

[g-Nova3D]

[User Manual]

CONTENTS

1. ABOUT THIS DOCUMENT	5
2. IMPORTANT INFORMATION.....	5
2.1. INSTRUMENT SAFETY INSTRUCTIONS.....	5
2.2. OPERATION CONSIDERATIONS.....	5
2.2.1. Important Safety Precautions.....	5
2.2.2. Handling and Cleaning	5
2.2.3. Installation	6
2.2.4. Performance and Longevity.....	6
2.2.5. Connector	6
2.2.6. C-mount Adjustment	6
3. CAMERA INTRODUCTION	7
4. QUICK START	7
4.1. SYSTEM REQUIREMENTS	7
4.2. DOWNLOAD SDK.....	7
5. CAMERA INSTALLATION AND CONFIGURATION.....	7
5.1. CAMERA CONNECTION.....	7
5.1.1. POWER I/O.....	8
5.1.2. Network Cable Connection	9
5.2. INSTALL SDK	9
5.2.1. Novitec Camera SDK File Execution.....	9
5.2.2. Install SDK and 3D Camera Viewer, Examples	9
5.3. NETWORK SETTINGS.....	10
5.3.1. Network settings in DHCP environment.....	10
5.3.2. Set static IP	10
5.4. ACCOUNT SETUP ON FIRST USE.....	14
5.4.1. Camera Connect in the Novitec 3D Camera Viewer.....	14
5.4.2. Create an account in Novitec 3D Camera Viewer.....	14
6. TO OPERATE.....	15
6.1. NOVITEC 3D CAMERA VIEWER	15
6.1.1. Menu.....	15

6.1.2. Toolbar	16
6.1.3. Image Display Window	16
6.1.4. Camera Settings Window.....	16
6.1.5. Status Bar.....	17
6.2. 2D DATA ACQUISITION.....	17
6.2.1. 2D Image Settings.....	17
6.3. PROFILE DATA ACQUISITION	18
6.3.1. Profile Settings	18
6.4. RANGEMAP DATA ACQUISITION	18
6.4.1. RangeMap Settings.....	19
6.5. 3D DATA ACQUISITION.....	19
6.6. USE IO.....	19
6.6.1. Trigger Input.....	20
6.6.2. Strobe Output.....	20
6.7. SENSOR CALIBRATION.....	20
6.7.1. Calibration Method.....	20
6.8. FIRMWARE UPDATER.....	21
7. SET	22
7.1. OUTPUT MODE.....	22
7.1.1. 2D.....	22
7.1.2. 2D /Profile	22
7.1.3. 3D.....	22
7.2. 3D PROFILE SETTINGS	22
7.2.1. COG (Center of Gravity).....	22
7.2.2. 3D Data Type	22
7.2.3. Dual Peak.....	22
7.2.4. Frame Combine	23
7.3. LINE TRIGGER.....	23
7.4. FRAME TRIGGER	23
7.5. FEATURES.....	23
7.5.1. Device Control.....	23
7.5.2. Action Control	24
7.5.3. Image Format Control	24
7.5.4. Acquisition Control	24

7.5.5. Scan3D Control.....	25
7.5.6. Analog Control.....	26
7.5.7. Digital IO Control.....	26
7.5.8. User Set Control.....	26
8. APPENDIX.....	26
8.1. G -NOVA3D SPECIFICATIONS.....	26
8.2. LUXIMA LUX1310 SPECIFICATIONS.....	27
8.3. G-NOVA3D DIMENSIONS.....	28
9. IMAGE INDEX.....	29
10. TABLE INDEX.....	30
11. REVISION HISTORY.....	30
12. CONTACT.....	30



1. About this document

This document is for those new to the g-Nova3D camera. This document introduces the basic information required to use the camera – H/W and S/W installation and how to acquire data using the provided viewer.

API documentation and example project for programming requirements.

For more information, please visit Novitec Technical Support Cafe.

<https://cafe.naver.com/novitecsupport>

2. Important Information

2.1. Instrument Safety Instructions

- We are not responsible for any damage caused by user negligence or other equipment connection.
- Please handle the camera with care. strong shock or please be careful when storing in an unsuitable environment.
- Please do not use accessories that are not recommended as they may be dangerous.

2.2. Operation Considerations

2.2.1. Important Safety Precautions

- Please check the specifications for each product and use a power supply with the appropriate specifications.
- The product is a radiator, fire, stove, or other product (amplifier, etc.) Please use it away from heat sources such as
 - flammable substances, water, or be careful not to let metal get inside the camera.
 - Do not modify the camera or use the camera with the outer cover removed.
 - Thunder, Stop using the camera in lightning strikes.
 - When using the camera outdoors, protect it from moisture. (rain / snow, etc.)
- Board level notes
 - Be careful to avoid electric shocks such as static electricity (ESD).
 - ◆ Please use grounding to respond ESD.
 - ◆ Avoid all plastic, vinyl, and Styrofoam around printed circuit boards.
 - ◆ Do not touch the components on the circuit board with your hands or conductive devices.

2.2.2. Handling and Cleaning

- Do not attempt to disassemble the camera.
- Lens and filter replacement Or, when removing, be careful not to let water or dust enter.

- Use a blower or lens brush to remove dust from the lens or optical filter.
- Do not disassemble the front flange.
- Clean the case with a soft, dry cloth.
- Do not use the cleaner like Benzene, thinner, alcohol, water, or spray.

2.2.3. Installation

Avoid installing or storing the camera in the following locations.

- Environments exposed to direct sunlight, rain, or snow
- Environments where combustible or corrosive gas exists
- Excessive temperature or low temperature environment (recommended ambient temperature: 0 to 45 °C)
- Wet or dusty places
- Places subject to excessive vibration or shock
- Environments exposed to strong electric or magnetic fields
- An environment where the camera is installed facing the sun or other strong light sources
- In case of unfavorable environment, be sure to inquire about the installation environment before installation.

2.2.4. Performance and Longevity

Please configure the environment that meets the camera operation specifications. If the ambient temperature is high, the service life may be shortened due to deterioration of the parts. In that case, you also need to consider the cooling system.

2.2.5. Connector

- I/O connector, please be careful with the connection so that the wires fit well.
- Make sure the power is off before connecting or disconnecting the I/O connector.
- To avoid damaging the connector, do not pull by holding the electric wire, etc.

2.2.6. C-mount Adjustment

g-Nova3D is basically manufactured as a CS-mount, and a C-mount lens can be used by using the extension ring as shown in the figure below.



<Image> 1. g-Nova3D mount (CS) and extension ring (CS to C) Image

3. Camera Introduction

g-Nova3D is a laser triangulation method optimized for high-speed 3D inspection. High speed 3D camera. Please refer to Chapter8 Appendix for camera specifications.



<Image> 2. g-Nova3D Camera Image

4. Quick Start

4.1. System Requirements

- OS: Microsoft Windows 7/8/10(32bit, 64bit), Linux(32bit/64bit/ARM64)
(However, Novitec Camera Viewer for Windows only supports 64bit OS.)

4.2. Download SDK

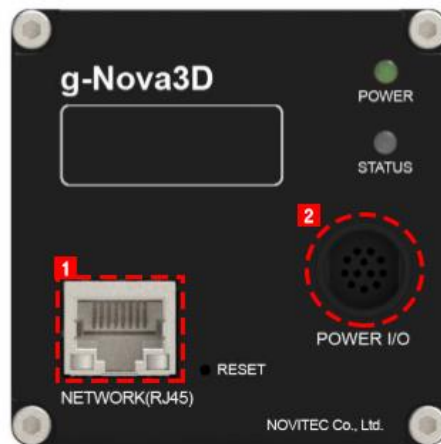
The SDK provided supports C++ and C#. (However, Linux supports only C++.)
SDK can be downloaded from our website.

<https://www.novitec.co.kr/its/sub/support03.php?category=SDK>

5. Camera Installation and Configuration

5.1. Camera Connection

On the back of the camera, there is a power I/O connector and a network connector as shown below.



<Image> 3. g-Nova3D Rear Port Image

5.1.1. POWER I/O

The g-Nova3D camera uses 12V power. Connect the power to the 12pin power I /O cable, Connect the power cable to the camera.

Pin map of POWER I/O of g-Nova3D is as follows.



<Image> 4. Power I/O Pin Map Image

Pin	signal	Description
1	GND	Camera Ground
2	CAMERA POWER	Camera Power (12V)
3	STROBE OUT	Strobe Output
4	ENC IN A+	Encoder Input A+
5	ENC INA-	Encoder Input A-
6	IO POWER	IO Power
7	TRIG IN-	Frame Trigger Input
8	-	-

9	TRIG IN	Line Trigger Input
1 0	ENC IN B+	Encoder Input B+
1 1	ENC IN B-	Encoder Input B-
1 2	IO GND	IO Ground

<Table> 1. Power I/O Pin Map Table

5.1.2. Network Cable Connection

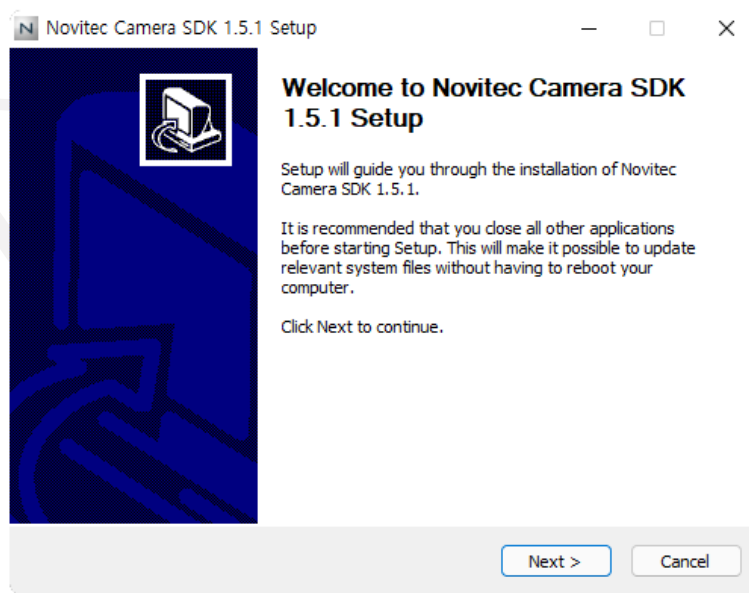
Network cable to the camera and PC.

When using DHCP, connect the cable to the router/switch/hub connected to the network with the camera and DHCP server.

5.2. Install SDK

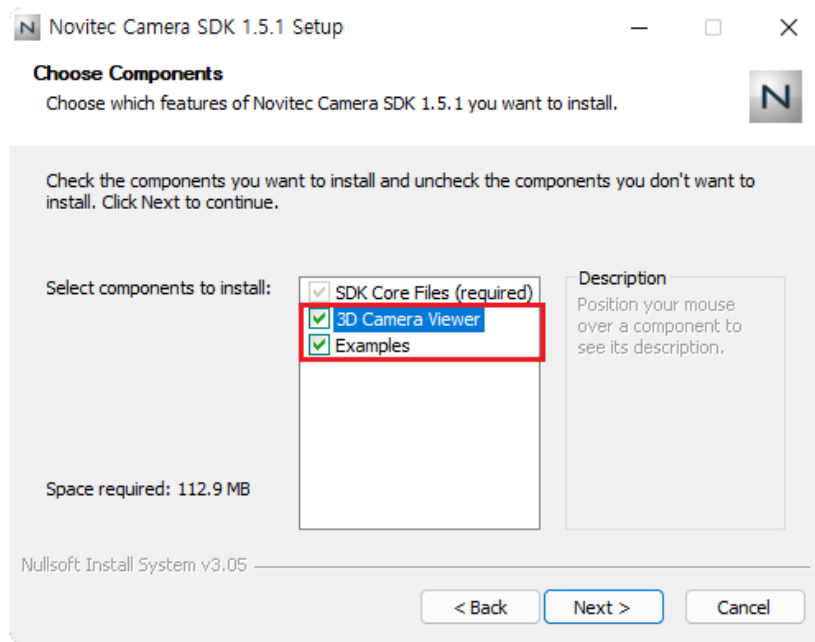
Execute the provided Novitec Camera SDK Installer to install the SDK.

5.2.1. Novitec Camera SDK File Execution



<Image> 5. Novitec Camera SDK Installation Image1

5.2.2. Install SDK and 3D Camera Viewer, Examples



<Image> 6. Novitec Camera SDK Installation Image2

SDK is installed by default. If necessary, you can install 3D Camera Viewer and Examples together. Click the "Next" button to complete the SDK installation.

5.3. Network Settings

When the camera is connected at the first time, camera IP settings option is set to DHCP and LLA (Link Local Address) by default. When the camera is failed to connect a DHCP server, the IP address is set by using LLA.

5.3.1. Network settings in DHCP environment

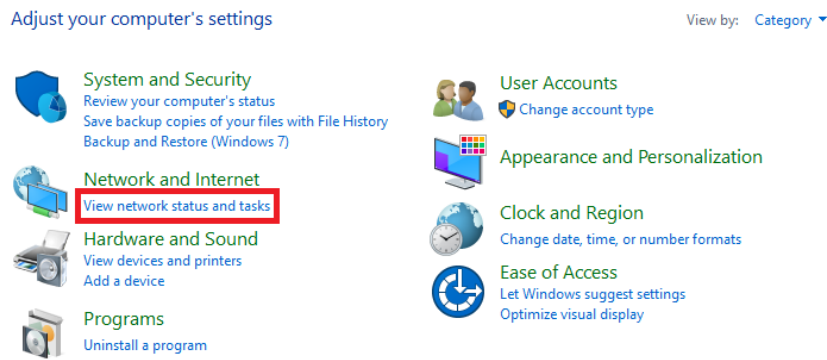
DHCP is set when the camera is shipped. When using for the first time, if the camera is connected to a network with a DHCP server, no additional settings are required.

5.3.2. Set static IP

When the camera is connected to the PC directly, IP settings of the camera and PC's network adapter are required.

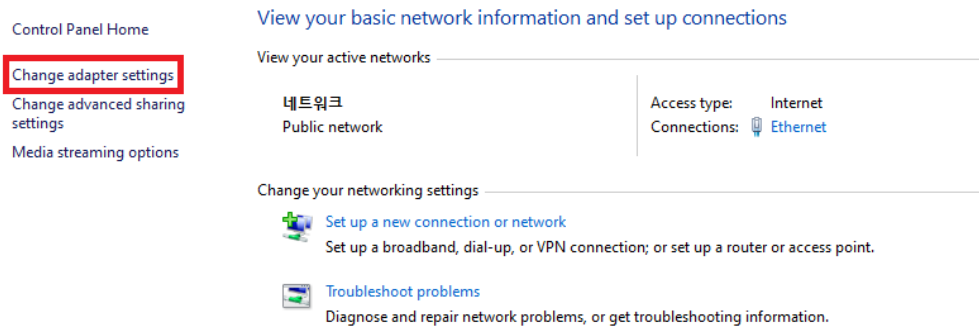
5.3.2.1. PC Network Adapter IP Settings

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



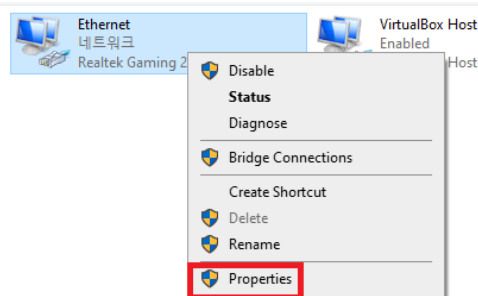
<Image> 7. Control Panel Image

- Click "Change adapter settings" on the left side of the screen.



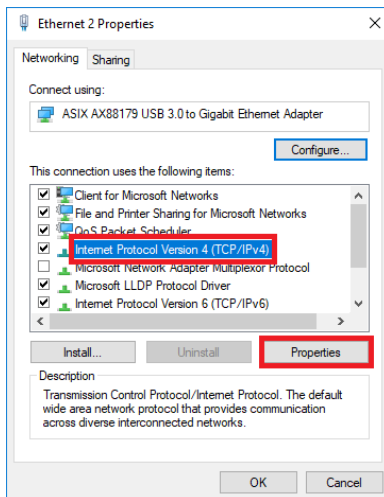
<Image> 8. Control Panel – Network Status and Tasks Screen Image

- Right Click on the network to which the camera is connected and select "Properties" from the menu.



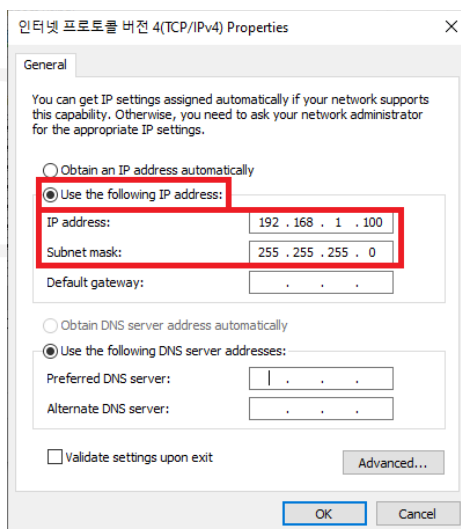
<Image> 9. Network Right Click Menu Image

- When the Ethernet properties appears, select "Internet Protocol Version 4(TCP/IPv4)", and click "Properties"



<Image> 10. Ethernet Properties Screen Image

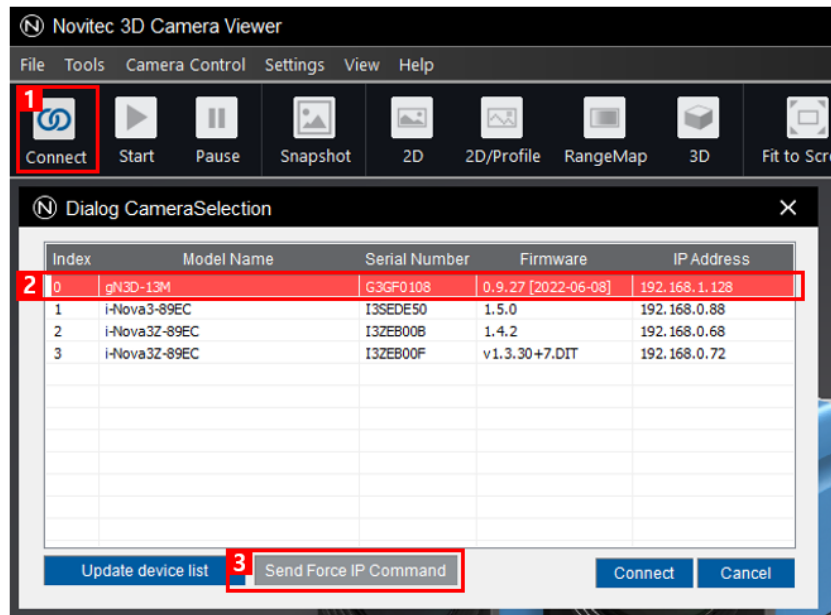
- ⑤ In Internet Protocol Version 4(TCP/Ipv4) properties screen, click “Use the following IP address” and then, set up IP address and subnet mask.
When using static IP, usually use private IP address class C. The C class ranges from 192.168.0.0 to 192.168.255.255.



<Image> 11. Ipv4 Settings Screen Image

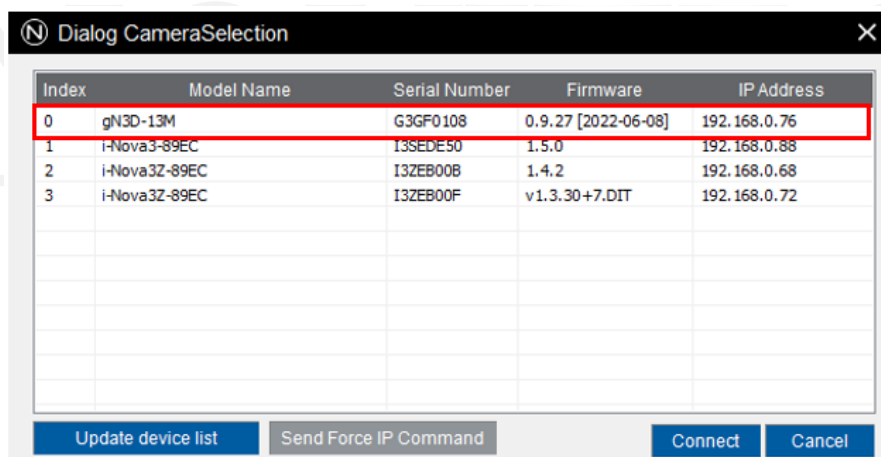
5.3.2.2. Camera IP settings

- ① Run the Novitec 3D Camera Viewer included in the SDK.
- ② Run the viewer and click “Connect” button on the top menu, displayed a list of connectable cameras. If IP band set on camera and IP band on network adapter are different, it is displayed in red as below. When you select the camera, the “Send Force IP Command” button at the bottom is activated. Click the button to give the camera a temporary IP.



<Image> 12. Novitec 3D Camera Viewer – Connect Dialog Image

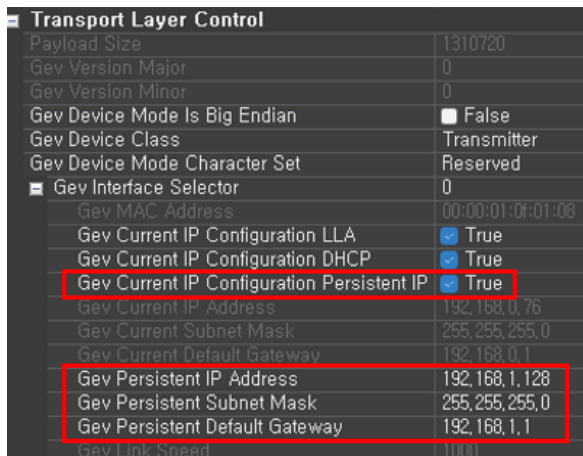
- ③ Once the camera is given a temporary IP, the red color will disappear as shown in the picture below, click the camera and click "Connect" button to connect the camera.



<Image> 13. Novitec 3D Camera Viewer – Connect Dialog Image2

After temporary IP address is assigned, the camera can be used immediately, but when the power is reset, IP settings are reset to default. Set up persistent IP to keep IP settings after camera is reset.

- ④ After running the viewer and connecting the camera, click the "Configuration Persistent IP" checkbox in the "Transport Layer Control" category of the Camera Property on the right side of the Viewer. Enter the IP, Subnet Mask, and Gateway to set.



<Image> 14. Persistent IP Setting Image

The IP you enter must be the same as the IP band of the PC network adapter

Example) PC Network Adapter – IP: 192.168.0.100, Subnet: 255.255.255.0

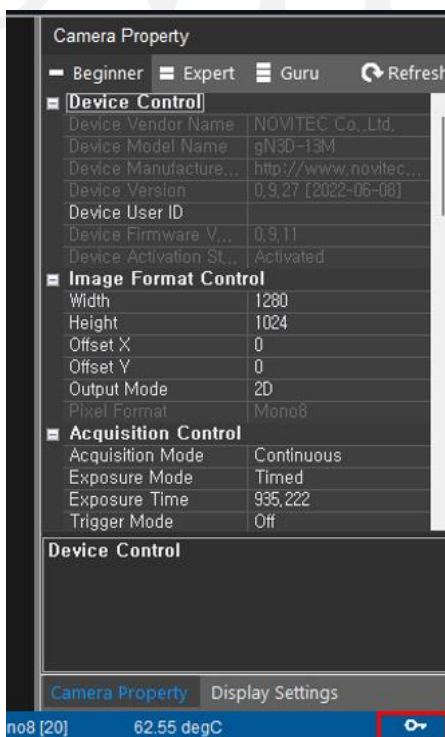
Camera – IP: 192.168.0.128, Subnet: 255.255.255.0

5.4. Account Setup on First Use

When connecting to camera for the first time, the user must set up ID and password. If you don't set ID and password, video streaming is limited.

5.4.1. Camera Connect in the Novitec 3D Camera Viewer

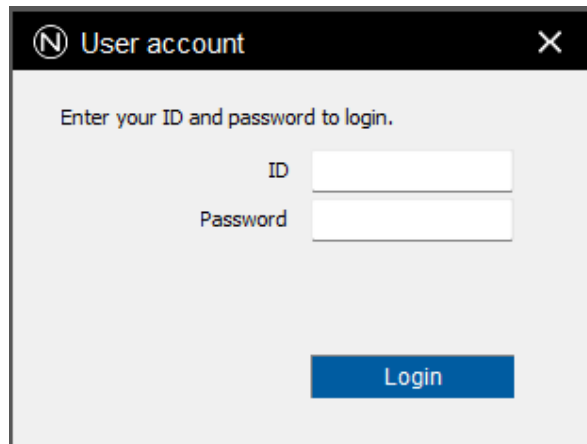
Run Novitec 3D Camera Viewer, connect to the camera, and click the key at the bottom right of the Viewer.



<Image> 15. Novitec 3D Camera Viewer - Account Settings Image1

5.4.2. Create an account in Novitec 3D Camera Viewer

Enter your ID and password and click the "Create account" button to create an account.

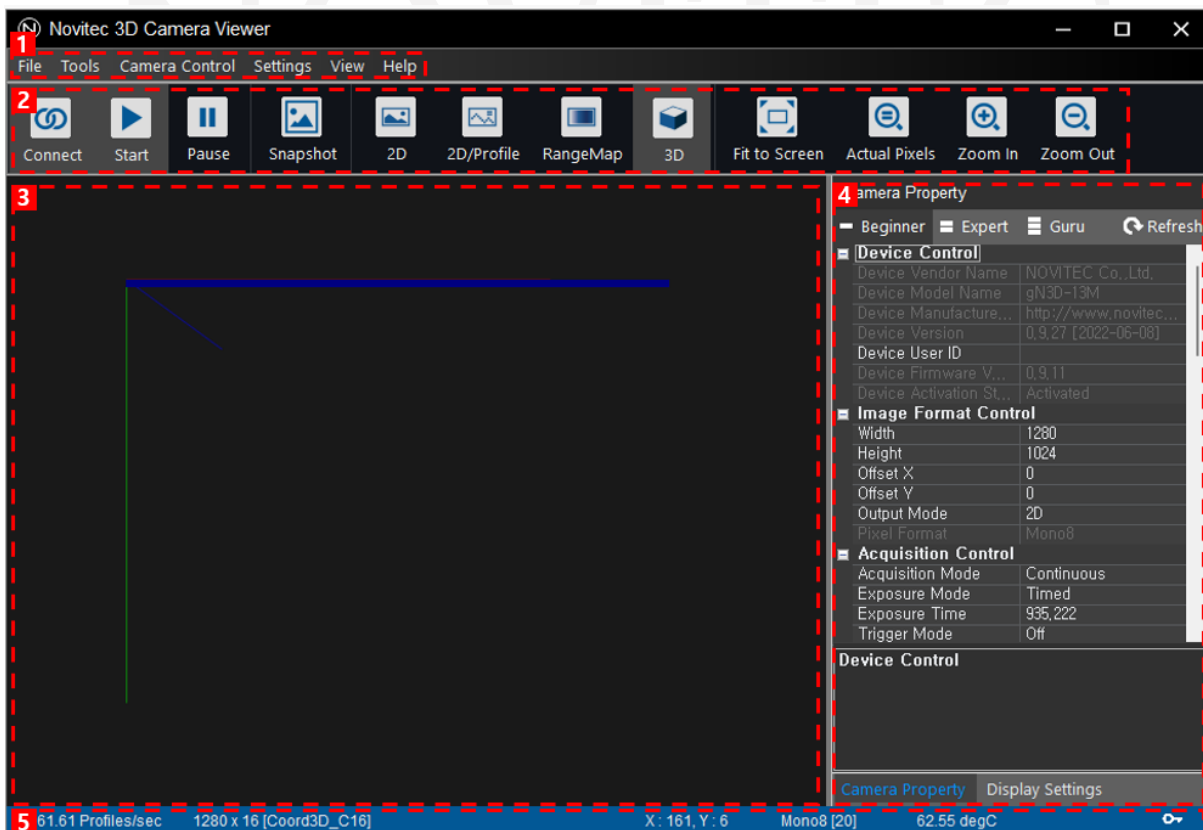


<Image> 16. Novitec 3D Camera Viewer - Account Settings Image2

6. To Operate

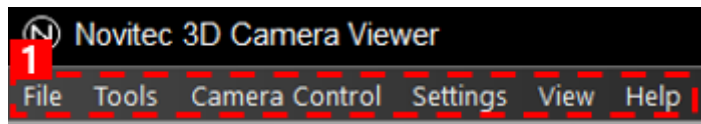
6.1. Novitec 3D Camera Viewer

The Novitec 3D Camera Viewer allows you to view basic camera controls and images. The UI of Viewer is composed as follows.



<Image> 17. Novitec 3D Camera Viewer - Main UI Image

6.1.1. Menu

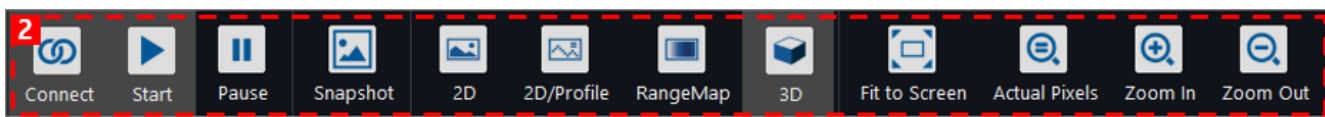


<Image> 18. Novitec 3D Camera Viewer - Menu Image

There are 5 items as follows.

- File: save/load images and exit the program
- Tools: firmware update
- Camera Control: connect/disconnect camera, Camera control such as start and stop
- Settings: set camera properties, screen display settings, sensor calibration, etc.
- View: image display size, such as Zoom In/Out, and display status settings such as profile view and status bar
- Help: show program information

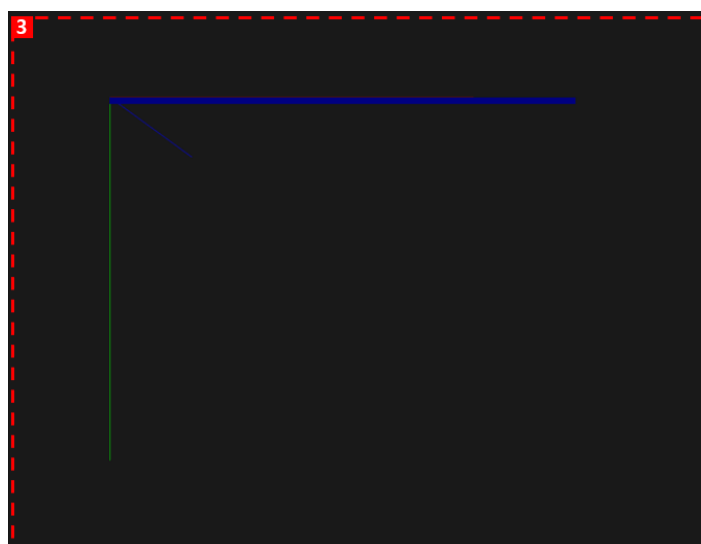
6.1.2. Toolbar



<Image> 19. Novitec 3D Camera Viewer - Toolbar Image

The toolbar has a camera controls function that is frequently used. These include camera connection and startup control, snapshot, output mode setting, screen setting, etc.

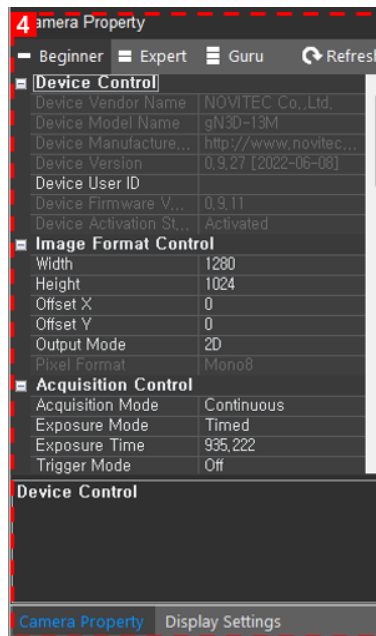
6.1.3. Image Display Window



<Image> 20. Novitec 3D Camera Viewer – Image Display Window Image

When the camera starts, an image appears in the image display window. Image according to the output mode, Data is displayed in the form of RangeMap, 3D Point Cloud.

6.1.4. Camera Settings Window



<Image> 21. Novitec 3D Camera Viewer – Camera Settings Window Image

Set camera properties and screen display method. You can change the setting items by changing the bottom tab.

6.1.5. Status Bar

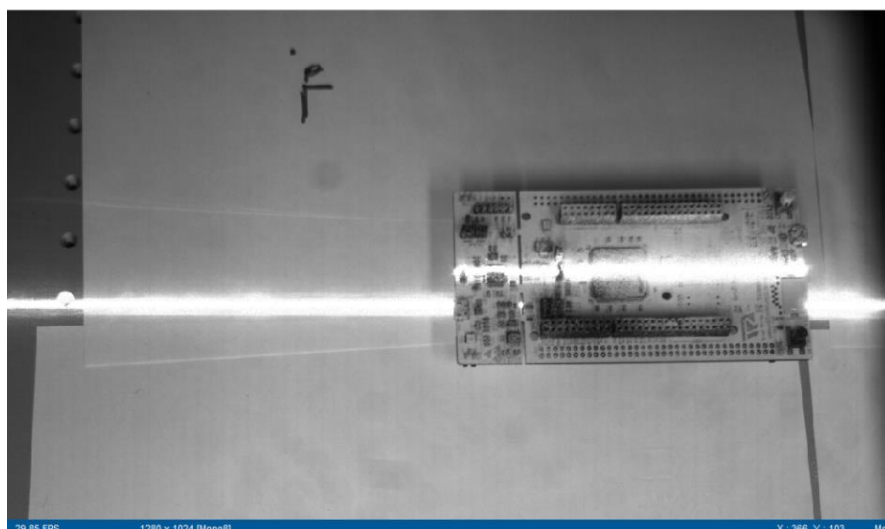


<Image> 22. Novitec 3D Camera Viewer – Status Bar Image

Displays the current camera status, such as FPS, Image Information, and camera temperature.

6.2. 2D Data Acquisition

“Start” button on the top toolbar and click the “2D” button to set the output mode to 2D. When set, the real-time image output from the sensor is displayed in the image display window.



<Image> 23. 2D Data Acquisition Image

6.2.1. 2D Image Settings

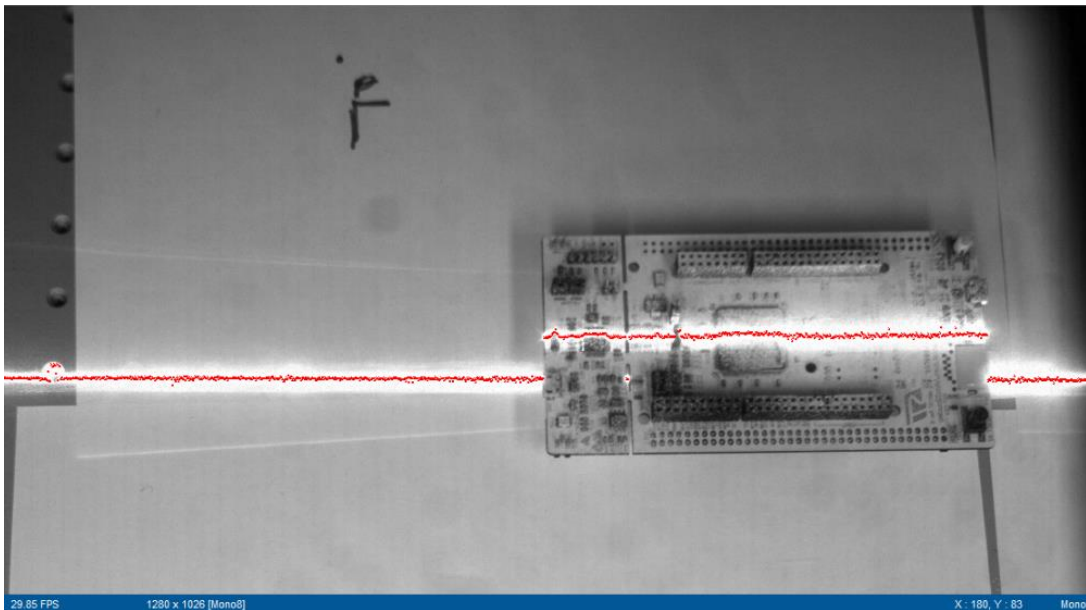
2D Mode is the stage to set the image for laser profile detection.

6.2.1.1. Main 2D Parameters

- Exposure /Gain: Adjust the sensor exposure time and gain to make the laser line visible.
- ROI: Set the ROI to match the object's inspection height. Reducing ROI increases the available FPS.
- Frame rate: Adjust the frame rate to be used during inspection.
In 2D mode, the frame rate displayed limited to 60 FPS.

6.3. Profile Data Acquisition

Click on "2D/Profile" on the top toolbar to obtain data containing 2D images and profile information.



<Image> 24. 2D/Profile Data Acquisition Image

6.3.1. Profile Settings

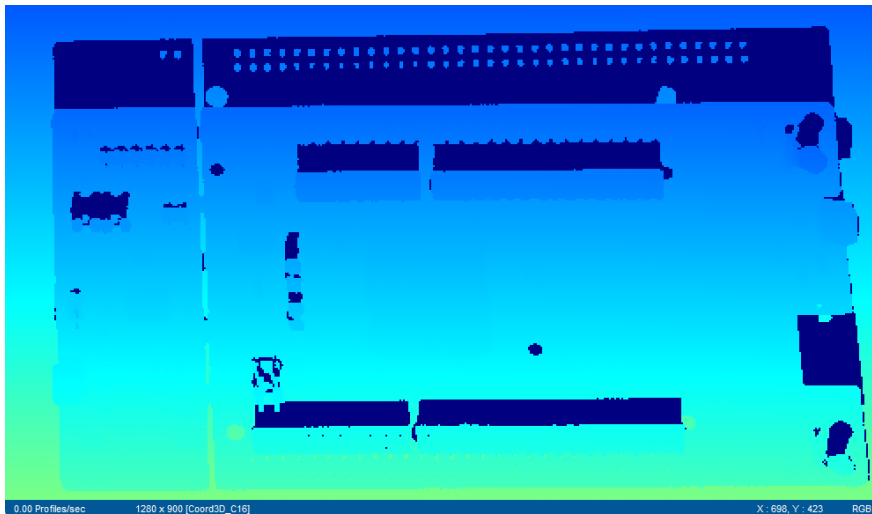
This step sets the detection ROI and threshold for the profile. g-Nova3D supports dual profiles. You need to set profile used or not, ROI, and the threshold for the profile detection.

6.3.1.1. Main Profile Parameters

- Peak0 Enable: Set whether Peak0 to used or not. Peak0 is always enabled, so it is fixed as True.
- Peak0 Y Begin/End: Detection ROI for Peak0
- Peak0 Threshold: Peak0 threshold
- Peak1 Enable: Set whether Peak1 to used or not.
- Peak1 Y Begin/End: Detection ROI for Peak1
- Peak1 Threshold: Peak1 threshold

6.4. RangeMap Data Acquisition

Click "RangeMap" button on the top toolbar. RangeMap is data created by accumulating profile data in chronological order



<Image> 25. RangeMap Data Acquisition Image

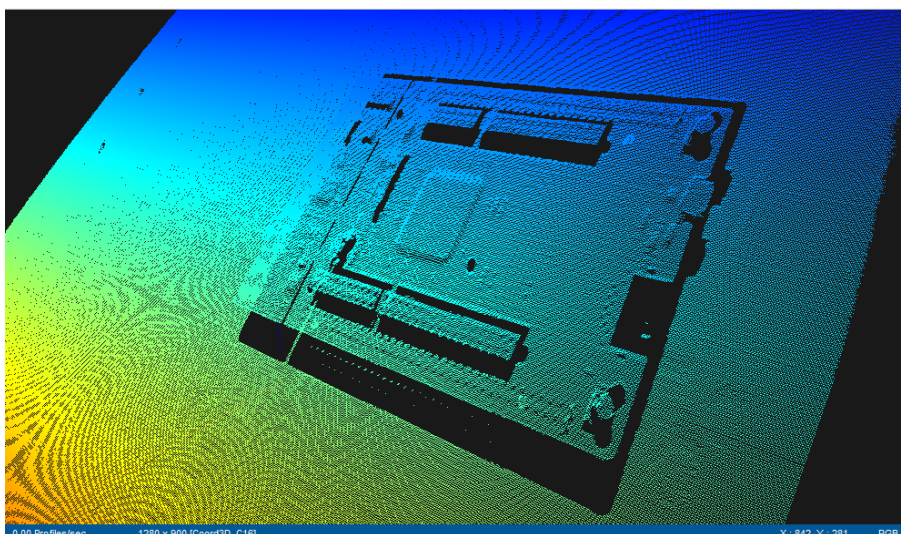
6.4.1. RangeMap Settings

6.4.1.1. Main RangeMap Parameter

- FrameCombine: Determines the number of Profiles to be transmitted in one frame when data is transmitted from the camera. Frame loss can be reduced by increasing FrameCombine during high-speed scanning.

6.5. 3D Data Acquisition

Click "3D" button on the top toolbar. 3D Data is output on the screen by converting RangeMap into point cloud form. You can adjust the scale of point cloud data by specifying point cloud scale X/Y/Z in the "Display Settings" tab of the camera setting window.



<Image> 26. 3D Data Acquisition Image

6.6. Use IO

g -Nova3D supports TTL, Encoder, Differential Encoder format trigger input and TTL format strobe output.
 g- Nova3D has separate IO power, so you need to input a separate power supply when using IO. <Table>
 1. Refer to Power I/O Pin Map and connect IO Power (pin6) / IO GND (pin12) and power.

6.6.1. Trigger Input

6.6.1.1. TTL Trigger Input

Connect trigger source + to TRIG_IN (pin9)

6.6.1.2. Encoder Input

Connect A/B signal output from encoder to camera IO TRIG_IN (pin9) / TRIG_IN- (pin7)

6.6.1.3. Differential Encoder input

Connect A+/A-/B+/B- output from encoder to camera IO ENC IN A+ / ENC IN A- / ENC IN B+ / ENC IN B-

6.6.1.4. Set Camera Properties

Set trigger related parameters in the Acquisition Control category in the Camera Property window on the right side of the viewer.

- TriggerMode – Set whether trigger to used or not.
- TriggerSource – Set the trigger source, Specifies the connected IO. (TTL / Encoder / Differential Encoder / Software)
- TriggerActivation – Set the trigger activation point (RisingEdge / FallingEdge)
- TriggerDivider – Specifies the trigger multiplier
- EncoderDirection – Set the encoder direction for trigger activation (A/B/AB)

6.6.2. Strobe Output

g -Nova3D supports one TTL output. Refer to Table 2 and connect to STROBE OUT (pin3) / IO GND (pin12) of external device and camera.

6.6.2.1. Set Camera Properties

strobe related parameters in the Digital IO Control category in the Camera Property window on the right side of the viewer.

- Line Source – Strobe Source (Off or ExposureActive)
- Line Inverter – Invert the output signal

6.7. Sensor Calibration

g -Nova3D supplies the product with basic calibration. The calibration function is prepared so that the user can directly calibrate for special cases such as calibration deviation during distribution. function.

6.7.1. Calibration Method

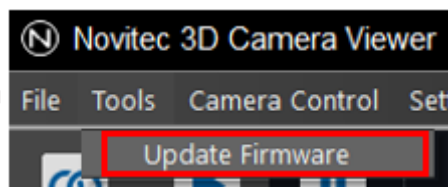
- ① Change the Output mode to 2D by clicking the "2D" button on the tool bar of the viewer.

- ② "Settings" -> "Sensor Calibration" in the menu
- ③ "Calibration mode on/off" checkbox in the "Sensor Calibration" window
- ④ lens so that the average image brightness is less than 250, and when the "Calibration ADC Offset" button is activated, click to perform calibration
- ⑤ Open the lens and reflect the unpatterned bright side (A4 paper) to the camera so that the average brightness is 3500, and when the Calibrate ADC Gain button is activated, click to perform calibration

6.8. Firmware Updater

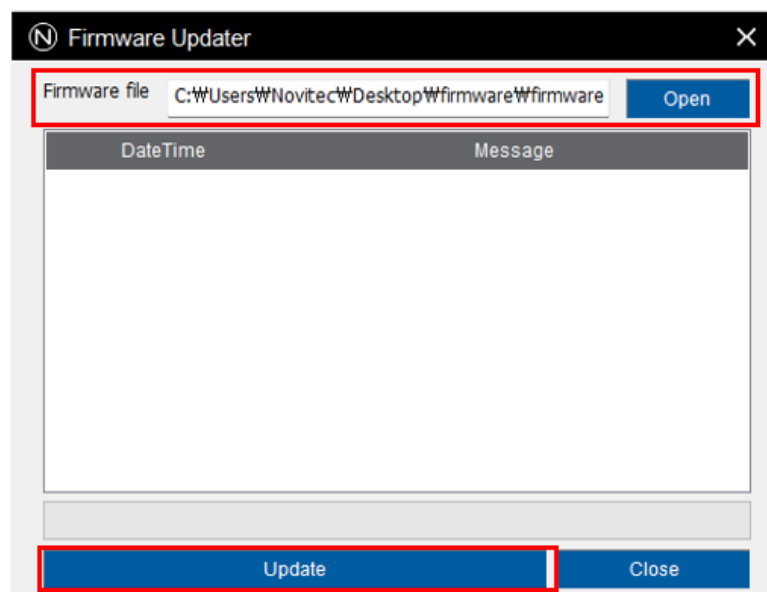
Firmware file is provided for updating when the camera feature changed, or bugs are fixed. The file extension of the provided firmware is *.nfw.

- ① Run the Novitec 3D Camera Viewer.
- ② Connect to the camera to update.
- ③ Select "Tools" on the menu, click "Update Firmware".



<Image> 27. Novitec 3D Camera Viewer – Firmware Update Menu Image

- ④ Click "Open" and select firmware file and click "Update" to update.



<Image> 28. Novitec 3D Camera Viewer – Firmware Update Window

- ⑤ After the update process is finished, reset the camera power.

7. Set

7.1. Output mode

7.1.1. 2D

This is the output mode for checking and setting the sensor image. Send images in Mono8 format. In 2D mode, the frame rate is limited to 60 FPS.

7.1.2. 2D /Profile

Output the sensor image and profile. You can set the 3D measurement ROI and threshold on the image and check the results. Print the data in Mono8 format and include the profile information in the bottom two lines of the image. Frame rate is limited to 60FPS.

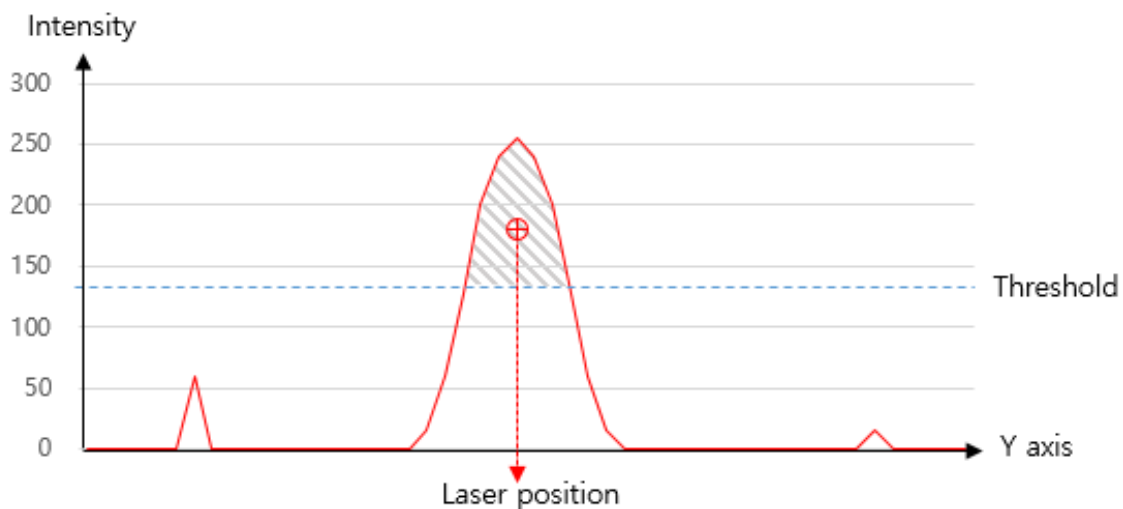
7.1.3. 3D

Send profile data. Each frame is sent as many profiles as specified by FrameCombine.

7.2. 3D Profile Settings

7.2.1. COG (Center of Gravity)

COG algorithm is used for laser profile detection. The position of the laser is obtained by calculating the center of gravity for pixels exceeding the user-specified threshold on all vertical axes of the image.



<Image> 29. COG Algorithm Principal Image

- Related Feature: Peak0 Threshold, Peak1 Threshold

7.2.2. 3D Data Type

3D The Pixel format of the data is Coor3d_C16. Each position of Laser is expressed as 16bit. The data is 1/16 or 1/2 subpixel data depending on the subsampling setting.

7.2.3. Dual Peak

g-Nova3D supports Dual Peak. The laser profile detection ROI on the sensor can be set in two areas. At this time, the settings are limited so that each area does not overlap.

Feature is divided so that it can be set individually for each peak. For the first peak, the feature name is named Peak0, and for the second peak, it is named Peak1.

- Peak0 Feature: Peak0 Enable, Peak0 Y Begin, Peak0 Y End, Peak0 Threshold
- Peak1 Feature: Peak1 Enable, Peak1 Y Begin, Peak1 Y End, Peak1 Threshold

Peak0 is always enabled. If you need to use the second peak, enable Peak1 Enable Feature.

7.2.4. Frame Combine

To increase transmission efficiency, the measured laser profile is transferred to one data in total as many numbers as specified. You can set the frame combine feature to determine the number of profiles to be merged. Generally, it is used to increase the number of profiles when measuring at high speed.

7.3. Line Trigger

Get a profile (or image) in synchronization with external IO. Input signal supports TTL or encoder.

- Related Feature: Trigger Mode, Trigger Source, Trigger Activation Trigger Divider, Encoder Direction, Trigger Software

7.4. Frame Trigger

It is a function to synchronize scan start times through external IO such as incoming sensors. Once the Frame Trigger feature is configured, the camera waits for a signal to enter the Frame Trigger IO. When the signal is entered, the profile is measured by the number of lines specified by the user, and when completed, it is changed to standby. Frame Trigger is used with Free running mode or Line trigger mode.

7.5. Features

Below is a list of features used in g-Nova3D. Most features are compatible with GenICam SFNC. Some Custom Features are displayed in green on the table.

7.5.1. Device Control

Feature	Type	Description	Visibility	Access
DeviceVendorName	String	Vendor Name	Beginner	RO
DeviceModelName	String	Model Name	Beginner	RO
DeviceManufacturerInfo	String	Manufacturer Info	Beginner	RO
DeviceVersion	String	Device Version	Beginner	RO
DeviceSerialNumber	String	Serial Number	Expert	RO
DviceUserID	String	User-enterable Device ID	Beginner	RW
DeviceLinkHeartbeatMode	Enum	Heartbeat of Link Activation Status	Expert	RW
DeviceLinkCommandTimeout	Int	Command timeout of device link	Guru	RO
DeviceFirmwareVersion	String	Firmware Version	Beginner	RO
DeviceTemperature	Float	Device Temperature	Expert	RO
DeviceActivationStatus	Enum	Device Activation Status	Beginner	RO

<Table> 2. Device Control Features List Table

7.5.2. Action Control

Feature	Type	Description	Visibility	Access
ActionUnconditionalMode	Enum	Enable unconditional job command mode in which job commands are processed even when the default control channel is closed	Guru	RW
ActionDeviceKey	Int	Device key to check the validity of action commands	Guru	RW
ActionQueueSize	Int	Size of the scheduled work command queue	Guru	RW
ActionSelector	Int	Select Action Signal	Guru	RW
ActionGroupKey	Int	Key to validate the action on reception of the action protocol message.	Guru	RW
ActionGroupMask	Int	Key to validate the action on reception of the action protocol message.	Guru	RW

<Table> 3. List of Action Control Features

7.5.3. Image Format Control

Feature	Type	Description	Visibility	Access
WidthMax	Int	Max Pixels of Width	Beginner	RO
HeightMax	Int	Max Pixels of Height	Beginner	RO
SensorWidth	Int	Sensor Height Pixels	Beginner	RO
SensorHeight	Int	number of sensor vertical pixels	Beginner	RO
Width	Int	Image Width	Beginner	RW
Height	Int	Image Height	Beginner	RW
Offset X	Int	ROI Offset X	Beginner	RW
Offset Y	Int	ROI Offset Y	Beginner	RW
OutputMode	Enum	Set the output mode (2D, 2D/Profile, 3D)	Beginner	RW
PixelFormat	Enum	Pixel Format	Beginner	RO
SensorPixelSize	Float	Sensor Pixel size (um)	Expert	RO

<Table> 4. Image Format Control Features List Table

7.5.4. Acquisition Control

Feature	Type	Description	Visibility	Access
AcquisitionMode	Enum	Data Acquisition Mode	Beginner	RW
ExposureMode	Enum	Exposure Mode	Beginner	RW
ExposureTime	Float	Exposure Time	Beginner	RW
TriggerMode	Enum	Trigger Mode	Beginner	RW
TriggerSource	Enum	Trigger Source	Beginner	RW

TriggerActivation	Enum	Specify trigger activation mode	Beginner	RW
TriggerDivider	Int	Specify division factor of input trigger signal	Expert	RW
EncoderDirection	Enum	Encoder direction	Beginner	RW
EncoderCounterH	Int	Encoder Counter value (high part bit 0 to 31)	Guru	RO
EncoderCounterL	Int	Encoder counter value (low part bit 32 to 63)	Guru	RO
EncoderCounterReset	Command	Encoder Counter value reset	Guru	RW
ReferenceCounter	Int	Reference Counter value	Guru	RW
ReferenceCounterReset	Command	Reset Reference Counter value	Guru	RW
ProfileBufferReset	Command	Profile Buffer Reset	Guru	RW
EncoderCounterTag	Bool	Encoder counter tag activate	Expert	RW
TriggerSoftware	Command	S/W trigger generation	Beginner	RW
FrameTriggerMode	Enum	Frame Trigger Mode	Expert	RW
FrameTriggerAcquisitionLines	Int	Number of profiles to be obtained when a frame trigger occurs	Expert	RW
FrameTriggerReset	Command	Frame trigger reset, forced termination of working frame trigger	Expert	RW
FrameTriggerSoftware	Command	S/W frame trigger generation	Expert	RW
FrameTriggerLineCounter	Int	Current number of profiles for frame triggers, reset to zero when frame triggers are complete	Expert	RO
FrameCombineAuto	Bool	FrameCombine auto setup	Expert	RW
AcquisitionFrameRate	Float	Frame rate designation	Beginner	RW
AcquisitionStart	Command	Start data acquisition	Beginner	RW
AcquisitionStop	Command	End data acquisition	Beginner	RW

<Table> 5. Acquisition Control Features List Table

7.5.5. Scan3D Control

Feature	Type	Description	Visibility	Access
Peak0Enable	Bool	Whether Peak0 is used or not	Beginner	RO
Peak0YBegin	Int	Peak0 ROI Y start position	Beginner	RW
Peak0YEnd	Int	Peak0 ROI Y end position	Beginner	RW
Peak0Threshold	Int	Peak0 laser detection threshold	Beginner	RW
Peak1Enable	Bool	Whether Peak1 is used or not	Beginner	RW
Peak1YBegin	Int	Peak1 ROI Y start position	Beginner	RW
Peak1YEnd	Int	Peak1 ROI Y end position	Beginner	RW
Peak1Threshold	Int	Peak1 laser detection threshold	Beginner	RW
Scan3dOutputMode	Enum	3D Data output format	Expert	RO
Scan3dFrameCombine	Int	3D Number of Profiles in one Frame during data transmission	Beginner	RW

InverseAxis	Bool	Profile data Y axis direction change	Expert	RW
InvalidValueMask	Enum	Set free point value (0x0000 or 0xFFFF)	Expert	RW
Subsampling	Enum	Subsampling setting (1/16 or 1/2) 8bit output at 1/2 setting	Expert	RW

<Table> 6. Scan3D Control Features List Table

7.5.6. Analog Control

Feature	Type	Description	Visibility	Access
GainSelector	Enum	Specify the gain to set	Beginner	RW
Gain	Float	Set the gain value	Beginner	RW
GainAuto	Enum	Automatic Gain Control(ACG) Mode Setting	Beginner	RW

<Table> 7. Analog Control Features List Table

7.5.7. Digital IO Control

Feature	Type	Description	Visibility	Access
LineSelector	Enum	Select IO to set	Expert	RW
LineSource	Enum	Line source designation	Expert	RW
LineInverter	Bool	Invert the selected input or output signal.	Expert	RW
LineFormat	Enum	I/O format	Expert	RO

<Table> 8. Digital IO Control Features List Table

7.5.8. User Set Control

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

<Table> 9. User Set Control Features List Table

8. Appendix

8.1. g -Nova3D Specifications

Model Name	g N3D-13M
Sensor Model	Luxima LUX1310, CMOS
Resolution	1280 x 1024 pixels
Profile Speed	1 ,600 Profile / Sec @ 1280 x 1024 pixels 32,160 Profile / Sec @ 1280 x 32 pixels

Sensor Size	2/3"
Shutter Type	Global Shutter
Sensor Type	Mono
Pixel Size	6.6 μm x 6.6 μm
Lens Mount	C / CS-mount
I/O Port	Encoder / Trigger input, Profile sync output
Power Supply	< 6W / 12V DC to 24V DC
Interface	Gigabit Ethernet
Image Data Format	Mono8 (2D), Coord3D_16(3D)
Operation Temperature / Humidity	0°C to 50°C / 20 to 80%
Dimension / Weight	65 x 65 x 52.5 mm / 386g
Trigger Source	TTL / Encoder_dif / Software
SDK	Viewer and example code for Novitec Camera API (C++, C#)
Certificate	KC

<Table> 10. g-Nova3D Specification Table

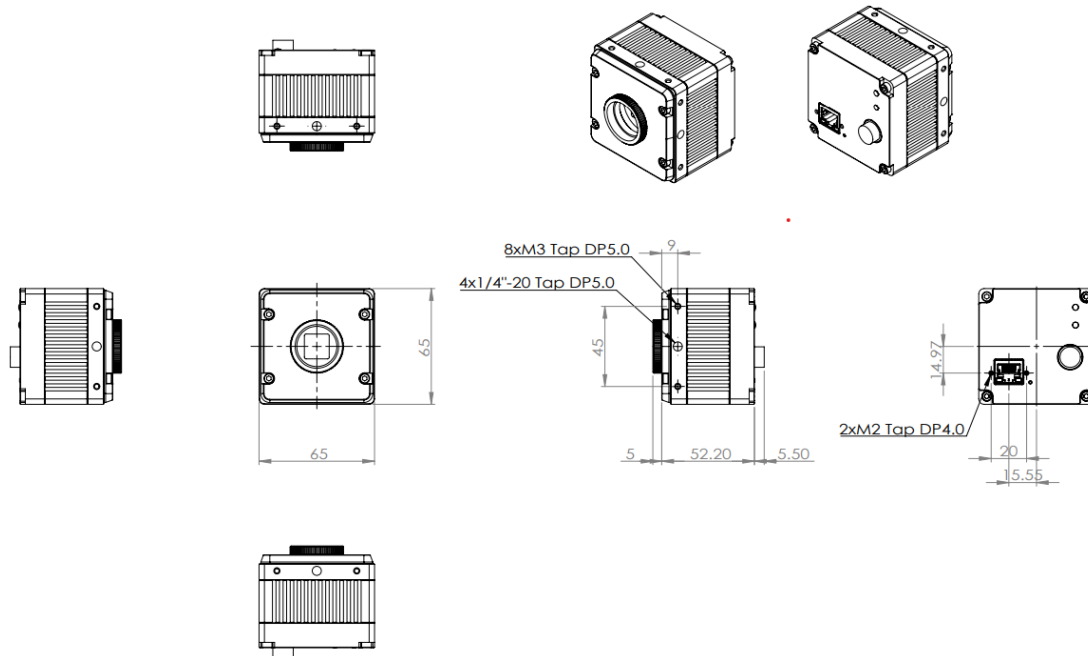
8.2. Luxima LUX1310 Specifications

Optical	format
Active Resolution	1280 x 1024 pixels
Pixel	6.6 μm pitch PPD global shutter pixel
Full Well	17,000 e-
Read Noise	25 e-
Responsivity	9.6 V/Lux-s @ 525 nm
Conversion Gain	73 μV /e-
Dynamic Range	56.7 dB
High Dynamic Range Mode	Dual-slope and Triple-slope response supported
Frame Rate	1,070 FPS @ 1280 x 1024 4,165 FPS @ 640 x 512 8,300 FPS @ 256 x 256 Up to 1,000,000 FPS @ 1280 x 1 Faster frame rates with smaller X, Y window size
Region of Interest	Windowing and up to 8 simultaneous ROI's are supported
Binning	2 x 2
Analog to Digital Converter	12bit
Analog Gain Options	1x – 16x
Clock Rate	25 MHz - 90 MHz (90 MHz typical @ 1,070 FPS)
Data Output	16 LVDS ports

	Multiplex Mode (8 LVDS, 4 LVDS, 2 LVDS ports) 300 Mbps per port @ 25 MHz – 1,080 Mbps per port @ 90 MHz
Power Supply	3.3V Analog, 1.8V Analog, 1.8V Digital
Power Consumption	2.0W @ 1,070 FPS Full Resolution Adjustable with lower frame rates, e.g. 670 mW @ 250 FPS
Package Type	88 Ceramic LCC in a small footprint of 16.9 mm x 16.9 mm
Color Filter	RGB or Monochrome

<Table> 11. Luxima LUX1310 Specification Table

8.3. g-Nova3D Dimensions



<Image> 30. g-Nova3D Dimensions Image

9. Image Index

<Image> 1. g-Nova3D mount (CS) and extension ring (CS to C) Image	6
<Image> 2. g-Nova3D Camera Image.....	7
<Image> 3. g-Nova3D Rear Port Image	8
<Image> 4. Power I/O Pin Map Image	8
<Image> 5. Novitec Camera SDK Installation Image1	9
<Image> 6. Novitec Camera SDK Installation Image2.....	10
<Image> 7. Control Panel Image	11
<Image> 8. Control Panel – Network Status and Tasks Screen Image	11
<Image> 9. Network Right Click Menu Image	11
<Image> 10. Ethernet Properties Screen Image	12
<Image> 11. Ipv4 Settings Screen Image	12
<Image> 12. Novitec 3D Camera Viewer – Connect Dialog Image	13
<Image> 13. Novitec 3D Camera Viewer – Connect Dialog Image2.....	13
<Image> 14. Persistent IP Setting Image	14
<Image> 15. Novitec 3D Camera Viewer - Account Settings Image1	14
<Image> 16. Novitec 3D Camera Viewer - Account Settings Image2.....	15
<Image> 17. Novitec 3D Camera Viewer - Main UI Image.....	15
<Image> 18. Novitec 3D Camera Viewer - Menu Image	16
<Image> 19. Novitec 3D Camera Viewer - Toolbar Image.....	16
<Image> 20. Novitec 3D Camera Viewer – Image Display Window Image	16
<Image> 21. Novitec 3D Camera Viewer – Camera Settings Window Image.....	17
<Image> 22. Novitec 3D Camera Viewer – Status Bar Image.....	17
<Image> 23. 2D Data Acquisition Image	17
<Image> 24. 2D/Profile Data Acquisition Image	18
<Image> 25. RangeMap Data Acquisition Image	19
<Image> 26. 3D Data Acquisition Image	19
<Image> 27. Novitec Camera Viewer – Firmware Update Menu Image.....	21
<Image> 28. Novitec Camera Viewer – Firmware Update Window	21
<Image> 29. COG Algorithm Principal Image.....	22
<Image> 30. g-Nova3D Dimensions Image.....	28

10. Table Index

<Table> 1. Power I/O Pin Map Table	9
<Table> 2. Device Control Features List Table	23
<Table> 3. List of Action Control Features	24
<Table> 4. Image Format Control Features List Table	24
<Table> 5. Acquisition Control Features List Table	25
<Table> 6. Scan3D Control Features List Table.....	26
<Table> 7. Analog Control Features List Table	26
<Table> 8. Digital IO Control Features List Table	26
<Table> 9. User Set Control Features List Table.....	26
<Table> 10. g-Nova3D Specification Table	27
<Table> 11. Luxima LUX1310 Specification Table.....	28
<Table> 12. Revision History Table.....	30

11. Revision history

Date	Version	Description	Note
2022.03.31	V1.0	Initial Release	
2022.06.27	V1.1	Relevant image modification according to 3D Viewer UI renewal	

<Table> 12. Revision History Table

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