

CAMERA SETUP FOR 24/7 USE



USER'S GUIDE

CAMERA SETUP FOR 24/7 USE

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INTRODUCTION

The document is intended to provide a thorough overview on how to properly mount and position cameras for ANPR purposes. Furthermore, it also documents how automatic brightness control should be configured to achieve the best possible results.

Note

To achieve the desired ANPR quality it is essential that you perform all the listed steps.

1. INSTALLATION

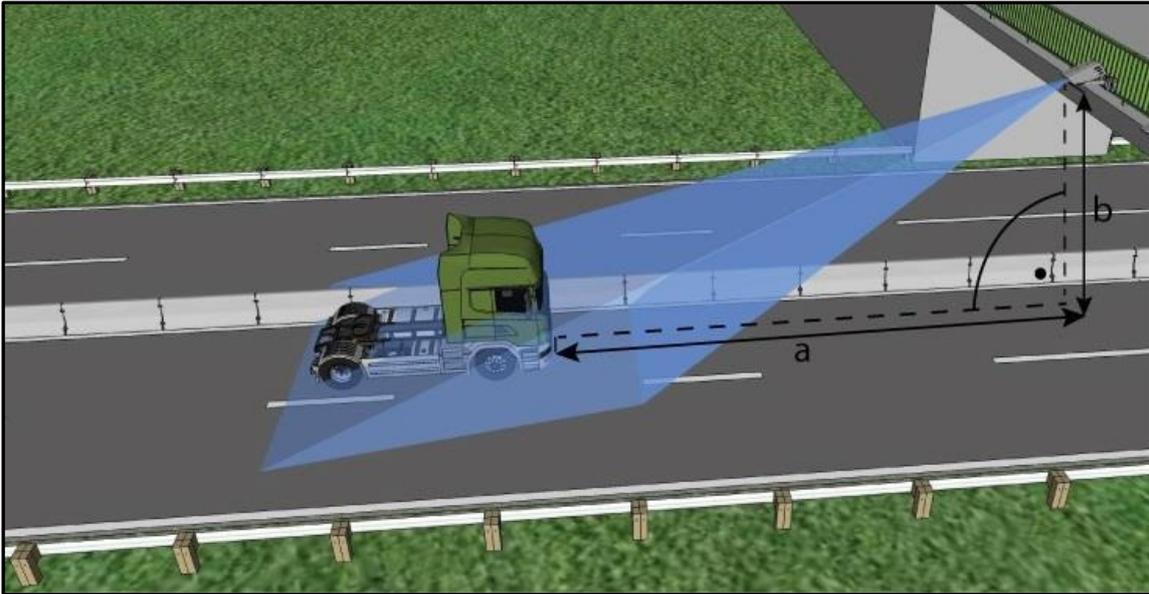
There are two suggested installation positions: Overhead and Lateral. The following section of the guide will describe these two in detail and will also present recommended values for both. Some typical mistakes made in connection with camera installation will also be discussed.

Note

Bear in mind that the recommended values could be different for the ParkIT, Mx02 and the FreewayCAM camera. This is due to the fact that they are used for different types of applications. The following differences should always be taken into consideration:

- Power of illumination/number of LEDs
- Shutter type
- Type of lens (fix or zoom)

1.1 OVERHEAD



	a	b
FreewayCAM	10.5 meters	6 meters
ParkIT and Mx02	5 meters	3 meters

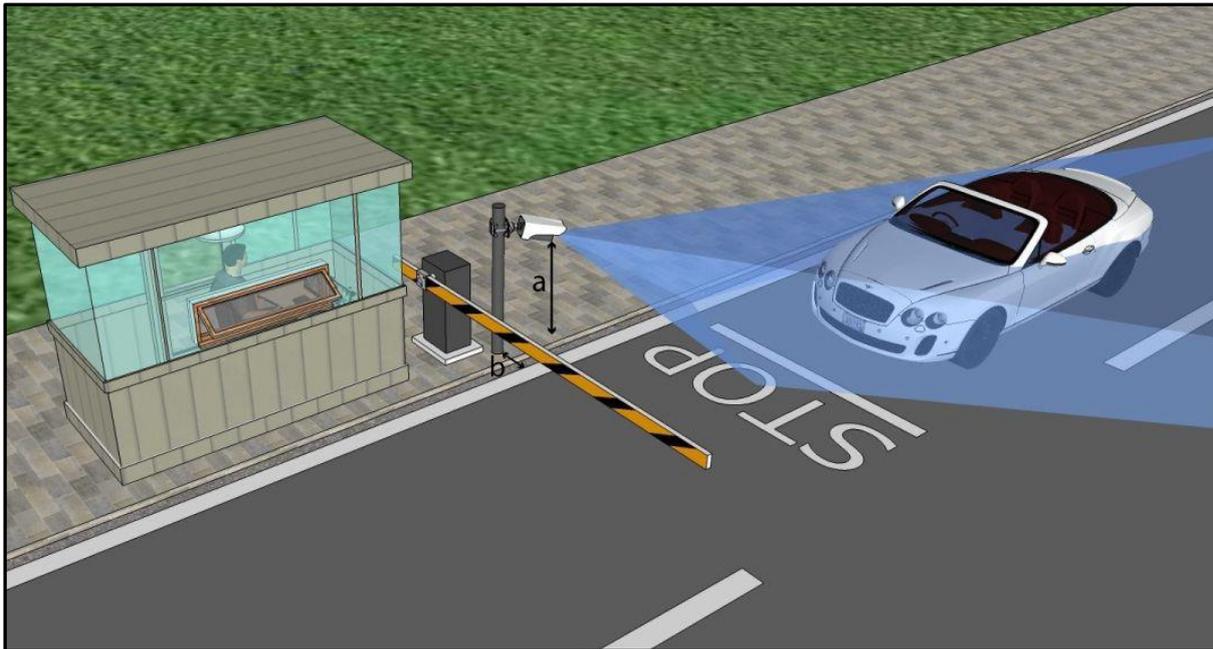
! Important

- The camera is **exactly above the center** of the lane,
- **vertical** rotation ≤ 40 degrees,
- **horizontal** rotation is 0.



Example image taken by an overhead installation

1.2 LATERAL



	a	b
FreewayCAM	1,5m (1m + the level of the vehicle headlights)	As close to the road as possible (maximum 1 m).
ParkIT		The vertical rotation degree should be as low as possible (lower than 25°)
Mx02		

! Important

- The camera should be installed on the **side of the road at least 1 meter above** the level of **the headlights** (to avoid unwanted light rays reaching the sensor); the camera should also be **facing** slightly **downward**,
- **horizontal** rotation \leq **25 degrees**,
- **vertical rotation should be as low as possible**,
- **distance from the side of the road should be as low as possible as well (max 1-2 meters)**.

In different installations (e.g. when the camera is placed horizontally, at the level of the headlights), either the effectiveness of the automatic brightness control or the license plate recognition may decrease.



Example image taken by a lateral installation

These settings will ensure proper angles for License Plate Recognition (important in terms of distortion).

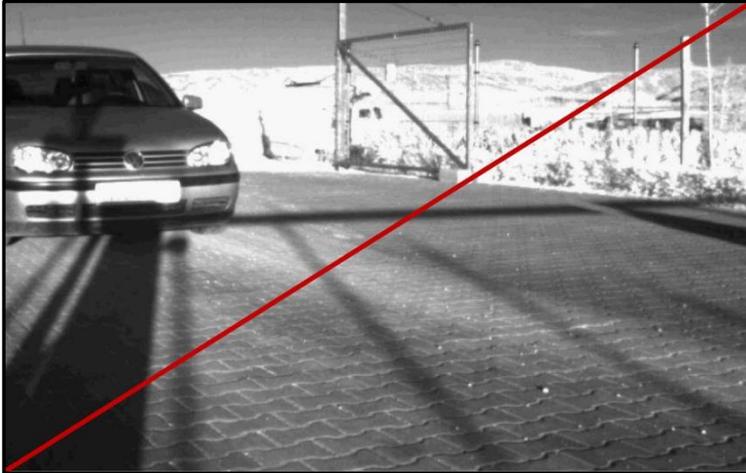
! Important

- The camera should look **on the road** if there's no car present,
- **NOT** to the **horizon**,
- **NOT** to the **sky**.

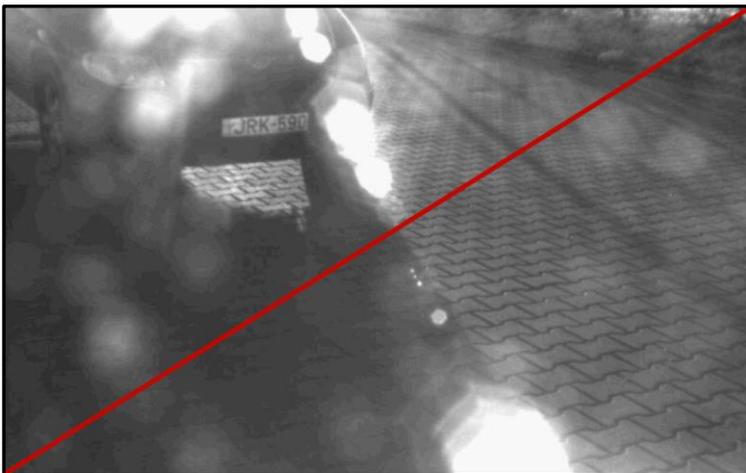
Note that higher traffic velocity requires smaller horizontal rotation of the camera.

1.3 TYPICAL MISTAKES

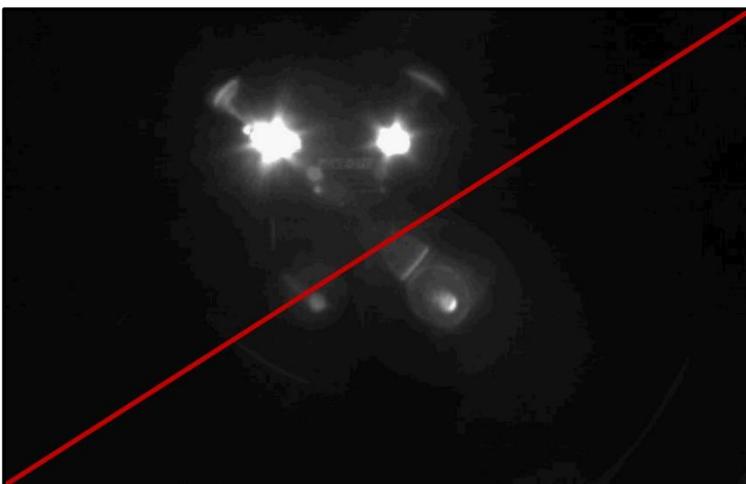
The correct camera position is essential to achieve accurate ANPR results. Avoid the following mistakes during the mounting process:



- Sun behind the camera, license plate reflects the sunbeams.
- Image contains the sky and a background (hills).



- The sun is facing the camera, causing glimmer.

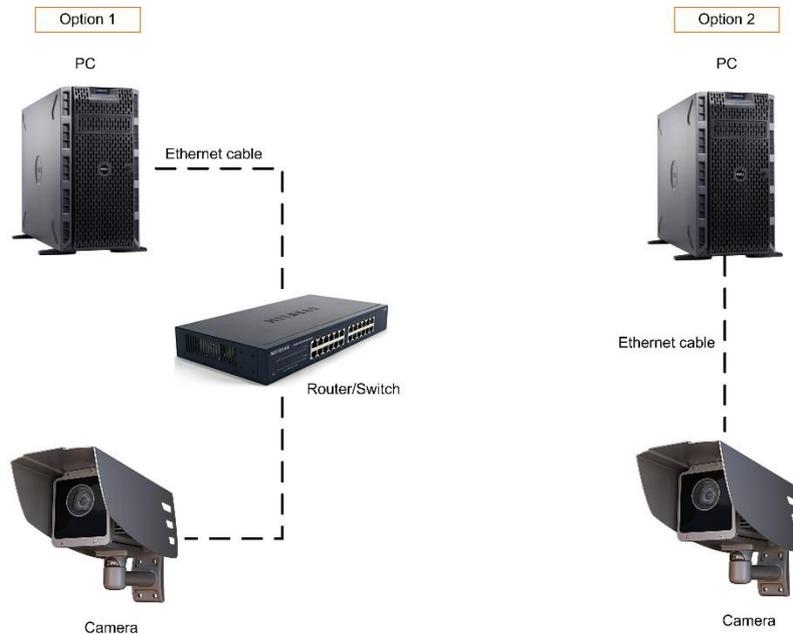


- Light from headlights reaching the sensor.

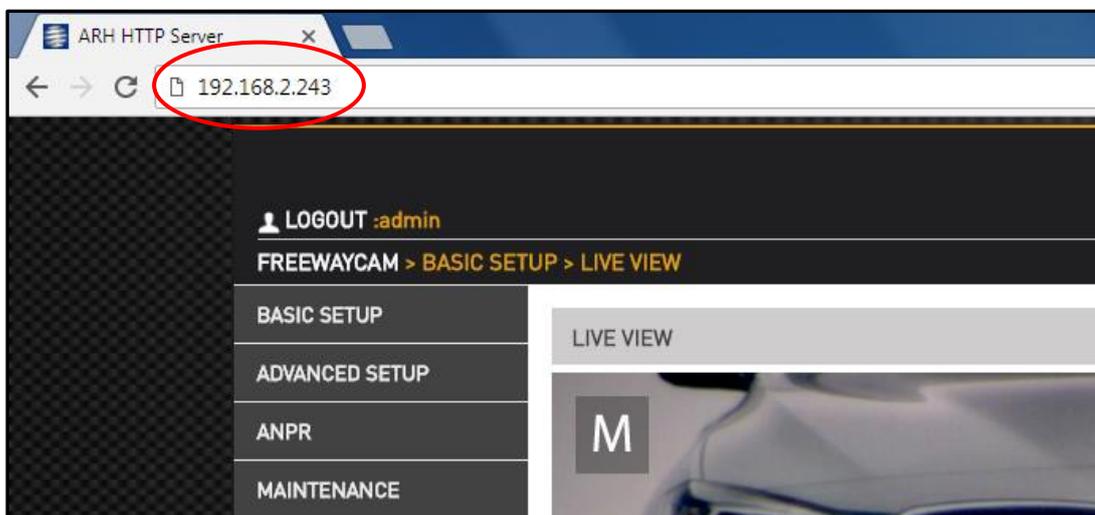
2. AUTOMATIC BRIGHTNESS CONTROL

2.1 CONNECTING THE CAMERA

- Connect the camera directly to your PC or into a switch/router to reach your local network.



- Access the camera by typing the **IP address** (default: 192.0.2.3, or the one that you already set) into your browser.



If everything was done correctly, after entering the IP address of the camera you should be presented with the web interface. The configuration steps you will have to follow and the settings available on the camera depend on the firmware version. If your camera is running firmware version 3.6r1.517 or higher, then keep on reading, if not, jump to [3.3 Configuration for older firmware versions](#).

2.2 CONFIGURATION FOR FIRMWARE V3.6R1.517 AND HIGHER

2.2.1 CONFIGURE CAMERA ZOOM AND FOCUS

Note

Zoom function is not available on Mx02 series.

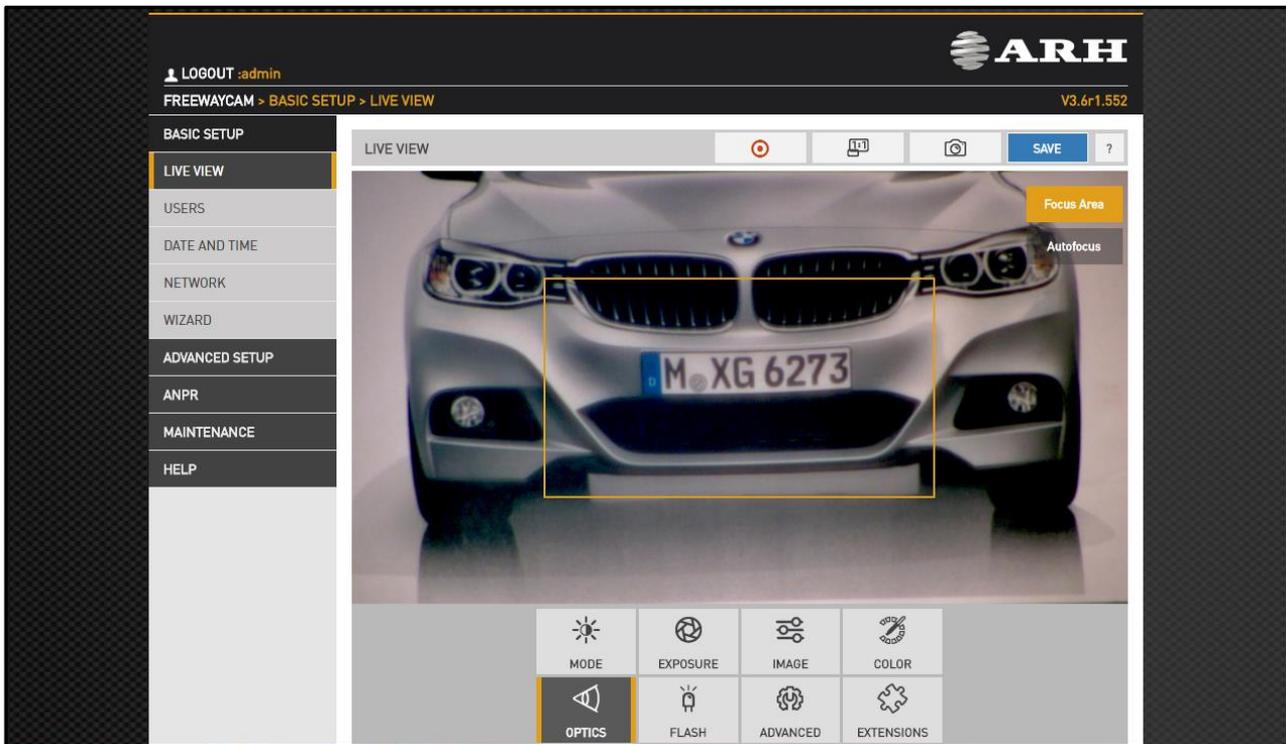
- Go to **Basic Setup / Live View**
- From the **Function buttons** under the live stream activate the **MODE button** by clicking on it. After the activation select the **Indoor (Manual)** option from the drop-down menu.
- Click on the **OPTICS button** and zoom out (by clicking to OPTICS button the already open MODE parameters will switch automatically to OPTICS parameters and there is no need to deactivate/activate the buttons).
- Click on the **EXPOSURE button** and fully open the **Iris**.
- After the iris is set adjust the **Shutter** until the image shows inhomogeneous - not fully dark nor fully bright – image (image will be probably blurry at this point).
- Go back to the **OPTICS button** and click on **Autofocus**
- **Zoom in** (the zoom ratio is dependent on situation)
- **Resize the Autofocus Area** so that it contains the objects you want to have sharp on the image
- Click on **Autofocus**, the camera will automatically focus on the area where the **Autofocus Area** box is located
- Click on **Save**

or use the Auto tracking function by following the steps below:

- Go to **Basic Setup / Live View**
- Change to **Indoor (Manual)** under the **MODE button**
- Set the **Iris** and **Shutter** the same way as written above
- Go to **OPTICS** and **Zoom in** (100%)
- Adjust the **Focus Area** and hit **Autofocus**, then **Save**
- Get back from **Focus Area** and choose **Auto Tracking**
- With active Auto Tracking function each Zoom movement will trigger a focus adjustment, so the image will be sharp after every Zoom modification (the adaptation may cause a very short idle time).

Hint

The **Autofocus Area** box is resizable. It is recommended to place a license plate in front of the camera for the setup period.

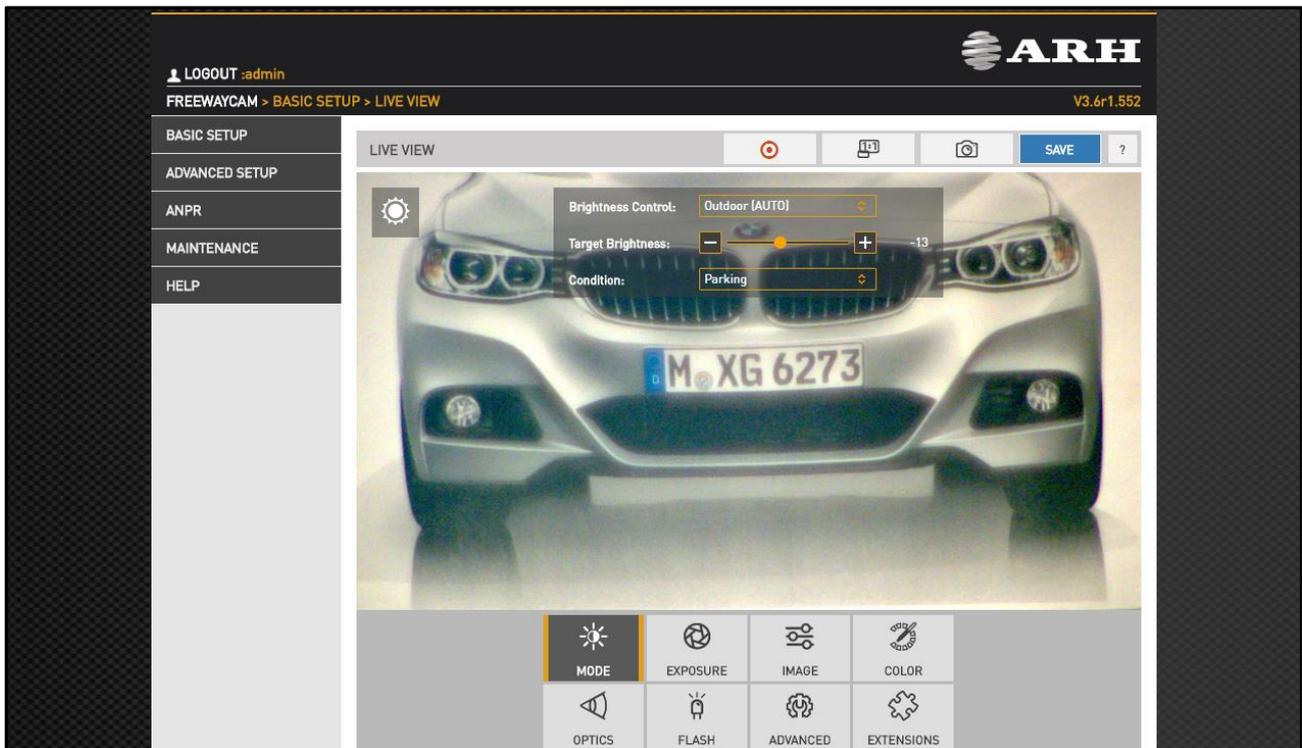


2.2.2 BRIGHTNESS CONTROL CONFIGURATION

To configure brightness control go to **Basic Setup / Live View** and click on the **MODE** button. How the interface looks like (i.e. what settings are available) will depend on which option you select from the **Brightness Control** drop down menu. There are two options available here, **Outdoor (AUTO)** and **Indoor (MANUAL)**.

2.2.2.1 Brightness Control: Outdoor (AUTO)

Select the **Outdoor (AUTO)** option from the **Brightness Control** drop down menu if the camera is outdoors. If this option is selected, the brightness of the camera will be adjusted automatically based on how you configure **Condition**, **Gain** and **Target Brightness**.



Hint

You can hover over the appellation of parameters to view a short description of the parameter, or click on the question mark icon (?) to open the related part of the manual for more information.

RECCOMENDED STEP-BY-STEP CONFIGURATION:

- From the **Condition** drop down menu select the appropriate option for your camera installation (e.g.: if the camera is installed on a highway, select the **Highway** option)
- Set **Gain** to **Medium** (EXPOSURE button / Gain)
- Set **Target Brightness** to -50 (MODE button / Target Brightness)

Once **Condition**, **Gain** and **Target Brightness** have been configured, the camera will automatically adjust the brightness settings on the camera. If you are satisfied with the results, click on **SAVE**.

However, if you are not satisfied with the results, then you will need to fine-tune your camera settings. The following list contains all the options that can be configured on the interface as well as a short description of what each parameter does. Configure these based on the ambient lighting conditions present on the site to fine-tune your camera.

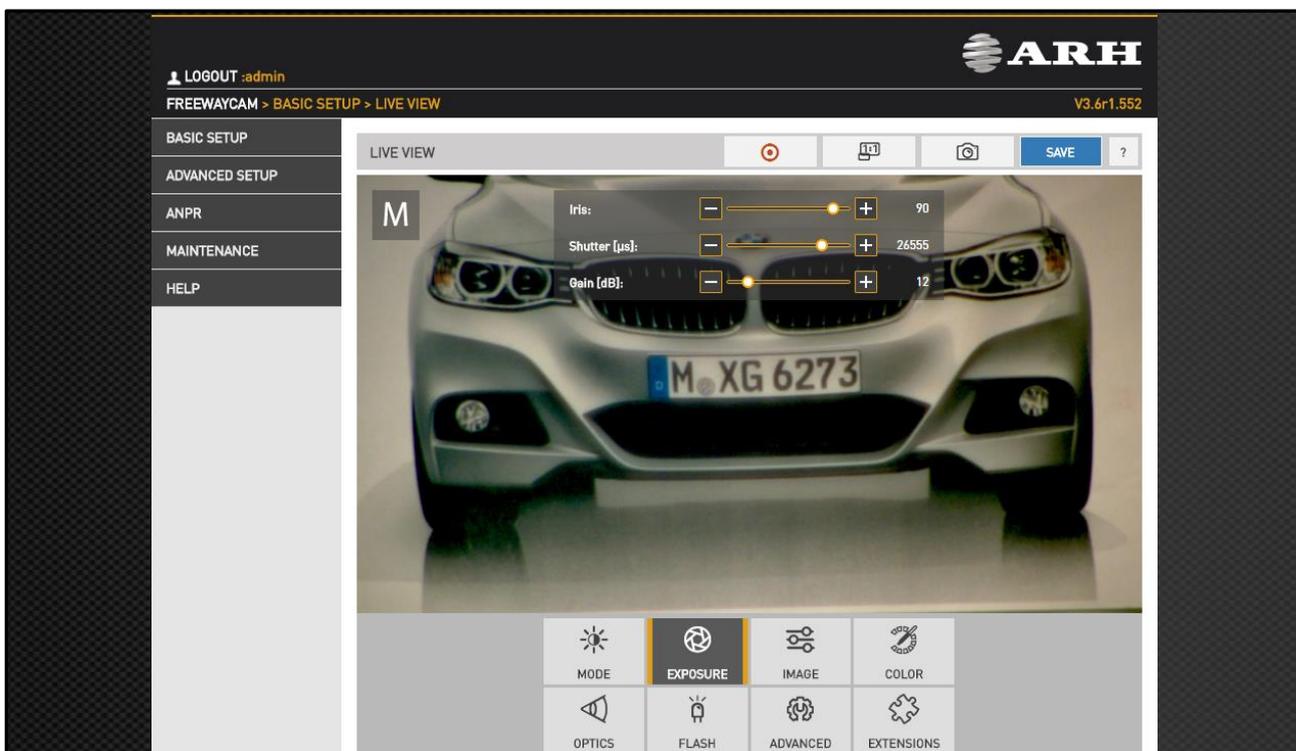
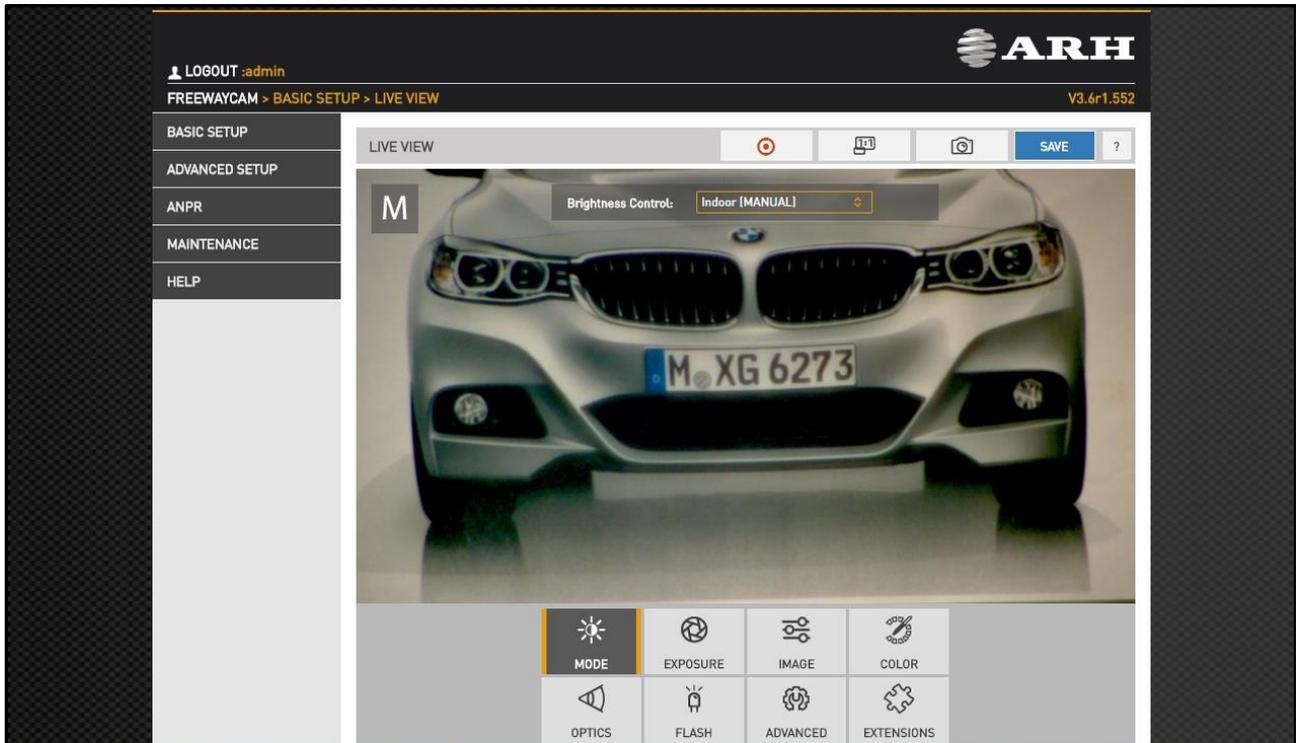
- **Target brightness [MODE button]:** higher values will result in brighter images, lower target values will lead to darker images
- **Condition [MODE button]:** Limits the range in which the maximum daytime shutter can be set for brightness control
- **Shutter max. [EXPOSURE button]:** Maximum daytime exposure time (in microseconds) that the brightness control is allowed to set
- **Gain [EXPOSURE button]:** Determines the maximum gain the brightness control is allowed to use in day mode. If custom is selected then this value can be set with the slider on the right
- **Gain max. [EXPOSURE button]:** Determines the maximum gain the brightness control is allowed to use in day mode

The following parameters can be set for both day and night mode:

- **Flash Intensity [FLASH button]:** Max flash intensity in day mode and fixed flash intensity in night mode
- **Parity Flashing [FLASH button]:** This value represents the percentage which the intensity of the flash will be lowered to for every second frame. Settings this value to -1 will disable the feature.
- **Low Light Mode [ADVANCED button]:** provides not only digital gain, but smoothens the over-burnt parts of the images. This enhancement can be used in case of low light conditions. In this case the sensor will be set according to these conditions and a digital gain will be applied for burnout reduction.

2.2.2.2 Brightness Control: Indoor (Manual)

Select the **Indoor (Manual)** option from the **Brightness Control** drop down menu if the environmental conditions on the destination site are constant (e.g.: the camera is in a parking garage). If this option is selected, you will be able to adjust fixed **Shutter**, **Iris**, **Gain [EXPOSURE button]** and **Flash intensity [FLASH button]** values as well as select which **Low light mode** you want to use **[ADVANCED button]**.



- **Gain [EXPOSURE button]:** is the extent to which the sensor is amplified, resulting in brighter pixels. Note that high gain values result in noisy images.
- **Iris [EXPOSURE button]:** is a mechanical device that controls the amount of light reaching the sensor. If 0 then no light can pass through to the camera sensor. A wide iris leads to a shallow depth of field. A small iris blends the subjects into the background, focuses on bigger part of the image.
- **Shutter [EXPOSURE button]:** controls the length of exposure time. Too high shutter values may result in blurred images. The maximum shutter time that you can use is only determined by the possible maximum speed of the cars.
- **Flash intensity [FLASH button]:** controls how intense the flash is.
- **Low light mode [ADVANCED button]:** provides not only digital gain, but smoothes the over-burnt parts of the images. This enhancement can be used in case of low light conditions, where the sensor will be set according to these conditions and a digital gain will be applied for burnout reduction.

! Important

- High shutter values can cause **motion blur**,
- a wide-open iris causes loss of **depth of field**,
- high gain values result in a **noisy image**.

Once you have configured the parameters and are satisfied with the results, click on **SAVE** to save your changes.

2.2.3 SETTING NIGHT MODE

Note

The Day/Night mode switch is an automated process, there is no need to configure anything in connection with it.

Night mode requires only one setup, since there are practically no changes in lighting conditions at night. To configure night mode, do the following:

- Go to **Advanced Setup / Plain Config / control / brightness_control** *
- Set the value of 'shutter_day_max' to the same value as 'shutter_night' (or to a slightly higher value). If the images are overexposed or are too bright, then lower this value
- Determine the proper illumination level and an iris position to ensure that the license plates are visible. In case of non-retro-reflective license plates, LLM (low light mode) may be necessary.

 Hint

* - **Plain Config** is a hidden menu by default (meant for experts only), but reachable with a hot key [hold SHIFT+CTRL+ALT, and press "P" two times], or with a specific URL: <http://192.0.2.3/#plainconfig> (in case you use the default 192.0.2.3 IP).

2.2.3.1 Recommended Values for Night Mode

 Note

All values presented are averages based on testing and professional experience. To achieve the best possible results, you have to set the values directly shaped for the environment of the camera, after testing on the destination site.

Type of traffic	Values		
	shutter_night	gain_night	iris_night
Highway	800 μ s	default	800
City	2000 μ s	default	800
Slow/Parking	10000 μ s	default	800

Before you adjust the parameters above, please select the "strategy_default" from the **Selected section** drop-down menu.

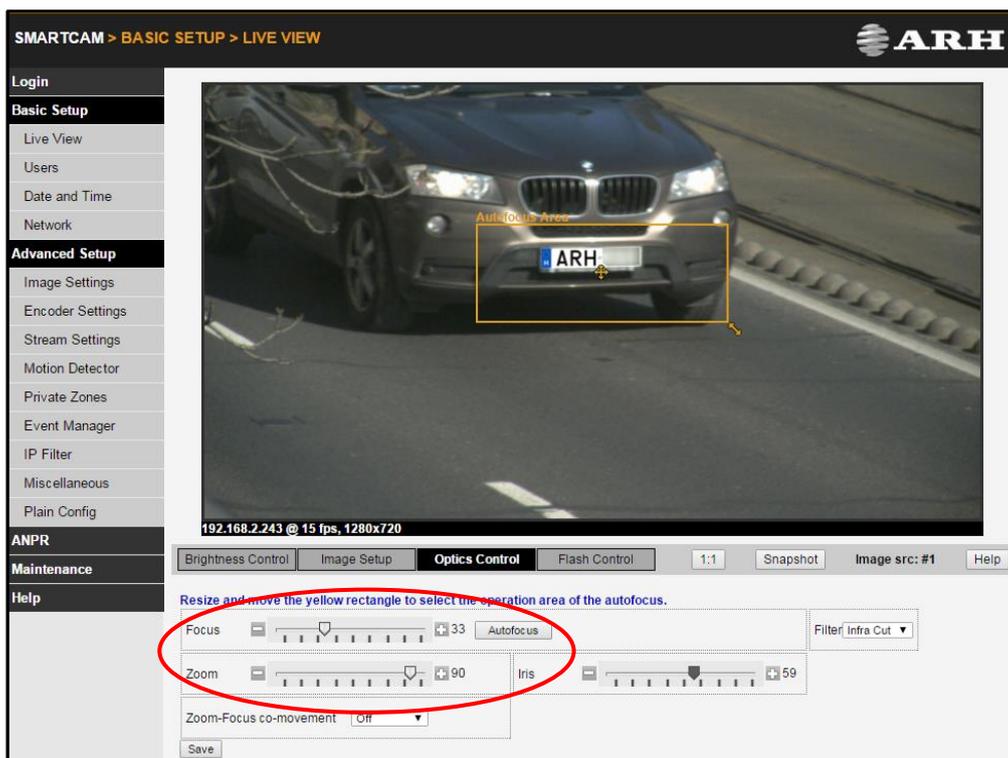
2.3 CONFIGURATION FOR OLDER (3.5) FIRMWARE VERSIONS

2.3.1 CONFIGURE CAMERA ZOOM AND FOCUS

- Go to **Basic Setup / Live View / Brightness Control**
- Disable **Auto Brightness** by unticking the **Enable Auto Brightness** checkbox
- Go to **Basic Setup / Live View / Optics Control**
- **Zoom** out
- Fully open the **Iris**
- Go back to the **Brightness Control** tab and reduce **Shutter** until the image turns grey
- On the **Optics Control** tab Click on the **[Autofocus]** button
- **Zoom** in
- **Resize the Autofocus Area** so that it contains the objects you want to have sharp on the image
- Click on **[Autofocus]**, the camera will automatically focus on the area where the **Autofocus Area** box is located
- Click on **[Save]**

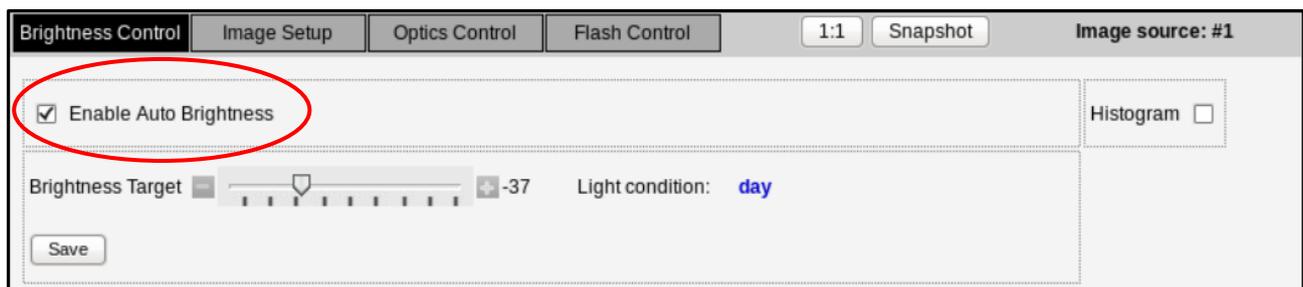
Hint

The **Autofocus Area** box is resizable. It is recommended to place a license plate in front of the camera for the setup period.



2.3.2 BRIGHTNESS CONTROL CONFIGURATION

- On the **Brightness Control** tab, tick the **Enable Auto Brightness** checkbox. Alternatively, if the environmental conditions are constant (e.g.: the camera is in a parking garage), leave the **Enable Auto Brightness** checkbox unticked and set fix values based on the lighting conditions on the site for the parameters available in the interface.
- Click **[Save]**.



Note

- If auto brightness is enabled, an automatic method is used to adjust the brightness of the camera image.
- Higher **Brightness Target** results in brighter images, a lower target leads to darker ones.
- Automatic brightness control makes it possible to achieve optimal brightness levels in ambient lighting conditions all day long.
- For night mode there will be one constant set of parameters that you can [modify](#).

Hint

Clicking on **[Help]** will redirect you to a page which contains detailed descriptions of what each parameter does.

2.3.3 RECOMMENDED VALUES FOR DAY MODE

Note

All values presented are averages based on testing and professional experience. To achieve the best possible results, you have to set the values directly shaped for the environment of the camera after testing on the destination site.

Values below are configurable at: *Advanced Settings/Plain Config/control/brightness_control*

Hint

Brightness target is usually set to: -50 (from -60 to -40).

Type of traffic	Values			
	shutter_day_max (min – max)	gain_day_max	iris_day_min	iris_day_max
Highway	default: 750 μ s (250 – 800 μ s)	default	300	800
City	default: 1500 μ s (1000 – 2000 μ s)	default	300	800
Slow/Parking	default: 7000 μ s (5000 – 10000 μ s)	default	300	800

! Important

- High shutter values can cause **motion blur**,
- a wide-open iris causes loss of **depth of field**,
- high gain values result in **noisy images**.

Hint

In *Advanced Setup / Plain config / control / birgthness_control* click on **[Help]**, then place your mouse cursor on any parameter name to make a short explanation of that parameter appear on the top portion of the screen.

Note

Histogram: enable it to draw an image histogram on the camera view.

Brightness Target: brightness settings can be set for day and night light conditions respectively. The light condition returns a value, day or night based on the camera light sensor.

The following control panel can be seen if the Auto Brightness mode is disabled:



Gain: gain is the extent to which the sensor is amplified, resulting in brighter pixels. Note that high gain values result in noisy images.

Iris: iris is a mechanical device that controls the amount of light reaching the sensor. If 0 then no light can pass through to the camera sensor. A wide iris leads to a shallow depth of field. A small iris blends the subjects into the background, focuses on bigger part of the image.

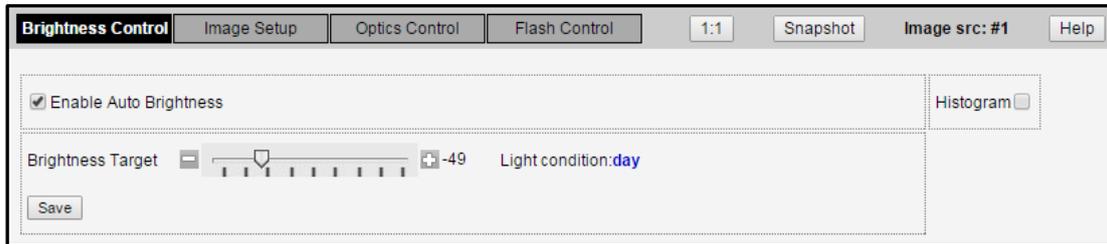
Shutter: controls the length of exposure time. Too high shutter values may result in blurred images. The maximum shutter time that you can use is only determined by the possible maximum speed of the cars.

Exposure time: displays the current shutter speed (fraction of seconds – in 1/sec).

Low light mode: provides not only digital gain, but smoothens the over-burnt parts of the images. This enhancement can be used in case of low light conditions, where the sensor will be set according to these conditions and a digital gain will be applied for burnout reduction.

2.3.4 DAY/NIGHT MODE SWITCH SETTINGS

- Tick the **Enable Auto Brightness** checkbox at *Basic Setup / Live View / Brightness Control*



- Save
- Return to *Advanced Setup / Plain Config / control / brightness_control*
- Configure automatic day / night switching:

Set '**bc_method**' to 1. Camera will change between day and night modes automatically, according to the built-in light sensor. If it is turned on, the '**daynightcut**' value is neglected. The switch is performed with automatic light value calculation.

Note

The '**bc_method**' option is available from firmware 3.1.2.29. If you are using older version, please request a software update through [ATSS](#).

2.3.5 SETTING NIGHT MODE

Night mode requires only one setup, since there are practically no changes in lighting conditions at night. To configure night mode, do the following:

- Go to *Advanced Setup / Plain Config / control / brightness_control*
- Set the value of '**shutter_day_max**' to the same value as '**shutter_night**' (or to a slightly higher value), if the images are overexposed or are too bright, then lower it.
- Determine the proper illumination level and an iris position to ensure that the license plates are visible. In case of non-retro-reflective license plates, LLM (low light mode) may be necessary.

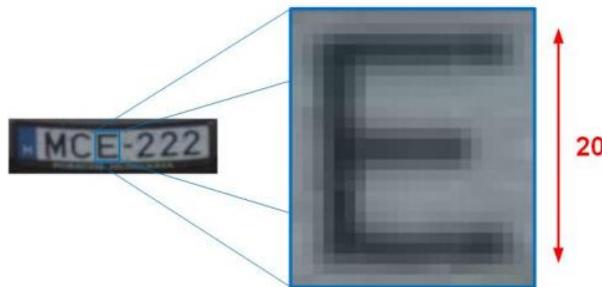
2.3.5.1 Recommended Values for Night Mode

Type of traffic	Values		
	shutter_night	gain_night	iris_night
Highway	800 μ s	default	800
City	2000 μ s	default	800
Slow/Parking	10000 μ s	default	800

3. IMAGES

In order to get the most accurate result from the CARMEN® software, the processed images should contain a license plate:

- ✓ with reasonably good spatial resolution. The **minimum** character height on the license plate is **16 pixels for Latin** and **20 pixels for Arabic** characters, **the line-width** on the image should be **2 pixels**.



- ✓ with reasonably good sharpness.
- ✓ with reasonably high contrast.
- ✓ under reasonably good lighting conditions.
- ✓ in a reasonably good position and angle of view.

The images below demonstrate the limits of OCR technology:

! Important

The images in the table do not show what the camera should see. These are cropped images containing only the license plates

IMAGES	SOLUTION
TROUBLESHOOTING IMPROPER LICENSE PLATE IMAGES 	
 Low contrast	To avoid overexposure, set a lower brightness target. This could lead to dark images being taken during daytime, but this

 <p>Overexposure</p>	<p>should not pose a problem if you are using the CARMEN® ANPR engine. Set the contrast_min* engine property to '0'. Please review the brightness control settings.</p>
 <p>High distortion</p>	<p>Make sure that the camera is in the right position with right rotation degrees.</p>
 <p>Low spatial resolution (too small characters on the plate)</p>	<p>The required minimum character size is 16 (20 for Arabic characters) pixels height and 2 pixels line-width on the image. Make sure that your zoom and focus settings are accurate.</p>
 <p>Blurred image</p>	<p>Lower the shutter speed.</p>

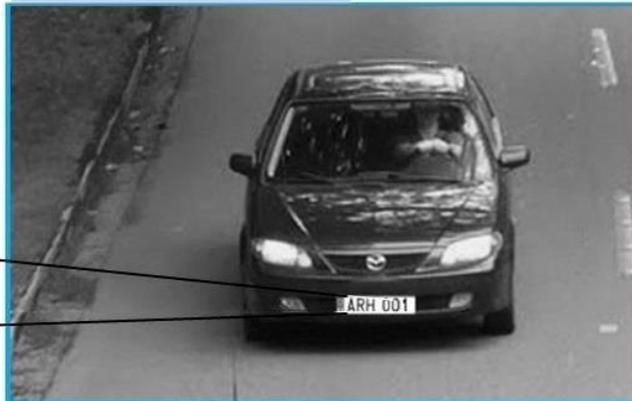
<p>Proper images</p> 	
	

*If you are using a camera with integrated plate recognition function, this property is accesible through the web interface at **ANPR / Engine Manager / Engine Properties**.

3.1 EXAMPLES

WVGA (752x480)

ParkIT (B&W), FreewayCAM (B&W)



HD (1280x720)

FreewayCAM (color)



FULL HD (1920x1080)

FreewayCAM



Note

The optimal character size for ANPR purposes is 16-20 pixels. But this size will be bigger (even 45 pixels) depending on the resolution of the camera (HD, FullHD) in case of zooming in the image until the view of the camera covers one lane.

CONTACT INFORMATION

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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](#).

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.

If you need assistance with login or registration, please contact atsshelp@arh.hu for help.