XNO-6120 R/FNP
Roadway ANPR Camera
OoB with FF ANPR application v.5.1.17

Installation Guide

Contents

SNO-6120 RH / **FNP**
Overview

Camera specifications

Max. 2 megapixel (1920 x 1080) resolution
0.03Lux@F1.6 1/30 sec (Colour)
0Lux (B/W: IR LED on)
5.2 ~ 62.4mm (Optical 12x) varifocal lens
2 SD card slots
32Gb SD card pre-installed
IR LED Viewable Length:
1) 20m / 66ft (**Licence plate recognition**)
2) 70m / 230ft (Normal use)
Operating Temperature -40°C ~ +55°C / -40°F ~ +131°F
Operating Humidity less than 90% RH

ANPR Application

Application comes pre-installed **out-of-box**
Solution Partner: FF Group
Recommended use: roadway ANPR
Requires SD card to store events and snapshots

For more details please visit
https://www.hanwha-security.eu/business-security-products/xno-6120rfnp/

WISENET

Traffic speed limit, up to km/h / mph
160 / 100 on a single lane
80 / 50 on two lanes

Click to jump to contents

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Camera Mounting
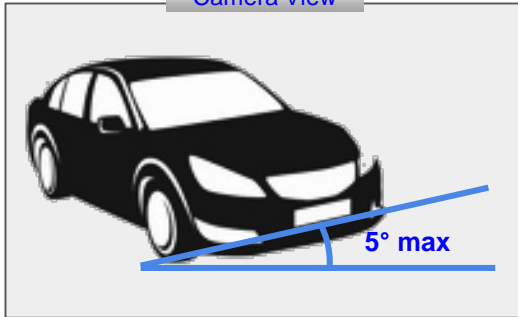
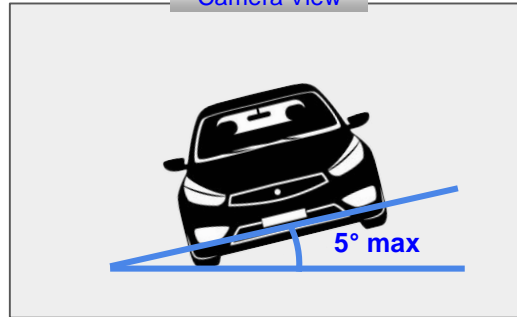First steps to obtain best results

Camera Mounting
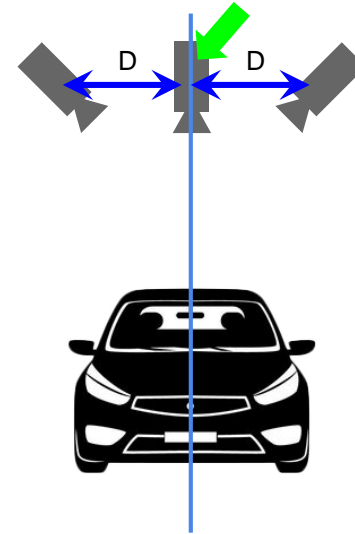## Perfect Installation Scenario - Camera tilt

Camera View

Camera View

5° max

5° max

Camera Mounting
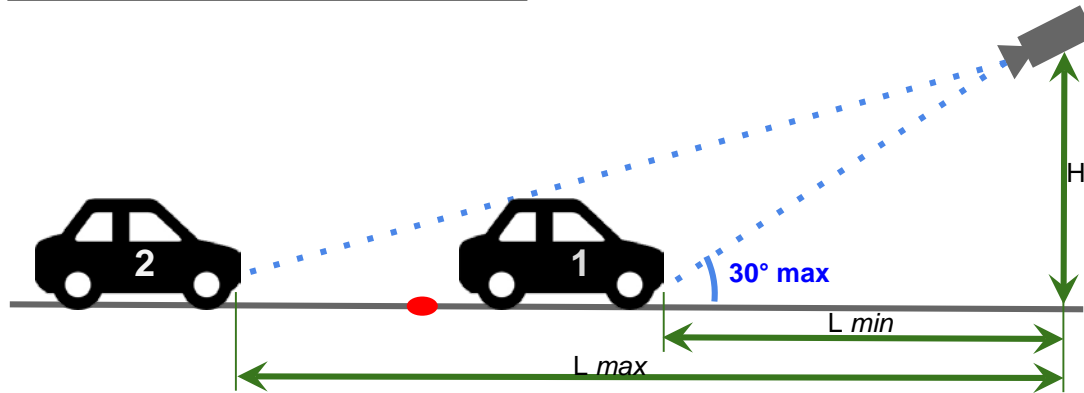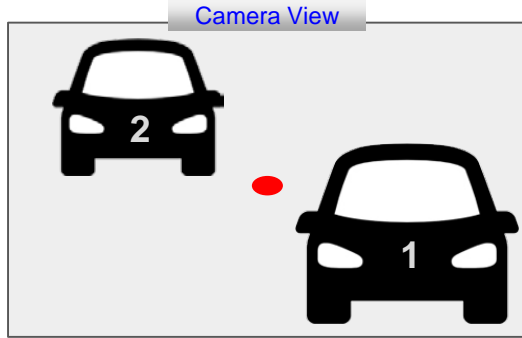## Perfect Installation Scenario - Camera placement

	D max
meters	1.5
feet	5

Camera Mounting
Perfect Installation Scenario - Recommended distances

H	L *min*		H	L *min*
meters			feet	
3.0	5.1		10	17.3
3.5	6.0		12	20.7
4.0	6.9		14	24.2
4.5	7.7		16	27.7
5.0	8.6		18	31.1
5.5	9.5		20	34.6
6.0	10.3		22	38.1

L *max* depends on lens zoom, however **should not exceed 20m / 66ft** considering effective **IR range**
Please consider using **external IR** for ranges longer than 20m / 66ft
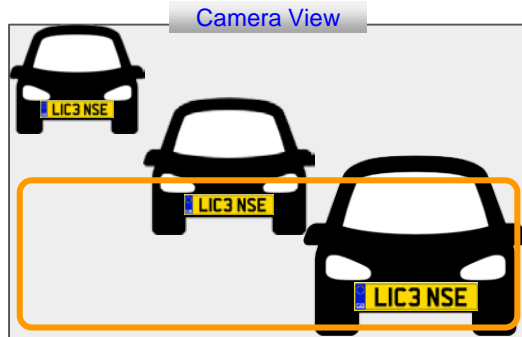
Camera Mounting
Perfect Installation Scenario - Plate number dimensions

If single row licence plate takes from **1/10 to 1/5** of FullHD (1920x1080) frame width then it fits ANPR requirements.

Normally, setting recognition zone (see yellow frame below) in lower half of camera view is sufficient and favours app performance.

Camera View

Best results are achieved when single row number plate width is between **150** (better) and **400** pixels (acceptable). Greater width may affect performance.

To measure pixel width of plate numbers:
1) spread or move plate numbers (cars) across the scene (see illustration on the left below) and take snapshots using iPolis web viewer capturing feature (**Live** -> **Capture**);
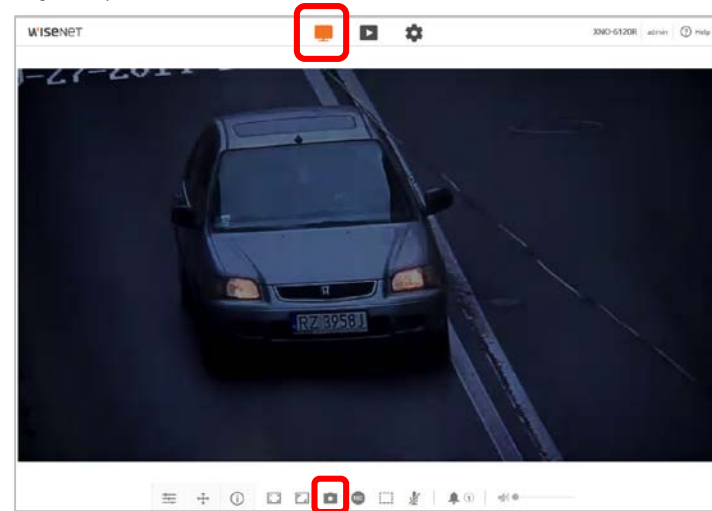
2) use any free image processing or viewing software to measure plate number width and tilt angles.
NB! WN3 iPolis is supported by specific browsers.
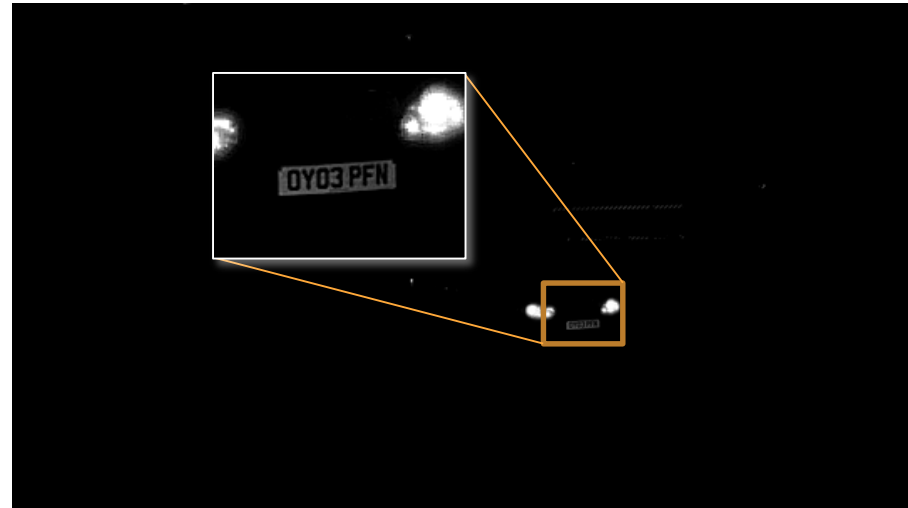Please, refer to notes on that in Camera Settings section below.

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Camera Mounting
Proper installation – possible IR restrictions

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

The license plate is closer to the centre of the frame. The plate is lit better.

Pay special attention to IR vignette effect (see illustration on the left) when setting up recognition zone. The closer to the centre the more even lighting is.
Also in this particular case real pixel width of the number plate is ~70px.
The Automatic Gain Control effect will be illustrated in camera exposure settings section.

Camera Mounting
Other installation scenarios - Advanced guidelines

For installation under conditions that do not fit constraints above, please refer to the comprehensive manual:

https://goo.gl/1KrM9W – download

https://goo.gl/p1uVa1 – view
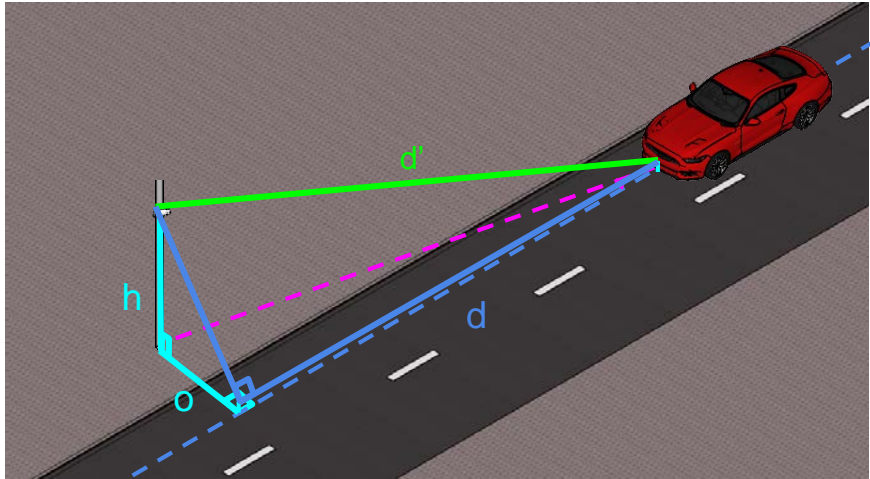
Consider referring to WiseNet toolbox to check XNO-6120R field of view

https://www.hanwha-security.com/wisenettoolbox/index.html#!/en/home

Camera Mounting
Proper installation - Best practices

Daytime

Night time
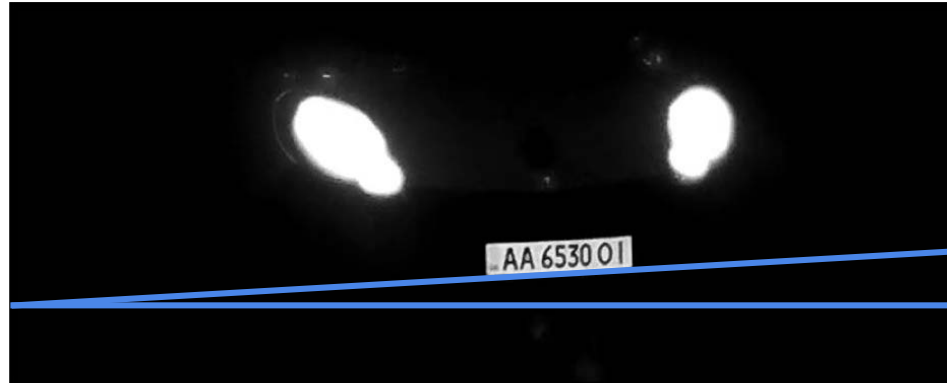

NP/LP:

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

NP/LP:

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

Camera Mounting
Installation don'ts - Worst practices

NP/LP:
- too small (less than 130px width)
- tilt angle exceeds 5°

Camera aspect view:
- too steep, much above 30°

Installation Summary

Scene requirements :

License plate is more than 130 px in width

License plate is readable

Vertical angle is less than 30°

Horizontal angle is less than 30°

Tilt angle is less than 5°

Camera Settings

Tuning camera to work
even under nasty weather conditions

Camera Settings
Important note on web browsers

WisenetX cameras could be reached through Non-Plugin Web Viewer via:
- Google Chrome 56
- MS Edge 39
- Mozilla Firefox 49 (Win 64bit only)
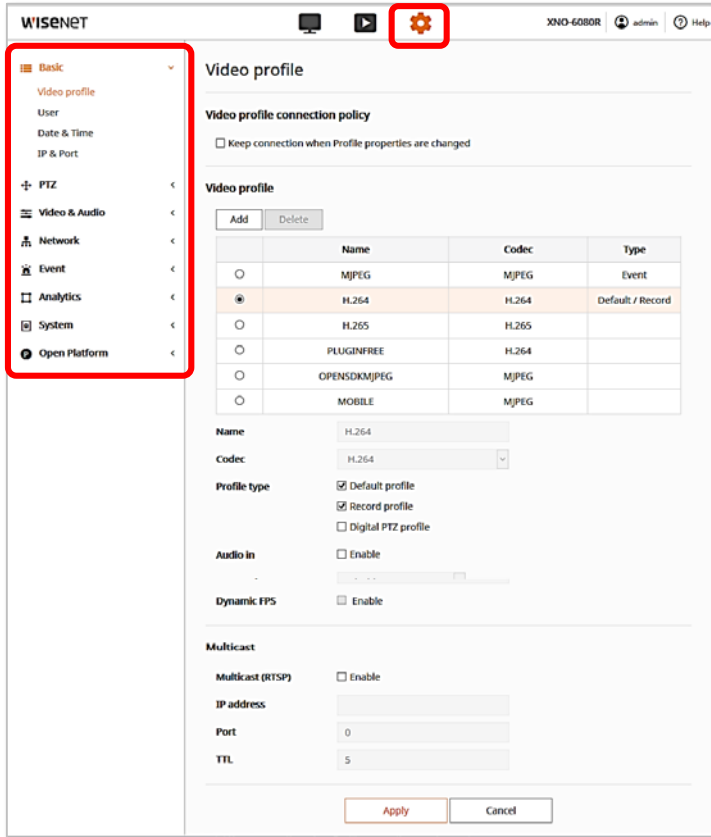- Apple Safari 10 (Mac OS X only)

Or Plug-in Web Viewer via:
- Internet Explorer 11
- Apple Safari 10 (Mac OS X only)

The above is based on X-series datasheet.

NB! IE requires extra efforts to enable plug-in and doesn't support legacy styling required by ANPR application!

Camera Settings
Overview

For proper operations, please, check and set properly:
- Camera Date Time
- IP settings
- SD card storage
- Camera exposure and focus

Some features like **SSDR, WDR, DIS, Defog, AGC and anti-flickering** are good for human eye but affect computer vision performance and therefore setting these to the least possible effect or turning off strongly advised.

Note on IR: SNO-6095 IR is controlled by an external sensor and cannot be managed via iPolis.

Note on native events: native events affect overall performance and also consume SD card storage when employed.

Camera Settings
Date and Time

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

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

Camera Settings
IP, DNS, ports

Proper IP, DNS and ports setting are important for:
- NVR and other integrations
- outside LAN access if required

NB! Reboot the camera whenever IP address gets changed.

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Camera Settings
SD Card

Check SD card is present physically.

Enable it and **format** if required.
Check **SD status** is **Recording**.

If SD card is not present or its status is Off then:
- no ANPR snapshots stored
- no advanced integration available

Should native events (motion detection, scheduled recording etc) be employed consider
1) installing 2 SD cards
2) using **class 10 64-128 Gb** SD cards
3) setting **Overwrite** and **Auto delete** features

Camera Settings
Video setup

Check video settings.

Camera Settings
Exposure adjustments

Sensor: 25 fps
SSDR: Off
White balance: ATW
Back light: Off (try other settings only if camera gets blinded by headlights in the night)
Exposure:
- Minimum shutter: 1/700
- Maximum shutter: as much as possible
- Anti flicker: Off
- SSNR (noise reduction): default
- Lens: as appropriate (set to DC whenever available)
- P-Iris: set to maximum
- AGC (gain control): Off

Day/Night:
- Mode: B/W
- Simple focus after D/N: Off

IR: manual, level 100
Other settings: default

Camera Settings
Exposure adjustments – Automatic Gain Control

AGC low, BW, IR on

OY03 PFN

AGC off, BW, IR on

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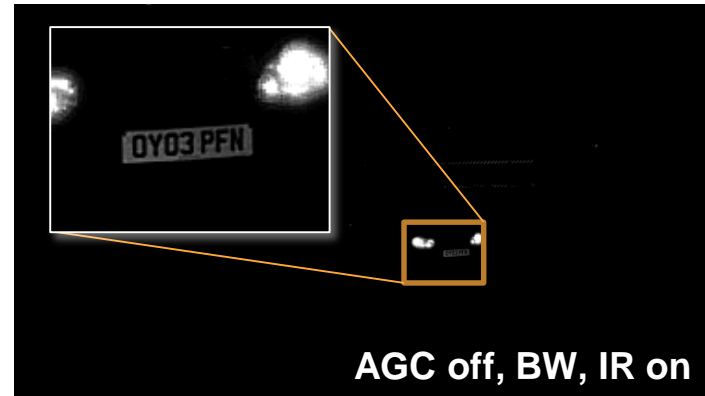
Automatic Gain Control can improve overall scene visibility notably. However, even at low setting AGC produces noise that can ruin license plate images, also lighter areas tend to bleach out. See illustrations to the left.

Start with turning AGC off and setting IR power as much as possible (while controlling possible bleach out at closer ranges). See the illustration above. Set AGC to low or high 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 so it is closer to the centre of the frame to avoid IR vignette effect.

Camera Settings
Focus setup

Adjust focus so number plates are sharp within intended recognition area.

Please, note that screen resolution pictures seem sharper than they actually are.
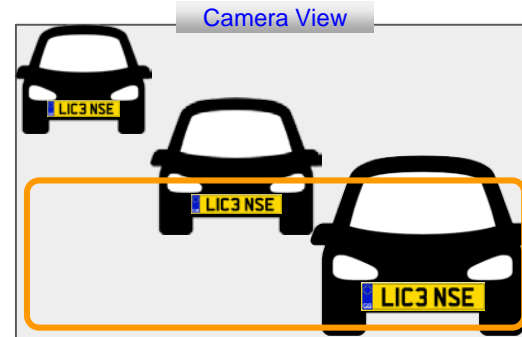
Camera Settings
Focus and Shutter faults

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.

Camera Settings
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.

ANPR Application

Installation & setup
Event collection & search through results
List management & reactions
Integrations (NVR, JSON, WebAPI)

Application Installation
Upload

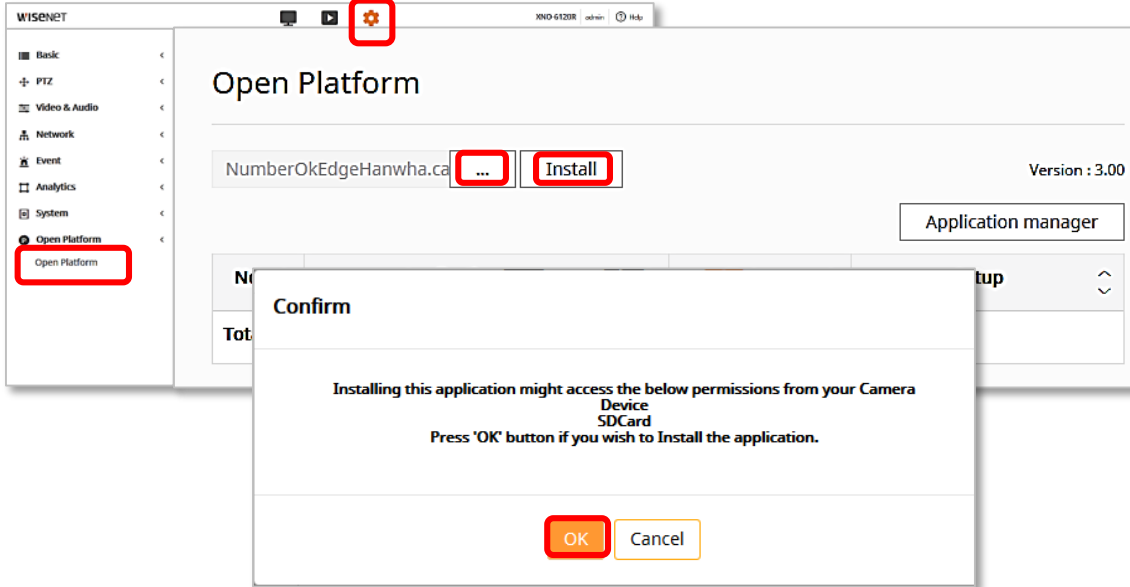The product is supplied out-of-box with FF ANPR application pre-installed and activated. The instructions below are provided to create awareness of installation and activation process.

Provided you've got an installation file.
Make sure application being stopped and uninstalled and SD card being formatted prior to upgrading/replacing the application.

Check that filename **doesn't contain any spaces and other non-alphanumeric characters** (like red ones in an example below); single full stop is allowed.
`NumberOkEdgeHanwha_(1).cap`

In Web-viewer:
1. go to **Setup** > **Open Platform** > **Open Platform**
2. click **[…]** button and **upload** installation file
3. click **Install**
4. **Confirm** SD card permissions

Application Installation
Launch

1. set Priority to **High**
2. check **Auto start**
3. **Apply** changes
4. **Start** application
5. Status will change to **Started but not running**
6. Wait for 5 seconds and refresh the page
7. Click **Go App**
8. Allow Pop-up windows if browser alerts so

To relaunch the application just click **Stop** and then **Start** again.

Application Installation
Activation
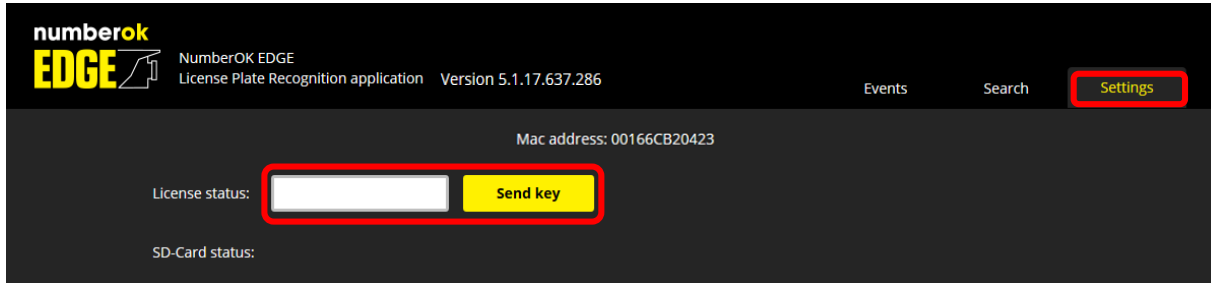
Provided you've got an activation key from **Hanwha support**:
1. go to **Settings**
2. paste the key in **License status** input field
3. **Send key**

Go to Web Viewer:
Setup > **Open Platform** > **Open Platform**
Stop application, wait for 10 seconds, then **Start** application.
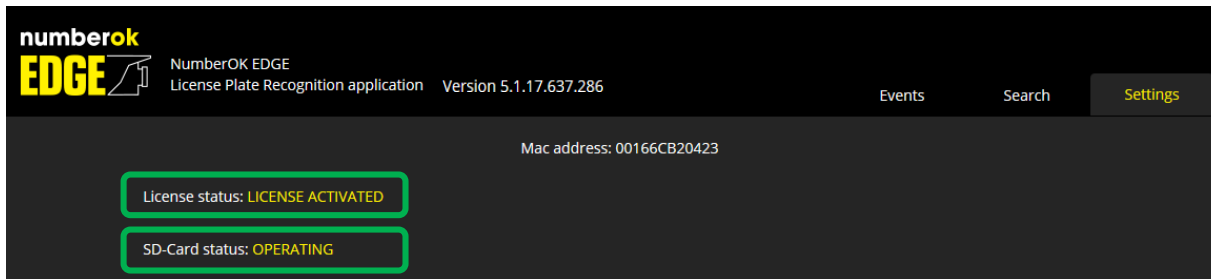
Go back to Application settings
1. if the key is correct License status will say **Activated** and key input field will disappear
2. check that SD card status is **Operating**

Direct app URL (WiseNet5)
http://x.x.x.x/home/setup/opensdk/html/NumberOkEdgeHanwha/index.html?AppName=NumberOkEdgeHanwha

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Application Setup
ANPR Settings - Recognition Area and Plate width

Adjust recognition zone.

Click and drag to reposition.

Click inside recognition zone frame to activate resize controls. Drag frame midpoints to resize.

Avoid OSD text and obstacles.

For better ANPR results ensure that plates enter and exit the zone through upper and lower borders of the frame.

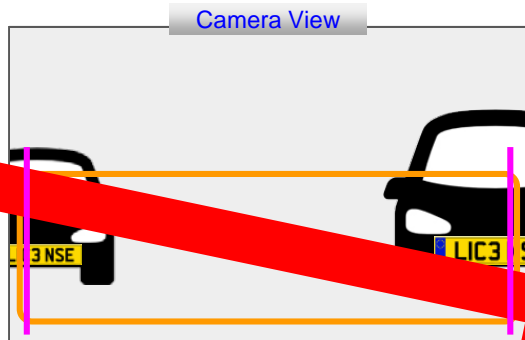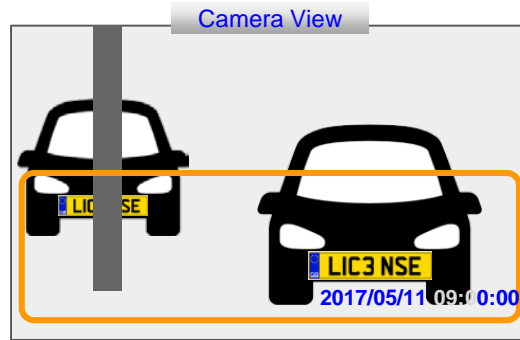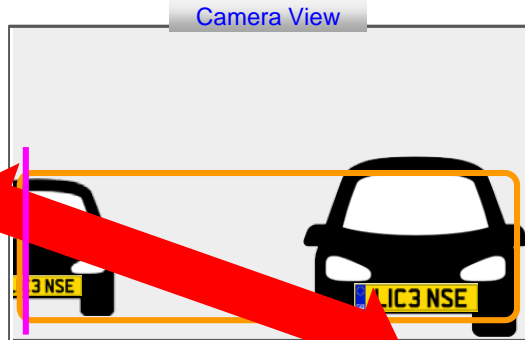Adjust **Min plate width** as appropriate.

Click **Save setting**

Application Setup
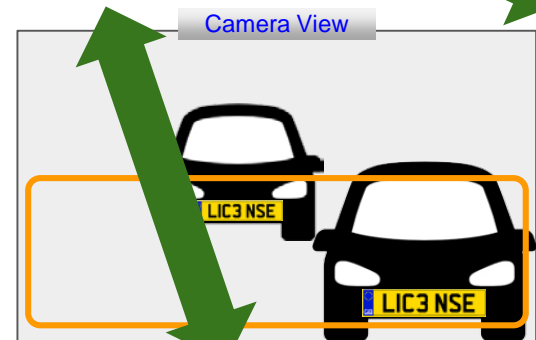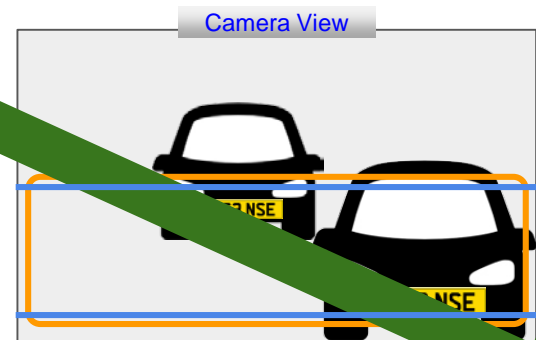## Recognition zone - Motion paths

ANPR unfriendly motion paths
(partial plate number recognition may occur)

ANPR friendly motion paths

Also avoid having within the recognition area:
- any obstacles that can appear between plate numbers and camera;
- OSD.

Application
Test operations
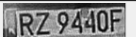
numberok
EDGE
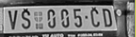NumberOK EDGE
License Plate Recognition application   Version 5.1.17.637.286
Version 5.1.17.637.286
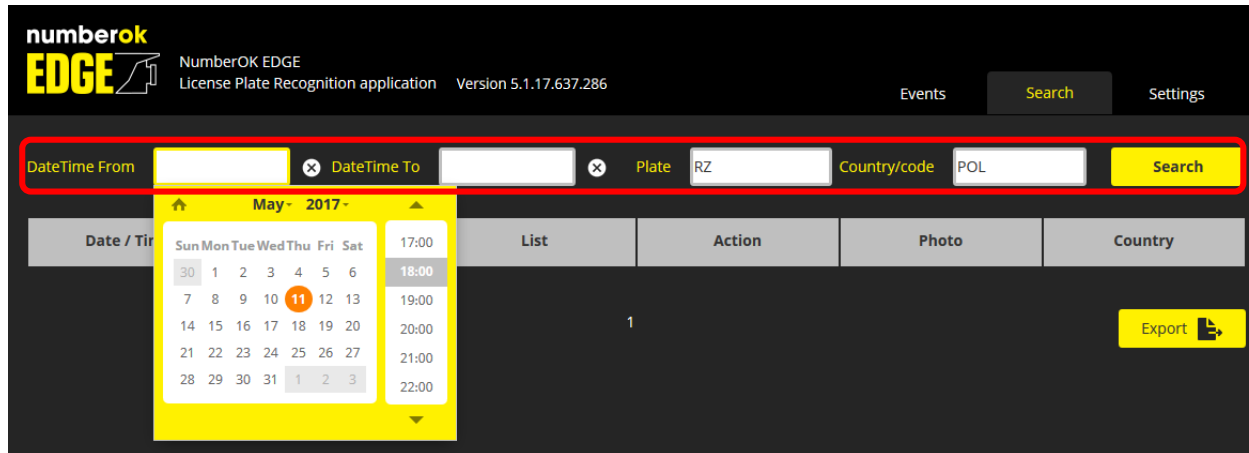
Events   Search   Settings

This mode is provided for setup purposes only.
It is not intended for continuous monitoring as video process affects camera and application performance a lot.

Date / Time	Plate	List	Action	Photo	Country
05/07/2017 15:14:19	VSnn5CDl	Not in list	Saved to SD Sent to NVR	VS 005 CD	No Country
05/07/2017 15:14:16	VS005CD	Not in list	Saved to SD Sent to NVR	VS 005 CD	SRB
05/07/2017 15:00:38	EK86	Not in list	Saved to SD Sent to NVR	RZE 2K86	DEU
05/07/2017 15:00:33	RZELW90	Not in list	Saved to SD Sent to NVR	RZE LW90	POL
05/07/2017 15:00:31	RPZY325	Not in list	Saved to SD Sent to NVR	RPZ Y325	POL
05/07/2017 15:00:15	RZ3958J	Not in list	Saved to SD Sent to NVR	RZ 3958 J	POL
05/07/2017 15:00:02	RZ24791	Not in list	Saved to SD Sent to NVR	RZ 24791	POL
05/07/2017 14:59:58	RZE2CV9	Not in list	Saved to SD Sent to NVR	RZE 2CV9	POL
05/07/2017 14:59:55	RZ9440F	Not in list	Saved to SD Sent to NVR	RZ 9440F	POL
05/07/2017 14:59:54	3R9440F	Not in list	Saved to SD Sent to NVR	RZ 9440F	No Country

1

Events watch

Click camera/plus icons to reveal video stream.

Please, avoid permanent monitoring as video streaming affects overall system performance. Hiding video just saves some space on the screen but it doesn't stop video stream consumption. Prolonged monitoring affects the camera performance even more if accessed from multiple browsers simultaneously.

Application
Test operations

Events watch

Cross-check licence plates appearance with recognition results.

Adjust camera settings (exposure, zoom, focus, tilt) or ANPR application settings (recognition zone, plate width) as appropriate.

Application
Features overview - Search

Click Search to get all registered ANPR events.

Use filters to narrow search down:
- DateTime from/to
- Plate: every plate number that contains given sequence will be found
- Country code:
- Use country code as per ISO 3166-1 alpha-3

Application
Features overview - Search

Search results can be exported.

Notes on images associated with events:

1) images can be retrieved via physical access to SD card;
2) Web API provides for stored images file names;
3) each image filename contains date and time, plate number text, so it can be associated with a particular event;
4) precede retrieved file name with camera IP address and add *.bmp* extension to get fully qualified image URL. Please, refer to WebAPI Spec and Guide for further details.

Application
Features overview - Exported results (csv)

TS	LPR	COUNTRY	LIST	ACTION
2017-05-16 12:31:34 UTC	AI0719AT	UKR	Not in list	
2017-05-16 12:30:33 UTC	AA92130	RUS	Not in list	
2017-05-16 12:30:25 UTC	AI0719AT	UKR	Not in list	
2017-05-16 12:29:32 UTC	AA9606BT	UKR	Not in list	
2017-05-16 12:29:26 UTC	AA4878IK	UKR	Not in list	
2017-05-16 12:28:55 UTC	BC3218BO	UKR	Not in list	
2017-05-16 12:28:21 UTC	AA7381HK	UKR	Not in list	
2017-05-16 12:28:01 UTC	BA9587AC	UKR	Not in list	
2017-05-16 12:27:35 UTC	AA0980OA	UKR	Not in list	
2017-05-16 12:26:41 UTC	D037012	PRT	Not in list	

Note that TS (timestamp) is specified as UTC (Coordinated Universal Time).

Simplified, UTC is equivalent to GMT (Greenwich Mean Time)
and
never observes DST (Daylight Saving Time)

Application
Features overview - Reactions, Black and White lists

Set up 1 or 2 reactions upon
- any ANPR event or
- black or white listed plate number detection

Available reactions are:
- Save to SD card
- Send to NVR
- Open barrier

Populate Black and White lists **one by one** or **import** in bulk. Each list capacity is limited to 2000 entries.

Source file is plain text file, one line per plate number; must contain empty line in the end.

Save settings every time.

Application
Integrations - NVR side

Check the NVR settings to obtain corresponding Port number in
Device > **Text** > **Device setting**
(by default port 7001 for CH 1, 7002 for CH 2, etc.)

Set **Use** for desired channel

Click the channel row to open channel settings.

Set
- **Encoding type** : **US-ASCII**
- **Start** string : **<LPR>**
- **End** string : **</LPR>**

NB! NVR may not show LPR events if there is no video stream bound to the same channel!

Application
Integrations - NVR settings in Application

Set NVR **IP/port**.

Assign **Send to NVR** reaction for either ANPR event.

Save settings.

Restart Application via Web Viewer whenever NVR settings being changed:
Setup > **Open Platform** > **Open Platform Stop**
Wait for 10 seconds
Start

Incorrect NVR settings or bad connectivity may affect overall performance and result in timeouts.

Application
Integrations – JSON structure

JSON field	Value type	Content value description
sensorProviderID	string	Device ID ("Camera ID Provider" from Settings)
geotag	dictionary	Coordinates from camera Cloud connection settings `{"lat": float, "lon": float }`
datetime	string	Plate recognition time, format "YYYYMMDD HHMMSS000"
timeProcessing	string (integer)	Frame processing time, ms
plateText	string	Plate number, alpha-numeric escaped Unicode ("\u0000")
plateCountry	string	ISO 3166-1 alpha-3 country code
imageType	string enum	Plate image type: "plate" for cropped image. Image itself is sent as a part of multi-part POST request. (Full frames sending will follow in future release)

JSON field	Value type	Content value description
plateImageType	string	Image file type (png)
plateCoordinates	[integer…]	Plate coordinates on the full frame [upper left y, upper left x, height, width]
plateImageSize	string (integer)	Reserved for future use
plateConfidence	string(float)	Reserved for future use
packetCounter	string (integer)	Reserved for future use
carState	string	Reserved for future use
carMoveDirection	string	Reserved for future use
carID	string (integer)	Reserved for future use
GEOtarget	string	Reserved for future use

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Application
Integrations – JSON

Multipart HTTP POST payload contains JSON data and associated image.

```
{
    "packetCounter"     : "0",
    "datetime"          : "20170707 072158000",
    "plateText"         : "\u0031\u0039\u005a\u0046\u005a\u004c",
    "plateCountry"      : "NLD",
    "plateConfidence"   : "0.855269",
    "carState"          : "new",
    "geotag"            : {"lat": 50.418114,"lon": 30.476213},
    "imageType"         : "plate",
    "plateImageType"    : "png",
    "plateImageSize"    : "0",
    "carMoveDirection"  : "in",
    "timeProcessing"    : "567",
    "plateCoordinates"  : [0, 1271, 44, 236],
    "carID"             : "1",
    "GEOtarget"         : "",
    "sensorProviderID"  : "SAMSUNG00-00166CFB7C20"
}
```

Application
Integrations - JSON

This integration is intended for integration with FF Limbio cloud solution.

However any system that is able to receive data via HTTP POST and parse JSON can benefit from this method.

Tick **FF-cloud settings** check-box.

Assign **Geo Latitude** and **Geo Longitude**; these values will be sent along with each ANPR event.
While values above are optional these will help visualize results on a map correctly when required.
Put data receiver URL to **Cloud URL**.
Assign **Camera ID Provider**; this value will be sent along with ANPR event data and used to identify camera at FF Limbio cloud. Please, make it unique e.g. by adding MAC address.

Application
Integrations - Web API

Web-API allows to:
- search and retrieve events
- populate lists
- remove particular plate numbers

Command	Description
SEARCH	Search by criteria
EXPORT	Export last search data
IMPORT	Import 1 to 2000 Number Plates (comma-separated text strings) to a particular (Black or White) list
ADD	Add 1 NP (text string) to a particular (Black or White) list
REMOVE	Remove particular NP (text string) from a particular (Black or White) list

Please, refer to Web API Specifications and Guide (https://goo.gl/3QZM9c)
for further details.

What's Next

ANPR App features
WiseNet X
New Products

What's Next
Features; WiseNet X; New products

ANPR App features	**WiseNet X**	**Other**
UI translation	XNB-6000 General purpose ANPR	High performance ANPR platform
HTTPS	XNB-8000 Multi lane ANPR	Business & Traffic Analytics platform
Direction detection		Scalability

Technical Support

Useful Resources
HTE Support

Useful Links

Product page	https://www.hanwha-security.eu/business-security-products/xno-6120rfnp/
XNO-6120 Installation Guide *(this document)*	ppsx: https://goo.gl/q3Fxey pdf: https://goo.gl/XRZd3D
Installation Checklist	pdf: https://goo.gl/v29ZTW
ANPR Application quick access link template	http://<IP>/home/setup/opensdk/html/NumberOkEdgeHanwha/index.html?AppName=NumberOkEdgeHanwha
Tech support contacts	https://www.hanwha-security.eu/support/support-faqs/
Online tools	https://www.hanwha-security.eu/online-tools/
More resources	https://www.hanwha-security.eu/support/

Thank you!

Your feedback and use experience
are most valuable!

Please, share with us!