

Hangzhou Hikrobot Technology Co.,Ltd.

Industrial Infrared Camera

User Manual

HIKROBOT

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Warning: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

KC Mark Certification

Class A: The device is advised to note that as a seller or a business user (Class A) Devices and intended for use outside the Home area.

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Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
 Danger	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.
 Caution	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.
 Note	Provides additional information to emphasize or supplement important points of the main text.

Available Model

This manual is applicable to the industrial infrared camera.

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Chapter 1 Safety Instruction

The safety instructions are intended to ensure that the user can use the device correctly to avoid danger or property loss. Read and follow these safety instructions before installing, operating and maintaining the device.

1.1 Safety Claim

- To ensure personal and device safety, when installing, operating, and maintaining the device, follow the signs on the device and all safety instructions described in the manual.
- The note, caution and danger items in the manual do not represent all the safety instructions that should be observed, but only serve as a supplement to all the safety instructions.
- The device should be used in an environment that meets the design specifications, otherwise it may cause malfunctions, and malfunctions or component damage caused by non-compliance with relevant regulations are not within the scope of the device's quality assurance.
- Our company will not bear any legal responsibility for personal safety accidents and property losses caused by abnormal operation of the device.

1.2 Safety Instruction

Caution:

- Do not install the device if it is found that the device and accessories are damaged, rusted, water ingress, model mismatch, missing parts, etc., when unpacking.
- Avoid storage and transportation in places such as water splashing and rain, direct sunlight, strong electric fields, strong magnetic fields, and strong vibrations.
- Avoid dropping, smashing or vigorously vibrating the device and its components.
- It is forbidden to install the indoor device in an environment where it may be exposed to water or other liquids. If the device is damp, it may cause fire and electric shock hazard.
- Place the device in a place out of direct sunlight and ventilation, away from heat sources such as heaters and radiators.
- This is a Class A device. In the living environment, this device may cause radio interference. In this case, the user may be required to take practical measures against the interference.
- In the use of the device, you must be in strict compliance with the electrical safety regulations of the nation and region.
- Use the power adapter provided by the official manufacturer. The power adapter must meet the Limited Power Source (LPS) requirements. For specific requirements, please

refer to the device's technical specifications.

- It is strictly forbidden to wire, maintain, and disassemble the device is powered on. Otherwise, there is a danger of electric shock.
- Before powering on the device, please confirm that the device is installed in good condition, the wiring is firm, and the power supply meets the requirements.
- If the device emits smoke, odor or noise, please turn off the power and unplug the power cord immediately, and contact the dealer or service center in time.
- It is strictly forbidden to touch any terminal of the device when operating it. Otherwise there is a danger of electric shock.
- It is strictly forbidden for non-professional technicians to detect signals during device operation, otherwise it may cause personal injury or device damage.
- It is strictly forbidden to maintain the device is powered on, otherwise there is a danger of electric shock.
- Avoid aiming the lens at strong light (such as lighting, sunlight, or laser beams, etc.), otherwise the image sensor will be damaged.
- It is forbidden to touch the image sensor directly. If it is necessary to clean, please moisten the soft clean cloth with 75% or less alcohol and gently wipe off the dust.
- Keep clean of the device's image acquisition window. It is recommended to use cleaning water to wipe off the dust. When the device is not in use, please add a dust cover to protect the image acquisition window.
- If the device does not work properly, please contact your dealer or the nearest service center. Never attempt to disassemble the device yourself (we shall not assume any responsibility for problems caused by unauthorized repair or maintenance).
- Caution: If the device has battery, risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.
- Please dispose of the device in strict accordance with the relevant national or regional regulations and standards to avoid environmental pollution and property damage.

 Note:

- Check whether the device's package is in good condition, whether there is damage, intrusion, moisture, deformation, etc. before unpacking.
- Check the surface of the device and accessories for damage, rust, bumps, etc. when unpacking.
- Check whether the quantity and information of the device and accessories are complete after unpacking.
- Store and transport the device according to the storage and transport conditions of the device, and the storage temperature and humidity should meet the requirements.
- It is strictly prohibited to transport the device in combination with items that may affect or damage the device.
- Quality requirements for installation and maintenance personnel:
 - Qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills.
 - The basic knowledge and operation skills of low voltage wiring and low voltage

electronic circuit connection.

- The ability to comprehend the contents of this manual.
- Please read the manual and safety instructions carefully before installing the device.
- Please install the device strictly according to the installation method in this manual.
- The case of the device may be overheated, and it needs to be powered off for half an hour before it can be touched.
- The device should not be placed with exposed flame sources, such as lighted candles.

1.3 Electromagnetic Interference Prevention

- Make sure that the shielding layer of cables is intact and 360° connected to the metal connector when using shielded cables.
- Do not route the device together with other equipment (especially servo motors, high-power devices, etc.), and control the distance between cables to more than 10 cm. Make sure to shield the cables if unavoidable.
- The control cable of the device and the power cable of the industrial light source must be wired separately to avoid bundled wiring.
- The power cable, data cable, signal cable, etc. of the device must be wired separately. Make sure to ground them if the wiring groove is used to separate the wiring and the wiring groove is metal.
- During the wiring process, evaluate the wiring space reasonably, and do not pull the cables hard, so as not to damage the electrical performance of the cables.
- If the device is powered on and off frequently, it is necessary to strengthen the voltage isolation, and consider adding a DC/DC isolation power supply module between the device and the adapter.
- Use the power adapter to supply power to the device separately. If centralized power supply is necessary, make sure to use a DC filter to filter the power supply of the device separately before use.
- The unused cables of the device must be insulated.
- When installing the device, if you cannot ensure that the device itself and all equipment connected to the device are well grounded, you should isolate the device with an insulating bracket.
- To avoid the accumulation of static electricity, ensure that other equipment (such as machines, internal components, etc.) and metal brackets on site are properly grounded.
- Make sure that the connector metal barrier of the device is well connected to the PC and other chassis, and if necessary, copper foil should be used to enhance the grounding effect.
- During the installation and use of the device, high voltage leakage must be avoided.
- Use a figure-eight bundle method if the device cable is too long.
- When connecting the device and metal accessories, they must be connected firmly to maintain good conductivity.
- Use a shielded network cable to connect to the device. If you use a self-made network cable, make sure that the shielding shell at the aviation head is well connected to the aluminum foil or metal braid of the shielding cable.

Chapter 2 Overview

2.1 Introduction

The industrial infrared camera adopts a high-sensitivity vanadium oxide uncooled detector, supports functions such as temperature measurement, region mapping and alarm, and multiple palette modes, and can display temperature feature information on image overlay. The camera uses GigE interface to quickly transmit data in real time, and users can remotely collect data and set parameters via using the client software or SDK.

2.2 Key Feature

- Support multiple temperature measurement types such as point, box, line, etc. with cross cursor highlighting the temperature feature information.
- Two temperature measurement ranges are available and temperature measurement alarm can be configured in single region and multiple regions
- Adopts compact design and supports four-side installation.
- Adopts GigE interface and max. transmission distance of 100 meters without relay.
- Compatible with the GigE Vision Protocol and GenICam Standard.

Note

- The specific functions may differ by device models.
 - Refer to the device's datasheet for specific parameters.
-

Chapter 3 Device Hardware

3.1 Appearance

Note

- For specific appearance and dimension, refer to the device's datasheet for details.
- The appearance is subject to change, and the actual device you purchased shall prevail.

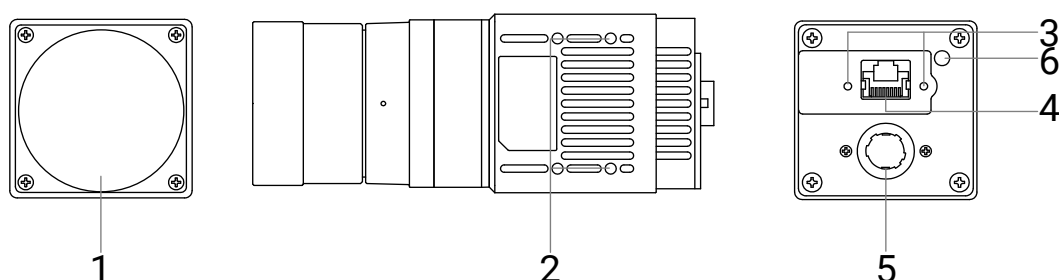


Figure 3-1 Appearance

Table 3-1 Component Description

No.	Component	Description
1	Lens	It refers to the device's lens.  Note The device has completed focus adjustment when leaving the factory. Do not execute focus adjustment. Otherwise, the device's temperature measurement will be affected.
2	Screw Hole	It is used to fix the device to the installation position. Refer to the device's datasheet for specific screw information.
3	Screw Hole of GigE Interface	It refers to the M2 screw hole for fixing the network cable.
4	GigE Interface	It refers to the GigE interface for transmitting data.
5	Power and I/O Connector	It provides power supply and input/output signals.
6	LED Indicator	It indicates the device's status.

3.2 Power and I/O Connector

The device has a 12-pin P10 connector as the power and I/O connector that provides power supply and input/output signals.

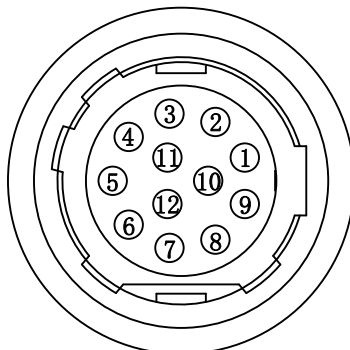


Figure 3-2 12-Pin P10 Connector

Note

Refer to table below and the label attached to the power and I/O cable to wire the device.

Table 3-2 Pin Definitions of 12-Pin P10 Connector

No.	Signal	I/O Signal Source	Description
1	GND	Line 2-	Device power supply ground
2	DC_PWR	--	Device power supply
3	NC	--	NC
4	OPT_IN-	Line 0-	Opto-isolated input signal ground
5	OPT_OUT-	Line 1-	Opto-isolated output signal ground
6	NC	--	NC
7	NC	--	NC
8	232_RX	--	RS-232 receives
9	232_TX	--	RS-232 transmits
10	GPIO2	Line 2+	Input or output
11	OPT_OUT+	Line 1+	Opto-isolated output
12	OPT_IN+	Line 0+	Opto-isolated input

3.3 Indicator

The device's indicator is used to indicate the operation status of the device.

Note

- The indicator status may differ by device models, and actual devices you purchased shall prevail.
 - When the indicator is lit up, flashing rapidly, flashing slowly, or flashing very slowly, its unlit interval is 5 sec, 0.2 sec, 1 sec, and 2 sec respectively.
 - The indicator sometimes may show a purple color when red and blue colors flashing at the same time.
-

Table 3-3 Indicator Description

No.	Indicator Color	Status	Device Status Description
1	Red	Flashing very slowly	The device's wiring exception occurs.
2	Red	Solid	The device exception occurs.
3	Blue	Flashing slowly	The device is acquiring images in trigger mode.
4	Blue	Flashing rapidly	The device is acquiring images normally.
5	Blue	Solid	The device is in an idle status.
6	Red and blue	Flash alternatively	The function of finding me is executed, or the firmware is updating.

Chapter 4 Quick Start Guide

4.1 Install Device

4.1.1 Installation Preparation

You need to prepare following accessories before device installation.

Table 4-1 Accessories

No.	Name	Quantity	Description
1	Power and I/O Cable	1	It refers to the 12-pin power and I/O cable. You need to purchase separately.
2	DC Power Supply	1	You should select suitable power adapter or switch power supply according to the device power supply and consumption. You need to purchase separately.
3	Network Cable	1	It refers to CAT-5e network cable or above. You need to purchase separately.

Note

- The device mentioned in this manual is an electronic product that requires operation and storage under dry conditions. In case of hot and humid, acidic and alkaline environment, please take isolation and protection measures to avoid corrosion damage of the device's internal components.
 - When using the lens, it is necessary to prevent humid environment and avoid steam from entering inside, causing fogging.
-

4.1.2 Install

Before You Start

- Make sure that the device in package is in good condition and all assembly parts are included.
- Make sure that all related devices are powered off during the installation.

Steps

1. Fix the device to the installation position.
2. Use a proper network cable to connect device with a GigE switch or a network interface card.
3. Use the 12-pin power and I/O cable to connect device to a proper power adapter.

4.2 Install Client Software

MVS client software is used to connect and set device's parameters, and acquire images.

Note

- The MVS client software is compatible with 32/64-bit Windows 7/10/11, 32/64-bit Linux, and 64-bit MacOS operating systems. Here we take Windows as an example.
 - Only MVS client software of V4.0.0 20221208 and above is applicable for the device.
 - The graphic user interface may differ by different versions of client software you use.
 - The client software has integrated driver required by hardware, and no need to download and install other drivers.
 - You can download the client software from **en.hikrobotics.com**.
-

Steps

1. Double click the MVS installation package.
2. Select the language.
3. Read and check **Terms of the License Agreement**.

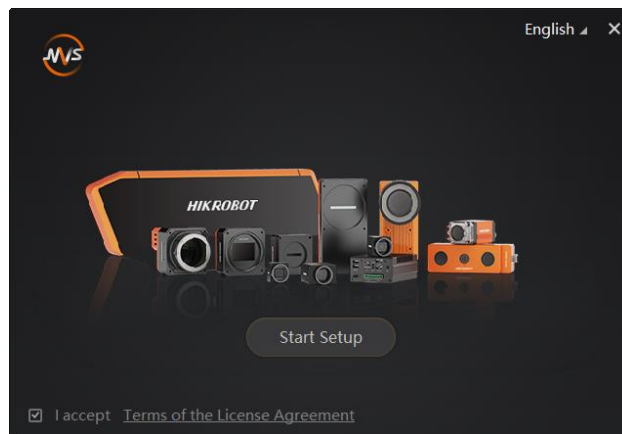


Figure 4-1 Installation Window

4. Click **Start Setup**.
5. Select installation directory, driver and others.
 - **Select Driver:** You can check **GIGE**, **USB 3.0** and **PCIE** according to actual demands.
 - **Others:** Check **Enable built-in debug features** to make it easier to use breakpoints while the device is connected and streaming images. Check **Enable Jumbo Frame for All NICs** to enhance network transmission performance. Check **PCle-CML**, **PCle-CXP**, **PCIE-GEV**, **PCIE-XoF** to enumerate the corresponding frame grabbers.

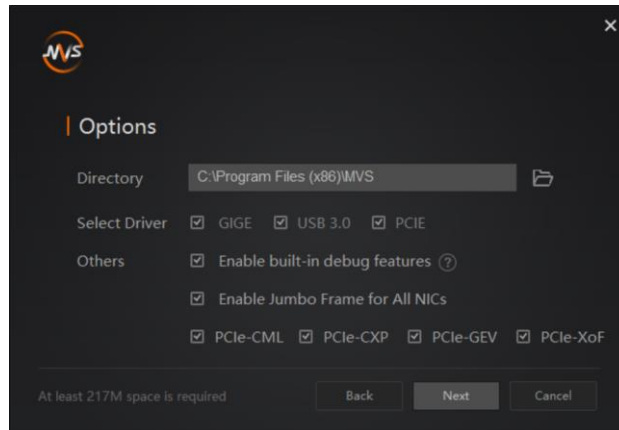


Figure 4-2 Installation Options

 Note

- Regarding options, it is recommended to keep default settings.
 - **PCle-CML, PCle-CXP, PCIE-GEV, PCIE-XoF** can be checked only when **PCIE** is checked.
 - **PCle-CML, PCle-CXP, PCIE-GEV, PCIE-XoF** supports frame grabbers developed by our company only.
-

6. Click **Next** to install.

7. Finish the installation process according to the prompts.

4.3 Set PC Environment

To ensure stable client running and data transmission, you are recommended to set PC environment.

4.3.1 Turn off Firewall

Steps

 Note

For different Windows versions, the path name or interface may differ. Please refer to the actual condition.

1. Go to Windows Firewall.
 - Windows 7 system: Click **Start** → **Control Panel** → **Windows Firewall**.
 - Windows 10 system: Click **Start** → **Control Panel** → **System and Security** → **Windows Defender Firewall**.
2. Click **Turn Windows Defender Firewall on or off** on the left.
3. Select **Turn off Windows Defender Firewall (not recommended)**.

-  ☐ Turn on Windows Defender Firewall
- ☐ Block all incoming connections, including those in the list of allowed apps
 - ☐ Notify me when Windows Defender Firewall blocks a new app
-  ☒ Turn off Windows Defender Firewall (not recommended)

Figure 4-3 Windows Defender Firewall

4. Click **OK**.

4.3.2 Set PC Network

Steps

Note

For different Windows versions, the specific setting path and interface may differ. Please refer to the actual condition.

1. Go to PC network settings page: **Start** → **Control Panel** → **Network and Internet** → **Network and Sharing Center** → **Change adapter settings**.
2. Select NIC and set the IP obtainment mode.
 - Select **Obtain an IP address automatically** to get an IP address of the PC automatically.
 - Or select **Use the following IP address** to set an IP address for the PC manually.

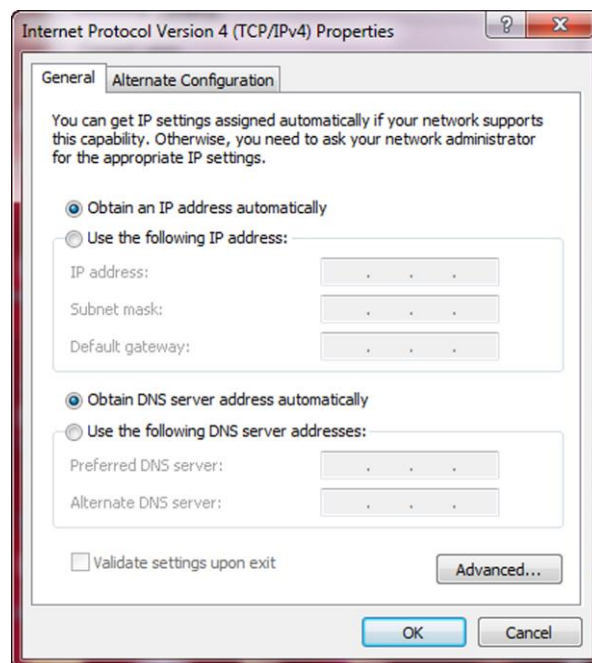


Figure 4-4 Set PC Network

3. Set NIC property via the PC.

- 1) Go to NIC settings page: **Control Panel** → **Hardware and Sound** → **Device Manager** → **Network Adapter**.
- 2) Select corresponding network interface card, and click **Advanced**.
- 3) Set **Jumbo Packet** value to 9014 Bytes, **Transmit Buffers** and **Receive Buffers** to 2048, **Interrupt Moderation Rate** to **Extremum**.
4. (Optional) Set NIC property via the MVS.
 - 1) Right click the **GigE**, and click **NIC Settings**.

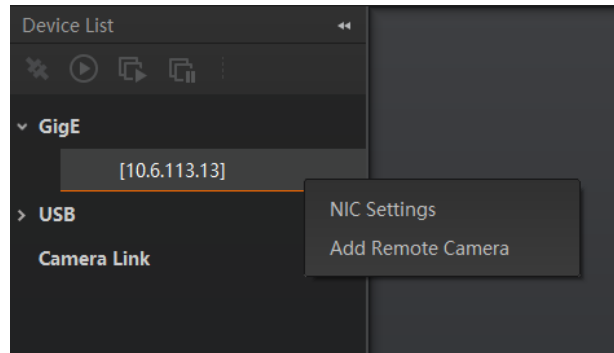


Figure 4-5 Click NIC Settings

- 2) Enable **Jumbo Frame**, and set **Receive Buffers** and **Transmit Buffers** to 2048.

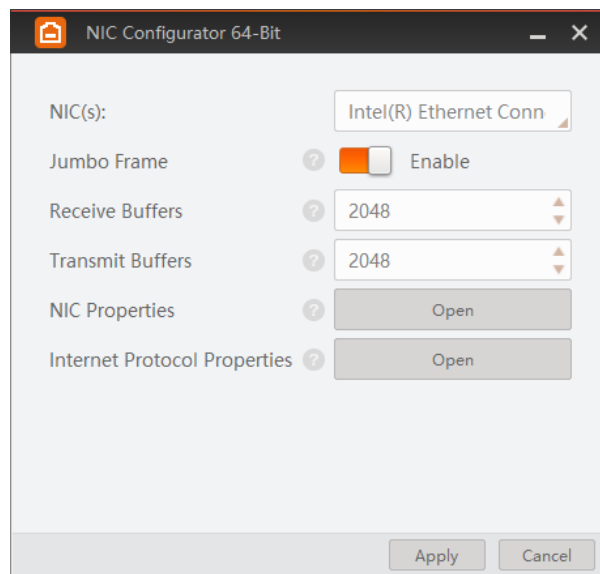


Figure 4-6 NIC Configurator

4.4 Set Device Network

You can set and operate the device in the client software only when the device is in the same network segment with the PC where the client software is installed.

Steps

1. Double click the client software to run it.

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**.

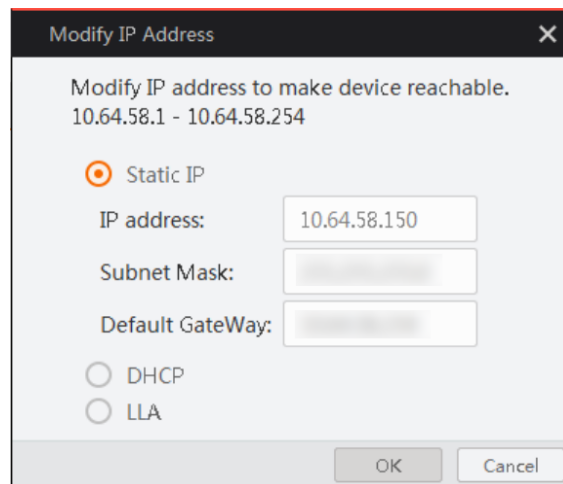


Figure 4-7 Set Device Network

 Note

The device will reboot after its IP address is modified.

4.5 Basic Operation

Steps

1. Double click the device name in the device list, or click  to connect the device to the client software.

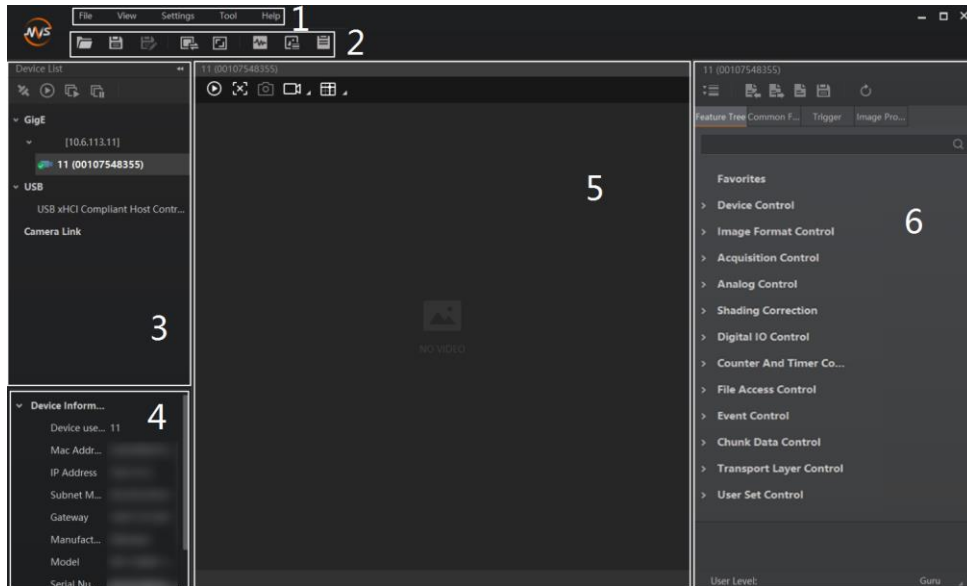


Figure 4-8 Main Window

Note

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

Table 4-2 Main Window Description

No.	Name	Description
1	Menu Bar	The menu bar displays function modules, including File, View, Settings, Tool, and Help.
2	Control Toolbar	The control toolbar provides quick operations for the device.
3	Device List Panel	This panel displays device list, and you can connect or disconnect device, modify device IP address, etc.
4	Device Information Panel	This panel displays the detailed device information.
5	Display Window	This area displays the acquisition images in real-time. You can click different icons to capture and save image, record, etc.
6	Feature Panel	You can view and set features of the selected device, and perform operations such as importing, exporting, and saving features.

2. Set the device's pixel format, exposure time, etc., in the feature panel.
 3. Click  in the display window to acquire images continuously.
 4. Adjust the device's aperture and focus to have clear images.
 5. (Optional) Set the device's other parameters in the feature panel.
-

 Note

The device's feature tree and parameters may differ by device models.

Chapter 5 Image Acquisition

The device supports two types of acquisition modes, including **SingleFrame** mode and **Continuous** mode. Go to **Acquisition Control** → **Acquisition Mode**, and select **Continuous** or **SingleFrame** as **Acquisition Mode** according to actual demands.

- **SingleFrame**: When device starts image acquisition, it acquires one image only, and then stops.
- **Continuous**: When device starts image acquisition, it acquires images continuously.

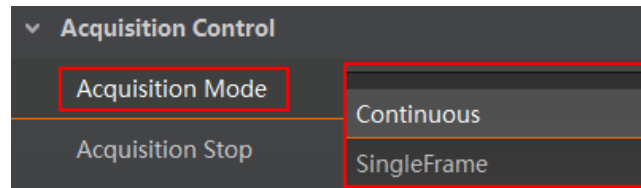


Figure 5-1 Set Acquisition Mode

Chapter 6 Trigger Input and Output

6.1 Trigger Input

6.1.1 Set Trigger Mode

The device supports two types of trigger modes, including internal trigger mode and external trigger mode. Go to **Scan Control** → **Trigger Control** → **Trigger Mode** and set it.

- **Internal Trigger Mode:** In this mode, the device acquires images via its internal signals.
- **External Trigger Mode:** In this mode, the device acquires images via external signals like software signal and hardware signal. The trigger source of external trigger mode includes software trigger, hardware trigger, counter trigger, action command trigger, and free trigger.

Enable Internal Trigger Mode

Go to **Acquisition Control** → **Trigger Mode**, and select **Off** as **Trigger Mode**.



Note

Off refers to the internal trigger mode.

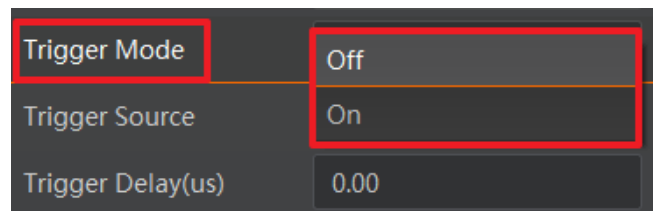


Figure 6-1 Enable Internal Trigger Mode

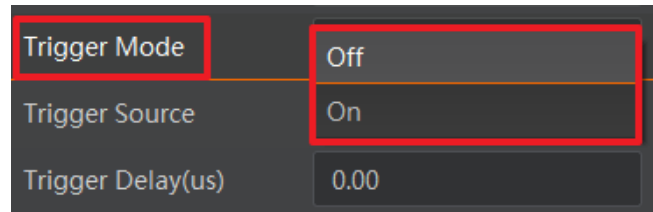
Enable External Trigger Mode

Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.



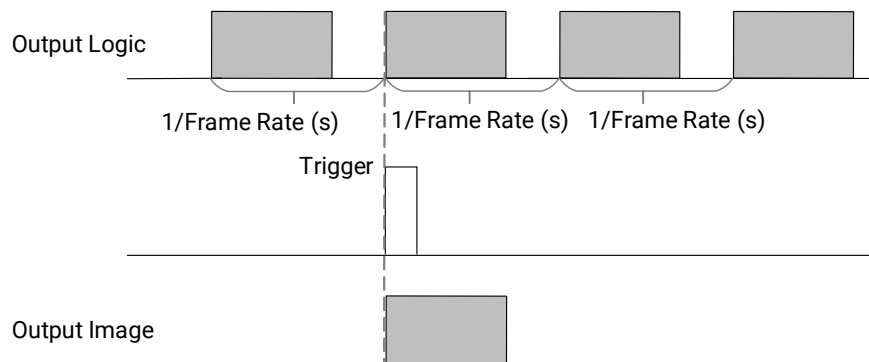
Note

On refers to the external trigger mode.

**Figure 6-2 Enable External Trigger Mode**

6.1.2 Set Trigger Source

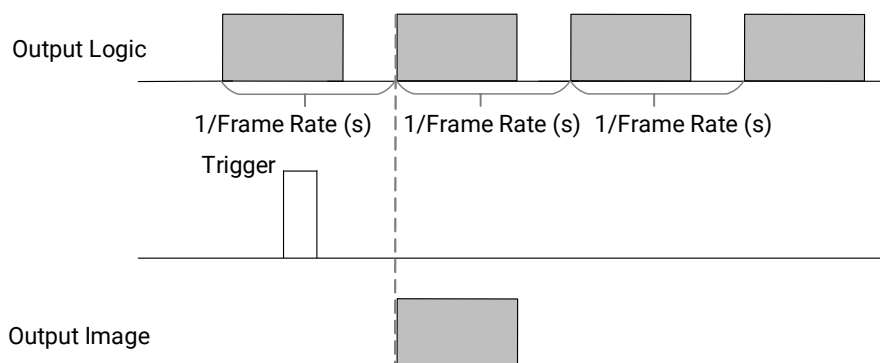
Under the external trigger mode, you can select a variety of external trigger sources to trigger the device to acquire images, and the device outputs images at a fixed time period of $1/\text{frame rate (s)}$. When the device receives a trigger signal at the beginning of each frame of image, the current frame image is output, as shown in the figure below.

**Figure 6-3 Output Current Frame Image**

Note

The figure above uses the rising edge as the trigger signal.

When the device receives a trigger signal within the output of each frame, the device acquires images in the next frame, as shown in the figure below.

**Figure 6-4 Output Next Frame Image**

External Trigger Source

The device's external trigger source includes software trigger, hardware trigger, counter trigger, action command trigger, and free trigger. Go to **Acquisition Control** → **Trigger Source**, and select **Trigger Source** according to actual demands.

Table 6-1 Trigger Source Description

External Trigger Source	Parameter	Description
Software Trigger	Software	The software sends trigger signal to the device via GigE interface to acquire images.
Hardware Trigger	Line 0, Line 2	External device connects device via device I/O interface. External device sends trigger signal to device to acquire images.
Free Trigger	Anyway	The device can receive software trigger and hardware trigger to acquire images.

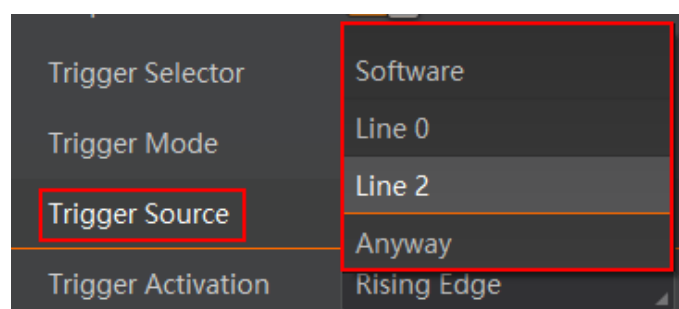


Figure 6-5 External Trigger Source

Note

These three external trigger sources are valid only when the **Trigger Mode** is **On**.

Set and Execute Software Trigger

In software trigger, the software sends trigger signal to the device via GigE interface to acquire images.

Steps

1. Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Software** as **Trigger Source**.
3. Click **Execute** in **Trigger Software**.

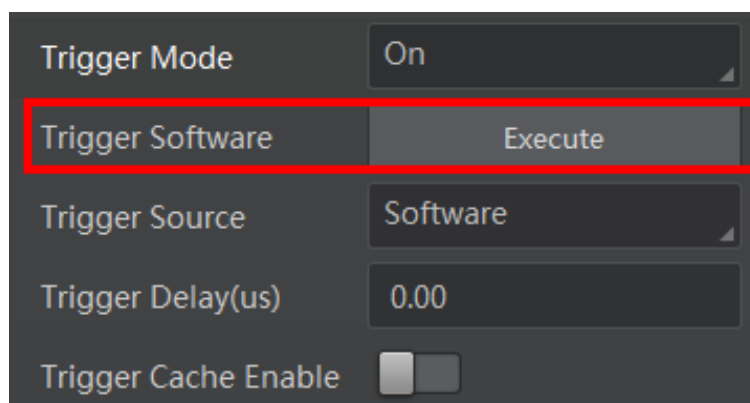


Figure 6-6 Set and Execute Software Trigger

Set and Execute Hardware Trigger

In hardware trigger, external device sends trigger signal to the device to acquire images via I/O connector.

Steps

1. Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Line 0** or **Line 2** as **Trigger Source** according to actual demands.

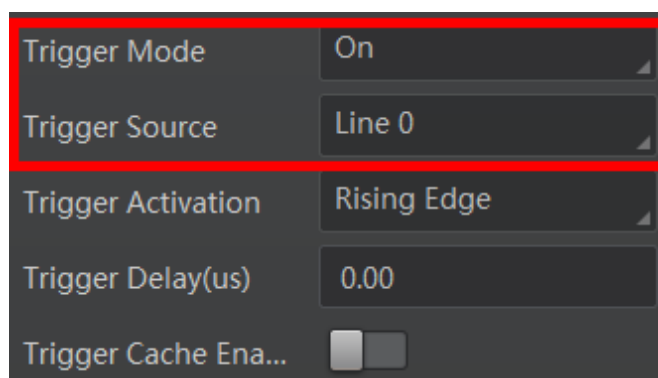


Figure 6-7 Set Line 0 or Line 2 as Input Signal

The device has one opto-isolated input (Line 0), and one bi-directional I/O (Line 2) that can be configured as input signal. Make sure that Line 2 is input signal if you want to use it as trigger source.

Steps

1. Go to **Digital IO Control** and select **Line 2** as **Line Selector**.
2. Select **Input** as **Line Mode**.

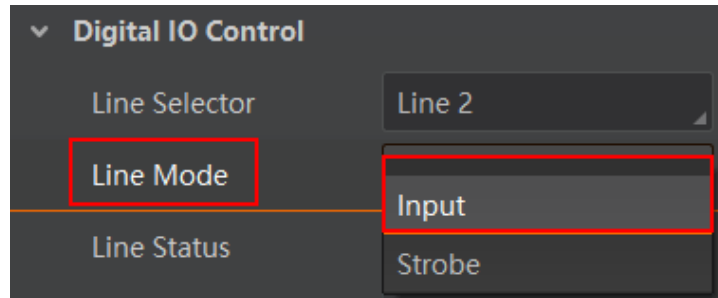


Figure 6-8 Set Line 2 as Input Signal

Set and Execute Free Trigger

In free trigger, the device can receive software trigger and hardware trigger to acquire images.

Steps

1. Go to **Acquisition Control** → **Trigger Mode**, and select **On** as **Trigger Mode**.
2. Select **Anyway** as **Trigger Source**.

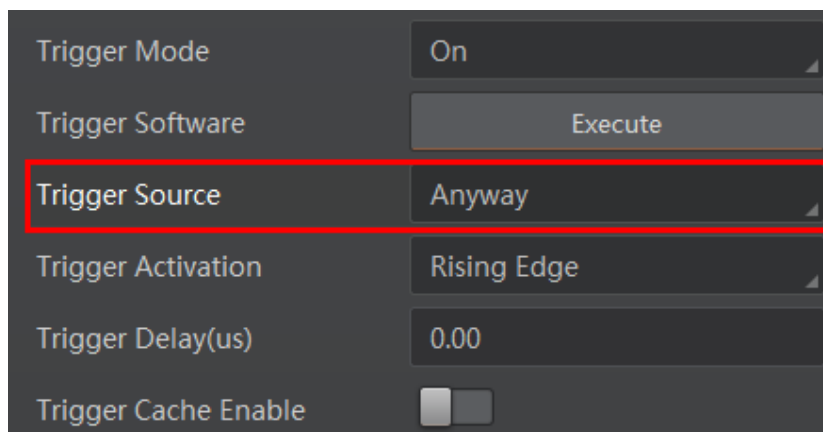


Figure 6-9 Set and Execute Free Trigger

6.1.3 Set Trigger Related Parameters

In external trigger mode, you can set five related parameters, including acquisition burst frame count, trigger delay, trigger cache, trigger activation, and trigger debouncer.

Note

- Different trigger sources can set various parameters in external trigger mode.
 - ✓ is supported, and × is not supported.
-

Table 6-2 Trigger Source and Trigger Related Parameters

Trigger Source Trigger Parameters	Software Trigger	Hardware Trigger	Free Trigger
Acquisition Burst Frame Count	√	√	√
Trigger Delay	√	√	√
Trigger Cache	√	√	√
Trigger Activation	×	√	√
Trigger Debouncer	×	√	×

Set Acquisition Burst Frame Count

In external trigger mode, you can set acquisition burst frame count. Go to **Acquisition Control** → **Acquisition Burst Frame Count**, and enter **Acquisition Burst Frame Count** according to actual demands.

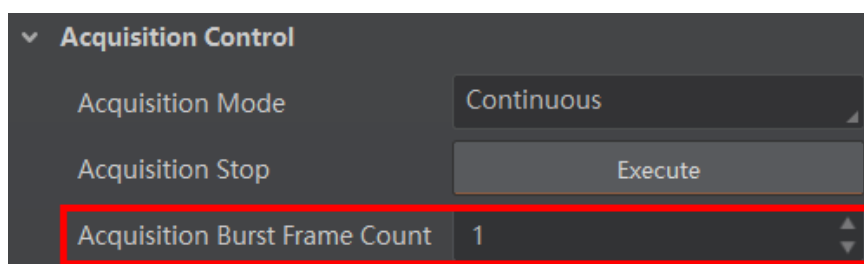
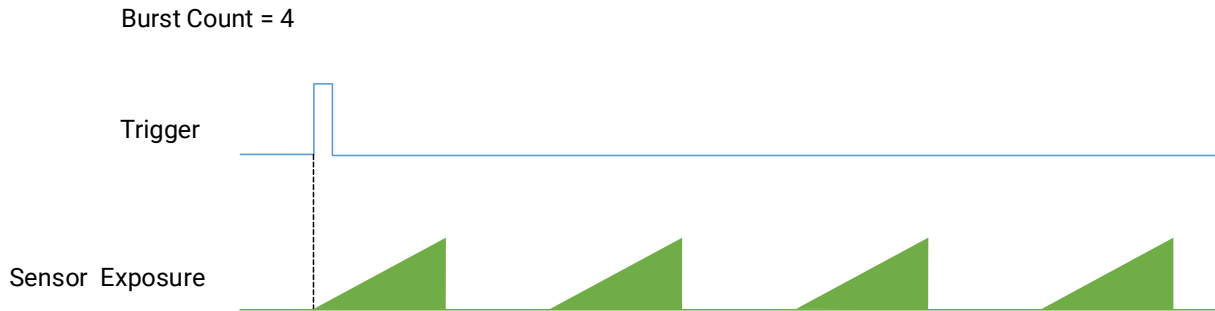


Figure 6-10 Set Acquisition Burst Frame Count

Note

- The range of **Acquisition Burst Frame Count** is from 1 to 1023.
- If **Acquisition Burst Frame Count** is 1, the device is in single frame trigger mode. If **Acquisition Burst Frame Count** is larger than 1, the device is in multi-frame trigger mode.
- If **Acquisition Burst Frame Count** is n, when input 1 trigger signal to the device, the device stops acquiring images after exposing n times and outputting n frame images.
- The sequence diagram below uses rising edge as trigger activation.

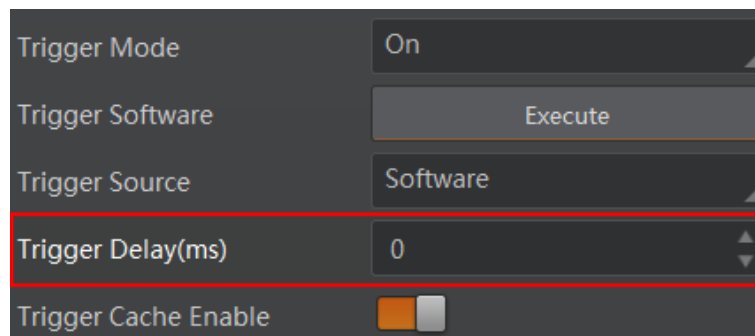
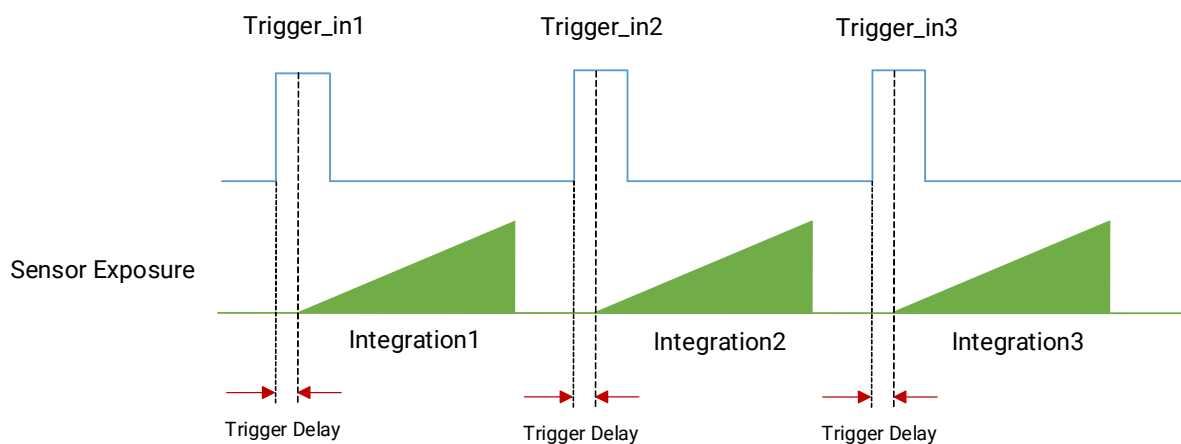
**Figure 6-11 Sequence Diagram of Acquisition Burst Frame Count**

Set Trigger Delay

The trigger delay function allows the device to add a delay between the receipt of trigger signal and the moment the trigger becomes active. Go to **Acquisition Control** → **Trigger Delay**, and enter **Trigger Delay**, and the unit is ms.

Note

The max. value of **Trigger Delay** is 16000 ms.

**Figure 6-12 Set Trigger Delay****Figure 6-13 Sequence Diagram of Trigger Delay**

Note

The sequence diagram above uses rising edge as trigger activation.

Set Trigger Cache

The trigger cache function allows the device to save and process new signal during trigger stage, and the device can save and process three trigger signals at most. Go to **Acquisition Control** → **Trigger Cache Enable**, and enable **Trigger Cache Enable**.

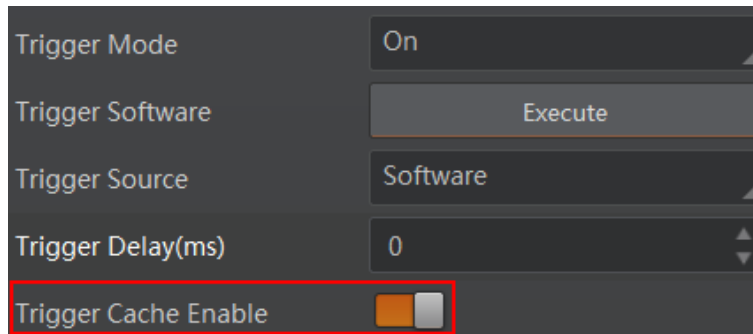


Figure 6-14 Set Trigger Cache

For example, if the device receives the 2nd trigger signal when it is processing the 1st trigger signal, and the result will be different depending on whether **Trigger Cache Enable** is enabled or not.

- The 2nd trigger signal will be filtered without processing if **Trigger Cache Enable** is disabled.

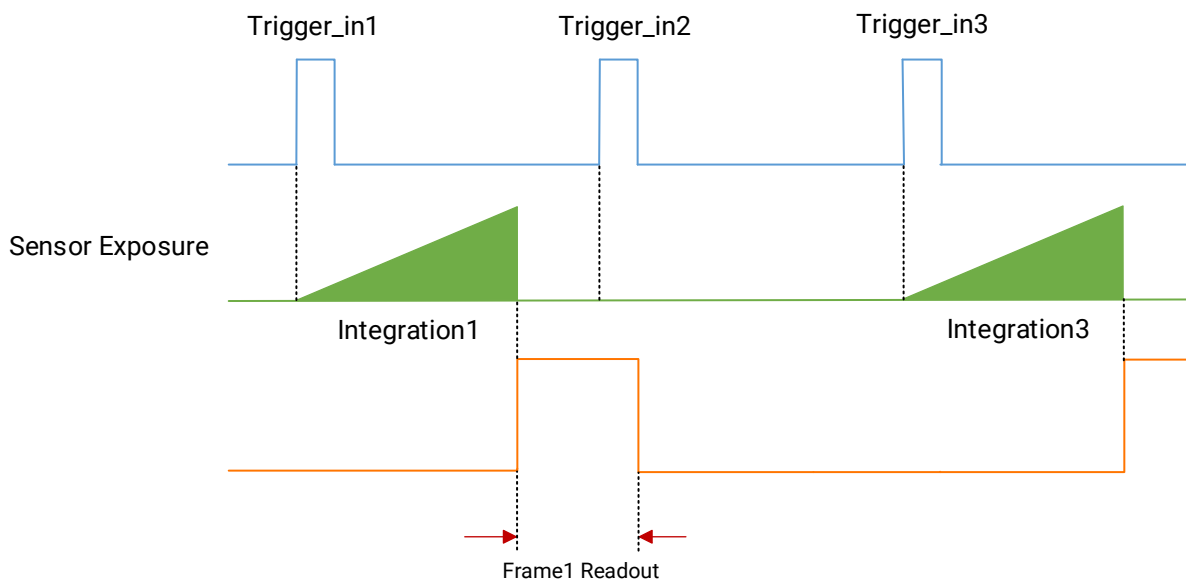


Figure 6-15 Second Frame Filtered

- The 2nd trigger signal will be saved if **Trigger Cache Enable** is enabled.

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

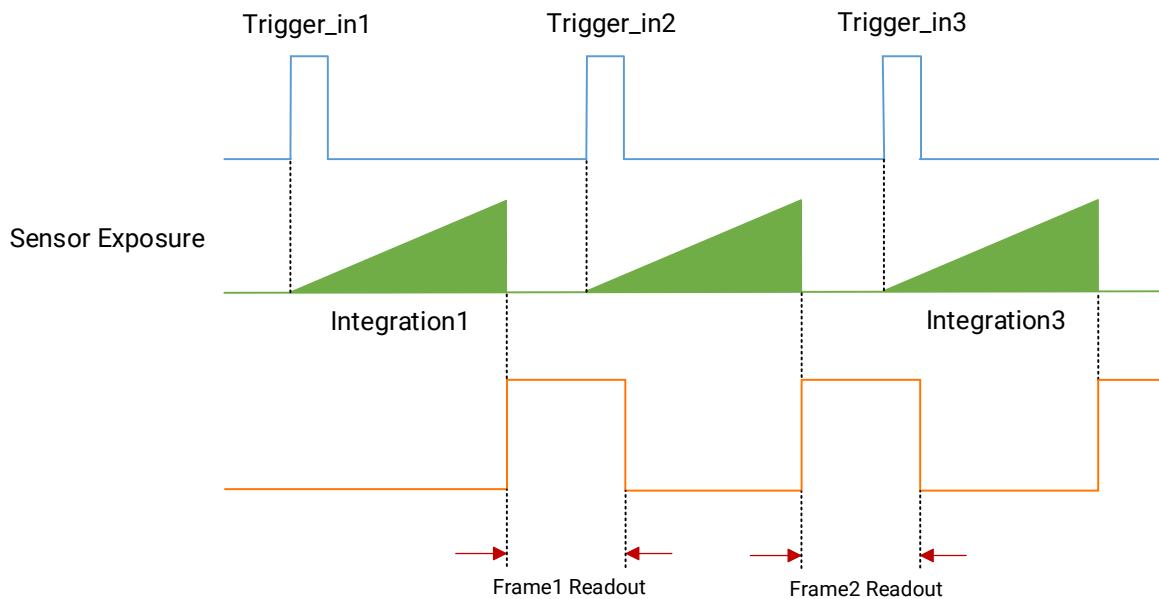


Figure 6-16 Second Frame Created Normally

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

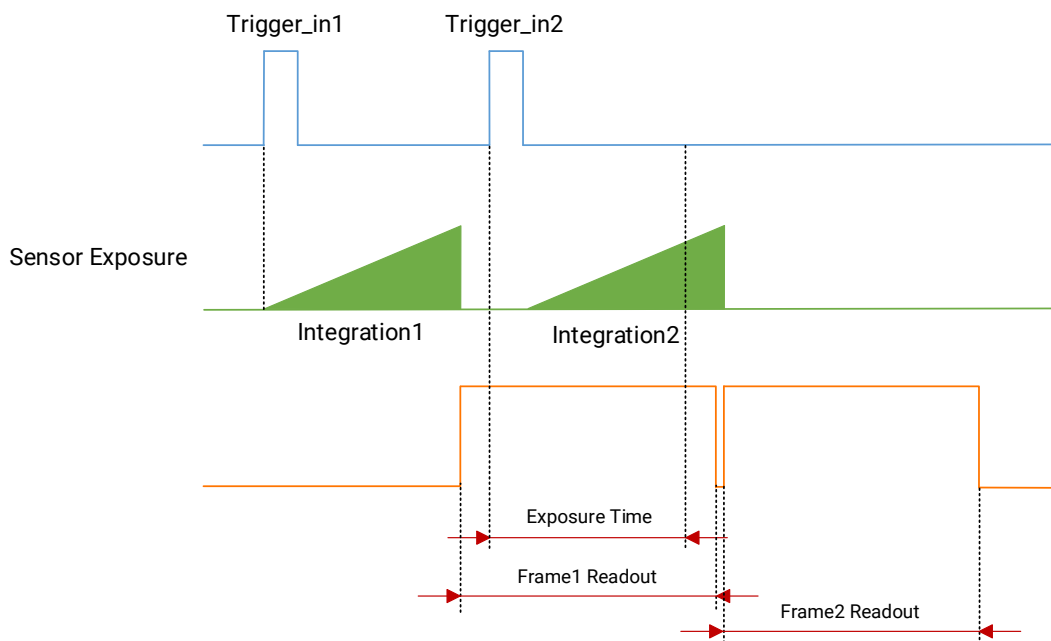


Figure 6-17 Sequence Diagram

 Note

The three sequence diagrams above use rising edge as trigger activation.

Set Trigger Activation

The device supports triggering image acquisition in the rising edge, falling edge, level high, level low or any edge of the external signal. Go to **Acquisition Control** → **Trigger Activation**, and select **Rising Edge**, **Falling Edge**, **Any Edge**, **Level High** or **Level Low** as **Trigger Activation**.

- **Rising Edge**: It means that when the level signal sent by external device is in rising edge, the device receives trigger signal and starts to acquire images.
- **Falling Edge**: It means that when the level signal sent by external device is in falling edge, the device receives trigger signal and starts to acquire images.
- **Any Edge**: It means that when the level signal sent by external device is in rising or falling edge, the device receives trigger signal and starts to acquire images.
- **Level High**: The level high of the trigger signal is valid. As long as the trigger signal is in level high, the device is in image acquisition status. If the trigger signal is in level low, the image acquisition will be stopped.
- **Level Low**: The level low of the trigger signal is valid. As long as the trigger signal is in level low, the device is in image acquisition status. If the trigger signal is in level high, the image acquisition will be stopped.

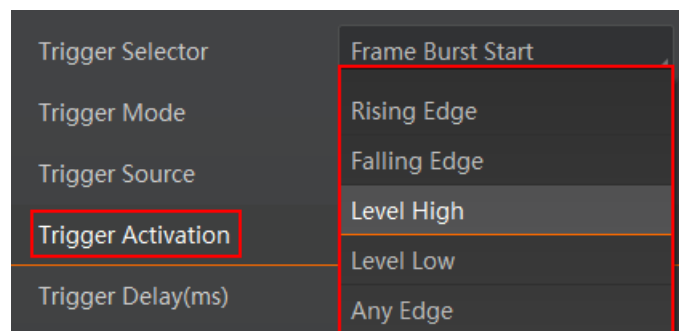


Figure 6-18 Set Trigger Activation

 Note

If the **Trigger Source** is **Anyway**, **Level High** and **Level Low** are not supported in **Trigger Activation**.

Set Trigger Debouncer

The trigger debouncer function allows the device to filter out unwanted short external trigger signal that is input to the device.

Go to **Digital IO Control** → **Line Debouncer Time**, and enter **Line Debouncer Time** according to actual demands. The range of **Line Debouncer Time** is from 0 ms to 1000 ms.

Note

If the **Line Debouncer Time** you set is greater than the time of trigger signal, this trigger signal will be ignored.

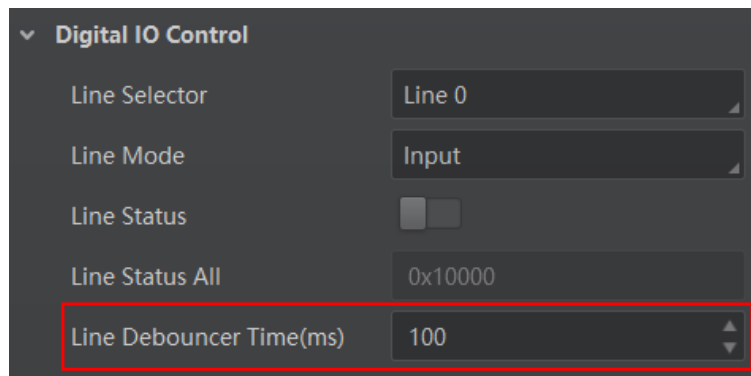


Figure 6-19 Set Trigger Debouncer

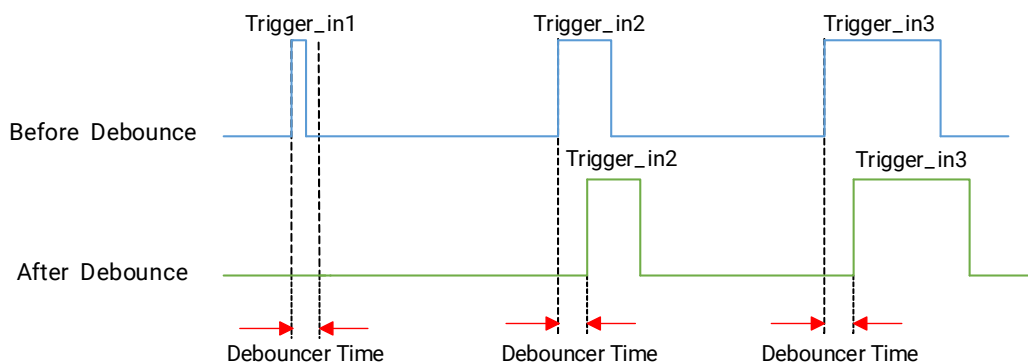


Figure 6-20 Sequence Diagram of Trigger Debouncer

Note

The sequence diagram above uses rising edge as trigger activation.

6.2 Trigger Output

The device has one opto-isolated output (Line 1), and one bi-directional I/O (Line 2) that can be configured as output signal. The steps for configuring Line 2 as output signal as follows.

Steps

1. Go to **Digital IO Control** and select **Line 2** as **Line Selector**.
2. Select **Strobe** as **Line Mode**.

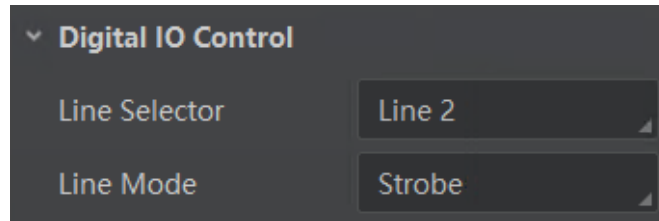


Figure 6-21 Set Line 2 as Output Signal

The output signal of the device is switch signal that can be used to control external devices such as light source, PLC, etc. There are two ways to set output signal, including line inverter and strobe signal.

6.2.1 Enable Line Inverter

The line inverter function allows the device to invert the electrical signal level of an I/O line. Go to **Digital IO Control** → **Line Inverter**, and enable it.

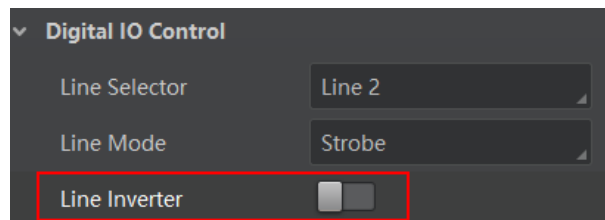


Figure 6-22 Enable Line Inverter

Note

The line inverter function is disabled by default.

6.2.2 Enable Strobe Signal

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

Steps

1. Go to **Digital IO Control** → **Line Source**, and select **Line Source** according to actual demands.
2. Enable **Strobe Enable**.

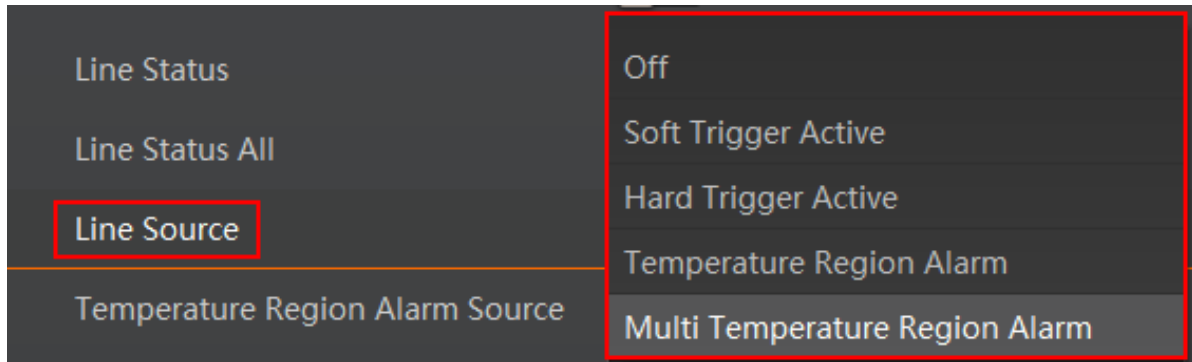
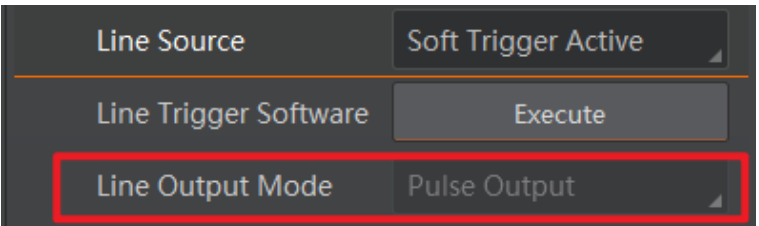
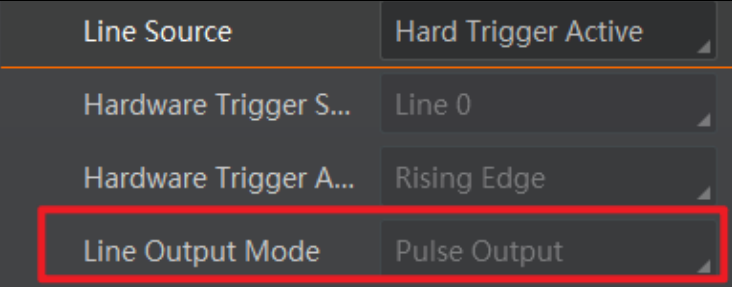
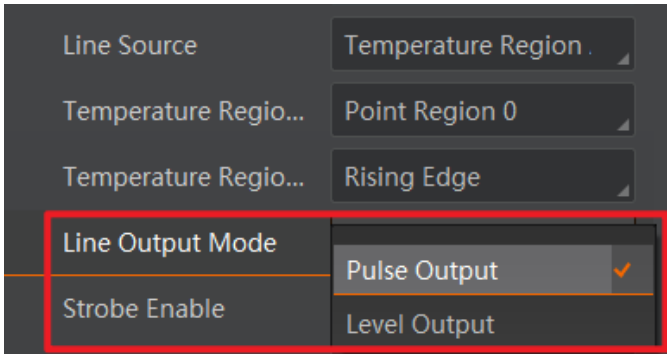


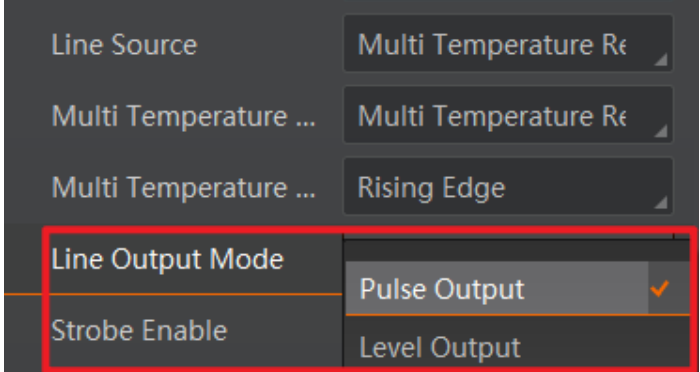
Figure 6-23 Enable Strobe Signal

The supported line sources are as follows:

Table 6-3 Line Source Description

Line Source	Description
Off	It disables the line source function.
Soft Trigger Active	The device outputs signals to external devices when it has a software trigger. Click Execute in Line Trigger Software to send signals.  Note The Line Output Mode is set as Pulse Output by default. 
Hard Trigger Active	The device outputs signals to external devices when it has a hardware trigger. • Hardware Trigger Source includes Line 0 and Line 2. • Hardware Trigger Activation includes Rising Edge and Falling Edge.

Line Source	Description
	 Note The Line Output Mode is set as Pulse Output by default. 
Temperature Region Alarm	If an alarm is triggered, a level low indicates that an alarm is initiated, and a level high indicates that no alarm event is generated. Alarm event source commands can be sent according to the drawn temperature measurement area and temperature region alarm activation, and the signal is output to external devices. • Select the drawn temperature measurement rule in the Temperature Region Alarm Source. • Select Rising Edge or Falling Edge in Temperature Region Alarm Activation. That is, the rising edge is valid from the normal state to the alarm state, and the falling edge is valid from the alarm state to the normal state.  Note • When the Line Output Mode is set as Pulse Output, Temperature Region Alarm Activation will be shown. • The Line Output Mode can be set as Pulse Output or Level Output. 
Multi Temperature Region Alarm	If an alarm is triggered, a level low indicates that an alarm is initiated, and a level high indicates that no alarm event is generated. Alarm event source commands can be sent according to the drawn temperature measurement area and

Line Source	Description
	temperature region alarm activation, and the signal is output to external devices. • Select the drawn temperature measurement rule in the Multi Temperature Region Alarm Source. • Select Rising Edge or Falling Edge in Multi Temperature Region Alarm Activation. That is, the rising edge is valid from the normal state to the alarm state, and the falling edge is valid from the alarm state to the normal state.  Note • When the Line Output Mode is set as Pulse Output, Multi Temperature Region Alarm Trigger Activation will be shown. • The Line Output Mode can be set as Pulse Output or Level Output. 

 Note

- The specific line sources may differ by device models.
- Parameters of **Temperature Region Alarm** and **Multi Temperature Region Alarm** are supported only when you use **Temperature Region Alarm Rule Control** function.

Set Strobe Line Duration

The device supports setting the duration of the triggered output signal. Go to **Digital IO Control** → **Strobe Line Duration**, set it according to actual demands, and its unit is ms.

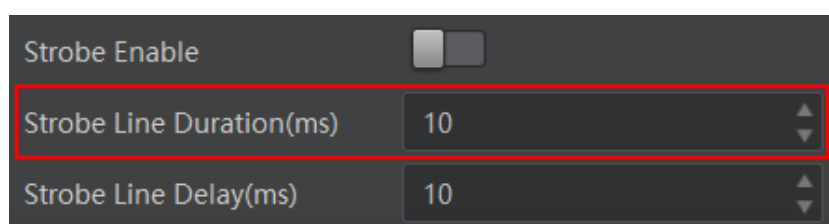


Figure 6-24 Set Strobe Line Duration

Note

- Disabling **Strobe Enable** is required when setting **Strobe Line Duration**.
 - When the **Line Output Mode** is set as **Level Output**, the **Strobe Line Delay** and **Strobe Line Duration** cannot be set.
-

Set Strobe Line Delay

The device supports setting an output delay to the output signal to meet the needs of applications where an external device needs a delayed response in some scenarios. Go to **Digital IO Control** → **Strobe Line Delay**, set it according to actual demands, and its unit is ms.

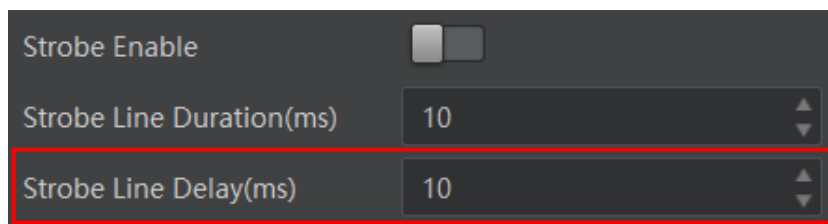


Figure 6-25 Set Strobe Line Delay

Note

Disabling **Strobe Enable** is required when setting **Strobe Line Delay**.

Chapter 7 I/O Electrical Features and Wiring

7.1 I/O Electrical Features

7.1.1 Electrical Features of Input Signal

The internal circuit of opto-isolated input (Line 0) is as follows.

Note

- The maximum input current of Line 0 is 25 mA.
- Make sure that the input voltage is not from 1 VDC to 1.5 VDC as the electric status between these two values are not stable.
- The breakdown voltage is 30 VDC. Keep voltage stable.

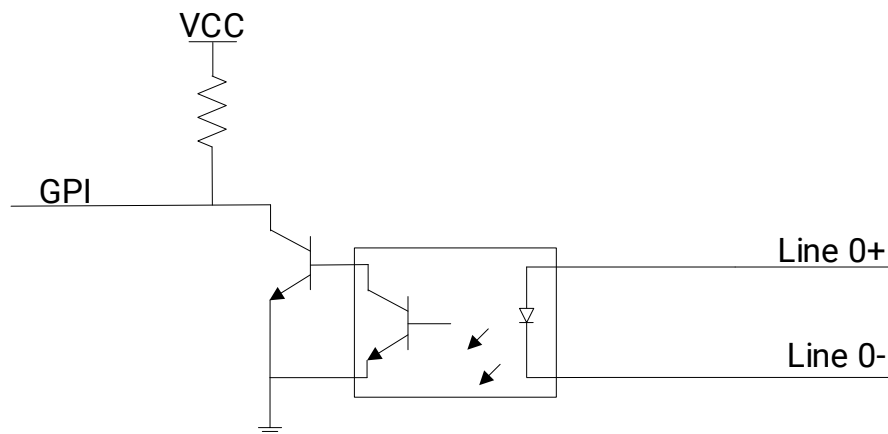


Figure 7-1 Internal Circuit of Input Signal

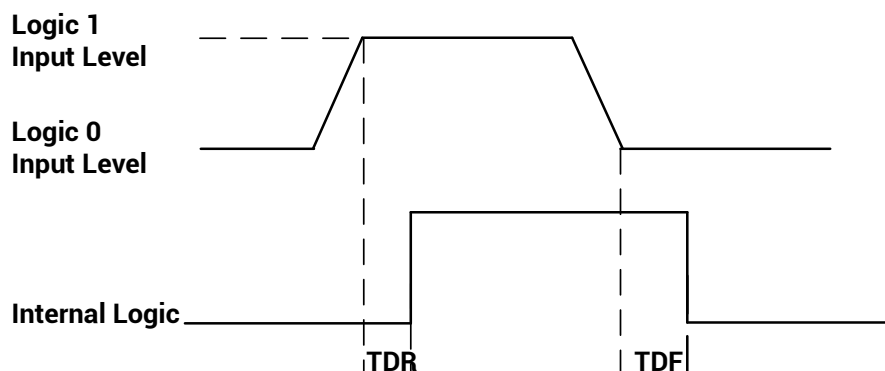


Figure 7-2 Input Logic Level

Table 7-1 Input Electrical Feature

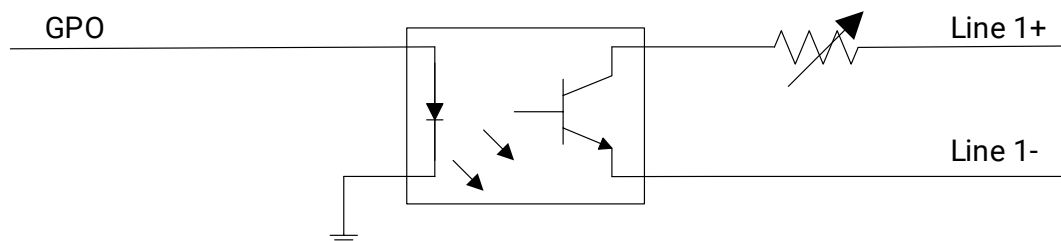
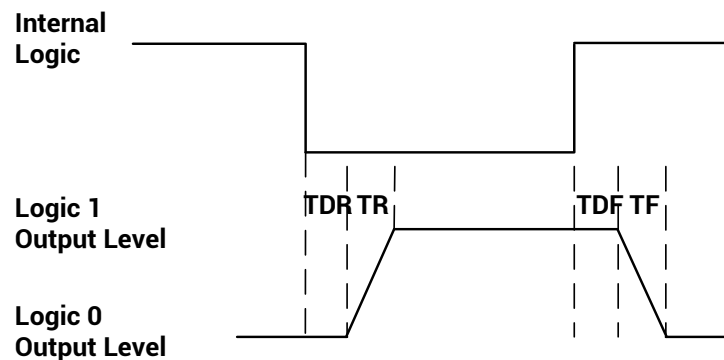
Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 VDC to 1 VDC
Input Logic Level High	VH	1.5 VDC to 24 VDC
Input Falling Delay	TDF	16.8 μ s to 22 μ s
Input Rising Delay	TDR	1.8 μ s to 4.6 μ s

7.1.2 Electrical Features of Output Signal

The internal circuit of opto-isolated output (Line 1) is as follows.

Note

The maximum output current of Line 1 is 25 mA.

**Figure 7-3 Internal Circuit of Output Signal****Figure 7-4 Output Logic Level**

The electrical features of opto-isolated output when the external voltage is 3.3 VDC and the external resistance is 1 K Ω is shown below.

Table 7-2 Output Electrical Feature

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

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

Table 7-3 Parameters of Output Logic Level Low

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

7.1.3 Electrical Features of Bi-Directional Signal

The device has one bi-directional non-isolated I/O signal (Line 2), and you can set it as input signal or output signal according to demands. Its internal circuit is as follows.

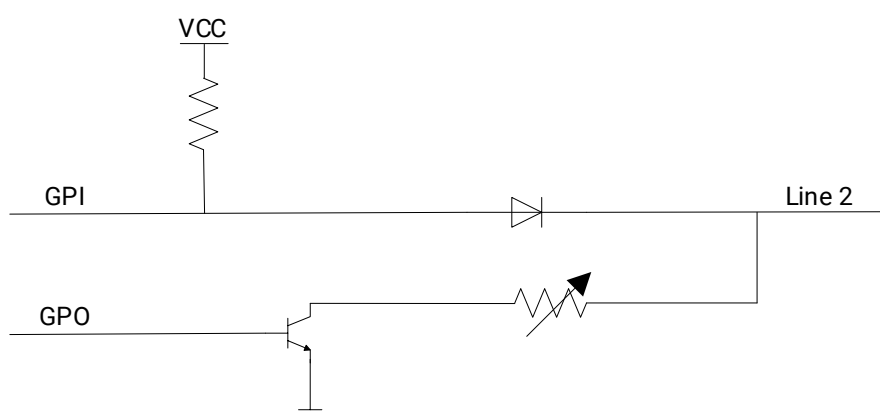


Figure 7-5 Internal Circuit of Bi-Directional Signal

Configured as Input Signal

Note

- Make sure that the input voltage is not from 0.5 VDC to 1.5 VDC as the electric status between these two values are not stable.
- The breakdown voltage is 30 VDC. Keep voltage stable.
- To prevent damage to the GPIO pin, please connect GND first and then input voltage in Line 2.

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

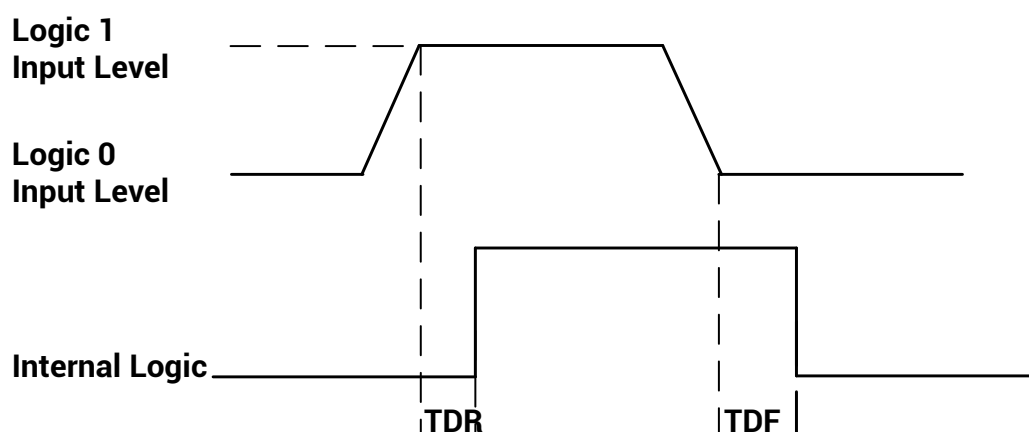


Figure 7-6 Input Logic Level

Table 7-4 Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 VDC to 0.5 VDC
Input Logic Level High	VH	1.5 VDC to 24 VDC
Input Falling Delay	TDF	< 1 μ s
Input Rising Delay	TDR	< 1 μ s

Configured as Output Signal

Note

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.

Table 7-5 Parameters of Output Logic Level Low

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

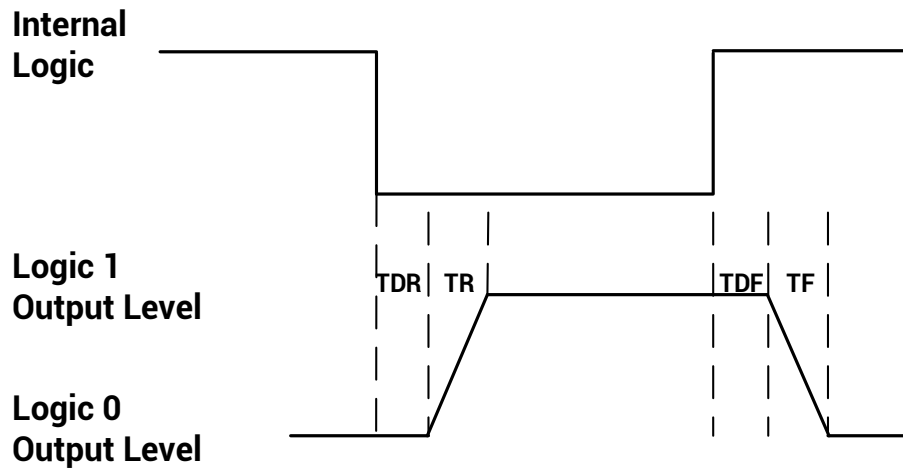


Figure 7-7 Output Logic Level

Table 7-6 Output Electrical Feature

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

7.1.4 Factors Affecting Transmission Delay of I/O Lines

The factors that affect the transmission delay of I/O lines are shown below, where ★ represents the main influencing factor and ☆ represents the secondary factor.

Table 7-7 Factors Affecting Transmission Delay of I/O Lines

Lines Factors	Opto-Isolated Input Lines	GPIO Input Lines	Opto-Isolated Output Lines	GPIO Output Lines
Working Temperature	★	☆	★	☆
Production Differences of Electronic Components	★	☆	★	☆
Aging	★	-	★	-
External I/O Power Supply Voltage	★	-	★	☆
Load Resistance	-	-	★	☆
Load Current	-	-	★	☆

Regarding the factors that affect the transmission delay of I/O lines in the table above, we provide the following explanations and suggestions:

- Use the I/O circuit at the recommended working temperature of the device. See the device's datasheet for the working temperature.
- Applying current to the input and output circuits of the opto-coupler will accelerate the aging rate of the opto-coupler. Keep the current to a minimum level, and ensure a stable transmission delay.
- In order to reduce the low-speed transmission delay, it is recommended to use an external I/O supply voltage of about 5 V.
- For a better quick trigger, use the recommended pull-up resistor.
- Generally, the trigger input-output frequency of an opto-coupler circuit rarely exceeds 10 kHz, and the trigger input-output frequency of a GPIO circuit rarely exceeds 1 MHz. Keep the trigger input-output frequency of the circuit within this range.
- If you need to reduce the transmission delay, it is recommended to use the GPIO line, which has a shorter transmission delay than the opto-coupler delay, but the GPIO line has the risk of burning out, please use it with caution.
- The bounce of the trigger signal may cause the internal bounce of the device to increase. To avoid bounce, keep the edge of the trigger signal steep to reduce the internal bounce of the device (preferably less than 1 μs).

7.2 I/O Wiring

This section introduces how to wire the device via its I/O connector.

Note

Here we take one kind of device as an example to introduce I/O wiring. The appearance here is for reference only, and the actual device you purchased shall prevail.

7.2.1 Input Signal Wiring

The input signal wiring is shown below when the device uses Line 0 as trigger source in external trigger mode.

Note

Input signal wiring may differ by the external device type.

PNP Device

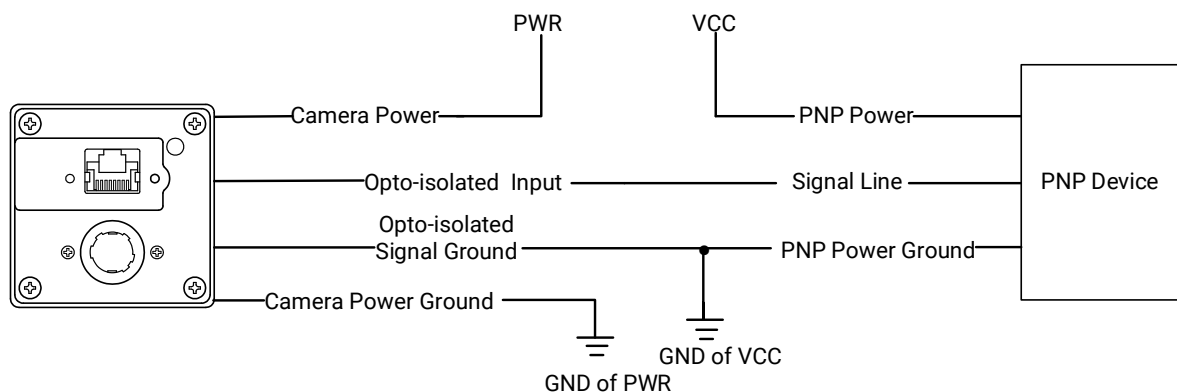


Figure 7-8 Input Signal Connects to PNP Device

NPN Device

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

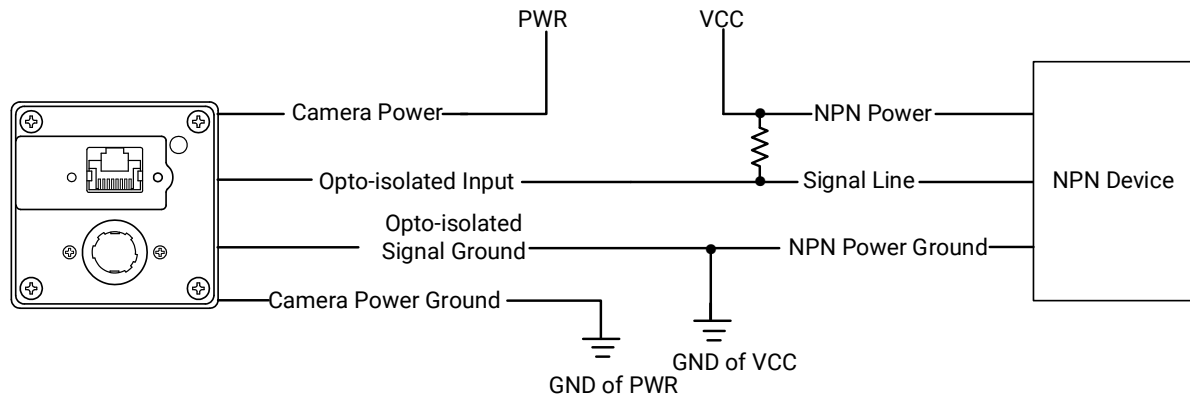


Figure 7-9 Input Signal Connects to NPN Device

Switch

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

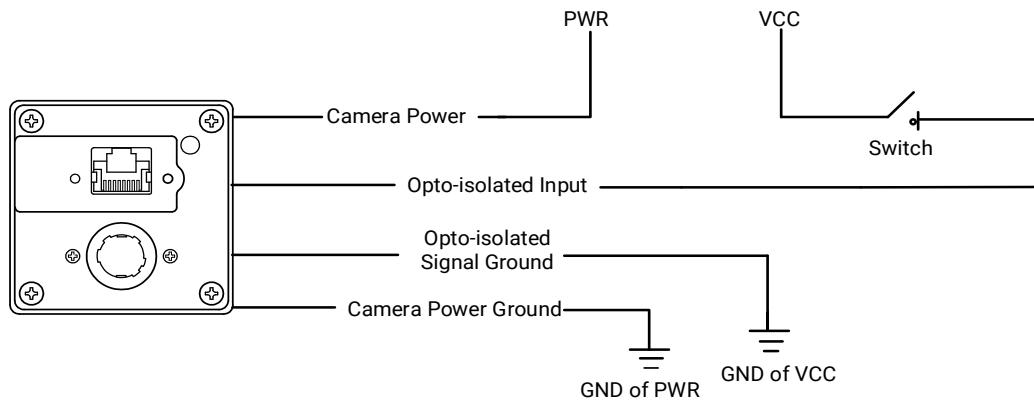


Figure 7-10 Input Signal Connects to Switch

7.2.2 Output Signal Wiring

The output signal wiring is shown below when the device uses Line 1 as output signal.

Note

Output signal wiring may differ by the external device type.

PNP Device

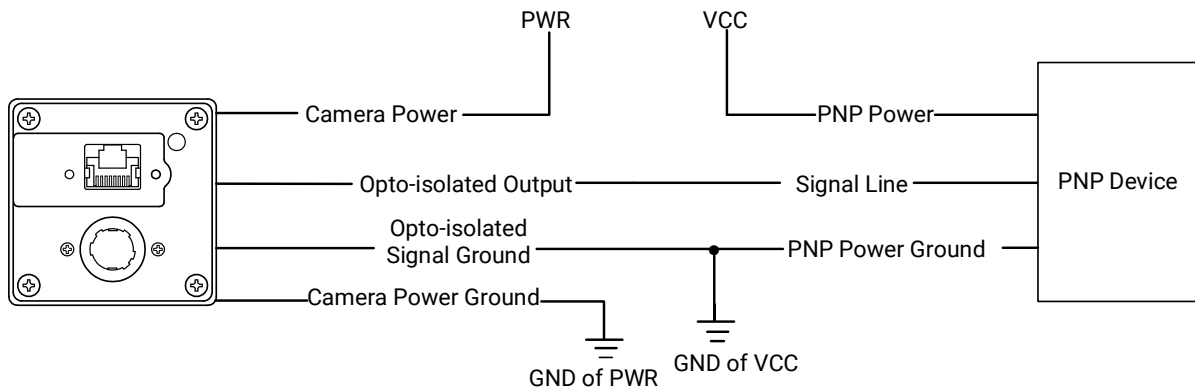


Figure 7-11 Output Signal Connects to PNP Device

NPN Device

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

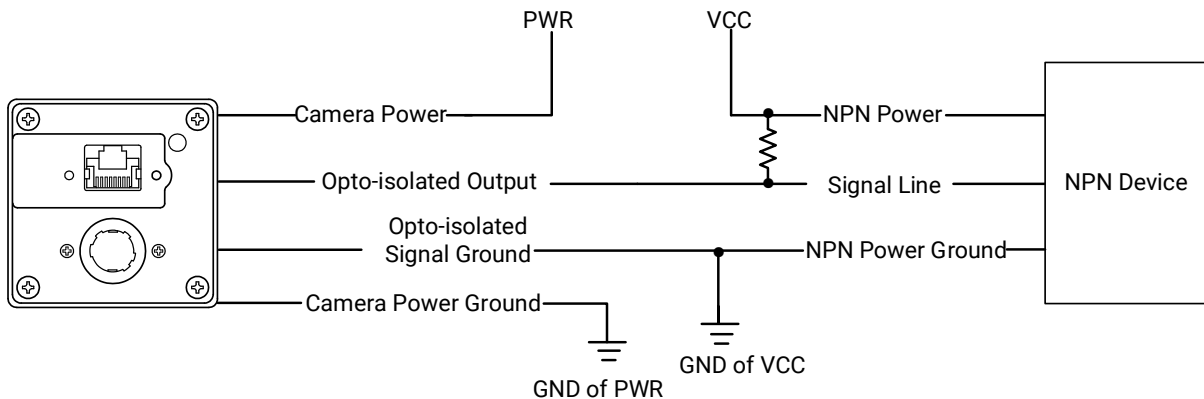


Figure 7-12 Output Signal Connects to NPN Device

7.2.3 Bi-Directional Signal Wiring

The device's Line 2 can be used as input signal and output signal.

Configured as Input Signal

The input signal wiring is shown below when the device's Line 2 is configured as input signal.

Note

Input signal wiring may differ by the external device type.

PNP Device

It is recommended to use 330 Ω pull-down resistor.

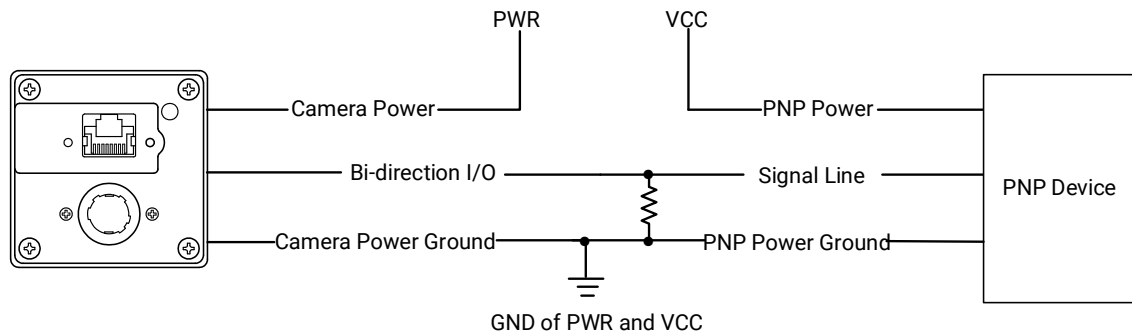


Figure 7-13 Input Signal Connects to PNP Device

NPN Device

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

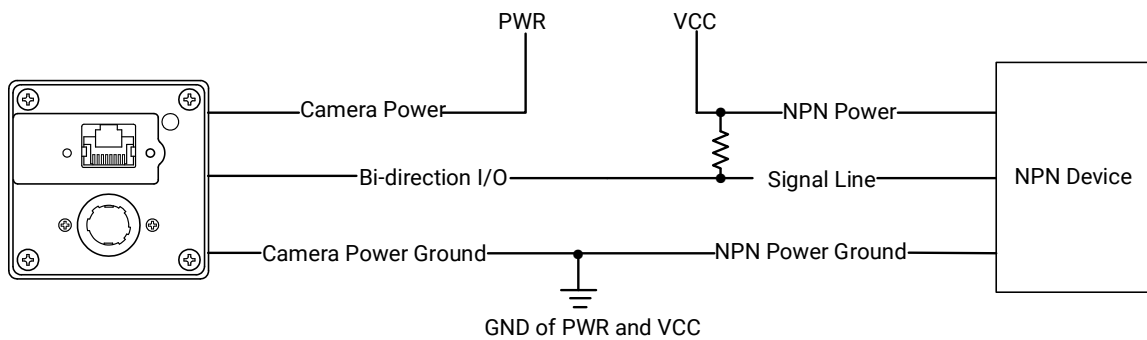


Figure 7-14 Input Signal Connects to NPN Device

Switch

The switch value can provide low electrical level to trigger line 2.

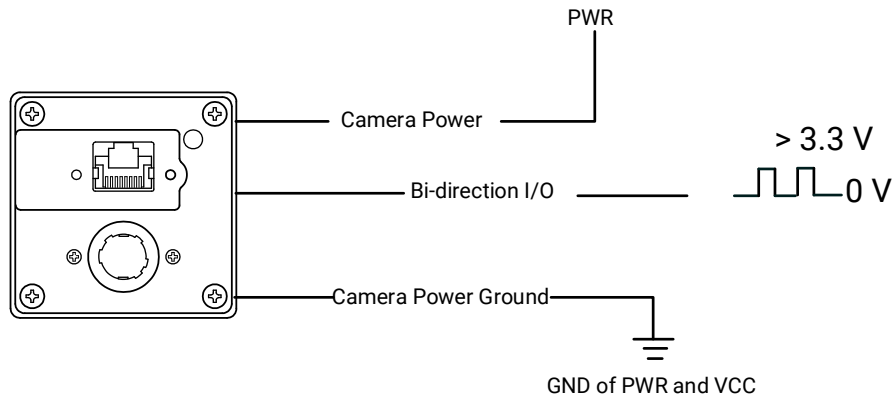


Figure 7-15 Input Signal Connects to Switch

Configured as Output Signal

The output signal wiring is shown below when the device's Line 2 is configured as output signal.

Note

Output signal wiring may differ by the external device type.

PNP Device

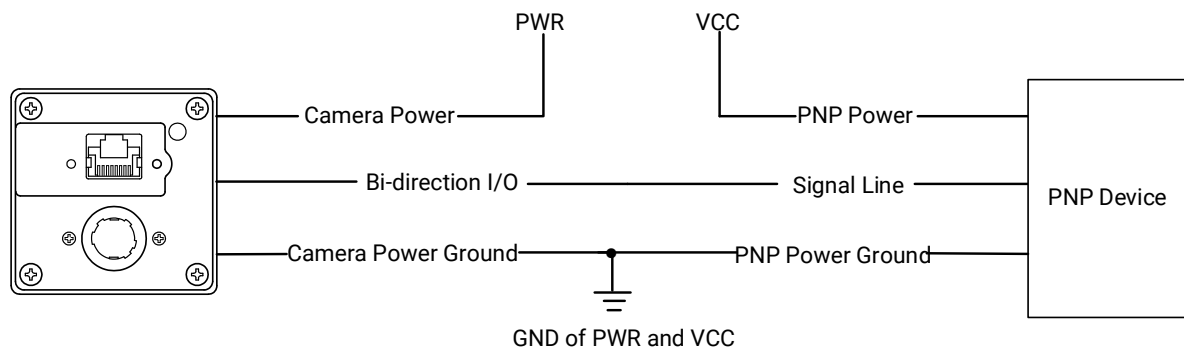


Figure 7-16 Output Signal Connects to PNP Device

NPN Device

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

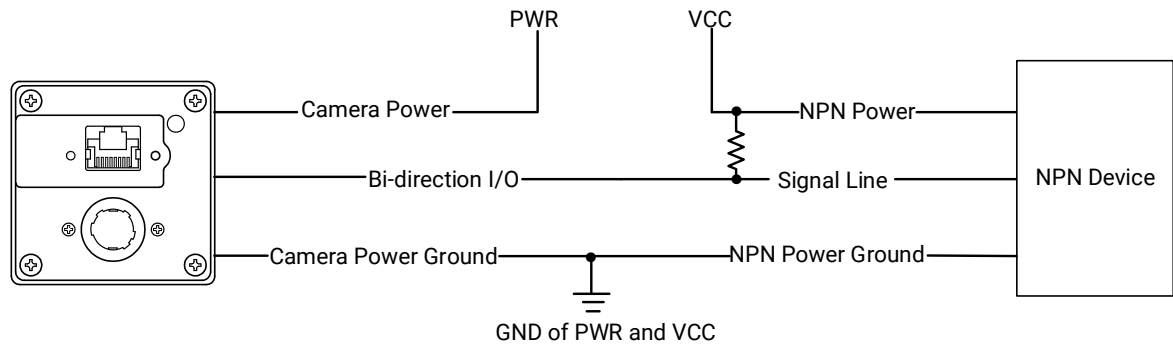


Figure 7-17 Output Signal Connects to NPN Device

Chapter 8 Image Debugging

8.1 Set Palettes Mode

The palettes mode improves the recognizability of the image content in some occasions by overlaying grayscale value of images collected by the device.

The palettes mode has 14 types, including White Hot, Black Hot, Fusion 1, etc. Go to **Infrared Control** → **Palettes Mode**, and set **Palettes Mode** according to actual demands.

Note

The grayscale value of the image captured by the device is related to the acquisition distance from the device to the object. Different grayscale values will present different pseudo-color images. Please refer to the actual display for specific pseudo-color images.

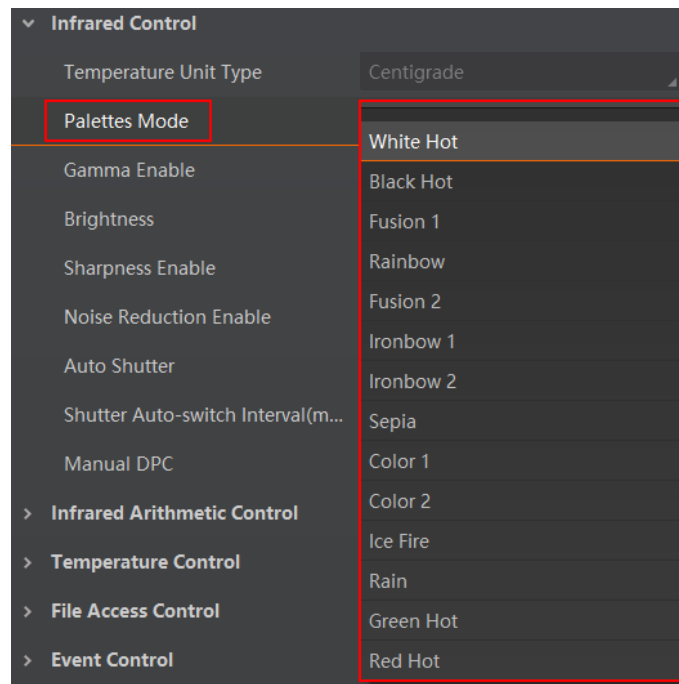


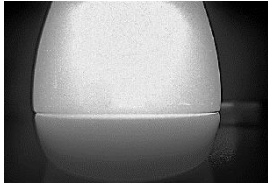
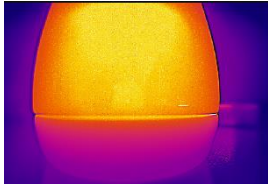
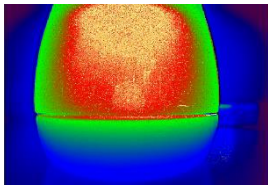
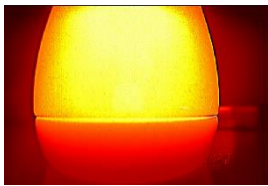
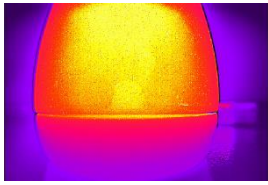
Figure 8-1 Set Palettes Mode

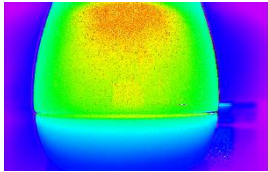
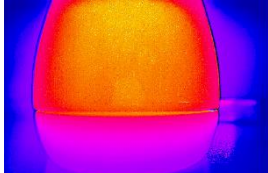
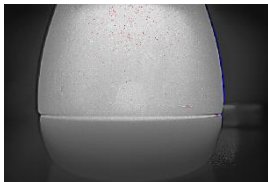
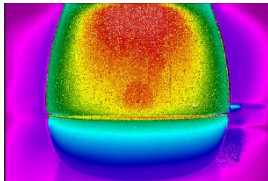
Here we take 100 °C hot water as the target object to introduce different palettes modes and pseudo-color images.

Note

The default palettes mode of the device is **White Hot**.

Table 8-1 Palettes Mode Description

No.	Palettes Mode	Pseudo-Color Images
1	White Hot	
2	Black Hot	
3	Fusion 1	
4	Rainbow	
5	Fusion 2	
6	Ironbow 1	
7	Ironbow 2	
8	Sepia	

No.	Palettes Mode	Pseudo-Color Images
9	Color 1	
10	Color 2	
11	Ice Fire	
12	Rain	
13	Green Hot	
14	Red Hot	

8.2 Set Frame Rate

Note

The image compression function may differ by device models

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

The **Acquisition Frame Rate (Fps)** is 50 by default, and you cannot adjust the value.

8.3 Set Gamma Correction

Note

- The Gamma correction function is disabled by default.
- Before you enable the Gamma correction function, please enable the live view of the camera, and disable the contrast ratio function.

The device supports Gamma correction function. Generally, the output of the device'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.

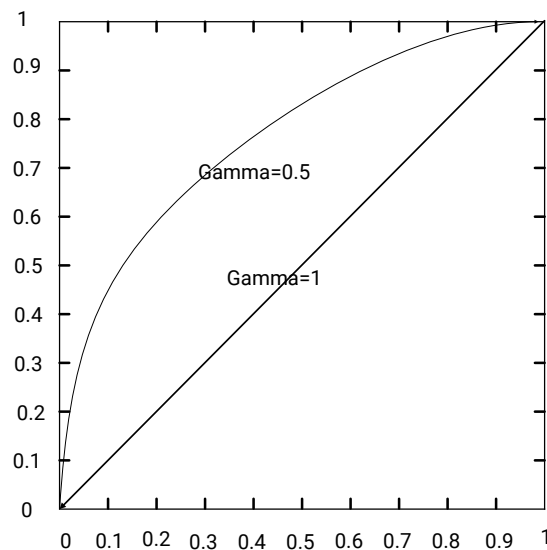


Figure 8-2 Gamma Curve

Steps

1. Go to **Infrared Control** → **Gamma Enable**.
2. Enable **Gamma Enable**.
3. Enter **Gamma** according to actual demands.

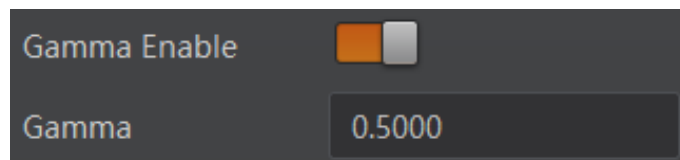


Figure 8-3 Set Gamma Correction

Note

The Gamma ranges from 0 to 1.

8.4 Set Brightness

The device supports brightness function. The larger the brightness value is, and the brighter the image is. Go to **Infrared Control** → **Brightness**, and set **Brightness** according to actual demands.

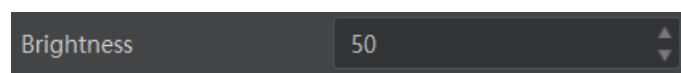


Figure 8-4 Set Brightness

8.5 Set Contrast Ratio

Note

- The contrast ratio function may differ by device models, and is disabled by default.
- The range of **Contrast Ratio** is from 0 to 100.
- Before you enable the contrast ratio function, please enable the live view of the camera, and disable the Gamma correction function.

The device supports the contrast ratio function that adjusts the intensity of light and darkness and color. The larger the contrast ratio, and more clear the image is.

Enable **Contrast Ratio Enable**, and set **Contrast Ratio** according to actual demands.

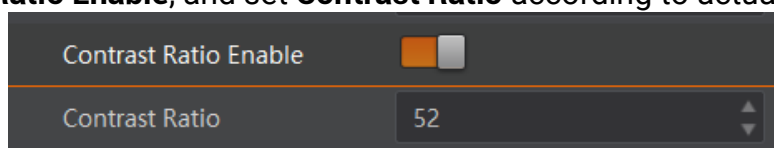
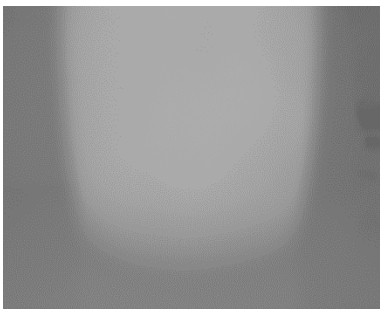
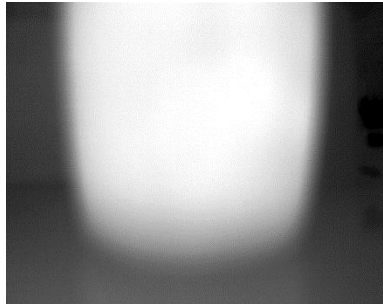
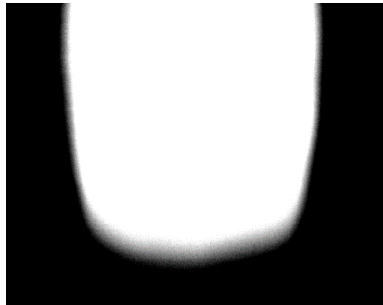


Figure 8-5 Set Contrast Ratio

Here we take the 100 °C hot water as the target object. If the **White Hot** is set as the **Palettes Mode**, the results of different contrast ratio values are shown below.

Table 8-2 Contrast Ratio Example

No.	Contrast Ratio	Image
1	Contrast Ratio = 0	

No.	Contrast Ratio	Image
2	Contrast Ratio = 50	
3	Contrast Ratio = 100	

8.6 Set Sharpness

Note

The sharpness function is disabled by default.

The device supports sharpness function that can adjust the sharpness level of the image edge.

Steps

1. Go to **Infrared Control** → **Sharpness Enable**
2. Enable **Sharpness Enable**.
3. Enter **Sharpness** according to actual demands.

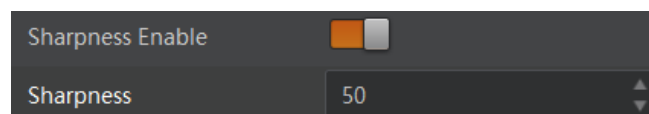


Figure 8-6 Set Sharpness

Note

The sharpness ranges from 1 to 100.

8.7 Set Noise Reduction

The device supports noise reduction function that can effectively eliminate noise in images and improve image quality and definition. Go to **Infrared Control** → **Noise Reduction Enable**, and enable **Noise Reduction Enable** according to actual demands.

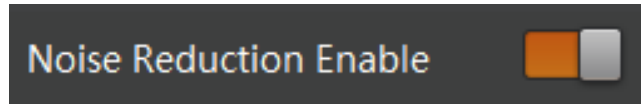


Figure 8-7 Set Noise Reduction

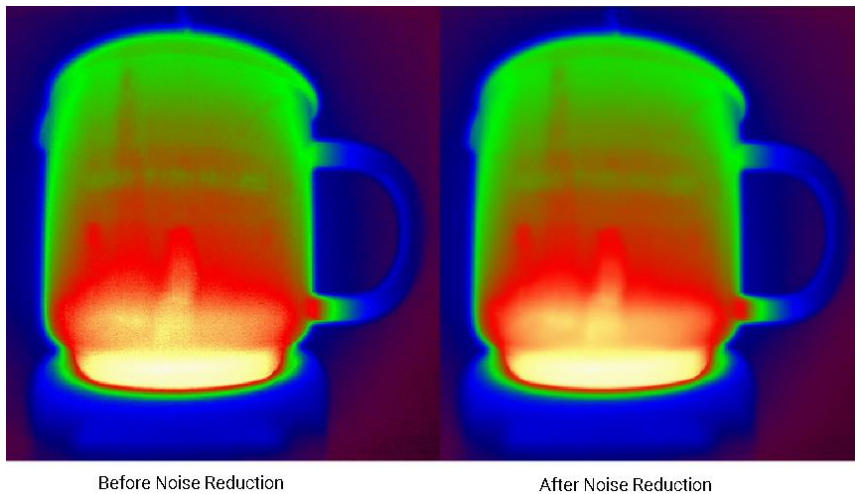


Figure 8-8 Noise Reduction Effect

8.8 View Resolution

Note

The device displays the image with max. resolution by default.

Go to **Image Format Control**, and you can view resolution by reading **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.

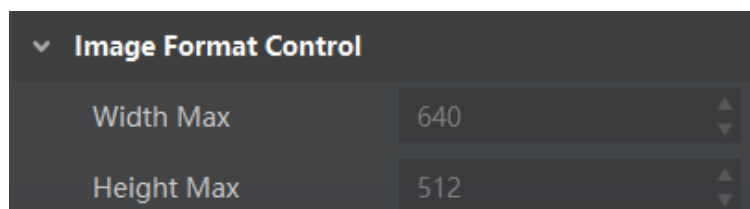


Figure 8-9 View Resolution

8.9 Set ROI

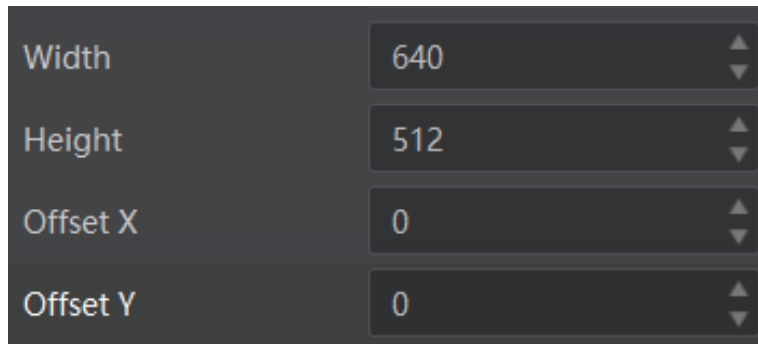
If you are only interested in a certain region of the image, you can set a Region of Interest (ROI) for the device. Setting the region of interest can reduce the transmission data bandwidth and improve the device's frame rate to a certain extent.

Note

- Caution: Editing ROI will lost all configured rules of temperature measurement.
 - Region of interest can be set only when you stop real-time acquisition.
 - The device currently supports one ROI only.
 - The **Width** plus **Offset X** should not be larger than **Width Max**, and **Height** plus **Offset Y** should not be larger than **Height Max**.
-

Go to **Image Format Control**, 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.



Width	640
Height	512
Offset X	0
Offset Y	0

Figure 8-10 Set ROI

8.10 Set Pixel Format

This function allows you to set the pixel format of the image data transmitted by the device. Go to **Image Format Control** → **Pixel Format**, and set **Pixel Format** according to actual demands.

Note

- The specific pixel formats may differ by device models.
 - With different pixel formats, the max. frame rate may differ.
 - YUV 422 (YUYV) Packed and YUV 422 Packed transmit image data, Mono 16 transmits grayscale data, and Float 32 transmits temperature data.
-

Table 8-3 Pixel Format and Pixel Size

Pixel Format	Pixel Size (Bits/Pixel)
Mono 16, YUV 422 (YUYV)Packed, YUV 422 Packed	16
Float 32	32

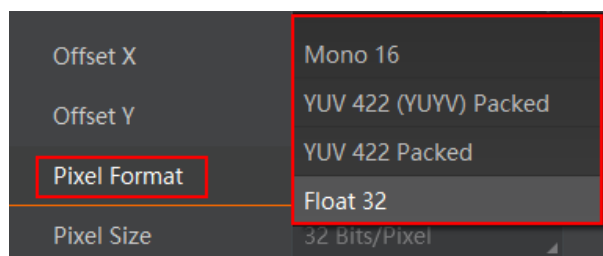


Figure 8-11 Set Pixel Format

8.11 Image Correction

The device supports different correction methods to solve image problems that occur during the actual preview process. You can go to **Infrared Control** and set corresponding parameters.

8.11.1 Set Shutter Control

If a degraded image such as noise, light spots, etc. appears in the process of collecting images, you can use auto shutter control conditions or perform manual shutter control to quickly correct the image.

When performing shutter correction, the baffle will fall between the infrared lens and the detector. At this time, the device generates a baffle sound, and collected images will freeze instantly to complete the image correction. Go to **Infrared Control** → **Auto Shutter**, and set **Auto Shutter** according to actual demands.

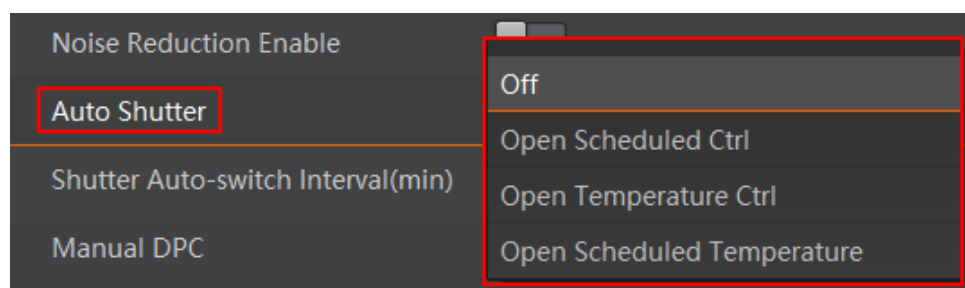


Figure 8-12 Shutter Control

Table 8-4 Auto Shutter Parameter

Auto Shutter	Description
Off	Click Execute in Manual Shutter Correction when the device starts to collect images, and the device generates a baffle sound and image correction is finished.
Open Scheduled Ctrl	Set Shutter Autoswitch Time Interval (min) when the device starts to collect images. If the configured time interval reaches, the device generates a baffle sound and image correction is finished.
Open Temperature Ctrl	Whenever the temperature of the collected image changes by 1 °C up and down, the device generates a baffle sound and image correction is finished.
Open Scheduled Temperature	Set Shutter Autoswitch Time Interval (min) when the device starts to collect images. If the configured time interval reaches or the temperature of the collected image changes by 1 °C up and down, the device generates a baffle sound and image correction is finished.

8.11.2 Set Defective Pixel Correction

A single pixel in the device sensor cannot respond to infrared radiation normally, which is called an invalid pixel. It is reflected in the infrared image as bright and dark spots whose coordinates do not change with the target. Defective pixel correction can eliminate these bright and dark spots. Follow steps below to set the correction.

Steps

1. Go to **Infrared Control** → **Manual DPC**, and set **On** or **Off** as **Manual DPC**.

Note

Off means auto defective pixel correction, and **On** means manual defective pixel correction.

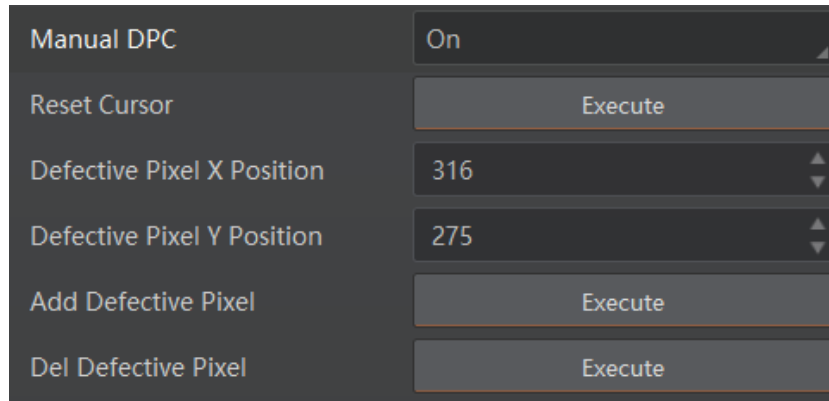


Figure 8-13 Set Defective Pixel Correction

2. Move cursor on defective pixels of the image, and view the corresponding coordinates on the bottom side of the client software main window when the **Manual DPC** is **On**.

Note

You can click  on the bottom side and check position to display coordinates if the client software does not display.

3. Enter coordinates of the pixel in **Dead Pixel X Position** and **Dead Pixel Y Position**, and view the pixel in the image.

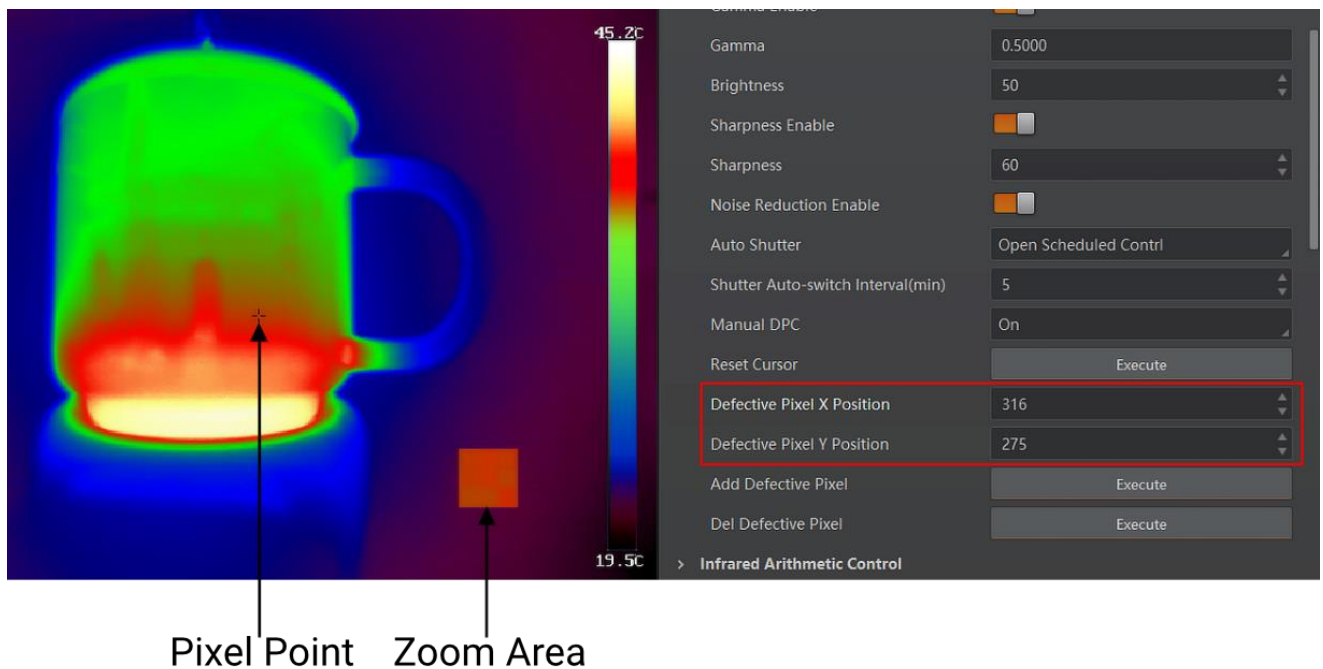


Figure 8-14 Defective Pixel X/Y Position

4. (Optional) Click **Execute** in **Reset Cursor** to let the cursor return to central coordinates.
5. Repair or restore defective pixel.
 - Repair defective pixel: Click **Execute** in **Add Dead Pixel** to repair selected defective pixels.

- Restore defective pixel: Click **Execute** in **Del Dead Pixel** to restore repaired defective pixels.

8.12 Set Temperature Range

You can set a temperature range for screen display, and the palette only works for targets within the temperature range.

Go to **Infrared Control** → **Temperature Range Mode**, and select **Auto** or **Manual** according to actual demands.

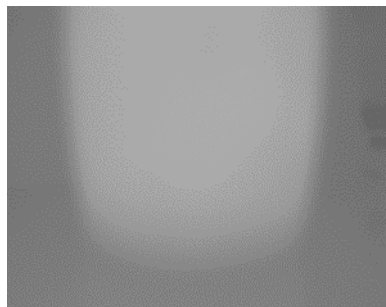
- When you select **Auto** mode, the upper limit and lower limit of temperature are the highest and lowest temperature of the image collected by the device. The grayscale value of images will be overlaid normally.
- When you select **Manual** mode, you can adjust the upper limit and lower limit of temperature in **Temperature Range Upper Limit** and **Temperature Range Lower Limit**. The grayscale value of images will be overlaid only in the set range. If the temperature in the collected image is greater than the upper limit, the grayscale value of this area is 255; if the temperature is smaller than the lower limit, the grayscale value of this area is 0.

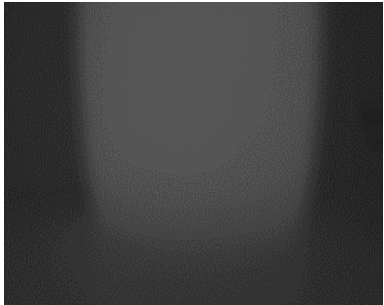
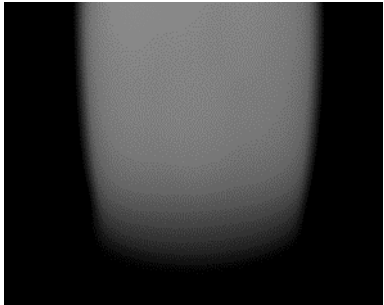
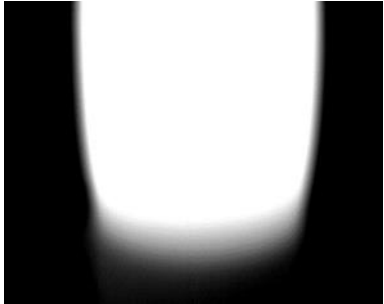
Temperature Range Mode	Manual
Temperature Range Upper Limit	40.0000
Temperature Range Lower Limit	35.0000

Figure 8-15 Set Temperature Range

Here we take the 100 °C hot water as the target object. If the **White Hot** is set as the **Palettes Mode**, the results of different temperature settings are shown below.

Table 8-5 Temperature Range Example

No.	Temperature Range Mode	Temperature Range Upper/Lower Limit	Image
1	Temperature Range Mode = Auto	N/A	

No.	Temperature Range Mode	Temperature Range Upper/Lower Limit	Image
2	Temperature Range Mode = Manual	Temperature Range Upper Limit = 100 Temperature Range Lower Limit = 0	
3		Temperature Range Upper Limit = 60 Temperature Range Lower Limit = 30	
4		Temperature Range Upper Limit = 40 Temperature Range Lower Limit = 30	

Chapter 9 Temperature Measurement Settings

9.1 Global Temperature Measurement

Global temperature measurement can set parameters like atmospheric transmissivity, temperature measurement range, target distance, full-screen emissivity, etc., which can avoid data exception caused by environmental influences and distance influences when the target object is measured at temperature. You can set parameters via **Infrared Arithmetic Control**, and the global temperature measurement parameters are shown in the following figure.

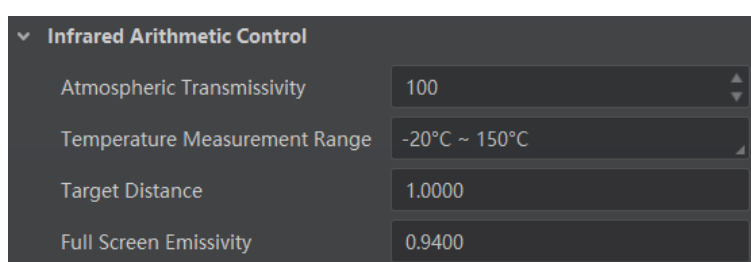


Figure 9-1 Global Temperature Measurement Parameters

Table 9-1 Parameters Description

Parameters	Description
Atmospheric Transmissivity	If a germanium glass needs to be added in front of the lens of the infrared camera, the transmittance of the germanium glass can be set by this parameter.  Note If no germanium glass is needed, you can keep this parameter as 100.
Temperature Measurement Range	Select a temperature measurement range as needed from -20 °C to 150 °C (-4 °F to 302 °F) and 0 °C to 550 °C (32 °F to 1022 °F).  Note In order to ensure the measurement accuracy, select -20 °C to 150 °C (-4 °F to 302 °F) for measuring objects below 150 °C, and 0 °C to 550 °C (32 °F to 1022 °F) for measuring objects above 150 °C.
Target Distance	Set the linear distance from the target object to be measured to the device (unit: m).

Parameters	Description
Full Screen Emissivity	Set the emissivity of the target object. The emissivity value varies for different objects. Refer to the user manual of the corresponding camera model for details.

9.2 Temperature Control

The Temperature Control feature allows you to set temperature measurement rules, region alarm (single region /multi-region), and image overlay functions. If you want to edit parameters in this feature, you should click **Execute** in **Temperature Control Load** to load configured temperature measurement parameters, as shown below.

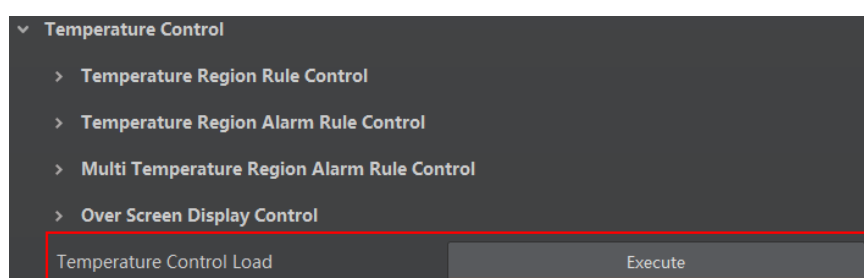


Figure 9-2 Set Temporal Noise Reduction

9.3 Temperature Measurement Rule

The device supports a total of 22 temperature measurement rules, including 4 temperature measurement types of point, polygon, line and circle, and supports drawing 10 point temperature measurements, 10 polygon temperature measurements, 1 line temperature measurement and 1 circle temperature measurement.

9.3.1 Set Expert Mode

Temperature measurement expert mode allows you to set individual temperature parameters for each rule, which can be set via **Temperature Region Rule Control** → **Temperature Measurement Expert Mode**.

Note

If expert mode is not set, the enabled temperature measurement rule uses the global temperature measurement parameters.

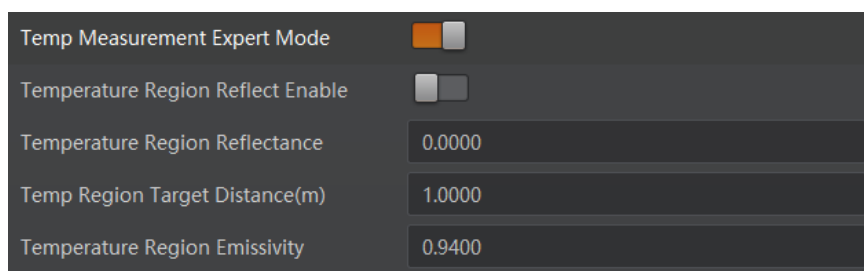


Figure 9-3 Set Expert Mode

Table 9-2 Parameters Description

Parameters	Description
Temp Region Reflectance	It sets the reflectance value of the temperature screening region, which needs to be consistent with the temperature value of the high-temperature object.  Note You need to enable Temperature Region Reflect Enable first.
Temp Region Target Distance (m)	It sets the linear distance from the target object to be measured to the device (unit: m).
Temp Region Emissivity	It sets the emissivity value of the target object (unit: %). The emissivity value varies for different objects. Refer to Appendix B Emissivity of Common Substances for details.

9.3.2 Set Temperature Measurement Rule

Point, polygon, line and circle are supported for temperature measurement rules, which can be configured via **Temperature Region Rule Control**.

Point Temperature Measurement

Point temperature measurement sets the coordinate point of any image in the scene, and automatically measures the temperature of the point, and up to 10 points can be drawn.

Steps

1. Go to **Temperature Region Rule Control** → **Temperature Region Selector**.
2. Select **Point Region 0** to **Point Region 9** from **Temperature Region Selector**.
3. Enable **Temperature Region Enable**.
4. Enter coordinates of point to be measured in **Temperature Region Point Position X** and **Temperature Region Point Position Y**.
5. Click **Execute** in **Temperature Region Load**.

Temperature Region Rule Control	
Temperature Region Selector	Point Region 0
Temperature Region Enable	☐
Temperature Region Point No.	1
Temperature Region Point Selector	Point 0
Temperature Region Point Position X	350
Temperature Region Point Position Y	192
Temperature Measurement Expert Mode	☐
Temperature Region Reflect Enable	☐
Temperature Region Reflectance	0.0000
Temperature Region Target Distance(m)	1.0000
Temperature Region Emissivity	0.9400
Temperature Region Alarm Rule Control	
Multi Temperature Region Alarm Rule Control	
Over Screen Display Control	
Temperature Control Load	Execute

Figure 9-4 Point Temperature Measurement

Note

- All point temperature measurement parameter settings only take effect after the **Temperature Control Load** is executed.
- After the temperature measurement rules for point temperature measurement are completed, you need to set and enable the temperature measurement rules to be displayed via **Region Display Selector** of the image overlay function. Refer to section **Image Overlay Display** for details.

Polygon Temperature Measurement

Polygon temperature measurement sets the coordinate points of any number of images in the scene to form a region, and automatically measures the temperature of the region, and up to 10 polygons can be drawn.

Steps

1. Go to **Temperature Region Rule Control** → **Temperature Region Selector**.
2. Select **Polygon Region 0** to **Polygon Region 9** from **Temperature Region Selector**.
3. Enable **Temperature Region Enable**.
4. Enter coordinate quantity consisting a polygon in **Temperature Region Point No**.

Note

The default value of **Temperature Region Point No** is 3, and its max. value is 20.

5. Select **Temperature Region Point Selector** and enter specific coordinate for each selected point via **Temperature Region Point Position X** and **Temperature Region Point Position Y**. For example:
 - Select **Point 0** as **Temperature Region Point Selector**, and enter specific coordinate of point 0 in **Temperature Region Point Position X** and **Temperature Region Point Position Y**
 - Select **Point 1** as **Temperature Region Point Selector**, and enter specific coordinate of point 1 in **Temperature Region Point Position X** and **Temperature Region Point Position Y**
 - And so on and so forth...
6. Click **Execute** in **Temperature Control Load**.

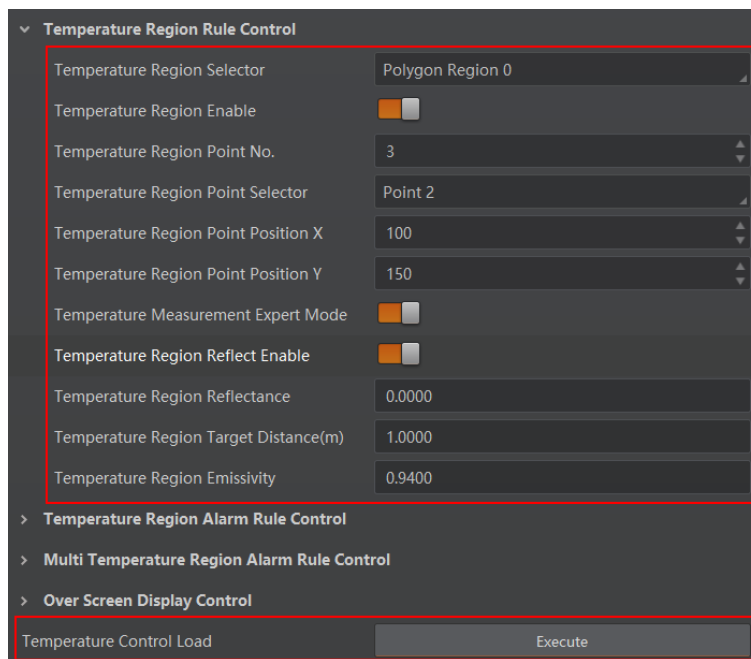


Figure 9-5 Polygon Temperature Measurement

Note

- All point temperature measurement parameter settings only take effect after the **Temperature Control Load** is executed.
- After the temperature measurement rules for polygon temperature measurement are completed, you need to set and enable the temperature measurement rules to be displayed via **Region Display Selector** of the image overlay function. Refer to section **Image Overlay Display** for details.

Line Temperature Measurement

Line temperature measurement sets the coordinate points of any two images in the scene to form a line segment, and automatically measures the temperature of the line segment,

and only one line can be drawn.

Steps

1. Go to **Temperature Region Rule Control** → **Temperature Region Selector**.
2. Select **Line Region 0** from **Temperature Region Selector**.
3. Enable **Temperature Region Enable**.
4. Select **Temperature Region Point Selector** and enter specific coordinates for the line segment via **Temperature Region Point Position X** and **Temperature Region Point Position Y**. For example:
 - o Select **Point 0** as **Temperature Region Point Selector**, and enter specific coordinate of point 0 in **Temperature Region Point Position X** and **Temperature Region Point Position Y**
 - o Select **Point 1** as **Temperature Region Point Selector**, and enter specific coordinate of point 1 in **Temperature Region Point Position X** and **Temperature Region Point Position Y**
 - o These two points' coordinates mentioned above can form a line segment.
5. Click **Execute** in **Temperature Control Load**.

Temperature Region Rule Control	
Temperature Region Selector	Line Region 0
Temperature Region Enable	☒
Temperature Region Point No.	2
Temperature Region Point Selector	Point 1
Temperature Region Point Position X	332
Temperature Region Point Position Y	336
Temperature Measurement Expert Mode	☐
Temperature Region Reflect Enable	☐
Temperature Region Reflectance	0.0000
Temperature Region Target Distance(m)	1.0000
Temperature Region Emissivity	0.9400
Temperature Region Alarm Rule Control	
Multi Temperature Region Alarm Rule Control	
Over Screen Display Control	
Temperature Control Load	Execute

Figure 9-6 Line Temperature Measurement

Note

- All point temperature measurement parameter settings only take effect after the **Temperature Control Load** is executed.
- After the temperature measurement rules for polygon temperature measurement are completed, you need to set and enable the temperature measurement rules to be displayed via **Region Display Selector** of the image overlay function. Refer to section **Image Overlay Display** for details.

Circle Temperature Measurement

Circle temperature measurement sets abscissa and ordinate of the circle center and its radius in the scene to form a circle, and automatically measures the temperature of the circle, and only one circle can be drawn.

Steps

1. Go to **Temperature Region Rule Control** → **Temperature Region Selector**.
2. Select **Circle Region 0** from **Temperature Region Selector**.
3. Enable **Temperature Region Enable**.
4. Set the circle center's abscissa and ordinate via **Temperature Region Center Point Position X** and **Temperature Region Center Point Position Y** respectively, and set the circle's radius via **Temperature Region Radius**.
5. Click **Execute** in **Temperature Control Load**.

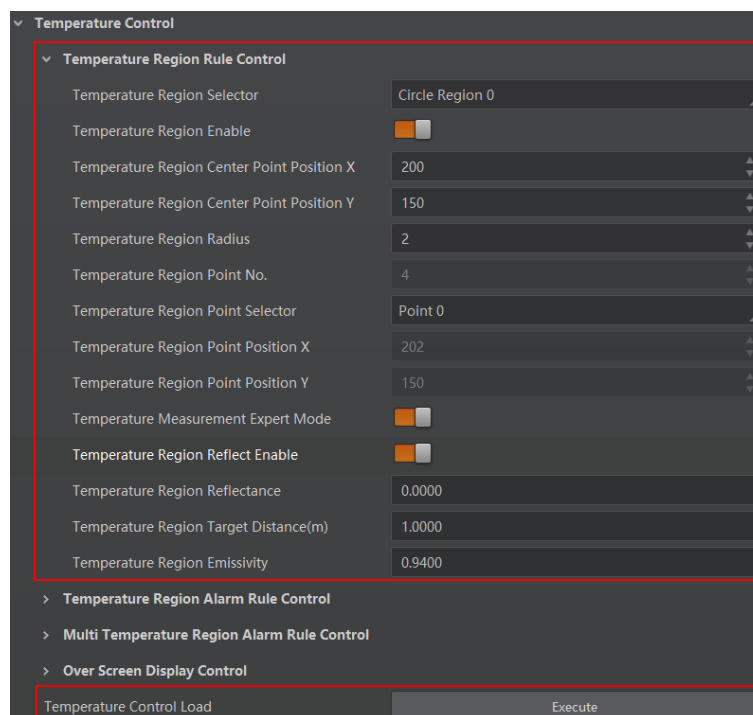


Figure 9-7 Circle Temperature Measurement

Note

- All point temperature measurement parameter settings only take effect after the **Temperature Control Load** is executed.
- After the temperature measurement rules for polygon temperature measurement are completed, you need to set and enable the temperature measurement rules to be displayed via **Region Display Selector** of the image overlay function. Refer to section **Image Overlay Display** for details.

9.4 Region Alarm

Under **Alarm**, you can configure parameters related to the temperature triggered alarms for a single region or of comparing two regions.

9.4.1 Set Single Region Alarm

Single-region temperature alarm supports setting the alarm rule for 22 regions, and performing real-time alarm events detection based on the selected temperature features (i.e., max. temperature, min. temperature, average temperature, temperature difference) and other corresponding alarm conditions, which can be set via **Temperature Region Alarm Rule Control** feature.

Before You Start

Make sure that you have configured temperature measurement rule, and corresponding image overlay function.

Steps

1. Go to **Temperature Region Alarm Rule Control** → **Temperature Region Alarm Rule Selector**, and select temperature region alarm rule according to actual demands.
2. Enable **Temperature Region Alarm Rule Enable**.
3. Set **Temperature Region Alarm Rule Source** to select the alarm sources, including **Region Maximum Temperature**, **Region Minimum Temperature**, **Region Average Temperature**, and **Region Temperature Variation**.

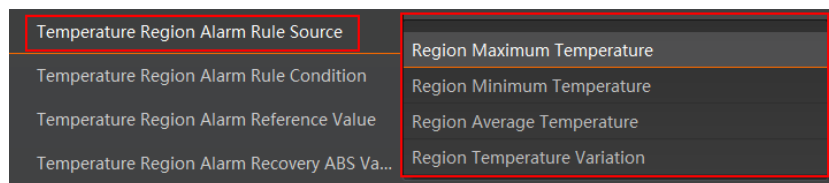


Figure 9-8 Set Temperature Region Alarm Rule Source

4. Select **Temperature Region Alarm Rule Condition** to set alarm rule condition.
 - If **>** is selected, and when the target's temperature alarm source is larger than the configured value (**Temperature Region Alarm Reference Value**), an alarm is generated.
 - If **<** is selected, and when the target's temperature alarm source is smaller than the configured value (**Temperature Region Alarm Reference Value**), an alarm is generated.

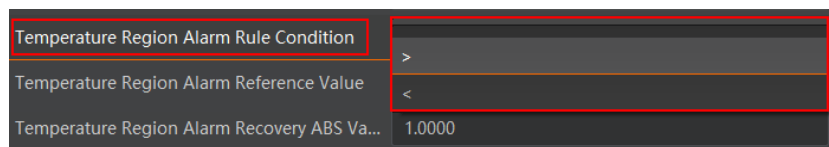


Figure 9-9 Set Temperature Region Alarm Rule Condition

5. Set **Temperature Region Alarm Reference Value** according to actual demands.

Temperature Region Alarm Reference Value	20.0000
Temperature Region Alarm Recovery ABS Value	1.0000

Figure 9-10 Set Temperature Region Alarm Reference Value

6. Set the tolerance temperature via **Temperature Region Alarm Recovery ABS Value** to prevent temperature shock from affecting the alarm result, as shown below.

Temperature Region Alarm Reference Value	20.0000
Temperature Region Alarm Recovery ABS Value	1.0000

Figure 9-11 Set Temperature Region Alarm Recovery ABS Value

 Note

If configured **Temperature Region Alarm Recovery ABS Value** is 5 °C, **Temperature Region Alarm Rule Condition** is <, and **Temperature Region Alarm Reference Value** is 50 °C, and the alarm is canceled when the detected target object is equal to or larger than 55 °C.

7. Click **Execute** in **Temperature Control Load**.

 Note

All alarm parameters settings only take effect after the **Temperature Control Load** is executed.

9.4.2 Set Multi Region Alarm

Multi-region temperature alarm supports comparing temperature features between two regions, and by configuring the corresponding alarm conditions, the temperature of the two regions can be determined according to the output signal of the trigger event, and a total of 4 multi-region alarm rules can be configured, which can be set via **Multi Temperature Region Alarm Rule Control** feature.

Before You Start

Make sure that you have configured temperature measurement rule, and corresponding image overlay function.

Steps

1. Go to **Multi Temperature Region Alarm Rule Control** → **Multi Region Alarm Rule Selector**, and select alarm rule according to actual demands from **Multi Temperature Region Alarm Rule 0** to **Multi Temperature Region Alarm Rule 3**.

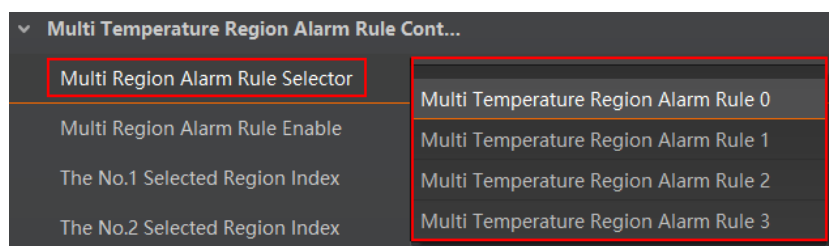


Figure 9-12 Set Multi Region Alarm Rule Selector

2. Enable **Multi Region Alarm Rule Enable**.
3. Set temperature measurement rule for the first region via **The No.1 Selected Region Index**.
4. Set temperature measurement rule for the second region via **The No.2 Selected Region Index**.
5. Set **Multi Region Alarm Rule Source** to select the alarm sources, including **Maximum Temperature Difference**, **Minimum Temperature Difference**, **Average Temperature Difference**, and **Variation Temperature Difference**.

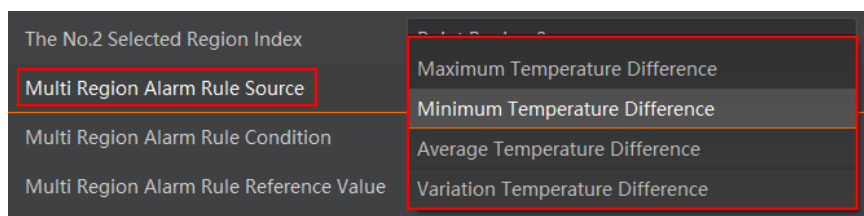


Figure 9-13 Set Multi Region Alarm Rule Source

6. Select **Multi Region Alarm Rule Condition** to set alarm rule condition.
 - If **>** is selected, and when the alarm rule source (maximum temperature, minimum temperature, average temperature, and variation temperature difference) of **The No.1 Selected Region Index** comparing the alarm rule source (maximum temperature, minimum temperature, average temperature, and variation temperature difference) of **The No.2 Selected Region Index** is larger than the configured **Multi Region Alarm Rule Reference Value**, an alarm is generated.
 - If **<** is selected, and when the alarm rule source (maximum temperature, minimum temperature, average temperature, and variation temperature difference) of **The No.1 Selected Region Index** comparing the alarm rule source (maximum temperature, minimum temperature, average temperature, and variation temperature difference) of **The No.2 Selected Region Index** is smaller than the configured **Multi Region Alarm Rule Reference Value**, an alarm is generated.

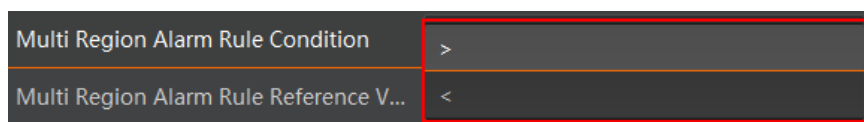


Figure 9-14 Set Multi Region Alarm Rule Condition

7. Set **Multi Region Alarm Reference Value** according to actual demands.

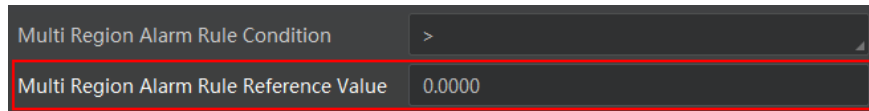


Figure 9-15 Set Multi Region Alarm Reference Value

Note

For example, if configured **Multi Region Alarm Reference Value** is 10 °C, **Multi Region Alarm Rule Condition** is >, and **Multi Region Alarm Rule Source** is **Maximum Temperature Difference**. And when the max. temperature of **The No.1 Selected Region Index** is 10 °C larger than that of **The No.2 Selected Region Index**, an alarm is generated.

8. Click **Execute** in **Temperature Control Load**.

Note

All alarm parameters settings only take effect after the **Temperature Control Load** is executed.

9.5 Image Overlay Display

The image overlay display function can display the temperature measurement bar on the current screen on the basis of the original image, and draw temperature feature such as the max. temperature, the min. temperature and the average temperature with a cross cursor in the temperature measurement region and the temperature alarm information of a single region, so that users can get the temperature information when previewing the image, which can be configured via **Over Screen Display Control**.

Note

The image overlay display function does not support the display of multi-region temperature difference alarm information.

Steps

1. Enable **Legend Display Enable** to display

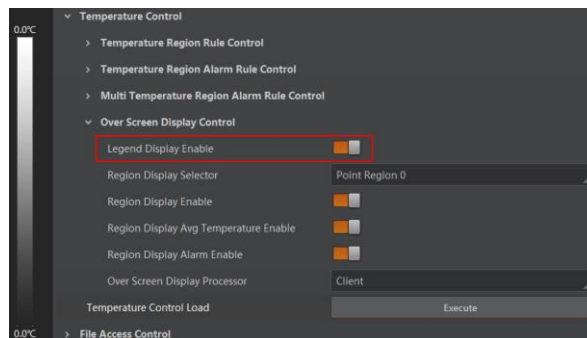


Figure 9-16 Enable Legend Display Enable

2. Set **Region Display Selector**.
3. Enable **Region Display Enable**, and enable to be displayed information of measured objects such as **Region Display Max Temperature Enable**, **Region Display Min Temperature Enable**, and **Region Display Avg Temperature Enable**.
4. Enable **Region Display Alarm Enable** to display alarm if the measured objects reach the alarm condition.

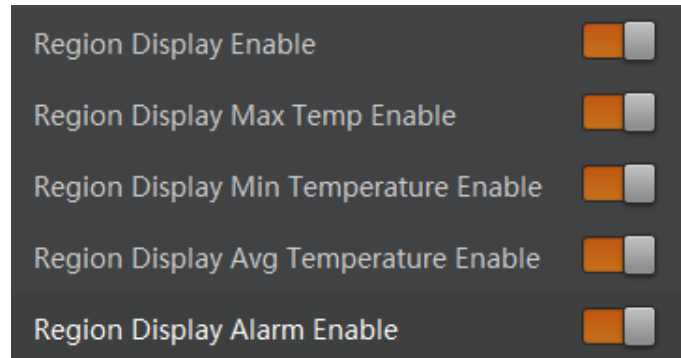


Figure 9-17 Enable Parameters

5. Set image overlay method via **Over Screen Display Processor**.
 - If **None** is selected, and it means that image overlay display is cancelled.
 - If **Camera** is selected, and it means that the temperature and alarm information overlaid to the camera. Moreover, the image acquired by the camera includes temperature measurement region and temperature information.
 - If **Client** is selected, and it means that the temperature and alarm information overlaid to the client software. However, the image acquired by the camera does not include temperature measurement region and temperature information.

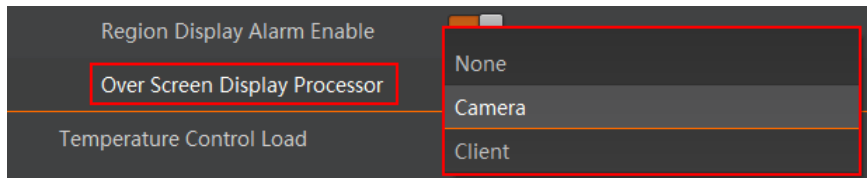


Figure 9-18 Over Screen Display Processor

6. Click **Execute** in **Temperature Control Load**.

Note

All parameters settings only take effect after the **Temperature Control Load** is executed.

9.6 Quick Setup

Quick setup provides users with convenient temperature measurement operations. You can quickly and intuitively manage temperature measurement rules, set temperature measurement related parameters, create region alarms, and set basic display and

temperature windows through the temperature screening region settings window.

Note

- Only MVS client software supports quick setup.
- Make sure that the camera is connected and is in acquiring status.

Click  above the live view window of the MVS client software to enter the temperature screening region settings, as shown below. After settings, you should click **OK** to save the configured parameters.

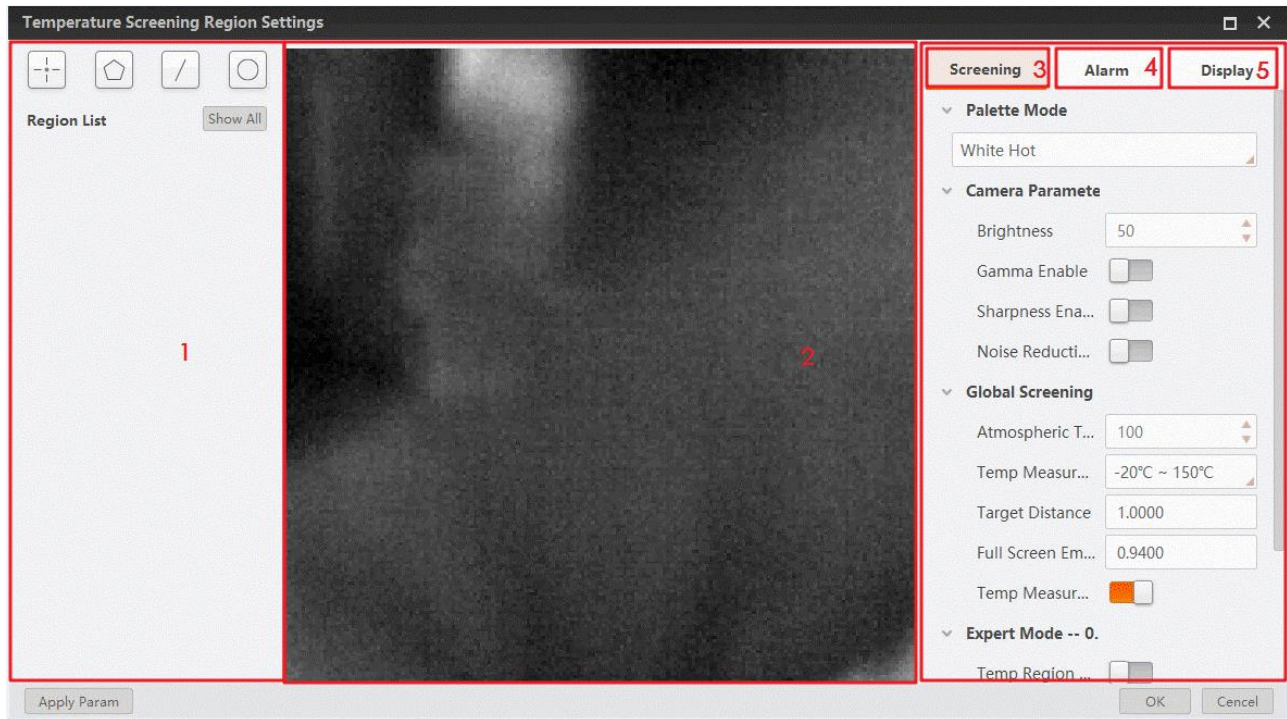


Figure 9-19 Temperature Screening Region Settings

Table 9-3 Main Window Description

No.	Name	Description
1	Region List	You can manage and set temperature measurement rules here.
2	Live View Window	In the live view window, you can manually draw temperature measurement rules and view the monitoring results of regional alarms in real time.
3	Screening Parameters	You can set the parameters required for temperature measurement, including palettes mode, camera parameters, global temperature measurement, and expert mode.
4	Alarm Settings	You can set alarms for single and multiple regions where temperature measurement rules have been configured.

No.	Name	Description
5	Display Settings	It includes basic display and temperature window.

9.6.1 Draw a Region for Temperature Screening

To perform temperature screening configurations, you need to first draw regions for temperature screening.

Before You Start

Make sure you have connected an infrared camera to the MVS client software.

Steps

1. Start the live view of the camera.
2. Click  above the live view window.

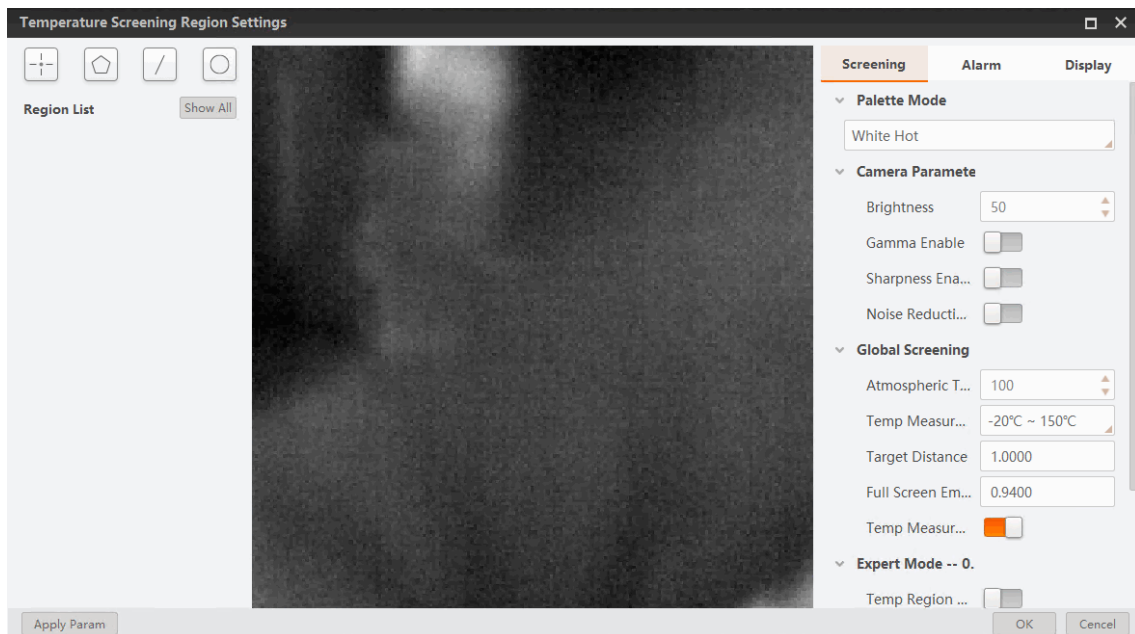


Figure 9-20 Temperature Screening Region Settings Window

3. On the top left of the configuration window, select a type of temperature screening region according to the table below.

Table 9-4 Temperature Screening Region Type

Icon	Region Type	Maximum No. Allowed
	Point	10
	Polygon	10
	Line	1
	Circle	1

The corresponding type of region will be added to **Region List** in the format "index.Type" (e.g., 0.Point). For each region type, the index starts with 0 and increases by one each time.

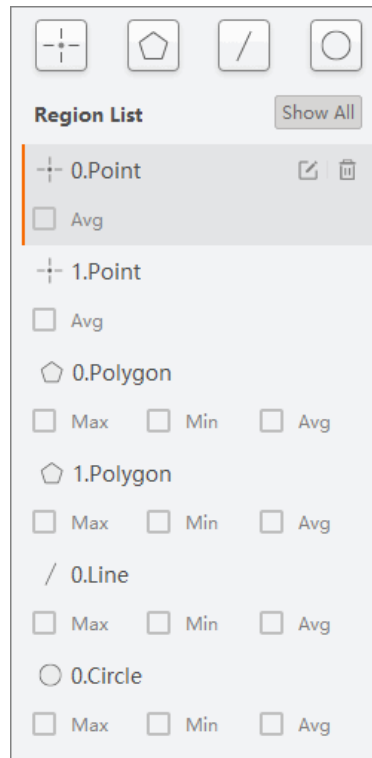


Figure 9-21 Example of Region List

4. From the list, select a region to be drawn, click , and draw on the live view window following the instructions below.

Table 9-5 Drawing Instruction

Region Type	Drawing Instruction
Point	Click to draw a point.
Polygon	Click to draw the first vertex of the polygon, move your cursor and click again to draw more vertices as needed, and double-click to finish drawing.
Line	Click to draw one end of the line, move your cursor, and click to draw the other one.
Circle	Click, hold, and drag to draw a circle.

Note

If needed, after a region is drawn, you can click  to draw again.

5. For each region, select **Max**, **Min**, or **Avg** as needed to display the maximum value, minimum value, and mean value respectively for the regions drawn.

Note

For points, only **Avg** (mean value) is available.

6. Optional: Select a region from the list and click  to delete it if needed.
7. On the bottom left of the configuration window, click **Apply Param** to save your settings. The regions you have drawn and their corresponding real-time statistics will be displayed on the live view window.

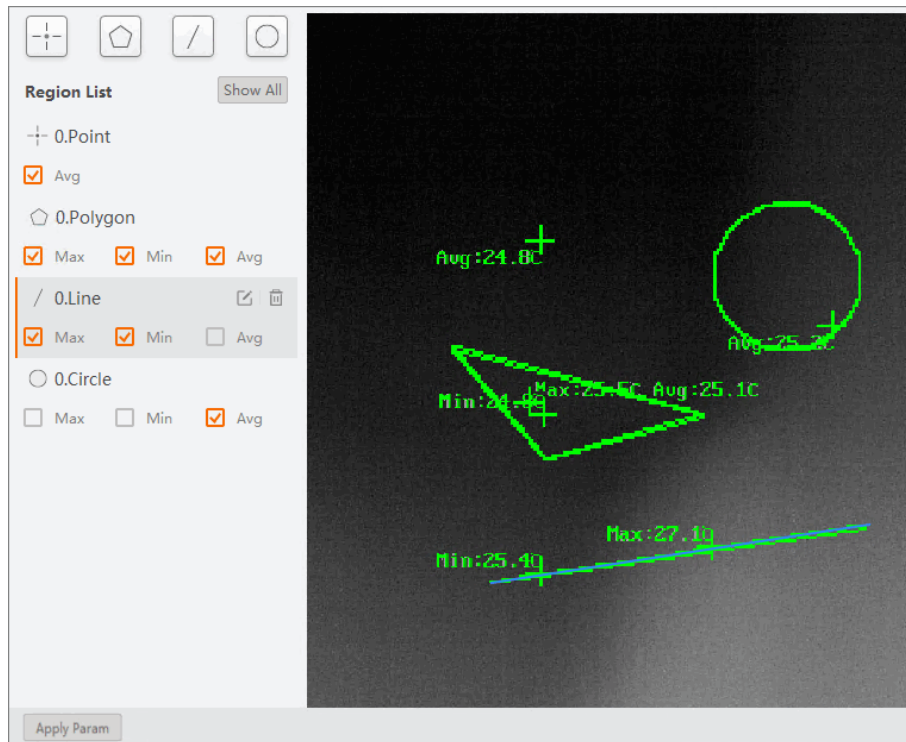


Figure 9-22 Temperature Screening Regions and Statistics

8. Optional: Click **Show All** to display all the regions you have drawn on the live view window.

9.6.2 Set Alarm

Under **Alarm**, you can configure parameters related to the temperature triggered alarms for a single region or of comparing two regions.

Single Region Alarm

Set the alarm rule for a single temperature screening region you have drawn.

- **Point:** For point ROIs, you can set the following parameters for conditions to trigger or restore alarms.
- **Point Temp:** Select **>** or **<** from the drop-down list, and enter a temperature value correspondingly to set the alarm rule. E.g., If you select **>** and enter 50 in the box, an

alarm will be triggered when the screened temperature exceeds 50 °C.

- **Tolerance Temp:** Set the threshold for restoring alarms of the region. E.g., If the tolerance temperature is set to 5 °C and the rule for triggering alarms is set to < 50 °C, alarms will be canceled when the detected target object is equal to or larger than 55 °C.
- **Polygon/Line/Circle:** For polygon, line, and circle ROIs, you can select a specific type of temperature statistics (Maximum, Minimum, Average, and Variation) and set the corresponding alarm triggering and restoring rules. The configuration process is similar to those of setting **Point Temp** and **Tolerance Temp** for point ROIs. E.g., If you select **Maximum**, >, and enter 50 in the box, an alarm will be triggered when the maximum temperature value of the region exceeds 50 °C.

Multi-Region Alarm

Set up to four multi-region alarm rules which compare the chosen type of statistics of two temperature screening regions. Follow the steps below to configure a rule.

Steps

1. Select a region from the drop-down list for **Region Index 1**, which will be set as the reference region (i.e., the region being compared to).
2. Select another region from the drop-down list for **Region Index 2**, which will be set as the target region.
3. Choose a specific type of temperature statistics to be compared between the regions from **Maximum, Minimum, Average, and Variation**.
4. Select > or < from the second drop-down list, and enter a temperature value correspondingly to set the alarm rule.

E.g., If you select **Maximum**, >, and enter 10 in the box, an alarm will be triggered when the maximum temperature value of the target region is 10 °C greater than that of the reference region.

9.6.3 Set Display

Under **Display**, you can configure parameters related to the display settings of the live view window and the temperature window.

Basic Display

- **Temperature Bar:** When enabled, a temperature bar will be displayed on the right side of the live view window.

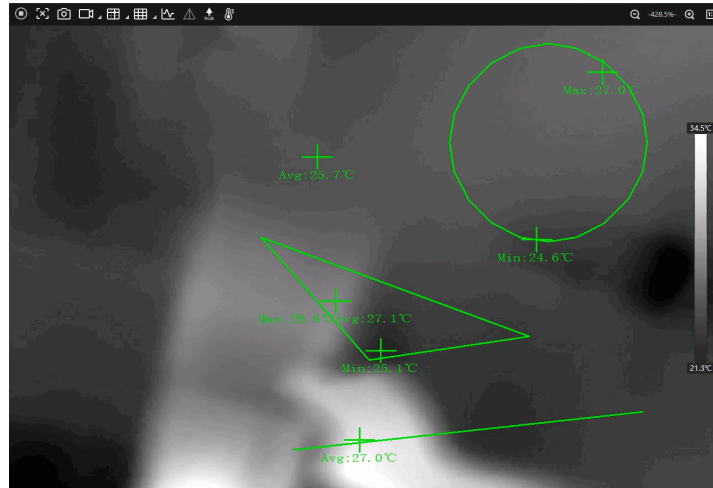


Figure 9-23 Temperature Bar

- **Region Information Overlay:** Select an overlay mode for the region information from the followings.
 - **None:** Disable region information overlay. No information is displayed when the camera acquires images or when the images are saved.
 - **Camera:** Overlay information of the temperature screening regions to the camera, so that the information will be displayed when the camera acquires images and when the images are saved.
 - **Client:** Overlay information of the temperature screening regions to the Client, so that the information will be displayed when the camera acquires images, but not when the images are saved.

Temperature Window

You can set up to 4 displays of temperature values and 1 display of the temperature curve to be displayed on the Temperature Window. For each display, you can select a temperature screening region and a type of statistics as shown below.

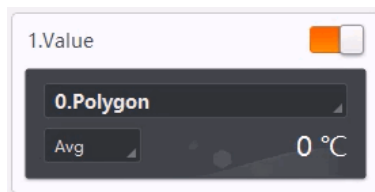


Figure 9-24 Temperature Window Settings

9.7 Temperature Screening Settings

You can go to **Settings** → **General** of the MVS client software to configure temperature screening settings.

- **Normal Region Color:** The color or regions with normal temperature.
- **Alarm Region Color 1/2:** The two colors of regions with an alarm triggered by abnormal temperatures.

Note

- If the alarm of screening region is not acknowledged after 200 seconds, the two colors will flash by turns.
- To display the colors of screening regions, you need to finish the following operations beforehand.
 - Draw a temperature screening region.
 - Set alarm rules of temperature screening regions.
 - Select **Region Information Overlap as Client**.

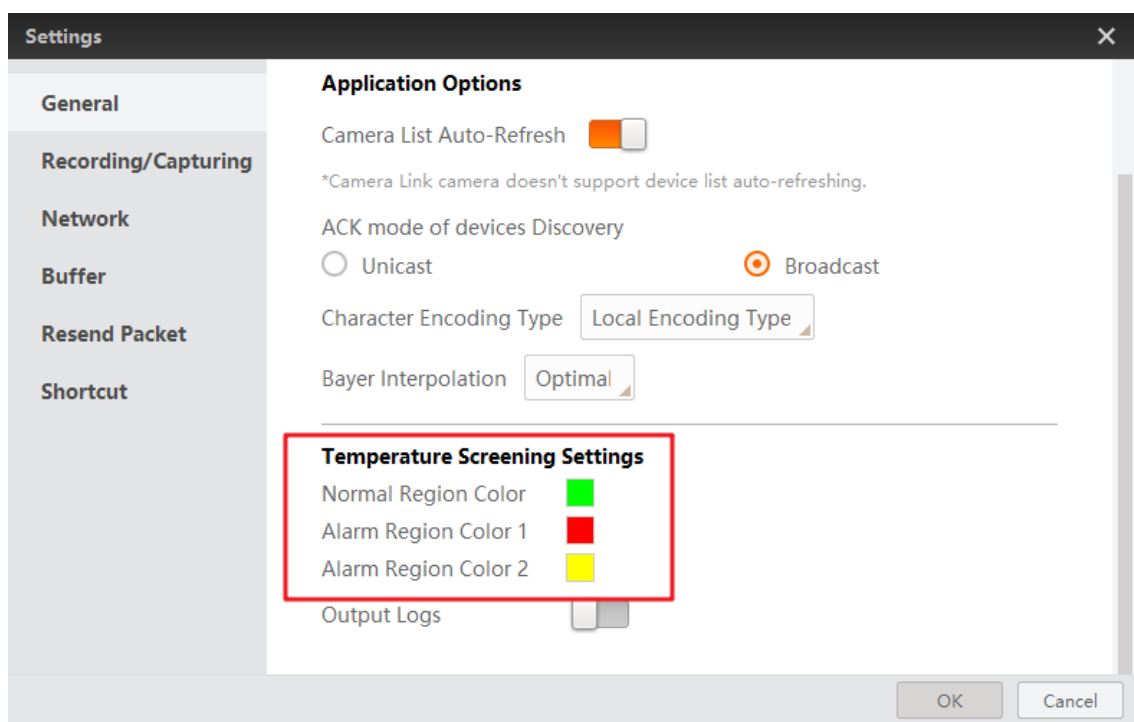


Figure 9-25 Temperature Screening Settings of General Settings

Chapter 10 Other Functions

10.1 Device Control

 Note

The specific device control parameters may differ by device's models and firmware versions.

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

Table 10-1 Parameter Description

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 device's sensor.
Device Vendor Name	Read Only	It is the name of the manufacturer of the device.
Device Model Name	Read Only	It is the model of the device.
Device Manufacturer Info.	Read Only	It is the manufacturer information about the device.
Device Version	Read Only	It is the version of the device.
Device Firmware Version	Read Only	It is the FPGA version of the device.
Device Serial Number	Read Only	It is device's serial number.
Device User ID	Read & Write	Device name and it is empty by default. You can set according to your preference. • If User ID is empty, the client software displays the device model (device serial number). • If you set it, the client software displays the User ID (device serial number) 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.
Device Temperature	Read Only	It displays the temperature of the device.
Device Reset	Read Only	It resets the device.

10.2 File Access Control

The file access function can import or export the device's feature files and save them in mfa format. The supported feature files include **User Set 1/2/3**, and **License Notice**.

Steps

1. Select a device in the device list, and click  to open the file access dialogue box.

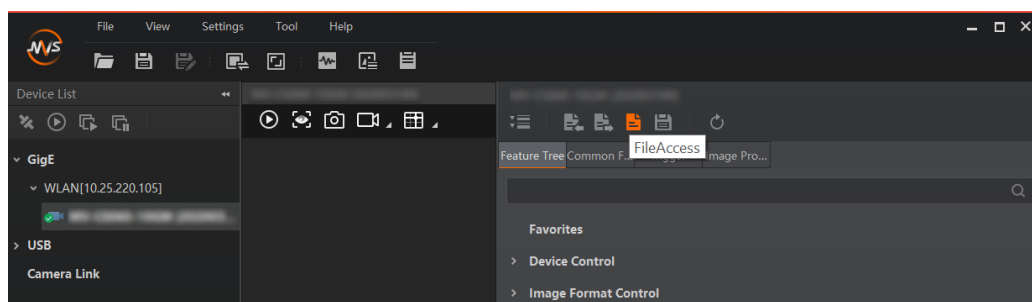


Figure 10-1 File Access

2. Select **Device Feature** and click **Import** or **Export**.

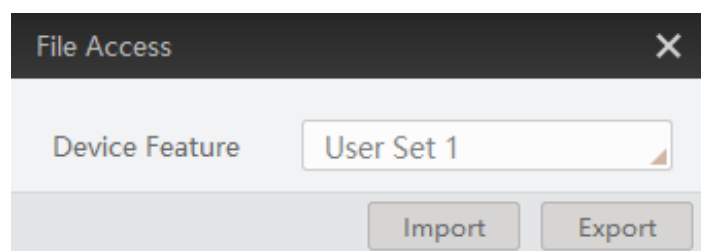


Figure 10-2 Import or Export

3. Select a mfa file from local PC to import or select a saving path and enter file name to save and export.

Note

- If **User Set 1/2/3** is selected as device feature, you need to load the corresponding user set you selected to take effect.
- **License Notice** supports exporting only.
- Importing and exporting the device feature among the same model of devices are supported.

10.3 Event Control

The event control can record events happen to the device and allow you to view them.

Steps

1. Go to **Event Control** → **Event Selector**, and select **Event Selector** according to actual demands.

 Note

The specific events may differ by device models.

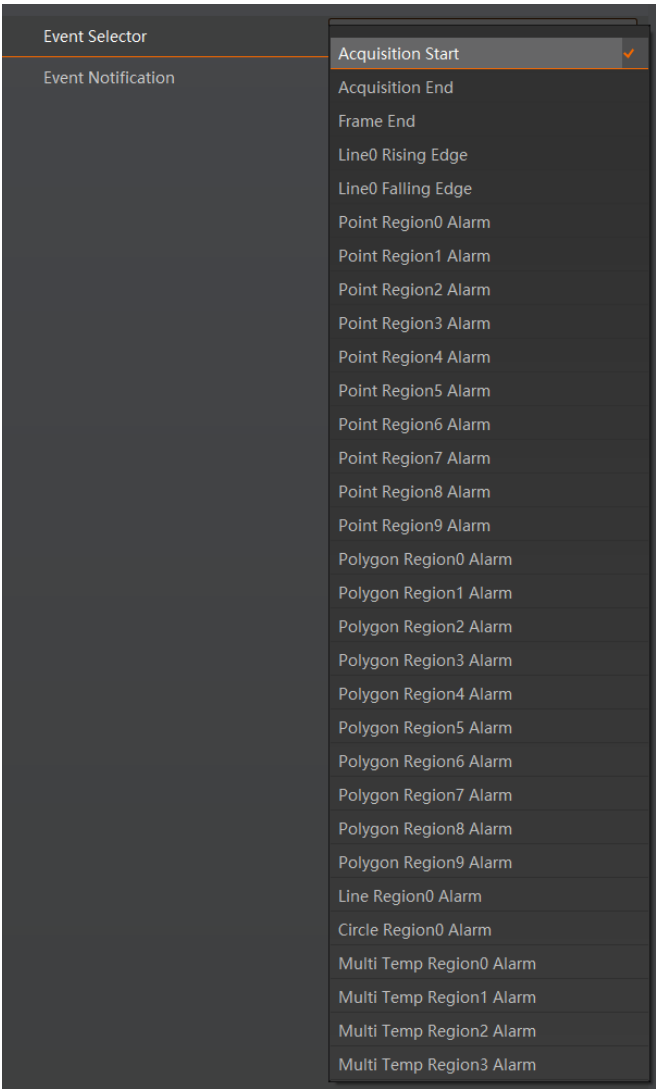


Figure 10-3 Event Selector

2. Select **Notification On** as **Event Notification** to output event.

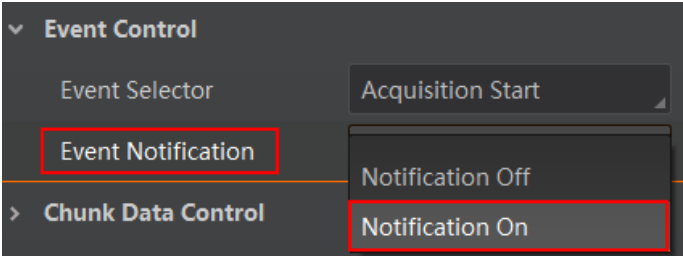


Figure 10-4 Set Event Control

3. Right click the connected device and click **Event Monitor**.

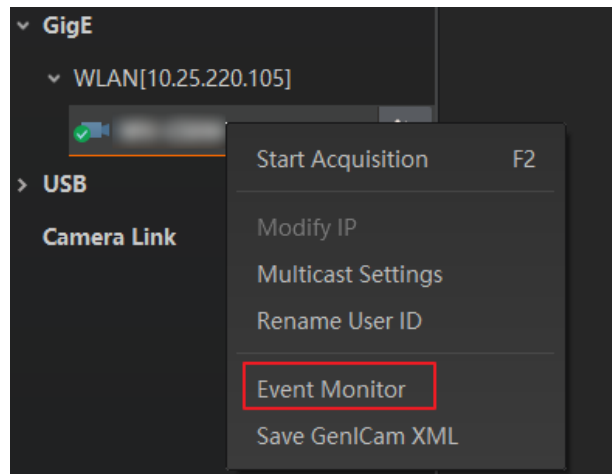


Figure 10-5 Event Monitor

4. Check **Messaging Channel Event**, and view specific event after device starts live view.

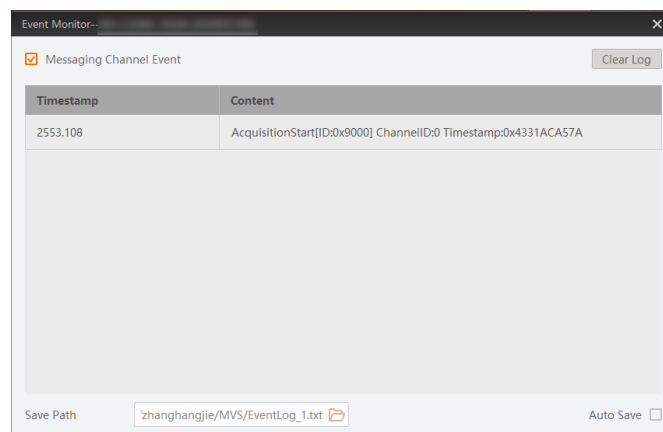


Figure 10-6 Event Monitor Window

10.4 Chunk Settings

The device supports embedding information into image data by enabling chunk function.

Steps

1. Go to **Chunk Data Control** → **Chunk Mode Active**, and **Chunk Mode Active**.

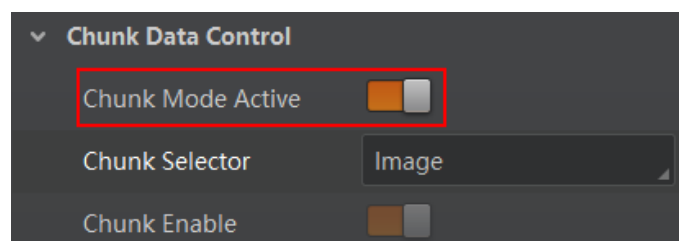


Figure 10-7 Enable Chunk Mode Active

2. Select **Chunk Selector** according to actual demands.

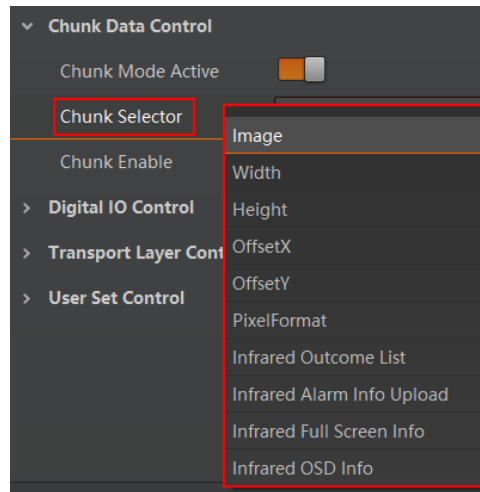


Figure 10-8 Chunk Selector

Table 10-2 Parameter Value Description

Parameter Value	Description
Image	It is the image data.
Width	It is the image's width.
Height	It is the image's height.
Offset X	It is the image's horizontal deviation.
Offset Y	It is the image's vertical deviation.
Pixel Format	It is the pixel format.
Infrared Outcome List	The temperature measurement feature information of the transmission area, including temperature measurement types of points, polygons, lines, and circles in all 22-temperature measurement regions, and the coordinates of the maximum/minimum/average temperature.
Infrared Alarm Info Upload	It is regional temperature alarm information, including the detection results of 22-region temperature measurement alarm rules and 4-regional temperature difference alarm rules.
Infrared Full Screen Info	It is full-screen temperature measurement feature information, and supports full-screen maximum/low temperature, and is used as a temperature reference bar.
Infrared OSD Info	It is the transmission area temperature measurement image overlays feature information, including the maximum temperature, minimum temperature, average temperature,

Parameter Value	Description
	and alarm switch of all temperature measurement rules.

10.5 Transport Layer Control

You can go to **Transport Layer Control** to view the device's payload size, GenCP version, etc.

Note

The specific parameters of transport layer control may differ by device models.

Table 10-3 Parameters of Transport Layer Control

Parameter	Read/Write	Description
Payload Size (B)	Read Only	It is the device's load size.
GenCP Version Major	Read Only	It is the major version in GenCP version.
GenCP Version Minor	Read Only	It is the minor version in GenCP 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 & 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 & Write	It indicates whether the DHCP IP configuration scheme is activated on the given network interface.
GEV Current IP Configuration Persistent IP	Read & Write	It indicates whether persistent IP configuration scheme is activated on the given network interface.
DEV PAUSE Frame Reception	Read & Write	It controls whether incoming pause frames

Parameter	Read/Write	Description
		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 Dictionary URL	Read Only	It is the URL of XML dictionary.
GEV Number of Interfaces	Read Only	It indicates the number of physical network interfaces supported by this device.
GEV Persistent IP Address	Read & 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 & 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 & 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 & Write	It indicates the current heartbeat timeout in milliseconds.

Parameter	Read/Write	Description
GEV Heartbeat Disable	Read & Write	It disables the GEV Heartbeat.
GEV GVCP Pending ACK	Read Only	It is GEV GVCP waiting for confirmation.
GEV GVCP Pending Timeout	Read Only	It is GEV GVCP timeout time.
GEV Timestamp Tick Frequency (Hz)	Read Only	It indicates the number of timestamp ticks in 1 second (frequency in Hz).
Timestamp Control Latch	Read & Write	It latches the current timestamp value of the device.
Timestamp Control Reset	Read & Write	It resets the timestamp value for the device.
Timestamp Control Latch Reset	Read & 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.
GEV CCP	Read & Write	It controls the device access privilege of an application.
GEV SCP Host Port	Read & Write	It is the host port of the channel
GEV MCDA	Read & Write	It controls the destination IP address for the message channel.
GEV MCTT (ms)	Read & Write	It provides the transmission timeout value in milliseconds.
GEV MCRC	Read & 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 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 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 & 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 & Write	It specifies the stream packet size (in bytes)

Parameter	Read/Write	Description
		to send on this channel. Note The device does not support jumbo frame.
GEV SCDA	Read & 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.

10.6 User Set Customization

This function allows you to save or load device settings. The device supports four sets of parameters, including one default set and three user sets, and the relation among four sets of parameters is shown below.

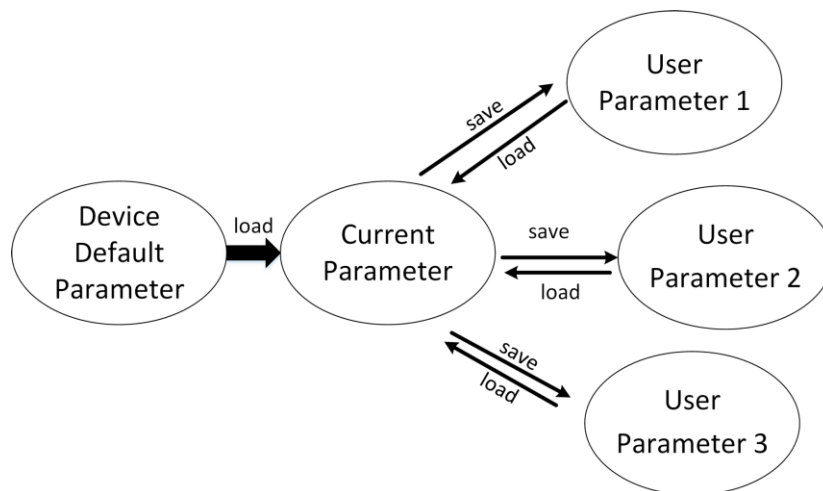


Figure 10-9 Parameter Relation

Note

After setting user parameters, it is recommended to save user parameters and select them as the default parameters.

10.6.1 Save User Set

Steps

1. Go to **User Set Control**, and select a user set in **User Set Selector**.

Note

Here we take selecting **User Set 1** as an example.

2. Click **Execute** in **User Set Save** to save parameter.

3. View **User Set Save Status**:

- Saving: User parameters are being saved.
- Ready: User parameters have been saved.

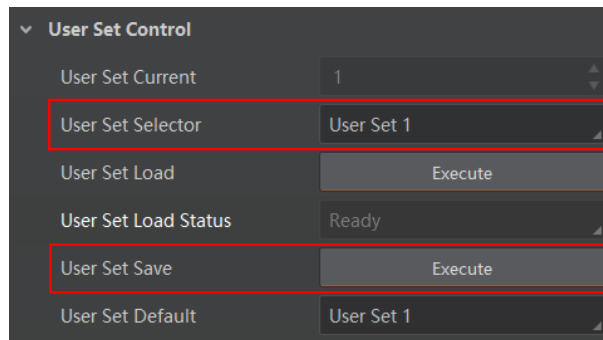


Figure 10-10 Save User Set

10.6.2 Load User Set

Note

Loading user set is available only when the device is connected but without live view.

Steps

1. Go to **User Set Control**, and select a user set in **User Set Selector**.

Note

Here we take selecting **User Set 1** as an example.

2. Click **Execute** in **User Set Load** to load parameter.

3. View **User Set Load Status**:

- Saving: User parameters are being loaded.
- Ready: User parameters are to be loaded.

Note

The parameter of **User Set Load Status** may differ by device models.

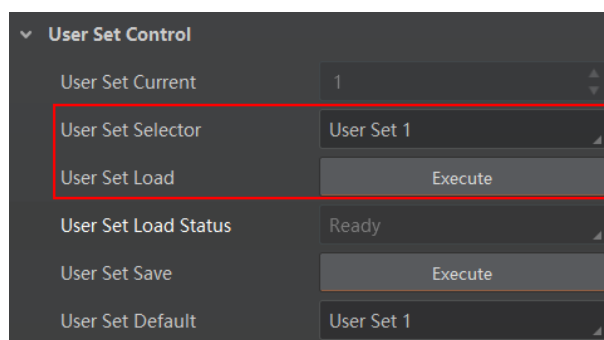


Figure 10-11 Load User Set

10.6.3 Set User Default

You can also set default parameter by going to **User Set Control**, and select a user set in **User Set Default**.

Note

Here we take selecting **User Set 1** as an example.

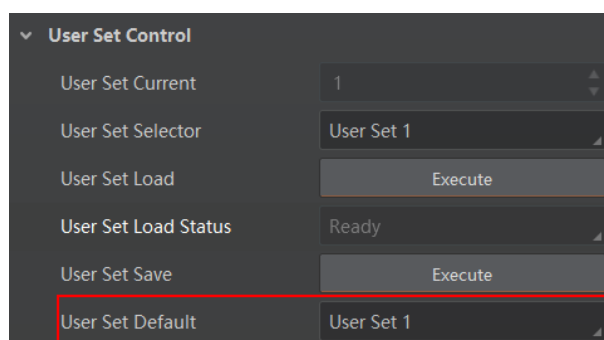


Figure 10-12 Set User Default

10.7 Multicast Function

The multicast function enables multiple PCs to access the same device at the same time. At the same time, the same device can only be connected by one client in controller and data receiver mode or controller mode, but can be connected by multiple clients in data receiver mode. The multicast mode of each device within the client is controlled individually. The description of three multicast modes is shown below.

Table 10-4 Multicast Mode Description

Multicast Mode	Description
Controller and Data Receiver	This mode allows you to read and edit the device's parameters, and get its image data.

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

When the multicast function is enabled, the device icon on the client software of other PCs will become , and you can connect the device via the data receiver mode. You can set multicast function for both the available device and connected device in the device list, but the specific settings are different.

10.7.1 Set Multicast (Available Status)

Follow steps below to set multicast function if the device is in available status.

Steps

1. Right click the available device, and click **Multicast Settings**.

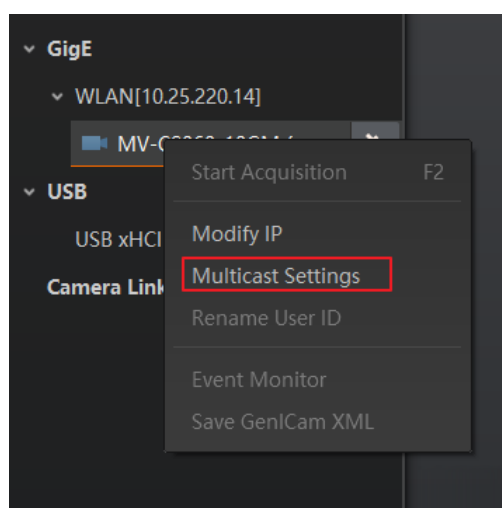


Figure 10-13 Multicast Settings

2. Select **Role**, and enter the **IP Address** and **Port**.

Note

- The available status device can use multicast function in Controller and Data Receiver mode or Controller mode.
- The IP address should be class D IP address, and the port ranges from 0 to 65535.

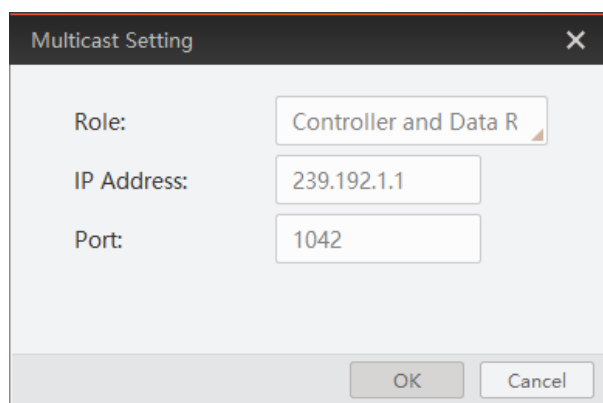


Figure 10-14 Set Parameters

3. Click **OK**.

10.7.2 Set Multicast (Connected Status)

Follow steps below to set multicast function if the device is in connected status.

Steps

1. Right click the available device, and click **Multicast Settings**.

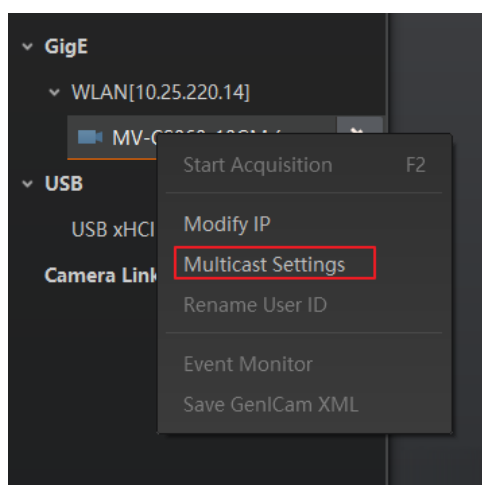


Figure 10-15 Multicast Settings

2. Enable the multicast function, and edit the **IP Address** and **Port**.

Note

- The connected status device can use multicast function in Controller and Data Receiver mode only.
 - The IP address should be class D IP address, and the port ranges from 0 to 65535.
-

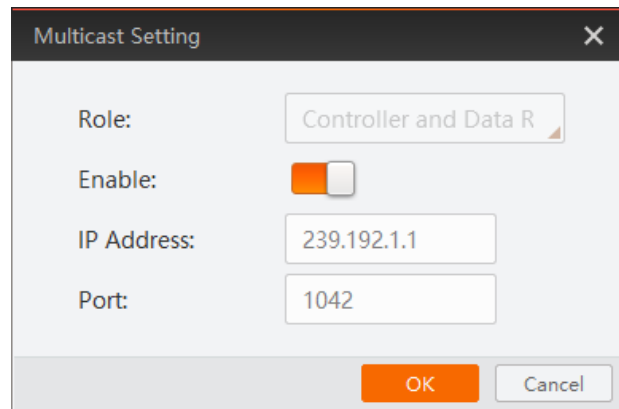


Figure 10-16 Set Parameters

3. Click **OK**.

10.8 Update Firmware

You can use the MVS Tool Kit to update the device's firmware.

Note

The MVS Tool Kit is installed by default when you install the MVS client software.

Steps

1. Go to **All** → **Configuration Tool** → **Firmware Upgrade Tool** after running MVS Tool Kit.
2. Click  in **GigE** to enumerate devices.
3. Click  to select firmware upgrade package (dav file).
4. Click **Update** to start updating.

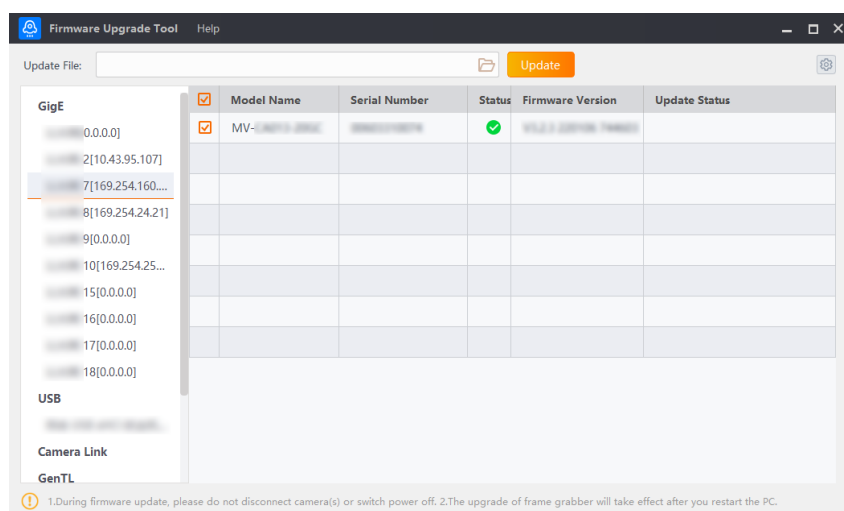


Figure 10-17 Update Firmware

 Note

- The device will reboot automatically after updating the firmware.
 - The firmware updating process may take a few minutes, please wait patiently.
 - During firmware updating, do not disconnect the device or switch power off.
-

Chapter 11 FAQ (Frequently Asked Question)

11.1 Why the client software cannot list devices?

Reason

- The device is not powered on.
- Incorrect network cable connection.

Solution

Check the device's power supply and network connection by observing the device's indicator and network link indicator.

11.2 Why device connection fails after the device is listed in the client software?

Reason

- The device and the client software are not in the same network segment.
- The device has been connected by other programs.

Solution

- Use IP configurator tool to edit the device's IP address to make sure that the device and the client software are in the same network segment.
- Disconnect the device with other programs, and reconnect it to the client software.

11.3 Why the live view is black?

Reason

- The device's lens aperture is not removed.
- The device exception occurs.

Solution

- Remove the device's lens aperture.
- Power off and restart the device.

11.4 Why the device cannot be triggered although the live view is normal?

Reason

- The trigger mode is not enabled or the device is not triggered.
- Incorrect trigger wiring.

Solution

- Enable the trigger mode and make sure that the selected trigger source matches with the corresponding I/O signal.
- Check if the input of trigger signal and wiring are correct or not.

11.5 Why the network changes from GigE Ethernet to Fast Ethernet?

Reason

The network cable may be damaged.

Solution

Check the network cable, and replace it if it is damaged.

11.6 Why the device is disconnected during operation?

Reason

- Use the adapter to connect the device.
- Many devices are connected to a switch, resulting in insufficient bandwidth.
- Insufficient power supply causes the device to disconnect.

Solution

- The device manufactured by our company has high requirements for data transmission, and the quality of adapters on the market is not very good, which cannot guarantee the effective transmission of data. It is not recommended to use adapters to connect the device.
- The device needs a GigE data transmission environment, and each device needs to be guaranteed a GigE transmission environment. If multiple devices are used together, it is recommended to use PCIE independent GigE NIC or a vision controller with multiple connectors.
- It is recommended to use DC power supply. Refer to the device's datasheet for the power supply range.

Appendix A Device Parameter Index

Here list all parameters of the device mentioned in different sections of this user manual. You can quickly locate parameters in different sections by viewing tables below.

A.1 Device Control

Table Appendix A-1 Device Control

Parameters	Section
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 User ID	
Device Uptime (s)	
Board Device Type	
Device Temperature	
Device Reset	

A.2 Image Format Control

Table Appendix A-2 Image Format Control

Parameters	Section
Width Max	Section View Resolution and Section Set ROI
Height Max	
Width	
Height	

Parameters	Section
Offset X	
Offset Y	
Pixel Format	Section Set Pixel Format
Pixel Size	

A.3 Acquisition Control

Table Appendix A-3 Acquisition Control

Parameters	Section
Acquisition Mode	Section Set Acquisition Mode
Acquisition Start	
Acquisition Stop	
Acquisition Burst Frame Count	Section Set Trigger Related Parameters
Acquisition Frame Rate (Fps)	
Acquisition Frame Rate Control Enable	
Trigger Selector	Section Set Trigger Source
Trigger Mode	
Trigger Software	
Trigger Source	
Trigger Activation	
Trigger Delay (ms)	
Trigger Cache Enable	

A.4 Infrared Control

Table Appendix A-4 Infrared Control

Parameters	Section
Temperature Unit Type	Section Set Palettes Mode
Palettes Mode	
Gamma Enable	Section Set Gamma

Parameters	Section
Gamma	Correction
Brightness	Section Set Brightness
Contrast Ratio Enable	Section Set Contrast Ratio
Contrast Ratio	
Sharpness Enable	Section Set Sharpness
Sharpness	
Noise Reduction Enable	Section Set Noise Reduction
Auto Shutter	Section Set Shutter Control
Shutter Auto-switch Interval(min)	
Manual Shutter Correction	
Manual DPC	Section Set Defective Pixel Correction
Reset Cursor	
Defective Pixel X Position	
Defective Pixel Y Position	
Add Defective Pixel	
Del Defective Pixel	Section Set Temperature Range
Temperature Range Mode	
Temperature Range Upper Limit	
Temperature Range Lower Limit	

A.5 Infrared Arithmetic Control

Table Appendix A-5 Infrared Arithmetic Control

Parameters	Section
Atmospheric Transmissivity	Section Global Temperature Measurement
Temperature Measurement Range	
Target Distance	
Full Screen Emissivity	

A.6 Temperature Control

Table Appendix A-6 Temperature Control

Parameters	Section
Temperature Control Load	Section Temperature Control
Temperature Region Selector	Section Temperature Measurement Rule
Temperature Region Enable	
Temperature Region Point No.	
Temperature Region Point Selector	
Temperature Region Point Position X	
Temperature Region Point Position Y	
Temperature Region Center Point Position X	
Temperature Region Center Point Position Y	
Temperature Region Radius	
Temperature Region Point No.	
Temperature Measurement Expert Mode	
Temperature Region Reflect Enable	
Temperature Region Reflectance	
Temperature Region Target Distance (m)	
Temperature Region Emissivity	
Temperature Region Alarm Rule Selector	Section Set Single Region Alarm
Temperature Region Alarm Rule Enable	
Temperature Region Alarm Rule Source	
Temperature Region Alarm Rule Condition	
Temperature Region Alarm Reference Value	
Temperature Region Alarm Recovery ABS Value	
Multi Temperature Region Alarm Rule Selector	Section Set Multi Region Alarm
Multi Region Alarm Rule Enable	
The No.1 Selected Region Index	
The No.2 Selected Region Index	
Multi Region Alarm Rule Source	

Parameters	Section
Multi Region Alarm Rule Condition	Section Image Overlay Display
Multi Region Alarm Rule Reference Value	
Legend Display Enable	
Region Display Selector	
Region Display Enable	
Region Display Max Temperature Enable	
Region Display Min Temperature Enable	
Region Display Avg Temperature Enable	
Region Display Alarm Enable	
Over Screen Display Processor	

A.7 File Access Control

Table Appendix A-7 File Access Control

Parameters	Section
File Selector	Section File Access Control
File Operation Selector	
File Operation Execute	
File Open Mode	
File Operation Status	
File Operation Result	
File Size(B)	

A.8 Event Control

Table Appendix A-8 Event Control

Parameters	Section
Event Selector	Section Event Control
Event Notification	

A.9 Chunk Data Control

Table Appendix A-9 Chunk Data Control

Parameters	Section
Chunk Mode Active	Section Chunk Settings
Chunk Selector	
Chunk Enable	

A.10 Digital IO Control

Table Appendix A-10 Digital IO Control

Parameters	Section
Line Selector	Section Trigger Output
Line Mode	
Line Inverter	
Line Status	
Line Status All	
Line Source	
Line Trigger Software	
Hardware Trigger Source	
Hardware Trigger Activation	
Temperature Region Alarm Source	
Temperature Region Alarm Activation	
Multi Temperature Region Alarm Source	
Multi Temperature Region Alarm Trigger Activation	
Line Output Mode	
Strobe Enable	
Strobe Line Duration (ms)	
Strobe Line Delay (ms)	

A.11 Transport Layer Control

Table Appendix A-11 Transport Layer Control

Parameters	Section
Payload Size(B)	Section Transport Later 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 Dictionary 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)	

Parameters	Section
GEV Heartbeat Disable	
GeV GVCPPending ACK	
GeV GVCPPending Timeout	
GEV Timestamp Tick Frequency(Hz)	
Timestamp Control Latch	
Timestamp Control Reset	
Timestamp Control Latch Reset	
Timestamp Value	
GEV CCP	
GEV MCP Host Port	
GEV MCDA	
GEV MCTT (ms)	
GEV MCRC	
GEV MCSP	
GEV Stream Channel Selector	
GEV SCP Interface Index	
GEV SCP Host Port	
GEV SCP Direction	
GEV SCPS Fire Test Packet	
GEV SCPS Do Not Fragment	
GEV SCPS Big Endian	
GEV SCPS Packet Size (B)	
GEV SCDA	
GEV SCSP	

A.12 User Set Control

Table Appendix A-12 User Set Control

Parameters	Section
User Set Current	Section User Set

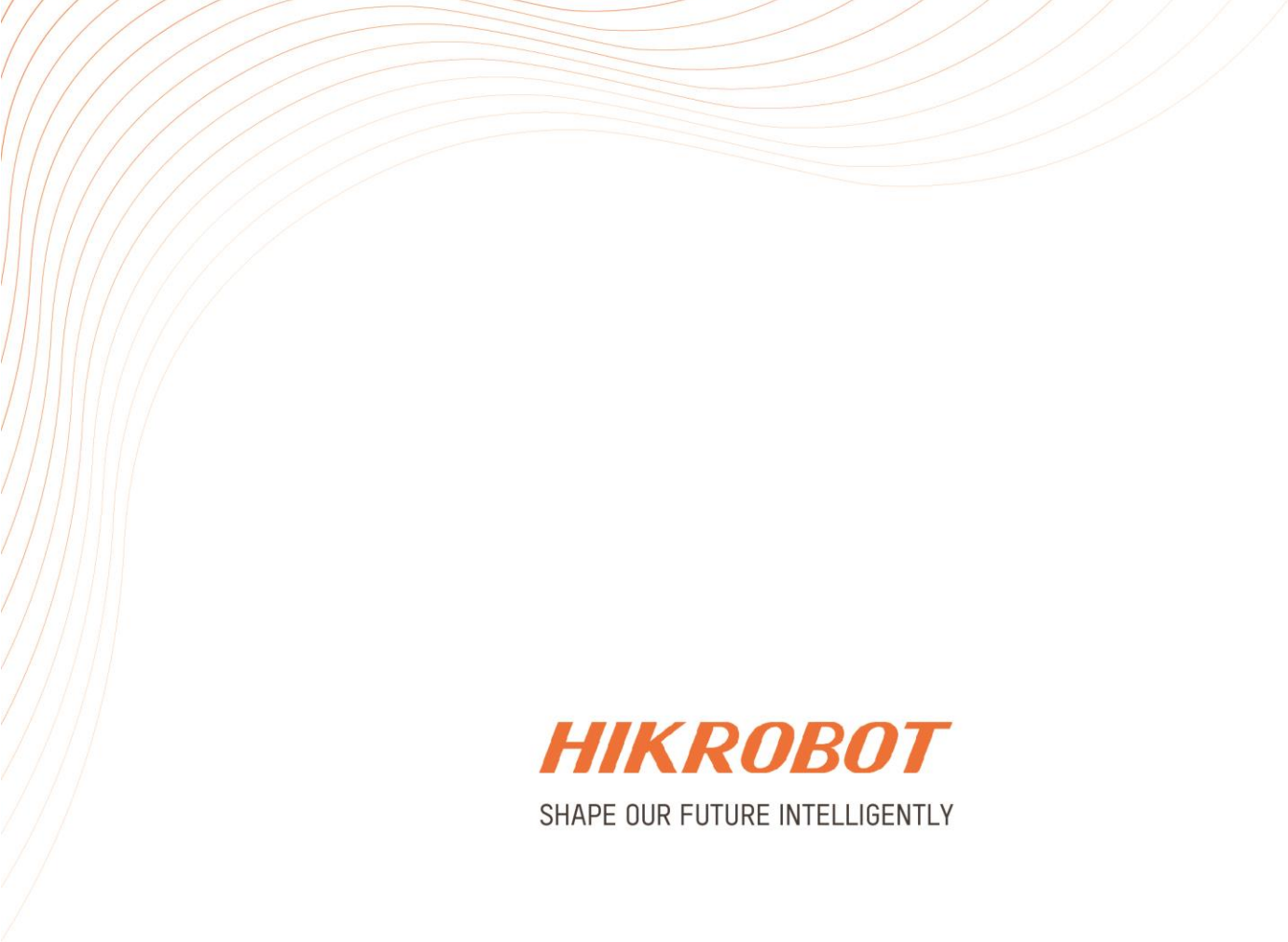
Parameters	Section
User Set Selector	Customization
User Set Load	
User Set Load Status	
User Set Save	
User Set Default	

Appendix B Emissivity of Common Substances

When measuring the temperature of an object, you should configure the emissivity of the target object. The emissivity varies depending on materials, temperature, surface glossy degree, and color. The higher the emissivity, the greater the radiation energy. In order to compensate for the measurement error caused by the different emissivity, the corresponding emissivity value needs to be configured according to the material of the target object, refer to the following table for specific instructions.

Table B-1 Emissivity of Common Substances

Material	Emissivity	Material	Emissivity	Material	Emissivity
Human Skin	0.98	Enamel	0.9	Copper (199 °C)	0.18
Ice	0.97	Wood	0.9	Sheet Aluminum	0.18
Asphalt	0.97	Granite (Polished)	0.85	Tinned Iron (Shell)	0.13
Plywood	0.96	Carbon	0.81	Copper (Shiny Non-reflective)	0.07
Asbestos Paper (23 °C)	0.96	Brick (Unglazed, Rough)	0.8	Lead (Purity: 99.9% Unoxidized)	0.06
Paper (White)	0.95	Copper (Heavy Oxide Plate)	0.78	Aluminum (Rough Plate)	0.06
Water	0.95	Iron Oxide	0.74	Aluminum (98.3% Plate @ 527 °C)	0.06
Formica Sheets	0.94	Iron Plate (Rust)	0.69	Aluminum Foil	0.04
Forged Iron	0.94	Steel Covered with Gold Leaf	0.66	Tin (Bright Tinned Iron Sheet)	0.04
Concrete	0.94	Steel (599 °C)	0.57	Nickel Wire	0.1
Glass (Smooth)	0.94	Steel (199 °C)	0.52	Brass (Polished Metal Wire)	0.04
Asbestos Paper (38 °C)	0.93	Cast Iron	0.29	Aluminum (98.3% Plate @ 227 °C)	0.04
Brick (Red, Rough)	0.93	Tinned iron Sheet (Bright)	0.23	Brass (Highly Polished)	0.03
Marble (Burnished Grey)	0.93	Top Polished Aluminum	0.22	Gold	0.02
Frozen Soil	0.93	Copper (599 °C)	0.19	Copper (Polished)	0.02
Plastic (White)	0.91	Aluminum (Oxide @599 °C)	0.19	Household Aluminum (Flat)	0.01



HIKROBOT

SHAPE OUR FUTURE INTELLIGENTLY

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