

LEO Series 10GigE Area Scan Camera User Manual

V2.2.11, Nov. 2022

Preface

Purpose

This Manual is a basic description of LEO series 10GigE Area Scan Cameras, which mainly includes the product description, quick installation guide and Simple introduction of SDK(iDatum). This manual may be updated due to product upgrades or other reasons. If you need, please contact the sales engineer for the latest version of this manual.

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Disclaimer

The information and specifications described in this manual are subject to change without notice.

Latest Manual Version

For the latest version of this manual, see the Download Center on our web site at: <http://www.contrastech.com/en/service/005001.html>

Technical Support

For technical support, e-mail: support@contrastech.com.

Warranty

To ensure that your warranty remains in force, adhere to the following guidelines::

Do not remove the camera's serial number label

If the label is removed and the serial number can't be read from the camera's registers, the warranty is void.

Do not open the camera housing

Do not open the housing. Touching internal components may damage them.

Prevent ingress or insertion of foreign substances into the camera housing

Prevent liquid, flammable, or metallic substances from entering the camera housing. If operated with any foreign substances inside, the camera may fail or cause a fire.

Avoid electromagnetic fields

Do not operate the camera in the vicinity of strong electromagnetic fields. Avoid electrostatic charging.

Clean with care

Avoid cleaning the sensor if possible.

Handle this camera with care

Do not abuse the camera. Avoid striking, shaking, etc. The camera could be damaged by improper handling.

Read the manual

Read the manual carefully before using the camera.

PRODUCT DESCRIPTION

Product Introduction

LEO series industrial cameras compatible with GigE、10GigE、USB3.0 and Cameralink data bus standards, support GenICam、USB3 Vision® and GigE Vision®, Smoothly connect with third-party software, like HALCON and Vision Pro, not need for secondary development. LEO series cameras with excellent cost performance and very suitable for various inspections measurement and high-speed imaging applications. This series cameras won customers high praise because its outstanding performance in cellphone and tablet PC screen inspection, LED automatic packaging, defect inspection, and electronic components manufacturing, wafer positioning and other applications.

With this variety of sensors and interfaces, combined with the extensive features offered, LEO series cameras are fit for a wide range of vision applications.

Product Features

- 10 Gigabit Ethernet interface, compatible with Gigabit Ethernet, with maximum 100m transmission;
- 1024MB on-board frame buffer for data transmission and image retransmission;
- Supports software trigger, hardware trigger, free run mode and etc;
- Supports sharpness, gamma correction, LUT, black level correction and other ISP function;
- Supports interpolation algorithm, white balance algorithm, color conversion matrix, hue,saturation and etc. for color camera;
- Supports various output formats for image data and supports ROI, binning, mirror and etc;
- Conforms GigE Vision protocol and GenICam standards;
- Support third-party software connection.

* The camera functions may differ by camera models,please refer to actual functions.

Status LED Description

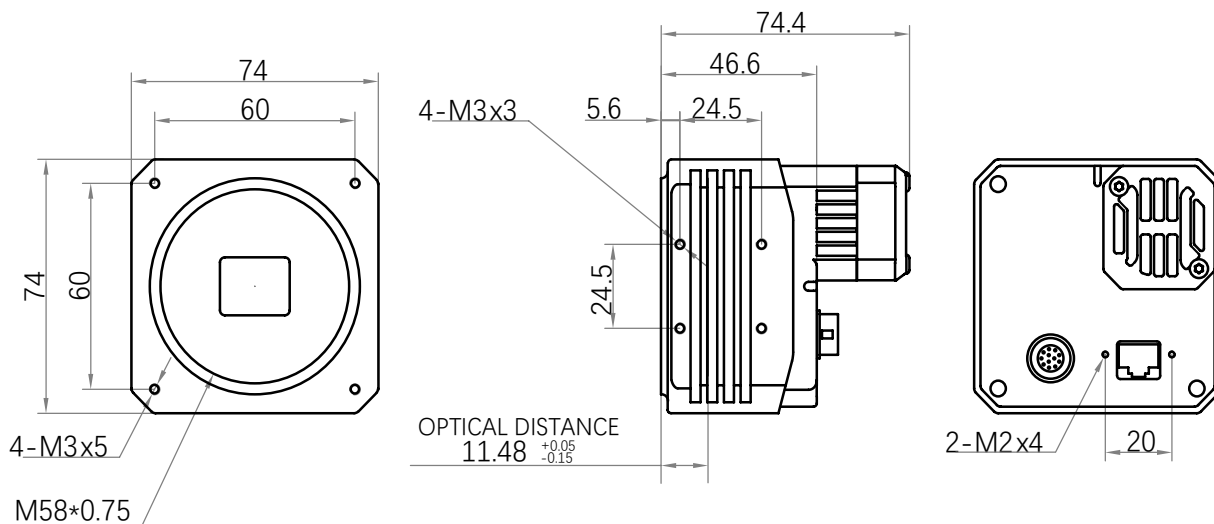
Status LED	Description
Slow Flashing Red (the interval between on and off is 2000 milliseconds)	The camera wiring exception occurs.
Red light is always on	The camera exception occurs.
Blue light is always off	The camera is in idle status.
Fast Flashing Blue (the interval between on and off is 200 milliseconds)	The camera is acquiring images normally.
Slow Flashing blue (the interval between on and off is 1000 milliseconds)	The camera is acquiring images in trigger mode.
Flashing Alternately Red and Blue	_The firmware is updating. _The function of finding me is executed,

Mechanical Dimensions

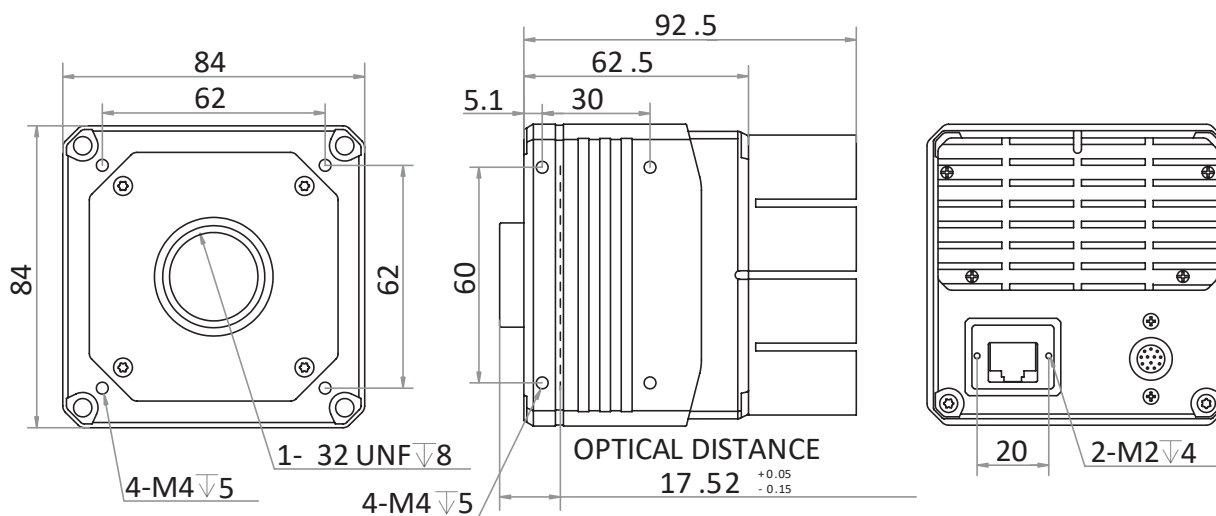
The dimensions is in millimeters:

The cameras are interfaced to an external circuitry via connectors located on the back of the housing.

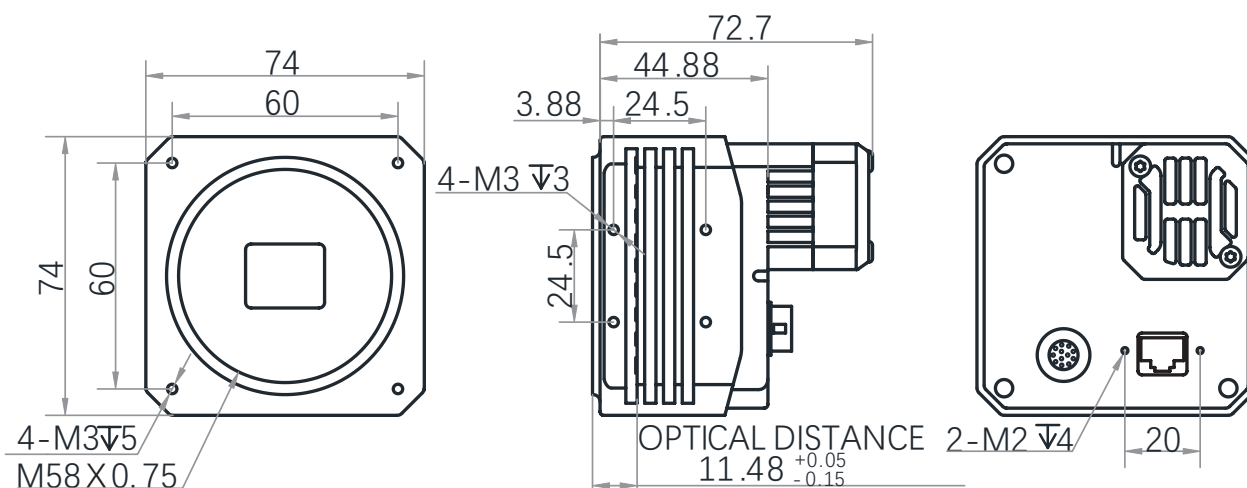
■ Mechanical Dimensions (in mm) of LEO 12MS-68tgm(V2) 10GigE Cameras with M58 Mount (With fan,the installation use M3 screws).



■ Mechanical Dimensions (in mm) of LEO 24MS-35Tgm 10GigE Cameras with C-mount (With heat sink,the installation use M4 screws).

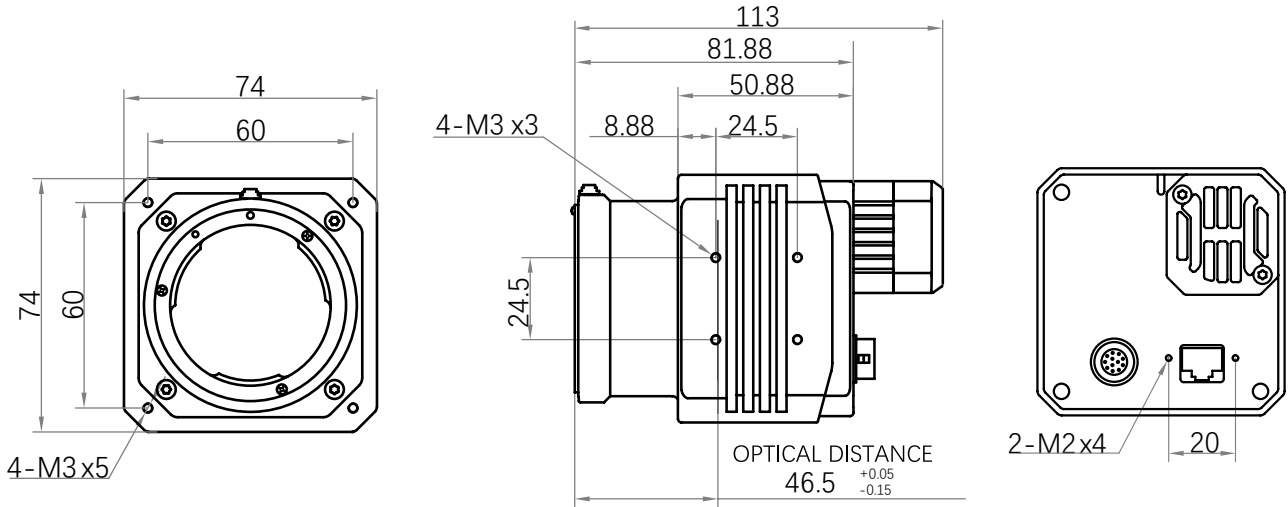


■ Mechanical Dimensions (in mm) of LEO 25MP-40tgm/tgc 10GigE Cameras with M58 Mount (With fan,the installation use M3 screws).

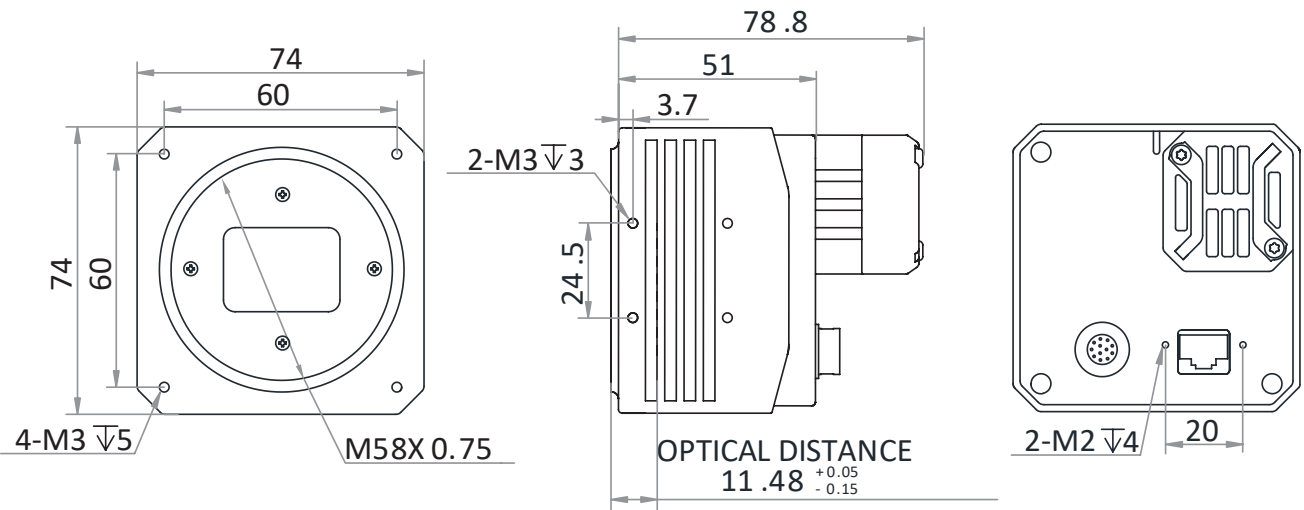


Mechanical Dimensions

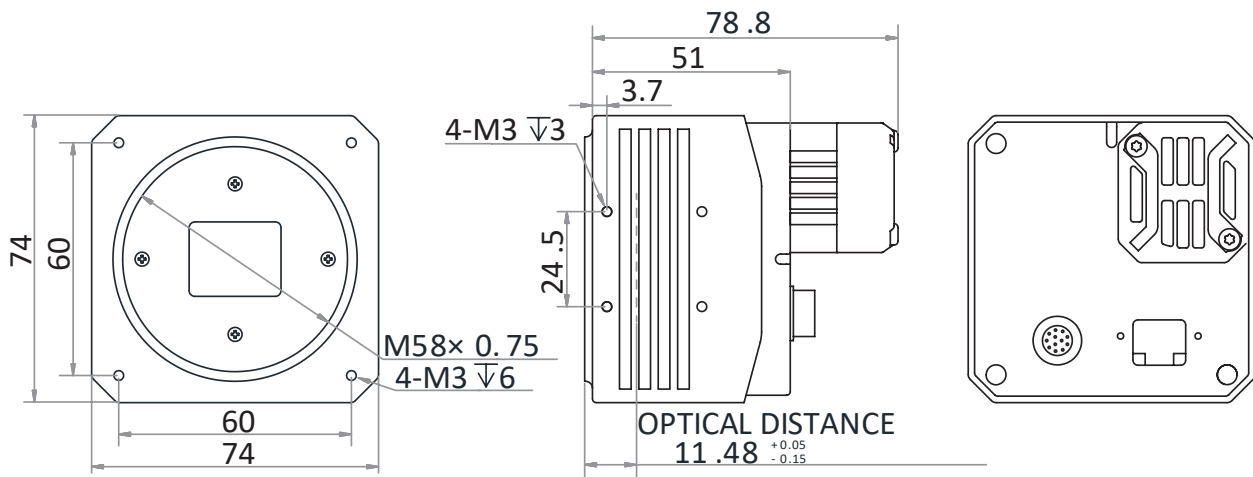
■ Mechanical Dimensions (in mm) of LEO 25MP-40tgm/tgc 10GigE Cameras with F Mount (With fan,the installation use M3 screws).



■ Mechanical Dimensions (in mm) of LEO 25MD-30Tgm 10GigE Cameras with M58 Mount (With fan,the installation use M3 screws).

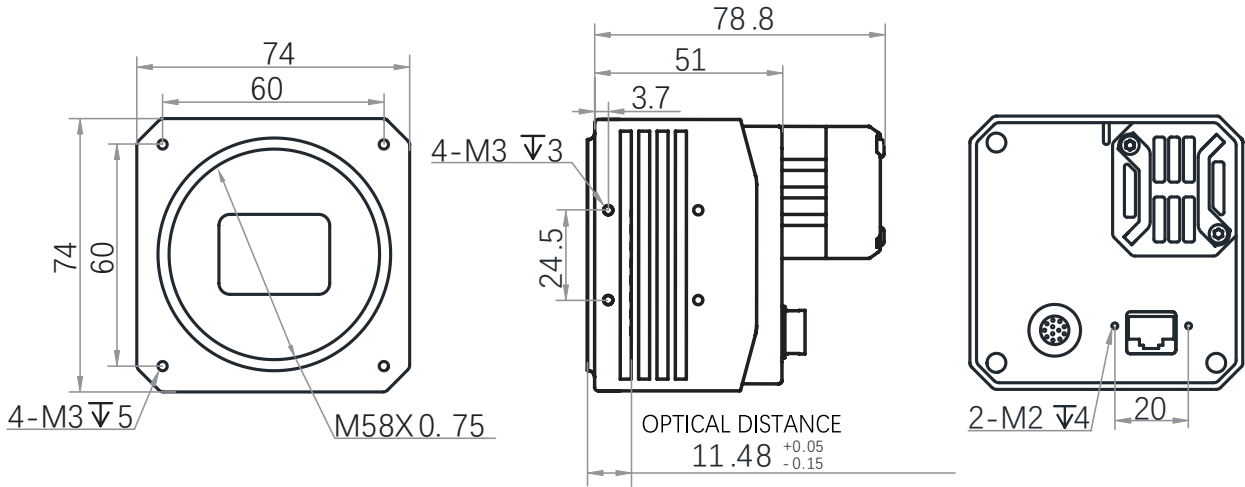


■ Mechanical Dimensions (in mm) of 25MG-40tgmTgc 10GigE Cameras with M58 Mount (With fan,the installation use M3 screws).

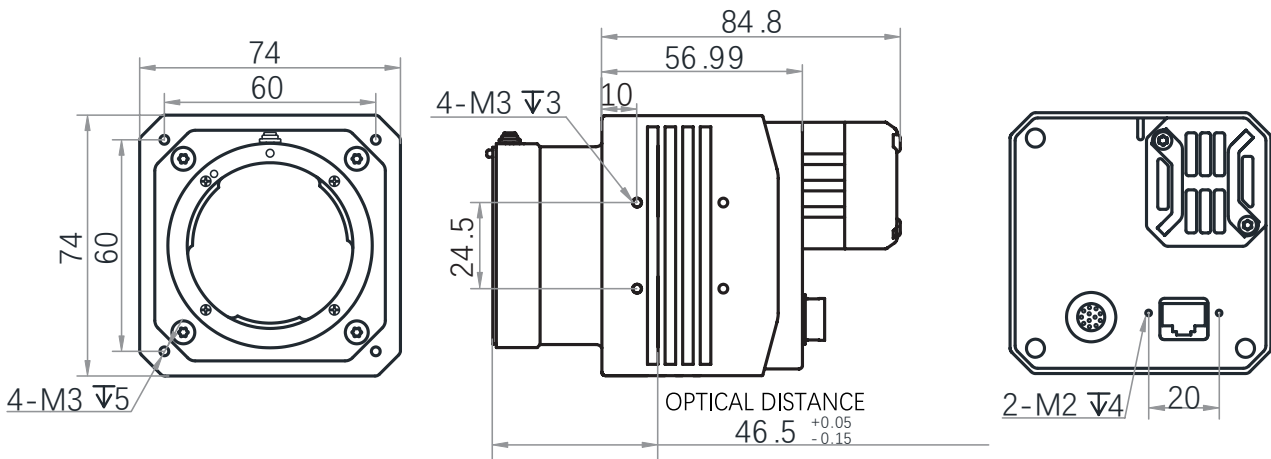


Mechanical Dimensions

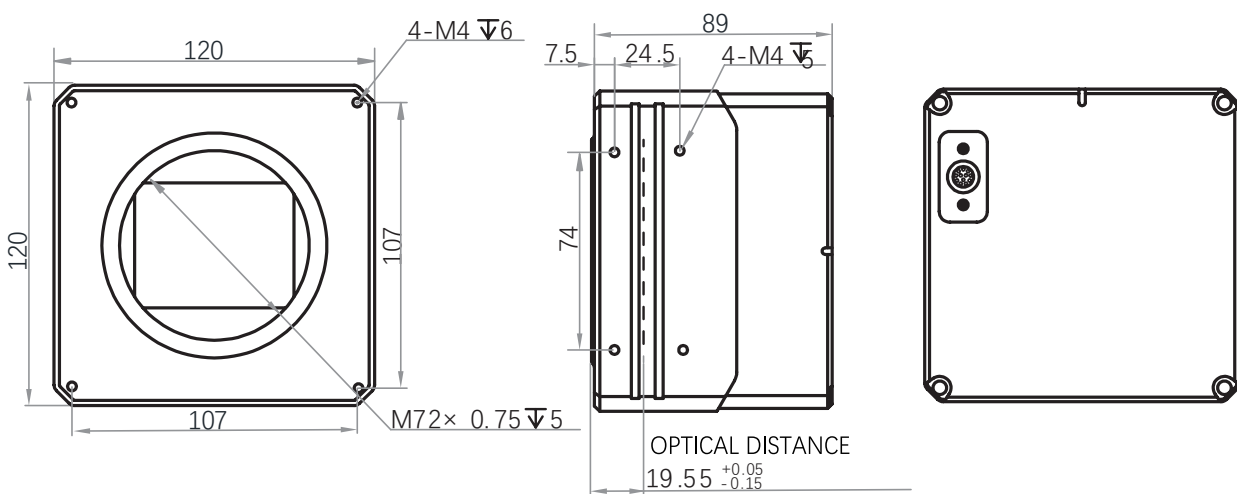
■ Mechanical Dimensions (in mm) of LEO 65MG-15tgm/tgc 10GigE Cameras with M58 Mount (With fan,the installation use M3 screws)



■ Mechanical Dimensions (in mm) of LEO 65MG-15tgm/tgc 10GigE Cameras with F Mount (With fan,the installation use M3 screws).



■ Mechanical Dimensions (in mm) of LEO 150MS-6tgm 10GigE Cameras with M72 Mount (TEC cooling,the installation use M4 screws).



CHAPTER 2 POWER AND I/O INTERFACE DEFINITION

I/O Connection Definition and Assignments

Read the followings to get pin definitions. Refer to the pin definitions and labels attached to the power and I/O cable to wire the device.

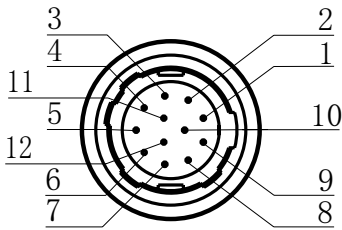


Table 2-1:
Numbering and assignments for
12pin Power and I/O Input Connector:
(M58/F-mount 10GigE camera)

Pin	Signal	I/O Signal Source	Designation
1	GND	DC ground	Camera Power Supply Ground
2	DC_PWR	DC_PWR +	DC Camera Power
3	-	-	-
4	-	-	-
5	GND_IO	Line 0/1-	Opto-isolated Signal Ground
6	-	-	-
7	-	-	-
8	RS232_RX	232 serial port input	RS232 Received Data
9	RS232_TX	232 serial output	RS232 Transmitted Data
10	GPIO	Line 2+	Can be Configured as Input or Output
11	OPTO_OUT	Line 1+	Opto-isolated OUT
12	OPTO_IN	Line 0+	Opto-isolated IN

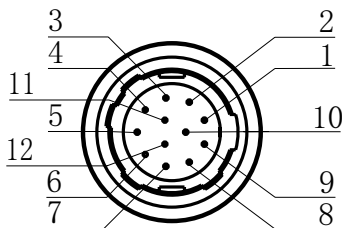


Table 2-2:
Numbering and assignments for
12pin Power and I/O Input Connector:
(M72-mount 10GigE camera)

Pin	Signal	I/O Signal Source	Designation
1	GND	Line 2-	Camera Power Supply Ground
2	DC_PWR	-	DC Camera Power
3	DC_PWR	-	DC Camera Power
4	OPT_IN-	Line 0-	Opto-isolated IN Signal Ground
5	OPT_OUT-	Line 1-	Opto-isolated output signal ground
6	GND	-	DC Camera Power
7	GND	-	DC Camera Power
8	232_RXD	-	RS232 Received Data
9	232_TXD	-	RS232 Transmitted Data
10	GPIO2	Line 2+	Can be Configured as Input or Output
11	OPTO_OUT+	Line 1+	Opto-isolated OUT
12	OPTO_IN+	Line 0+	Opto-isolated IN

I/O Connection Definition and Assignments

■ Cable

Recommendations for using Network cables:

- 10 Gigabit RJ-45 port camera,It refers to CAT-6e network cable or above. You need to purchase separately.
- 10 Gigabit optical fiber port camera,It refers to the optical fiber and you should select it according to the camera's optical module. You need to purchase separately.


10 GigE NIC: RJ-45-port camera needs to be equipped with 10 GigE NIC;It refers to the 10 GigE network interface card. You need to purchase separately.

Optical Module: 10 Gigabit optical fiber port camera needs to be equipped with optical module for photoelectric signal conversion,It includes single module or multiple modules, and you should purchase it separately according to actual demands.

Recommendations for using I/O cables:

- I/O cables must be shielded.
- Use twisted pair cables.
- Recommended maximum cable length: 10 m.
- Pin assignments (refer to Tables 2-1/2-2).
- Avoid strong magnetic fields.


Depending on the particular application, using different cables may lead to voltage drops, signal distortion, and EMI/ESD problems which in turn may cause the camera to malfunction.

	<p>Note that direct-coupled GPIO lines have the advantage of working with very short delays compared to opto-isolated I/O lines.</p> <p>Note also that the direct-coupled GPIOs are distinctly more susceptible to EMI than the opto-isolated I/Os. Under harsh EMI conditions, GPIOs can turn out not to be usable at all.</p> <p>Accordingly, use of the GPIOs in an environment with elevated risk of EMI calls for taking additional measures like, e.g. using shorter cables.</p>
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NOTICE

An incorrect plug can damage the I/O connector.

The plug on the cable that you attach to the camera's I/O connector must have 12 female pins. Using a plug designed for a smaller or a larger number of pins can damage the connector

	<p>Contrasttech offers suitable plugs and cables.</p> <p>Contact your sales representative to order connectors or cables.</p>
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CHAPTER 3 INSTALLATION AND SETUP

Installation and Setup

You should perform the software installation procedure first and the hardware installation procedure second.

Software Installation

■ iDatum Installation

If you use a firewall on your computer, disable the firewall for the network adapter to which your camera is connected.

Close the Firewall

In order to ensure the camera software keep running and image transmission stability, please close the firewall before using the software.

System Requirements

LEO Camera Software Suite for Windows requirements that one of the following operating systems is installed on your computer:

- Windows XP (32 bit)
- Windows 7 (32 bit or 64 bit)
- Windows 10 (32 bit or 64 bit)
- Linux 32 Bit/64 Bit : Ubuntu 14.04(32/64)、Ubuntu 16.04(32/64)、Redhat7(64)、Centos7(32/64)、gcc/g++ version requires 4.6.3 and above
- ARM: NVIDIA TX2、RaspberryPi3.0+

Installation Steps

- 1.You can download the iDatum software (LEO Series Industrial Cameras SDK For xxx) from:
<http://www.contrastech.com/en/service/005001.html>
- 2.Double click iDatum installation package to install the client.
- 3.Follow the instructions on the screen. The installer will guide you through the installation process.

Environment Testing

After successful installation, please connect the camera and turn on iDatum client software to check the result of camera connection and image preview. You can start secondary development base on the SDK when all environment testing is normal. You should notice follow items when using GigE Camera:

- FrameRate Whether the frame rate is consistent with the actual set frame rate.
- Errors If not 0, it means there is a frame skip, it is abnormal.
- Lost Packets If not 0, it is abnormal.

Hardware Installation

■ Camera Installation

The installation procedures assume that you will be making a peer-to-peer connection between your camera and a computer.

Make sure that the following items are available before starting the installation:

- LEO 10GigE Area scan camera
- Applicable power supply or a 10Gigabit Ethernet Switch
- It refers to the lens that matches with lens mount of the camera.
- The computer with a GigE network adapter installed
- The computer must be equipped with appropriate operating system
- Use a suitable network cable to connect the camera to a 10 GigE or a 10 GigE NIC or a 10 GigE optical NIC.

Steps:

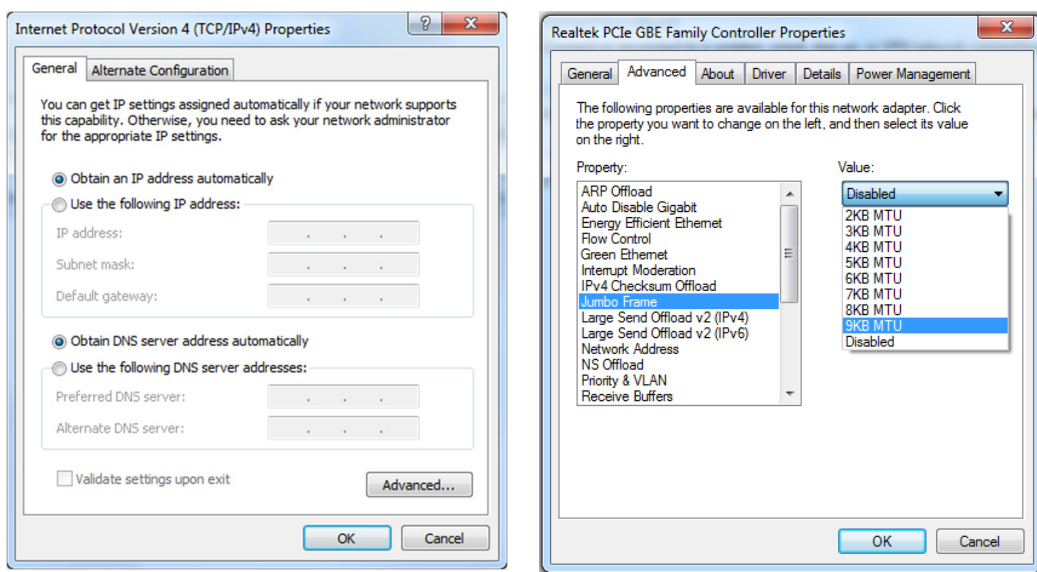
- Mount lens that matches with lens mount of the camera
- Connect the camera to the computer and power 12-pin:
 - Use a network cable to connect the camera to a network interface card.
 - Use the 12-pin power and I/O cable to connect the camera to a power adapter.

Network Settings

Before using the camera, you need to configure IP in the same network segment with the computer. You can modify it in "Local Connection" to ensure network communication is normal.


Local Network Configuration

- Click "Control Panel"> "Network and Internet"> "Network and Sharing Center"> "Change Adapter Configuration." Then select corresponding network card to configure it automatically obtain IP address or manually assign it as same network segment address with the camera. Shown as below:
- Open "Advanced" in the properties, set "Jumbo Frame" as its maximum value:9014bytes, both of transmit buffer and receive buffer set as 2048bytes, the Interrupt Throttle Rate set as extremum value. These maximum values mentioned above depend on the specific network card. Shown as below:




Software Operation

■ iDatum Operation

- 1、 Double-click the iDatum shortcut on the desktop to open up the client software.
- 2、 Click in device list  to search the device.
- 3、 Select a device to be connected.
- 4、 Right click the device, and click Modify IP.
- 5、 Set the IP address of the device in the same network segment with the PC
- 6、 Click OK.

Click ">" in the camera's feature panel to unfold the specific camera parameters, and set them according to actual demands. Please see the table below for the introduction of each attribute classification.

Attribute	Description
<i>Device Control</i>	You can view the device information, edit its name, reset the device, etc.
<i>Image Format Control</i>	You can view and set the device's resolution, image reverse function, pixel format, region of interest, test pattern, etc.
<i>Acquisition Control</i>	You can view and set the device's acquisition mode, frame rate, trigger mode, exposure time, etc.
<i>Analog Control</i>	You can view and set the device's gain, black level, Gamma correction, sharpness, etc.
<i>Color Transformation Control</i>	You can view and set the device's color transformation related parameters like hue and saturation.
<i>LUT Control</i>	You can view the Look-Up Table (LUT), and set its index and value.
<i>Shading Correction</i>	You can set shading correction to correct shade.
<i>Digital IO Control</i>	You can set the different input and output signals.
<i>Counter And Timer Control</i>	You can view and set the counter related parameters.
<i>File Access Control</i>	You can view and set the device's file access control related parameters.
<i>Event Control</i>	You can view and set the device's event control related parameters to let the device generate an event and transmit a related event message to the computer.
<i>Chunk Data Control</i>	You can view and set the device's chunk data control related parameters to generate supplementary image data and append that data to every image that you acquire.
<i>Transport Layer Control</i>	You can view and set the parameters of the device's transport layer.
<i>User Set Control</i>	You can save or load the device's parameters.

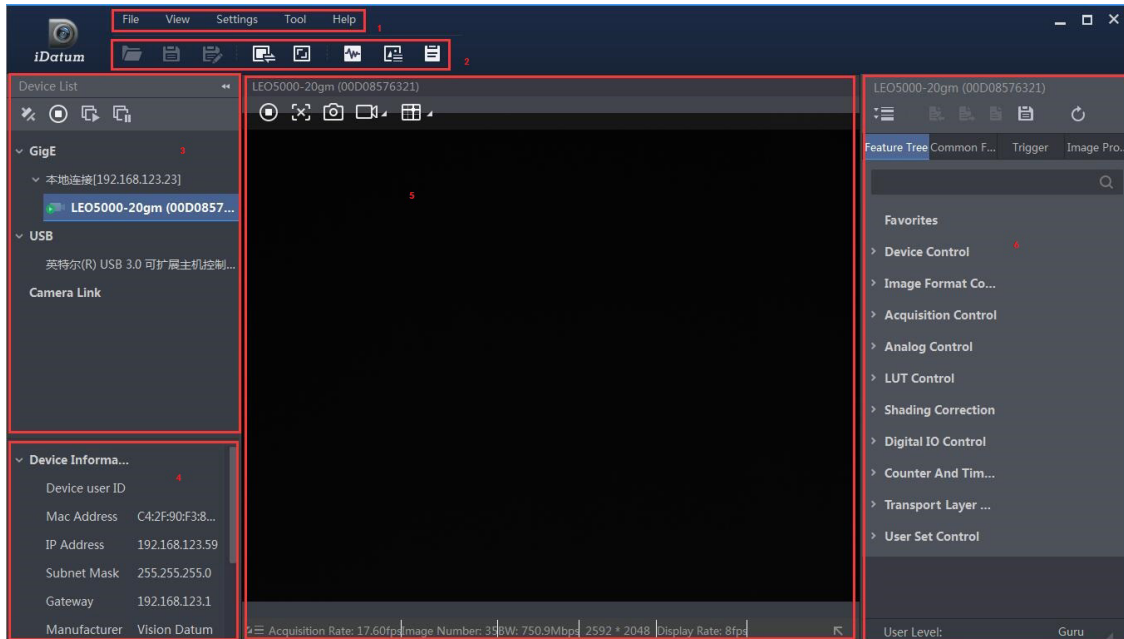


The camera's attribute tree and parameters may differ by camera models.

Software Operation

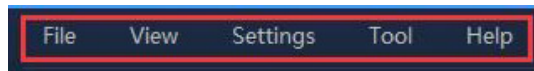
■ Main interface

For specific main window of the client software, please refer to the actual one you got.



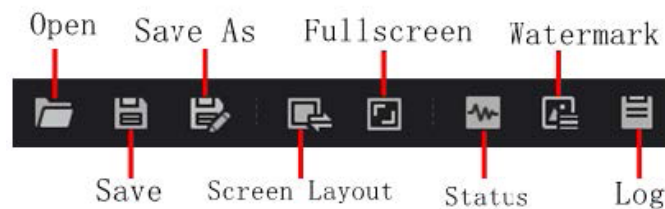
■ Menu Bar

The menu bar for iDatum client provides following functions: File, View, Settings, Tool and Help, as shown in the figure below.

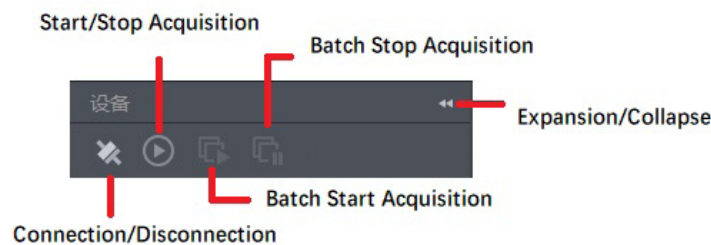


■ Control Toolbar

The control toolbar provides quick operations for the device. the icon meaning is shown in the figure below. The operation buttons in the tool bar can quickly and conveniently edit camera images.



The meaning of shortcut icons in Device List is shown as below.



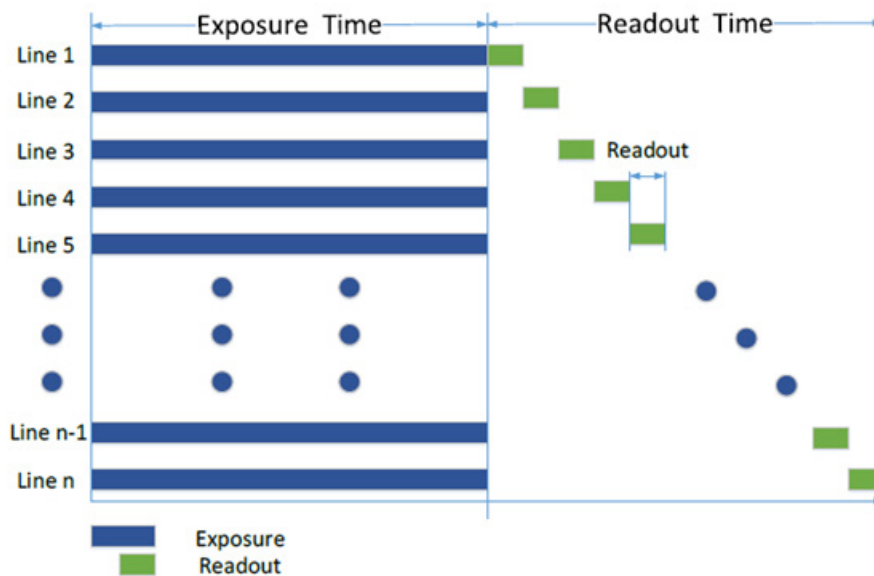
- Connection/Disconnection: After you selecting the camera, click "Connect" to connect the camera; click "Disconnect" to disconnect the camera.
- Start/Stop Acquisition: For current connected camera, click "Start Acquisition" to acquire image data; click "Stop Acquisition" to stop image data acquisition.
- Batch Start Acquisition: click "Batch Start Acquisition" to start image data acquisition for all currently connected camera by iDatum.
- Batch Stop Acquisition: click "Batch Stop Acquisition" to stop image data acquisition for all currently connected camera by iDatum.
- Expansion/Collapse: This function can be used to expand or collapse the Device List and Device Information which list on the left side of iDatum, and the default state is expansion. In the "Collapse" state, the iDatum left side only display the searched cameras.

CHAPTER 4 CAMERA FEATURES

Shutter

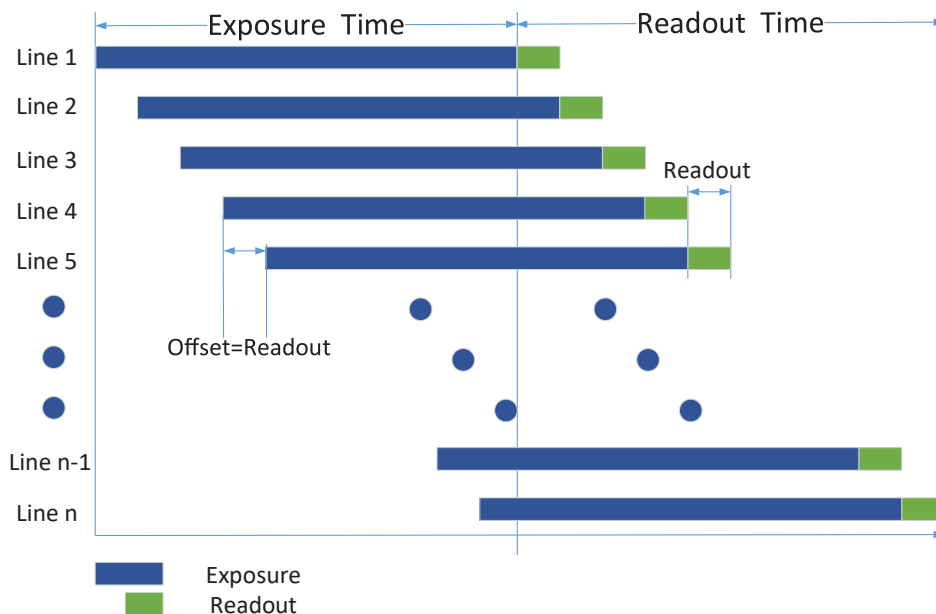
■ Global Shutter

For camera that supports global shutter, its exposure starts and ends in each line simultaneously. After the exposure, data readout starts line by line. All pixels expose at the same time, then readout at different time, as shown below.



■ Rolling Shutter

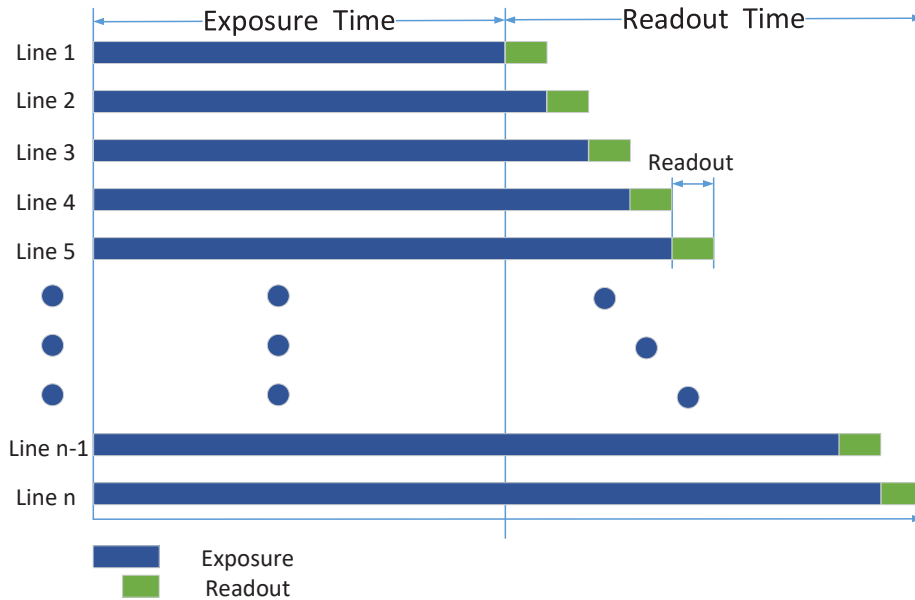
For cameras that support rolling shutter, after the first line of exposure starts, and the next line starts to exposure after the time interval, and so on, and the exposure time of each line is the same. After the exposure of each line ends, the camera will immediately read out the data, and the readout time for each line is readout, as shown below.



Shutter

■ Global Reset

Only some models of cameras with rolling shutter support the Global Reset function. Global reset means that all of the sensor's pixels start exposing at the same time, but stop exposing at different time.



When you need to use the Global Reset function, You can go to Acquisition Control > Sensor Shutter Mode, and select Sensor Shutter Mode to Global Reset.

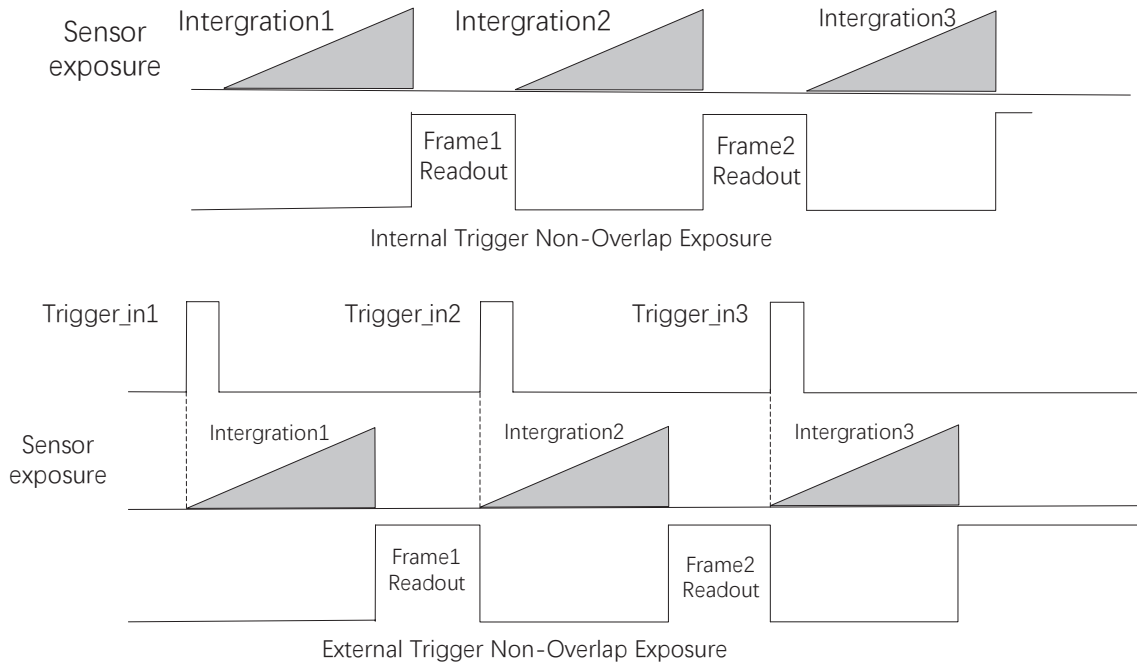
Non-Overlap Exposure and Overlap Exposure

The process that camera captures one frame of image includes two stages, exposure and readout. According to the overlap relation between the exposure time and the readout time, cameras with different sensors can be divided into overlap exposure and non-overlap exposure. Compared with non-overlap exposure, overlap exposure can reduce the influence of exposure time on grabbing time.

The products mentioned in this manual use overlap exposure to process image data.

■ Non-Overlap Exposure

After completing the current frame's exposure and readout, the next frame starts to expose and read out. This process is called non-overlap exposure. The non-overlap exposure's frame period is larger than the sum of the exposure time and the readout time, as shown below.

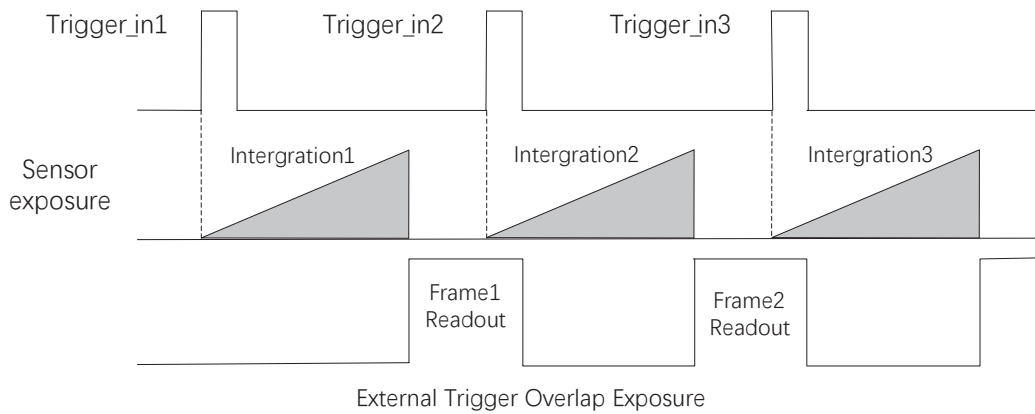
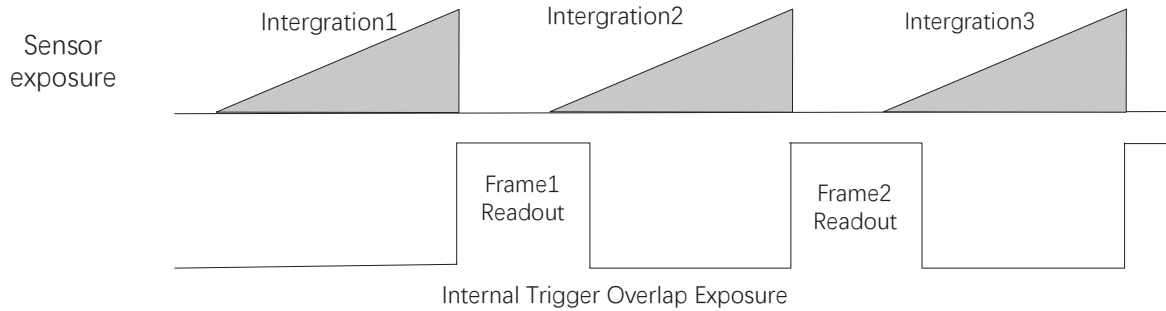


The camera will ignore the external signal in the readout section under this mode.

Non-Overlap Exposure and Overlap Exposure

Overlap Exposure

Overlap exposure refers to the overlap between the current frame exposure and the previous frame readout. In other words, when the previous frame starts to read out, the current frame starts to expose simultaneously, as shown below.



The camera will ignore the external signal in the readout section under this mode.

CHAPTER 5 IMAGE ACQUISITION

Frame Rate

Frame rate refers to the image number that is acquired by the camera per second. The higher frame rate, and shorter time used for image acquisition will be.

The following 5 factors determines the camera's frame rate in real-time.

- **Frame readout time:** The frame readout time is related with camera's sensor performance and image height. The lower the image height and less the frame readout time, and the higher the frame rate will be.
- **Exposure time:** If the reciprocal of max frame rate that the camera supports is t , and when the configured exposure time is larger than t , the less the exposure time, the higher the frame rate will be. When the configured exposure time is less than or equal to t , exposure time will not influence the frame rate.
- **Bandwidth:** The larger the bandwidth, the higher the frame rate will be.
- **Pixel format:** The more bytes pixel format occupy, the lower the frame rate will be.

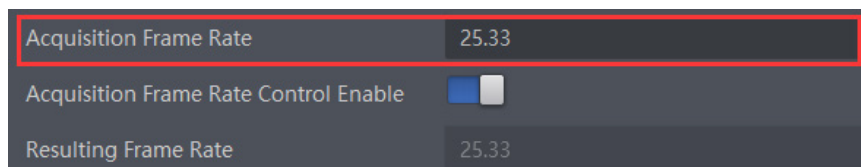
The camera can also manually control the real-time frame rate.

The specific steps are as follows:

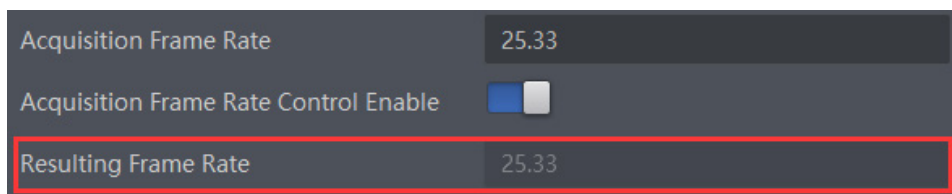
Click Acquisition Control > Acquisition Frame Rate, enter Acquisition Frame Rate according to actual demands, and enable Acquisition Frame Rate Control Enable.

_If the current real-time frame rate is smaller than configured frame rate, the camera acquires images according to the real-time frame rate.

_If the current real-time frame rate is larger than configured frame rate, the camera acquires images according to the configured frame rate.



3.You can refer to Resulting Frame Rate to view the camera's resulting frame rate.



Trigger Mode

The camera has 2 types of trigger mode, including internal trigger mode and external trigger mode.

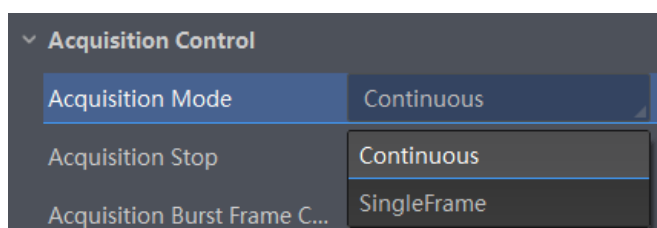
Internal trigger mode(acquisition modes), including SingleFrame mode and Continuous mode;external trigger mode, including software trigger, hardware trigger.

Trigger Mode	Parameter	Parameter Value	Principle
Internal trigger mode	Acquisition Control > Trigger Mode	Off	The camera acquires images via its internal signals.
External trigger mode		On	The camera acquires images via external signals. These signals can be software signal and hardware signal, including software trigger, hardware trigger, counter trigger, etc..

Internal trigger mode

Their principle and parameter setting are shown below.

Internal trigger mode	Parameter	Parameter Value	Principle
SingleFrame mode	Acquisition Control > Acquisition Mode	SingleFrame	When camera starts image acquisition, it acquires one image only, and then stops.
Continuous mode		Continuous	When camera starts image acquisition, it acquires images continuously. Real-time frame rate decides the acquisition frame number per second. You can stop camera image acquisition manually.



External trigger mode

The external trigger signals types of trigger camera acquisition can be given by software or external device. Under external trigger signal mode, the camera output image via following several working modes: SingleFrame Trigger mode, Burst Trigger mode and Long Exposure Trigger mode.

External Trigger Source

There are 4 types of external trigger sources, including software trigger, hardware trigger, counter trigger and anyway.

Their principle and parameter setting are shown below.

External trigger mode	Parameter	Parameter Value	Principle
Software Trigger	Acquisition Control > Trigger Source	Software	The software sends trigger signal to the camera via GigE interface to acquire images.
Hardware Trigger		Line 0 / Line 2	External device connects camera via camera I/O interface. External device sends trigger signal to camera to acquire images.
Counter Trigger		Counter 0	The counter sends trigger signal to the camera to acquire images.
Software Trigger, Hardware Trigger and Counter		Anyway	Use software trigger, hardware trigger, counter or action command to send trigger signal to the camera to acquire images.

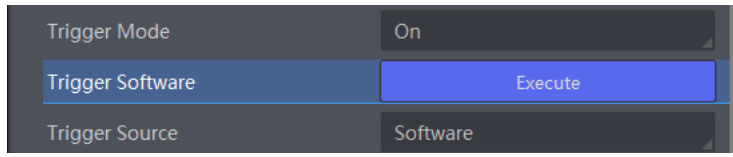
These 4 external trigger sources are valid only when the Trigger Mode is On

Trigger Mode

■ Software Trigger

For the camera support software trigger mode, when user set software trigger, the client software can send commands to camera to acquires and transfer images via Gigabit Ethernet.

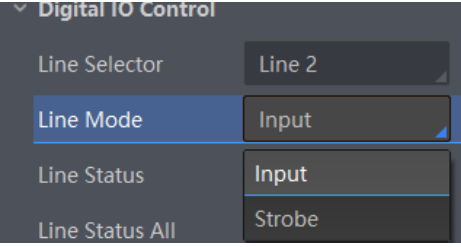
- 1.Click Acquisition Control > Trigger Mode, and select On as Trigger Mode.
- 2.Select Software as Trigger Source, and click Execute in Trigger Software to send trigger commands.



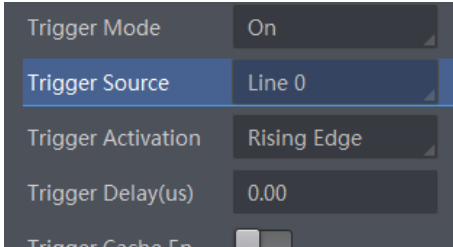
■ Hardware Trigger

If set "Hardware" as "Trigger Source" can switched to hardware external trigger mode. The camera has 1 Opto-isolated input (Line 0), and 1 bi-directional I/O (Line 2) that can be configured as input signal, The setting of Line 2 as input signal is as shown below:

- 1.Click Digital IO Control.
- 2.Select Line 2 as Line Selector, and Input as Line Mode to set line 2 as input signal.



- 3.Click Acquisition Control, select On as Trigger Mode, select Line 0 or Line 2 as Trigger Source.as shown in the figure below. The command to trigger the photo is given to the camera by the external device.



i For details about the electrical characteristics and wiring of the IO interface, please refer to Chapter 6 I/O Electrical Characteristics and Wiring.

Trigger Mode

■ Counter Trigger

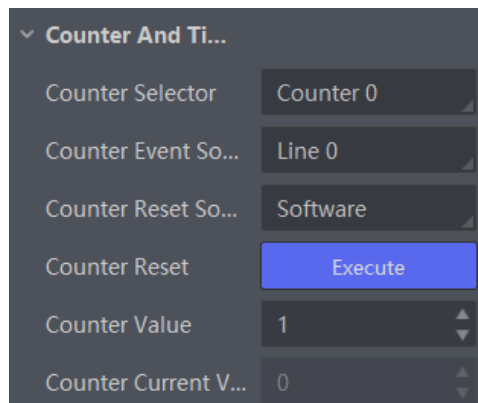
The counter trigger provides frequency division to the external trigger signal. The camera performs an external trigger after receiving multiple hardware trigger signals.

1. Click Acquisition Control > Trigger Mode, and select On as Trigger Mode.
2. Select Counter 0 as Trigger Source.

When using counter as trigger source, you need to set relevant parameters under Counter And Timer Control.

For specific parameter function and setting, please refer to the following table.

Parameter	Read/Write	Description
Counter Selector	Read and write	It selects counter source. Counter 0 is available only at present.
Counter Event Source	Read and write	It selects the signal source of counter trigger. Line 0 and Line 2 are available. It is disabled by default.
Counter Reset Source	Read and write	It selects the signal source of resetting counter. Software is available only. It is disabled by default.
Counter Reset	Write is available under certain condition	It resets counter and it can be executed when selecting Software as Counter Reset Source.
Counter Value	Read and write	It is the counter value with the range of 1 to 1023. For example, if the parameter is set to n, then the trigger signal n times can execute the counter trigger once to obtain 1 frame of image.
Counter Current Value	Read only	It displays the number of executed external trigger.



■ Anyway Trigger

In the free trigger mode, the camera can receive signals from software trigger, hardware trigger, action command trigger, and counter trigger.

1. Click Acquisition Control > Trigger Mode, and select On as Trigger Mode.
2. Select Anyway as Trigger Source.

Trigger Mode

Trigger Related Parameters

Under external trigger mode, you can set burst frame count, trigger delay, trigger cache enable, trigger activation and trigger debouncer. Different trigger sources can set various trigger parameters, and their relation is shown below.

Trigger Source \ Trigger Parameter	Software Trigger	Hardware Trigger	Counter Trigger	Anyway Trigger
Burst Frame Count	√	√	√	√
Trigger Delay	√	√	√	√
Trigger Cache Enable	√	√	√	√
Trigger Activation	×	√	√	√
Trigger Debouncer	×	√	√	√

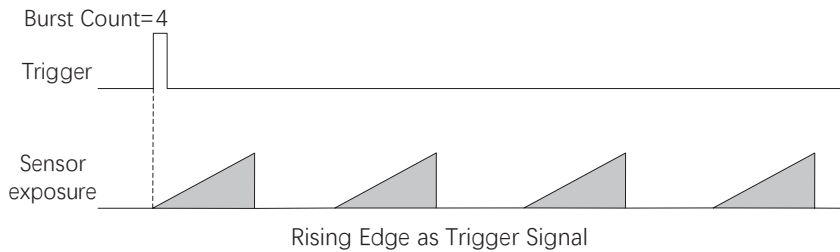
Burst Frame Count

Under external trigger mode, you can set burst frame count as shown below.

Click Acquisition Control > Acquisition Burst Frame Count, and enter Acquisition Burst Frame Count according to actual demands. Its range is from 1 to 1023.

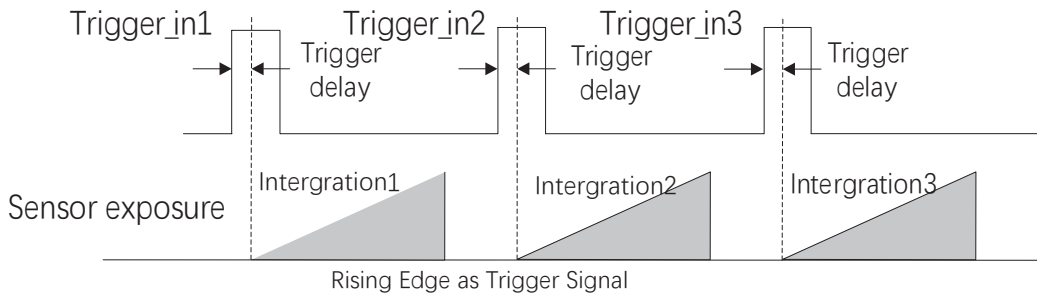


When Acquisition Burst Frame Count is 1, it is in single frame trigger mode. When Acquisition Burst Frame Count is larger than 1, it is in multi-frame trigger mode. If Acquisition Burst Frame Count is n and when inputting 1 trigger signal, the camera stops acquiring images after exposing n times and outputs n frame images. The sequence diagram of burst frame count is shown below.

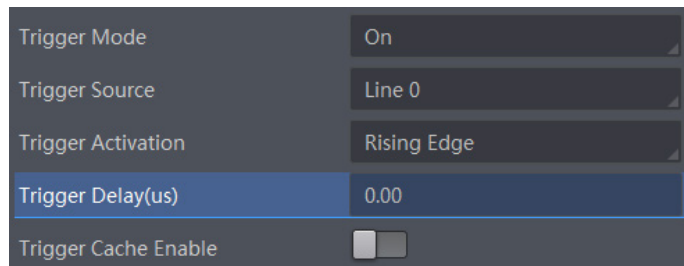


Trigger Delay

From camera receiving signal and responding, this period is trigger delay. Its sequence diagram is shown below.



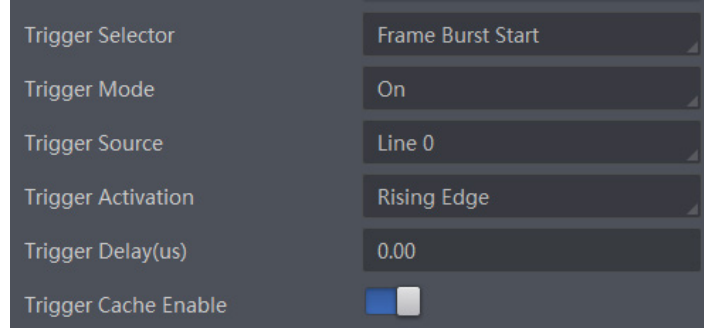
You can set proper value in Trigger Delay, and its range is from 0 μs to 16000000 μs.



Trigger Mode

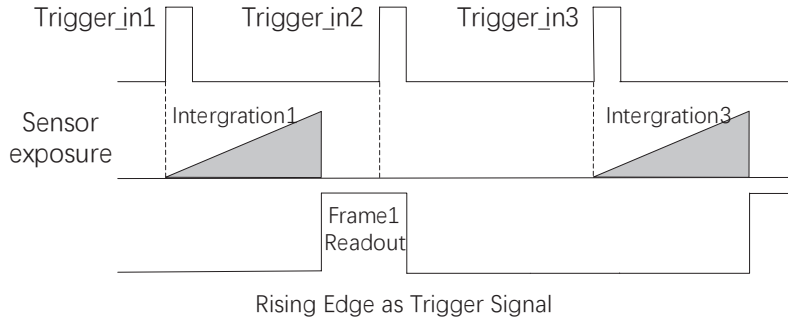
■ Trigger Cache Enable

The camera has the function of Trigger Cache Enable. During the triggering process, if the camera receives new trigger signal, it will save and process the signal if you enable this function. Trigger cache enable can save up to 2 trigger signals. Click Acquisition Control > Trigger Cache Enable, and enable Trigger Cache Enable.



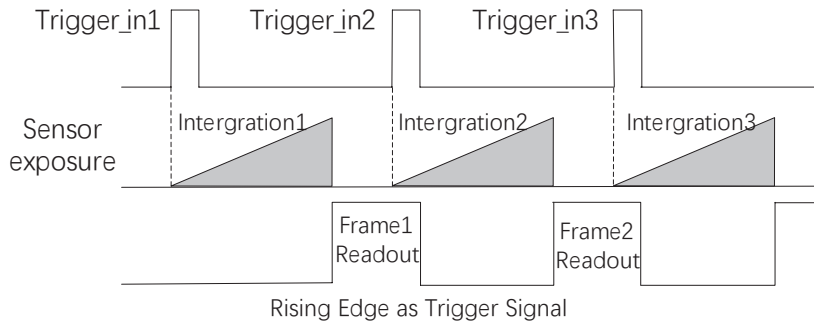
If the camera receives the 1st trigger signal first, and the camera receives the 2nd trigger signal during processing the 1st trigger signal.

- Disable Trigger Cache Enable: the 2nd trigger signal will be filtered without processing.

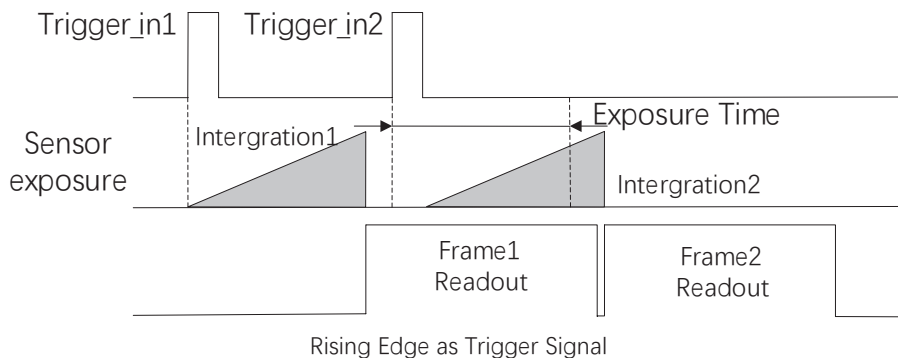


- Enable Trigger Cache Enable: the 2nd trigger signal will be saved.

_If the 1st frame image's exposure time of the 2nd trigger signal is not earlier than the camera's last frame creation time of the 1st trigger signal, and then the 2nd trigger signal's 1st frame image is created normally.



_If the 1st frame image's exposure time of the 2nd trigger signal is earlier than the camera's last frame creation time of the 1st trigger signal, and then the camera will delay this exposure time. Thus making sure this exposure time is not earlier than the camera's last frame creation time of the 1st trigger signal.

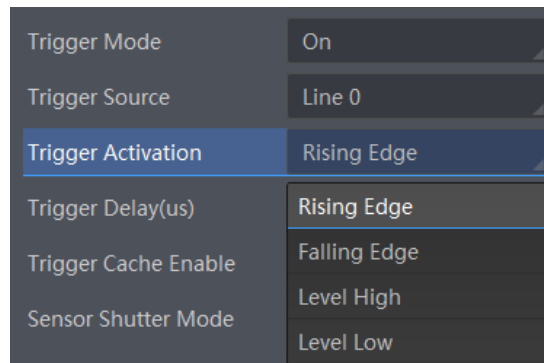


Trigger Mode

■ Trigger Activation

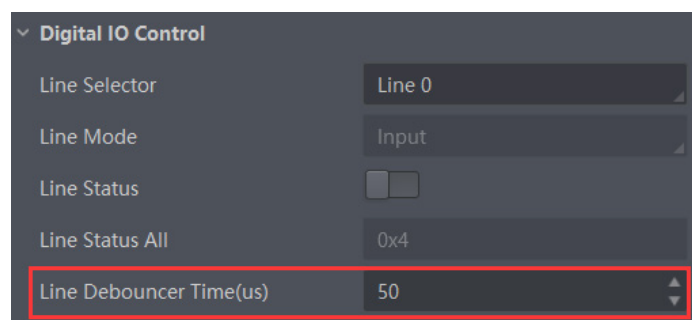
The camera supports trigger acquisition in the rising edge, falling edge, level high, or level low of the external signal. The principle and parameter of trigger activation are shown below.

Trigger Activation	Parameter	Parameter Value	Principle
Rising Edge	Acquisition Control > Trigger Activation	Rising Edge	Rising Edge refers to the rising edge of the trigger signal is valid, that is camera exposure and acquisition at the beginning of the rising edge of the trigger signal.
Falling Edge		Falling Edge	Falling Edge refers to the falling edge of the trigger signal is valid, that is camera exposure and acquisition at the beginning of the falling edge of the trigger signal.
Level High		Level High	Level High refers to the level high of the trigger signal is valid. As long as trigger signal is in level high, the camera keeps exposure and acquisition status.
Level Low		Level Low	Level Low refers to the level low of the trigger signal is valid. As long as trigger signal is in level low, the camera keeps exposure and acquisition status.

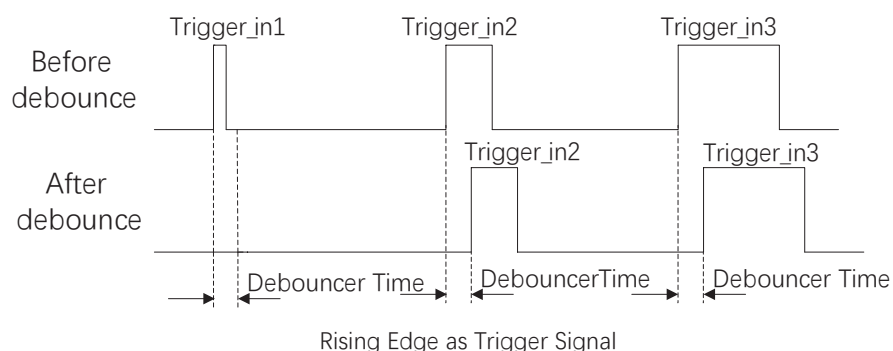


■ Trigger Debouncer

The external trigger input signal of the camera may have signal bounce that may cause false trigger. Thus, it is necessary to debounce the external trigger signal, and its sequence diagram is shown below. Click Digital IO Control > Line Debouncer Time, enter Line Debouncer Time, and its range is from 1 μ s to 1000000 μ s.



When the set Debouncer time is greater than the trigger signal time, the trigger signal is ignored.

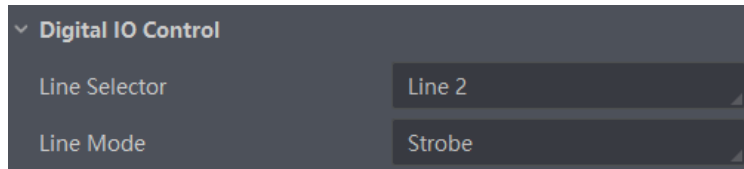


CHAPTER 6 I/O OUTPUT

Select Output Signal

The camera has 1 opto-isolated output (Line 1), and 1 bi-directional I/O (Line 2) that can be configured as output signal. Here we take Line 2 as an example.

Click Digital IO Control, select Line 2 as Line Selector, and select Strobe as Line Mode to set line 2 as output signal.



For details about the electrical characteristics and wiring of the IO interface, please refer to Chapter 7 I/O Electrical Characteristics and Wiring.

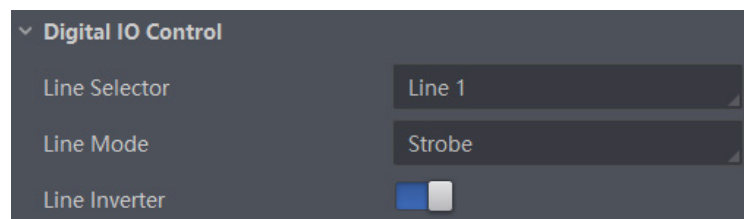
Set Output Signal

The output signal of the camera is switch signal that can be used to control external devices such as light source, PLC, etc.

■ Enable Level Inverter

The line inverter function allows the camera to invert the electrical signal level of an I/O line, and meets requirements of different devices for high or low electrical signal level. All high signals are converted to low signals and vice versa.

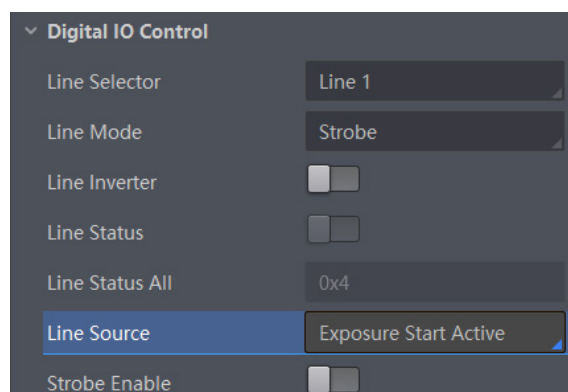
Click Digital IO Control > Line Selector, select line for Line Selector, and enable Line Inverter. The Line Inverter parameter is disabled by default.



■ Enable Strobe Signal

The strobe signal is used to directly output I/O signal to external devices when camera's event source occurs.

Click Digital IO Control, select different output events as Line Source, and enable Strobe Enable.

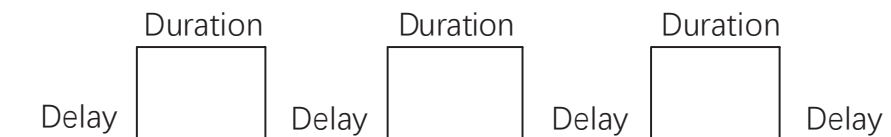
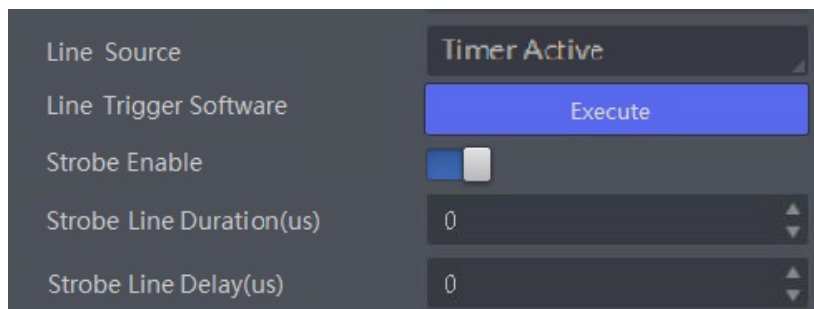


Set Output Signal

For specific Line Source, please refer to following table for details.

Name	Description
Exposure Start Active	It refers to output one I/O edge signal when starting exposure.
Acquisition Start Active	It refers to output one I/O edge signal when starting acquisition.
Acquisition Stop Active	It refers to output one I/O edge signal when stopping acquisition.
Frame Burst Start Active	It refers to output one I/O edge signal when starting triggering and acquiring images under Burst mode.
Frame Burst End Active	It refers to output one I/O edge signal when stopping triggering and acquiring images under Burst mode.
Soft Trigger Active	It refers to output one I/O edge signal when software trigger acquisition.
Hard Trigger Active	It refers to output one I/O edge signal when hardware trigger acquisition.
Counter Active	It refers to output one I/O edge signal when counter output is enabled.
Timer Active	It refers to output one I/O edge signal when timer output is enabled.
Exposure End Active	It refers to output one I/O edge signal when camera exposure is stop.
Frame Trigger Wait	It refers to responds to one I/O edge signal when timer output is enabled. Avoid excessive triggering when the camera trigger frequency is too high.
Frame Start Active	It refers to output one I/O edge signal when the camera starts grabbing a single frame.
Frame End Active	It refers to output one I/O edge signal when the camera stops grabbing a single frame.

Select Line Source as Timer Active. After the Line Trigger Software parameter is executed, the camera will output a signal of Strobe Line Duration every time the Strobe line Delay is set.



Regarding strobe signal, you can also set its duration, delay and pre delay.

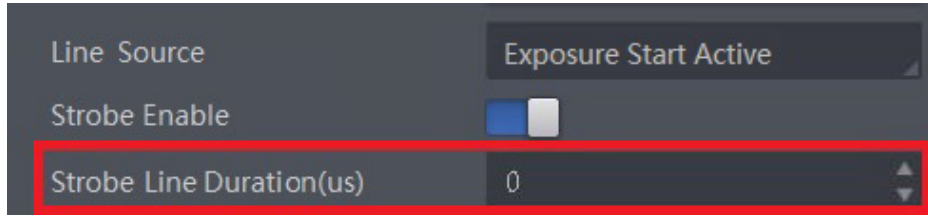


- The specific line source may differ by camera models.
- When the Strobe Line Duration value is 0, the strobe duration is equal to the exposure time. When the Strobe Line Duration value is not 0, the strobe duration is equal to Strobe Line Duration value.

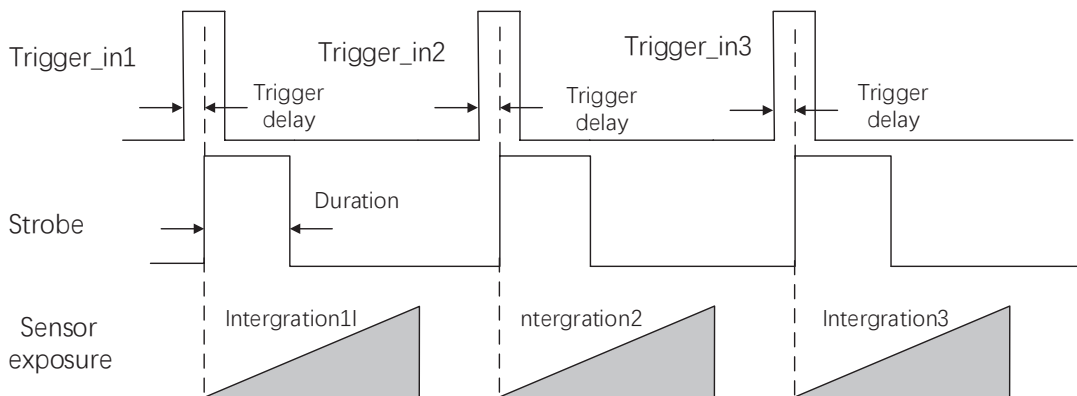
Set Output Signal

■ Strobe Line Duration

Strobe signal is active Level High, After enabling strobe signal, you can set its duration. Click Digital IO Control > Strobe Line Duration, and enter Strobe Line Duration.



For example, select Line Source as Exposure Start Active. When the camera starts to expose, Strobe outputs immediately. When the Strobe Line Duration value is 0, the strobe duration is equal to the exposure time. When the Strobe Line Duration value is not 0, the strobe duration is equal to Strobe Line Duration value.

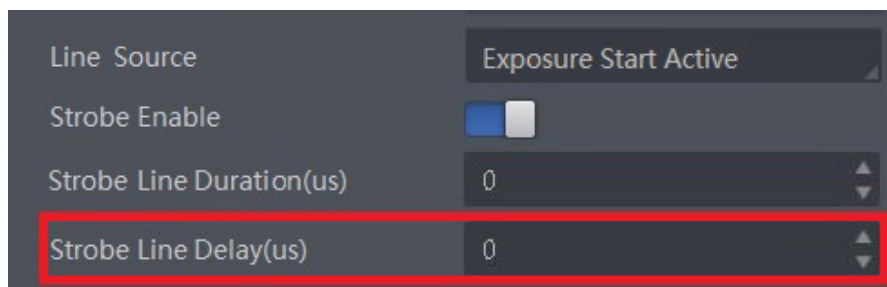


■ Strobe Line Delay

The camera supports setting strobe line delay to meet actual demands. When exposure starts, the strobe output doesn't take effect immediately. Instead, the strobe output will delay according to the strobe line delay setting.

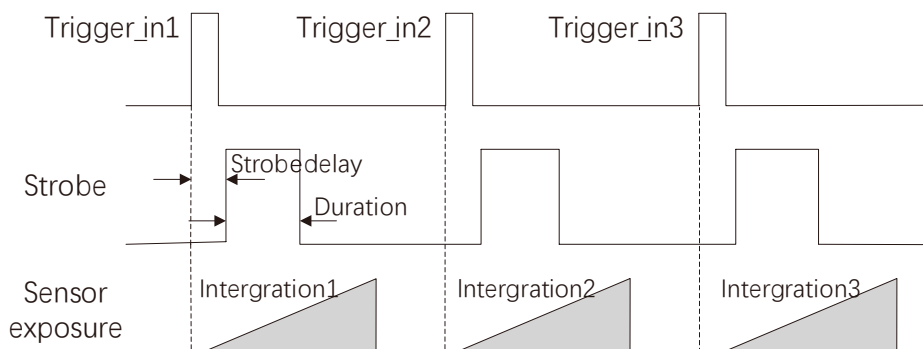
Click Digital IO Control > Strobe Line Delay, and enter Strobe Line Delay according to actual demands.

The unit is μs and the range is 0~10000, that is, 0~10 ms.



For example, select Line Source as Exposure Start Active.

When the camera starts to expose, the Strobe output does not take effect immediately, but delays the output according to the value set by Strobe Line Delay. The sequence diagram of strobe line delay is shown below.

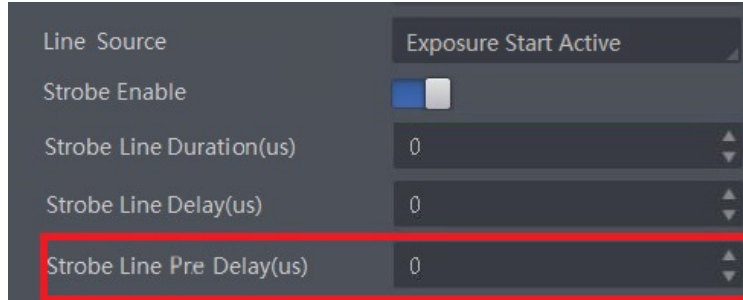


Set Output Signal

■ Strobe Line Pre Delay

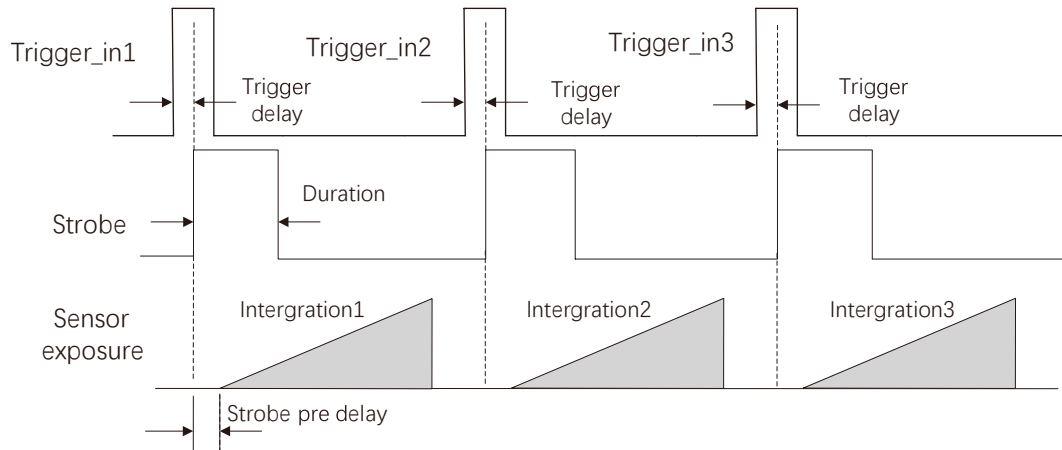
The camera also supports the function of strobe line pre delay, which means that the strobe signal takes effect early than exposure. This function is applied to the external devices that have slow response speed.

Click Digital IO Control > Strobe Line Pre Delay, and enter Strobe Line Pre Delay according to actual demands. The unit is μ s and the range is 0~5000, that is, 0~5 ms.



For example, select Line Source as Exposure Start Active.

The camera will delay the exposure according to the value set by Strobe Line Pre Delay. The sequence diagram of strobe line pre delay is shown below.

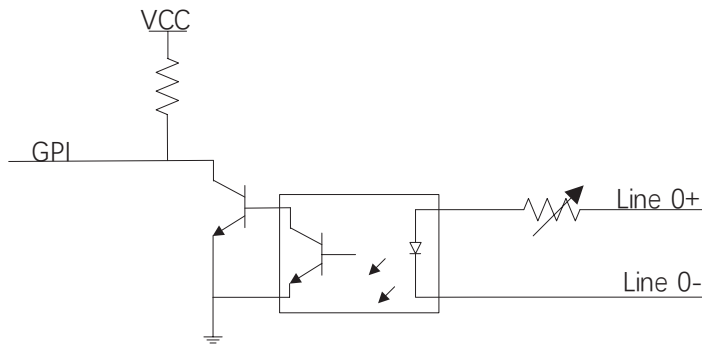


I/O ELECTRICAL FEATURE AND WIRING

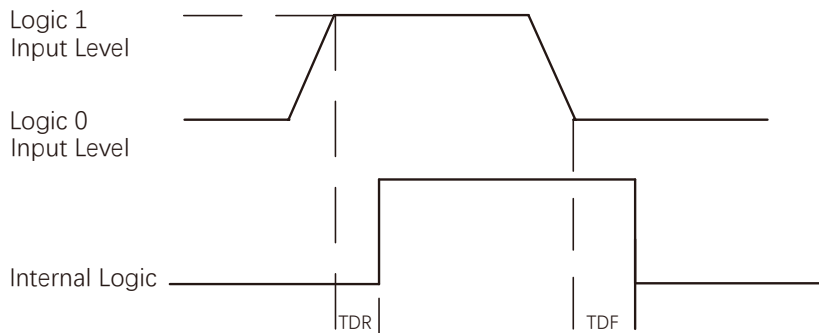
I/O Electrical Feature

Line 0 Opto-isolated Input Circuit

The Line 0 opto-isolated input circuit in camera I/O control is shown below.
The maximum input current of Line 0 is 25 mA.



Input Logic Level:



Input Electrical Feature:

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 ~ 1 VDC
Input Logic Level High	VH	1.5 ~ 24 VDC
Input Rising Delay	TDR	1.8 ~ 4.6 μ s
Input Falling Delay	TDF	16.8 ~ 22 μ s

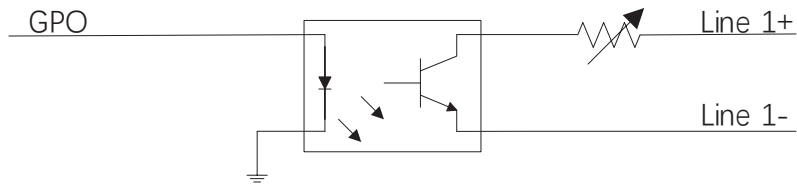


- Make sure the input voltage is not from 1 VDC to 3.3 VDC as the electric status between these two values are not stable.
- The breakdown voltage is 30 VDC, and keep voltage stable.

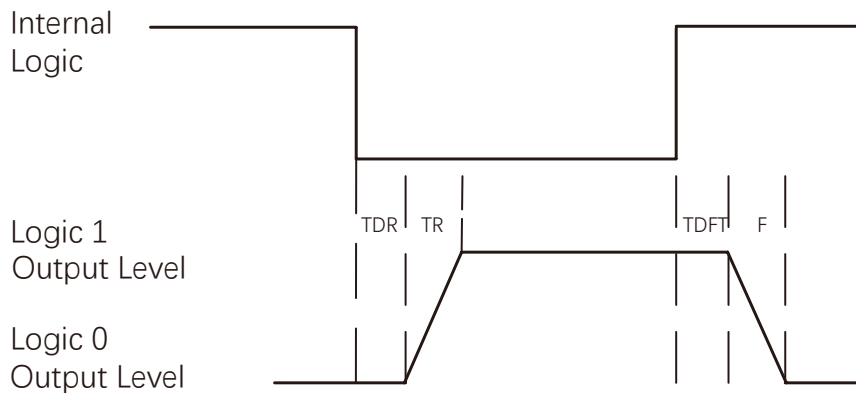
I/O Electrical Feature

Line 1 Opto-isolated Output Circuit

The Line 1 opto-isolated output circuit in camera I/O control is shown below.
The maximum output current of Line 1 is 25 mA.



Output Logic Level:



Opto-isolated output electric feature is shown in below (when the external voltage is 3.3 VDC and the external resistance is 1 K Ω).

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	575 mV
Output Logic Level High	VH	3.3 V
Output Rising Time	TR	8.4 μ s
Output Falling Time	TF	1.9 μ s
Output Rising Delay	TDR	15 ~ 60 μ s
Output Falling Delay	TDF	3 ~ 6 μ s

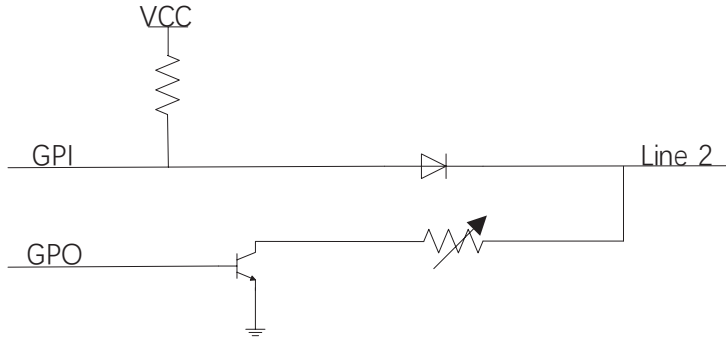
With different external voltage and resistance, the corresponding current and the parameter of output logic level low are shown below.

External Voltage	External Resistance	VL	Output Current
3.3 V	1 K Ω	575 mV	2.7 mA
5 V	1 K Ω	840 mV	4.1 mA
12 V	2.4 K Ω	915 mV	4.6 mA
24 V	4.7 K Ω	975 mV	4.9 mA

I/O Electrical Feature

Line 2 Bi-direction I/O Circuit

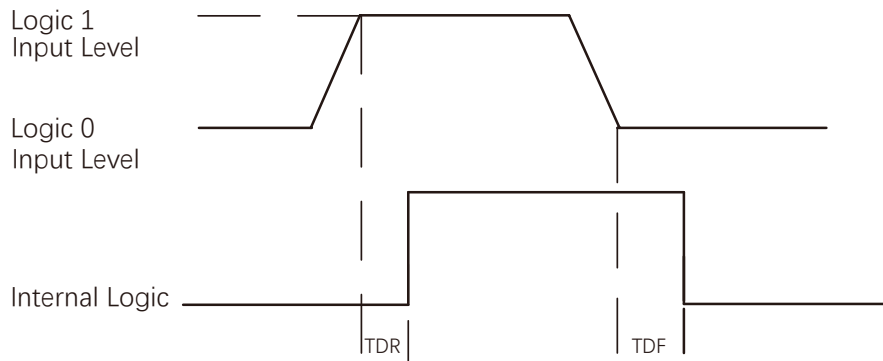
The Line 2 bi-direction I/O circuit in camera I/O control is shown below. The Line 2 can be configured as input signal or as output signal.



Line 2 Configured as Input

With the condition of 100 Ω and 5 VDC, the logic level and electrical feature of configuring Line 2 as output are shown below.

Input Logic Level:



Electrical Feature of Line 2 Input:

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 ~ 0.5 VDC
Input Logic Level High	VH	3.3 ~ 24 VDC
Input Rising Time	TDR	< 1 μ s
Input Falling Time	TDF	< 1 μ s



- Make sure the input voltage is not from 0.5 VDC to 3.3 VDC as the electric status between these two values are not stable.
- The breakdown voltage is 30 VDC, and keep voltage stable.
- To prevent damage to the GPIO pin, please connect GND first and then input voltage in Line 2.

I/O Electrical Feature

Line 2 Configured as Output

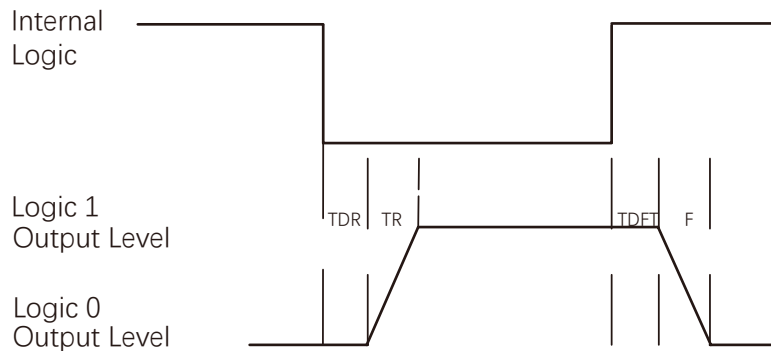
The maximum current is 25 mA and the output impedance is 40 Ω .

The relation among external voltage, resistance and the output level low is shown below.

External Voltage	External Resistance	VL (GPIO2)
3.3 V	1 K Ω	160 mV
5 V	1 K Ω	220 mV
12 V	1 K Ω	460 mV
24 V	1 K Ω	860 mV
30 V	1 K Ω	970 mV

When the voltage of external resistance (1 K Ω) is pulled up to 5 VDC, the logic level and electrical feature of configuring Line 2 as output are shown below.

Output Logic Level:



Electrical Feature of Line 2 Output:

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	220 mV
Output Logic Level High	VH	4.75 V
Output Rising Time	TR	0.06 μ s
Output Falling Time	TF	0.016 μ s
Output Rising Delay	TDR	0 ~ 4 μ s
Output Falling Delay	TDF	< 1 μ s

I/O Wiring

The camera has different appearance with varied models. Here we take type with Fan camera as an example to introduce I/O wiring. Other cameras can be analogized according to the cable definition in the wiring diagram, combined with the power supply and I/O interface definition chapter in Chapter 2.

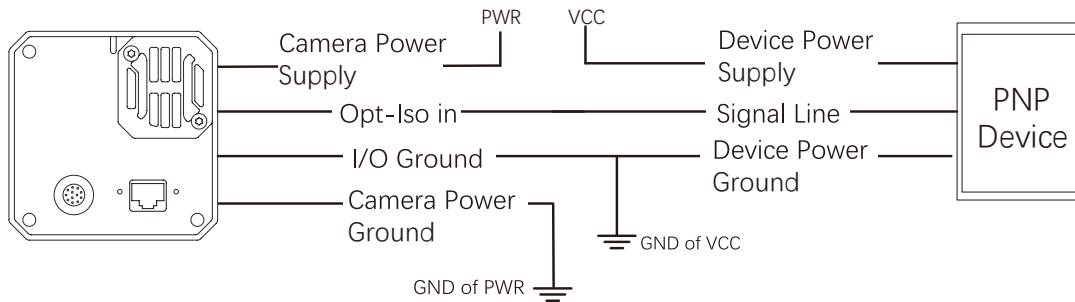


For specific camera appearance, cable color and I/O wiring, please refer to the actual one you got.

Line 0 Wiring

When the camera uses Line 0 as hardware trigger source, wirings are different with different external devices of input signal.

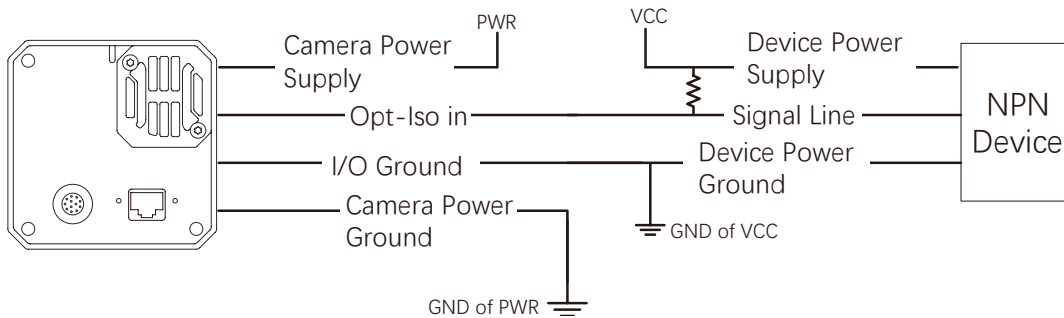
The input signal is PNP Device, that is, Line 0 Connecting to PNP Device:



The input signal is NPN Device, that is, Line 0 Connecting to NPN Device:

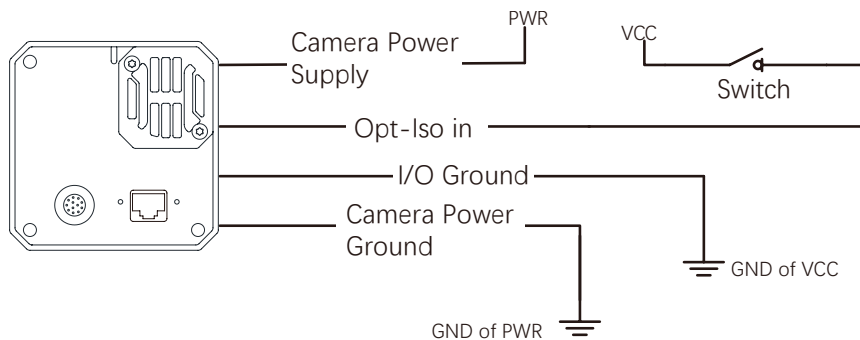
_If the VCC of NPN device is 24 VDC, and it is recommended to use 1 K Ω to 4.7 K Ω pull-up resistor.

_If the VCC of NPN device is 12 VDC, and it is recommended to use 1 K Ω pull-up resistor.



The input signal is Switch, that is, Line 0 Connecting to Switch:

If the VCC of switch is 24 VDC, and it is recommended to use 1 K Ω to 4.7 K Ω resistor to protect circuit.

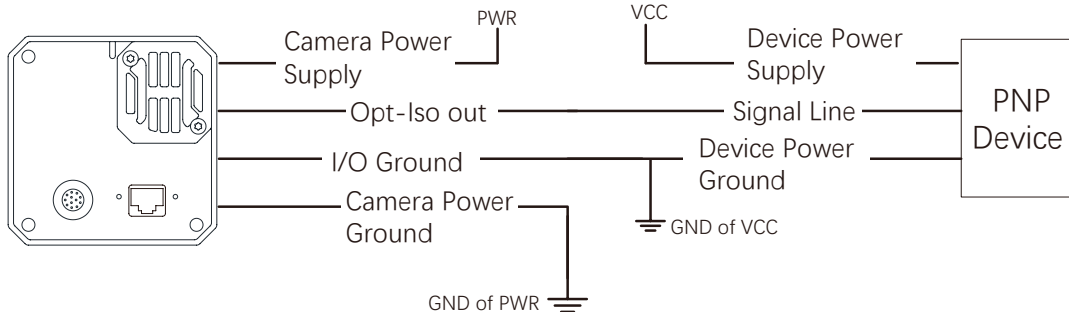


I/O Wiring

Line 1 Wiring

When the camera uses Line 1 as output signal, wirings are different with different external devices.

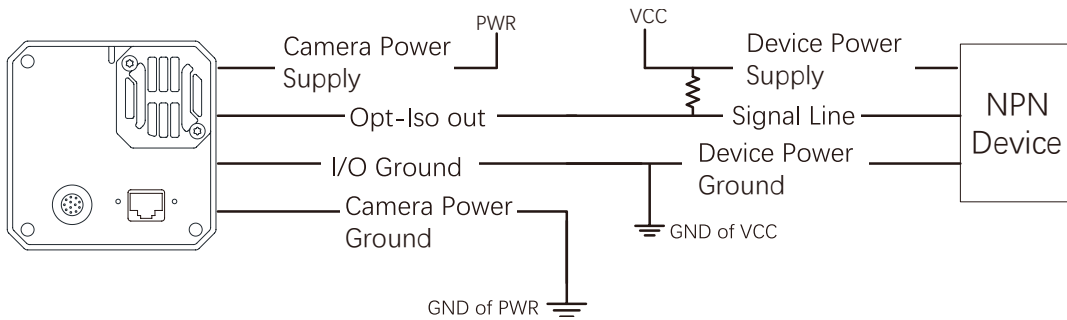
The external devices is PNP Device, that is, Line 1 Connecting to PNP Device:



The external devices is NPN Device, that is, Line 1 Connecting to NPN Device:

_If the VCC of NPN device is 24 VDC, and it is recommended to use 1 K Ω to 4.7 K Ω pull-up resistor.

_If the VCC of NPN device is 12 VDC, and it is recommended to use 1 K Ω pull-up resistor.



I/O Wiring

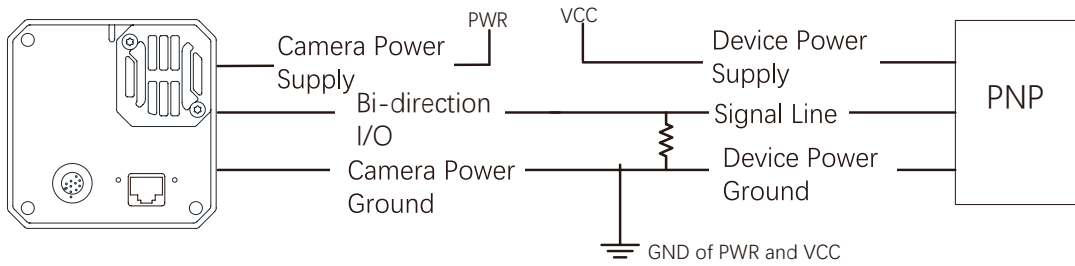
Line 2 Wiring

As bi-direction I/O Circuit, Line 2 can be used as both input signal and output signal.

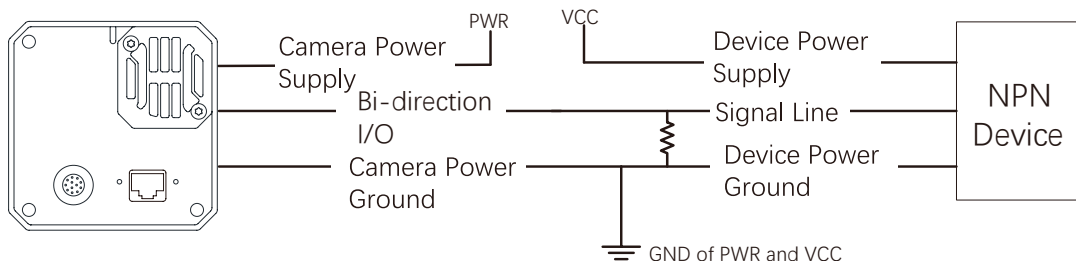
Line 2 Configured as Input :

When the camera uses Line 2 as hardware trigger source, wirings are different with different external devices of input signal.

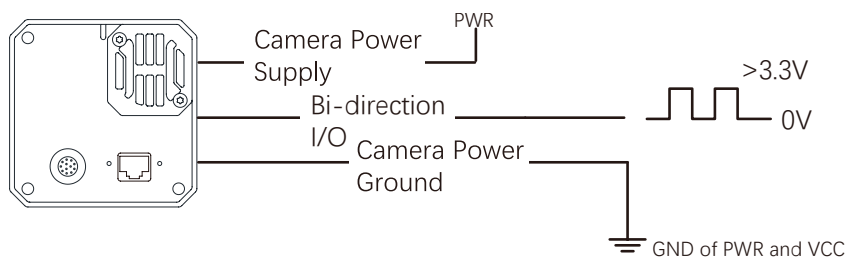
The input signal is PNP Device, that is, Line 2 Connecting to PNP Device as Input:
It is recommended to use 330 Ω pull-down resistor.



The input signal is NPN Device, that is, Line 2 Connecting to NPN Device as Input:
_If the VCC of NPN device is 24 VDC, and it is recommended to use 1 K Ω to 4.7 K Ω pull-up resistor.
_If the VCC of NPN device is 12 VDC, and it is recommended to use 1 K Ω pull-up resistor.



The input signal is Switch, that is, Line 2 Connecting to a Switch as Input:
The switch value can provide low electrical level to trigger line 2.



I/O Wiring

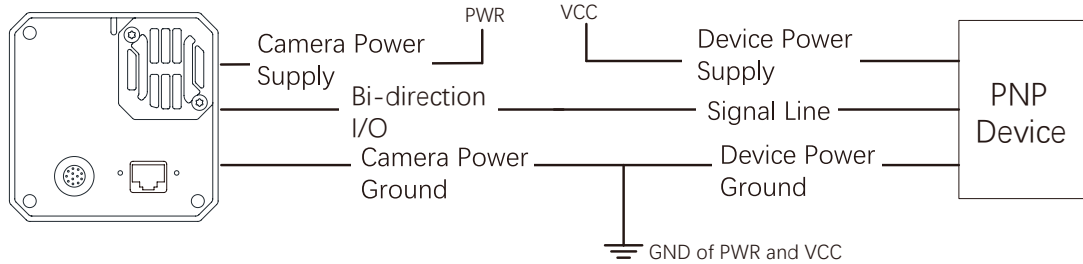
Line 2 Wiring

As bi-direction I/O Circuit, Line 2 can be used as both input signal and output signal.

Line 2 Configured as Output:

When the camera uses Line 2 as output signal, wirings are different with different external devices.

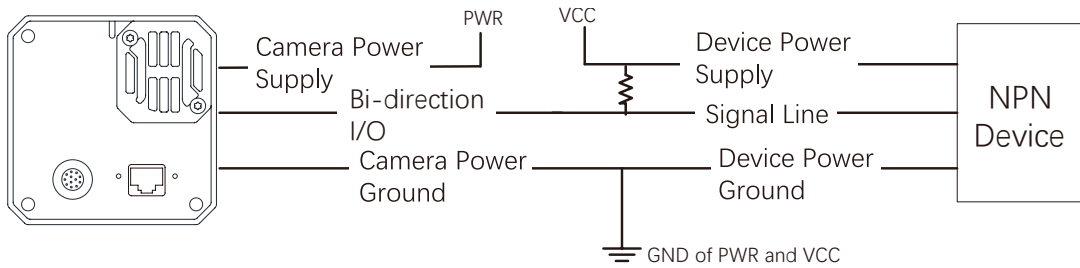
The external devices is PNP Device, that is, Line 2 Connecting to PNP Device as Output:



The external devices is NPN Device, that is, Line 2 Connecting to NPN Device as Output:

_If the VCC of NPN device is 24 VDC, and it is recommended to use 1 K Ω to 4.7 K Ω pull-up resistor.

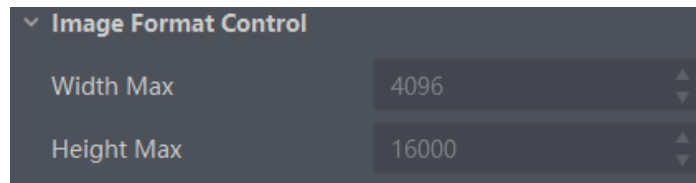
_If the VCC of NPN device is 12 VDC, and it is recommended to use 1 K Ω pull-up resistor.



CHAPTER 8 IMAGE PARAMETER

Resolution and ROI

The camera displays the image with max. resolution by default. Click Image Format Control, and view Width Max and Height Max. Width Max stands for the max. pixels per inch in width direction and Height Max stands for the max. pixels per inch in height direction.



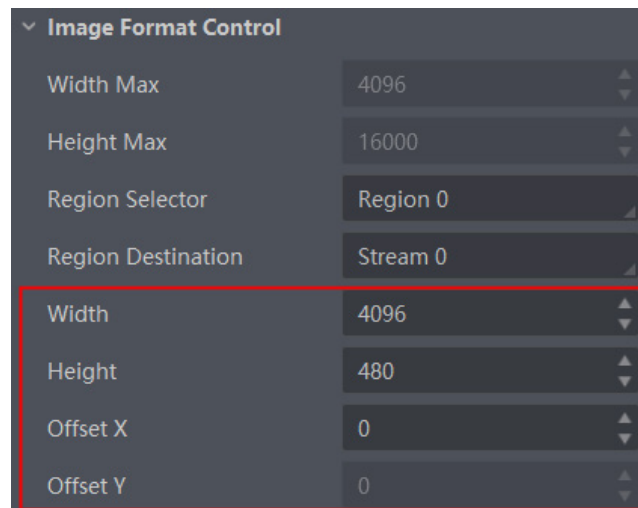
If you are only interested in a certain region of the image, you can set a Region of Interest (ROI) for the camera. Setting Region of Interest can reduce the bandwidth of the image being transmitted. Thus increasing the frame rate to some extent.



The camera currently supports 1 ROI only, that is, there is Region 0 for Region Selector parameter only.

Click Image Format Control > Region Selector, and enter Width, Height, Offset X, and Offset Y.

- Width: it stands for horizontal resolution in ROI area.
- Height: it stands for vertical resolution in ROI area.
- Offset X: it refers to the horizontal coordinate of the upper left corner of the ROI.
- Offset Y: it refers to the vertical coordinate of the upper left corner of the ROI.



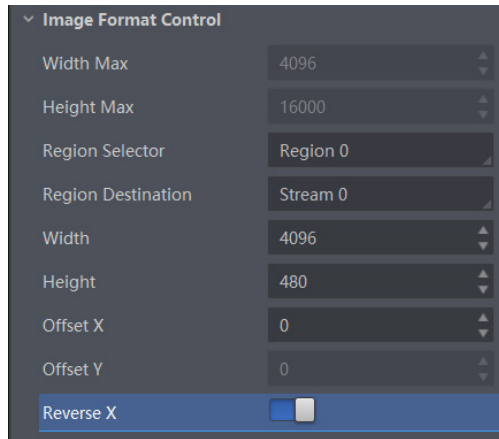
- The Width value plus Offset X value should not be larger than Width Max parameter value, Height value plus Offset Y value should not be larger than Height Max parameter value.
- The ROI function may differ by camera models.

Image Reverse

There are two types of Image Reverse, Reverse X and Reverse Y. The principle and parameter of Image Reverse are shown below.

Image Reverse	Parameter	Principle
Reverse X	Image Format Control > Reverse X	the image reverses in a horizontal way
Reverse Y	Image Format Control > Reverse Y	the image reverses in a vertical way

You can click Image Format Control, and enable Reverse X or Reverse Y according to actual demands.



The image reverse function may differ by camera models.

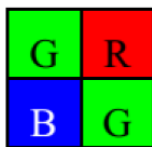
Pixel Format

The pixel format may differ by camera models.

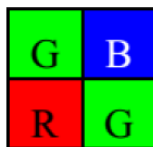
Pixel Format	Pixel Size (Bits/Pixel)
Mono 8, Bayer 8	8
Mono10 Packed、Mono 12 packed、Bayer 10 Packed、Bayer 12 Packed	12
Mono 10/12、Bayer 10/12、YUV422Packed、YUV 422 (YUYV) Packed	16
RGB 8、BGR 8	24

The original data of monochrome cameras is in Mono 8 format; the original data of color cameras is in Bayer 8 format. Among them, the color camera completes the conversion of the original data to RGB8 through the camera's internal pixel interpolation algorithm. The RGB format can be converted to YUV format through the algorithm, YUV Under the format, the value of Y component can be output as Mono 8 format.

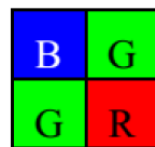
Bayer GR, Bayer GB, Bayer BG, Bayer RG, etc. are shown in the figure below.



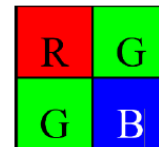
Bayer GR



Bayer GB

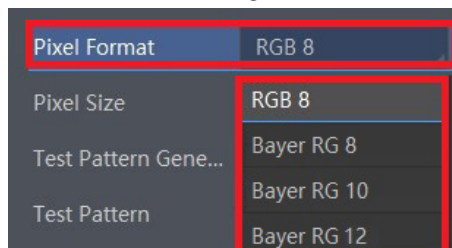


Bayer BG



Bayer RG

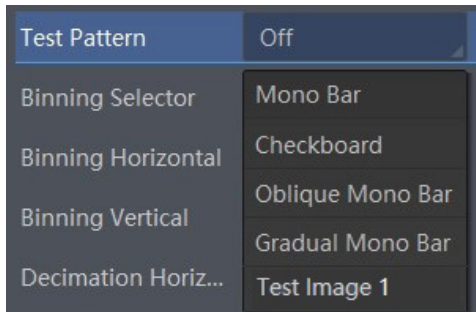
Click Image Format Control > Pixel Format, and set Pixel Format according to actual demands.



Test Pattern

The camera supports test pattern function. When there is exception in real-time image, you can check whether image of test mode have similar problem to determine the reason. This function is disabled by default, and at this point, the outputted image by the camera is real-time image. If this function is enabled, the outputted image by the camera is test image.

Click Image Format Control > Test Pattern, and set Test Pattern according to actual demands



The mono camera offers 5 test patterns, including Mono Bar, Checkboard, Oblique Mono Bar, Gradual Mono Bar, and Test Image 1. The color camera offers 7 test patterns, including Mono Bar, Checkboard, Oblique Mono Bar, Gradual Mono Bar, Vertical Color Bar, Horizontal Color Bar, Test Image 1.


 The pattern of the test image 1 may differ by camera models.



Fig:Mono Bar

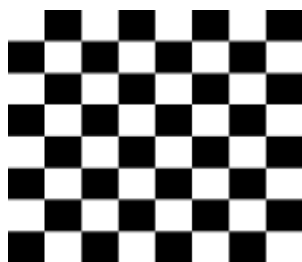


Fig:Checkboard



Fig:Oblique Mono Bar

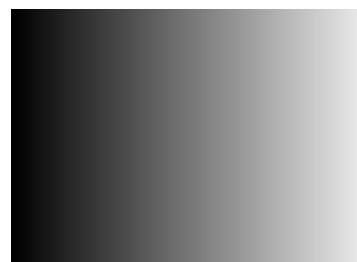


Fig:Gradual Mono Bar

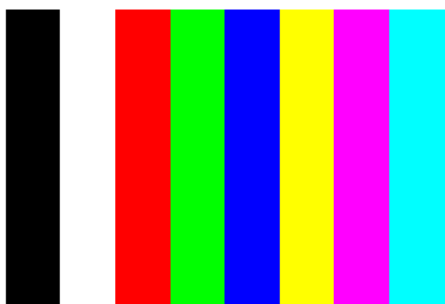


Fig:Vertical Color Bar



Fig:Horizontal Color Bar

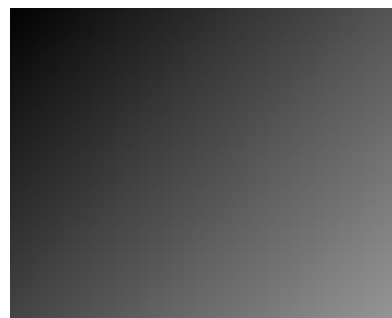


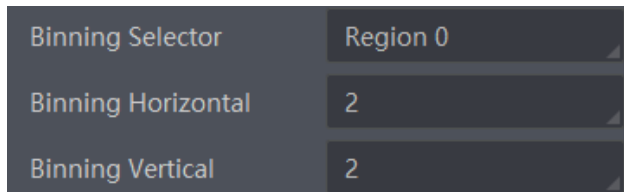
Fig:Test Image 1

Binning

The purpose of setting binning is to enhance sensibility. With binning, multiple sensor pixels are combined as a single pixel to reduce resolution and improve image brightness.

Click Image Format Control, and set Binning Horizontal and Binning Vertical according to actual demands.

Binning Horizontal refers to the image's width, and Binning Vertical refers to the image's height.



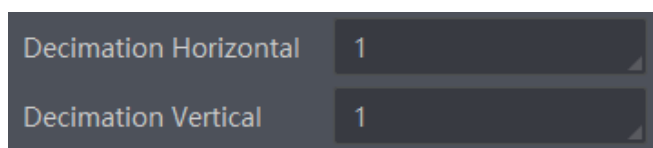
i The binning function may differ by camera models.

Decimation

The decimation feature allows you to reduce the number of sensor pixel columns or rows that are transmitted by the camera. This procedure is also known as "subsampling". It reduces the amount of data to be transferred and may increase the camera's frame rate.

Click Image Format Control, and set Decimation Horizontal and Decimation Vertical according to actual demands.

Decimation Horizontal refers to the image's width, and Decimation Vertical refers to the image's height.



i The decimation function may differ by camera models.

Exposure Time

The exposure time mode may differ by camera models.

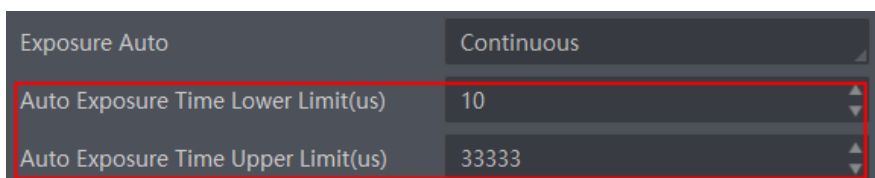
Click Acquisition Control > Exposure Time Mode, and set Exposure Time Mode according to actual demands.

■ Standard Mode

Under the standard exposure time mode, the camera supports 3 types of exposure methods: Off, Once and Continuous. Click Acquisition Control > Exposure Auto, and select Exposure Auto according to actual demands. The exposure method and principle are shown below.

Exposure Method	Parameter	Principle
Off	Acquisition Control > Exposure Auto	The camera exposures according to the value configured by user in Exposure Time.
Once		Adjust the exposure time automatically according to the image brightness. After adjusting, it will switch to Off Mode.
Continuous		Adjust the exposure time continuously according to the image brightness.

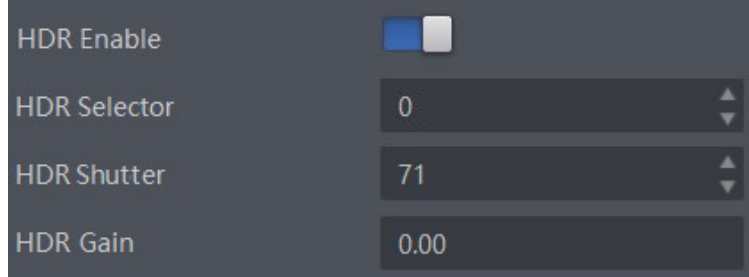
When the Exposure Auto is set as Off, you can enter Exposure Time manually. When the Exposure Auto is set as Once or Continuous, the exposure time should be within the range of Auto Exposure Time Lower Limit and Auto Exposure Time Upper Limit.



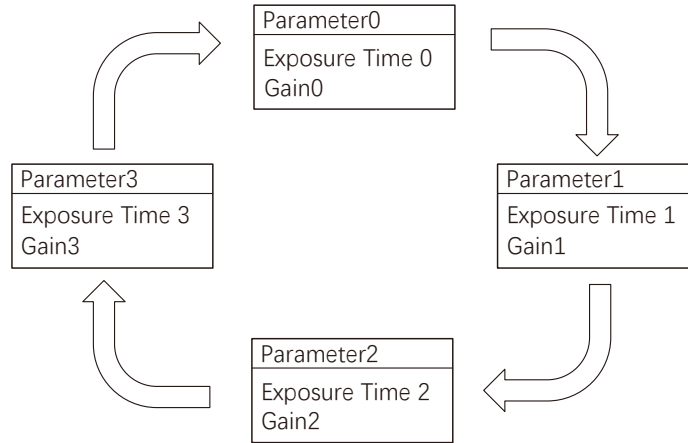
HDR

The camera supports HDR (High Dynamic Range) function that the camera acquires images based on 4 sets of settings, and each with its own exposure time and gain.

Step:
Click Acquisition Control, enable HDR Enable, select 0, 1, 2 or 3 as HDR Selector, and set corresponding HDR Shutter and HDR Gain.



The polling diagram between the four groups of HDR parameters is shown in the figure below.



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- The HDR function may differ by camera models.
- When the Acquisition Burst Frame Count parameter value is set greater than 4, polling of the four sets of parameters is rounded. For example, if the Acquisition Burst Frame Count is set to 6, the parameter polling order is: parameter 0 > parameter 1 > parameter 2 > parameter 3 > parameter 0 > parameter 1, as is the next set of polls.

Gain

The camera has 2 types of gain, including the analog gain and digital gain. The analog gain is applied before the signal from the camera sensor is converted into digital values, while digital gain is applied after the conversion.

When increasing the analog gain, the image noise will increase too, which will influence image quality. If you want to increase image grayscale value, it is recommended to increase the camera's exposure time. If the exposure time reaches its upper limit, and at this point, you can increase analog gain.

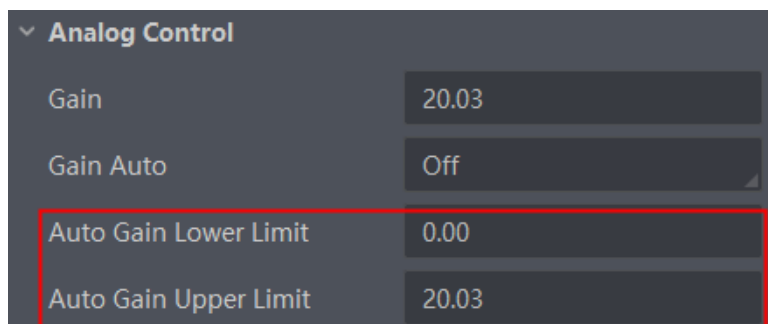
■ Analog Gain

The gain function may differ by camera models.

The camera supports 3 types of analog gain modes: Off, Once and Continuous. Click Analog Control, and select Gain Auto according to actual demands. The analog gain mode and principle are shown below.

Gain Mode	Parameter	Principle
Off	Analog Control > Gain Auto	The camera adjusts gain according to the value configured by user in Gain.
Once		Adjust the gain automatically according to the image brightness. After adjusting, it will switch to Off Mode.
Continuous		Adjust the gain continuously according to the image brightness.

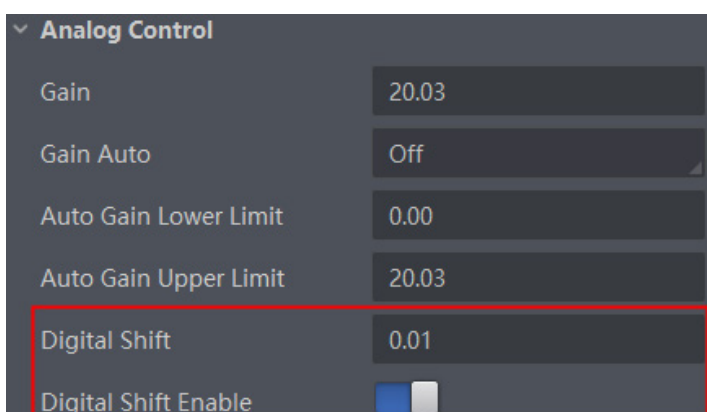
When the analog gain is set as Once or Continuous, the gain should be within the range of Auto Gain Lower Limit and Auto Gain Upper Limit.



■ Digital Gain

Apart from analog gain, the camera supports digital gain function. When analog gain reaching its upper limit and the image is still too dark, it is recommended to improve image brightness via digital gain.

Click Analog Control, enable Digital Shift Enable, and enter Digital Shift according to actual demands. The range of Digital Shift is from -6 to 6.



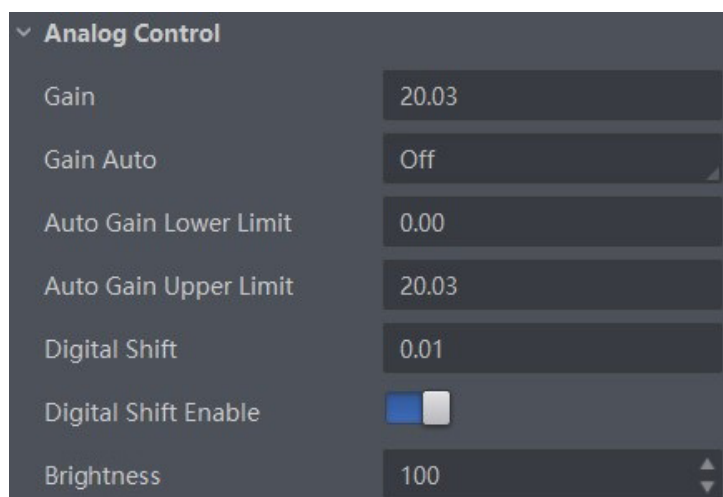
Brightness

The camera brightness refers to the brightness when the camera adjusts image under Once or Continuous exposure mode, or Once or Continuous gain mode. You can set brightness as shown below.

You should enable Once or Continuous exposure mode, or Once or Continuous gain mode first before setting brightness.

Click Analog Control > Brightness, and set Brightness according to actual demand, and its range is from 0 to 255.

After setting brightness, the camera will automatically adjust exposure time to let image brightness reach target one. Under Once or Continuous exposure mode, or Once or Continuous gain, the higher the brightness value, the brighter the image will be.

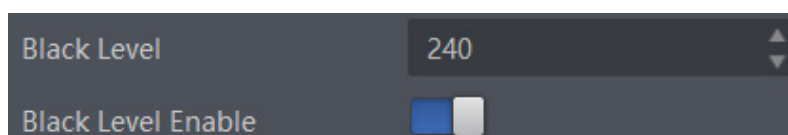


Black Level

The camera supports black level function that allows you to change the overall brightness of an image by changing the gray values of the pixels by a specified amount.

Click Analog Control > Black Level Enable, enable Black Level Enable, and enter Black Level according to actual demands.

The range of black level is from 0 to 4095.



The black level function may differ by camera models.

White Balance

White balance is only available for color cameras.

The white balance refers to the camera color adjustment depending on different light sources. Adjust the Gain Value of the image's R channel and B channel to keep white regions white under different color temperatures. Ideally, the proportion of R channel, G channel and B channel in the white region is 1:1:1.

Click Analog Control > Balance White Auto, and select Balance White Auto according to actual demands.

The camera supports 3 types of white balance modes: Off, Once and Continuous.

White Balance Mode	Parameter	Principle
Off	Analog Control > Balance White Auto	You need to set the R, G, B value manually, between 1 and 4095. 1024 means ratio is 1.0
Once		Automatic white balance once. Adjust the white balance for a certain amount of time then stop. It implements an algorithm that finds possible gray areas in the Bayer data.
Continuous		Continuous automatic white balance. It implements an algorithm that finds possible gray areas in the Bayer data.

It is recommended to correct white balance when there is great difference between the camera's color effect and actual effect.

You can correct white balance as shown below.

Steps:


1. Put a white paper in the range of the camera's field of view, and make sure the paper covers the entire field of view.
2. Set exposure and gain. It is recommended to set image brightness value between 120 and 160.
3. Select Once as Balance White Auto, and the camera will automatically adjust white balance for once.

Balance White Auto parameter defaults to Continuous, and AWB Color Temperature Mode is Narrow. If the color effect of the image is still not good after performing automatic white balance in this color temperature mode, you can set the AWB Color Temperature Mode parameter to Wide and then perform automatic white balance correction.

If there is still great difference between correction effect and actual color, it is recommended to correct white balance according to following steps.

Steps:

1. Select Off as Balance White Auto. At this time, Balance Ratio is 1024.
2. Find corresponding R/G/B channel in Balance Ratio Selector. Here we take Green as an example.
3. Find camera's R/G/B value.
4. Take Green as correction standard, and manually adjust other two channels (R channel and B channel) to let these three channels have same value.

	<ul style="list-style-type: none"> ■ Here we take Green as an example. For specific Balance Ratio Selector value, please refer to the actual condition. ■ In order to avoid repeated correction after rebooting the camera, it is recommended to save white balance parameter to User Set after white balance correction. You can refer to the Section Save and Load User Set for details. ■ If the light source and color temperature in environment change, you need to correct white balance again.
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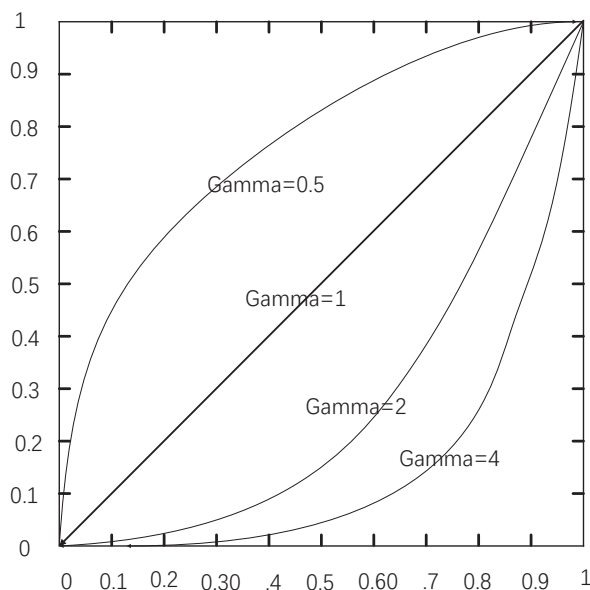
Gamma Correction

The camera supports Gamma correction function. Generally, the output of the camera's sensor is linear with the photons that are illuminated on the photosensitive surface of the sensor. Gamma correction provides a non-linear mapping mechanism as shown below.

- Gamma value between 0.5 and 1: image brightness increases, dark area becomes brighter.
- Gamma value between 1 and 4: image brightness decreases, dark area becomes darker.

 Gamma correction is not supported under Bayer format for color cameras.

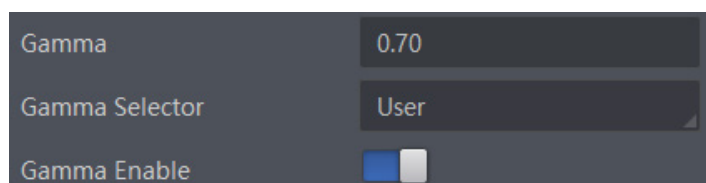
Gamma Curve



There are 2 types of Gamma correction, including User mode and sRGB mode. User is a user-defined mode, which can set the value of Gamma; sRGB is a standard protocol mode.

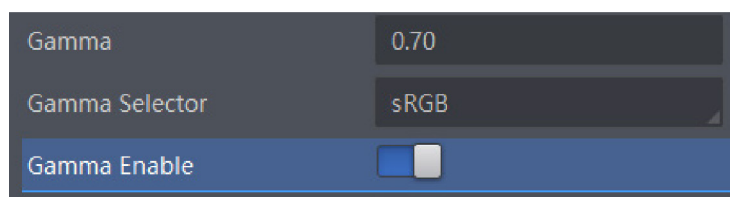
■ You can set User mode as shown below.

1. Click Analog Control > Gamma Selector.
2. Select User as Gamma Selector.
3. Enable Gamma Enable.
4. Enter Gamma according to actual demands, and its range is from 0 to 4.



■ You can set sRGB mode as shown below.

1. Click Analog Control > Gamma Selector.
2. Select sRGB as Gamma Selector.
3. Enable Gamma Enable.



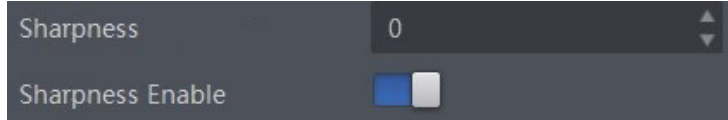
Sharpness

The camera supports sharpness function that can adjust the sharpness level of the image edge, and this function is disabled by default.

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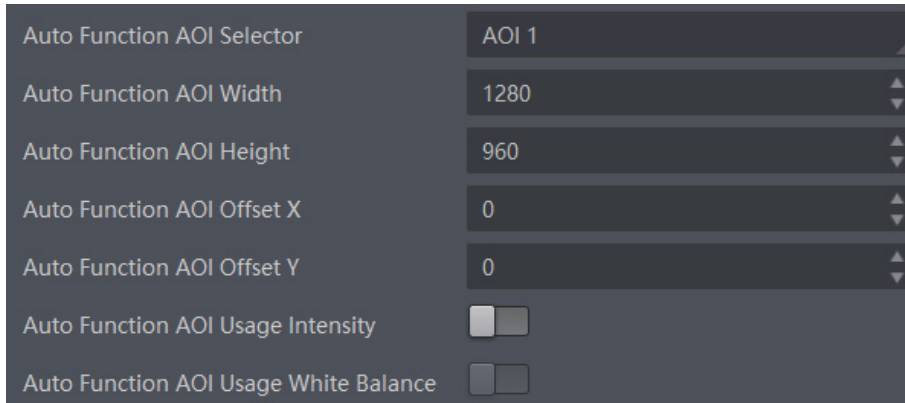
The sharpness function is available when the camera is in Mono and YUV pixel format.

Click Analog Control > Sharpness Enable, enable Sharpness Enable, and enter Sharpness according to actual demands. The range of the brightness is from 0 to 100.



AOI

The camera supports AOI function that can adjust the brightness and white balance of the entire image based on the area you selected.



i

The AOI 1 function needs to be used in the camera's Auto Exposure Time Mode, and the AOI 2 function needs to be used in the camera's Auto White Balance Mode.

Steps:

1. Click Analog Control > Auto Function AOI Selector, and select AOI 1 or AOI 2 Auto Function AOI Selector.
2. Enter Auto Function AOI Width, Auto Function AOI Height, Auto Function AOI Offset X, and Auto Function AOI Offset Y according to actual demands.
3. Enable Auto Function AOI Usage Intensity if AOI 1 is selected as Auto Function AOI Selector. Or enable Auto Function AOI Usage White Balance if AOI 2 is selected as Auto Function AOI Selector.

Color Transformation Control

After the image has been processed for white balance, the overall image will appear dim, and multiple colors may deviate from their standard values to varying degrees. At this time, it is necessary to multiply the color of the image by the correction matrix to correct each color to its standard value, so that the overall color of the image is more vivid.

The color transformation control is used to restore color and eliminate the overlap in the color channels. Two methods are available to set color transformation control.

- Click Color Transformation Control, select Color Transformation Value Selector, and set Color Transformation Value according to actual demand.
- Click Color Transformation Control, enable Color Transformation Enable, set Hue and Saturation to adjust Color Transformation Value.

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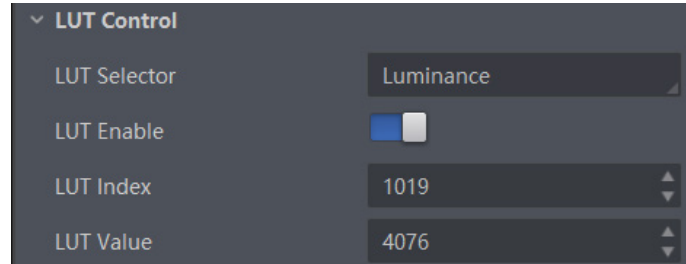
- The color transformation control function may differ by camera models and is only available for color cameras.
- Currently, RGB to RGB is available for Color Transformation Selector only.
- Color correction is achieved by adjusting the value of each parameter in the Color Transformation Value Selector. Gain00, Gain01 and Gain02 adjust the R component of the red pixel, Gain10, Gain11, and Gain12 adjust the G component of the green pixel, and Gain20, Gain21, Gain22 adjust the B component of the blue pixel.

LUT

A Look-Up Table (LUT) is a customized grayscale-mapping table. The LUT allows you to replace the pixel values in your images by values defined by you.

Steps:

1. Click LUT Control, and enable LUT Enable.
2. Enter LUT Index according to actual demands, and its range is from 0 to 1023.
3. Enter LUT Value according to actual demands, and its range is from 0 to 4095.



i You cannot use Gamma correction function and LUT function at the same time.

Shading Correction

The camera supports shading correction function that improves the image uniformity when you acquire a non-uniformity image due to external conditions. The shading correction type includes LSC correction, FFC correction, FPNC correction, and PRNUC correction.

i ■ The specific shading correction type that cameras support may differ by camera models.
 ■ The steps for LSC correction may differ by camera models.

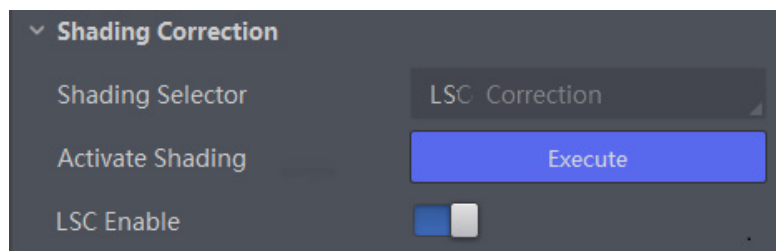
LSC Correction

LSC correction stands for Lens Shading Correction that eliminates non-uniform illumination brought by lens. The LSC correction supports two correction methods, including auto image correction or correcting image via setting parameters.

■ Auto Image Correction

Steps:

1. Click Shading Correction, select LSC Correction as Shading Selector.
2. Click Execute in Activate Shading.
3. Enable LSC Enable.



■ Correcting Image via Setting Parameters

Some camera models support correcting image via setting parameters to adjust the image brightness according to different scenarios.

Steps:

1. Click Shading Correction, select LSC Correction as Shading Selector.
2. Select tables from LSC Table Selector ranging from Table 0 to Table 7 according to actual demands.
3. Enable LSC Target Enable and set LSC Target R/G/B according to actual demands.

i ■ The larger value configured in LSC Target R/G/B, and brighter the image is.
 ■ The function of LSC Target Enable and LSC Target is only valid before executing Activate Shading.

4. Click Execute in Activate Shading, and enable LSC Enable.

i The LSC correction can be done only when the camera is in full resolution. If you are only interested in certain details in the image, you can use the ROI function.

Shading Correction

LSC Sequencer

Without stopping camera's image streams, LSC sequencer function can periodically take pictures of collected images via setting multiple groups of brightness parameter tables according to the default sequencer parameter group or manually setting sequencer parameter group. Therefore, the camera can process images of inconsistent uniformity due to different light sources.

i The LSC sequencer function may differ by camera models.

Steps:

1. Click Shading Correction, select LSC Correction as Shading Selector.
2. Select tables from LSC Table Selector ranging from Table 0 to Table 7 according to actual demands.

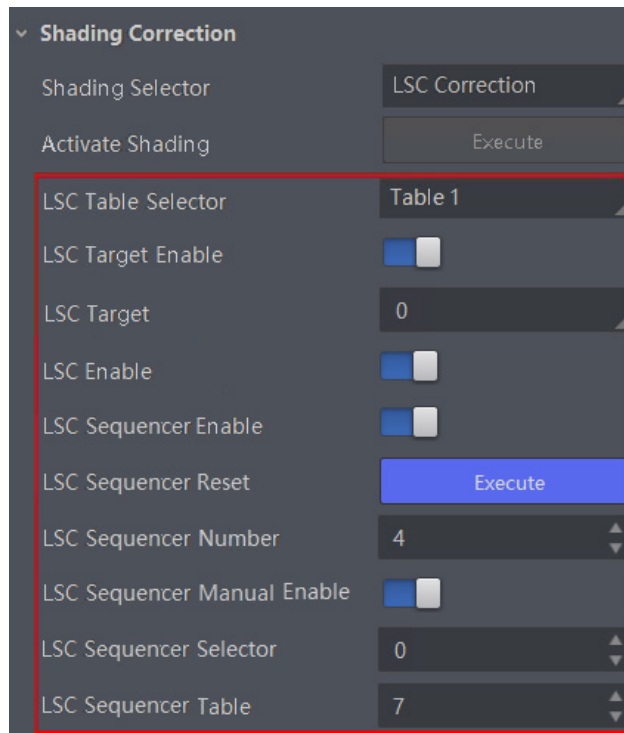
i When using eight LSC tables, the default sequencer order is from Table 0 to Table 7 in turn.

3. Enable LSC Target Enable and set LSC Target.

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- The larger value configured in LSC Target, and brighter the image is.
- The function of LSC Target Enable and LSC Target is only valid before executing Activate Shading.

4. Click Execute in Activate Shading, and enable LSC Sequencer Enable.



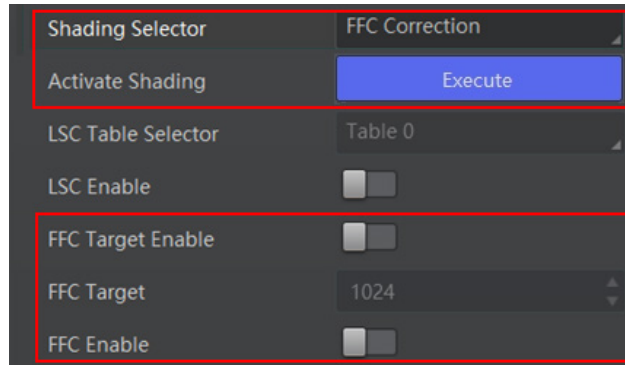
5. Set LSC Sequencer Number to configure how many tables to participate the sequencer.
6. (Optional) Click Execute in LSC Sequencer Reset to reset the sequencer.
7. (Optional) Enable LSC Sequencer Manual Enable if you need to set the sequencer order manually, and set LSC Sequencer Selector and LSC Sequencer Table according to actual demands.

Shading Correction

FFC Correction

The fat field correction (FFC) is used to improve the image uniformity that may be impacted by the sensor, light sources, external conditions, etc. The FFC correction supports two correction methods, including auto image correction or correcting image via setting parameters.

i The FFC correction can be done only when the camera is in full resolution.



■ Auto Image Correction

Steps:

1. Click Shading Correction, select FFC Correction as Shading Selector.
2. Click Execute in Activate Shading, and enable FFC Enable.

■ Correcting Image via Setting Parameters

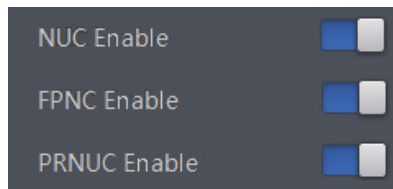
Steps:

1. Click Shading Correction, select FFC Correction as Shading Selector.
2. Enable FFC Target Enable and set FFC Target according to actual demands.
3. Click Execute in Activate Shading, and enable FFC Enable.

i The function of FFC Target Enable and FFC Target is only valid before executing Activate Shading.

Other Corrections

Click Shading Correction, and enable NUC Enable. The FPNC Enable and PRNUC Enable will be automatically enabled or disabled according to the camera's condition.



i The specific setting steps of other corrections may differ by camera models.

CHAPTER 9 OTHER FUNCTIONS

Device Control

In the Device Control attribute, you can view device information, edit device name, reset device, etc. The specific parameters in Device Control attribute are shown below.

Parameter	Read/Write	Description
Device Type	Read only	It is the device type.
Device Scan Type	Read only	It is the scan type of the sensor.
Device Vendor Name	Read only	It is the name of device manufacturer.
Device Model Name	Read only	It is the device model.
Device Manufacturer Info	Read only	It is the manufacturer information.
Device Version	Read only	It is the device version.
Device Firmware Version	Read only	It is the device firmware version.
Device Serial Number	Read only	It is the device serial number.
Device ID	Read only	It is the device ID.
Device User ID	Read and write	Device name and it is empty by default. You can set according to your preference. <ul style="list-style-type: none"> ● If User ID is empty, the client software displays the device model. ● If you set it, the client software displays the User ID you set.
Device Uptime(s)	Read only	It is the period of time when device is powered up.
Board Device Type	Read only	It is the device type.
TEC Enable	Read and write	It enables TEC function.
TEC Temperature	Read and write	It sets the max. temperature of sensor. <ul style="list-style-type: none"> ● If actual sensor's temperature is lower than this parameter, and TEC function is not enabled. ● If actual sensor's temperature is higher than this parameter and TEC enable is enabled, and then TEC function is enabled.
Fan Control Mode	Read and write	It sets the fan mode. <ul style="list-style-type: none"> ● In auto mode, it includes three-level fan speed: 70, 85 and 100. According to the difference between the configured sensor temperature (TEC Temperature parameter) and the actual temperature, adjustment is made every 30 seconds. If actual temperature - configured temperature > 2 degrees, fan speed will increase. Otherwise, fan speed will decrease. ● In manual mode, the fan speed is decided by value set in Fan Speed.
Fan Speed	Read and write	It sets the fan speed, and its range is from 40 to 100.
Device Connection Selector	Read and write	It is the ID of GenICam XML.
Device Connection Speed(Mbps)	Read only	It is the device connection speed.
Device Link Selector	Read and write	It selects device link.
Device Link Speed(Mbps)	Read only	It is the link speed.
Device Link Connection Count	Read only	It is the link connection quantity.
Device Link Heartbeat Mode	Read and write	It enables heartbeat mode or not.

Device Control

Parameter	Read/Write	Description
Device Stream Channel Count	Read only	It counts data packet quantity.
Device Stream Channel Selector	Read and write	It is the character set used in register.
Device Stream Channel Type	Read only	It is the stream channel type.
Device Stream Channel Link	Read only	It is the stream channel link quantity.
Device Stream Channel Endianness	Read only	It is the image data endianness.
Device Stream Channel Packet Size(B)	Read and write	It is the data packet size.
Device Event Channel Count	Read only	It is the channel quantity that the device supports.
Device Character Set	Read only	It is the character set used in register.
Device Reset	Read and write	Click Execute to reset the device.
Device Temperature Selector	Read and write	It selects device component temperature.
Device Temperature	Read only	It displays the real-time temperature of the device component you selected in Device Temperature Selector.
Find Me	Read and write	Click Execute to let red indicator flash once, and find device.
Device Max Throughput(Kbps)	Read only	It is the maximum flow of device operation.
Device PJ Number	Read only	It is the device's project number.




The specific device control parameters may differ by camera models.

Embedded Information in Image

The camera supports adding and embedding the collection information to the image data. You can set in the client software and define which information to be embedded in the image data.

Embedded information includes following categories. Each category of embedded information has its unique data format.

Information Type	Byte	Data Format Description
Timestamp	4	4 bytes are used to transfer the timestamp information.
Gain	4	4 bytes are used to transfer the gain information. Each low 8 bits of the 4 valid data are combined to transfer the gain information. Value Range: 0 to 1023. Note: High bits will be complemented with 0 automatically.
Exposure	4	4 bytes are combined to show the exposure time, and the unit is μ s.
Brightness Info	4	4 bytes are used to transfer the brightness information. Value Range: 0 to 4095. Note: High bits will be complemented with 0 automatically.
White Balance	8	R/G/B occupies 2 bytes each. Value Range: 0 to 4095.
Frame Counter	4	Value Range: 0 to $2^{32}-1$
Ext Trigger Count	4	Value Range: 0 to $2^{32}-1$
Line Input Output	4	4 bytes are used to transfer the line input and output information.
Pixel Format	4	Value Range: 0 to $2^{32}-1$
ROI Position	8	The column coordinate occupies 2 bytes, and the row coordinate occupies 2 bytes. The column coordinate information comes first. The length and width occupy 2 bytes respectively, and the length information comes first.



- The specific embedded information categories may differ by camera models.
- Color cameras have the white balance only. Embedded information types, including width, height, offset X, offset Y and pixel format, are for cameras that support the chunk data function only.
- The camera embeds category that you select into the image data. The ROI area do not influence collection information embedding. If the ROI area is small and there is not enough space in first line image, and then the collection information will be embedded into the second line image.
- The low 8-bit of each valid data storages image embedded information.

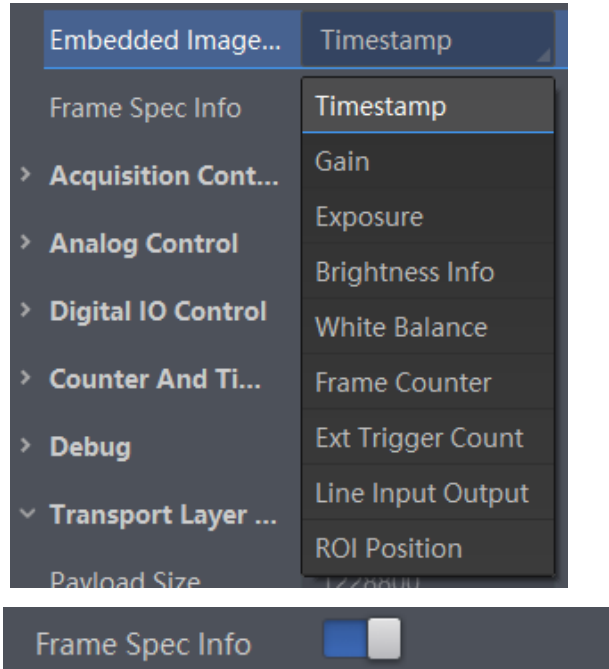
Following way to set

- Embedded Information Set: Click Image Format Control > Embedded Image Info Selector, select specific parameters as Embedded Image Info Selector, and enable Frame Spec Info.

Embedded Information

Steps:

1. Click Image Format Control > Embedded Image Info Selector, select specific parameters as Embedded Image Info Selector, and enable Frame Spec Info.



2. When multiple information needs to be embedded, just repeat the above steps.

3. You can view related information through Embedded Information Tool in the iDatum shortcut toolbar, and the specific values will only be displayed after the camera starts previewing.

i When the Embedded Information tool sets the image embedded information, it is not affected by ROI. If the ROI area is small and the first line of image is not enough to embed information, it will be embedded in the second line of image.

File Access Control

The file access control allows you to export or import the camera's feature configuration (including User Set 1, User Set 2, or User Set 3) or DPC (Defective Pixel Correction) data to or from the local PC as the mfa format.

Steps:

1. Select a camera in the device list. Click  to open the File Access interface.



2. Select a User Set (User Set 1, User Set 2, or User Set 3) or DPC from the drop-down list.

3. Click Import or Export to import or export the camera's feature configuration or DPC data according to actual demands.

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- The file access control function may differ by camera models.
- Importing and exporting the camera's feature configuration or DPC data among the same model cameras are supported.
- DPC represents the bad pixel data corrected by the camera.

Transport Layer Control

You can go to Transport Layer Control attribute to view the camera's load size, GEV version, etc.

Parameter	Read/Write	Description
Paylode Size(B)	Read only	It is the camera's load size.
GEV Version Major	Read only	It is the major version in GEV version.
GEV Version Minor	Read only	It is the minor version in GEV version.
GEV Device Mode Is Big Endian	Read only	It is the endianness in device's register.
GEV Device Mode Character Set	Read only	It is the character set in device's register.
GEV Interface Selector	Read only	It sets which physical network interface to be controlled.
GEV MAC Address	Read only	It is the MAC address of the network interface.
GEV Supported Option Selector	Read and write	It selects the GEV option to interrogate for existing support.
GEV Supported Option	Read only	It indicates whether the selected GEV option is supported or not.
GEV Current IP Configuration LLA	Read only	It indicates whether the Link Local Address IP configuration scheme is activated on the given network interface.
GEV Current IP Configuration DHCP	Read and write	It indicates whether the DHCP IP configuration scheme is activated on the given network interface.
GEV Current IP Configuration Persistent IP	Read and write	It indicates whether persistent IP configuration scheme is activated on the given network interface.
DEV PAUSE Frame Reception	Read and write	It controls whether incoming pause frames are handled on the given logical link.
GEV Current IP Address	Read only	It is the current IP address for the given network interface.
GEV Current Subnet Mask	Read only	It is the current subnet mask of the given interface.
GEV Current Default Gateway	Read only	It is the default gateway IP address to be used on the given network interface.
GEV First URL	Read only	It is the first choice of URL for the XML device description file.
GEV Second URL	Read only	It is the second choice of URL to the XML device description file.
GEV Number Of Interfaces	Read only	It indicates the number of physical network interfaces supported by this device.
GEV Persistent IP Address	Read and write	It indicates the persistent IP address for this network interface. It is only used when the device boots with the persistent IP configuration scheme.
GEV Persistent Subnet Mask	Read and write	It indicates the persistent subnet mask associated with the persistent IP address on this network interface. It is only used when the device boots with the persistent IP configuration scheme.
GEV Persistent Default Gateway	Read and write	It indicates the persistent default gateway for this network interface. It is only used when the device boots with the persistent IP configuration scheme.
GEV Link Speed	Read only	It indicates the speed of transmission negotiated by the given network interface in Mbps.
GEV Message Channel Count	Read only	It indicates the number of message channels supported by this device.
GEV Stream Channel Count	Read only	It indicates the number of stream channels supported by this device.
GEV Heartbeat Timeout(ms)	Read and write	It indicates the current heartbeat timeout in milliseconds.
GEV Heartbeat Disable	Read and write	It disables the GEV Heartbeat.
GEV Timestamp Tick Frequency (Hz)	Read only	It indicates the number of timestamp ticks in 1 second (frequency in Hz).
Timestamp Control Latch	Read and write	It latches the current timestamp value of the device.
Timestamp Control Reset	Read and write	It resets the timestamp value for the device.
Timestamp Control Latch Reset	Read and write	It resets the timestamp control latch.
Timestamp Value	Read only	It is a read only element. It indicates the latched value of the timestamp.
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Transport Layer Control

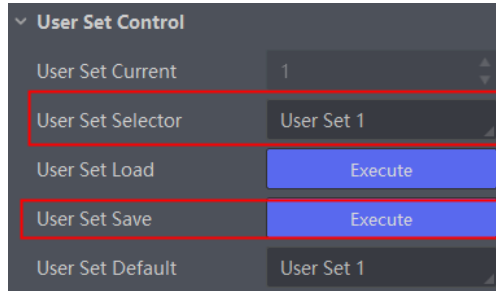
Parameter	Read/Write	Description
GEV CCP	Read and write	It controls the device access privilege of an application.
GEV Stream Channel Selector	Read only	It selects the stream channel to control.
GEV SCP Interface Index	Read only	It is the Index of network interface to be used.
GEV SCP Host Port	Read and write	It is the host port of the channel
GEV SCP Direction	Read only	It transmits or receives the channel.
GEV SCPS Fire Test Packet	Read only	It sends a test packet.
GEV SCPS Do Not Fragment	Read and write	The state of this feature is copied into the "do not fragment" bit of the IP header of each stream packet.
GEV SCPS Big Endian	Read only	It is the Endianness of multi-byte pixel data for this stream.
GEV SCPS Packet Size(B)	Read and write	It specifies the stream packet size (in bytes) to send on this channel.
GEV SCPD	Read and write	It indicates the delay (in timestamp counter units) to insert between each packet for this stream channel.
GEV SCDA	Read and write	It indicates the destination IP address for this stream channel.
GEV SCSP	Read only	It indicates the source UDP port address for this stream channel.
GEV MCP Host Port	Read and write	It controls the port to which the device must send messages. Setting this value to 0 closes the message channel.
GEV MCDA	Read and write	It controls the destination IP address for the message channel.
GEV MCTT(ms)	Read and write	It provides the transmission timeout value in milliseconds.
GEV MCRC	Read and write	It controls the number of retransmissions allowed when a message channel message times out.
GEV MCSP	Read only	It indicates the source port for the message channel.
GEV GVSP Extended ID Mode	Read and write	It enables the extended ID mode.

Save and Load User Set

The camera supports 4 sets of parameters, including 1 default set and 3 user sets. You can save parameters, load parameters and set user default as shown below.


Save Parameters:

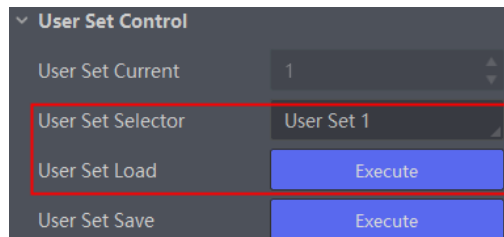
1. Click User Set Control, and select a user set in User Set Selector. Here we take selecting User Set 1 as an example.
2. Click Execute in User Set Save to save parameters.



Load Parameters:

1. Click User Set Control, and select a user set in User Set Selector. Here we take selecting User Set 1 as an example.
2. Click Execute in User Set Load to load parameters to the camera, as shown below.

 Loading parameters is available when connecting with camera, but without acquisition.



Set User Default:


You can also set default parameter by selecting parameter from drop-down list of User Set Default.

Multicast

The multicast function allows you to access the same camera via multiple PCs. The same camera can be connected to only one iDatum via the controller and data receiver or the controller mode at the same time, while in the data receiver mode, the same camera can be connected to multiple client software, and it has 3 modes as follows.

Modes	Description
Controller and Data Receiver	This mode allows you to read and edit the camera's parameters, and get its image data.
Controller	This mode allows you to read and edit the camera's parameters, but you cannot get its image data.
Data Receiver	This mode allows you read the camera's parameters and get its image data, but you cannot edit the camera's parameters.

When the multicast function is enabled, the camera icon on the iDatum of other PCs will become , and you can connect the camera via the data receiver mode.

When you connect the camera via the data receiver mode, the camera icon on the iDatum of your PC will become , and at this time, you can read its parameters only.

You can set multicast function for both the available camera and connected camera, but the specific settings are different.

■ Enable Multicast (Available)

For the available camera, you can set multicast function as follows.

1. Right click the available camera, and click Multicast Settings.
2. Select Role
 - _The camera in the available state can start the multicast function in two roles: control and receiving mode and control mode.
3. Enter the IP Address
 - _If the IP address is invalid, the system will prompt "Please check if the IP address is valid".
 - _The multicast IP address should be a class D IP address.
4. Enter the Port
 - _The valid value of the multicast port number is 0~65535, and the port number used should be an unused port number.
5. Click OK.

■ Enable Multicast (Connected)

For the connected camera, you can set multicast function as follows.

1. Right click the connected camera, and click Multicast Settings.
2. Enable the multicast function, and edit the IP Address and Port.
3. Click OK.

Camera Parameter Index

Attribute	Parameter	Section
Device Control	Device Type	Section Device Control
	Device Scan Type	
	Device Vendor Name	
	Device Model Name	
	Device Manufacturer Info	
	Device Version	
	Device Firmware Version	
	Device Serial Number	
	Device ID	
	Device User ID	
	Device Uptime(s)	
	Board Device Type	
	Device Connection Selector	
	Device Connection Speed(Mbps)	
	Device Link Selector	
	Device Link Speed(Mbps)	
	Device Link Connection Count	
	Device Link Heartbeat Mode	
	Device Stream Channel Count	
	Device Stream Channel Selector	
	Device Stream Channel Type	
	Device Stream Channel Link	
	Device Stream Channel Endianness	
	Device Stream Channel Packet Size(B)	
	Device Event Channel Count	
	Device Character Set	
	Device Reset	
	Device Temperature Selector	
	Device Temperature	
	Find Me	
Device Max Throughput(Kbps)		
Device PJ Number		
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Camera Parameter Index

Attribute	Parameter	Section
Image Format Control	Width Max	Section Resolution and ROI
	Height Max	
	Region Selector	
	Region Destination	
	Width	
	Height	
	Offset X	
	Offset Y	
	Reverse X	Section Image Reverse
	Reverse Y	
	Pixel Format	Section Pixel Format
	Pixel Size	
	Image Compression Mode	Section Image Compression Mode
	High Bandwidth Mode	
	Test Pattern Generator Selector	Section Test Pattern
	Test Pattern	
	Binning Selector	Section Binning
	Binning Horizontal	
	Binning Vertical	
	Decimation Horizontal	Section Decimation
Decimation Vertical		
Embedded Image Info Selector	Section Embedded Information in Image	
Frame Spec Info		
Acquisition Control	Acquisition Mode	Section Frame Rate
	Acquisition Start	
	Acquisition Stop	
	Acquisition Burst Frame Count	
	Acquisition Frame Rate (Fps)	
	Acquisition Frame Rate Control Enable	
	Resulting Frame Rate (Fps)	
	Reference Frame Rate	
	Trigger Selector	Section External Trigger Mode
	Trigger Mode	
	Trigger Software	
	Trigger Source	
	Trigger Activation	
	Trigger Delay (μs)	
	Trigger Cache Enable	
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Camera Parameter Index

Attribute	Parameter	Section
Acquisition Control	Exposure Mode	Section Exposure Time Mode
	Exposure Time (μs)	
	Exposure Auto	
	Auto Exposure Time Lower Limit (μs)	
	Auto Exposure Time Upper Limit (μs)	
	HDR Enable	Section HDR
	HDR Selector	
	HDR Shutter(us)	
HDR Gain		
Analog Control	Preamp Gain	Section Gain
	Gain(dB)	
	Gain Auto	
	Auto Gain Lower Limit	
	Auto Gain Upper Limit	
	Digital Shift	
	Digital Shift Enable	
	Brightness	Section Brightness
	Black Level	Section Black Level
	Black Level Enable	
	Balance White Auto	
	AWB Color Temperature Mode	Section White Balance
	Balance Ratio Selector	
	Balance Ratio	Section Gamma Correction
	Gamma	
	Gamma Selector	
	Gamma Enable	Section Sharpness
	Sharpness	
	Sharpness Enable	Section AOI
	Auto Function AOI Selector	
	Auto Function AOI Width	
Auto Function AOI Height		
Auto Function AOI Offset X		
Auto Function AOI Offset Y		
Auto Function AOI Usage Intensity		
Auto Function AOI Usage White Balance		
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Camera Parameter Index

Attribute	Parameter	Section
Color Transformation Control	Color Transformation Selector	Section Color Transformation Control
	Color Transformation Enable	
	Color Transformation Value Selector	
	Color Transformation Value	
LUT Control	LUT Selector	Section LUT
	LUT Enable	
	LUT Index	
	LUT Value	
	LUT Save	
Shading Correction	NUC Enable	Section Shading Correction
	FPNC Enable	
	PRNUC Enable	
	Shading Selector	
	Activate Shading	
	LSC Enable	
Digital IO Control	Line Selector	Section I/O Output
	Line Mode	
	Line Inverter	
	Line Status	
	Line Status All	
	Line Debouncer Time (μs)	
	Line Source	
	Strobe Enable	
	Strobe Line Duration (μs)	
	Strobe Line Delay (μs)	
	Strobe Line Pre Delay (μs)	
Counter And Timer Control	Counter Selector	Section Counter Trigger
	Counter Event Source	
	Counter Reset Source	
	Counter Reset	
	Counter Value	
	Counter Current Value	
File Access Control	File Selector	Section File Access Control
	File Operation Selector	
	File Operation Excute	
	File Open Mode	
	File Operation Status	
	File Operation Result	
	File Size(B)	
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Camera Parameter Index

Attribute	Parameter	Section
Event Control	Event Selector	Section Event Control
	Event Notification	
Transport Layer Control	Payload Size(B)	Section Transport Layer Control
	GEV Version Major	
	GEV Version Minor	
	GEV Device Mode Is Big Endian	
	GEV Device Mode Character Set	
	GEV Interface Selector	
	GEV MAC Address	
	GEV Supported Option Selector	
	GEV Supported Option	
	GEV Current IP Configuration LLA	
	GEV Current IP Configuration DHCP	
	GEV Current IP Configuration Persistent IP	
	GEV PAUSE Frame Reception	
	GEV Current IP Address	
	GEV Current Subnet Mask	
	GEV Current Default Gateway	
	GEV First URL	
	GEV Second URL	
	GEV Number Of Interfaces	
	GEV Persistent IP Address	
	GEV Persistent Subnet Mask	
	GEV Persistent Default Gateway	
	GEV Link Speed	
	GEV Message Channel Count	
	GEV Stream Channel Count	
	GEV Heartbeat Timeout(ms)	
	GEV Heartbeat Disable	
	GEV Timestamp Tick Frequency(Hz)	
	Timestamp Control Latch	
	Timestamp Control Reset	
	Timestamp Control Latch Reset	
	Timestamp Value	
	GEV CCP	
GEV Stream Channel Selector		
GEV SCP Interface Index		
GEV SCP Host Port		
GEV SCP Direction		
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Camera Parameter Index

Attribute	Parameter	Section
Transport Layer Control	GEV SCPS Fire Test Packet	Section Transport Layer Control
	GEV SCPS Do Not Fragment	
	GEV SCPS Big Endian	
	GEV SCPS Packet Size(B)	
	GEV SCPD	
	GEV SCDA	
	GEV SCSP	
	GEV MCP Host Port	
	GEV MCDA	
	GEV MCTT(ms)	
	GEV MCRC	
	GEV MCSP	
	Gev GVSP Extended ID Mode	
User Set Control	User Set Current	Section Save and Load User Set
	User Set Selector	
	User Set Load	
	User Set Save	
	User Set Default	



The specific parameter s may differ by camera models.

Trouble Shooting

Trouble:

■ No camera found when running the iDatum

- Possible Reason1: Camera is not started up normally
Solution1: Check camera power wiring (observe the indicator)
Possible Reason2: Network cable connection error
Solution2: Check network connection

■ Camera connection error

- Possible Reason1: Camera and client software are not in the same network segment
Solution1: Edit its IP address
Possible Reason2: The camera has been connected by another program
Solution2: Reconnect after disconnecting the camera from other programs

■ Live view is black

- Possible Reason1: Aperture is closed
Solution1: Open the aperture
Possible Reason2: Camera exception occurs
Solution2: Reboot the camera.

■ Live view is normal, but the camera cannot be triggered.

- Possible Reason1: Trigger mode is not enabled
Solution1: Check whether the camera trigger mode and related trigger signal input are normal in the current environment.
Possible Reason2: Incorrect wiring
Solution2: Check whether the wiring is correct under corresponding triggering mode.

CHAPTER 10 TECHNICAL SUPPORT

If you need advice about your camera or if you need assistance troubleshooting a problem with your camera, it's highly recommended to describe your issue in details and contact us via E-mail at support@contrasttech.com

It would be helpful if you can fill-in the following table and send to us before you contact our technical support team.

Camera Model:		Camera's SN:	
Describe the issue in as much detail as possible:			
If known, what's the cause of the issue?			
How often did/does the issue occur?			
How severe is the issue?			
Parameter set	Please connect the camera directly to PC and use iDatum to make note of the parameter when the issue occurred.		

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