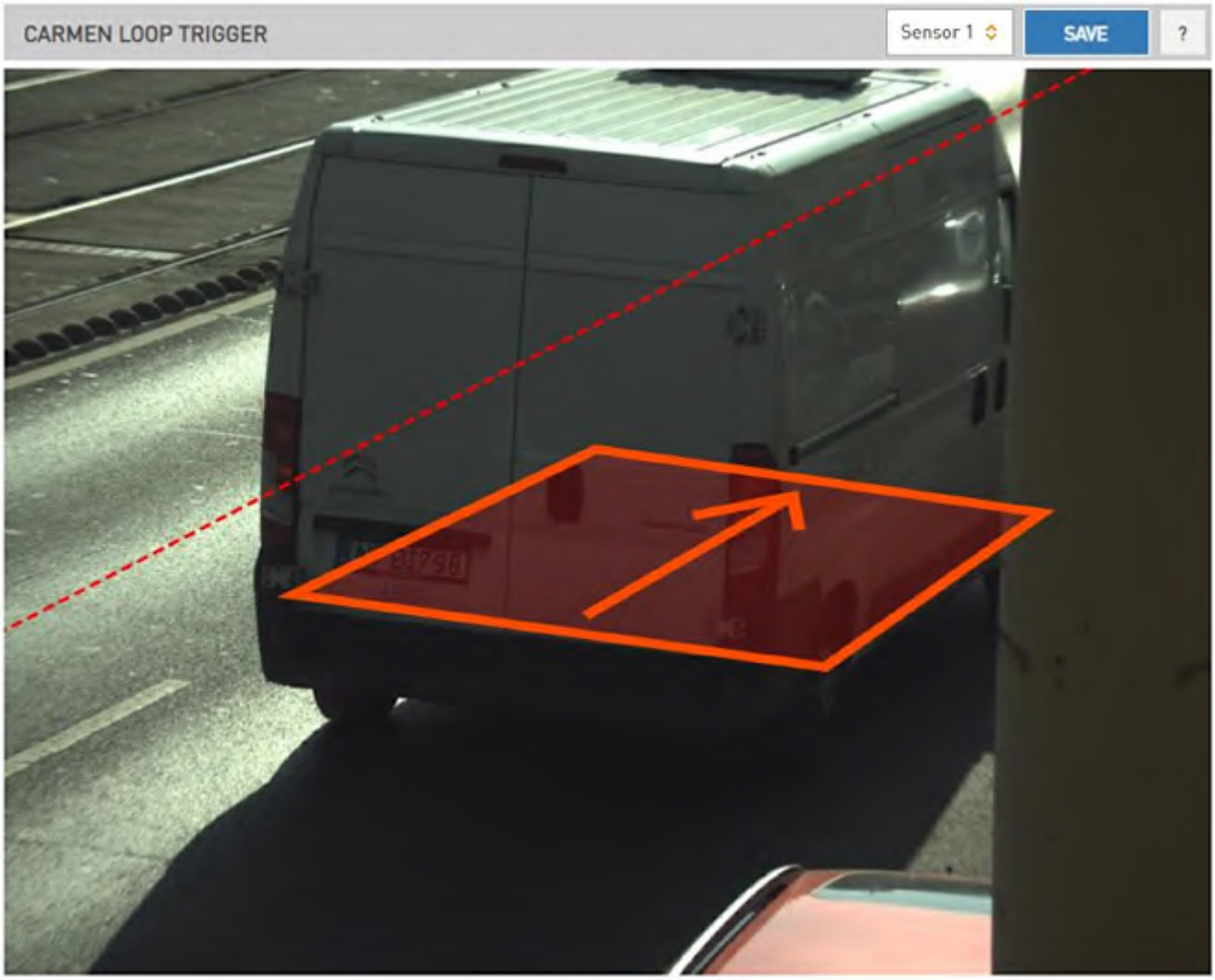
You can delete any of the drawn ROIs **by right-clicking on it.**

While drawing a ROI, you can delete with right-click the last placed one.

SET UP ANPR ROI:

To have the ANPR engine read the license plate in the appropriate track, you can set up a lane line. To embed the separator, just **click out of the ROI squares with the right mouse button.**

This way the trimmer selector appears:



You can rotate the lane line **by right-clicking the button and pressing the left mouse button. At this time, the lane line starts to rotate. If the lane line is roughly parallel to the band, release the left mouse button. Right-click to move more positioning.**

! Important

There is a registration number for one and the other ROI racing vehicle in a trunk line!

You can operate the lines from the keyboard as well. The key to manipulate the line by the keyboard is Ctrl. You need to move the cursor on the image first, Ctrl functions will only work then. Click right mouse button to place center point. If the roi is selected, the Delete button will erase it.

The canvas focuses on dragging the mouse and is removed when the focus mouse is pulled off. (Focus is needed to handle key combinations on an item.) To make this possible without a mouse, use these combinations:

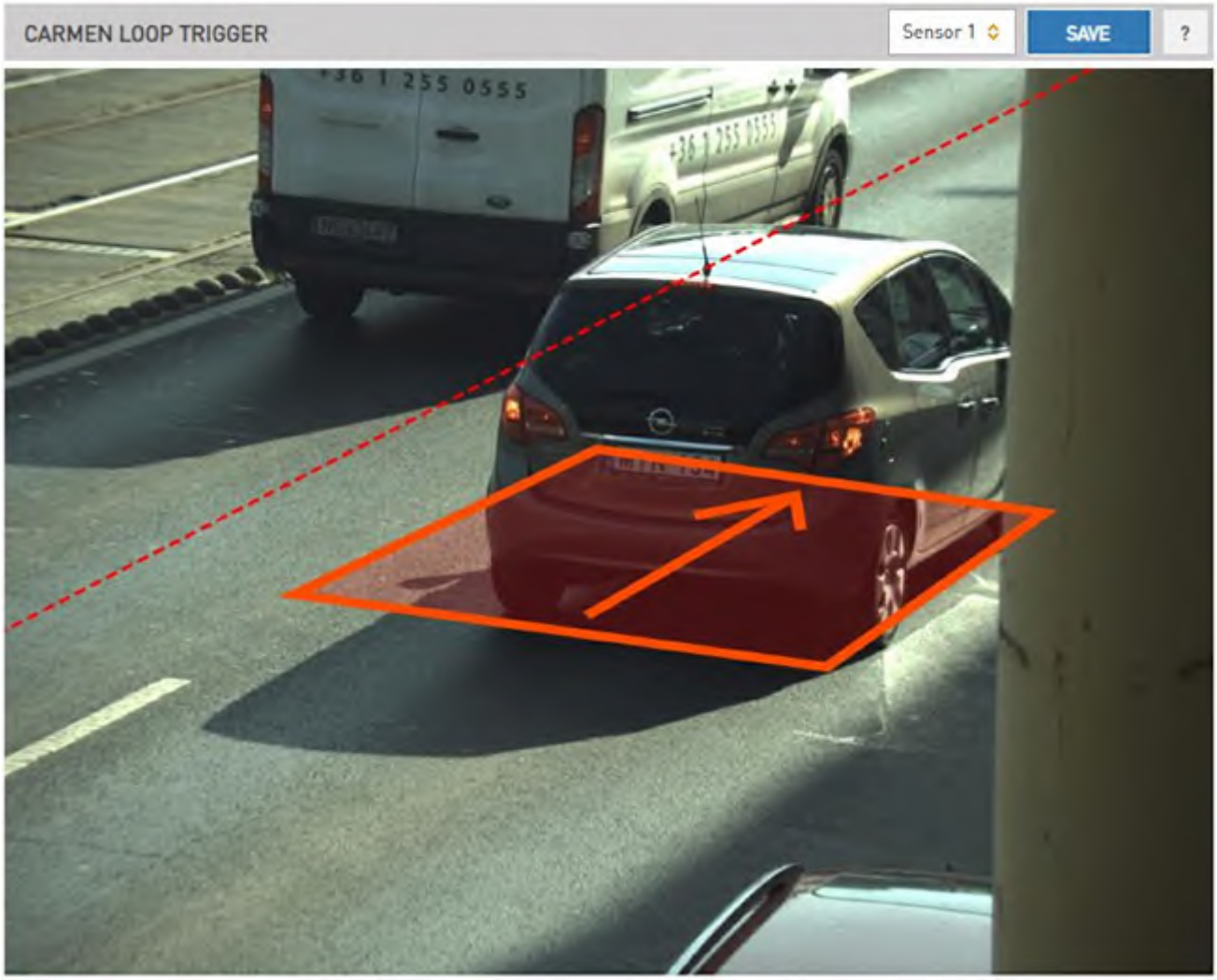
Key combination	Description
Ctrl+Enter	Canvas focus. You can then change the separator lane.
Ctrl+Up/Down/Left/Right	Changing the center of rotation, thus the position of the line in a given direction. You can draw this point out and track it with mouse and keyboard management. The key of rotating the line and other function is Shift.
Ctrl+Shift+Left/Right	Ctrl+Shift+Right combination results clockwise rotation. Ctrl+Shift+Left key combination results counter clockwise rotation.
Ctrl+Shift+Enter	Centering the point on the separator line
Ctrl+Shift+Up	Centering the point horizontally, correlate to the image, if it is positioned inside the image
Ctrl+Shift+Down	Centering the point vertically, correlate to the image, if it is positioned inside the image

! Important

Number plates have to be on the track where its ROI squares are drawn on both sides of a lane line!

You can save the settings with the save button.

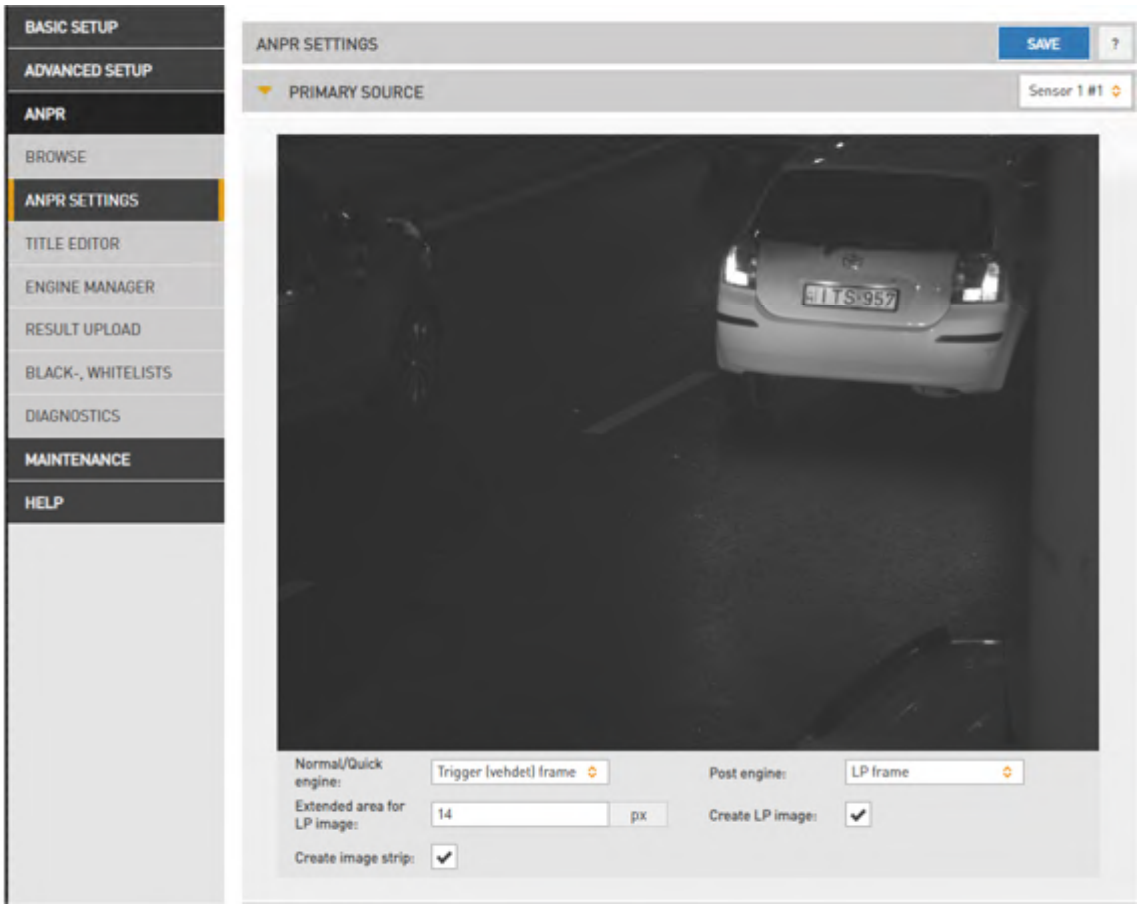
One possible proper setting:



SETTING ANPR TO USE ANPR ROI:

For ANPR to locate a license plate in the appropriate area, you must set the **Normal / Quick engine menu on the ANPR Settings interface to Trigger (vehdet) frame!**

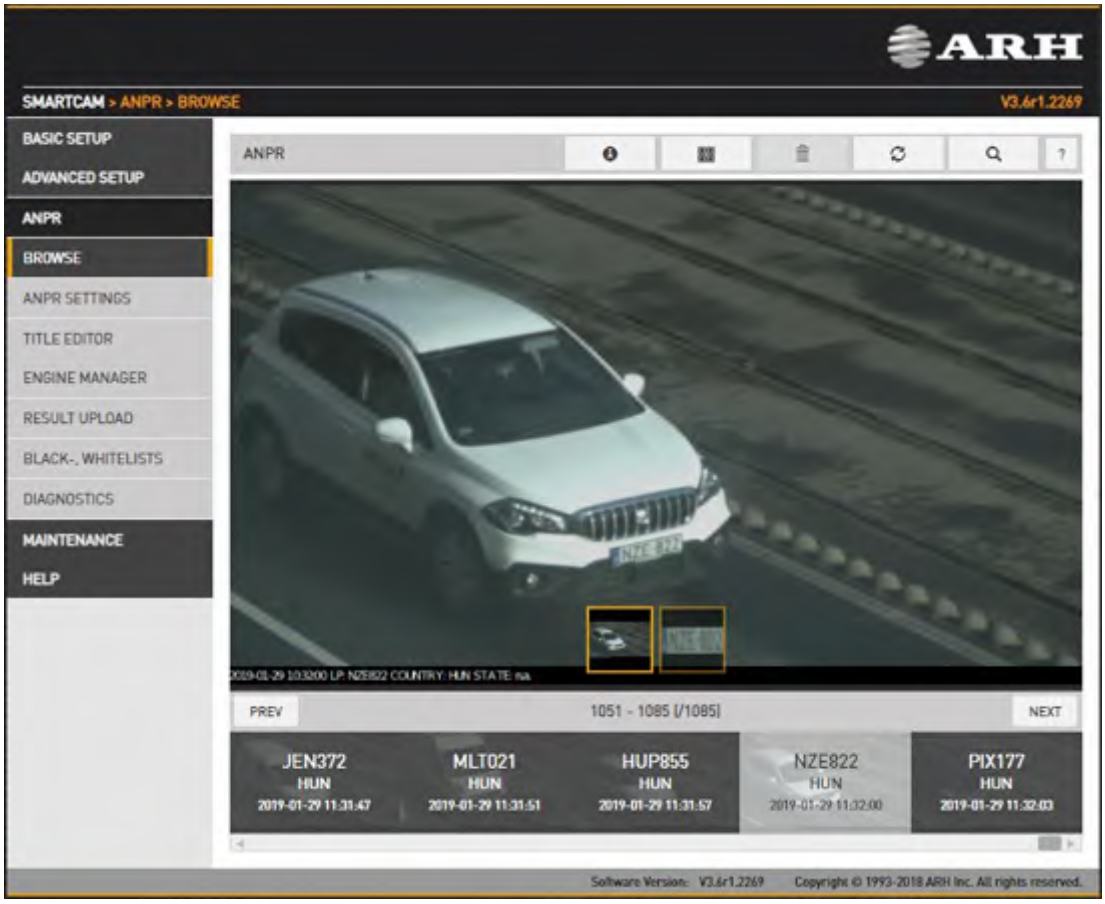
You can save the settings with the save button.



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:

 – Select/unselect all records

 – List image data

 – Delete record(s)

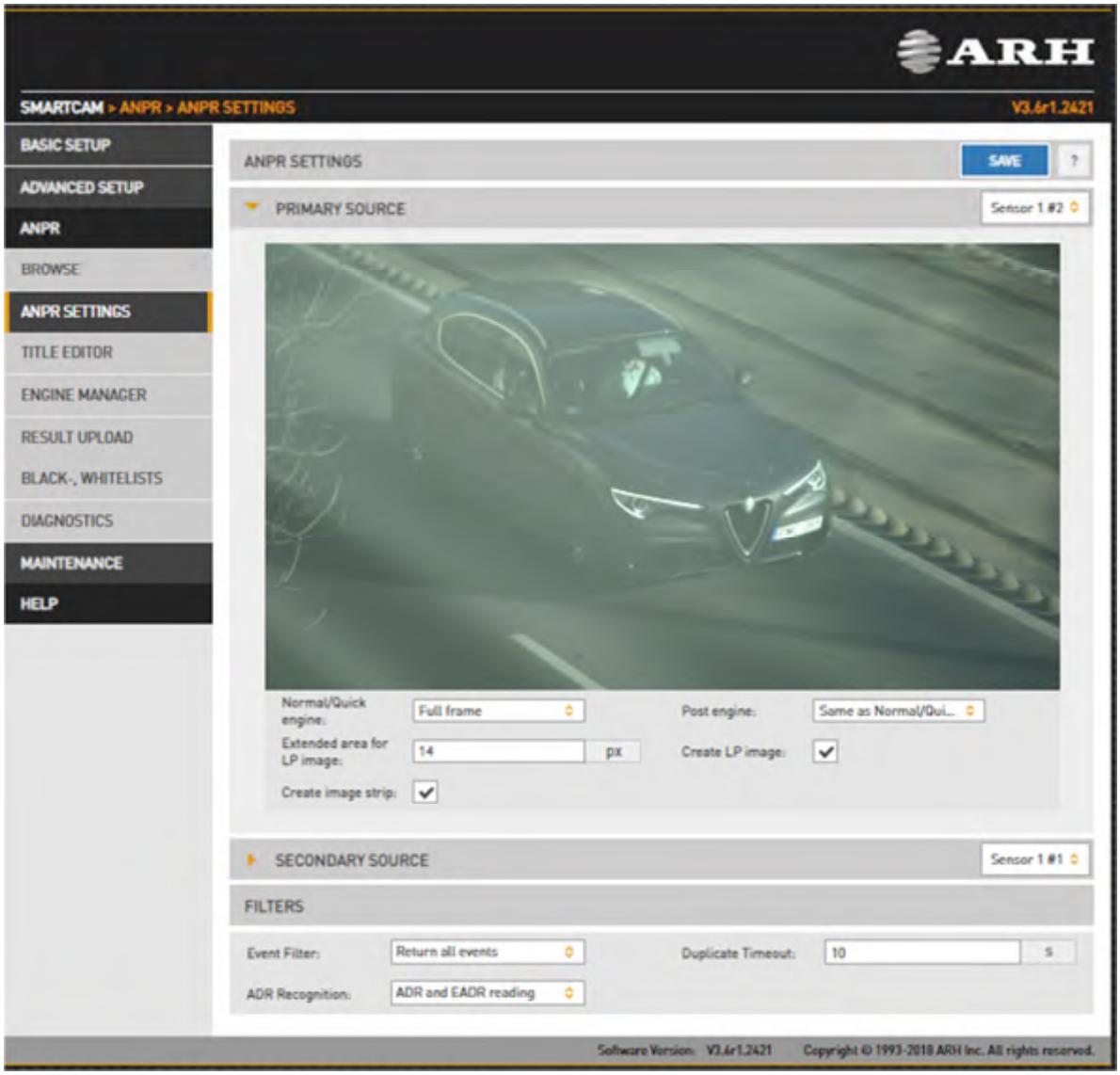
 – Reload list of entries

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

If you move the cursor on the picture, small pictures will appear. Primary image is showing the full image of the event made by the primary sensor, Secondary image made by the secondary source (sensor). Plate image is showing the image of the detected number plate of the event. The last image can be set by enable Create image strip in ANPR Settings menu. It will be discussed in the next chapter.

7.2.2. ANPR SETTINGS

WEB INTERFACE > ANPR > ANPR SETTINGS



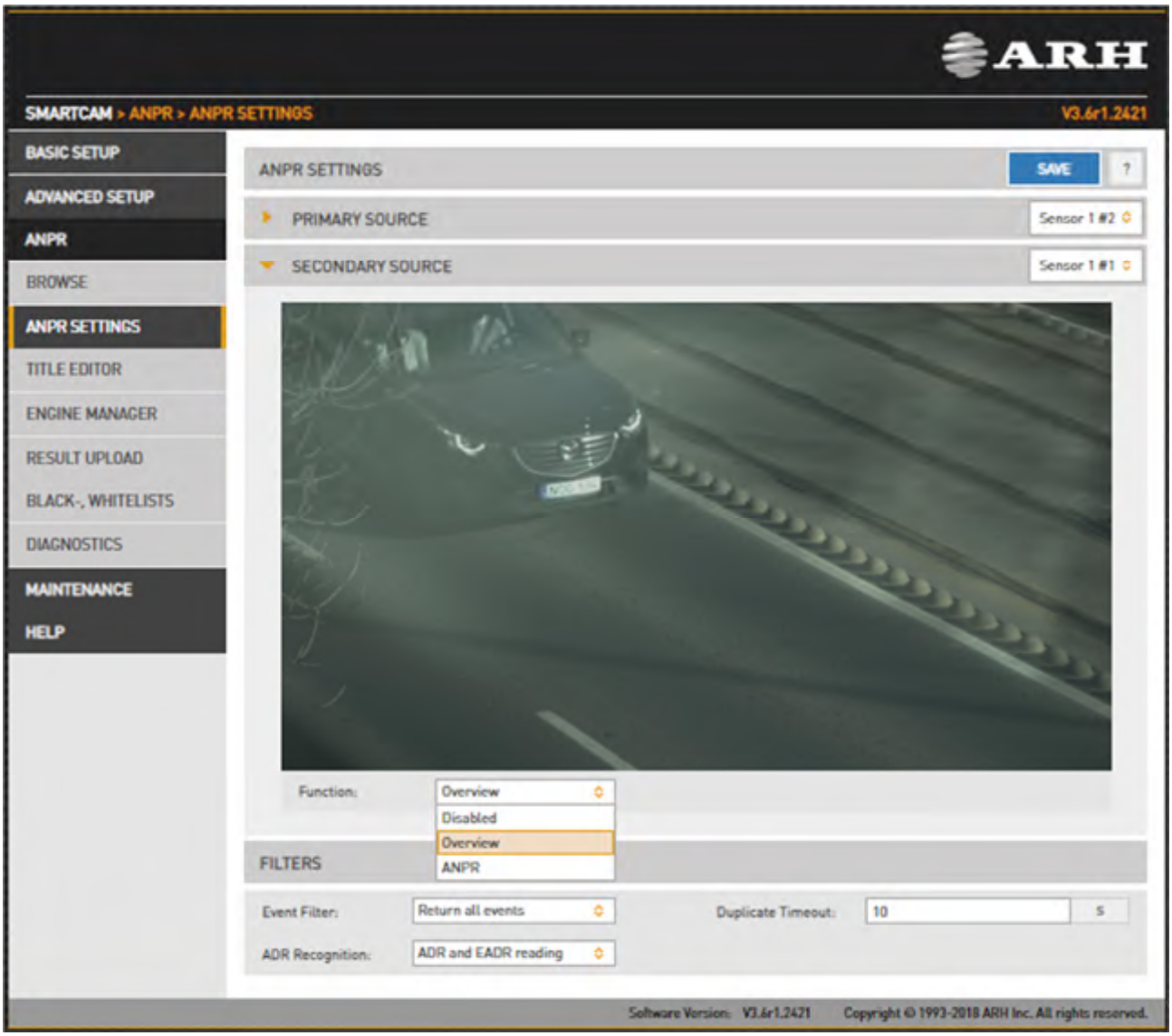
The main properties of the license plate recognition pipeline are configured here.

It is beneficial from a performance point to limit license plate recognition to the part of the image, in which the vehicle is likely to be found. Vehicle detection and motion detection can provide such a frame, and users can define a manual frame also.

Moreover, the preliminary license data provided by the Normal/Quick stage contains a license plate frame which can be used as such at the Post stage.

You are able to choose which sensor want to use for primary and secondary source:

- **Primary source** contains the main configurations of ANPR settings.
- **Secondary source** enables to set the function of secondary sensor.



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

The Normal/Quick 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 (vehdet) Frame:** the frame returned by other trigger sources, such as vehicle detection

- **Post engine:** the frame used by the Post stage
  The Post stage will use:
  - **None:** The Post stage will be skipped
  - **Same as Normal/Quick:** the same frame will be used as in the previous stage (Full, Manual, Motdet or Trigger)
  - **LP frame:** the license plate frame as returned by the previous stage
- **Extended area for LP image:** As License Plate frames are somewhat less predictable, the frame can be extended with this parameter

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

- **Create image strip:** It makes three images from the vehicle during movement. This picture available at the Browser menu.

Filtering results can be configured with the following two options:

- **Event filter:**
  - **Return all events:** create a record in the DB even if a license plate was not found
  - **Return events with license plate**: create a record in the DB only if a license plate was found
  - **Return events with license plate and type:** create a record in the DB only if both a license plate was found and its jurisdiction was determined.

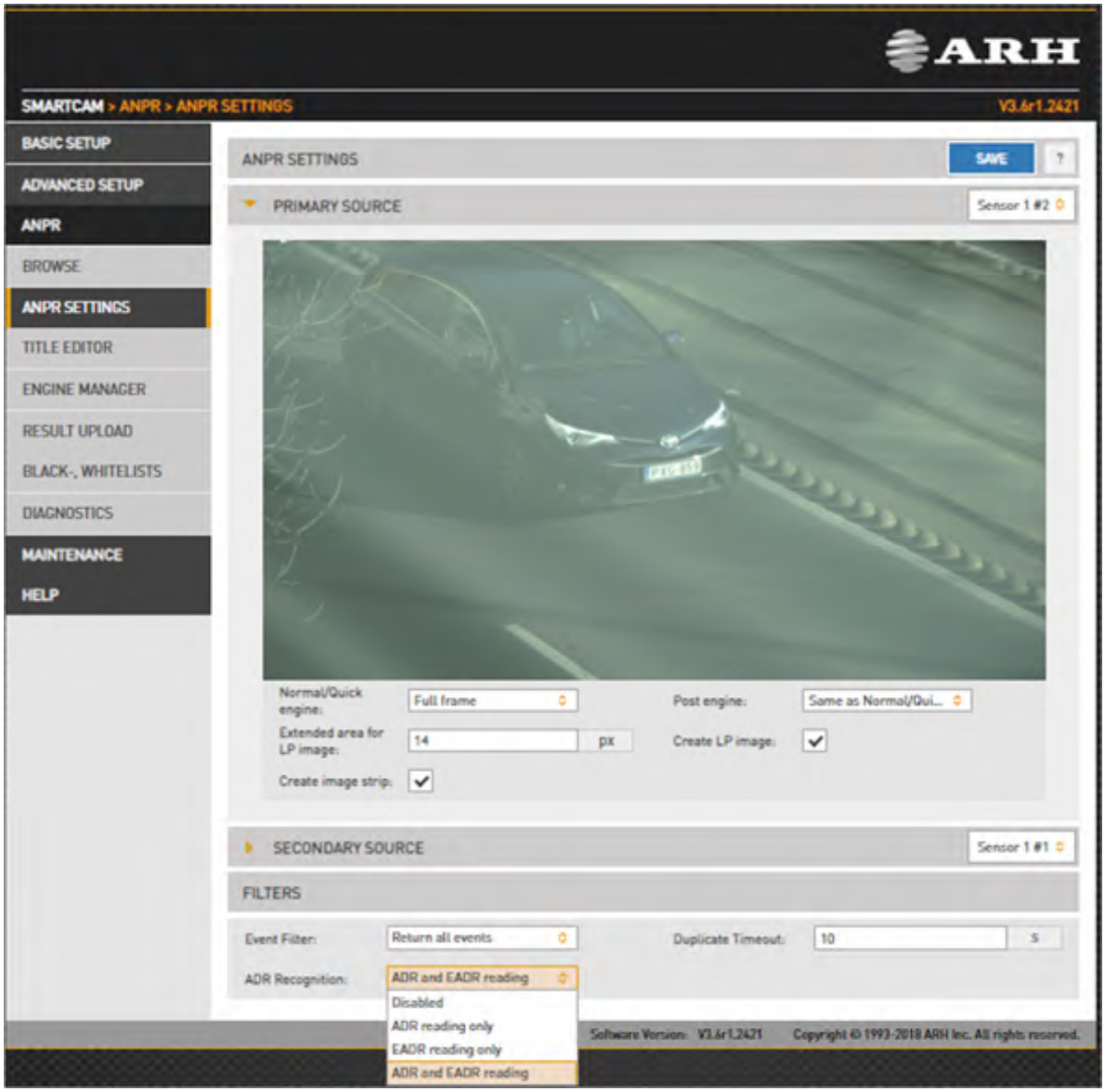
- **Duplicate timeout:** the time frame in which the same license plate will not be registered again if once read.

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

When an ADR or EADR plate has been read, the data xml will feature a tag with the relevant info:

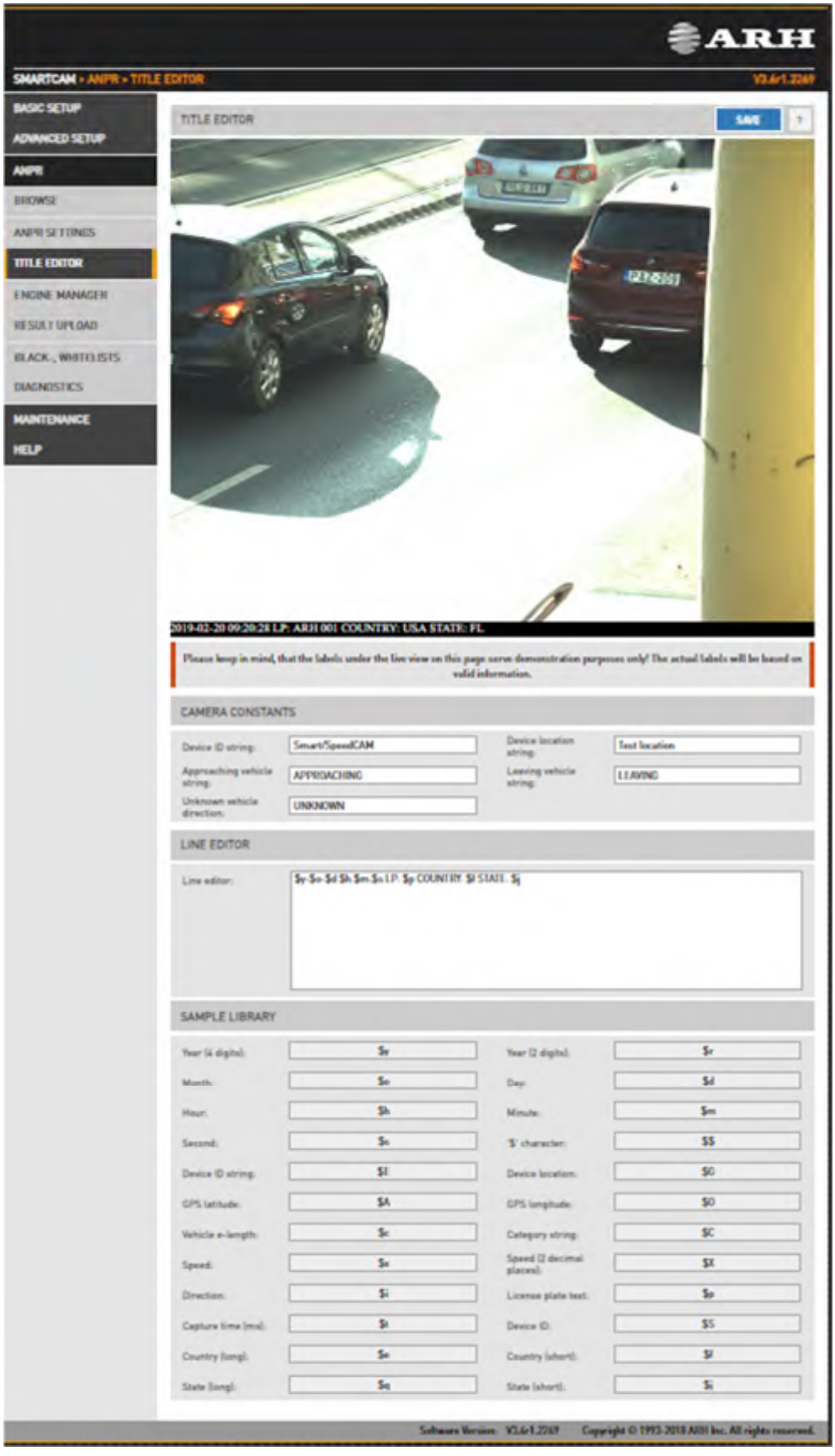
- Text: in case of emplty ADR plates it will read as EADR, otherwise the ADR text
- Type: numeric
- Frame: usual coordinates

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



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.

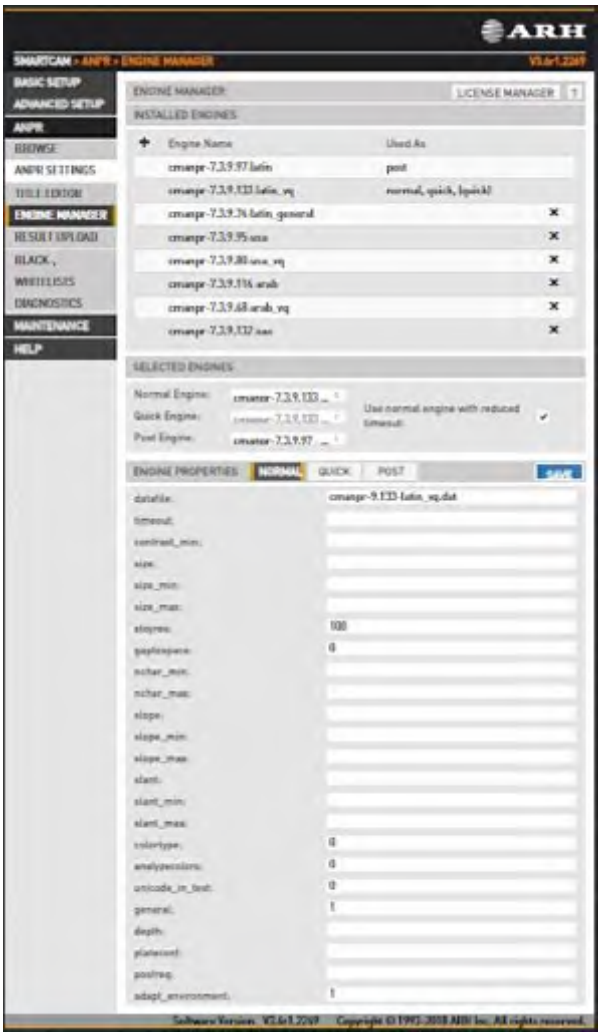
7.2.4. ENGINE MANAGER

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 on clicking the + icon.

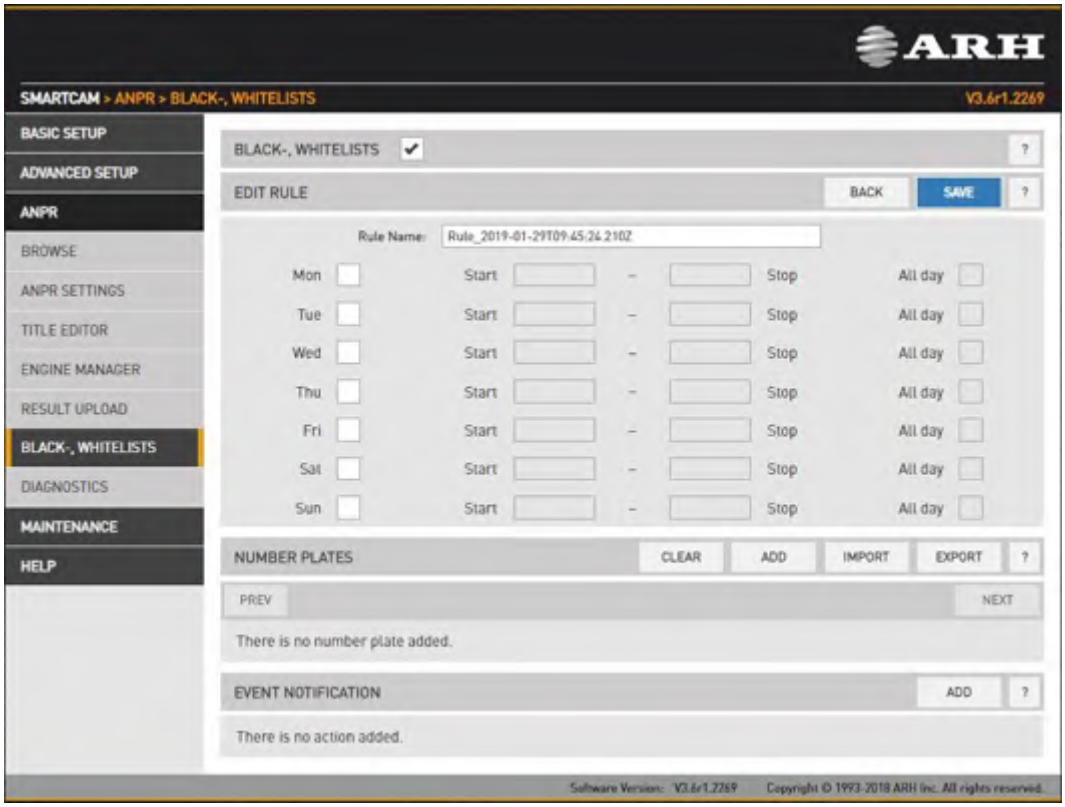
Currently used engines are listed in the **Selected Engines** tab. The Normal/Quick stage uses two engines: 'Normal' under normal circumstances and 'Quick' under heavy load. Please note that these two may not be necessarily two different engines, one can use the 'Normal' engine with a reduced timeout as 'Quick'. This way memory footprint of the process is substantially lighter.

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



7.2.1. BLACK/WHITE LISTS

WEB INTERFACE > ANPR > BLACK/WHITE LISTS



The purpose of this feature is to execute tasks upon reading a certain license plate.
To enable the Black/White List feature use the check box.

> **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 BWL 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. 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.

7.2.2. 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.

7.2.3. TIME SETTINGS

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

7.2.4. 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.

7.2.5. EVENT NOTIFICATIONS

You can add multiple tasks to a rule, each will be executed if the conditions are satisfied. 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**.

7.2.6. EXAMPLES

7.2.7. BLACKLIST FOR STOLEN CARS

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.

7.2.8. WHITELIST FOR OPENING GATE

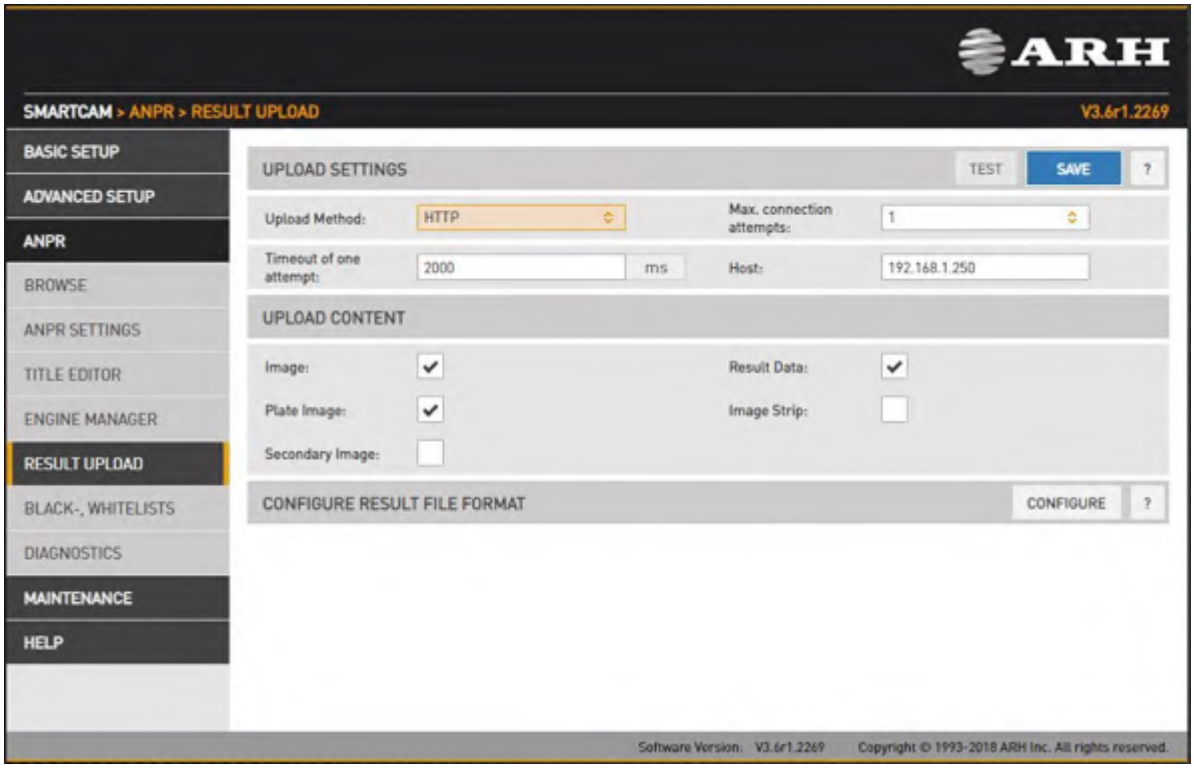
Create a rule, select workdays and add the license plates and an Exec/GPIO type Event Notification. GP output will be triggered when a plate on the list has been read.

7.2.9. WHITELIST ON TOLL ROAD

Create a 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.

7.2.10. RESULT UPLOAD

WEB INTERFACE > ANPR > RESULT UPLOAD



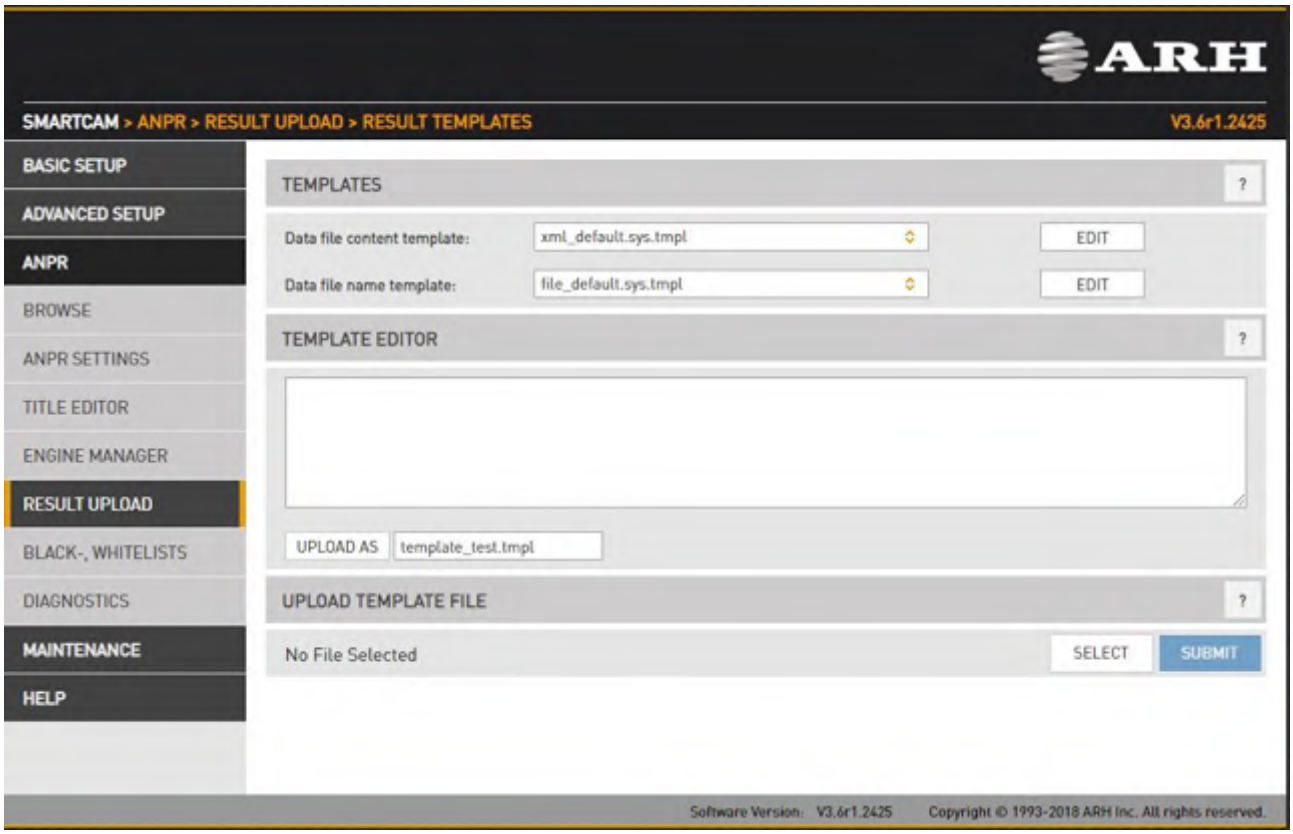
Recognition results can be uploaded using the HTTP, FTP or SFTP protocol.

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

*: only present in FTP, SFTP configuration

Upload Content: The data and images will be uploaded

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



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
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"

.

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
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));

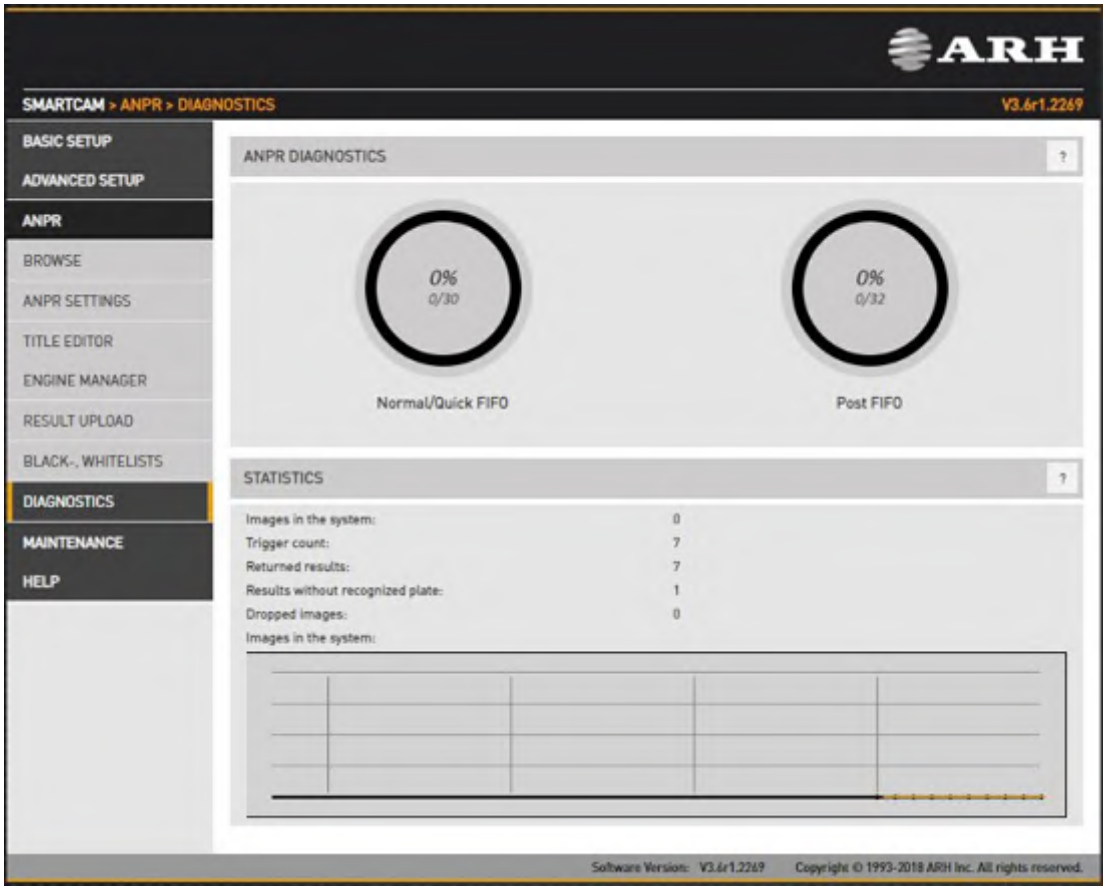
will evaluate as

();a$a,DATA

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

7.2.11. 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
- **Returned results:** the number of events stored in database
- **Results without recognized plate:** the number of events where the engine couldn't recognize plate.

8. MAINTENANCE

8.1. SYSTEM INFO

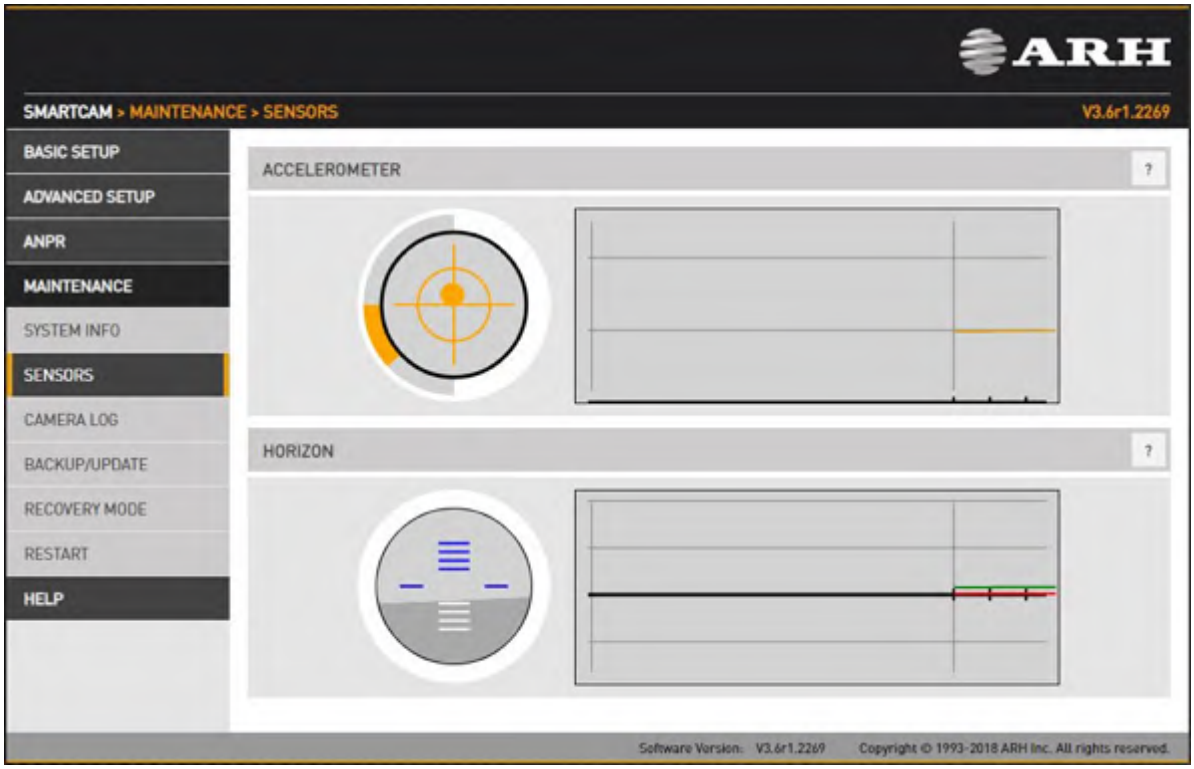
WEB INTERFACE > MAINTENANCE > SYSTEM INFO

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.
- **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

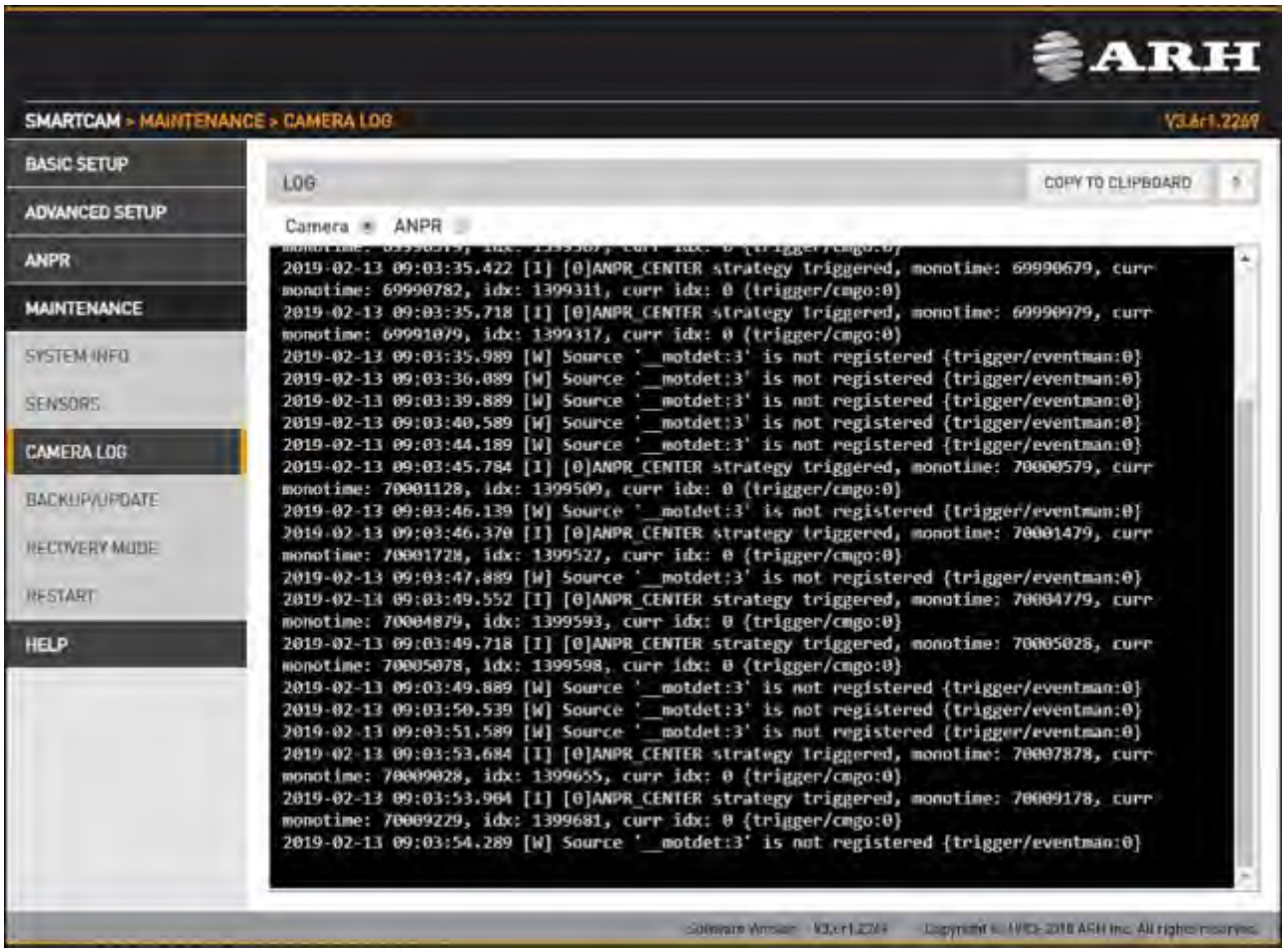
WEB INTERFACE > MAINTENANCE > SENSORS



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

8.3. CAMERA LOG

WEB INTERFACE > MAINTENANCE > CAMERA LOG

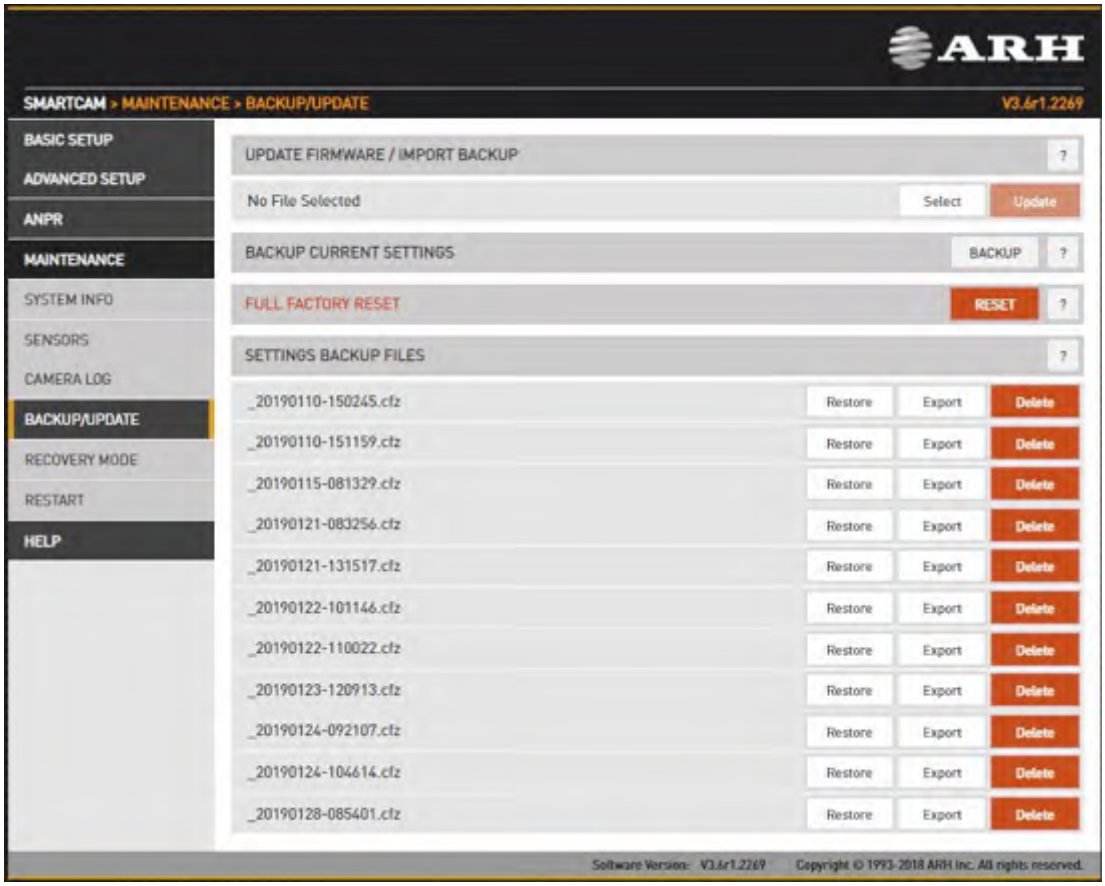


Camera and ANPR logs provide information about the processes in the camera and the license plate recognition module respectively. Log entries can be copied to the clipboard

and attached to a bug report.

8.4. BACKUP/UPDATE

WEB INTERFACE > MAINTENANCE > BACKUP/UPDATE



This menu provides tools to manage camera firmware.

Use UPDATE FIRMWARE to upload a new firmware.

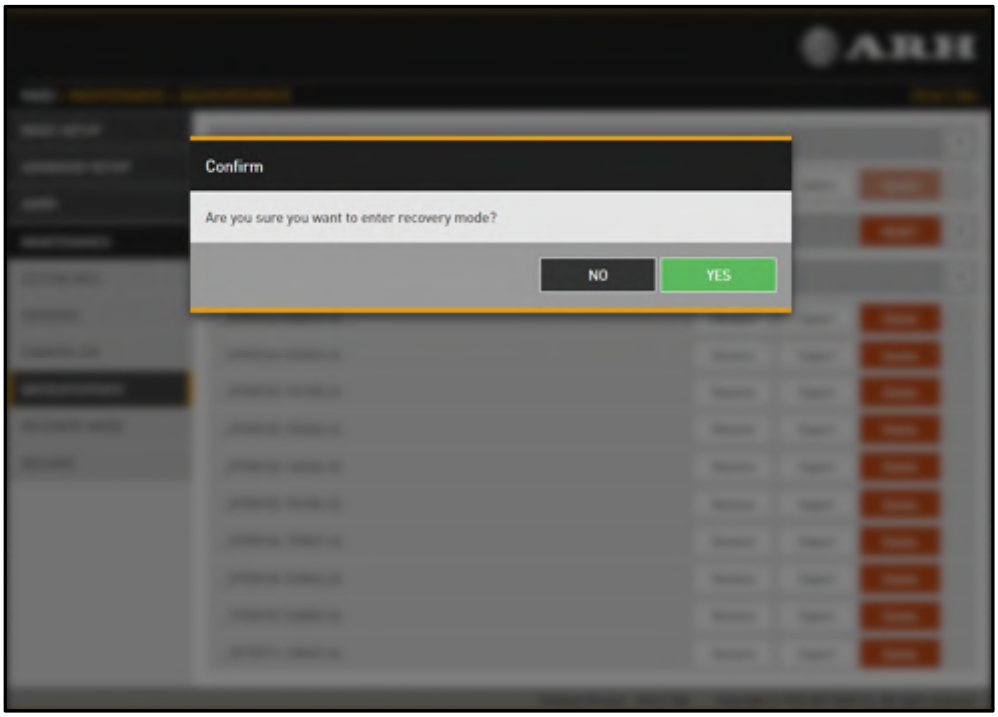
The camera will save a backup file upon each restart, which can be restored Restore, removed Delete or downloaded Export by clicking the appropriate button.

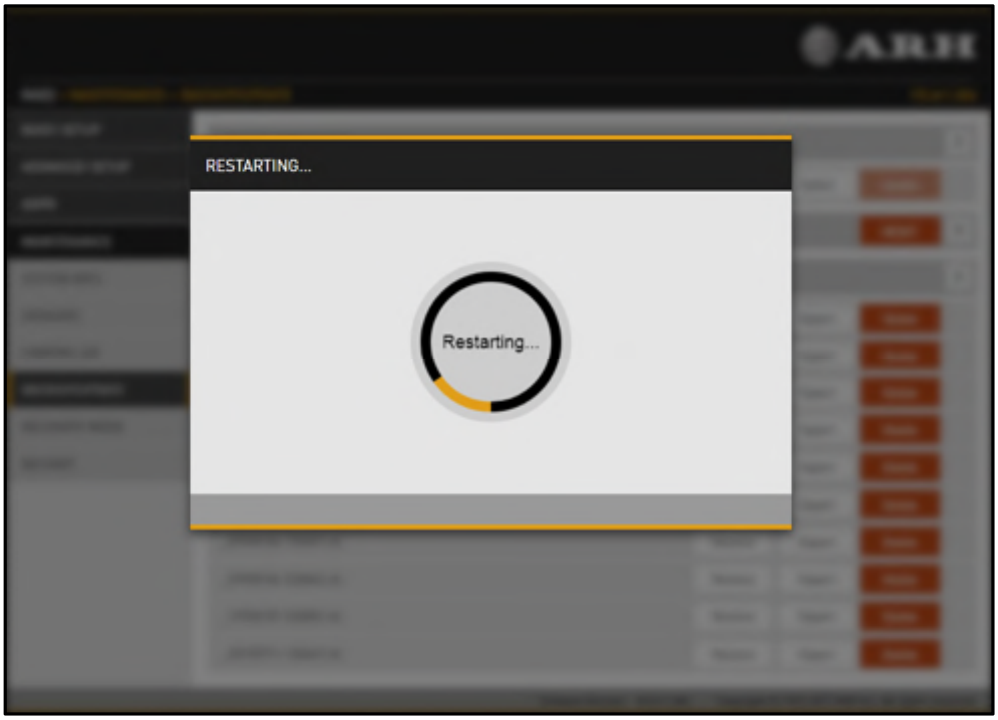
Click FULL FACTORY RESET to return to default settings. The IP address remains unchanged. Use RECOVERY MODE to change the IP address.

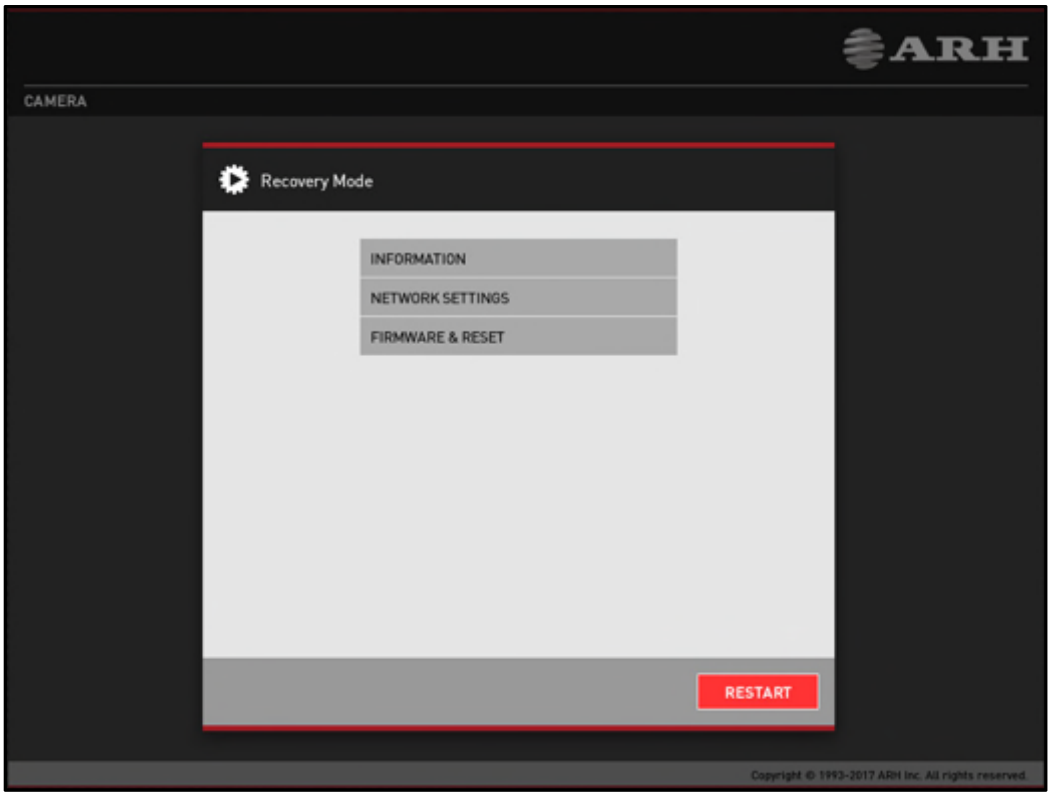
8.5. RESTART & RECOVERY MODE

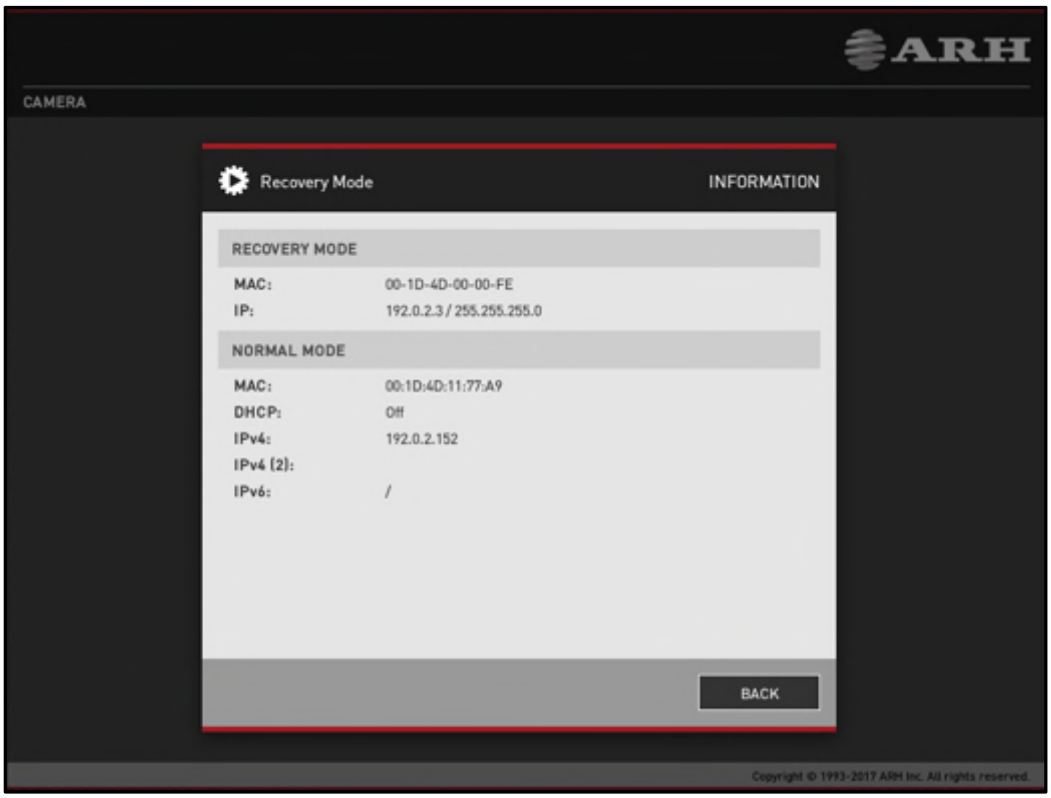
WEB INTERFACE > MAINTENANCE > RECOVERY MODE

WEB INTERFACE > MAINTENANCE > RESTART






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


ARH
CAMERA
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
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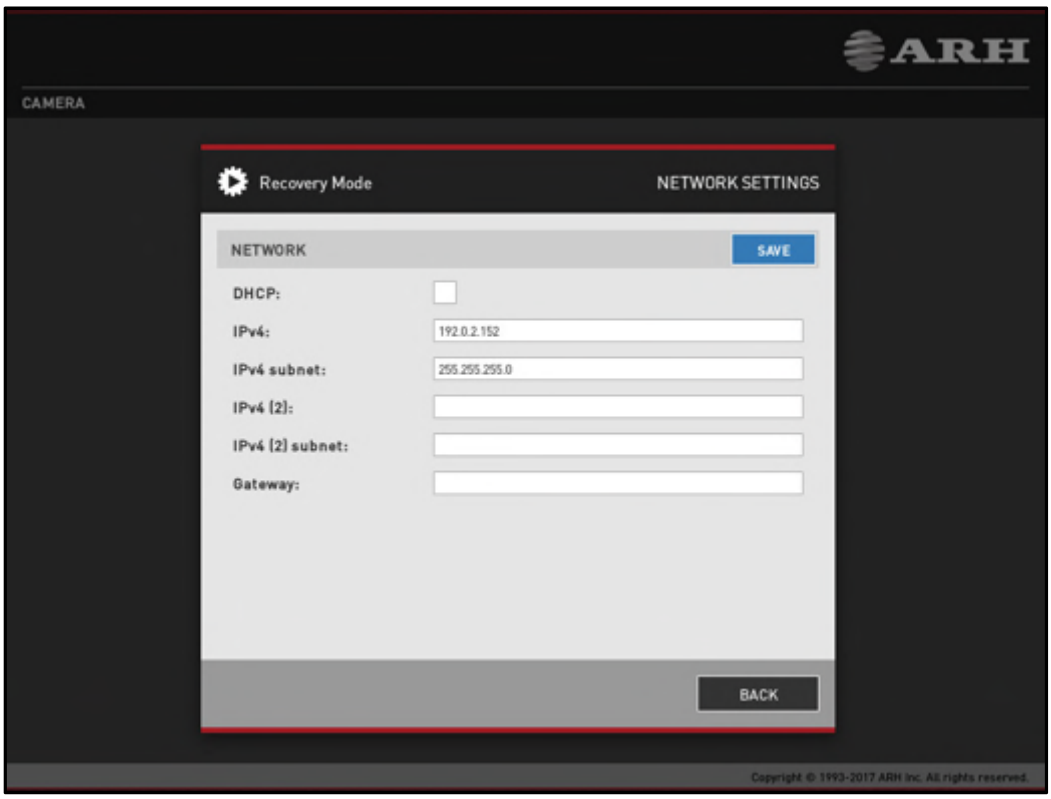
ARH
CAMERA
Recovery Mode
NETWORK SETTINGS
NETWORK
SAVE
DHCP:
IPv4:
192.0.2.152
IPv4 subnet:
255.255.255.0
IPv4 (2):
IPv4 (2) subnet:
Gateway:
BACK
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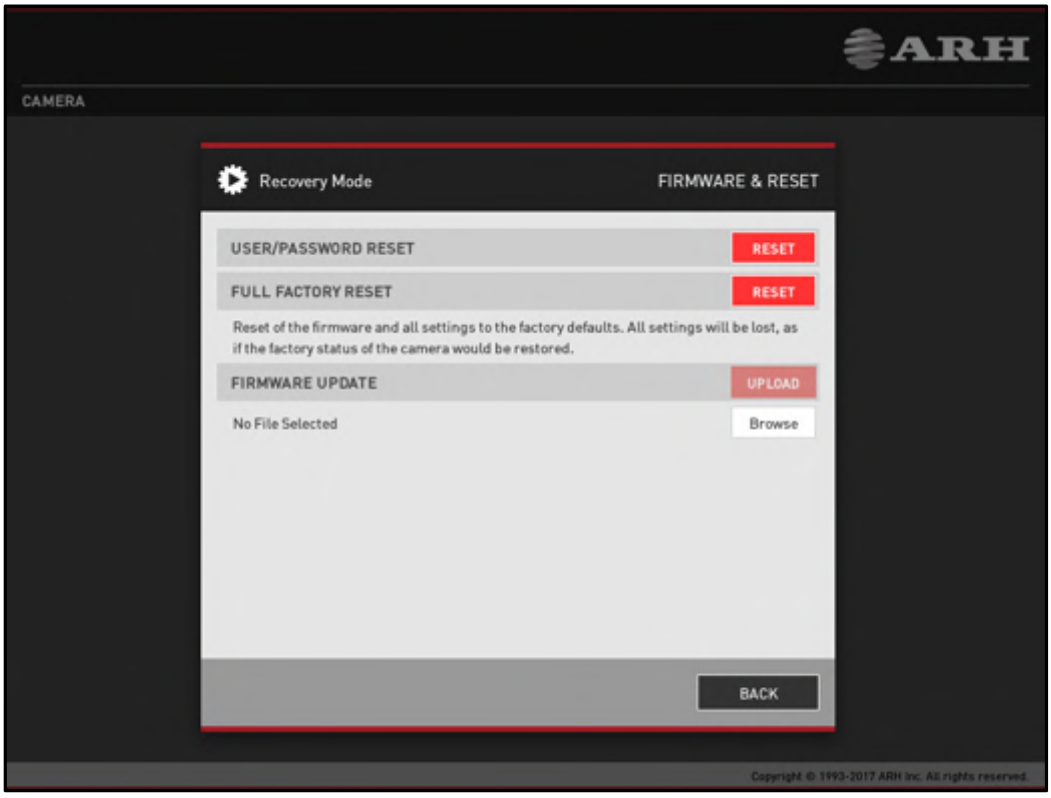
ARH
CAMERA
Recovery Mode
FIRMWARE & RESET
USER/PASSWORD RESET
RESET
FULL FACTORY RESET
RESET
Reset of the firmware and all settings to the factory defaults. All settings will be lost, as if the factory status of the camera would be restored.
FIRMWARE UPDATE
UPLOAD
No File Selected
Browse
BACK
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These 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.

The **magnetic reset procedure** is as follows:

- Start with a powered off device.
- Place a magnet at the indicated position
- Power on the device (if the magnet is in proper position, the green indicator led on the front of the camera will start flashing very fast)
- Remove the magnet
- Enter the web interface at the 192.0.2.3 (default) IP

Entering Recovery mode to Freeway camera:

Starting of the Recovery mode can be implemented 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).

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ARH 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 hardware, software, manuals and FAQ are easily accessible for customers who previously registered to enter the dedicated ATSS site. Besides offering assistance, the site is also designed to provide maximum protection while managing your business information and technical solutions utilized.

New User
If this is your first online support request, please create an account by clicking on this link.

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