[i-Nova4 Series]

[User Manual]

NOVITEC
Vision Intelligence

CONTENTS

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2. About this manual

This manual provides instructions on how to prepare the camera and begin developing programs for acquiring images.

For programming information, please refer to other API manuals and example projects.

For additional information and support, please visit the Novitec Support website. (https://cafe.naver.com/novitecsupport)

3. Important Information

3.1. Important Safety Instructions

- We cannot and do not assume any responsibility for any damage caused to you or to any other equipment connected to the camera. Please use the camera responsibly and in accordance with the instructions provided in this manual.
- To ensure the longevity of your camera, handle it with care. Avoid exposing it to strong impact and do not store it in non-recommended environments such as extreme temperatures, humidity, or direct sunlight.
- To avoid hazards, only use accessories that are recommended by the manufacturer. Using non-recommended accessories may damage the camera or cause safety hazards.

3.2. Operating Considerations

3.2.1. Important Safety Notes

- Always check the product specifications to ensure that you are using a power supply that matches the camera's specifications. Using the wrong power supply may damage the camera or cause safety hazards.
- Keep the camera away from heat sources such as radiators, heat registers, stoves, or other products that produce heat, including amplifiers. Placing the camera near heat sources may damage the camera or cause a fire hazard.
- Take care to prevent flammable substances, water, or metal from entering inside the camera. Any of these substances may damage the camera or cause safety hazards.
- Do not modify the camera or use the camera with external covers removed. Modifying the camera may cause safety hazards and may also void the manufacturer's warranty.
- If an electrical storm or thunder approaches, stop using the camera immediately and disconnect it from the power source. Using the camera during an electrical storm or thunder may cause safety hazards or damage the camera.
- If using the camera outdoors, protect it from rain or snow. Exposure to water may damage the camera or cause safety hazards.
- Board-Level Cautions
  - Handle the camera with care to avoid damaging the electrical components through electrostatic discharge (ESD).
    - To protect from ESD, please use grounding measures.
    - Avoid using plastic, vinyl, or Styrofoam materials around printed circuit boards.
    - Do not touch the components on the printed circuit board with your hands or any conductive devices.

3.2.2. Handling And Cleaning

- Do not attempt to disassemble the camera. Disassembling the camera may cause damage or injury.
- When installing or removing a lens or filter, take care to prevent water or dust from entering the inside of the camera.
- Use an air blower or lens brush to remove dust from the lens or optical filter. Do not use your fingers or any sharp objects to remove dust, as this may scratch or damage the lens or filter.
- Do not disassemble the front flange. Disassembling the front flange may cause damage or injury.
- Clean the camera case with a soft, dry cloth. Do not use cleaners such as benzene, thinner, alcohol, water, or spray, as these may damage the camera case or cause safety hazards.

3.2.3. Installing

- Avoid installing or storing the camera in the following environments:
  - Environments exposed to direct sunlight, rain, or snow.
  - Environments where combustible or corrosive gas exists.
  - Excessively warm or cold environment (Operating ambient temperature: 0 ~ 45℃)
  - Humid or dusty environment.
  - Place subjected to excessive vibration or shock.
  - Environment exposed to strong electric or magnetic field.
- Do not aim the camera lens at the sun or other very strong light sources.
- Please note that if you plan to use this product in harsh environmental conditions, we recommend contacting our technical support team for assistance.

3.2.4. Performance and Lifetime

- To ensure optimal performance and lifespan of the camera, please configure the operating environment according to the camera's specifications. It is important to note that using the camera in high ambient temperatures may cause internal parts to deteriorate, resulting in a shorter lifespan. If applicable, additional cooling measures should be considered.

3.2.5. Connector

- When fabricating the I/O connector, ensure that the wires are installed correctly and fit securely. Before connecting or removing the connector, make sure that the power is turned off. To prevent damage to the connector, avoid pulling on the wires.

3.2.6. Adjusting the C-mount

i-Nova4 series is built with CS-mount. You can also use C-mount lenses by attaching an extension ring.

<Figure> 1. i-Nova4 mount (CS) and extension ring (CS to C)

4. i-Nova4 Series Introduction

The i-Nova4 Series is a high-performance ITS camera with a 5-megapixel resolution. It supports industry-standard protocols such as ONVIF, GigE Vision, and GenICam, ensuring compatibility with various software and hardware platforms. For detailed specifications of the camera, please refer to Chapter 9 Appendix.

<Figure> 2. i-Nova4 Camera

5. Getting Started

5.1. System Requirements

- OS: Microsoft Windows 10 or 11(32bit / 64bit), Linux (32bit / 64bit / ARM64)
  'Novitec Camera Viewer for Windows' only supports 64bit Windows OS
- H.265 hardware encoding supporting graphic cards
- 100Mbps or 1Gbps Ethernet card
  (For a more stable connection, we recommend using network adapters from Intel®, a trusted provider of Ethernet technology."
- Web Browsers: Modern browsers such as Google Chrome™, Mozilla Firefox®, and others.

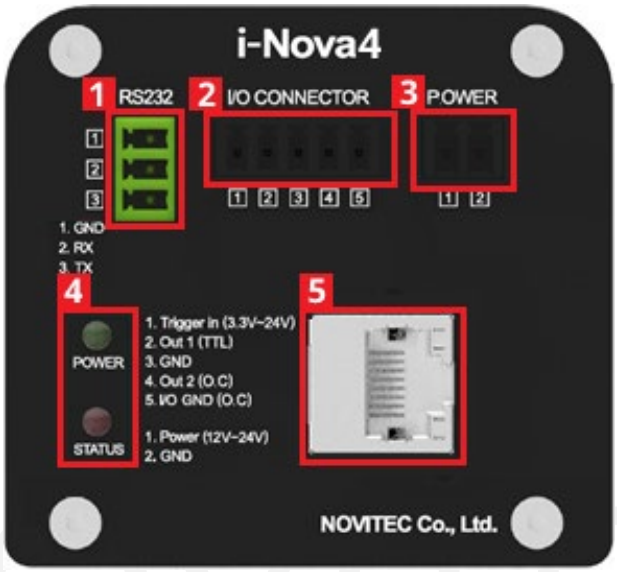
5.2. Novitec SDK

Novitec SDK supports C++ and C#. (However, Linux only supports C++.)
The Novitec SDK is available for download on our website.
https://www.novitec.co.kr/its/sub/support03.php?category=SDK

6. Camera Installation and Preferences

6.1. Camera Ports

The Power, I/O, Ethernet, HDMI, and RS232 ports are located on the back side of the device as shown below:



<Figure> 3. i-Nova4 Back Side Ports

① RS232

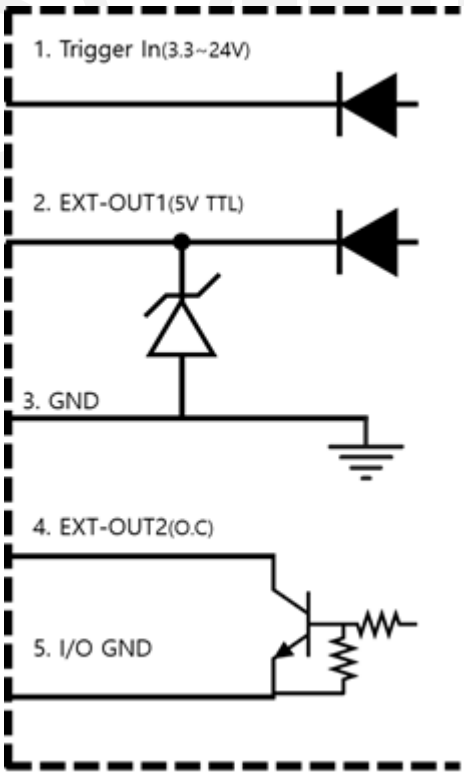
Pin	Signal	Description
1	GND	GND
2	RX	Receive Data
3	TX	Transmit Data

<Table> 1. RS232 connector Pin Map

② I/O: Port for using external trigger or strobe.

Pin	Signal	Description
1	Trigger In (3.3V ~ 24V)	Input Trigger (3.3V ~ 24V)
2	Out 1(TTL)	Output
3	GND	GND
4	Out 2(O.C)	Output
5	I/O GND (O.C)	I/O GND (O.C)

<Table> 2. I/O Connector Pin Map



<Figure> 4. i-Nova4 Series GPIO Circuit

I/O ports 2 and 3 are TTL and should be used when using normal lighting. However, if using open collector lighting, I/O ports 4 and 5 should be used. In this case, it is important to connect a pull-up resistor inside the lighting device to ensure clear representation of HIGH and LOW signals. For optimal performance, we recommend optimizing the resistor values for minimal time of rising and falling. Please refer to the

example resistor values below for guidance.

6.2.

High(V)	Low(V)	Rising(Tr) (μs)	Falling(Tf) (μs)	Pull-up Resistor (kΩ)
5	0.65	18	0.5	2.2
12	0.88	18	0.72	3.6
24	1	20	1	4.7

<Table> 3. Pull-up Resistor Table

If an open collector circuit with a pull-up resistor connected to port 4 is used, the circuit's characteristics will cause the opposite signal of the applied signal to be output. When a HIGH signal is applied, the circuit is connected, and the output is connected to ground, resulting in a LOW signal output. Conversely, when a LOW signal is applied, the circuit is disconnected, and the output is connected to 12V, resulting in a HIGH signal output.

③ Power: The camera power port supports 12V to 24V input.

Pin	Signal	Description
1	Power (12V ~ 24V)	Camera power, Input 12V ~ 24V
2	GND	Power ground

<Table> 4. Power Connector Pin Map

④ Status LED: The power LED will light up when the power is connected.

⑤ Ethernet: The Ethernet port is used for network connectivity. The green LED will light up when the network is connected, and the orange LED will light up when data is being sent or received.

6.2. Connection

1. Connect the 2-pin power female connector to a 12V to 24V power source, and then connect it to the power connector labeled '③'.
2. Connect the network cable to the Ethernet port labeled '⑤' on the camera, and to the Ethernet port on your PC. If you are using DHCP, connect the network cable to a router, switch, hub, or any other device that has a DHCP server available.

6.3. SDK Installation

To install the SDK, download and run the Novitec Camera SDK Installer from the Novitec support page.

6.4. Network Settings

By default, when the camera is connected for the first time, the camera IP settings option is set to DHCP and LLA (Link Local Address). If the camera fails to connect to a DHCP server, the IP address is set using LLA.

6.4.1. Network Settings with DHCP

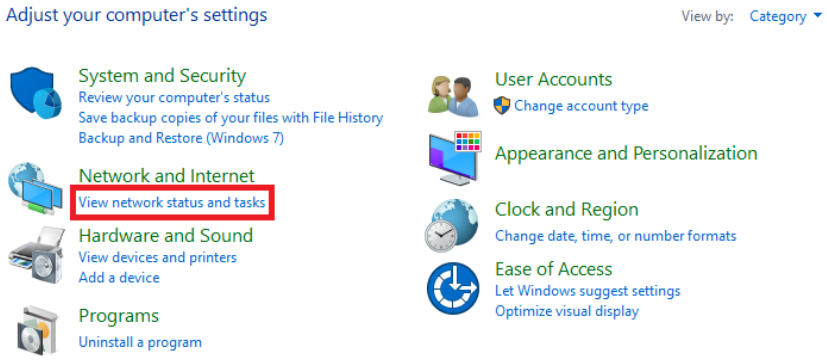
If the camera is connected to a network with a DHCP server for the first time, the camera's IP settings option is set to DHCP by default, so no special settings are required to use the camera.

6.4.2. Network Settings with Persistent IP

If the camera is connected directly to the PC, IP settings for both the camera and PC's network adapter must be configured.

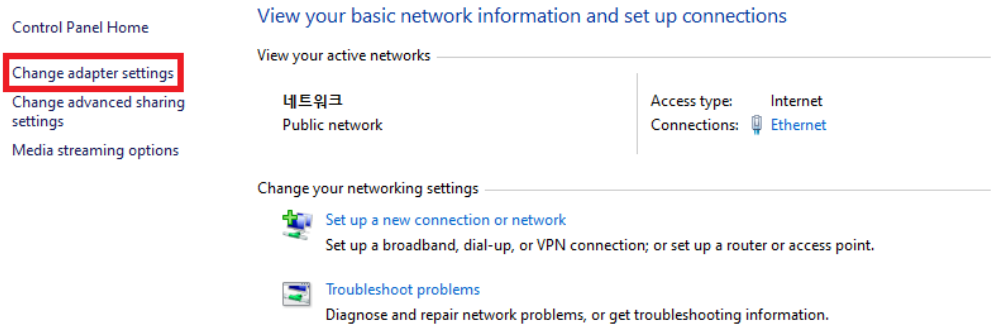
6.4.2.1. PC Network Adapter IP Settings

① Open control panel and click "View network status and tasks" below "Network and Internet".



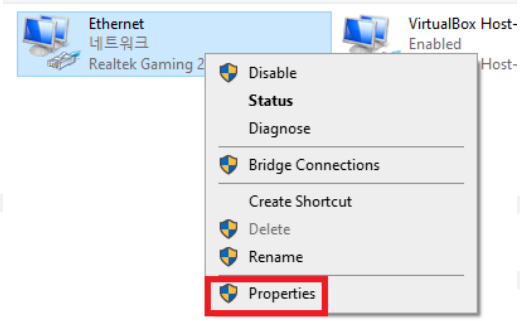
<Figure> 5. Control Panel

② Click "Change adapter settings" on the left.



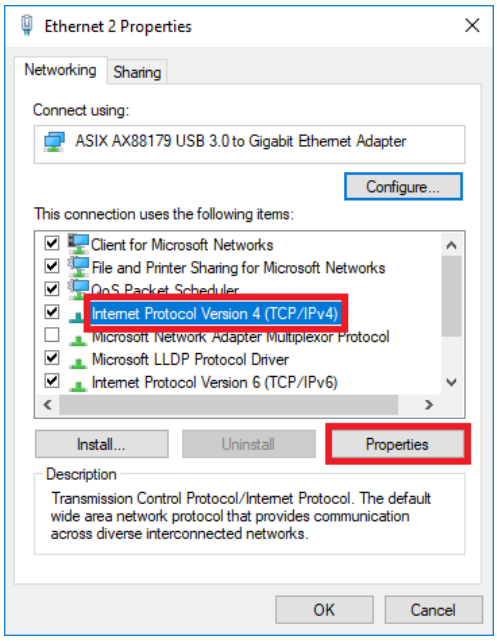
<Figure> 6. Control Panel – Network Settings

③ Select and right-click network which camera connected in network list and click "Properties".



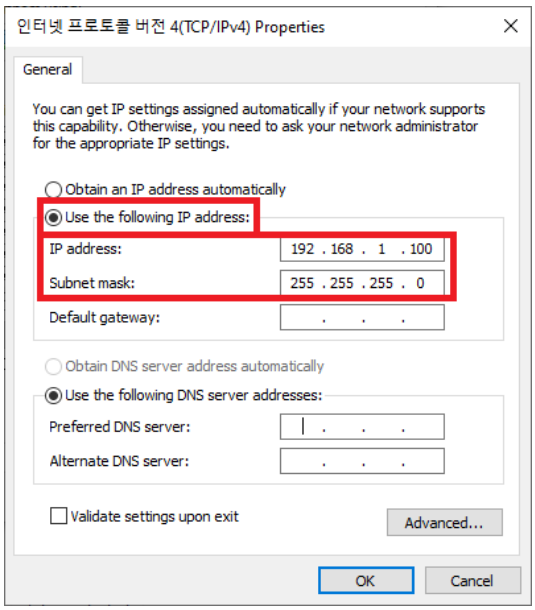
<Figure> 7. Network Connection

④ After the Ethernet properties window appears, select "Internet Protocol Version 4 (TCP/IPv4)" and click on the "Properties" button".



<Figure> 8. Ethernet Properties

⑤ In the Internet Protocol Version 4 (TCP/IPv4) properties screen, select "Use the following IP address" and enter the desired IP address and subnet mask.

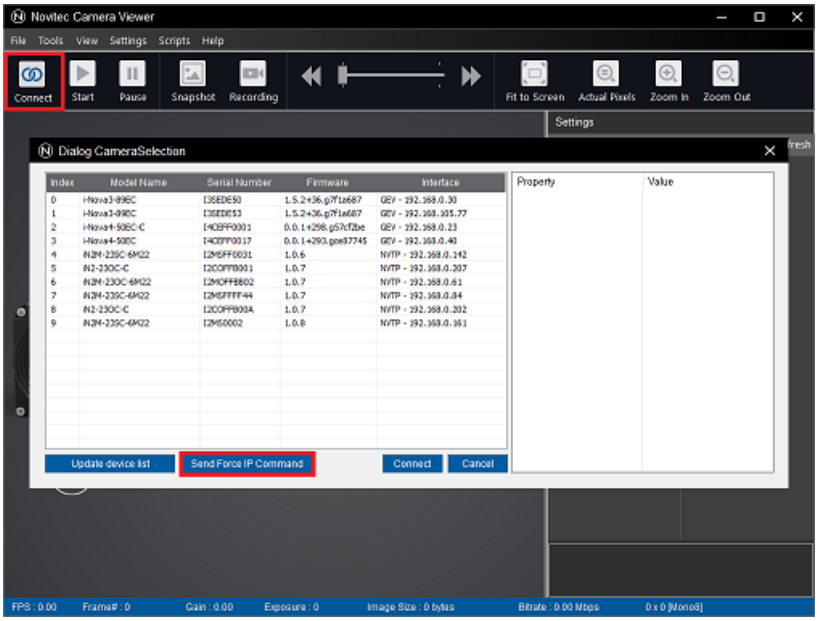


<Figure> 9. IPv4 Properties

6.4.2.2. Camera IP Settings

① Launch the Novitec Camera Viewer from the installed SDK.

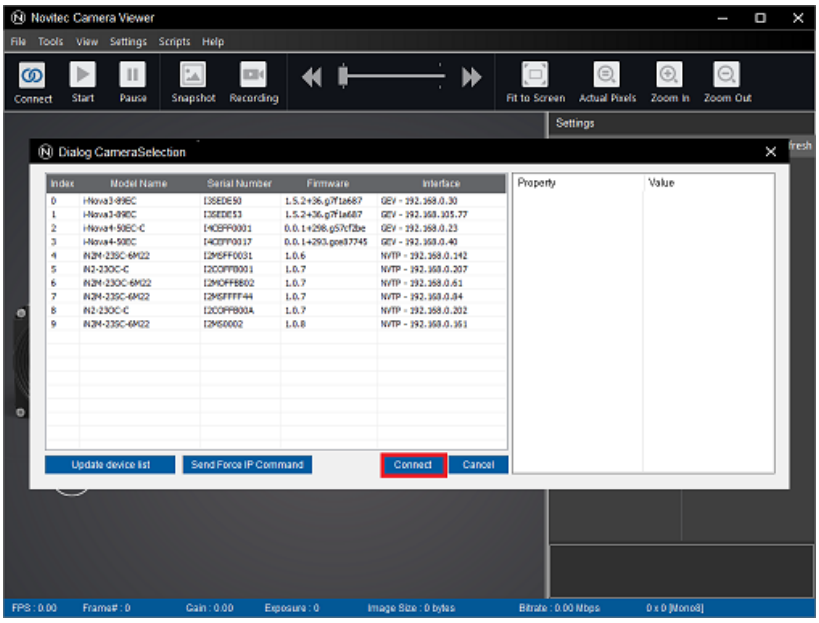
② After launching the viewer, click the 'Connect' button on the top menu to display a list of connected cameras. If the IP address range set on the camera and the network adapter are different, it will be shown in red as shown below. Click the 'Send Force IP Command' button to temporarily set an IP address on the camera for communication.



<Figure> 10. Novitec Camera Viewer - Connect

③ If a camera from the updated list is selected, the temporarily assigned IP address will be

displayed. Select the desired camera and click the 'Connect' button to establish a connection. If the updated IP address is not shown immediately, click the 'Update Device List' button to manually refresh the camera list.



<Figure> 11. Novitec Camera Viewer -Connect (2)

④ After assigning a temporary IP address, the camera can be used immediately. However, the IP settings will be reset to default when the power is reset. To retain the IP settings after resetting the camera, you need to set up a persistent IP. You can find the persistent IP settings under the "TransportLayerControl" category. To access these settings, open the settings window on the right and navigate to the "TransportLayerControl" category. Then, modify the following settings:

GEV Current IP Configuration Persistent IP	True
GEV Persistent IP Address	IP address you want to use.
GEV Persistent Subnet Mask	Subnet mask you want to use.
GEV Persistent Default Gateway	Gateway you want to use.

<Table> 5. Persistent IP Settings

※ The set IP address must match the IP subnet of the PC's network adapter.
ex) PC Network Adapter - IP: 192.168.0.100, Subnet: 255.255.255.0
Camera - IP: 192.168.0.128. Subnet: 255.255.255.0

⑤ After resetting the power, the camera will use the persistent IP that has been set.

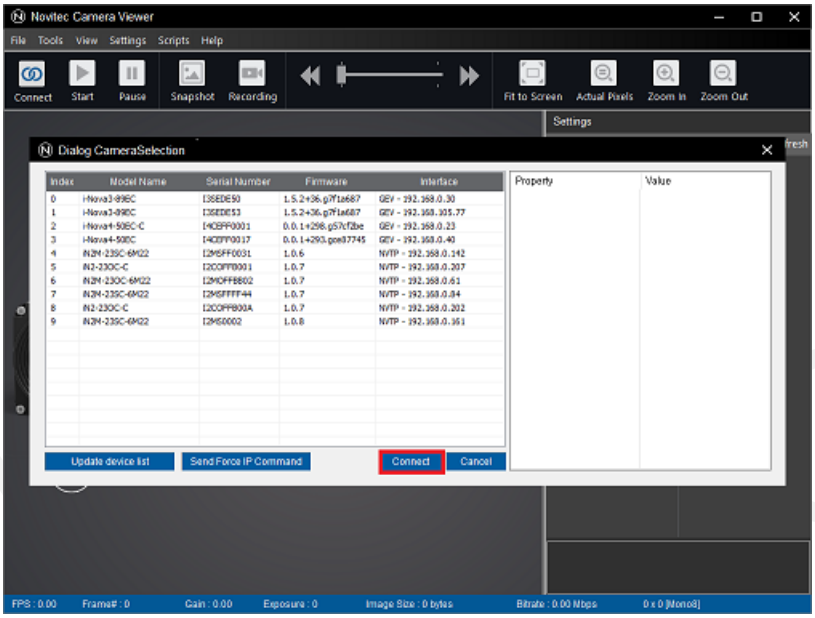
6.5. Setting Up an Account for First Use

When connecting to the camera for the first time, you must set up an ID and password to access the camera. Failure to set an ID and password may limit your access to the video streaming functionality.

6.5.1. How to find the camera IP

6.5.1.1. Searching the Camera with Novitec Camera Viewer

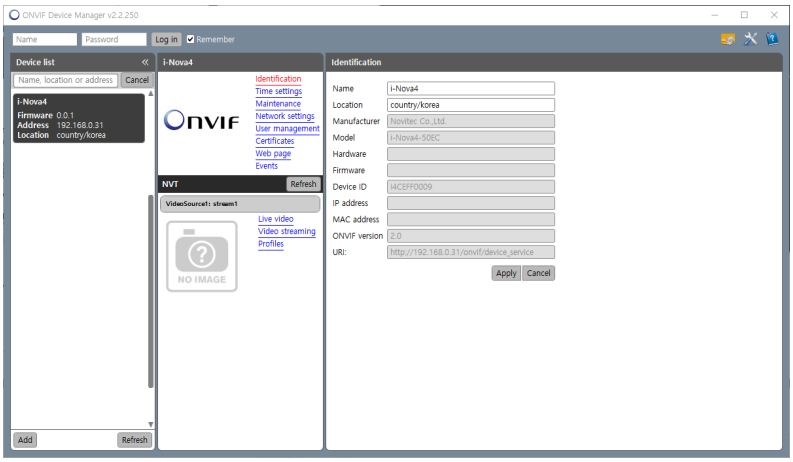
Launch the Novitec Camera Viewer and click on the "Connect" button. The connected cameras and their IP addresses will be displayed in the camera selection list.



<Figure> 12. Novitec Camera Viewer – Camera Search

6.5.1.2. Searching the Camera with ONVIF protocol

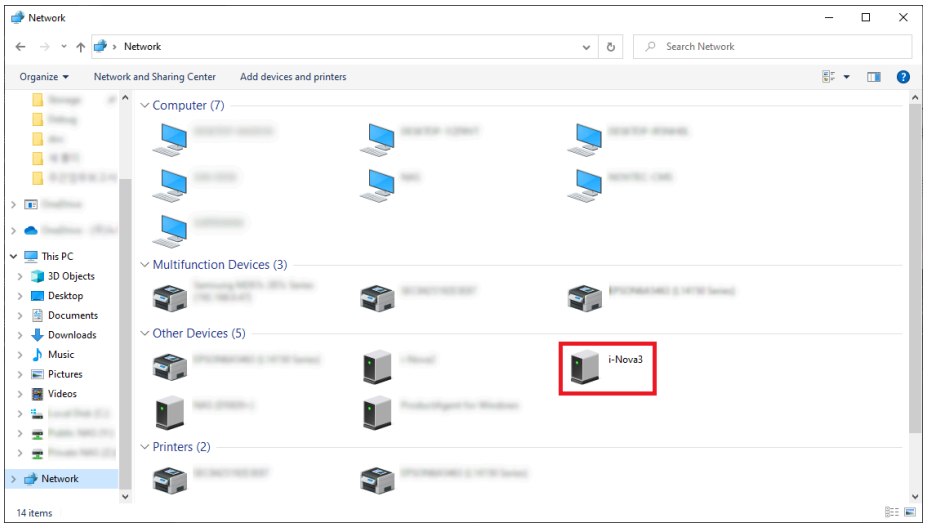
Launch ONVIF application such as 'ONVIF Device Manager'. Then, connect to camera and click "Web Page" button to open the web page of the camera.



<Figure> 13. ONVIF Device Manager – Web Page

6.5.1.3. Searching the camera with UPnP

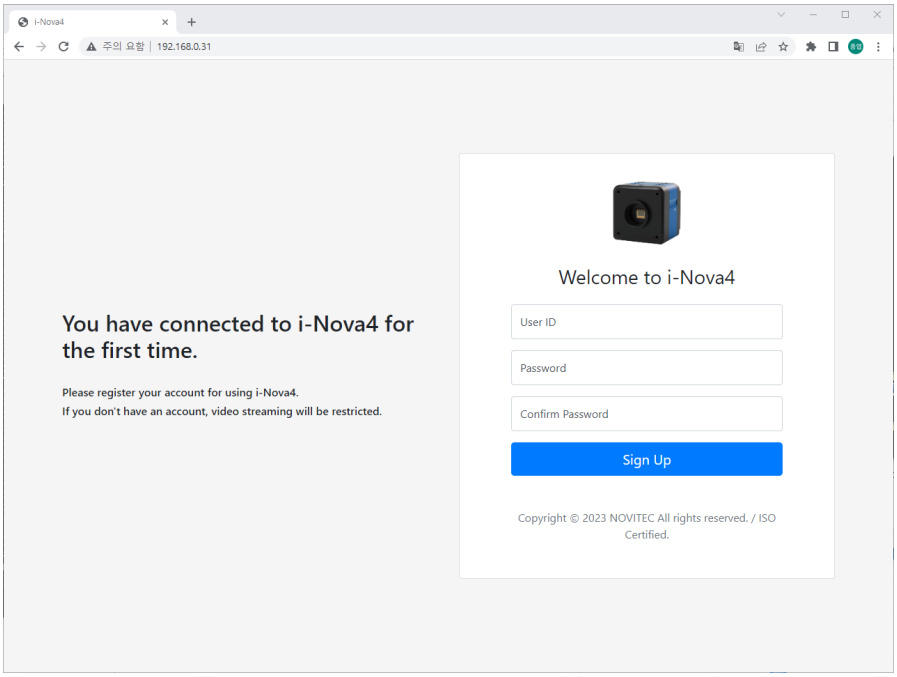
When you click the 'Network' tab in Windows Explorer, a list of network devices will be displayed. To access the camera web page, click on 'i-Nova4' under 'Other Devices'.



<Figure> 14. Windows Explorer – Network Tab (Searching with UPnP)

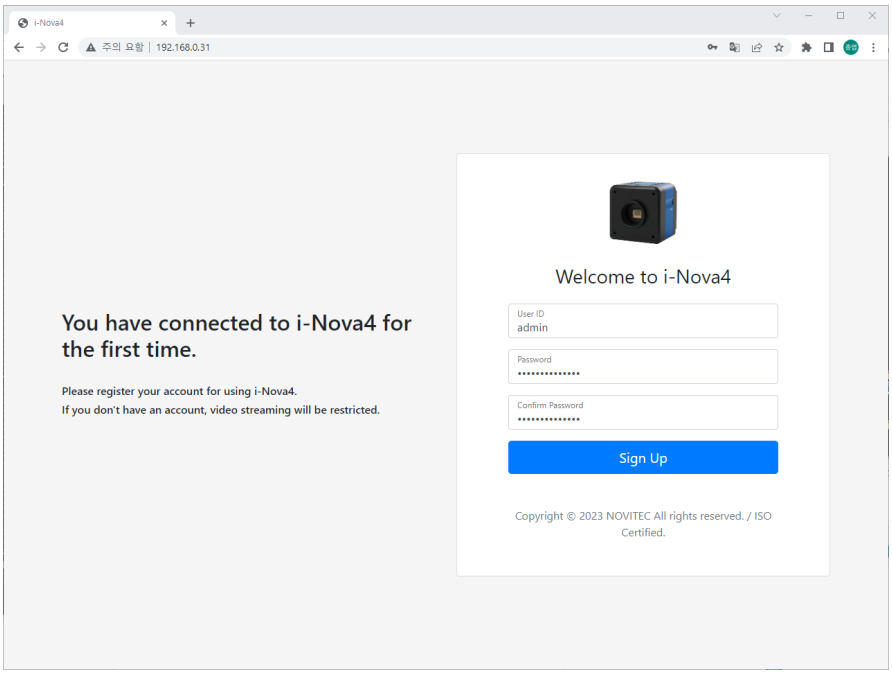
6.5.2. ID and Password Setting

① Open the web page of the camera.



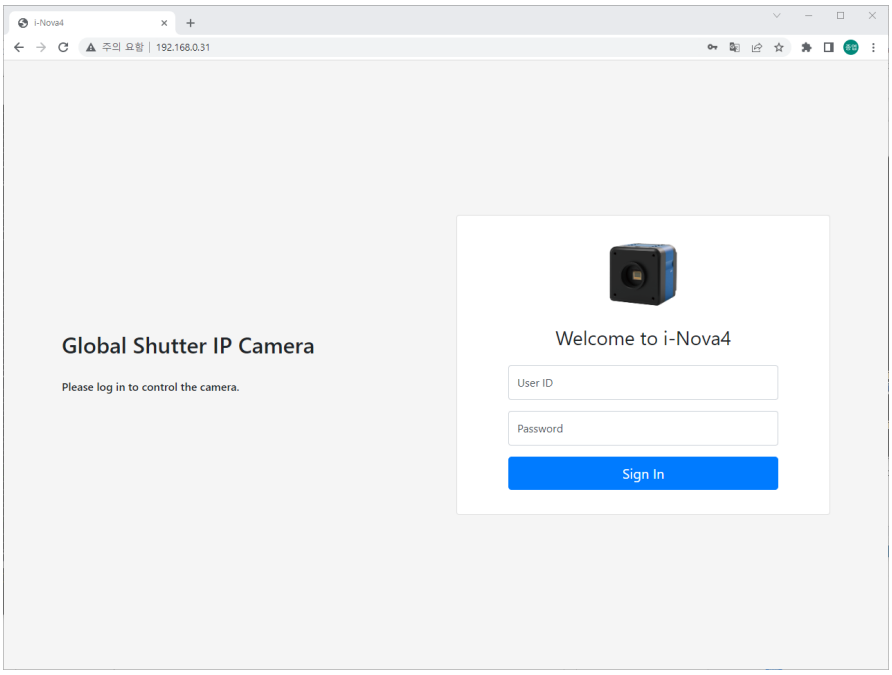
<Figure> 15. Camera Web – 'Register Account' Page

② Enter the ID and password to set them up, then click on the 'Sign Up' button below.



<Figure> 16. Camera Web – 'Register Account' Page (2)

③ If the message "Device is activated!" appears, it means that the camera is ready to use.

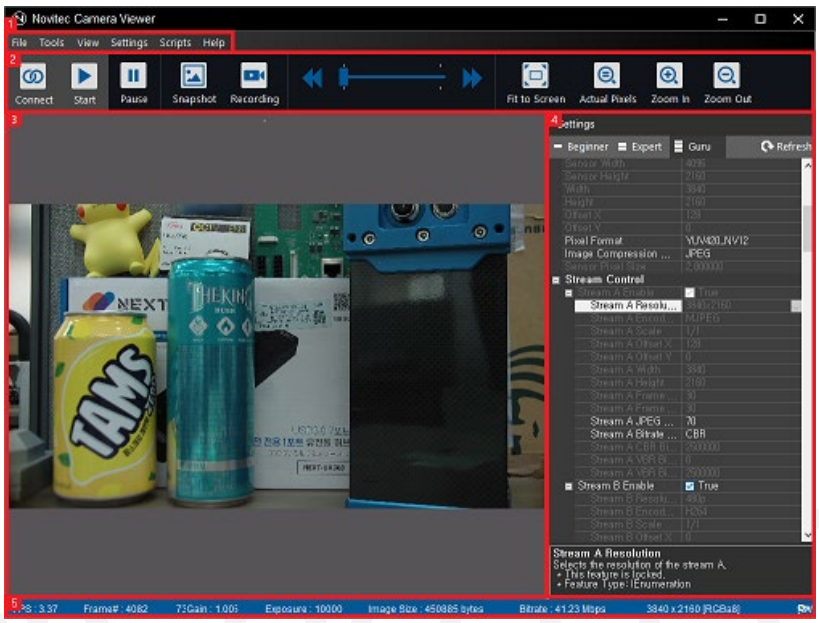


<Figure> 17. Camera Web – Login Page

7. Operation

7.1. Novitec Camera Viewer

Novitec Camera Viewer is a demo application software for controlling camera settings and acquiring images.



<Figure> 18. Novitec Camera Viewer Main Screen

7.1.1. Screen Layout

① Menu

Name	Description
File	Connect the camera, Snapshots, Close the application
Tools	Overlay Text, Histogram, Update Firmware, Viewer Settings
View	Zoom-In/Out, Fit to Screen, Actual Pixels, Console
Settings	Camera Settings
Scripts	Load Script, Activate Script
Help	Program Info

<Table> 6. Menu List Sheet

② Toolbar

The toolbar includes frequently used camera control features, such as screenshot capture, screen settings, and camera control functions like connect, start, pause, and others.

③ Screen

After the camera acquisition has started, the video will be streamed on the screen.

④ Settings

In the 'Settings' menu, you can change various camera parameters such as resolution, frame rate, and shutter speed.

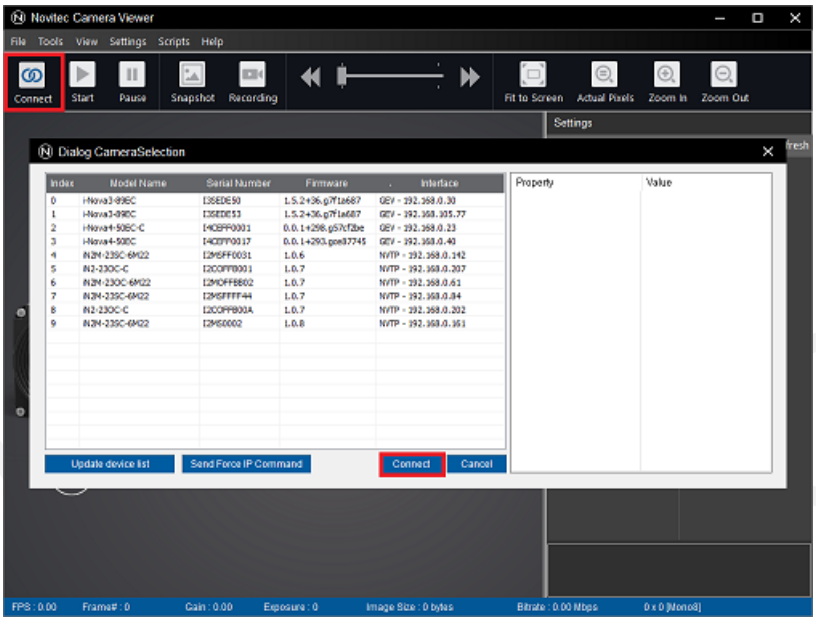
⑤ Status Bar

FPS, image information, bitrate, exposure, and others will be displayed.

7.1.2. Camera connection

① Launch 'Novitec Camera Viewer'.

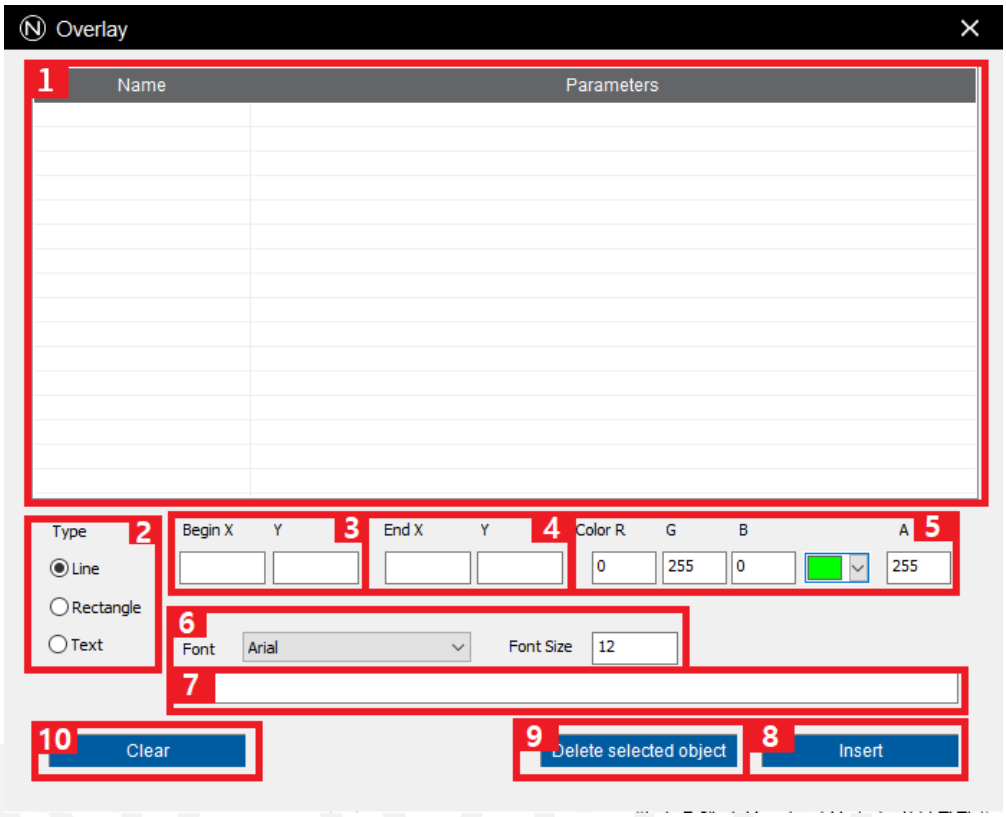
② Click the "Connect" button on the top menu to display a list of connected cameras. Select the camera you want to connect to and click "Connect".



<Figure> 19. Novitec Camera Viewer – Camera Connection

③ Click the "Start" button on the top menu to begin streaming images in real-time.

7.1.3. Overlay



<Figure> 20. Overlay Feature

Overlay feature allows drawing lines, rectangles, and text on the screen. Note that this feature is only visible within the Novitec Camera Viewer, not in other applications such as RTSP viewers like VLC Player. Here are the steps to use this feature:

① View a list of registered overlay objects.

② Set the object type to be registered.

③ Set the starting coordinate of the object to be registered (X, Y).

④ Set the ending coordinate of the object to be registered (X, Y).

⑤ Set the color of the object to be registered (the "A" value specifies transparency).

⑥ Set the font family and size of the object to be registered (text only).

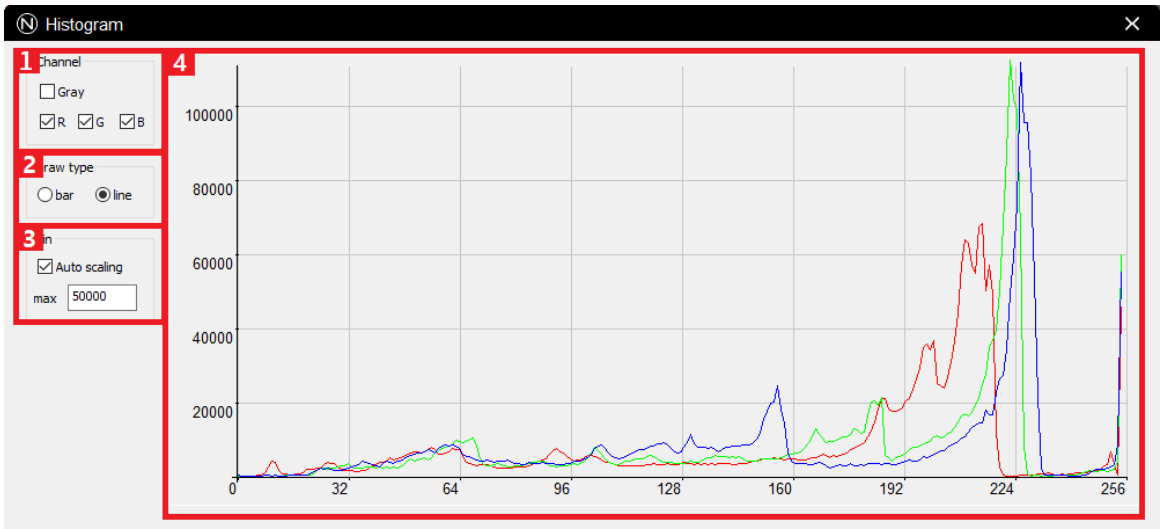
⑦ Set the text of the object to be registered (text only).

⑧ Register the set object.

⑨ Remove selected objects.

⑩ Remove all registered objects.

7.1.4. Histogram



<Figure> 21. Histogram Feature

This feature displays a histogram that can be customized in the following steps:

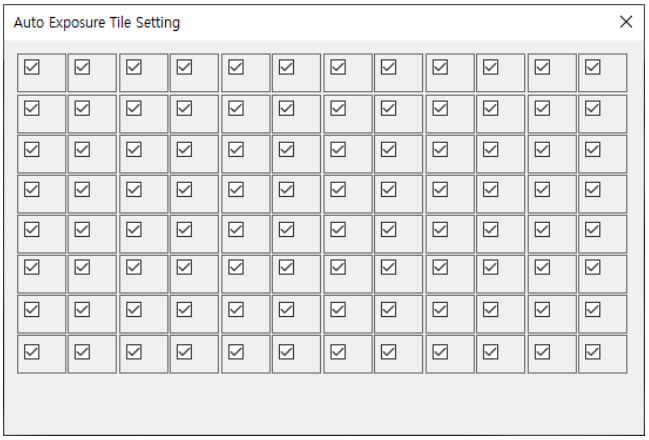
① Select the channel to display.

② Choose the type of histogram (Bar or Line).

③ Select whether to automatically adjust the height of the histogram. If unchecked, the height can be set manually with a maximum value.

④ The histogram is displayed on the screen.

7.1.5. Exposure Tile Settings

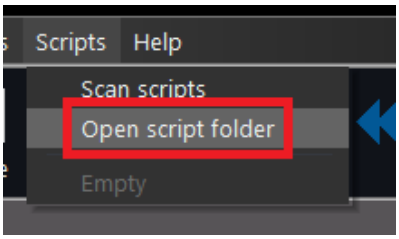


<Figure> 22. Auto Exposure Tile Settings

To set up the calculation range for auto exposure, select the desired range. The exposure will be calculated based on the selected range. For more information, please refer to Chapter 8.

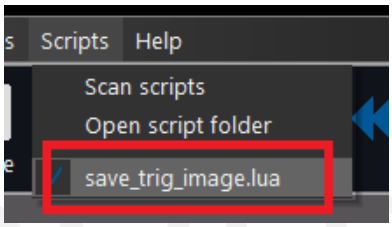
7.1.6. Scripts

The camera can be controlled using Lua scripts(https://www.lua.org/) through the script feature. Example script codes can be found in the 'Documents₩Novitec Camera SDK₩scripts' folder.



<Figure> 23. Open Script Folder

To open the folder where you can put your Lua scripts, click on "Script" and then "Open script folder" on the top menu. Once you have put your script in the folder, click "Scan scripts" to load the script in Novitec Camera Viewer.



<Figure> 24. Script Activation

Click loaded script to activate the script.

7.2. Stream Settings

The camera has the capability to output 2 streams, namely Stream A and Stream B, with the encoding mode (MJPEG, H.264, H.265) of each stream being configurable. While Stream A allows for resolution settings, the resolution of Stream B is fixed. Please refer to the table below for the initial stream settings of the camera.

Stream Name	Resolution	FPS	Encoding Type
Stream A	3840x2160	30	MJPEG, H.264, H.265
Stream B	640x480	30	H.264, H.265

<Table> 7. Default Resolution and FPS of Stream List

7.2.1. Encoding Mode

Each stream (Stream A and B) can be encoded using MJPEG, H.264, or H.265. However, please note that changing the encoding mode may restrict transmission depending on the protocol being used. Additionally, while the resolution of Stream A can be adjusted, the resolution of Stream B is fixed. See below for more information on the initial stream settings of the camera.

Protocol	Viewer	Available Stream
GigE Vision	Novitec Camera Viewer	Stream A / MJPEG
RTSP	VLC Player and others	Stream A, B MJPEG, H.264, H.265 All streams available In case of MJPEG, if resolution is 2K or higher resolution, video is broken. (Refer 7.4.1. Limitation of MJPEG Image Size to get more information.)
ONVIF	ONVIF Device Manager, other NVR S/W, and others	Stream A, B MJPEG, H.264, H.265 In case of MJPEG, if resolution is 2K or higher resolution, video is broken.

<Table> 8. Available Encoding mode by Protocol List

7.2.2. Bitrate Control

You can set the bitrate control of each stream to CBR (constant bitrate), VBR (variable bitrate), or CVBR (constrained variable bitrate).

① VBR

Variable bitrate adjustment is a technique that allows for the allocation of lower bitrates to static videos and higher bitrates to dynamic videos, resulting in a better quality-to-bitrate ratio. This method enables setting the quality level independently for each stream and encoding type.

Encoding Type	Related Feature
JPEG	StreamAJPEGQuality, StreamBJPEGQuality
H.264, H.265	StreamAH26XQuality, StreamBH26XQuality

<Table> 9. VBR Feature List

② CBR

This is a control method that aims to maintain a constant bitrate. The quality is dynamically adjusted to match the target bitrate within the range of minimum and maximum quality thresholds.

Encoding Type	Related Feature
JPEG	StreamAJPEGQualityMin
	StreamAJPEGQualityMax
	StreamATargetBitrate
	StreamBJPEGQualityMin
	StreamBJPEGQualityMax
	StreamBTargetBitrate
H.264, H.265	StreamAH26XQualityMin
	StreamAH26XQualityMax
	StreamATargetBitrate
	StreamBH26XQualityMin
	StreamBH26XQualityMax
	StreamBTargetBitrate

<Table> 10. CBR Feature List

③ CVBR

CVBR works similar to CBR, but the bitrate may temporarily exceed the set target bitrate based on the bitrate duration and sensitivity values.

The bitrate duration is measured in 100ms units, and the bitrate is adjusted to ensure that the delay time does not exceed the set value.

The bitrate sensitivity allows for a temporary increase in bitrate above the target value, depending on the complexity of the video being encoded.

Encoding Type	Related Feature
JPEG	StreamAJPEGQualityMin
	StreamAJPEGQualityMax
	StreamATargetBitrate
	StreamBJPEGQualityMin
	StreamBJPEGQualityMax
	StreamBTargetBitrate
	StreamABitrateDuration
	StreamABitrateSensivity
	StreamBBitrateDuration
	StreamBBitrateSensivity
H.264, H.265	StreamAH26XQualityMin
	StreamAH26XQualityMax
	StreamATargetBitrate
	StreamBH26XQualityMin
	StreamBH26XQualityMax
	StreamBTargetBitrate
	StreamABitrateDuration
	StreamABitrateSensivity
	StreamBBitrateDuration
	StreamBBitrateSensivity

<Table> 11. CVBR Feature List

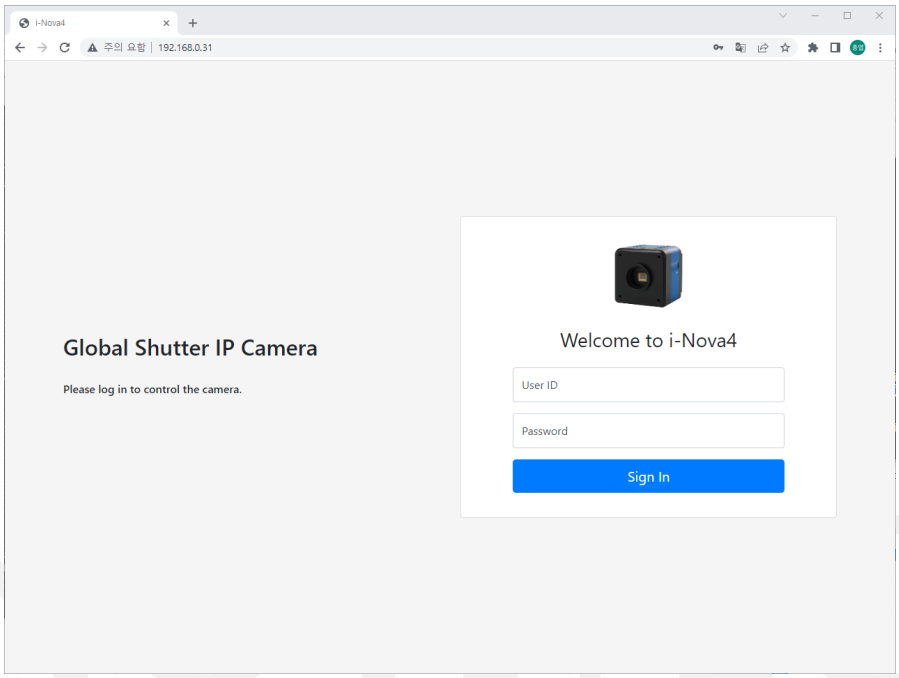
,

7.3. Web Page

You can use the camera's web page to set an initial password, view camera information, and stream videos.

Web URL: http://<Camera IP>

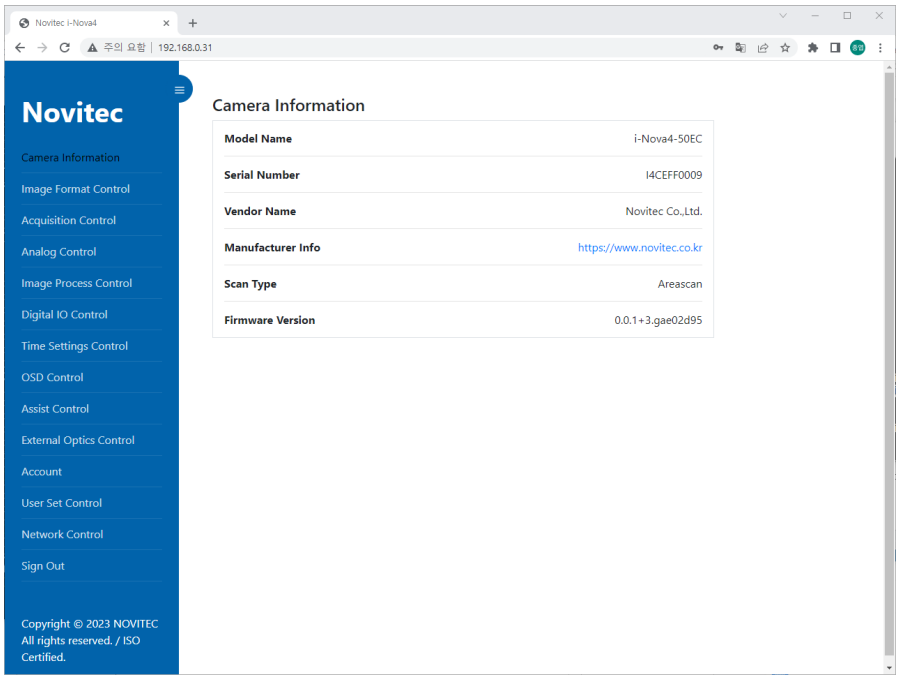
7.3.1. Login



<Figure> 25. Camera Web - Login

When you access the camera's web page, a sign-in page will appear. On this page, you can enter your ID and password to log in.

7.3.2. Camera Information

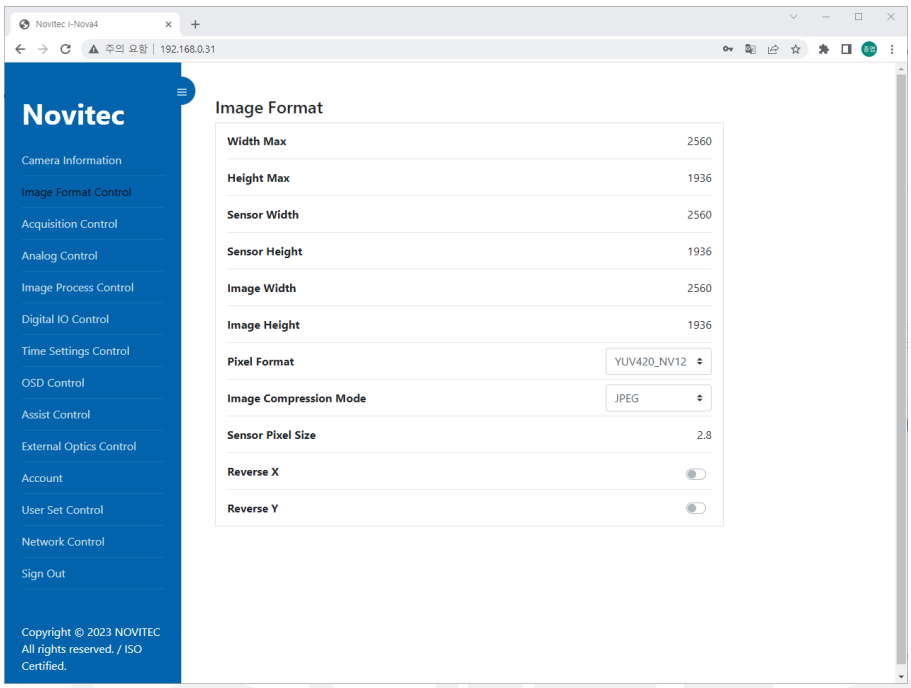


<Figure> 26. Camera Web – Camera Information

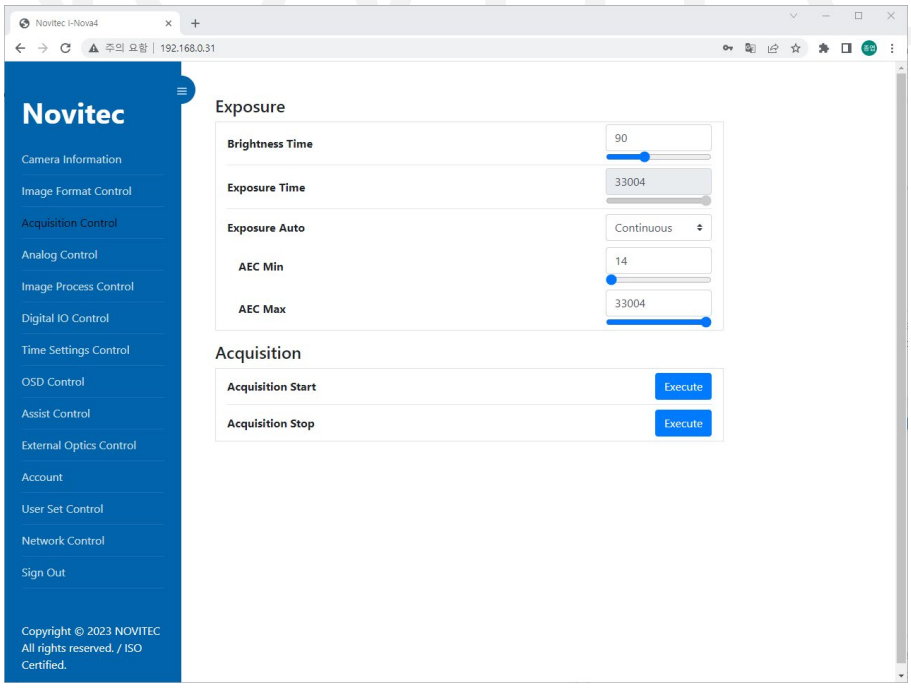
After signing into the camera's web page, you will be able to view the camera information.

7.3.3. Camera Control Pages

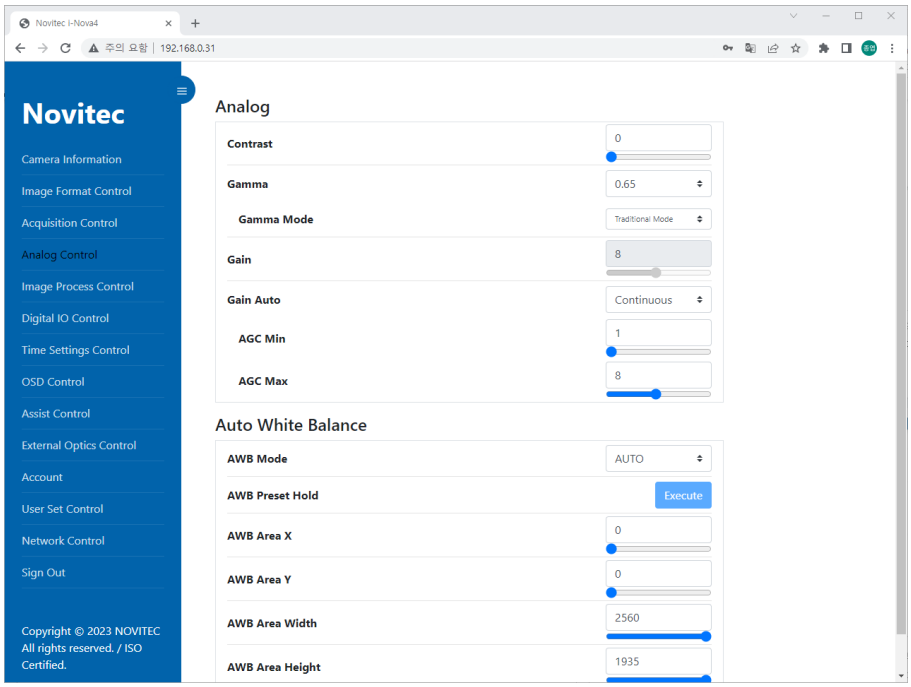
For additional information on the main features, please refer to Section 9: Features.



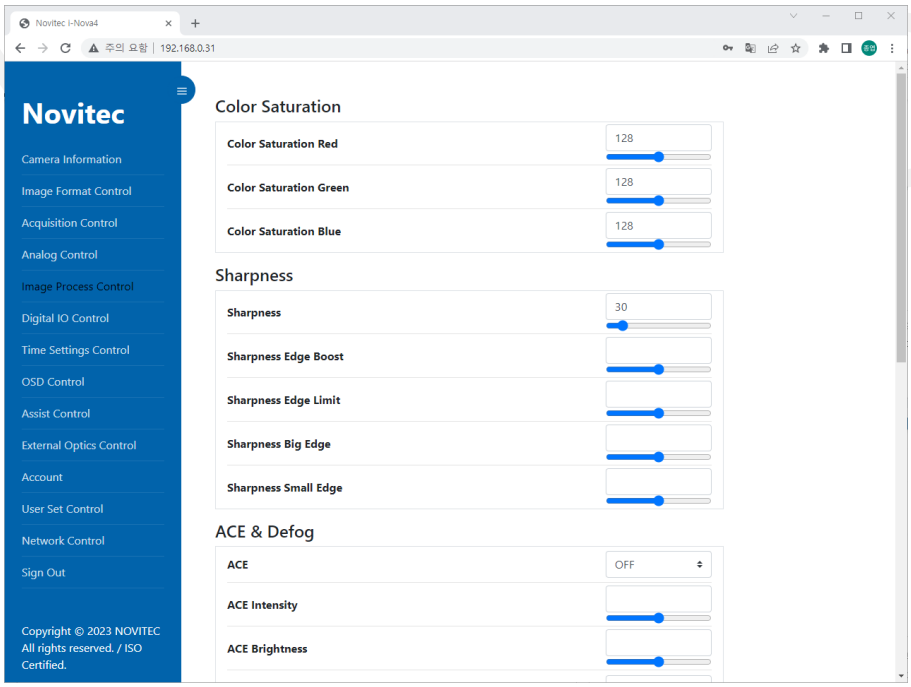
<Figure> 27. Camera Web – Image Format Control



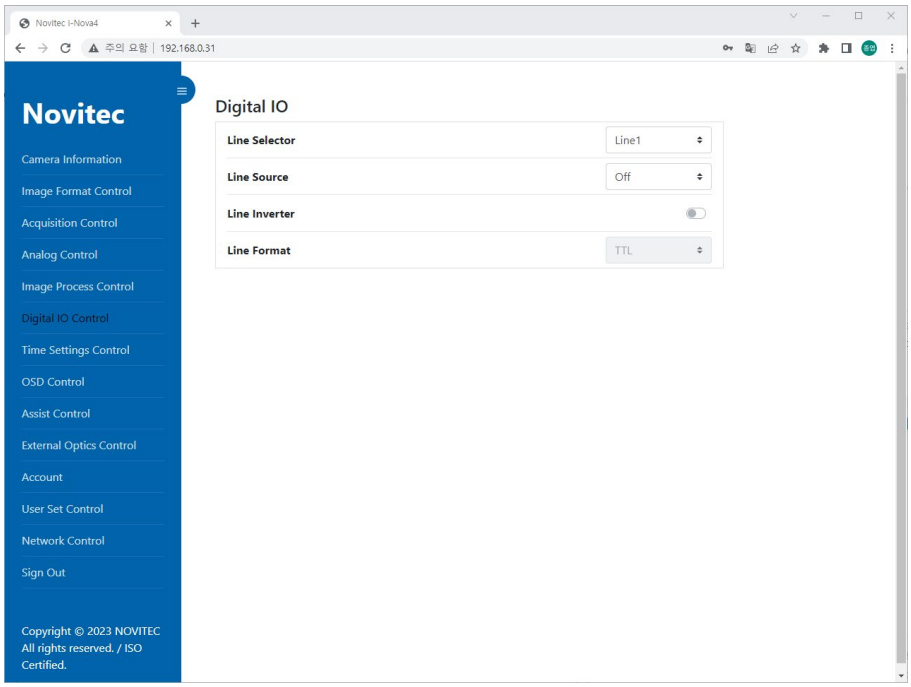
<Figure> 28. Camera Web – Acquisition Control



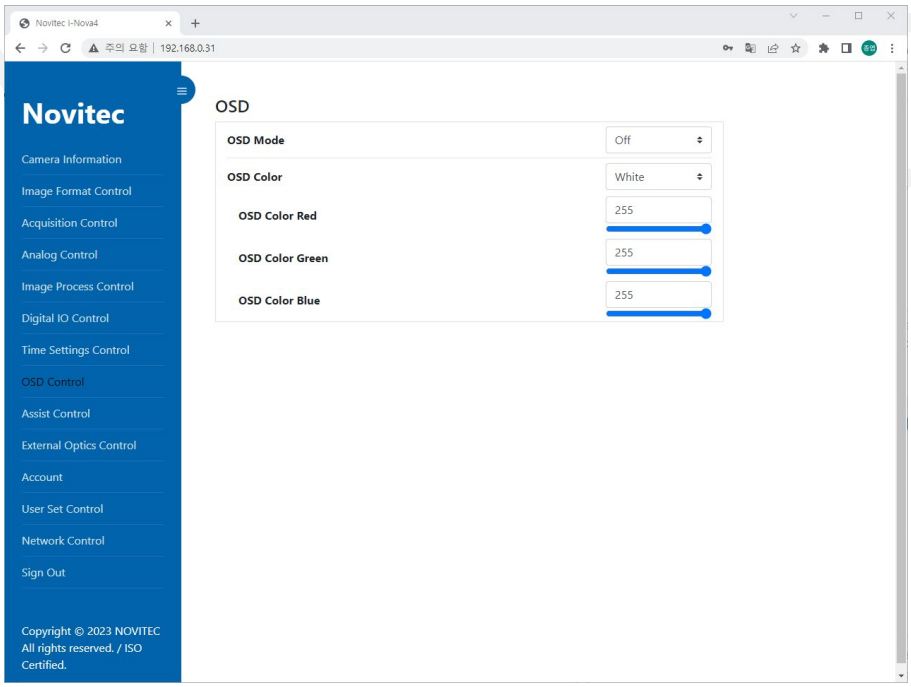
<Figure> 29. Camera Web – Analog Control



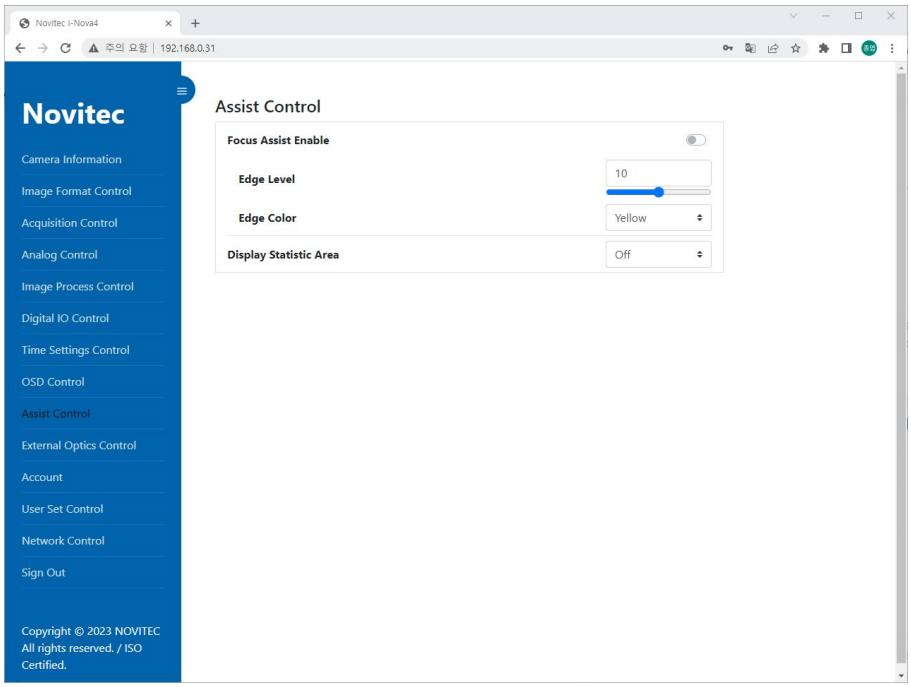
<Figure> 30. Camera Web – Image Process Control



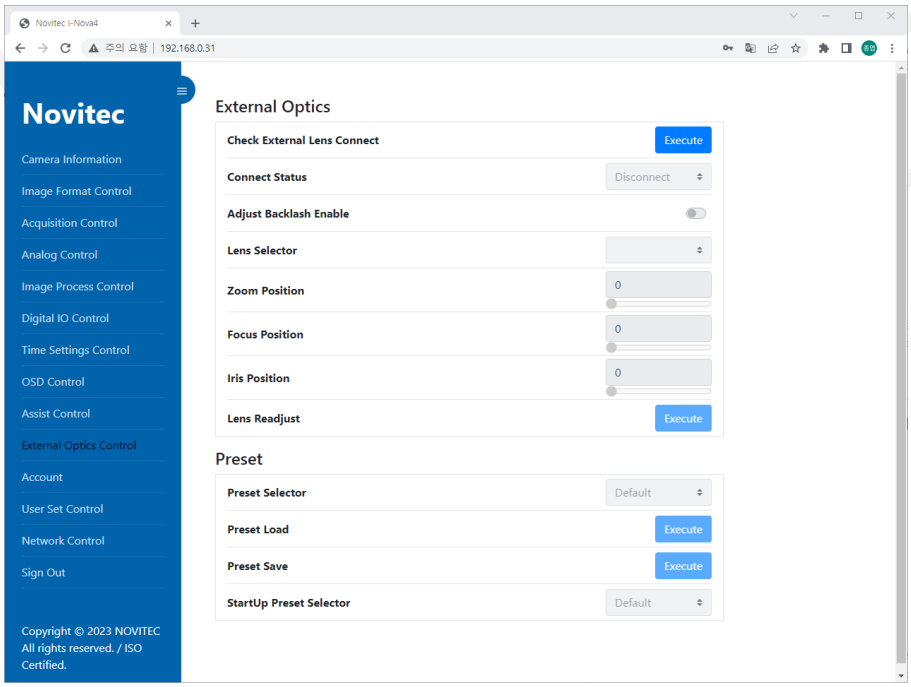
<Figure> 31. Camera Web – Digital I/O Control



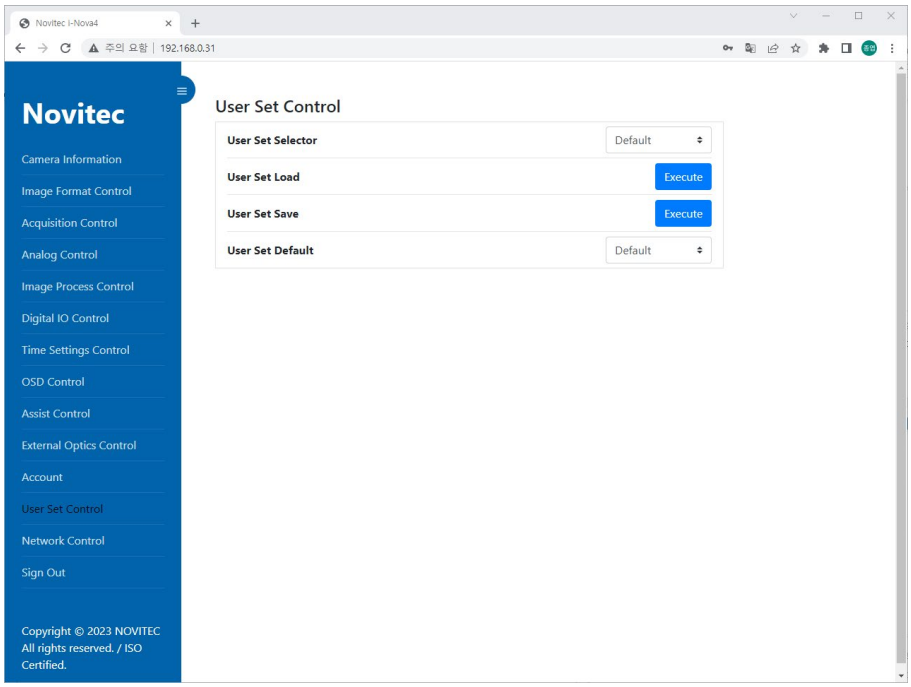
<Figure> 32. Camera Web – OSD Control



<Figure> 33. Camera Web – Assist Control

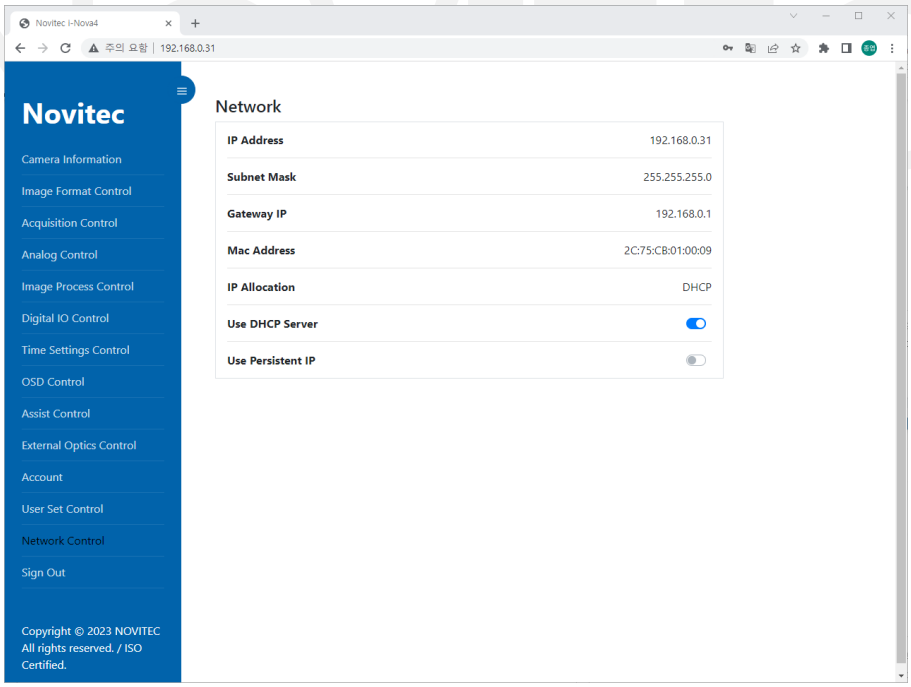


<Figure> 34. Camera Web – External Optics Control



<Figure> 35. Camera Web – User Set Control

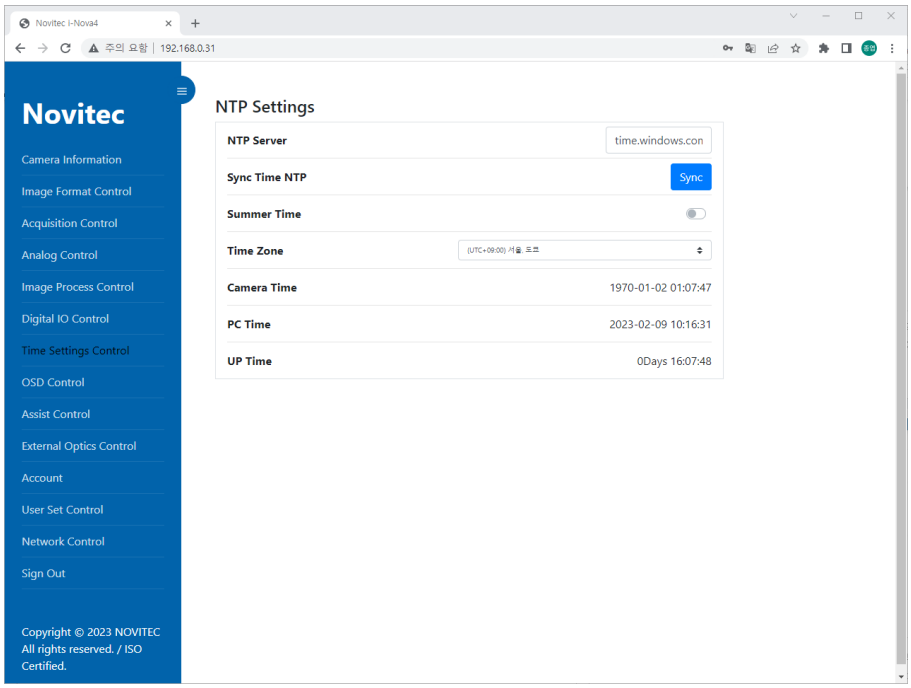
7.3.4. Network Control



<Figure> 36. Camera Web – Network Control

On this page, you can configure network settings. For more detailed information, please refer to Section 6: Camera Installation and Preferences.

7.3.5. Time Settings

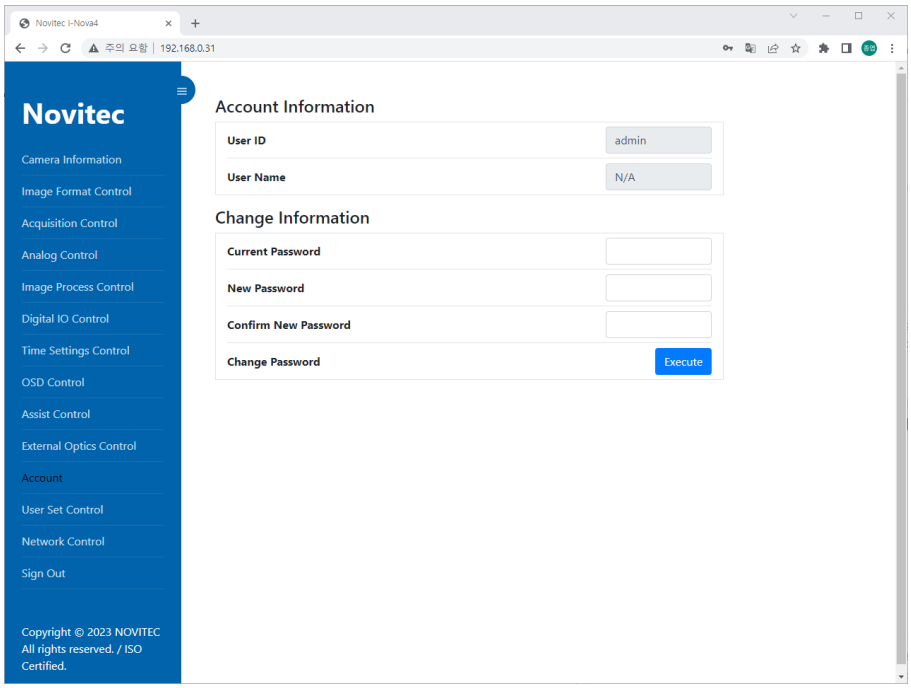


<Figure> 37. Camera Web – Time Settings Control

On this page, you can configure the date and time settings, which include the following options:

- Camera Time: Displays the current date and time of the camera.
- PC Time: Displays the current date and time of the PC.
- UP Time: Displays the elapsed time since the camera was last booted.

7.3.6. Account



<Figure> 38. Camera Web - Account

On this page, you can configure or modify your web account information.

7.3.7. Other Menu

Sign Out: Logs out from the web page.

7.4. RTSP Protocol

RTSP is a network protocol that is specifically designed for real-time video streaming. In the i-Nova4 series camera, the encoded stream images are transmitted to the client through an RTSP server.

Stream	Stream URL
Stream A	rtsp://<Camera IP>/stream1
Stream B	rtsp://<Camera IP>/stream2

<Table> 12. RTSP URL by Stream

7.4.1. Limitation of MJPEG Image Size

In the RTSP standard, when streaming with MJPEG, the width and height that can be assigned to the Packet Header are limited to 2048 (https://tools.ietf.org/html/rfc2435). To compensate for this limitation, the width and height of the RTP header received from the client can be adjusted arbitrarily. Refer to the "testRTSPClient_MJPEG4K" example to view the following code.

```
unsigned width = (unsigned)headerStart[6] * 8;
unsigned height = (unsigned)headerStart[7] * 8;
if ((width == 0 || height == 0) && fDefaultWidth ≠ 0 && fDefaultHeight ≠ 0) {
  // Use the default width and height parameters instead:
  width = fDefaultWidth;
  height = fDefaultHeight;
}
if (width == 0) width = 256*8; // special case
if (height == 0) height = 256*8; // special case

if (width == 1792)            // 4K special case
    width = width + 2048;
if (height == 112)
    height = height + 2048;
```

<Figure> 39. Code snippet of JPEGVideoRTPSource.cpp

When streaming an image with a size of 3840x2160 pixels using RTSP, the resolution is reduced to 1792x112 because the size exceeds the maximum range of the RTP Packet Header. To decode the stream normally, you need to add 2048 to the received width and height values. Refer to the "testRTSPClient_MJPEG4K" example for more information.

7.4.2. Acquiring stream Using VLC Player

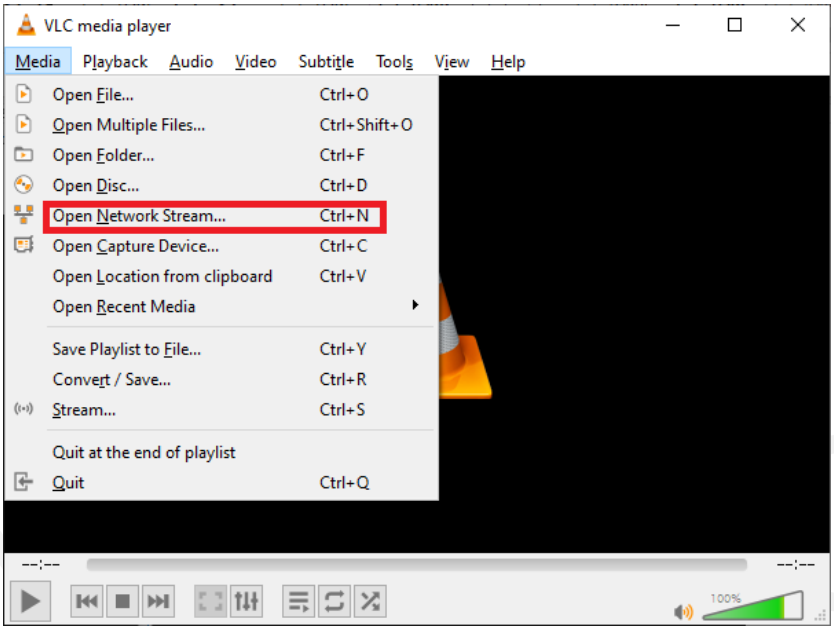
① Download and install VLC from the following link:

https://www.videolan.org/vlc/index.html

② Run VLC after installation.

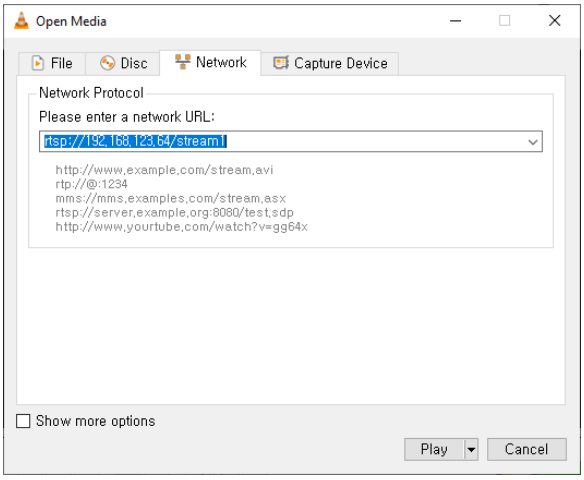
③ Check the IP address of the camera (Refer to section 6.5.1 "How to Find Camera IP").

④ Select "Media" in VLC Player and click "Open Network Stream...".



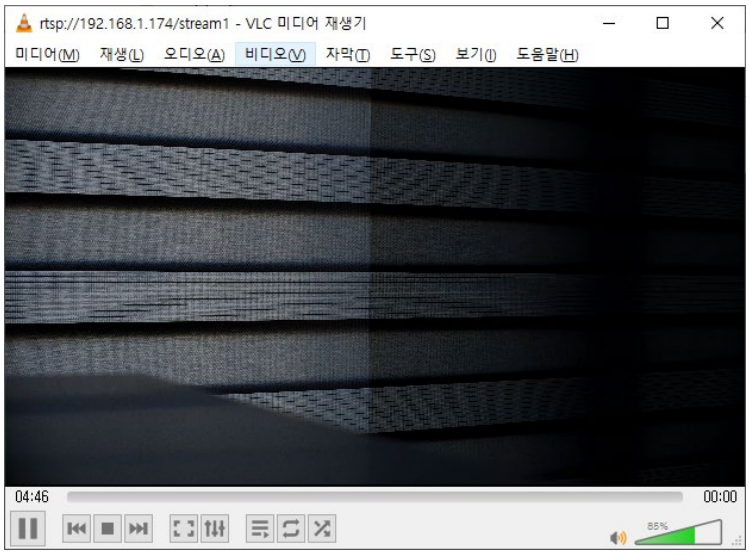
<Figure> 40. VLC Media Player – Network Stream

⑤ Input the network address as follows and click "Play."



<Figure> 41. VLC Media Player – Open Network Stream

⑥ The stream will now be played in VLC Player.



<Figure> 42. VLC Media Player – Playing

7.5. Firmware Update

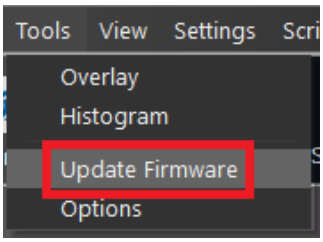
A firmware file is provided for updating the camera's features or fixing bugs. The firmware file extension is *.nfw.

7.5.1. Updating Firmware in Novitec Camera Viewer

① Run the Novitec Camera Viewer.

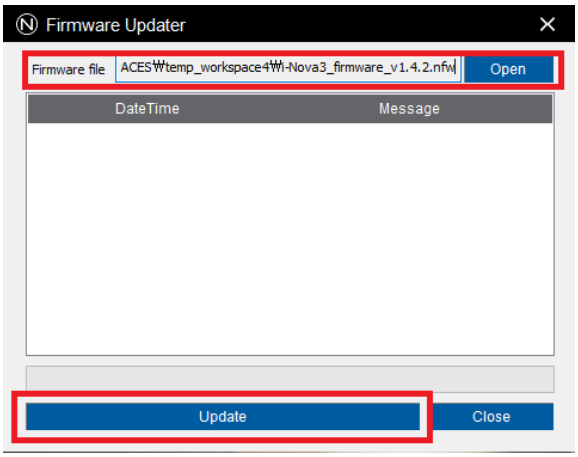
② Connect to the camera that needs to be updated.

③ Select "Tools" from the menu and click "Update Firmware".



<Figure> 43. Novitec Camera Viewer – Firmware Update Menu

④ Click "Open" and select the firmware file, then click "Update" to start the update process.



<Figure> 44. Novitec Camera Viewer – Firmware Update Window

⑤ After the update process is complete, reset the camera power.

8. Filters and Lenses

8.1. Filters

Filters are used to block light in certain wavelength bands that are input to the sensor. There are various types of filters that can achieve different effects, such as allowing only light in a specific wavelength band to pass through.

Camera	Filter List
i-Nova4	IR Cut Filter / Off

<Table> 13. Filters by camera List

8.1.1. IR Cut Filter

Image sensors such as CCD, CMOS and others acquire infrared (IR) regions that cannot be recognized by humans, which can result in colors appearing different from how they would normally appear. Therefore, using an IR cut filter is recommended to block IR regions and correct colors.

9. Features

9.1. Auto Exposure / Gain

Acquisition Control
Brightness
Exposure Time
Exposure Auto
AEC Range Min
AEC Range Max
ALC Area Start X
ALC Area Start Y
ALC Area Width
ALC Area Height
Analog Control
Gain
Gain Auto
AGC Range Min
AGC Range Max

<Table> 14. ALC Feature List

Exposure and gain are automatically adjusted based on the set brightness. Exposure and gain can be set separately for auto and manual control.

① Auto Exposure Control (AEC): This feature allows for automatic adjustment of exposure. It is automatically adjusted according to the target value between the minimum and maximum values set by the user.

② Auto Gain Control (AGC): This feature allows for automatic adjustment of gain. It is automatically adjusted according to the target value between the minimum and maximum values set by the user.

③ Brightness: Set the target brightness value of the image to be set automatically. Exposure and gain are automatically adjusted according to this value. Since it is the value before gamma is applied, it may appear brighter than the actual brightness value.

④ ALC Area: Specifies the Region of Interest (ROI) to which ALC is applied. This can be set regardless of the resolution and is based on 2560x1936 (full resolution).

9.2. Trigger

The trigger function enables the camera to capture an image based on an externally input signal. The following features are related to the trigger function:

Trigger Mode
Trigger Source
Trigger Activation
Trigger Software
Pseudo Multishot Frame Count

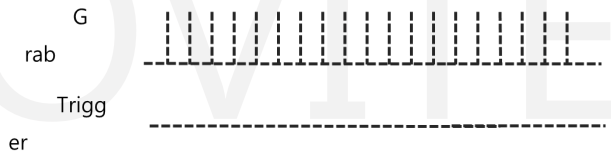
<Table> 15. Trigger Features List

9.2.1. Trigger Mode

The i-Nova4 camera series supports several trigger modes, including Free Run, One Shot Trigger, Bracket Mode, and Pseudo Trigger. These modes allow the camera to acquire an image according to an externally input signal and offer different options for controlling the image acquisition process.

① Off

In this mode, the camera acquires images according to the set frame rate (FPS) irrespective of any external trigger signal.

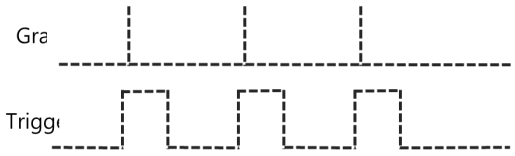


<Figure> 45. Trigger Off Mode

② On (One Shot Trigger)

Acquire an image only when an external trigger signal is received.

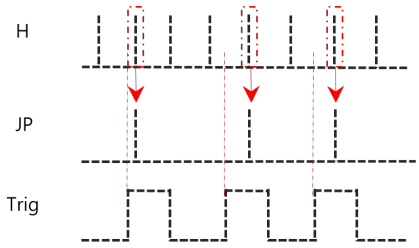
This feature is currently not available but will be supported in a later version of i-Nova4.



<Figure> 46. One Shot Trigger Mode

③ Pseudo Trigger Mode

In this mode, the camera operates with a fixed frame rate, and when an external trigger signal is received, the camera sends an image captured close to the trigger timing. This mode is useful when high-speed capturing is required and the One Shot Trigger Mode is not available.



<Figure> 47. Pseudo Trigger Mode

④ Bracket Mode

When an external trigger signal is received, a set number of images are taken. Each image is taken with a different exposure time and gain to acquire images with different brightness levels sequentially.

This feature is currently not available but will be supported in a later version of i-Nova4

⑤ Pseudo Multi-shot Trigger Mode

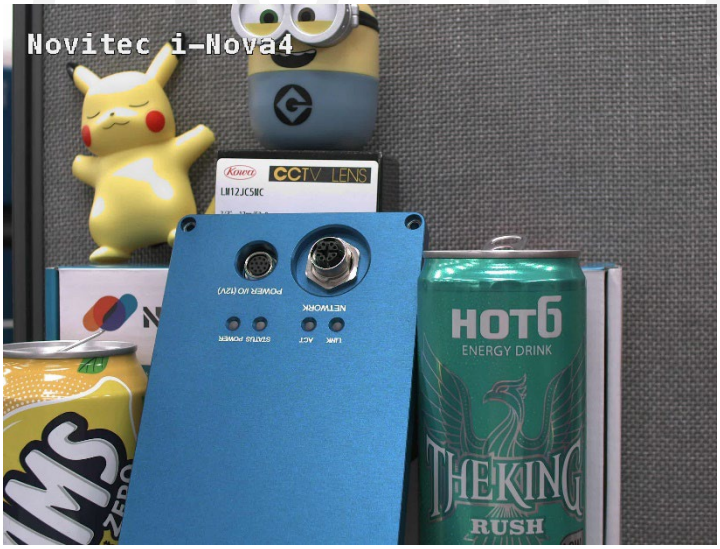
When a trigger signal is inputted while the camera is working with a specific FPS, it captures a set number of images close to the input point.

9.3. On-Screen Display (OSD)

OSD Control	
OSDMode	
OSDSize	
OSDPosX	
	OSDSize
	OSDPosX
	OSDPosY
	OSDText
	OSDTextClear
OSDColor	
	OSDColorRed
	OSDColorGreen
	OSDColorBlue

<Table> 16. OSD Feature List

This function overlays specific information or text on the image, such as the date and time, camera settings, or custom messages.



<Figure> 48. OSD - Custom

Currently, the following OSD modes are supported:

① FrameCount: Displays the current frame count.

② DateTime: Displays the current camera date and time.

③ Custom: Displays user-defined text.

9.4. Gamma

Gamma is a way to adjust the brightness and contrast of an image. The i-Nova4 camera has two gamma modes:

Analog Control
Gamma
Gamma Mode

<Table> 17. Gamma Features List

① Low Saturation Mode
This is a gamma mode that minimizes saturation characteristics using an algorithm. It increases the gradient in dark areas and reduces it in bright areas.

② Traditional Mode
This is the normal gamma mode, which has uniform luminance characteristics.

9.5. DNR

Image Process Control
3DDNR
2DDNR
2DDNREdgeLevel

<Table> 18. DNR Features List

This is a function to reduce noise in the image.

① 2D DNR: Reduces noise in the current image.

② 3D DNR: Reduces noise using the current and previous images.
Note that if the image has many changes and the threshold value is high, afterimages may be present.

9.6. HLC

Image Process Control
HLCEnable
HLCMaskThreshold
HLCMaskColor

<Table> 19. HLC Features List

This is a function to mask bright areas with a specific color. The masking color can be selected.

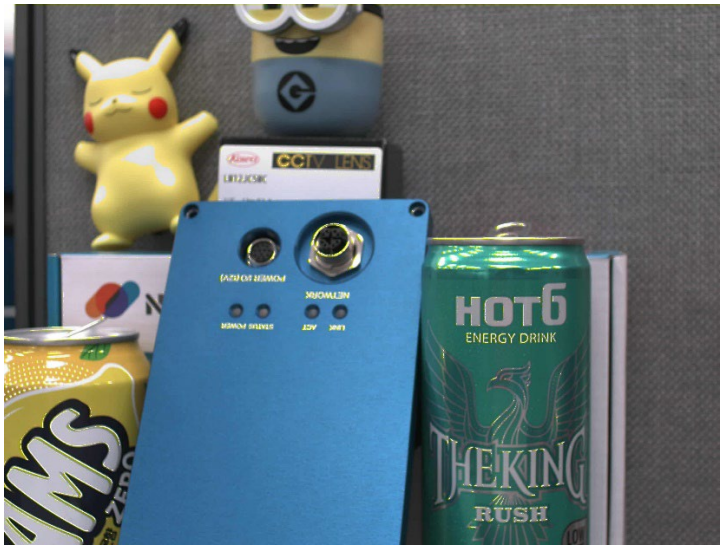
9.7. Focus Assist

Assist Control
FocusAssistEnable
FocusAssistEdgeLevel
FocusAssistEdgeColor
DisplayStatisticArea

<Table> 20. Focus Assist Feature

9.7.1. Focus Assist

The focus assist function helps to adjust the focus of the video by displaying yellow lines on the edges when the focus is properly set. The user can change the color of the lines to a color of their choice..



<Figure> 49. Focus Not Set Image

<Figure> 50. Focus Set Image

9.7.2. Statistic Area

This function allows users to set specific areas for Automatic Level Control (ALC) and Automatic White Balance (AWB). When using this function, a rectangular area is drawn on the image as a solid line, indicating the area that will be used for statistical analysis in ALC or AWB adjustment.

<Figure> 51. Statistic Area Enabled Image

9.8. Other Image Processing

- ACE (Advanced Contrast Enhancer): This function corrects backlighting issues in images.
- Highlight Color Suppression: This function corrects color reproduction problems in images.
- Sharpness: This function enhances the sharpness of images.

9.9. Features List

Below is the list of features of i-Nova4. Most features are compatible with GenICam SFNC, while customized features are highlighted in dark sky-blue background on the tables.

9.9.1. Device Control

Feature	Type	Description	Visibility	Access
DeviceModelName	IString	Model of the device.	Beginner	RO
DeviceVendorName	IString	Name of the manufacturer of the device.	Beginner	RO
DeviceManufacturerInfo	IString	Manufacturer information about the device.	Beginner	RO
DeviceScanType	IEnumeration	Scan type of the sensor of the device.	Expert	RO
DeviceVersion	IString	Version of the device.	Beginner	RO
DeviceFirmwareVersion	IString	Version of the firmware in the device.	Beginner	RO
DeviceSerialNumber	IString	Device's serial number. This string is a unique identifier of the device.	Beginner	RO
DeviceUserID	IString	User-programmable device identifier.	Beginner	RW
DeviceLinkHeartbeatMode	IEnumeration	Activate or deactivate the Link's heartbeat.	Expert	RW
DeviceLinkCommandTimeout	IInteger	Indicates the command timeout of the specified Link. This corresponds to the maximum response time of the device for a command sent on that link.	Guru	RO
DeviceActivationStatus	IEnumeration	Device activation status.	Beginner	RO
DeviceReset	ICommand	Resets the device to its power up state.	Guru	WO

<Table> 21. Device Control Feature List

9.9.2. Action Control

Feature	Type	Description	Visibility	Access
ActionDeviceKey	IInteger	Device key to check the validity of action commands.	Guru	RW
ActionSelector	IInteger	Select Action Signal	Guru	RW
ActionGroupMask	IInteger	Mask to validate the action on reception of the action protocol message.	Guru	RW
ActionGroupKey	IInteger	Key to validate the action on reception of the action protocol message.	Guru	RW

<Table> 22. Action Control Feature List

9.9.3. Image Format Control

Feature	Type	Description	Visibility	Access
WidthMax	IInteger	Maximum width of the image (in pixels).	Expert	RO
HeightMax	IInteger	Maximum height of the image (in pixels).	Expert	RO
SensorWidth	IInteger	Effective width of the sensor in pixels.	Expert	RO
SensorHeight	IInteger	Effective height of the sensor in pixels.	Expert	RO
Width	IInteger	Width of the image provided by the device (in pixels).	Beginner	RO
Height	IInteger	Height of the image provided by the device (in pixels).	Beginner	RO
PixelFormat	IEnumeration	Format of the pixels provided by the device.	Beginner	RW
ImageCompressionMode	IEnumeration	Enable a specific image compression mode as the base mode for image transfer.	Beginner	RW
SensorPixelSize	IFloat	Sensor Pixel Size in (㎛).	Expert	RO
ReverseX	IBoolean	Flip horizontally the image sent by the device.	Guru	RW
ReverseY	IBoolean	Flip vertically the image sent by the device.	Guru	RW
MonochromeMode	IBoolean	Enable Monochrome Mode.	Beginner	RW

<Table> 23. Image Format Control Feature List

9.9.4. Stream Control

When setting up the stream resolution, Stream C is restricted based on Stream A.

Ex: If resolution of Stream A is set 2560x1936, Max resolution of Stream C is 2560x1936.

Feature	Type	Description	Visibility	Access
StreamAEnable	IBoolean	Enables the Stream A.	Beginner	RO
StreamAResolution	IEnumeration	Selects the resolution of the stream A.	Beginner	RW
StreamAEncodeMode	IEnumeration	Selects the Encode mode of the stream A.	Beginner	RW
StreamAH264Profile	IEnumeration	Selects the H.264 profile of the stream A.	Beginner	RW
StreamAWidth	IInteger	ROI Width from the scaled image (in pixels).	Expert	RW
StreamAHeight	IInteger	ROI Height from the scaled image (in pixels).	Expert	RW
StreamAFrameRate	IInteger	Change frame rate interval for Stream A.	Beginner	RW
StreamAIFrameInterval	IInteger	Change the I frame interval for Stream A.	Guru	RW
StreamAJPEGQuality	IInteger	Change the JPEG Quality of Stream A	Expert	RW
StreamAJPEGQualityMin	IInteger	Change the JPEG Quality Min of Stream A	Expert	RW
StreamAJPEGQualityMax	IInteger	Change the JPEG Quality Max of Stream A	Expert	RW
StreamAH26XQuality	IInteger	Change the H26X Quality of Stream A	Expert	RW
StreamAH26XQualityMin	IInteger	Change the H26X Quality Min of Stream A	Expert	RW
StreamAH26XQualityMax	IInteger	Change the H26X Quality Max of Stream A	Expert	RW
StreamABitrateControl	IEnumeration	Selects Bitrate Control for Stream A.	Expert	RW
StreamATargetBitrate	IInteger	Change the Target Bitrate of Stream A.	Expert	RW
StreamABitrateDuration	IInteger	Change the Bitrate Duration of Stream A.	Expert	RW
StreamABitrateSensivity	IInteger	Change the Bitrate Sensitivity of Stream A.	Expert	RW
StreamBEnable	IBoolean	Enables the Stream B.	Beginner	RO
StreamBResolution	IEnumeration	Selects the resolution of the stream	Beginner	RO

		B.		
StreamBEncodeMode	IEnumeration	Selects the Encode mode of the stream B.	Beginner	RW
StreamBH264Profile	IEnumeration	Selects the H.264 profile of the stream B.	Beginner	RW
StreamBWidth	IInteger	ROI Width from the scaled image (in pixels).	Expert	RW
StreamBHeight	IInteger	ROI Height from the scaled image (in pixels).	Expert	RW
StreamBFrameRate	IInteger	Change frame rate interval for Stream B.	Beginner	RW
StreamBIFrameInterval	IInteger	Change the I frame interval for Stream B.	Guru	RW
StreamBH26XQuality	IInteger	Change the H26X Quality of Stream B	Expert	RW
StreamBH26XQualityMin	IInteger	Change the H26X Quality Min of Stream B	Expert	RW
StreamBH26XQualityMax	IInteger	Change the H26X Quality Max of Stream B	Expert	RW
StreamBBitrateControl	IEnumeration	Selects Bitrate Control for Stream B.	Expert	RW
StreamBTargetBitrate	IInteger	Change the Target Bitrate of Stream B.	Expert	RW
StreamBBitrateDuration	IInteger	Change the Bitrate Duration of Stream A.	Expert	RW
StreamBBitrateSensivity	IInteger	Change the Bitrate Sensitivity of Stream B.	Expert	RW
StreamAURL	IString	Stream A RTSP URL	Beginner	RO
StreamBURL	IString	Stream B RTSP URL	Beginner	RO

<Table> 24. Stream Control Features List

9.9.5. Acquisition Control

Feature	Type	Description	Visibility	Access
Brightness	IInteger	Brightness Option	Beginner	RW
ExposureMode	IEnumeration	Sets the operation mode of the Exposure.	Beginner	RW
ExposureTime	IInteger	This controls the duration where the photosensitive cells are exposed to light.	Beginner	RW
ExposureAuto	IEnumeration	Sets the automatic exposure mode when Exposure Mode is Timed. The exact algorithm used to implement this control is device specific.	Beginner	RW
AECRangeMin	IInteger	Controls the selected gain as an absolute physical value in multiplication(X). This is an amplification factor applied to the video signal.	Beginner	RW
AECRangeMax	IInteger	Controls the selected gain as an absolute physical value in multiplication(X). This is an amplification factor applied to the video signal.	Beginner	RW
ALCAreaStartX	IInteger	Set the ALC area start x position. Values are based on 2560x1936 resolution.	Beginner	RW
ALCAreaStartY	IInteger	Set the ALC area start y position. Values are based on 2560x1936 resolution.	Beginner	RW
ALCAreaWidth	IInteger	Set the ALC area width. Values are based on 2560x1936 resolution.	Beginner	RW
ALCAreaHeight	IInteger	Set the ALC area height. Values are based on 2560x1936 resolution.	Beginner	RW
TriggerMode	IEnumeration	Controls if the selected trigger is active.	Beginner	RW
TriggerSource	IEnumeration	Specifies the internal signal or physical input Line to use as the trigger source.	Beginner	RW
TriggerActivation	IEnumeration	Specifies the activation mode of the trigger.	Beginner	RW

TriggerSoftware	ICommand	Generates an internal trigger. Trigger Source must be set to Software.	Beginner	WO
PseudoMultishotFrameCount	IInteger	Controls number of acquisition images in Pseudo Multishot trigger mode.	Beginner	RW
AcquisitionStart	ICommand	Starts the Acquisition of the device. The number of frames captured is specified by AcquisitionMode.	Beginner	WO

<Table> 25. Acquisition Control Features List

9.9.6. Analog Control

Feature	Type	Description	Visibility	Access
Contrast	IInteger	Sets the contrast of image.	Guru	RW
Gamma	IEnumeration	Sets the gamma of image.	Beginner	RW
GammaMode	IEnumeration	Sets the gamma mode.	Beginner	RW
Gain	IFloat	Controls the selected gain as an absolute physical value in multiplication(X). This is an amplification factor applied to the video signal.	Beginner	RW
GainAuto	IEnumeration	Sets the automatic gain control (AGC) mode. The exact algorithm used to implement AGC is device specific.	Beginner	RW
AGCRangeMin	IFloat	Controls the selected gain as an absolute physical value in multiplication(X). This is an amplification factor applied to the video signal.	Beginner	RW
AGCRangeMax	IFloat	Controls the selected gain as an absolute physical value in multiplication(X). This is an amplification factor applied to the video signal.	Beginner	RW
AutoWhiteBalanceMode	IEnumeration	Controls the mode for automatic white balancing between the color channels. The white balancing ratios are automatically adjusted.	Beginner	RW
AWBPresetHold	ICommand	Set the color temperature information at the time.	Beginner	RW
AWBAreaStartX	IInteger	Set the auto white balance area start x position. Values are based on 2560x1936 resolution.	Beginner	RW
AWBAreaStartY	IInteger	Set the auto white balance area start y position. Values are based on 2560x1936 resolution.	Beginner	RW
AWBAreaWidth	IInteger	Set the auto white balance area width. Values are based on 2560x1936 resolution.	Beginner	RW

AWBAreaHeight	IInteger	Set the auto white balance area height. Values are based on 2560x1936 resolution.	Beginner	RW
ColorTemp	IEnumeration	In the Manual mode, the color temperature is established.	Beginner	RW
GainR	IInteger	Set the white balance red color.	Beginner	RW
GainB	IInteger	Set the white balance blue color.	Beginner	RW

<Table> 26. Analog Control Features List Sheet

9.9.7. Image Process Control

Feature	Type	Description	Visibility	Access
ColorSaturationR	IInteger	Adjusts the overall color of the image in the red direction.	Beginner	RW
ColorSaturationG	IInteger	Adjusts the overall color of the image in the green direction.	Beginner	RW
ColorSaturationB	IInteger	Adjusts the overall color of the image in the blue direction.	Beginner	RW
Sharpness	IInteger	The function of emphasizing the edge of the image.	Beginner	RW
SharpnessBigEdge	IInteger	Sharpness for Big edge image.	Beginner	RW
SharpnessSmallEdge	IInteger	Sharpness for Small edge image.	Beginner	RW
ACE	IEnumeration	Selects the ACE.	Guru	RW
ACEIntensity	IInteger	ACE intensity setting.	Guru	RW
ACEBrightness	IInteger	ACE brightness setting.	Guru	RW
Defog	IEnumeration	Selects the Defog.	Guru	RW
DefogMode	IEnumeration	Selects the defog mode.	Guru	RW
3DDNR	IInteger	Setting the intensity of 3D DNR.	Guru	RW
2DDNR	IInteger	Setting the intensity of 2D DNR.	Guru	RW
2DDNREdgeLevel	IInteger	Setting the edge level of 2D DNR.	Guru	RW
HLCEnable	IBoolean	Enables the HLC.	Beginner	RW
HLCMaskThreshold	IInteger	Sets the threshold of the saturation region in HLC mode.	Guru	RW
HLCMaskColor	IEnumeration	Selects the masking color of the saturated region in HLC mode.	Guru	RW
HSUPEnable	IBoolean	High Light color suppression on/off.	Guru	RW
HSUPThreshold	IInteger	High Light color suppression threshold.	Guru	RW

<Table> 27. Image Process Control Features List Sheet

9.9.8. Digital I/O Control

Feature	Type	Description	Visibility	Access
LineSelector	IEnumeration	Selects the physical line (or pin) of the external device connector or the virtual line of the Transport Layer to configure.	Expert	RW
LineSource	IEnumeration	Selects which internal acquisition or I/O source signal to output on the selected Line. LineMode must be Output.	Expert	RW
LineInverter	IBoolean	Controls the inversion of the signal of the selected input or output Line.	Expert	RW
LineFormat	IEnumeration	Controls the current electrical format of the selected physical input or output Line.	Expert	RO

<Table> 28. Digital I/O Control Features List

9.9.9. Optics Control

Feature	Type	Description	Visibility	Access
FilterSwitch	IBoolean	Turn on/off filter switch	Beginner	RW

<Table> 29. Optics Control Features List

9.9.10. Time Settings Control

Feature	Type	Description	Visibility	Access
NTPServer	IString	NTP Server URL or IP address	Guru	RW
TimeSyncNTP	ICommand	Synchronize time from specified NTP server	Guru	WO
SummerTime	IBoolean	Enables the summertime.	Guru	RW
TimeZone	IEnumeration	Selects the time zone.	Guru	RW

<Table> 30. Time Settings Control Features List

9.9.11. OSD Control

Feature	Type	Description	Visibility	Access
OSDMode	IEnumeration	Selects the OSD mode.	Guru	RW
OSDSize	IInteger	Sets the OSD size.	Guru	RW
OSDPosX	IInteger	Sets the OSD position x.	Guru	RW
OSDPosY	IInteger	Sets the OSD position y.	Guru	RW
OSDText	IString	Sets the OSD text	Guru	RW
OSDTextClear	ICommand	OSD Text Clear.	Guru	WO
OSDColor	IEnumeration	Selects the OSD color.	Guru	RW
OSDColorRed	IInteger	Sets the OSD color red.	Guru	RW
OSDColorGreen	IInteger	Sets the OSD color green.	Guru	RW
OSDColorBlue	IInteger	Sets the OSD color blue.	Guru	RW

<Table> 31. OSD Control Features List

9.9.12. Assist Control

Feature	Type	Description	Visibility	Access
FocusAssistEnable	IBoolean	Enables the Focus Assist.	Beginner	RW
FocusAssistEdgeLevel	IInteger	Sets the Focus Assist Edge Level.	Beginner	RW
FocusAssistEdgeColor	IEnumeration	Sets the Focus Assist Edge Color.	Beginner	RW
DisplayStatisticArea	IEnumeration	Sets the display statistic area.	Beginner	RW

<Table> 32. Assist Control Features List

9.9.13. External Optics Control

Feature	Type	Description	Visibility	Access
CheckExternaLensConnect	ICommand	Check external lens connection.	Beginner	WO
ExternalLensConnectStatus	IEnumeration	External lens connection status.	Beginner	RO
ExternalLensAdjustBacklashEnable	IBoolean	External lens adjust backlash enable.	Beginner	RW
ExternalLensSelector	IEnumeration	Selects the external lens type.	Beginner	RW
ExternalZoomPosition	IInteger	Sets the zoom.	Beginner	RW
ExternalFocusPosition	IInteger	Sets the focus.	Beginner	RW
ExternalIrisPosition	IInteger	Sets the iris.	Beginner	RW
ExternalLensReadjust	ICommand	Readjust zoom/focus/iris.	Beginner	WO
ExternalLensPresetSelector	IEnumeration	Selects the lens preset.	Beginner	RW
ExternalLensPresetLoad	ICommand	Loads the selected external lens preset.	Beginner	WO
ExternalLensPresetSave	ICommand	Saves the current external lens preset.	Beginner	WO
ExternalLensStartupPresetSelector	IEnumeration	Sets the external lens preset to be used as the default startup.	Beginner	RW
ExternalZoomRange	IInteger	External Zoom Range.	Invisible	RO
ExternalFocusRange	IInteger	External Focus Range.	Invisible	RO
ExternalIrisRange	IInteger	External Iris Range.	Invisible	RO

<Table> 33. External Optics Control Features List

9.9.14. Transport Layer Control

Feature	Type	Description	Visibility	Access
PayloadSize	IInteger	Size of payload (Bytes)	Expert	RO
GevVersionMajor	IInteger	GEV major version	Expert	RO
GevVersionMinor	IInteger	GEV minor version	Expert	RO
GevDeviceModeIsBigEndian	IBoolean	Endian of bootstrap register True: Big Endian False: Little Endian	Guru	RW
GevDeviceClass	IEnumeration	Device class	Guru	RW
GevDeviceModeCharacterSet	IEnumeration	Char Set of bootstrap register (Reversed, UTF8)	Guru	RW
GevInterfaceSelector	IInteger	Network interface selector	Beginner	RW
GevMACAddress	IInteger	MAC Address	Beginner	RO
GevCurrentIPConfigurationLLA	IBoolean	Enable/Disable LLA	Beginner	RO
GevCurrentIPConfigurationDHCP	IBoolean	Enable/Disable DHCP	Beginner	RW
GevCurrentIPConfigurationPersistentIP	IBoolean	Enable/Disable Persistent IP	Beginner	RW
GevCurrentIPAddress	IInteger	Current IP address	Beginner	RO
GevCurrentSubnetMask	IInteger	Current subnet mask	Beginner	RO
GevCurrentDefaultGateway	IInteger	Current gateway	Beginner	RO
GevPersistentIPAddress	IInteger	Set persistent IP	Beginner	RW
GevPersistentSubnetMask	IInteger	Set persistent subnet mask	Beginner	RW
GevPersistentDefaultGateway	IInteger	Set persistent gateway	Beginner	RW
GevLinkSpeed	IInteger	Network connection speed	Expert	RO
GevFirstURL	IString	First URL of XML device description	Guru	RO
GevSecondURL	IString	Second URL of XML Device Description	Guru	RO
GevNumberOfInterfaces	IInteger	Number of the interfaces installed in the device.	Expert	RO
GevMessageChannelCount	IInteger	Message channel count supported by the	Expert	RO

		device.		
GevStreamChannelCount	IInteger	Stream channel count supported by the device.	Expert	RO
GevHeartbeatTimeout	IInteger	Heartbeat Timeout(ms)	Guru	RW
GevTimestampTickFrequency	IInteger	Tick frequency of timestamp clock in 1 second.	Expert	RW
GevTimestampControlLatch	ICommand	Latch timestamp value	Expert	RW
GevTimestampControlReset	ICommand	Reset timestamp in device.	Expert	RW
GevTimestampControlLatchReset	ICommand	Reset timestamp latch.	Expert	RW
GevDiscoveryAckDelay	IInteger	Maximum value of random delay waiting to receive search command. (ms)	Expert	RW
GevGVCPExtendedStatusCodesSelector	IEnumeration	Select GEV version to control extended status code.	Guru	RW
GevGVCPPendingAck	IBoolean	Enable PENDING_ACK command generation.	Guru	RW
GevPrimaryApplicationSwitchoverKey	IInteger	Key for primary application switchover requests activation.	Guru	WO
GevCCP	IEnumeration	Control channel privilege feature	Guru	RW
GevPrimaryApplicationSocket	IInteger	UDP Port of Primary Application.	Guru	RO
GevPrimaryApplicationIPAddress	IInteger	IPv4 Address of Primary Application	Guru	RO
GevStreamChannelSelector	IInteger	Select stream channel	Expert	RW
GevSCPDirection	IEnumeration	Direction of the steam channel	Guru	RW
GevSCPInterfaceIndex	IInteger	network interface index to use.	Guru	RW
GevSCPHostPort	IInteger	Port through device streams data.	Guru	RW
GevSCPSFireTestPacket	IBoolean	Execute test packet in bits 16-31	Guru	RW
GevSCPSDoNotFragment	IBoolean	Copied to the DF (Don't Fragment) bit in the IP	Guru	RW

		header of each stream packet.		
GevSCPSPacketSize	IInteger	Packet Size of Selected Channel(bytes)	Expert	RW
GevSCPD	IInteger	Latency between packets of selected channel(tick)	Expert	RW
GevSCDA	IInteger	Destination IPv4 Address of Selected Channel	Guru	RW
GevSCSP	IInteger	Source port of the stream channel	Guru	RO
nvtTCPStreamServerEn	IBoolean	Stream with TCP	Guru	RW

<Table> 34. Transport Layer Control Features List

9.9.15. User Set Control

Feature	Type	Description	Visibility	Access
UserSetSelector	IEnumeration	Select UserSet to save or load.	Beginner	RW
UserSetLoad	ICommand	Load settings.	Beginner	RW
UserSetSave	ICommand	Save current settings (Cannot save in "Default".)	Beginner	RW
UserSetDefault	IEnumeration	Set channel to load by default. (Load selected UserSet when booting the camera.)	Beginner	RW

<Table> 35. User Set Control Features List

9.9.16. UART Control

Feature	Type	Description	Visibility	Access
UARTDataLength	IInteger	UART Data Length	Guru	RW
UARTData	IString	UART Data	Guru	RW
UARTRead	ICommand	Read UART	Guru	WO
UARTWrite	ICommand	Write UART	Guru	WO
PrintFrameInfo	IBoolean	Print frame info.	Guru	RW

<Table> 36. UART Control Features List

10. Appendix

10.1. i-Nova4 Specification

10.1.1. i-Nova4 Camera

Model name	iN4-50EC
Sensor model	Teledyne e2v Emerald EV2S05MC: 1/1.8", CMOS, Color
Interface	100/1000Mbps Ethernet (RJ45 Connector)
Resolution / Frame rate	2560x1936 pixels, 30fps (MJPEG: 2560x1936*)
Shutter mode	Global Shutter
Color depth	RGB 8bit
Gain	Manual / Auto 1 ~ 32 (0 ~ 20dB)
Trigger modes	External Trigger (One shot, Multi shot), Software Trigger
Flash out modes	On / Off / Auto
Operation temperature / Humidity	0°C ~ 50°C / 20 ~ 80%
Storage temperature / Humidity	-20°C ~ 60°C / 20 ~ 90% (Before Condensation)
Power supply	+12 V DC ~ 24 V DC
Power consumption	Max. 8.5W
Connector I/O, Power	2-pin Screw terminal block
Lens mount	C/CS-Mount
I/O port	1x Input for Triggering (Low level: 0 ~ 0.8V / high level: 2V ~ 24V) 2x Strobe (TTL, open collector)
Dimension / Weight	70 x 72 x 82mm (W x H x D), 665g
Filter switcher / DC iris	IR-cut filter On/Off
Image processing	White Balance, WDR, Sharpening
Protocol	RTSP (MJPEG, H.264, H.265), GenICam, ONVIF
SDK	Viewer and example code for Novitec Camera API (C++, C#)
Certificate	KC / CE

<Table> 37. i-Nova4 Specification

* Please note that when using a third-party RTSP stream player, the video resolution may be limited to 1920x1080. To fully utilize the i-Nova4's capabilities, we recommend using the Novitec viewer

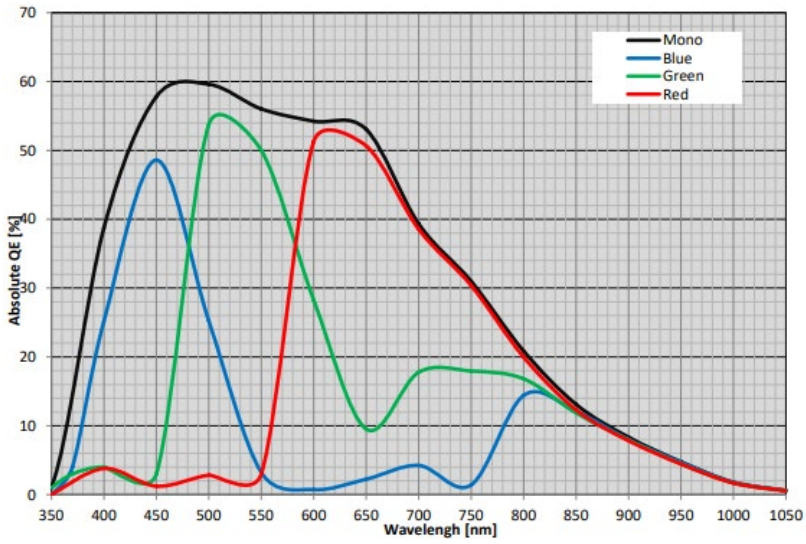
10.2. EV2S05MC

10.2.1. EV2S05MC Sensor Information

Parameter			Unit	Typical Value
Sensor characteristics	Resolution		pixels	2560 (H) x 1936 (V)
	Image size		mm inches	8.987 (diagonal) 1/1.8"
	Pixel size (square)		µm²	2.8 x 2.8
	Aspect ratio		1/inch	4:3
	Max frame rate		fps	54 @ 8bit 54 @ 10bit 40 @ 12bit
	Pixel clock		MHz	50 (Nominal) or 100
	Bit depth		bits	8 / 10 / 12
Pixel performance [0]	Dynamic range		dB	66
	System Gain K		DN/e-	0.61
	Full Well Capacity		e-	6970
	Saturation capacity μe_{sat}		e-	6420
	SNR max		dB	38
	Linearity error		%	± 0.5
	MTF @ Nyquist, 550 nm		%	>50
	Temporal dark noise σ_d		e-	2.8
	Absolute sensitivity, μe_{min}		e-	3.1
	DSNU [1]		e-	1.63
	PRNU [2]		%	1.8
	QE (@500nm)		%	60
Electrical interface	Power supplies	Digital	V	1.62 < VDDIO < 3.6
				3.3
				1.2
		Analog	V	3.3
	Power consumption [3] : Functional Standby idle		 mW mW mW	 < 450 < 6 < 200

<Figure> 52. EV2S05MC Sensor Information

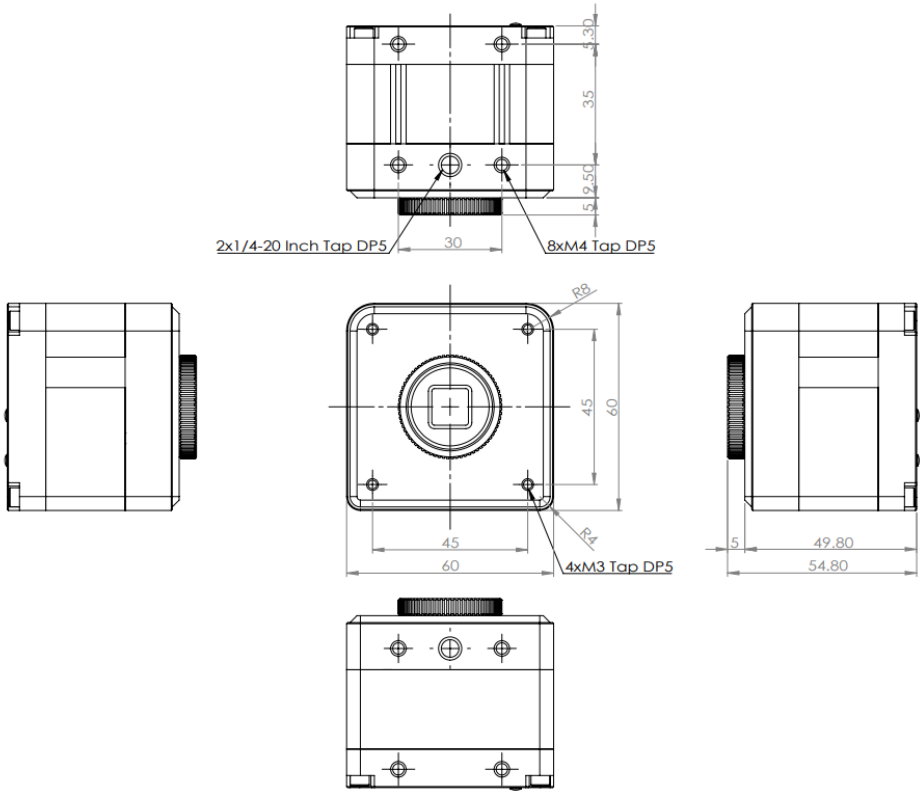
10.2.2. Quantum Efficiency



<Figure> 53. Quantum Efficiency

10.3. Dimensions

10.3.1. i-Nova4 Dimensions



<Figure> 54. i-Nova4 Dimensions

11. Image Index

12. Sheet Index

13. Revision History

Date	Version	Description	Note
2023.03.14	V1.0	Initial Release	

<Figure> 55. Revision History

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