Novus Cameras for the use with NMS ANPR system

Examples of camera settings presented below are examples of settings enabling possibility to recognition of license plate numbers under specific test conditions. Precise camera parameter settings should be set depending on the conditions prevailing at the given object and the requirements set. Due to the fact that parameters such as the camera installation distance from the recognised licence plates, camera installation angle in relation to recognized licence plates, lighting conditions, speed of moving vehicles, etc. are very different, the selection of one universal settings is not possible.

The following camera models are described in the document:

6000 series cameras:

NVIP-4H-6502M/F

NVIP-4H-6522M/F

NVIP-4VE-6502M/F

NVIP-4H-6532M/F

NVIP-4C-6500/F

NVIP-5H-6422M/F

NVIP-5H-6412M/F

NVIP-5VE-6402M/F

NVIP-5DN3600C-2P/F

7000 series cameras::

NVIP-4DN7000C-1P

NVIP-6DN5021H/IRH-1P

6000 series cameras

Camera features thanks to which it is possible to use them to recognize license plate numbers:

1. *Smart IR* function (applies to the cameras with IR)
2. Schedule for auto exposure settings allowing the camera to work with different settings for day mode and different for night mode (*Schedule - > Config File - > Auto; Day; Night*).
3. Option of increasing the day/night switching delay to a maximum 120 seconds. This is to prevent the camera from immediately switching to colour mode each time it is illuminated by vehicle lights (*Delay time*).
4. Possibility to define min. and max. Shutter speed (*Max./ Min.*).
5. Possibility to define max gain level (*Gain Limit*).
6. Possibility to set main stream resolution to 1920x1080

Camera models and sample settings:

1. Cameras:

NVIP-4H-6502M/F

NVIP-4H-6522M/F

NVIP-4VE-6502M/F

NVIP-4H-6532M/F

Set:
Camera: NVIP-4C-6500/F
Lens: NVL-5MP3818D/IR lub NVL-3MP660D/IR
IR LED Illuminator: NV-IR60/150LED or NV-IR60/80LED or NV-IR120/40LED
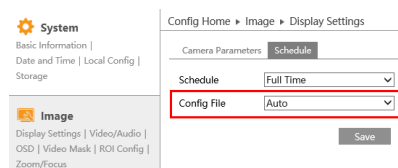Housing: NVH-160H/X

Example settings (modifications to the default settings have been listed):

Setting 1

After appearing vehicle in the observed scene camera automatically adjusts the image so that the licence plates are legible.

- Stream resolution 1920x1080, quality *High* or higher

- Auto exposure schedule set to auto

- For the day mode set *Sutter Mode - > Max*. to 1/250 or 1/500

- For the day mode *Brightness* option set to 10

Config File	Day
Brightness	10
Contrast	50
Hue	50
Saturation	50
Sharpness ☐	50
Noise Reduction ☐	30
Defog ☐	50
Lens Distortion Correction ☐	80
Auto Iris ☑	(disable without auto iris lens)
BLC	Off
HFR	Off
Antiflicker	Off
Smart IR	Off
White Balance	Auto
Frequency	50HZ
Day/Night Mode	Auto
Sensitivity	Low
Delay Time(Second)	2
Infra-red Mode	Auto
Shutter Mode	Auto
Max.	1/250
Min.	1/100000
Gain Mode	Auto
Gain Limit	50
Corridor Pattern	0
Image Mirror	○ Open ◉ Close
Image Flip	○ Open ◉ Close

Default   Revoke

- For the night mode *SMART IR* function *On* and *Level* set to *High* (applies to cameras with IR)

- For the night mode day/night switching delay set to a maximum 120 seconds. This is to prevent the camera from immediately switching to colour mode each time it is illuminated by vehicle lights (*Delay time*).

Setting 2

If the above described Setting 1 does not enable correct recognition of the license plate numbers, other settings adapted to the given scene should be selected. Examples of settings are presented below.

- Stream resolution 1920x1080, quality *High* or higher

- Auto exposure schedule set to auto

- For the day mode set *Sutter Mode - > Max.* to 1/250 or 1/500

- For the day mode *Brightness* option set to 10

Config File	Day
Brightness	10
Contrast	50
Hue	50
Saturation	50
Sharpness ☐	50
Noise Reduction ☐	30
Defog ☐	50
Lens Distortion Correction ☐	80
Auto Iris ☑	(disable without auto iris lens)
BLC	Off
HFR	Off
Antiflicker	Off
Smart IR	Off
White Balance	Auto
Frequency	50HZ
Day/Night Mode	Auto
Sensitivity	Low
Delay Time(Second)	2
Infra-red Mode	Auto
Shutter Mode	Auto
Max.	1/250
Min.	1/100000
Gain Mode	Auto
Gain Limit	50
Corridor Pattern	0
Image Mirror	○ Open ● Close
Image Flip	○ Open ● Close

Default   Revoke

- For the night mode day/night switching delay set to a maximum 120 seconds. This is to prevent the camera from immediately switching to colour mode each time it is illuminated by vehicle lights (*Delay time*).

- For the night mode set Brightness level to 2

- For the night mode set *Gain Limit* set to 1

- For the night mode set *Sutter Mode - > Max*. to 1/500

- For the night mode *SMART IR* function *Off* (applies to cameras with IR)

2. Cameras:

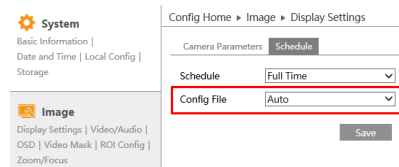NVIP-5H-6422M/F

NVIP-5H-6412M/F

NVIP-5VE-6402M/F

Example settings (modifications to the default settings have been listed):

<u>Setting 1</u>

After appearing vehicle in the observed scene camera automatically adjusts the image so that the licence plates are legible.

- Stream resolution 1920x1080, quality *High* or higher

- Auto exposure schedule set to auto

- For the night mode *SMART IR* function set to Auto

- For the night mode day/night switching delay set to a maximum 120 seconds. This is to prevent the camera from immediately switching to colour mode each time it is illuminated by vehicle lights (*Delay time*).

Setting 2

If the above described Setting 1 does not enable correct recognition of the license plate numbers, other settings adapted to the given scene should be selected. Examples of settings are presented below.

- Stream resolution 1920x1080, quality *High* or higher

- Auto exposure schedule set to auto

- For the night mode day/night switching delay set to a maximum 120 seconds. This is to prevent the camera from immediately switching to colour mode each time it is illuminated by vehicle lights (*Delay time*).

- For the night mode set *Gain Limit* set to 10.

- For the night mode set *Sutter Mode - > Max*. to 1/500.

- For the night mode *SMART IR* function *Off*.

Config File	Night

Brightness		25
Contrast		50
Hue		50
Saturation		50
Sharpness	☐	50
Noise Reduction	☐	30
Defog	☐	50
Auto Iris	☑	(disable without auto iris lens)
BLC	Off	
Antiflicker	Off	
White Balance	Auto	
Frequency	50HZ	
Day/Night Mode	Auto	
Sensitivity	Mid	
Delay Time(Second)		120
Infra-red Mode	Auto	
Smart IR	Off	
Shutter Mode	Auto	
Max.	1/500	
Min.	1/10000	
Gain Mode	Auto	
Gain Limit		10
Corridor Pattern	0	
Image Mirror	○ Open	⦿ Close
Image Flip	○ Open	⦿ Close

Default   Revoke

- For the Day mode set *Sutter Mode - > Max*. to 1/250.

Config File	Day

Brightness		25
Contrast		50
Hue		50
Saturation		50
Sharpness	☐	50
Noise Reduction	☐	30
Defog	☐	50
Auto Iris	☑	(disable without auto iris lens)
BLC	Off	
Antiflicker	Off	
White Balance	Auto	
Frequency	50HZ	
Day/Night Mode	Auto	
Sensitivity	Mid	
Delay Time(Second)		2
Infra-red Mode	Auto	
Smart IR	Off	
Shutter Mode	Auto	
Max.	1/250	
Min.	1/10000	
Gain Mode	Auto	
Gain Limit		75
Corridor Pattern	0	
Image Mirror	○ Open	⦿ Close
Image Flip	○ Open	⦿ Close

Default   Revoke

3. Set:

Camera: NVIP-5DN3600C-2P/F
Lens: NVL-5MP3818D/IR or NVL-3MP660D/IR
IR LED Illuminator: NV-IR60/150LED or NV-IR60/80LED lub NV-IR120/40LED
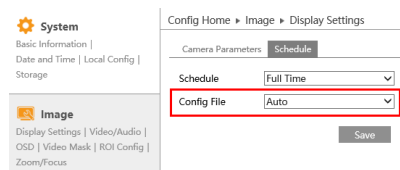Housing: NVH-160H/X

Example settings (modifications to the default settings have been listed):

<u>Setting 1</u>

- Stream resolution 1920x1080, quality *High* or higher

- Auto exposure schedule set to auto

- For the night mode day/night switching delay set to a maximum 120 seconds. This is to prevent the camera from immediately switching to colour mode each time it is illuminated by vehicle lights (*Delay time*).

- For the night mode set *Gain Limit* set to 10.

- For the night mode set *Sutter Mode - > Max*. to 1/500.
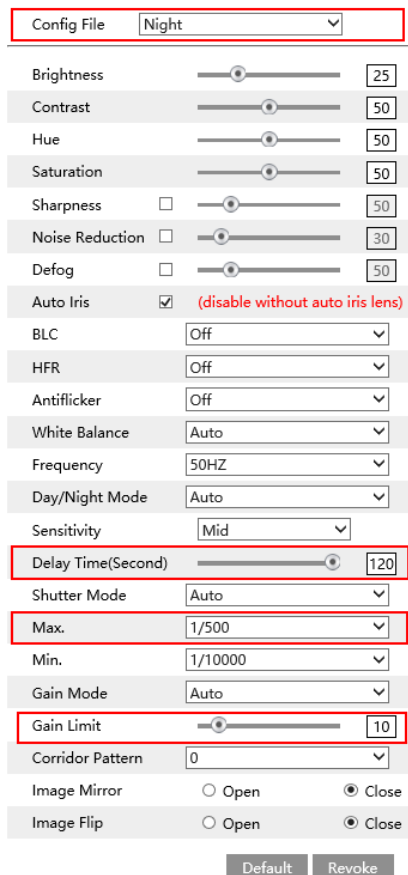
- For the Day mode set *Sutter Mode - > Max*. to 1/250.

- For the Day mode set *Gain Limit* to 5.

Config File	Day
Brightness	25
Contrast	50
Hue	50
Saturation	50
Sharpness ☐	50
Noise Reduction ☐	31
Defog ☐	50
Auto Iris ☑	(disable without auto iris lens)
BLC	Off
HFR	Off
Antiflicker	Off
White Balance	Auto
Frequency	50HZ
Day/Night Mode	Auto
Sensitivity	Mid
Delay Time(Second)	2
Shutter Mode	Auto
Max.	1/250
Min.	1/10000
Gain Mode	Auto
Gain Limit	5
Corridor Pattern	0
Image Mirror	○ Open ⦿ Close
Image Flip	○ Open ⦿ Close

Default   Revoke

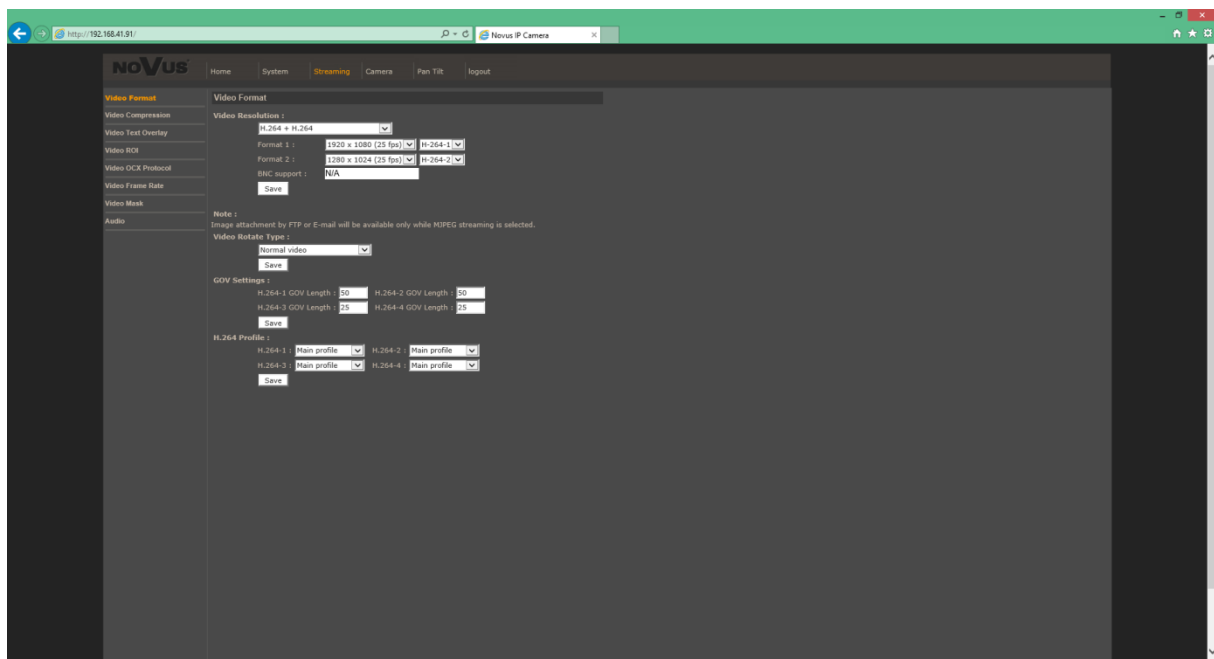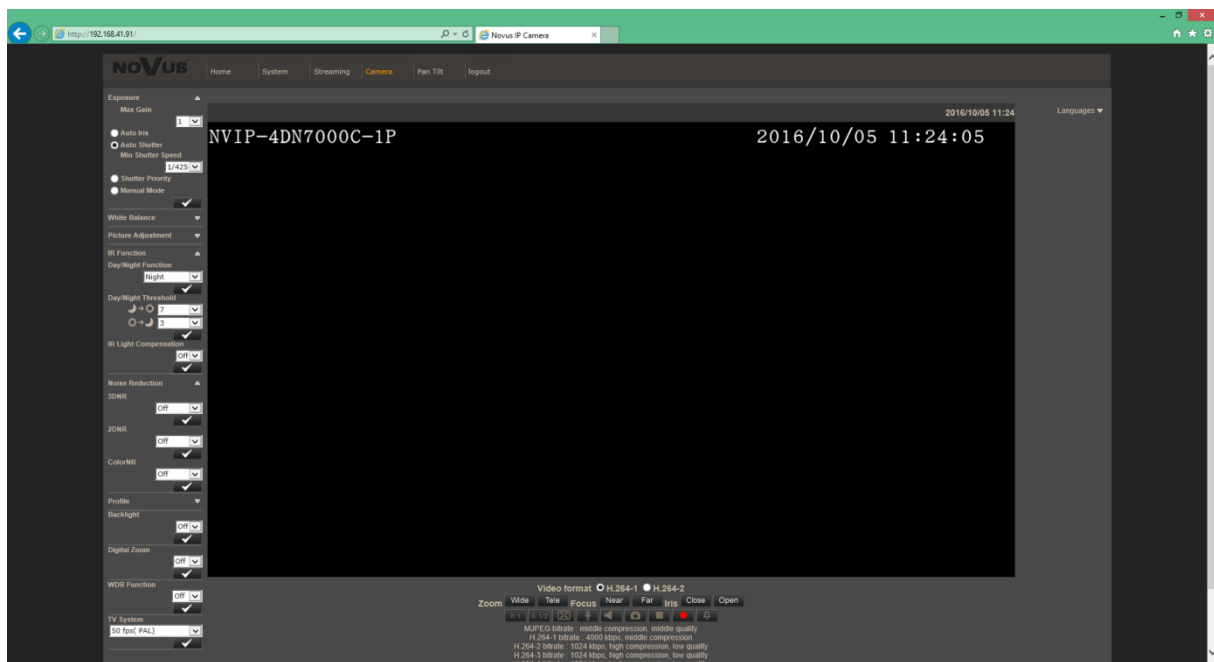**7000 series cameras**

1. Set:

Camera: NVIP-4DN7000C-1P

Lens: NVL-3MP660D/IR

IR LED Illuminator: NV-IR60/150LED

Camera Housing: NVH-160H/X

Proposed camera settings are as below (modifications to the factory settings):

Exposure :

      Max Gain: 1

      Auto Shutter

      Min Shutter Speed: 1/425

Day/Night Function: Night

TV System: 50 fps (PAL)

Video Resolution:

      Format 1: 1920x1080 (25 fps)

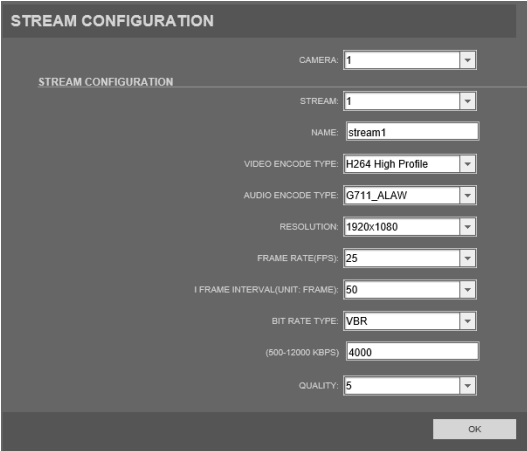Proposed additional possibilities in adjusting settings:

Exposure :

      Max Gain: 0 or 1

CBR mode setting:

      Enable H.264 CBR mode: On or Off

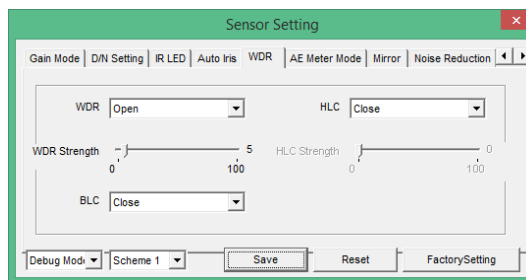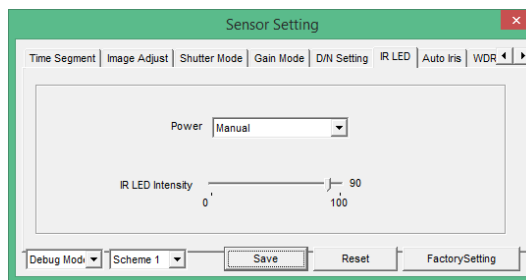TV System: 50 fps (PAL) or WDR 2 shutter (PAL)

2. NVIP-6DN5021H/IRH-1P

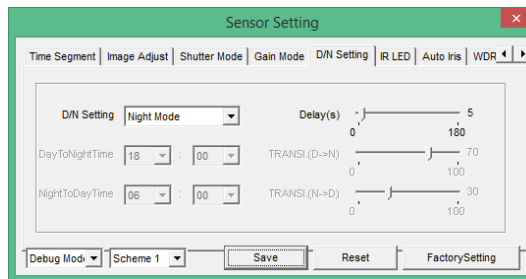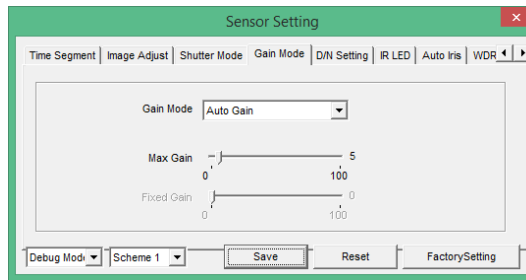Proposed camera settings are as below (modifications to the factory settings):

Video System: 50Hz

Video Stream Resolution: 1920x1080 (25 fps)

Video Bitrate: 4000 kbps

Shutter Mode

Shutter Mode: Auto Shutter

Max Shutter: 1/500

Gain Mode

Gain Mode: Auto Gain

Max Gain: 5

D/N Setting: Night Mode

IR LED

Power: Manual

IR LED Intensity: 90

WDR

WDR: Open

WDR Strength: 5

Proposed additional possibilities in adjusting settings:

Shutter Mode

Shutter Mode: Auto Shutter

Max Shutter: 1/500 or 1/1000

Gain Mode

Gain Mode: Auto Gain

Max Gain: 5 - 10

IR LED

Power: Auto or Manual

IR LED Intensity: 50 - 100

WDR

WDR: Open

WDR Strength: 1-10