Hanwha Vision

# Wisenet Road AI Cameras

# QUICK REFERENCE GUIDE

# CONTENTS



# 1 PRE-INSTALLATION

## 1.1 Choosing Location

The LPR (License Plate Recognition) / ANPR (Automatic Number Plate Recognition) Technology running on this camera will provide you with the best results when following the recommended installation requirements below.

**Fig. 1**
Camera shown from side

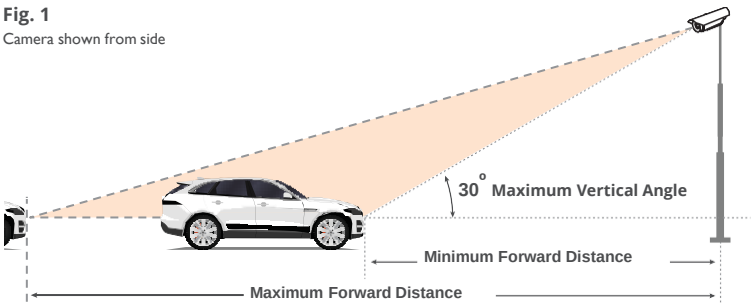
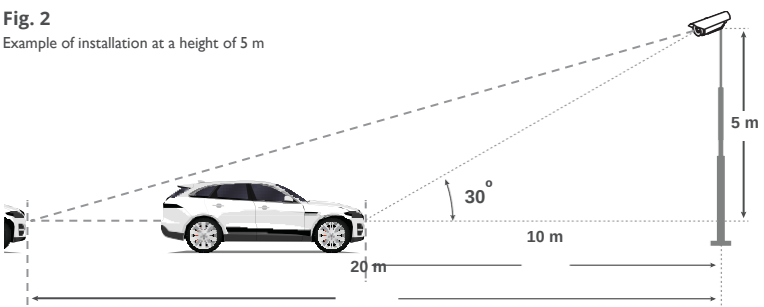



**Fig. 2**
Example of installation at a height of 5 m




### Recommended

**30°** Maximum Vertical Angle

Maximum Forward Distance depends on lens zoom, however should not exceed

**20 m / 65.6 ft (for PNO/PNV-A9081RLP model)** and

**70m / 229.6 ft (for PNO-A9311RLP model)** considering effective IR range.

For **PNB-A9001LP** it depends on the lens installed and IR module used.

Please consider using external IR for ranges above recommended.

## 1.1 Choosing Location (continued)

### Recommended

**30°** Maximum Horizontal Angle for high-speed traffic, and up to **45°** for city traffic.

**Fig. 3**

Camera shown from top

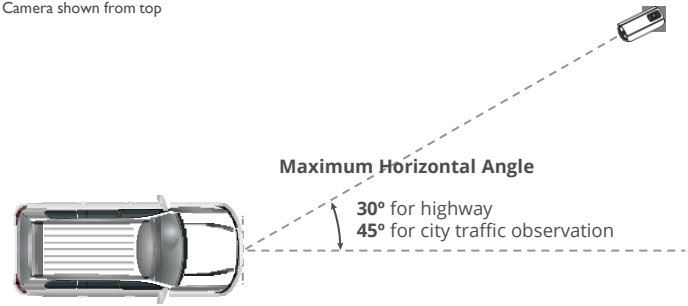
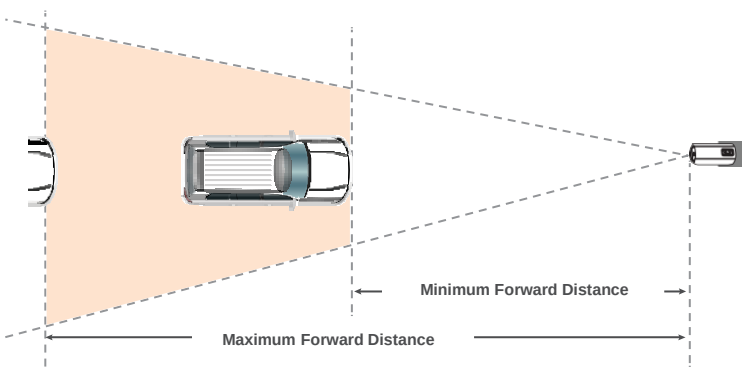



**Fig. 4**




Due to computational resource limitations, Road AI runs faster in FullHD (high-performance) mode than in 4K (low-speed) mode. However, 4K mode offers the advantage of covering more lanes and providing higher pixel density, which in turn supports higher traffic speeds (see p.6,7).

**To ensure the fastest speed support,** opt for higher zoom. This will help you capture vehicles across the full distance range specified on p.6,7.

Make sure the license plates in the camera field of view match the following criteria

**For FullHD:**

- **80-300 pixels** for regular EU plates
- **80-300 pixels** for US plates without stacked symbols (small ones)
- **90-300 pixels** for US plates with stacked symbols

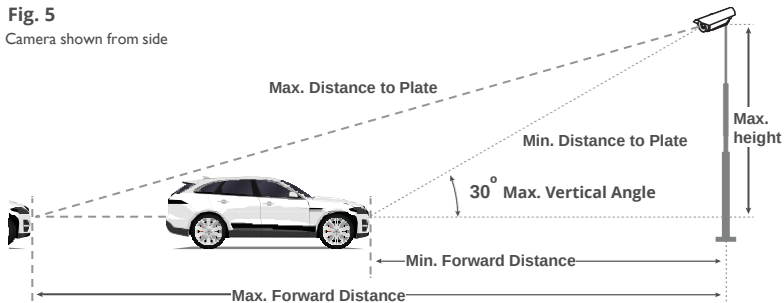
**For 4K:**

- **110-500 pixels** for regular EU plates
- **110-500 pixels** for US plates without stacked symbols (small ones)
- **110-500 pixels** for US plates with stacked symbols

You may use the color coded pixel counts available in the settings section of Road AI

## 1.2 Calculating camera height and horizontal offset

**Fig. 5**
Camera shown from side

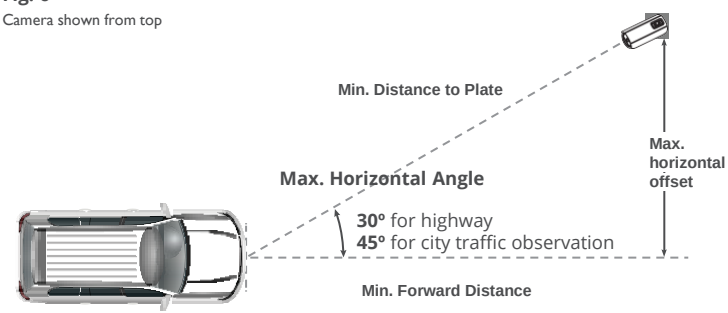



Calculation of the **Maximum camera height** depends on:
- the view you would like to have on the road to **minimize tailgating effect** (optimally, it should be at least 5m high),
- the **Maximum Vertical Angle**, and
- the **Minimum Distance to Plate** (at this position the vertical angle is more than for the Maximum Distance to Plate).

**Max Height = sin(θ) × D,**
Where
θ - Max. Vertical Angle
D - Min. Distance to Plate (see pp, 7,8)

**30º** Maximum Horizontal Angle for high-speed traffic, and up to **45º** for city traffic.

**Fig. 6**
Camera shown from top




Calculation of the **Maximum horizontal offset** is similar and depends on:
- the **Maximum Horizontal Angle**, and
- the **Minimum Distance to Plate** (at this position the vertical angle is more than for the Maximum Distance to Plate).

**Max horizontal offset = sin(θ) × D,**
Where
θ - Max. Horizontal Angle
D - Min. Distance to Plate (see pp, 7,8)

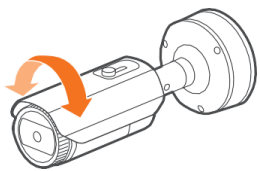
# 2 INSTALLING AND POSITIONING CAMERA

## 2.1 Camera Installation

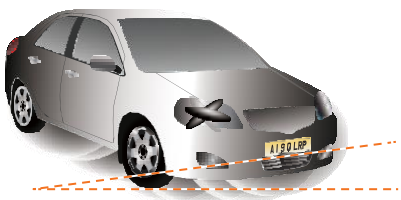
**NOTE:** ***Refer to PNO-A9081RLP, PNV-A9081RLP, PNO-A9311RLP or PNB-A9001LP installation guide and follow the installation instructions.***

## 2.2 Adjusting the Plate "Rotation" Angle

For best results, check the angle of your plate compared to the horizontal angle and rotate the camera to less than **15°** as shown below (Recommended Angle(s).



**Recommended Angle(s)**



**NOTE:** ***Refer to the "show plate grid" section available in Wisenet Road AI settings for assistance.***

## 2. 3 LPR(ANPR)/ MMCR Specification - North American License Plates

| LPR(ANPR) CAMERAS | PNV-A9081RLP | PNO-A9081RLP | PNB-A9001LP (with 50mm lens) | PNO-A9311RLP |
|---|---|---|---|---|
| |  |  |  |  |

| LPR Usage Conditions | Community Traffic / Parking Application | | Community Traffic / Parking Application | | City Traffic | | City Traffic | |
|---|---|---|---|---|---|---|---|---|
| Speed Description | Low to Moderate Speed | | Low to Moderate Speed | | Regular Speed | | High Speed | |
| Lane Coverage | 2 lanes, 8.1m/26 ft wide (with built in IR) | | | | | | | |
| | 4K | FHD | 4K | FHD | 4K | FHD | 4K | FHD |
| Speed limit | Up to 70km/h (43mph) | - | Up to 70km/h (43mph) | - | Up to 120km/h (74mph) | - | Up to 140km/h (87mph) | - |
| Min. Forward Distance | 8m (26.2ft) | - | 8m (26.2ft) | - | 15m (49.2ft) | - | 33m (108.2ft) | - |
| Max. Forward Distance | 15m (49.2ft) | - | 15m (49.2ft) | - | 30(98.4ft) | - | 70m (229.6ft) | - |
| Lane Coverage | 1 lane, 3.6m/12ft wide (with built in IR) | | | | | | | |
| | 4K | FHD | 4K | FHD | 4K | FHD | 4K | FHD |
| Speed limit | Up to 90km/h (56mph) | Up to 60km/h (37mph) | Up to 90km/h (56mph) | Up to 60km/h (37mph) | Up to 140km/h (87mph) | Up to 140km/h (87mph) | Up to 140km/h (87mph) | Up to 140km/h (87mph) |
| Min. Forward Distance | 6m (19.7ft) | 6m (19.7ft) | 6m (19.7ft) | 6m (19.7ft) | 6m (19.7ft) | 8m (26.2ft) | 13m (42.6ft) | 19m (62.3ft) |
| Max. Forward Distance | 15m (49.2ft) | 11m (36t) | 15m (49.2ft) | 11m (36ft) | 30(98.4ft) | 30(98.4ft) | 70m (229.6ft) | 70m (229.6ft) |
| Max. Horizontal Angle | 30° for highway, 45° for city traffic observation | | | | | | | |
| Max. Vertical Angle | 30° | | | | | | | |
| Vehicle Recognition | Makes : 100+ Models : 4700+ Colors : 11 | | | | | | | |

## 2. 3 LPR (ANPR)/ MMCR Specification - European License Plates

| LPR(ANPR) CAMERAS | PNV-A9081RLP | | PNO-A9081RLP | | PNB-A9001LP (with 50mm lens) | | PNO-A9311RLP | |
|---|---|---|---|---|---|---|---|---|
| LPR Usage Conditions | Community Traffic / Parking Application | | Community Traffic / Parking Application | | City Traffic | | City Traffic | |
| Speed Description | Low to Moderate Speed | | Low to Moderate Speed | | Regular Speed | | High Speed | |
| Lane Coverage | 3 lanes, 16.2m/53 ft wide (with built in IR) | | | | | | | |
| | 4K | FHD | 4K | FHD | 4K | FHD | 4K | FHD |
| Speed limit | Up to 45km/h (28mph) | | Up to 45km/h (28mph) | | Up to 70km/h (43mph) | | Up to 140km/h (87mph) | |
| Min. Forward Distance | 9m (29.5ft) | | 9m (29.5ft) | | 15m (49.2ft) | | 33m (108.2ft) | |
| Max. Forward Distance | 20m (65.6ft) | | 20m (65.6ft) | | 30m(98.4ft) | | 70m (229.6ft) | |
| Lane Coverage | 2 lanes, 8.1m/26 ft wide (with built in IR) | | | | | | | |
| | 4K | FHD | 4K | FHD | 4K | FHD | 4K | FHD |
| Speed limit | Up to 100km/h (62mph) | Up to 100km/h (62mph) | Up to 100km/h (62mph) | Up to 100km/h (62mph) | Up to 140km/h (87mph) | Up to 140km/h (87mph) | Up to 140km/h (87mph) | Up to 140km/h 87mph) |
| Min. Forward Distance | 6m (19.7ft) | 8m (26.2ft) | 6m (19.7ft) | 8m (26.2ft) | 9m (29.5ft) | 12m (39.3ft) | 20m (65.6ft) | 35m (114.8ft) |
| Max. Forward Distance | 20m (65.6ft) | 19m (35.2ft) | 20m (65.6ft) | 19m (62.3ft) | 30(98.4ft) | 30(98.4ft) | 70m (229.6ft) | 70m (229.6ft) |
| Lane Coverage | 1 lane, 3.6m/12ft wide (with built in IR) | | | | | | | |
| | 4K | FHD | 4K | FHD | 4K | FHD | 4K | FHD |
| Speed limit | Up to 110km/h (68mph) | Up to 110km/h (68mph) | Up to 110km/h (68mph) | Up to 110km/h (68mph) | Up to 140km/h (87mph) | Up to 140km/h (87mph) | Up to 140km/h (87mph) | Up to 140km/h (87mph) |
| Min. Forward Distance | 6m (19.7ft) | 6m (19.7ft) | 6m (19.7ft) | 6m (19.7ft) | 6m (19.7ft) | 8m (26.2ft) | 7m (22.9ft) | 13m (42.6ft) |
| Max. Forward Distance | 20m (65.6ft) | 19m (62.3ft) | 20m (65.6ft) | 19m (62.3ft) | 30(98.4ft) | 30(98.4ft) | 70m (229.6ft) | 70m (229.6ft) |
| Max. Horizontal Angle | 30° for highway, 45° for city traffic observation | | | | | | | |
| Max. Vertical Angle | 30° | | | | | | | |
| Vehicle Recognition | Makes : 100+ Models : 4700+ Colors : 11 | | | | | | | |

# 3 CONFIGURING YOUR CAMERA

Please note that there is no default username or password for camera settings. When you access them for the first time:
1) You will need to create your own username and password.
2) Set the correct date and time before proceeding to other settings.

## 1. Field of View

Perform the following steps in the Wisenet camera configuration webpage:

- Configure camera so left and right are correct, not mirrored.
- Set camera zoom to capture license plate
- Adjust camera view angle so plate passes through the middle of the image.

## 2. Configuring Initial Camera Settings

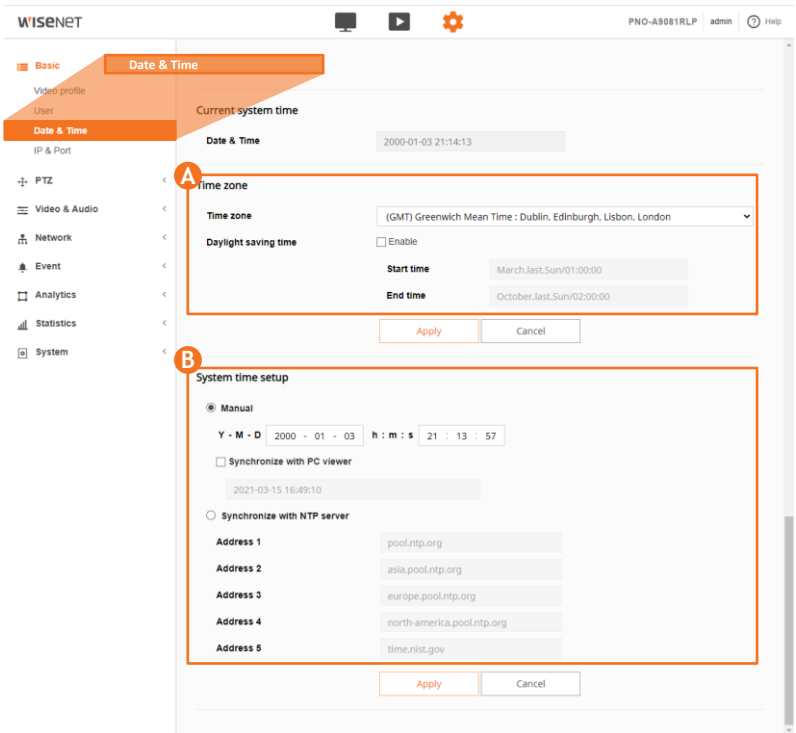
For proper operations, please, check and set

- Camera Date Time (+page 9)
- IP settings (+page 10)
- SD card storage (+page 14)
- Camera exposure and focus (+pages 15~16)

To enhance computer vision accuracy, set features like SSDR, WDR, DIS, Defog, AGC, and anti-flickering to their lowest possible setting or turn them off completely. These features are helpful for human observation but can degrade computer vision results.

## 3. 2 Configuring Initial Camera Settings (continued)

### [Date and Time]



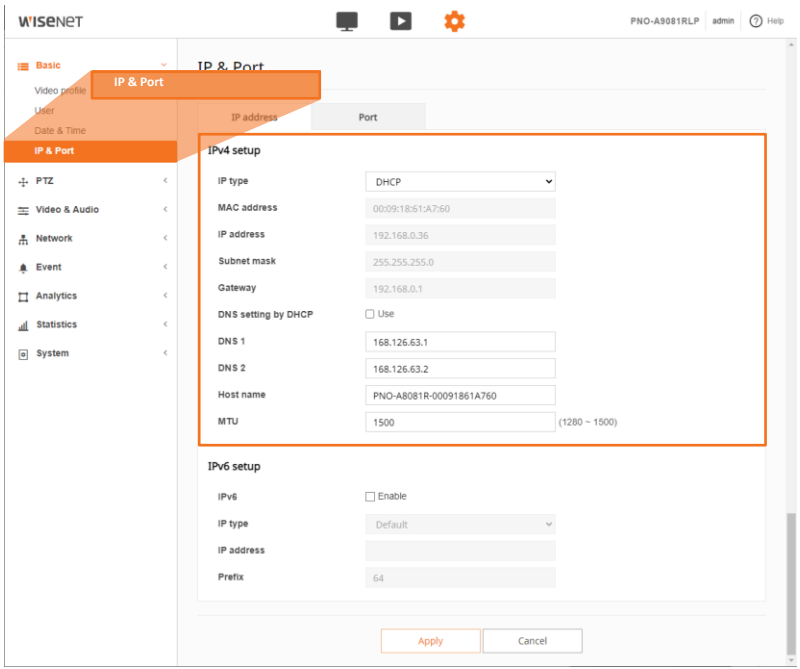

Choose A **Timezone** and set **Use daylight saving time** as appropriate.

Set B **date and time** or opt to **synchronize with your PC** or **NTP server.**

**NOTE:** *Wisenet Road AI app relies on these settings and if these are not set properly you may not see events in Wisenet Road AI app and events delivered to the other systems may not contain proper timestamps.*

## 3. 2 Configuring Initial Camera Settings (continued)

### [IP, DNS, Ports]




Proper IP, DNS and port settings are important for:

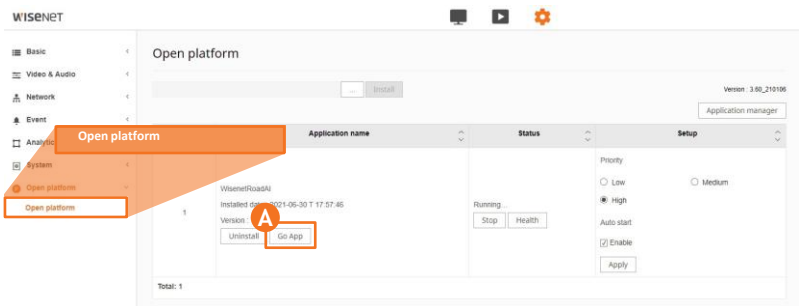
- NVR and other integrations
- outside LAN access if required

**NOTE:** *Reboot the camera whenever the IP address gets changed.*

## 3. 2 Configuring Initial Camera Settings (continued)

### [Go to App]

**Please go to App in camera open platform section.**

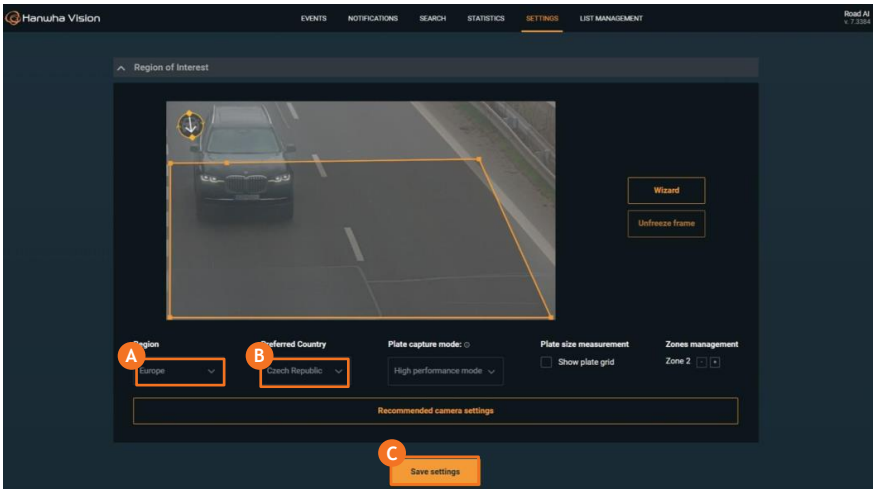



To run the Wisenet Road AI app, select the **Open platform** menu and click the A **Go App** button in the **Application name** field.

## 3. 2 Configuring Initial Camera Settings (continued)

### [Go to App] (Continued)

**Go to Wisenet Road AI application tab and select “Settings” from the pull down menu.**




A First, choose the **Region**.

Choose the correct region that matches your country/region (Europe is set by default).

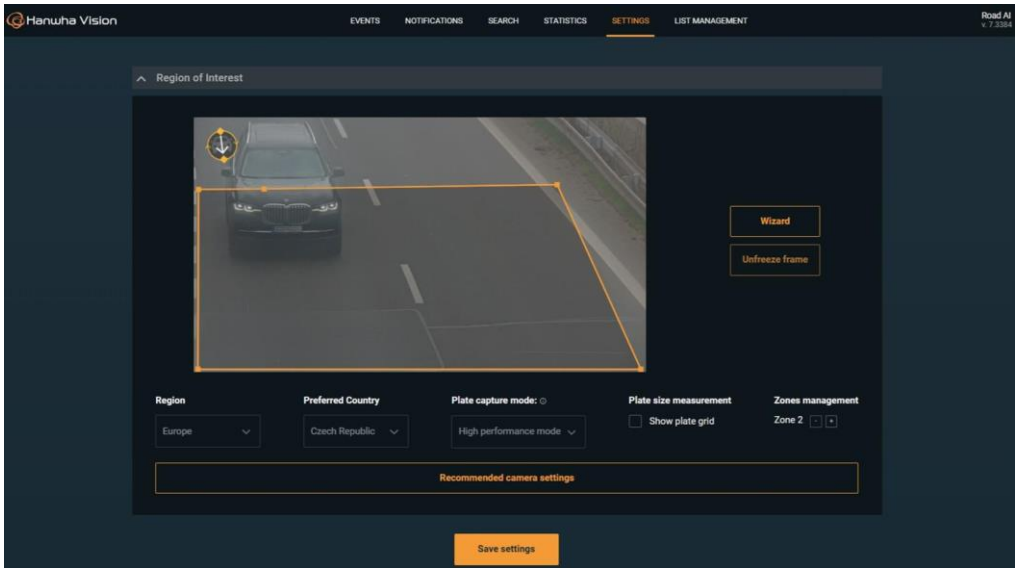
For Europe/US region specify B the **Preferred country/state** to improve the ANPR accuracy.

Save the settings. Click C **Save settings**. The application will restart for the selected region to take effect. After clicking Reload, wait for several seconds and reload the browser page.

## 3. 2 Configuring Initial Camera Settings (continued)

### [Go to App] (Continued)

**Go to Wisenet Road AI application tab and select “Settings” from the pull down menu.**




Set up the **Region of Interest** (ROI), a 5-point region that frames the recognition zone.

When setting the ROI, follow the principles below:
1) To ensure the vehicle is fully visible during detection and achieve the best MMCR results, leave ample space between the Region of Interest (ROI) and the side where the vehicle enters the camera's field of view.

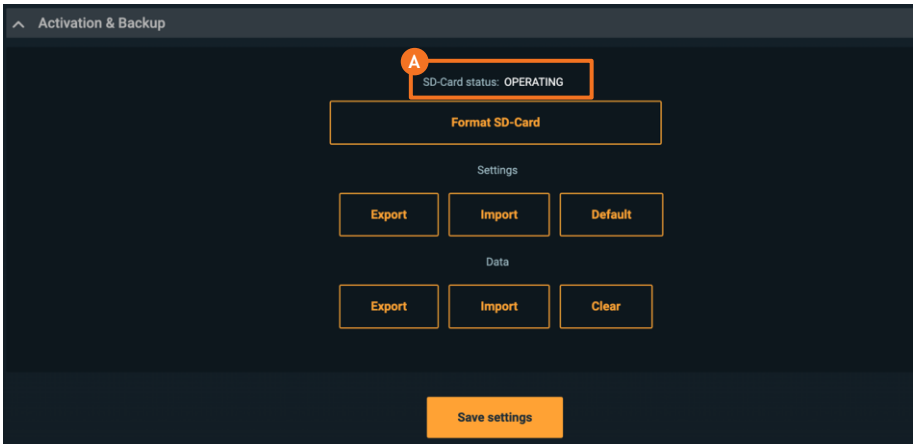
2) To ensure no vehicles are missed, keep the Region of Interest (ROI) slightly wider than the vehicle's path. This helps guarantee the vehicle fully enters the ROI at some point.

3) To maximize ANPR and MMR performance, set the ROI to cover the longest possible vehicle travel, factoring in point 1.

## 3. 2 Configuring Initial Camera Settings (continued)

### [microSD card]

**Your camera is supplied with micro SD card.**




**SD-card** is managed by the Wisenet Road AI application and no user interaction needed.

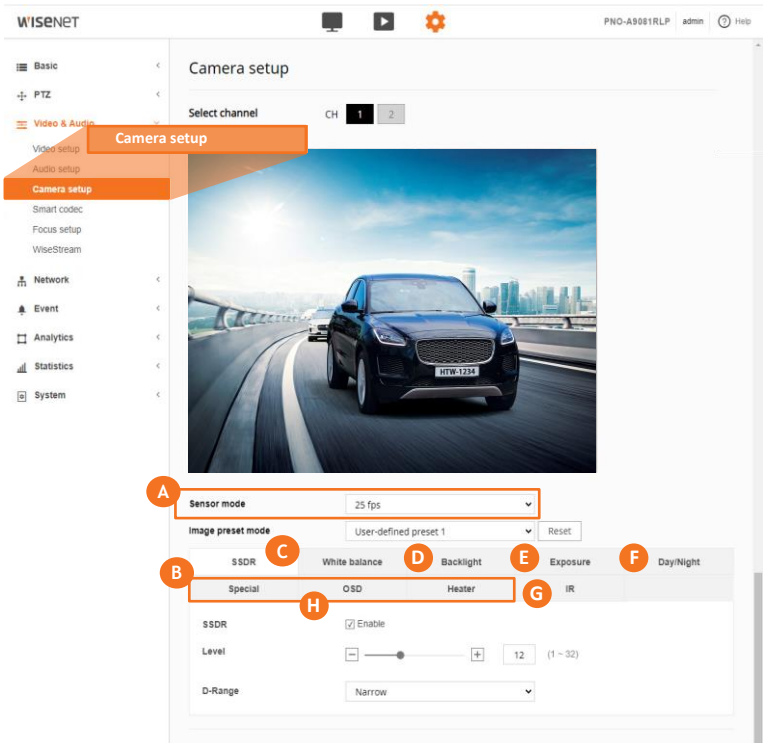
Please check A SD-Card status in **Activation & Backup** section of the Wisenet Road AI app.

Change the micro SD card if you see Error status.

## 3. 2 Configuring Initial Camera Settings (continued)

### [Exposure adjustments]

**Use the recommended settings from the Wisenet Road AI application in most cases. But if you need to manually adjust here are the most common settings that affect the LPR performance.**

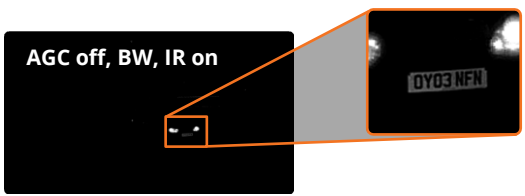



- **A** Sensor: 25-30 fps
- **B** SSDR: Off
- **C** White balance: ATW
- **D** Back light: Off
  (try other backlight options only if camera gets blinded by headlights in the night)
- **E** Exposure:
  - minimum shutter speed : 1/700
  - maximum shutter speed : 1/12000
  - preferred shutter speed : 1/1000
  - Anti flicker : Off
  - SSNR: Off
  - AGC: Low
- **F** Day/Night:
  - Mode: Auto
- **G** IR: mode Auto
- **H** Other settings: default

## 3. 2 Configuring Initial Camera Settings (continued)

**[Exposure adjustments-Automatic Gain Control]**






Automatic Gain Control can improve overall scene visibility notably. However, even at low setting AGC produces noise that can ruin license plate images, also lighter areas tend to bleach out. See illustrations to the left.

Start with turning AGC off. See the illustration to the left. Set AGC to low to improve plates visibility unless only other methods are helpful.

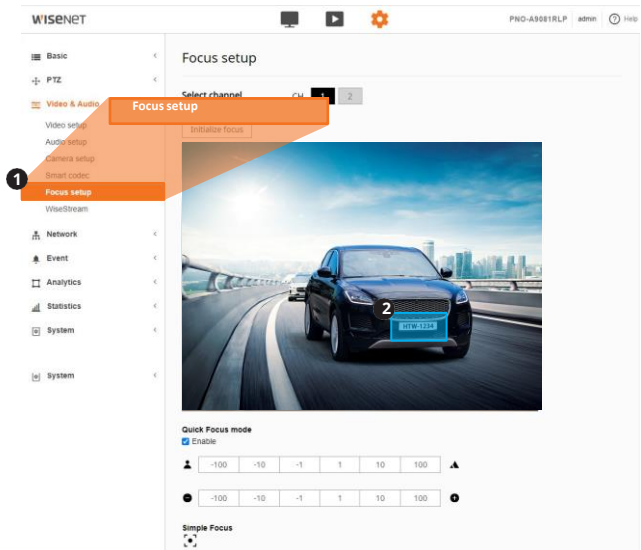
Adjust zoom so that real plate pixel width is at least 130px. Consider adjusting recognition zone to be closer to the center of the frame to avoid the IR vignette effect.

**NOTE:** Do not use WDR as it decreases the shutter speed and may lead to the blur of the vehicles on footage.

## 3.3 Focus

A unique feature of this camera allows you to select the plate area and hit a button to perform a “Simple Focus” on this plate area.

1. From the Video & Audio menu, select **Focus setup**.
2. Click and drag to draw an area of focus where the license plate is displayed.
3. Click the **Simple Focus** button to initiate a focus operation on the user-specified area.




**NOTE**:

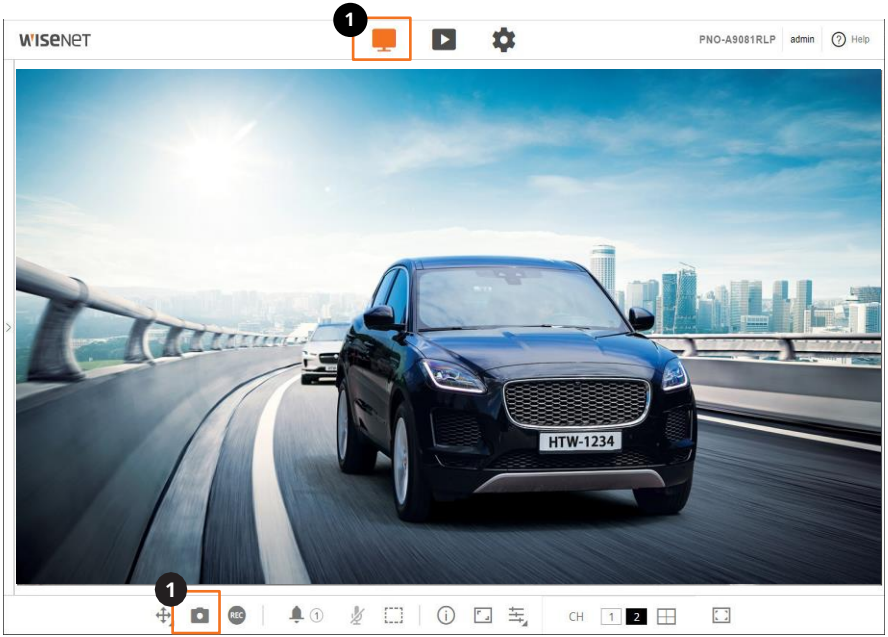
*The focus setting of the PNB-A9001LP is based on the lens type. Manual focus is activated when using a manual varifocal lens.*

*The area indicated is not stored. If you need to perform a new Simple Focus, please draw a new area on-screen.*

*Set the focus to have plates in the proper pixel size (see p.4).*

## 3. 4 Pixel width of License/Number plate

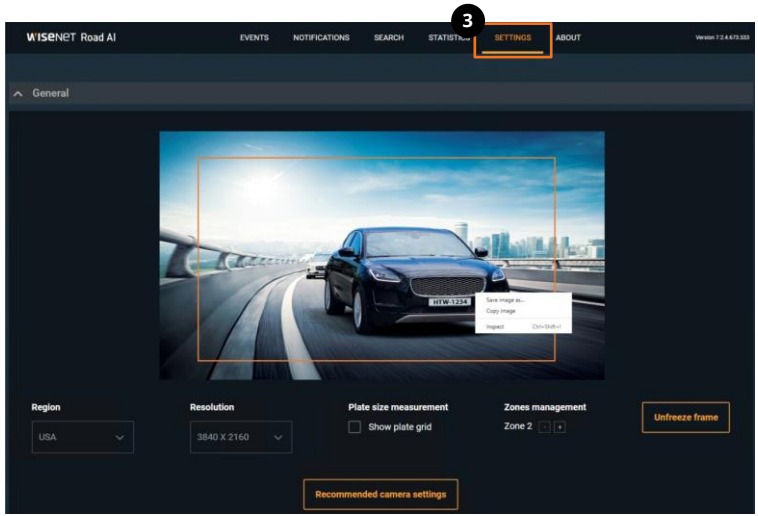
1 Spread or move license/number plate (vehicles) across the scene and take snapshots using web viewer capturing feature (**Live ; Capture**);



## 3. 4 Pixel width of License/Number plate (Continued)

2 Use **Plate Grid** tool in the **Settings** tab of Wisenet Road AI and **Freeze Frame** feature to check whether plate fits the allowed range.

3 You can add an image from the Wisenet Road AI **; Settings ;** Freeze frame to show the actual settings.



## 3. 5 Observing **PROPER** Installation

**SCENE REQUIREMENTS:**


License/number plate is more than 80px in width


License/number plate is readable


Vertical angle is less than 30°


Tilt angle is less than 15°


Horizontal angle is less than 30° for highway installations

**Fig. 1**
**Daytime**

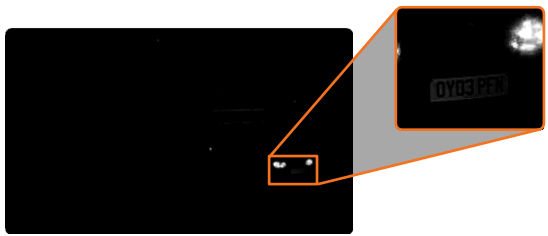

- good proportion to the frame width
- well illuminated
- sufficient contrast
- acceptable tilt angle

**Fig. 2**
**Night time**

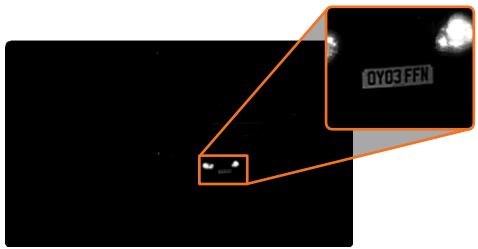

- good proportion to the frame width
- perfect IR power
- sufficient contrast
- acceptable tilt angle

## 3. 5 Observing **PROPER** Installation (continued)

**POSSIBLE IR RESTRICTIONS:**




**The license/number plate is quite close to the frame boundary. You may notice a vignette effect.**




**The license/number plate is closer to the centre of the frame. The plate is illuminated much better.**

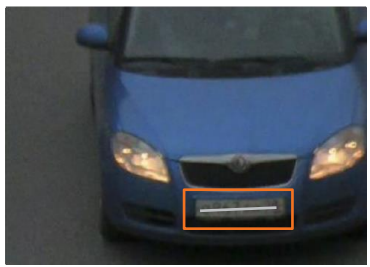
Note : *Pay special attention to IR vignette effect (see illustration on the left) when setting up recognition zone.*
*The closer to the center the more even illumination is.*
*Also, in this particular case the real pixel width of the license/number plate is critically small.*

## 3. 6 Examples of IMPROPER Installation

Too small (less than 80px wide)

### Focus and Shutter faults

Depth of field is insufficient to cover foreground license plates. Adjust the lens settings.



Improper focus settings. Adjust the lens.

Blurry image due to long exposure. Fix the shutter speed to obtain sharper picture.

## 3. 6 Examples of IMPROPER Installation (continued)

### Exposure faults

Too much light. Either adjust the iris or shutter speed. Night time: dim the IR or set AGC to Low.

Insufficient light. Adjust exposure settings or provide additional lighting.

For more information visit us at

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