Hikrobot Co., Ltd.

ID3000 Series Industrial Code Reader

User Manual

HIKROBOT

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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 ID3000 Series Industrial Code Reader.

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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

- In the use of the device, you must be in strict compliance with the electrical safety regulations of the nation and region.
- Please install the code reader in accordance with the content in this manual, and make sure that it is fastened securely.
- 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.
- 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.
- 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.
- Do not cover the device's plug or outlet for disconnecting power supply.
- It is strictly forbidden to wire, maintain, and disassemble 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 necessary, please moisten a soft

clean cloth with alcohol and gently wipe off the dust. When the device is not in use, please add a dust cover to protect the image sensor.
- 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.
- 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.
- 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.
- Do not use the product in extremely heat, extremely cold, dusty environment, corrosive environment or high humidity environment.
- The device should not be placed with exposed flame sources, such as lighted candles.
- Please read the manual and safety instructions carefully before installing 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.

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.
- 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

With functions of image acquisition, code recognition and output, the ID3000 series industrial code reader can read different types of code. It is applicable to consumer electronics, food and beverage, pharmaceutical, semiconductor, automobile, and other industries.
The device uses sensors and optical elements to obtain images of the measured object, and achieves code parsing via the built-in deep learning code reading algorithm. It also supports outputting the detection results through different communication modes.

2.2 Key Features

- Adopts built-in deep learning algorithm to read codes with good robustness.
- Adopts CMOS global shutter sensor to provide high quality images.
- Adopts multiple I/O interfaces for input and output signals.
- Adopts multiple indicators displaying device status from different sides.
- Waterproof debug button, manual triggering supported.
- Modularized light source design and easy to replace.
- Ingress Protection Rating 67.

Note

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

Chapter 3 Appearance

Note

Appearance here is for reference only. Refer to the device's specification for detailed dimension information.

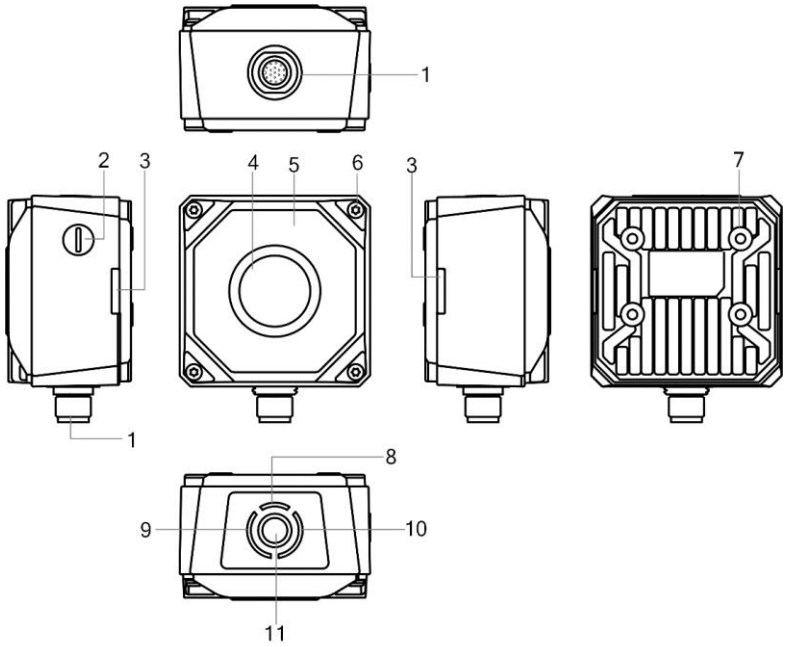


Figure 3-1 Appearance of Device with Four-Channel Light Source

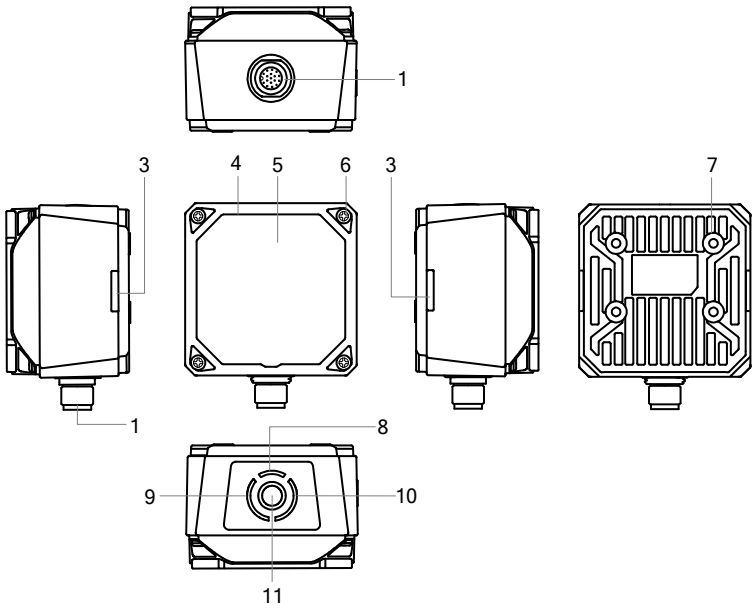


Figure 3-2 Appearance of Device with Six-Channel Light Source

Table 3-1 Component Description

No.	Name	Description
1	Power and I/O Connector	It refers to 17-pin M12 connector for providing power, Ethernet, I/O, and serial port signal. Refer to section ***17-Pin M12 Connector*** for details. The connector is designed with threads to tighten connection between the device and cable.
2	Focus Knob	It is used to adjust focal length manually. **Note** The focus knob may differ by device models, and some models do not have a focus knob.
3	OK/NG Indicator	Refer to section ***Indicator*** for details.
4	Lens Cap	It can be replaced with polarized lens cap or transparent lens cap. Refer to the device's specification for details.
5	Light Source	It refers to LED lights providing light for improving code reading effect. For the device with four-channel light source, it has 8 LED lights. For the device with six-channel light source, it has 14 LED lights, and its standard light source is a half- polarized one, with the upper half providing normal lighting and the lower half delivering polarized lighting. **Note** The default color of LED lights is white. Red, blue, IR, and white/blue/red wide-angle lights are optional.
6	Screw	It is used to fix the device body and lens cap.
7	Screw Hole	It is used to fix the device, and you should use M4 screws.
8	PWR Indicator	It is a power indicator. Refer to section ***Indicator*** for details.
9	STS Indicator	It is a status indicator. Refer to section ***Indicator*** for details.
10	LNK Indicator	It is a network status indicator. Refer to section ***Indicator*** for details.
11	Button	It is used to trigger the device or execute smart tune. ● Trigger button: When the device is in continuous mode, press the button to switch to the trigger mode. When the device is in trigger mode, press the button and the device triggers once. ● Smart tune button: Hold the button for 3 seconds and the device starts smart tune. Hold the button for 3 seconds again during smart tune process, and the adjustment will be cancelled.

Chapter 4 Connector and Indicator

4.1 17-Pin M12 Connector

The device has a 17-pin M12 connector to provide power, Ethernet, I/O, and serial port signal. Read the following content to get pin definitions of this connector.

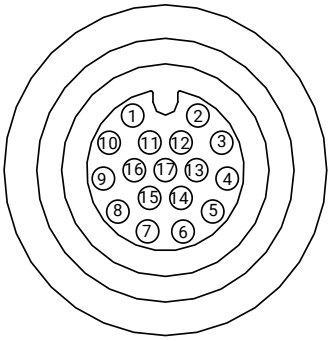


Figure 4-1 17-Pin M12 Connector

Table 4-1 Pin Definition

No.	Signal	Description	Cable Color		Supplied Cable	I/O Signal Source
1	POWER_IN	Direct current power supply positive	Red		Pin 8 of 8-pin terminal	--
2	DO_2	Non-isolated output/ isolated output	Brown		Pin 6 of 8-pin terminal	Pin 5 output
3	OUT_R	Can be configured as output pull-up/pull-down resistor	Purple/White		Open line	--
4	RS232TX	RS-232 serial port output	Red/Blue		DB9 female serial port	--
5	RS232RX	RS-232 serial port input	Gray/Pink		DB9 female serial port	--
6	RX+	Fast Ethernet signal	White/Orange		RJ45 network interface	--
7	TX-	Fast Ethernet signal	Green		RJ45 network interface	--
8	DO_0	Non-isolated output/	Blue/White		Pin 4 of 8-pin	Pin 3

No.	Signal	Description	Cable Color		Supplied Cable	I/O Signal Source
		isolated output			terminal	output
9	DI_2	Non-isolated input/ isolated input	Blue		Pin 3 of 8-pin terminal	Pin 2 input
10	DO_1	Non-isolated output/ isolated output	Brown/White		Pin 5 of 8-pin terminal	Pin 4 output
11	GND	Direct current power supply negative	Black		Pin 7 of 8-pin terminal	Signal ground
12	IN_R	Can be configured as input pull-up/pull-down resistor	Pink		Open line	--
14	RX+	Fast Ethernet signal	Orange		RJ45 network interface	--
15	TX-	Fast Ethernet signal	White/Green		RJ45 network interface	--
16	DI_0	Non-isolated input/ isolated input	Gray		Pin 1 of 8-pin terminal	Pin 0 input
17	DI_1	Non-isolated input/ isolated input	White		Pin 2 of 8-pin terminal	Pin 1 input

Note

- For the device with 3.0 version, the pin 2/8/9/10/16/17 is isolated input or output.
- You should refer to the tables above and the label attached to the supplied power and I/O cable to wire the device.
- For some devices before the upgrade, pin 0/1/2 is used for output signal source.

It is recommended to use the supplied 17-pin cable.

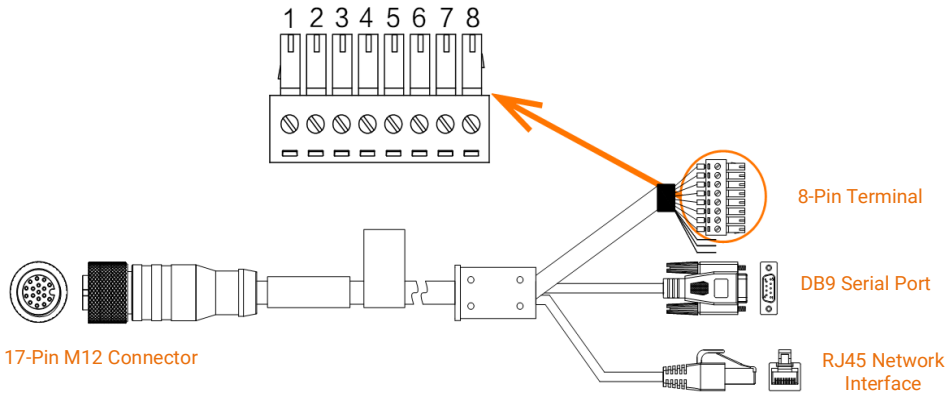


Figure 4-2 17-Pin Cable

Note

- The 17-pin cable may differ by device model.
- When you use three-channel I/O at the same time, please use an IO box or open line to connect to pull-up/pull-down resistor. Refer to section ***Installation Preparation*** for details.

4.2 Indicator

You can observe the device's indictor to check whether the device operates normally or not.

Table 4-2 Indicator Description

Device Status	Description
PWR (Power Indicator)	In Green: Power supply is normal.
	In Red: There is an exception.
STS (Status Indicator)	In Green: The device is normal.
	In Red: The device starts up or operation error occurs.
LNK (Network Indicator)	Flashing Green: Network connection is normal.
	Unlit: Network is disconnected.
OK/NG (Result Indicator)	In Orange: The device is starting up.
	In Red: The device is powered on.
	In Green: The device reads the code for 0.5 seconds.
	Solid Green: The device reads the codes continuously.

Chapter 5 Installation

5.1 Installation Preparation

You need to prepare following accessories before installation. The included accessories are in the device's package, and you can purchase optional accessories according to actual demands.

Note

The images below are for reference only.

Table 5-1 Included Accessories

No.	Name	Image	Quantity	Description
1	Cable		1	It refers to the supplied 17-pin M12 cable which is 3 meters.
2	Power Adapter or Switch Power Supply		1	You should select a suitable power adapter or switch power supply according to the device power supply and consumption. You need to purchase separately.
3	Installation Bracket		1	It refers to the supplied installation bracket, and is used to fix the device.

When you use three-channel I/O at the same time, please use an IO box to connect to pull-up/pull-down resistor.

Table 5-2 Optional Accessories (IO Box)

IO Box	Image	Usage	Description
8-Pin IO Box V1.0	 8-Pin IO Box V1.0	The IO box can be used for switching pull-up and pull-down resistors for each I/O channel.	You need to purchase separately.

IO Box	Image	Usage	Description
8-Pin IO Box V2.0	 8-Pin IO Box V2.0	The IO box can be used for upgrading the non opto-isolated I/O to opto-isolated I/O.	

You can scan the QR codes below to get the operating guide of the IO box.

Table 5-3 Operating Guide of IO Box

IO Box	Operating Guide
8-Pin IO Box V1.0	
8-Pin IO Box V2.0	

5.2 Install Device

Before You Start

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

Steps

1. Use M4 screws to fix the installation bracket to the device, as shown below.

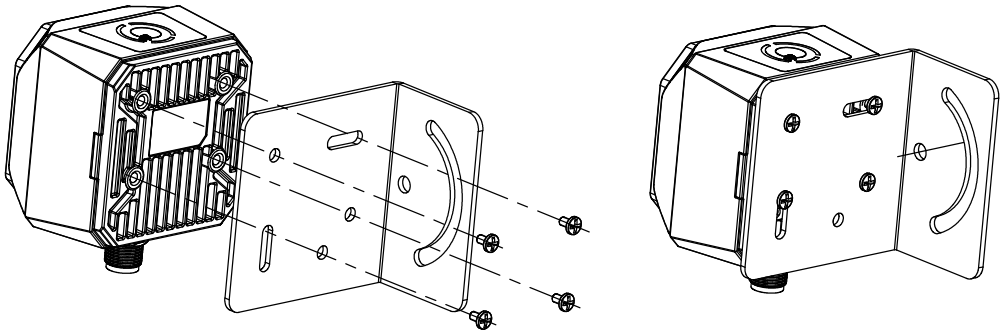


Figure 5-1 Fix Installation Bracket (Method 1)

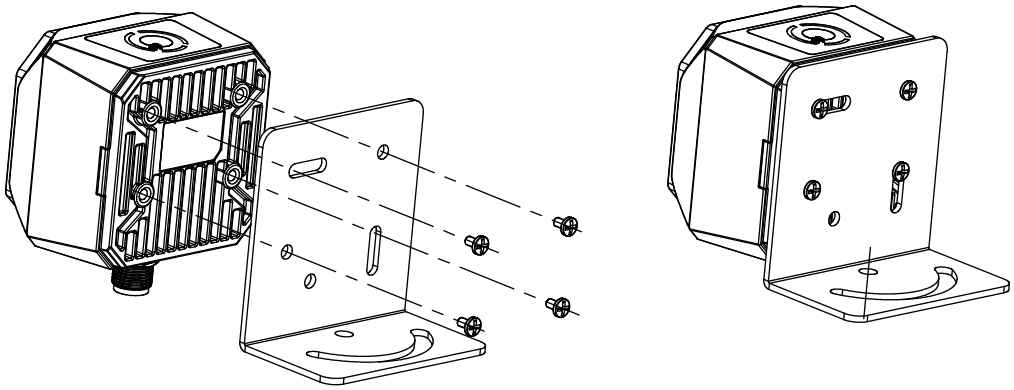


Figure 5-2 Fix Installation Bracket (Method 2)

2. Install the device to the installation location.
3. Use the supplied 17-pin M12 cable to connect to the device. Refer to section ***17-Pin M12 Connector*** for details.
4. Select a suitable power adapter or switch power supply to connect to the device for power supply.
5. Use the network cable to connect to the PC or network card for image debugging or data communication.

Chapter 6 I/O Electrical Feature and Wiring

This section introduces the I/O electrical features and wiring methods of the device.

Note

This section only introduces the wiring methods between the device and the other external devices. If you need to wire the device via the IO box, scan the QR codes below to get the operating guide of the IO box.

Table 6-1 Operating Guide of IO Box

IO Box	Operating Guide
8-Pin IO Box V1.0	
8-Pin IO Box V2.0	

6.1 Input Signal

The device's LineIn 0/1/2 are input signals, and their internal circuit is as follows.

Note

- The maximum input current of input signal is 25 mA.
- The breakdown voltage is 36 VDC. Keep voltage stable.

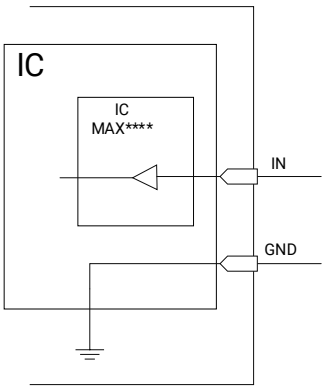


Figure 6-1 Internal Circuit of Input Signal

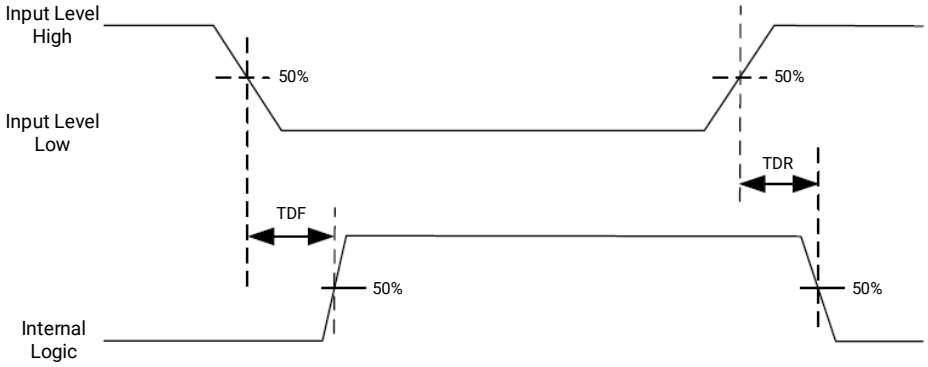


Figure 6-2 Input Logic Level

Table 6-2 Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	0 VDC to 9 VDC (VCC = 24 V) 0 VDC to 5.4 VDC (VCC = 12 V)
Input Logic Level High	VH	11 VDC to 24 VDC (VCC = 24 V) 7.56 VDC to 12 VDC (VCC = 12 V)
Input Falling Delay	TDF	1.3 μs to 3.5 μs
Input Rising Delay	TDR	1.3 μs to 3.5 μs

Note

VCC stands for Volt Current Condenser, and it is the device's input voltage.

6.2 Output Signal

The device's LineOut 0/1/2 are output signals, and their internal circuit is as follows.

Note

The maximum output current of output signal is 200 mA.

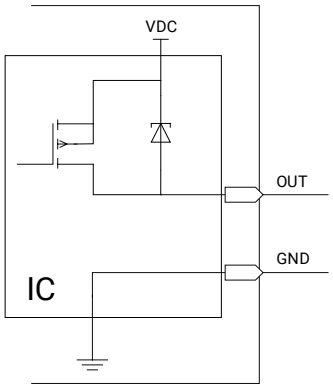


Figure 6-3 Internal Circuit of Output Signal

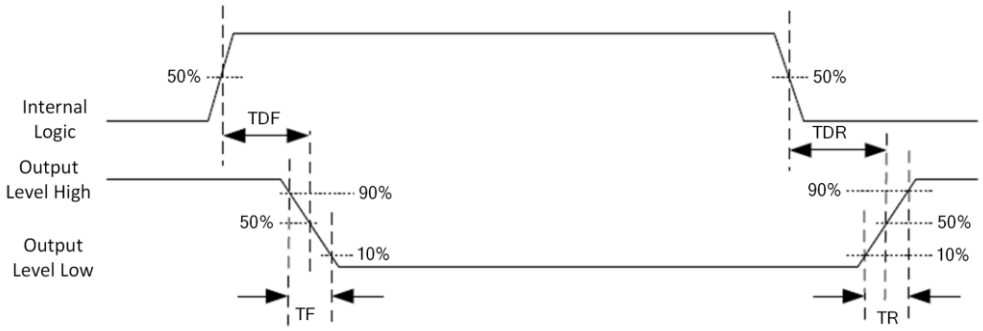


Figure 6-4 Output Logic Level

When the external voltage and resistance is 12 VDC and 1 KΩ respectively, output electrical feature is as follows.

Note

If the external voltage and resistance change, the corresponding current of output signal and output logic level low may differ.

Table 6-3 Output Electrical Feature

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	212 mV
Output Logic Level High	VH	11.8 VDC
Output Falling Delay	TDF	0.4 μs

Parameter Name	Parameter Symbol	Value
Output Rising Delay	TDR	0.4 μs
Output Falling Time	TF	0.4 μs
Output Rising Time	TR	0.4 μs

6.3 Input Signal Wiring

The device can receive the external input signal via I/O interface, and here we take LineIn 0 as an example to introduce input signal wiring.

Note

Input signal wiring may differ by device version and external device types.

6.3.1 Device with 3.0 Version

PNP Device

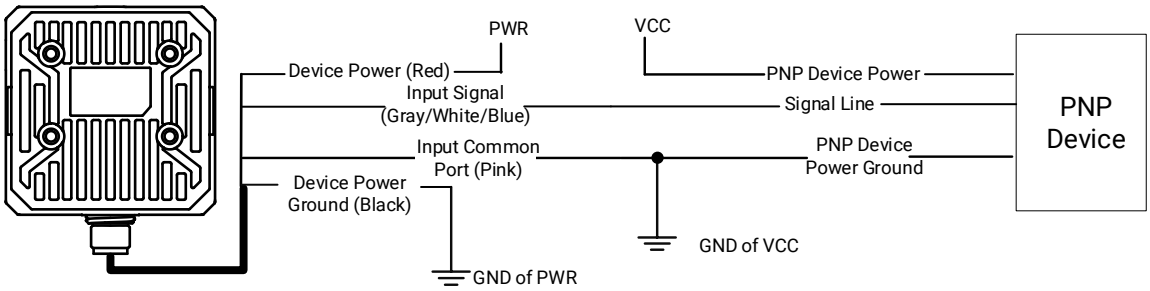


Figure 6-5 Input Signal Connecting to PNP Device

NPN Device

If the VCC of NPN device is 12 VDC or 24 VDC and pull-up resistor is not used, its wiring is as follows.

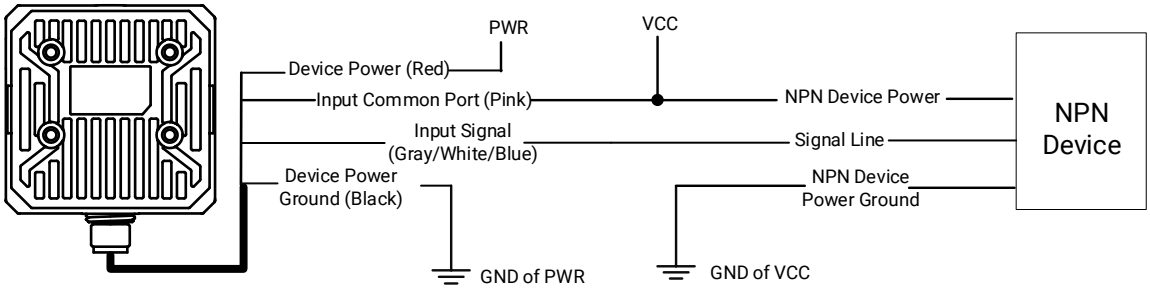


Figure 6-6 Input Signal Connecting to NPN Device Without Pull-Up Resistor

If the VCC of NPN device is 12 VDC or 24 VDC and 1 KΩ pull-up resistor is used, its wiring

is as follows.

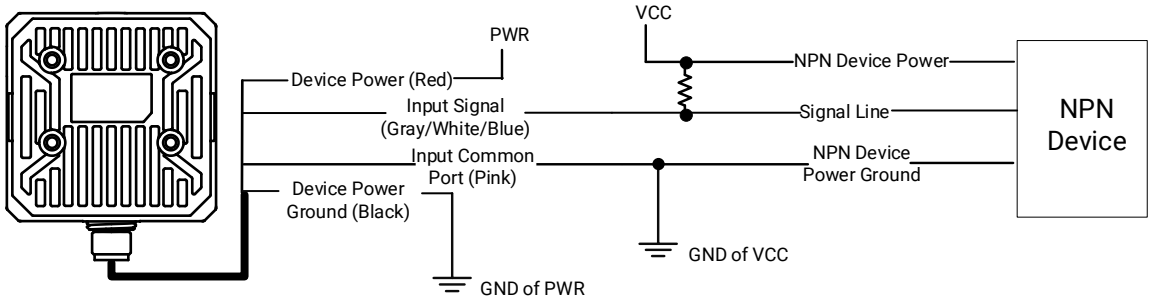


Figure 6-7 Input Signal Connecting to NPN Device with Pull-Up Resistor

6.3.2 Device with 2.0 Version

PNP Device

Note

It is recommended to use 330 Ω pull-down resistor. There are three methods for wiring.

- Use the pink open line of the supplied cable for wiring.
- Prepare a resistor independently for wiring.
- Use the 8-pin IO box V1.0 for wiring. Refer to section ***Installation Preparation*** for details.

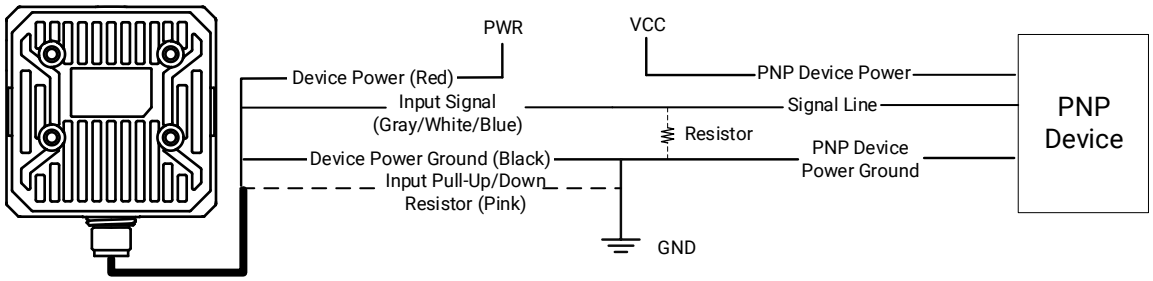


Figure 6-8 Input Signal Connecting to PNP Device

NPN Device

Note

If the VCC of NPN device is 12 VDC or 24 VDC, and it is recommended to use a 1 KΩ pull-up resistor. There are three methods for wiring.

- Use the pink open line of the supplied cable for wiring.
- Prepare a resistor independently for wiring.
- Use the 8-pin IO box V1.0 for wiring. Refer to section ***Installation Preparation*** for details.

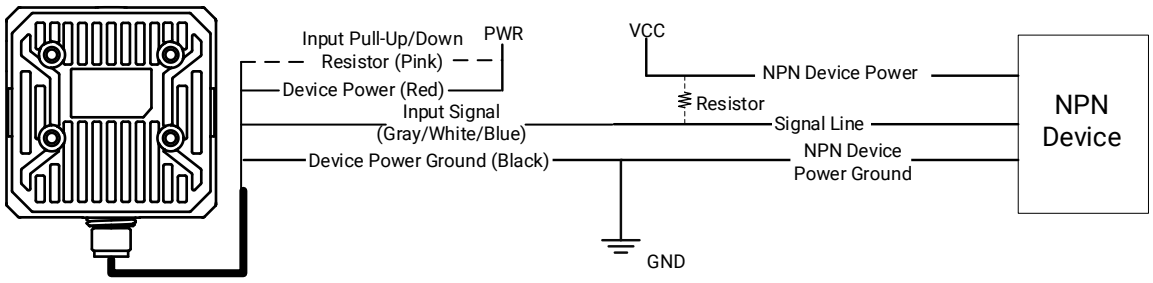


Figure 6-9 Input Signal Connecting to NPN Device

Switch

Note

It is recommended to use a 1.1 KΩ pull-down resistor.

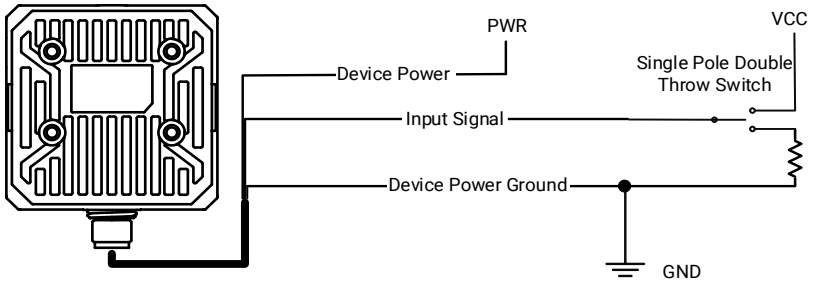


Figure 6-10 Input Signal Connecting to a Switch

6.4 Output Signal Wiring

The device can output signal to external devices via I/O interface, and here we take LineOut 0 as an example to introduce output signal wiring.

Note

- Output signal wiring may differ by device version and external device types.
- The voltage of VCC should not higher than that of PWR. Otherwise, the device's output signal may have exception.

6.4.1 Device with 3.0 Version

PNP Device

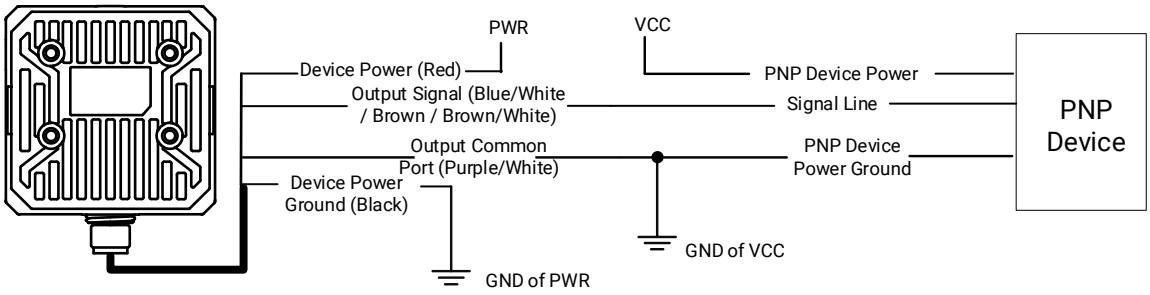


Figure 6-11 Output Signal Connecting to PNP Device

NPN Device

If the VCC of NPN device is 12 VDC or 24 VDC and pull-up resistor is not used, its wiring is as follows.

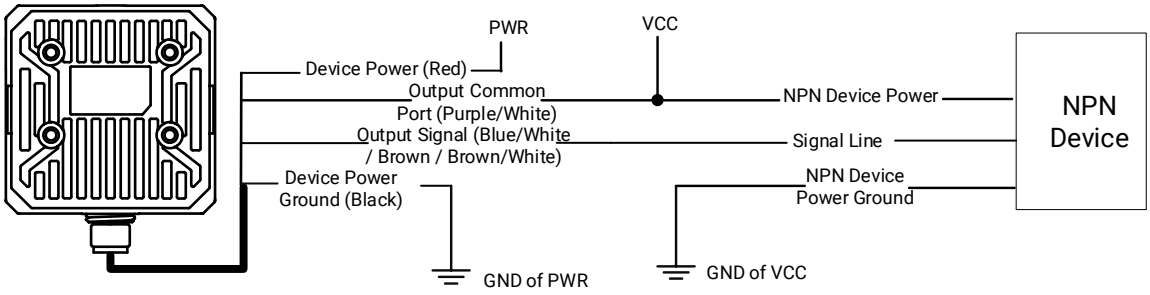


Figure 6-12 Output Signal Connecting to NPN Device Without Pull-Up Resistor

If the VCC of NPN device is 12 VDC or 24 VDC and 1 KΩ pull-up resistor is used, its wiring is as follows.

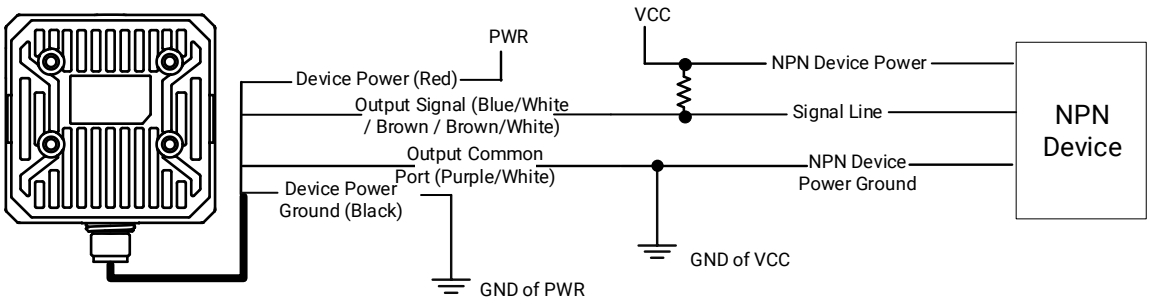


Figure 6-13 Output Signal Connecting to NPN Device with Pull-Up Resistor

6.4.2 Device with 2.0 Version

PNP Device

Note

It is recommended to use 330 Ω pull-down resistor. There are three methods for wiring.

- Use the purple/white open line of the supplied cable for wiring.
- Prepare a resistor independently for wiring.
- Use the 8-pin IO box V1.0 for wiring. Refer to section ***Installation Preparation*** for details.

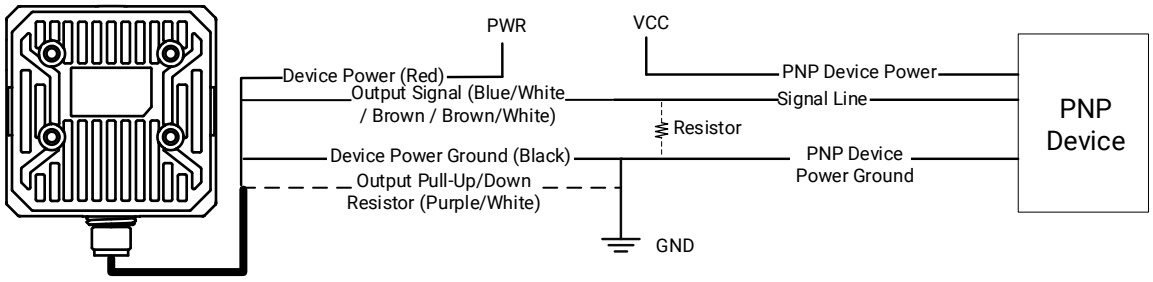


Figure 6-14 Output Signal Connecting to PNP Device

NPN Device

Note

If the VCC of NPN device is 12 VDC or 24 VDC, and it is recommended to use 1 KΩ pull-up resistor. There are three methods for wiring.

- Use the purple/white open line of the supplied cable for wiring.
- Prepare a resistor independently for wiring.
- Use the 8-pin IO box V1.0 for wiring. Refer to section ***Installation Preparation*** for details.

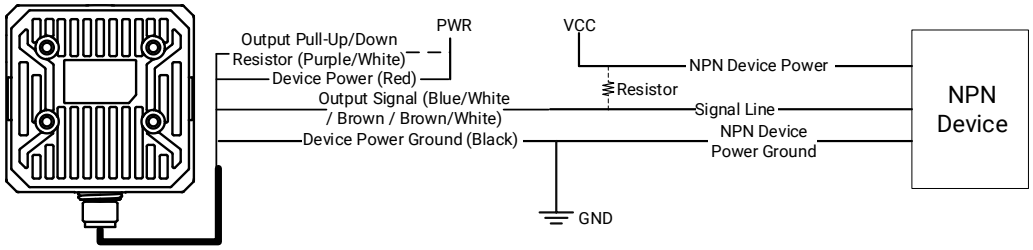


Figure 6-15 Output Signal Connecting to NPN Device

6.5 RS-232 Serial Port

The device supports output via RS-232 serial port. The 9-pin male connector and 25-pin male connector are commonly used serial ports, as shown below. You can refer to the table below

for the specific pin name and function.

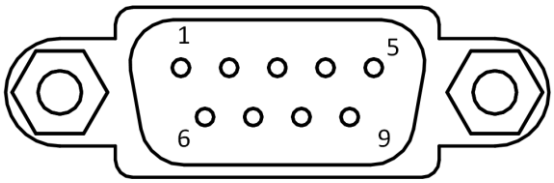


Figure 6-16 9-Pin Male Connector

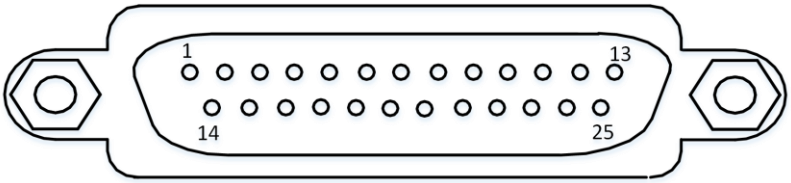


Figure 6-17 25-Pin Male Connector

Table 6-4 Pin Definitions

Serial Port Type	Pin No.	Name	Function
9-Pin Male Connector	2	RX	Receive data
	3	TX	Send data
	5	GND	Signal ground
25-Pin Male Connector	2	TX	Send data
	3	RX	Receive data
	7	GND	Signal ground

You can refer to the serial port wiring below to connect the device with an external device.

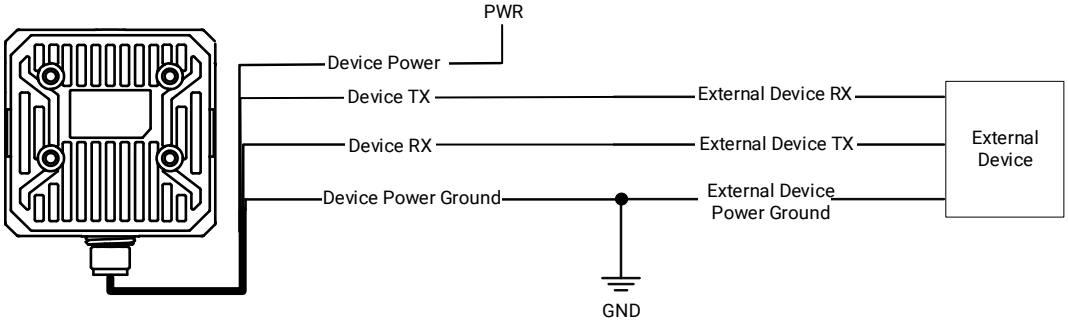


Figure 6-18 RS-232 Serial Port Wiring

Chapter 7 Device Debugging

You can execute device debugging and parameter settings via the client software. This section introduces how to install the client software, connect the device to the client software, fast configuration, etc.

7.1 Client Software Installation

IDMVS is a client software for device configuration and remote operations.

Steps

Note

- The client software is compatible with 32/64-bit Windows 7/10 and 64-bit Windows 11 operating systems. Here we take Windows as an example.
- You can get the client software installation package from ***https://en.hikrobotics.com/***. It is recommended to use the client software with version of V5.0.0 and later.
- For the devices with USB interface, only the client software with version of V2.3.0 and above in Windows system is supported.
- The client software with version of V2.3.0 and above in Windows system has integrated the USB driver. If the driver is not recognized, you can install it.
- The graphic user interface may differ by different versions of client software you use.

1. Double click the installation package to start installing the client software.
2. Select the language.
3. Read and check **Terms of the License Agreement**.
4. Click **Start Setup**.
5. Select installation directory and click **Next**.

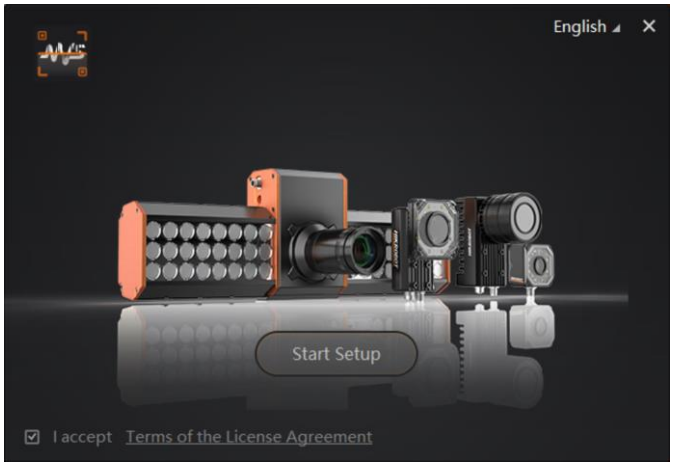


Figure 7-1 Installation Interface

6. Finish the installation according to the interface prompts.

7.2 Device Connection

Device connection is a prerequisite for using the client software to perform code reading and represents the first step after launching the client. This section provides an overview of the necessary preparations and guides you to discover and connect to the device.
The connection process is primarily managed through the **Device List**. If no device is connected, you can open the floating **Device List** in either of the following ways:

- Click ＋ next to **No cameras, click to add** in the upper-left corner.
- Click **Connect Camera** in the left panel.

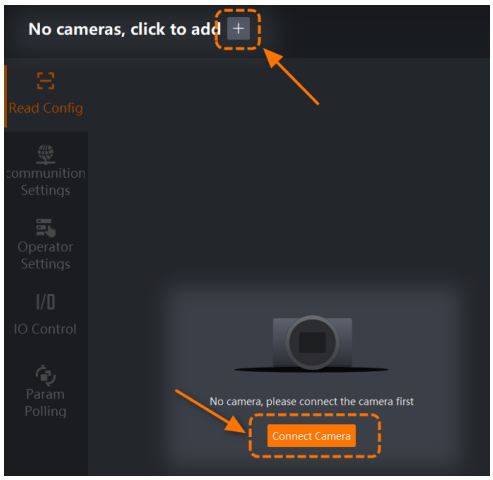


Figure 7-2 Open Device List

Once the **Device List** is open, you can follow the steps below to connect to device and set basic parameters.



Figure 7-3 Operation Flow

7.2.1 Preparations

To ensure a normal connection and proper functioning of the client software, confirm that your system meets the requirements. After that, complete the hardware wiring of the device and perform the necessary environment configuration.

System Requirements

The PC configuration should meet the following requirements.

Minimum Configuration

- OS: 32/64-bit Windows 7/10 or 64-bit Windows 11

- CPU: Intel Pentium IV 2.0 GHz
- RAM: 1 GB
- NIC: Intel Pro1000, I210, or I350 series recommended
- Display resolution: 1366 × 768

Recommended Configuration

- OS: 32/64-bit Windows 7/10 or 64-bit Windows 11
- CPU: Intel Pentium IV 3.0 GHz or higher
- RAM: 4 GB or higher
- NIC: Intel Pro1000, I210, or I350 series recommended
- Display resolution: 1920 × 1080 or higher

Note

- The client software has integrated all necessary drivers, and there is no need to install drivers.
- The client software relies on the system disk for operation. Please ensure sufficient space on the system drive.
- Some antivirus programs may mistakenly identify the client software as a virus. To avoid issues, consider adding the client software to the antivirus whitelist or disabling the antivirus. It is recommended to disable 360 Security Guard if installed.

Hardware Wiring

Before using the device, you need to complete the hardware wiring for power supply, data communication, I/O, and RS-232 serial port connections. Refer to section ***I/O Electrical Feature and Wiring*** for details.

Device Environment Configuration

To ensure stable data transmission, you should configure the firewall and PC network settings for network-type devices, or ensure the driver installation for USB-type devices.

- **For network-type devices:** Before using the client software, ensure the PC and the device are on the same LAN subnet and enable jumbo frames on the PC's Ethernet port.
  - Open the NIC Configurator. You can choose any one of the following ways to open it:
    - Go to the IDMVS installation directory and open **NIC_Configurator**. Relative path: .\Applications\Win64\NIC_Configurator.
    - Right-click **GigE** in the device list and select **NIC Properties**.

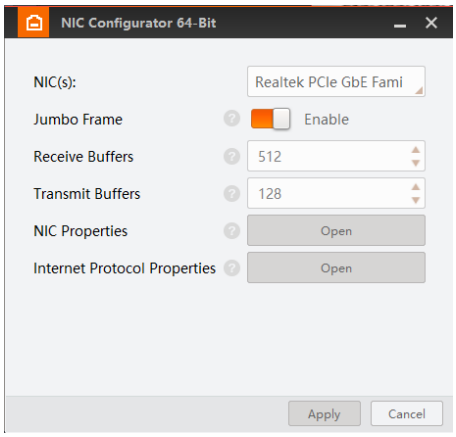


Figure 7-4 NIC Configurator

- Select the target NIC at **NIC(s)**.
- Configure its parameters.

Jumbo Frame

Enable jumbo frame for TCP/IP packets to reduce CPU usage and improve data transmission efficiency, especially when handling large packets and latency is acceptable to the user.

Note

If enabling jumbo frames fails, open **NIC Properties** → **Advanced** and check if the **Jumbo Packet** or **Jumbo Frame** is available. If available, set the value to 9 KB or 9014 Bytes. If not, update the NIC driver or use a different NIC that supports jumbo frames.

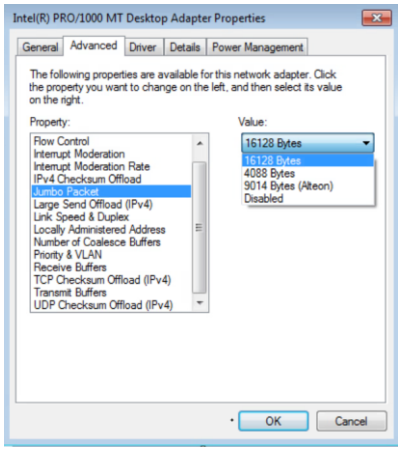


Figure 7-5 Enable Jumbo Packer

Receive Buffers

In cases that the NIC properties meet the requirements, you can adjust the receive buffer size. A larger buffer improves reception performance but consumes more system memory.

Transmit Buffers

In cases that the NIC properties meet the requirements, you can adjust the transmit buffer size. A larger buffer enhances transmission performance but consumes more system memory.

NIC properties

You can view or edit the NIC configuration options. Some options may be locked by the manufacturer and cannot be changed.

NIC Protocol Properties

You can view or modify the PC's IP address.

Note

- To ensure stable device operation, it is recommended to set the PC's network port IP address to a static IP address.
- For device status details, refer to section ***Device Discovery***. For IP editing steps, refer to section ***Pre-Connection Configuration***.

- **For USB-type devices**: You should install a USB-to-Ethernet driver before connection.
  - Connect the USB-type devices to the PC via a USB interface.
    The Windows system will automatically detect the new hardware device and install the driver.
  - (Optional) Go to **Control Panel** → **Device Manager** → **Network adapters** to check if the driver has been installed successfully.

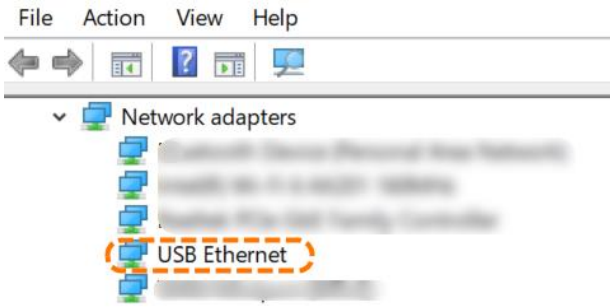


Figure 7-6 Driver Installed Successfully

Note

If the driver installation fails (e.g., displayed RNDIS under **Other devices** or the system does not detect the RNDIS driver), contact technical support to obtain the driver and install it manually.

7.2.2 Device Discovery

After environment preparations, the device can be detected in the **Device List** by using two

methods: Auto/Manual Refresh or Remote Addition. The first method is applicable when the device and the PC are in the same subnet, while the second is used when they are in different subnets but their IP addresses are pingable.

Note

The client software also supports virtual device connection for testing and debugging without physical devices.

Discover Device

This section introduces the following two methods: Auto/Manual Refresh and Remote Addition.

Auto/Manual Refresh

- **Auto Refresh**: When **Device List Auto-Refresh** is enabled under **Settings** → **General**, the client software periodically detects and updates the available devices on the local area network.

  Note

  By default, the client software refreshes automatically every 30 seconds. You may adjust this value as needed.

- **Manual Refresh**: Click on the top of the **Device List** to manually refresh the device.

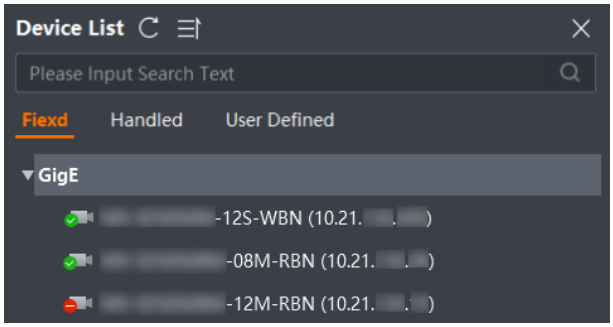


Figure 7-7 Auto Enumeration of Devices

Remote Addition

Remote Addition is useful for centralized remote management in distributed or complex environments, such as production lines at different locations with minimal on-site intervention.

Steps

1. Ensure the device and PC can ping each other on the same network.
2. Right-click **GigE** in the **Device List**, and select **Add Remote Camera**.

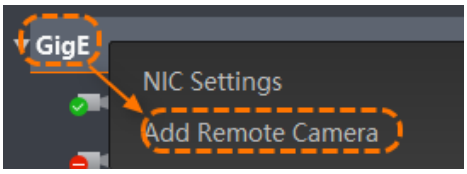


Figure 7-8 Add Remote Camera

3. Select the appropriate network adapter, and enter the device's IP address.
4. Click **OK**.

View Status and Information of Device

After the device is detected, you can check the device status and availability in the **Device List**. Different icons on the left of the device name symbolizes different status.

Table 7-1 Device Status Description

Icon	Status	Description
	Free	The device is ready for connection. Double click it to connect and use.
	Connected	The client software has successfully connected to the device, and you can execute some operations.
	Acquire Image	The client software has connected to the device, and starts to acquire images.
	In Use	The device is in use by another software (including IDMVS client software).
	Unreachable	The device is unreachable on the local area network. You need to adjust its IP address to the same network. For details, refer to section ***Pre-Connection Configuration***.

In addition, select a specific device, and you can view its detailed information.

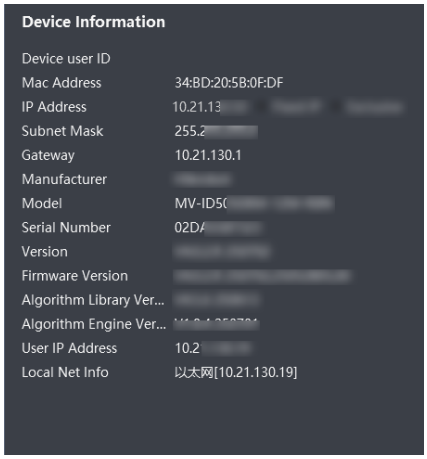


Figure 7-9 Viewing Device Information

Note

You can right-click to copy specific data entries.

7.2.3 Pre-Connection Configuration

If a device is detected in the **Device List** and is not in use, you can modify its IP address or upgrade its firmware as needed.

Modify IP Address

You may need to modify the IP address in the following cases: setting the device to a static IP address or resolving network issues to make the device reachable. You can follow the steps below.

Steps

1. Select the device that needs IP address change in the **Device List**.
2. Right-click the device and select **Modify IP** to enter the IP configuration interface.
3. Choose the desired IP configuration type: Static IP, DHCP (Dynamic Host Configuration IP) or LLA (Link-Local Address).



Figure 7-10 Modify IP Address

4. Click **OK** to apply the changes.

Note

- The client software supports advanced network configuration for connected devices. In addition to IP modification, it allows you to set a fixed IP address and IP address anti-occupation (Exclusive) in **IP Address** of the Device Information. The fixed IP address function ensures long-term stable connectivity by assigning permanent addresses to devices, while the IP address anti-occupation function effectively prevents communication interruptions caused by unauthorized devices attempting to occupy assigned IP addresses. For details, refer to section ***Post-Connection Configuration***.

- If you need to configure the IP addresses of multiple devices, go to **Tools** → **IP Configurator** in the menu bar.

Firmware Upgrade

To ensure optimal performance and access to the latest functions, you can regularly upgrade device's firmware. Contact our technical support for the latest firmware. The client software supports two upgrade methods: UDP firmware upgrade and TCP firmware upgrade.

Table 7-2 Comparison of UDP and TCP Firmware Upgrades

Items	UDP Firmware Upgrade	TCP Firmware Upgrade
Precondition	Device should be available.	Device should be connected, and is not in grabbing status.
UI Path	• Right-click the device name in the **Device List** and select **Firmware Upgrade**. • Click **Tools** → **Firmware Updater** in the Menu Bar.	• Right-click the device name in the **Device List** and select **Firmware Upgrade**. • Click **Tools** → **Firmware Updater** in the Menu Bar.
Support	Supported by all devices.	Only supported by some device models (refer to the interface for availability).
Features	Supports firmware upgrading without device connection, and batch upgrading. Click **Tools** → **Firmware Updater** in the Menu Bar.	Enhanced upgrade speed, and also supports batch upgrading. Click **Tools** → **Firmware Updater** in the Menu Bar.

You can follow the steps below to upgrade UDP firmware.

Steps

Note

- Please use the firmware package of the corresponding device model for upgrading.
- Do not power off the device or disconnect network during upgrading.
- The device will restart automatically after the firmware is upgraded.

1. Select the target device in the **Device List**.
2. Right-click the device, and select **Firmware Upgrade**.
3. Click 🗁 and select a .dav firmware file matching with the target device model.

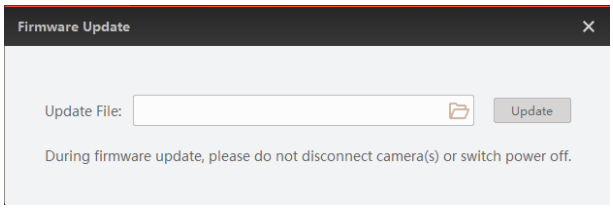


Figure 7-11 UDP Firmware Upgrade

4. Click **Upgrade**.
Upon completion, a success notification will appear, and the device will automatically restart.

Note

If you select the wrong model during the process, the firmware upgrade fails and does not overwrite the original firmware. In such cases of upgrade failure or abnormal termination, the device will automatically restart.

7.2.4 Device Connecting

Once a device is discovered in the **Device List**, you can connect it for further operations.

Connect to Device

There are two ways for connection.

- Double-click the device name.
- Click next to the device name.

Note

You also can click next to the device name to disconnect.

Check and Switch Devices

After connecting, the client software's main interface will display. The upper-left device information provides the following details.



Figure 7-12 Device Information

- **Device Model**: You can double-click it to open the floating device list, and then refer to the steps above to connect to other devices.

Note

If you rename the user ID in the ***Post-Connection Configuration***, the user ID will be displayed in the device information bar instead of the device model.

- **Current Load**: It shows the current parameter group, including default and custom settings. You can configure startup parameter loading via **Param Save** in the Quick Access Toolbar or switch parameter groups manually.

7.2.5 Post-Connection Configuration

After connecting to the device, you can configure basic functions, device control, static IP assignment, and IP anti-occupancy function by right-clicking the device name in the device list.

Basic Functions

You can right-click the device name in the **Device List** or the device information in the upper-left corner of the main window to perform the following operations.

Start/Stop Acquisition

You can start or stop image acquisition, and can press F2 to execute this function. The shortcut can be set in **Settings** → **Shortcut** in the menu bar.

Rename User ID

You can set a device user's ID (up to 15 English characters). The user ID will be displayed in the **Device List** or the device information in the upper-left corner of the main window.

File Access

You can import or export the following device parameters.

Note

You can also use **File Access** in the Menu Bar to import device parameters in a batch.

User Set

You can import or export user parameters.

- Import: After importing, all user parameter sets, including quantity, name, and specific parameters, will be changed according to imported files.
- Export: After exporting, a configuration file in .mfa format (with internal system user parameters) will be generated and be exported to the selected path. The default naming rule for the .mfa file is: device model_SerialNumber_User Set.mfa.

Multi ROI

You can import or export algorithm ROI data.

- Import: You can import configuration files to edit algorithm ROI parameters in a batch, improving the efficiency of parameter configuration.
- Export: After exporting, a configuration file in .mfa format (with internal algorithm ROI data) will be generated and be exported to the selected path. The default naming rule for the .mfa file is: device model_SerialNumber_Multi ROI.mfa.

SECBIN

You can import encrypted files in .bin format. Contact technical support for more details.

License Notice

You can export open-source software licenses as a .txt file.

Save GenICam XML

You can save the current device GenICam configuration as an XML file.

Firmware Update

You can upgrade connected device's TCP firmware.

Note

- TCP firmware upgrade can be achieve via TCP packets. For a comparison between TCP and UDP upgrades, refer to section ***Pre-Connection Configuration***.
- It is unnecessary to edit the TCP **Update Port**, and you can use the default value.

Steps

1. Click and select a .dav firmware file matching with the target device model.
2. Click **Update**.

Device Restart

You can execute a soft restart of the device. For batch restarting, use the IP Configurator for one-click restarting.

Device Control

For the connected devices, you can enable **Auto Work** and **Timing** in the **Device Control**.



Figure 7-13 Device Control

Auto Work

When this parameter is enabled, the device will automatically start working upon power-up if it is not connected to the client software.

Note

If the device is connect to the client software, you should manually enable this function.

Timing

You can perform manual timing or NTP timing.

Note

Some connected devices support automatic time synchronization with the PC time.

- **Manual Timing**: After related parameters are configured, the device can either be set to the input time or synchronized with the current PC time.

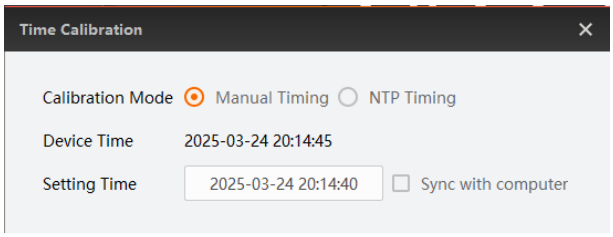


Figure 7-14 Manual Timing

Device Time

It displays the current time of the device.

Setting Time

You can manually set time here. If you check **Sync with computer**, the PC time will be synchronized to the device. Both **Device Time** and **Setting Time** will be updated.

Note

Only some devices support manual timing.

- **NTP Timing**: After the device establishes network connectivity with an NTP server, its time will be regularly synchronized according to the configured interval.

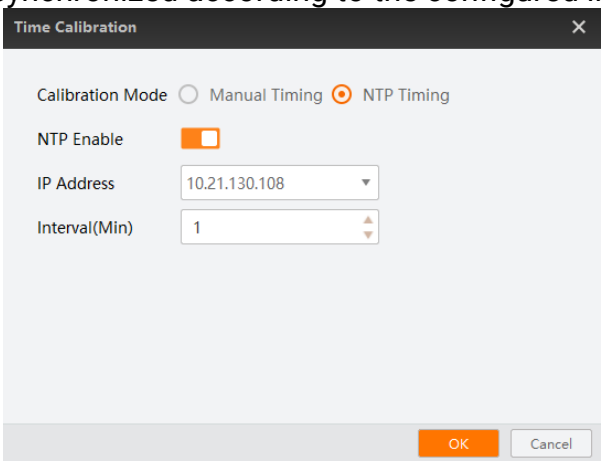


Figure 7-15 NTP Timing

NTP Enable

When this parameter is enabled, the device time will be corrected according to the parameters you configure.

IP Address

You can set the IP address of the NTP server.

Interval (Hour/Minute)

You can set the NTP time interval. The parameter unit (hour/minute) may differ by device model.

IP Address Configuration

The client software allows you to set a fixed IP address and IP anti-occupation (Exclusive) in **IP Address** → **Device Information**.

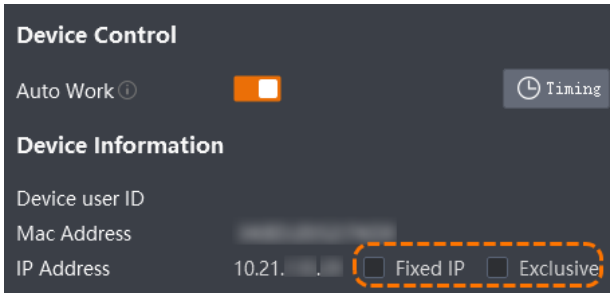


Figure 7-16 Fixed IP and Exclusive

Fixed IP

This parameter is disabled by default. You can adjust the static IP address of the device. If it is enabled, the device IP address is fixed, and you cannot change the static IP address, or switch between dynamic IP address and static IP address.

Exclusive

When this parameter is enabled, other applications on the PC cannot occupy or connect to the device.

7.2.6 Device Group

The client software supports grouping devices detected in the device list. In complex code reading scenarios with multiple devices, you can group them based on usage scenarios or tasks for centralized coordination and control.

Note

- For coordination among multiple devices, you can enable multicast mode or main-sub networking function.
- The devices can be grouped before or after connection.

Steps

1. You can click **User Defined** in the **Device List**, and right click **GigE** → **Add Group**.
2. (Optional) Right click **New Group**. You can rename or delete the new group if needed.
3. You can switch to specific tabs (e.g., Fixed/Handled), and right click the device. Hover over **Move To Group** and select a group name to move the device.

Note

Grouped devices can only be viewed under the tab of **User Defined**.

4. (Optional) Under the tab of **User Defined**, you can right click a device, and select **Remove From Group**. The removed devices will be moved to the original tab.

Note

If there are multiple groups, you can choose **Switch Group**.

7.3 Quick Start Guide

The **Read Config** module supports a quick code reading and fine-tuning process, helping you capture clear and complete codes.

Before You Start

- Connect to the device and enter the main window. The **Fast Config** tab under **Read Config** is displayed by default.
- Set the location for auto saving of fine-tuning parameters. You can select the current parameter or a specific polling parameter. For polling parameter, you can enter **Param Polling** on the left-side bar to view the each polling parameter.

Note

Polling parameters 1 to 8 are displayed by default. You can add new polling parameters in **Param Polling**, and up to 16 polling parameters can be added.

The flow of quick start guide is shown as below.



Figure 7-17 Flow of Quick Start Guide

Steps

1. (Optional) Click **Real Grabbing** to adjust the test object to the proper position within the field of view.

Note

In trigger scenarios, you should enable **Trigger On** located on the right side of **Real Grabbing**; and in non-trigger scenarios, disable the **Trigger On**.

2. Click **Auto Focus**, and the device will automatically adjust to the optimal focus position.

Note

- If multiple planes are detected, the plane with the maximum readable codes will be selected as the focal plane.
- For further fine-tuning of focus parameters, you can click **Focus Settings**.

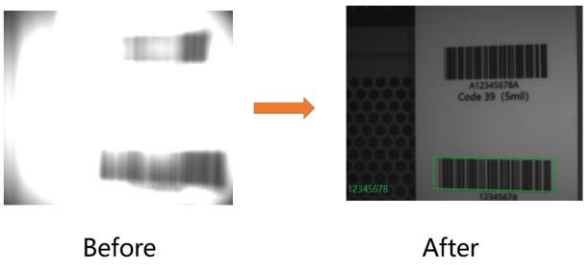


Figure 7-18 Auto Focus Effect

3. Click **Self Adapt**, and the device will automatically adjust the parameters, such as exposure, gain, light source, symbology, and code quantity.

Note

- During the self-adapt process, the client software supports incremental addition of symbologies. It only adds new symbologies, and will not remove pre-configured one.
- During the self-adapt process, Pharmacode is not compatible with 1D codes. If Pharmacode is enabled, the client software will not execute self-adapt tune on any 1D codes. If any 1D code is enabled, the client software will not execute self-adapt tune on Pharmacode.
- If further adjustment of self-adapt parameters and light source parameters is required, you can click **Selfadapt Settings** on the right. If the desired code still cannot be read, you can click **Code Select** to select more symbologies or adjust the number of codes.
- When setting the number of codes, the client software will execute self-adapt on 1D codes, 2D codes, and stacked codes based on the actual number of detected codes.

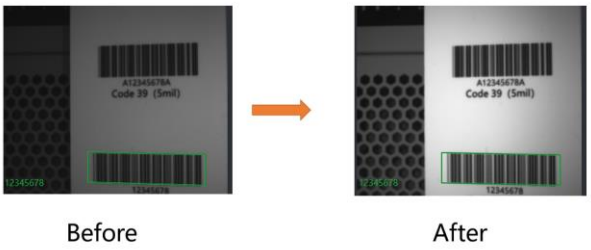


Figure 7-19 Self Adapt Effect

After successful self-adapt adjustment, the parameters will automatically be saved, and you can select the polling parameter to save. After saving, enter **Param Polling** on the left-side bar to view the each polling parameter.

- If the parameter auto-saving location is **Polling ParamN**, the fine-tuned parameters can be saved to this polling parameter and the current user parameters.
- If the parameter auto-saving location is **Current Param**, the fine-tuned parameters can be saved to **Polling ParamN** under the current user parameters.

Note

Polling parameters 1 to 8 are displayed by default. You can add new polling parameters in **Param Polling**, and up to 16 polling parameters can be added.

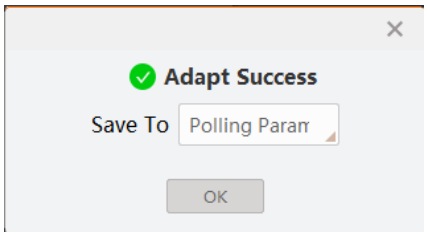


Figure 7-20 Save to Polling Param

4. Click **Start Work** or **Single Trigger** to start a single grabbing.

Note

- If there are requirements for communication protocols, I/O, formatted output, etc., you can switch to the corresponding module through the left-side navigation bar to configure parameters.
- In normal mode, the device filters duplicate codes regardless of whether triggering is enabled.
- In test mode, duplicate codes are not filtered when triggering is disabled, or duplicate codes within a single trigger signal are filtered when triggering is enabled.

5. You can view the real-time image and execute ROI drawing in the image preview panel on the right side. The image preview panel is divided into the following parts.



Figure 7-21 Image Preview Panel

- **Preview Panel Toolbar**: It mainly includes image capture tools, ROI tools, and auxiliary tools.
- **Image Display Area**: You can preview the images captured by the device here. If multiple devices are used, the image capture effects can be previewed via setting **Multi Frame**.
- **Image Capture Data Bar**: Select the image capture data to be displayed at the bottom of the image preview panel via in the lower left corner, including sensor rate, algorithm rate, transmission rate, image number, resolution, serial number, etc.

6. View history and statistical data.

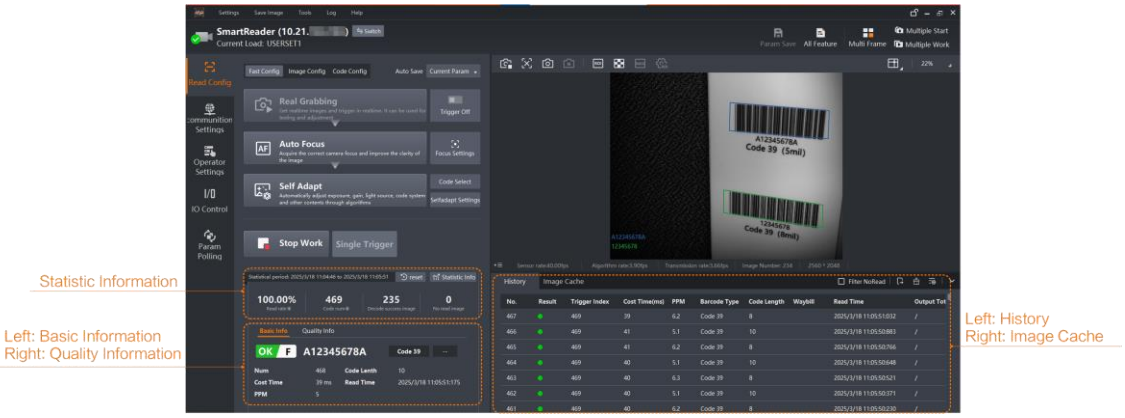


Figure 7-22 View Decoding Information

7. After settings, you should click to save parameters to user parameter sets. Otherwise, the settings will be lost after device restart.
8. After settings and preview, if you want to save the images, there are three ways for saving.

- **Client Image Storage**: Save the device images to the local PC through the client software.
- **Camera Image Storage**: Save images to storage medium inside the device.
- **FTP Image Storage**: Set up the local PC as an FTP server and the device as an FTP client, transferring the device images or decoding results to the local PC through the FTP service.

Chapter 8 Device Settings

Note

- The device now supports IDMVS client software V5.0.0 and above, which features significant changes in UI. For detailed information on the new client software, please refer to the latest version of ***IDMVS Client Software User Manual***. The following descriptions are still based on the older version of client software.
- The functions such as ***Characters Replace***, ***Multi-Reader Synchronization***, ***Lua Script***, and ***Set Parameter Polling*** should be used in IDMVS V5.0.0 and above.

Figure 8-1 IDMVS Client Software User Manual

8.1 Feature Tree Introduction

After the device is connected to the client software, and you can right click the device in **Device Connection**, and click **Feature Tree**.

Note

The parameters of the feature tree may differ by device models and firmware versions.

Table 8-1 Feature Tree Description

Name	Description
Device Control	It allows you to view the device's information, edit its name, and restart the device.
Read Setting	It allows you to set the device's running mode and select code types.
Image Setting	It allows you to set frame rate, exposure, gain, and Gamma, etc.
Algorithm Control	It allows you to set algorithm parameters.
Focus Control	It allows you to adjust focus for improving image quality.

Name	Description
SelfAdapt Adjust	It allows you to quickly adjust some parameters, such as exposure and gain.
LightSource Control	It allows you to set the light source's parameters.
Trigger and IO Control	It allows you to set parameters of input and output.
Filter Rules	It allows you to set the filtering rule of codes.
Contrast Control	It allows you to compare the data that the device reads with preset data and output contrast result. **Note** It is available only when the running mode is Normal.
Communication Control	It allows you to set parameters related to different communication protocols.
Result Setting Control	It allows you to set parameters of output contents. **Note** It is available only when the running mode is Normal.
Statistics Info	It allows you to count data related to code reading. **Note** It is available only when the running mode is Normal.
User Set Control	It allows you to save and load configured user set.
Diagnose Event Report	It allows you to monitor memory and CPU usage rate, and let you know when there is a crash, higher CPU usage rate, insufficient memory, etc.

8.2 Running Mode Settings

After connecting the device, go to the left corner of live view window, and select the running mode.

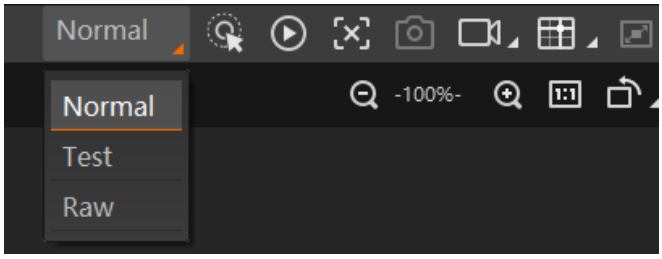


Figure 8-2 Select Running Mode

Table 8-2 Running Mode Description

Device Mode	Description
Test Mode	It is used during device debugging. The device outputs images that are acquired in real time, and displays code information.
Normal Mode	It is used during device normal operation. After reading code in image, the device outputs image and code information.
Raw Mode	It is used during image data testing. The device outputs raw data and displays code information.

Note

- Stopping the real-time acquisition is required before selecting the running mode.
- The running mode may differ by device model.
- For some devices, Raw Mode cannot be set here, and you can go to **Device Control** to set it.

8.3 Image Quality Settings

This section introduces how to set image-related parameters of the device via client software.

Note

For different models of the device, the specific parameters may differ, and the actual device you purchased shall prevail.

8.3.1 Set Image

You can set parameters like exposure time, gain, Gamma, acquisition frame rate, acquisition burst frame count, etc. in **Image Settings** area.

Note

- For specific parameter range like exposure time, gain and acquisition frame rate, refer to the device's specification for details.
- Specific parameters of this function may differ by device models.

Table 8-3 Set Image Parameters

Name	Description
Exposure(μs)	You can increase exposure time to improve image brightness. **Note**

Name	Description
	Increasing exposure time may reduce acquisition frame rate, and impact image quality.
Gain(dB)	You can increase gain to improve image brightness. **Note** Increasing gain will create more image noises, and impact image quality.
Gamma	Gamma allows you to adjust the image contrast. It is recommended to reduce Gamma to increase brightness in dark background.
Acquisition Frame Rate(fps)	Acquisition frame rate refers to the image quantity that is acquired by the device per second. **Note** This function may differ by device model.
Acquisition Burst Frame Count	Acquisition burst frame count refers to the output image quantity when the device is triggered once.

Note

The value range of exposure time and gain, and the maximum value of acquisition frame rate are related to the device model. Refer to the device's specifications for specific parameters.

8.3.2 Set Exposure

The device supports the following types of exposure modes, including off, once, continuous, and exposure alternate. Refer to the table below for details.

Table 8-4 Exposure Mode

Exposure Mode	Description
Off	The device exposures according to the value configured by the user in **Exposure Time(μs)**.
Once	The device adjusts the exposure time automatically according to the image brightness. After adjusting once, the device will switch to off mode.
Continuous	The device adjusts the exposure time continuously according to the image brightness.
Exposure	The device executes exposure alternatively according to the

Exposure Mode	Description
Alternate	configured multiple exposure values.

Once/Continuous Mode

Steps

1. Right click the device in **Device Connection**, and click **Feature Tree**.
2. Go to **Image Setting**, and select **Once** or **Continuous** as **Exposure Auto** according to actual demands.
3. Select **Global** or **Partial** as **Exposing Area** according to actual demands.
4. (Optional) Set specific exposure area if **Partial** is selected.

- Area Width: It refers to the horizontal resolution in partial exposure area.
- Area Height: It refers to the vertical resolution in partial exposure area.
- Offset X: It refers to the horizontal coordinate of the upper-left corner in partial exposure area.
- Offset Y: It refers to the vertical coordinate of the upper-left corner in partial exposure area.

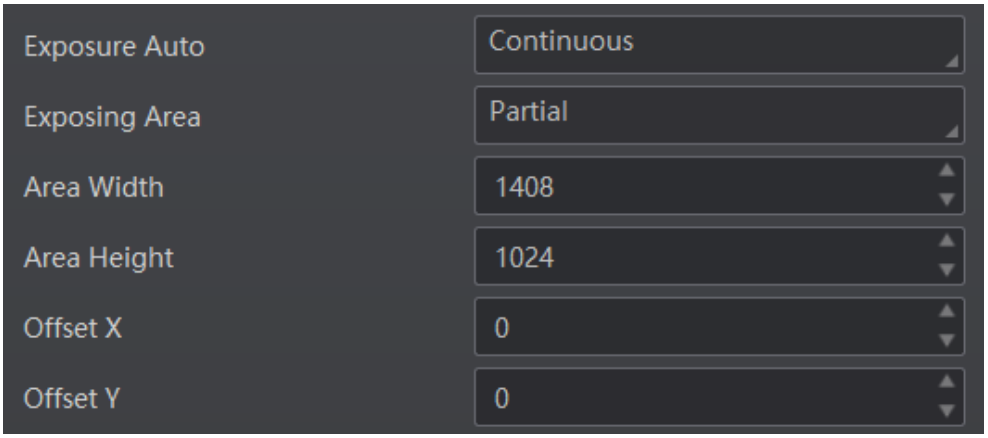


Figure 8-3 Once or Continuous Exposure

Exposure Alternate Mode

Steps

1. Right click the device in **Device Connection**, and click **Feature Tree**.
2. Go to **Image Setting**, and enable **Exposure Alternate**.
3. Select **Exposure1/2/3/4/5/6/7/8** in **Exposure Index**.
4. Enable **Exposure Enable**.
5. Set exposure value in **Exposure Time**.
6. Repeat Step 3 to Step 5 and configure exposure values for each parameter set.

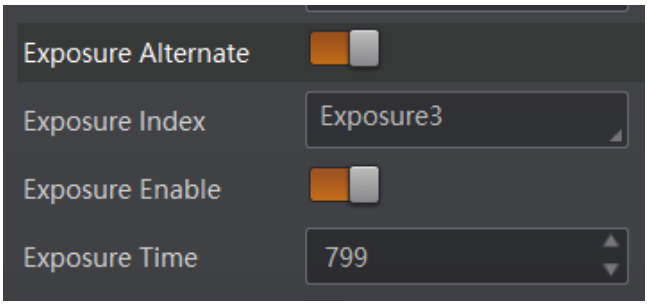


Figure 8-4 Exposure Alternate

Note

The exposure alternate may differ by device model.

8.3.3 Set Gain

The device supports the following types of gain modes, including off, once, continuous, and gain alternate. Refer to the table below for details.

Table 8-5 Gain Mode

Gain Mode	Description
Off	The device adjust gain according to the value configured by the user in **Gain(dB)**.
Once	The device adjusts gain automatically according to the image brightness. After adjusting once, the device will switch to off mode.
Continuous	The device adjusts gain continuously according to the image brightness. **Note** This mode is set by default for the device with auto focusing.
Gain Alternate	The device executes gain alternatively according to the configured multiple gain values.

Once/Continuous Mode

Steps

1. Right click the device in **Device Connection**, and click **Feature Tree**.
2. Go to **Image Setting**, and select **Once** or **Continuous** as **Gain Auto** according to actual demands.



Figure 8-5 Once or Continuous Gain

Gain Alternate Mode

Steps

1. Right click the device in **Device Connection**, and click **Feature Tree**.
2. Go to **Image Setting**, and enable **Gain Alternate**.
3. Select **Gain1/2/3/4/5/6/7/8** in **Gain Index**.
4. Enable **Gain Enable**.
5. Set gain value in **Alternate Gain**.
6. Repeat Step 3 to Step 5 and configure gain values for each parameter set.

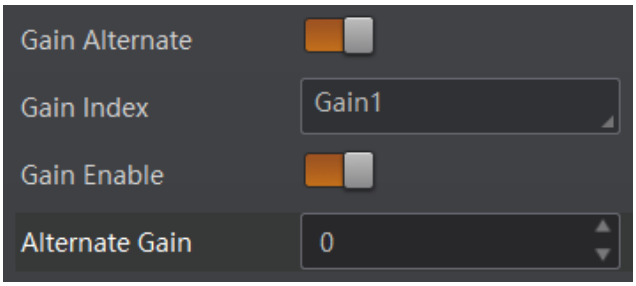


Figure 8-6 Gain Alternate

Note

The gain alternate may differ by device model.

8.3.4 Set Parameter Polling

Note

The following descriptions are based on the IDMVS V5.0.0 and above.

For dynamic and complex code-reading scenarios (e.g., varying code positions or fluctuating lighting), the parameter polling function allows you to preconfigure multiple sets of imaging parameters. As the code reader executes grabbing, it automatically switches among these parameter sets to adapt to environmental changes, ensuring stable and accurate code recognition in dynamic scanning scenarios. This section takes multiple parameter polling as an example to introduce this function.

Before You Start

- You should disable **Real Grabbing** of the code reader.

Note

If **Real Grabbing** is enabled, parameter polling cannot be configured.

- The **Trigger Mode** has been enabled, and the **Trigger In Source** is not **Brightness**.

Steps

1. In the main interface navigation bar of IDMVS, select **Param Polling**.
2. From the dropdown menu at the top of the **Param Polling** page, choose **Multiple Polling**.



Figure 8-7 Parameter Rolling

You should enable any two or more polling parameters. The code reader can alternately apply the enabled polling parameters for code reading until a code is successfully captured, and then the polling stops. The polling sequence between the 8 sets of parameters is shown in the following figure. The polling rule begins with the optimal parameter group and proceeds through the enabled parameter groups in ascending order. For example, if the enabled polling parameters are 1, 2, 3, 4, 5, and the current parameter is 3 (i.e., group 3 is set as the optimal group), the polling sequence will be 3, 4, 5, 1, 2, which constitutes one polling cycle.

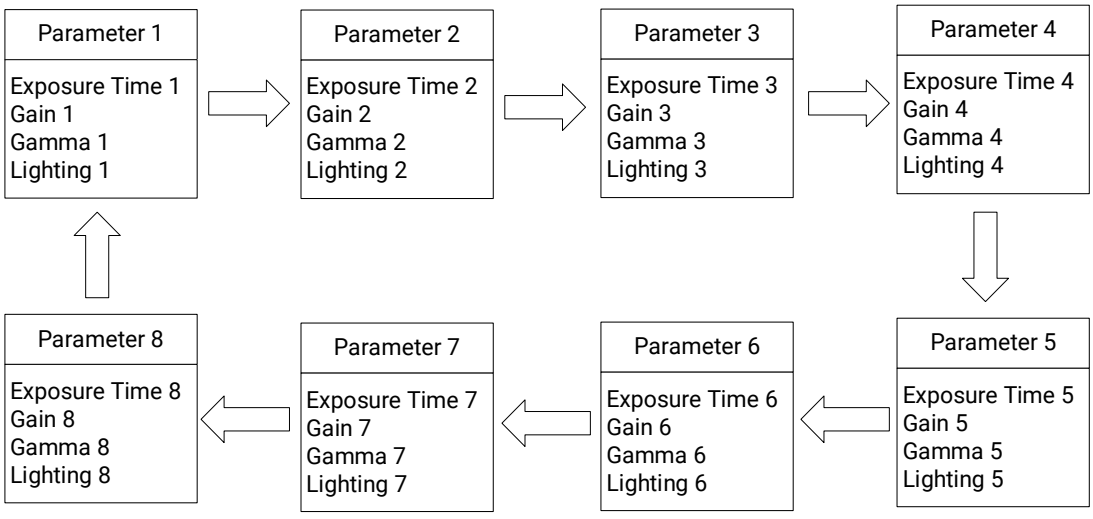


Figure 8-8 Polling Diagram

Note

If you need to execute single polling, select **Param** * (* is the polling group number) to apply a specific parameter group. The current parameter polling interface only supports configuring parameters of the selected group, and parameters of other polling groups are unavailable. The code reader will apply the currently selected polling parameters during operation.

3. Configure the target polling parameters. The descriptions of polling parameters are as follows:

Note

- The polling parameters may differ by device firmware version.
- The modified parameter cells are highlighted in purple.
- The parameters for single-group parameter polling are similar to those for multi-group parameter polling, so this content will take the multiple-group parameter polling parameters as an example.

- **Polling Param Name**: Customize the name of the polling parameter.
- **Polling Param ChgTime**: Display the last editing time of polling parameters. If there is no editing, 1970-01-01 is displayed by default.
- **Polling Param Enable**: Enable/disable the current polling param in the polling sequence of the code reader.

Note

It is only available for **Multiple Polling**. At least 2 polling parameters are required.

- **Polling SingleParam Timeout(ms)**: Set the maximum waiting time for code reading in the current polling parameter. If no codes are read during this period, the code reader will stop reading codes and apply the next polling parameter.
- **Polling SingleParam Period**: Configure frame output quantity during code reading with the current polling parameter.
- **Polling ROI Region Index**: Set the ROI index for the code reader to read codes by applying the current polling parameter. If 0 or an invalid index is set, the code reader will read all codes in the field of view.
- **Code Info Settings**: Click **Part Code** to select code types on the **Bar Code Info Setting** page, and configure their valid bit ranges.

Note

At the top of the **Bar Code Info Setting** page, you can select all code types at once by checking the **All** button.

- **Internal Light Source**: Enable light channels on the light source diagram of the code reader. Click **All** to turn on all lights. After turned on, the lights are in green color.

Note

The light source diagram corresponds to the built-in light source on the code reader.

- **External Light Source**: If the code reader is connected to external light sources through I/O pins, you can select pin No. and enable light sources.
- **Image Setting**: Refer to section ***Image Quality Settings*** for details of image-related parameters.
- **Polling Focus Pos Enable**: Enable/disable focal length configuration during parameter polling. When it is enabled, set the lens focal length of the code reader through **Polling Focus Pos**.
- **Polling Time (ms)**: Set the polling duration. The polling mode requires at least 2 output frames to determine the polling stopping status.

Note

You can configure the parameter at the bottom of the **Param Polling** page only when multiple polling is selected.

- **Polling Period**: Set the number of periods for parameter polling operation. All enabled polling parameters constitute a polling cycle.

Note

You can configure the parameter at the bottom of the **Param Polling** page only when multiple polling is selected.

- **Polling Stop Trigger Enable**: Whether to configure a stop condition for triggered parameter polling. When it is enabled, stop conditions can be set through the **Polling Stop Condition**. Available options are as follows.
  - **Single Polling Frame**: Stop current parameter polling based on the number of codes read within a single frame image. After selection, the number of codes can be specified through **Polling Code Num** to trigger the stop.
  - **Whole Polling Period**: Specify the number of codes read within the whole polling period. After selection, the number of codes can be specified through **Polling Code Num** to trigger the stop.

Note

You can configure the parameter at the bottom of the **Param Polling** page only when multiple polling is selected.

4. Repeat Step 3 to configure the parameters of the target polling group. You can use the following functions when configuring the parameters of other groups.

- **Search**: Support parameter searching based on input content. If a parameter contains the input content, the corresponding parameter is highlighted in orange.

Note

Searching function is case-sensitive.

- **Add Param**: Support adding a new group of polling parameters.

Note

Only some code reader models with firmware version V4.0.0 and above support adding polling parameter groups. Up to 8 groups can be added (16 groups in total). Refer to the actual interface for details.

- **Restore Default**: Restore all parameters of the current polling group to default values.
- : Click this icon to set the current polling group as follows.
  - **Col Restored Default**: Restore all parameters of the current polling group to default values.
  - **Apply To All**: Apply the parameters of the current polling group to other polling groups.
  - **Apply To Other**: Apply the parameters of the current polling group to the specified polling group.

5. Click **Save** at the top of the **Param Polling** page. Once saved, the polling parameters will be triggered when the code reader starts operation.

8.3.5 Set Light Source

Light source control allows you to enable the device's light source and aiming system, and set related parameters according to actual demands. There are three types: with built-in light source, with external light source, and without light source.

Note

Light source parameters may differ by device models.

With Built-In Light Source

In this type, the built-in light source will be turned on during code reading, and you can set the related parameters.

Steps

1. Select **Own Lighting** as **Light Type**.
2. Click lights on the light source illustration to turn on or turn off lights on different directions.

Note

The specific lighting selector may differ by device model. For devices with four-channel light source, you can check **All** to turn on all lights. For devices with six-channel light source, you can click **All On** or **All Off** to turn on or turn off all lights.

3. Select **Lighting Mode** according to actual demands.
- **Strobe** means the light flashes at a specific interval.
- **Long** means the light is solid.

Note

Disable light source before you change the **Lighting Mode**.

4. (Optional) Enable aiming system according to the needs.
5. (Optional) Set the following parameters according to the needs.
- **Lighting Duration**: It sets the lighting duration, and the unit is μs.
- **Lighting Delay Time**: It determines the delay time for lighting after exposure, and the unit is μs.
- **Precharge Time**: It determines how earlier the light source starts lighting before exposure, and the unit is μs.

With External Light Source

In this type, the external light source will be turned on via trigger output signal, and you can set the related parameters.

Steps

1. Select **External Lighting** as **Light Type**.
2. Set the following parameters.
- **Line Out Duration:** The lighting duration of the external light source, and the unit is μs.
- **Line Out Delay Time:** It sets the delay time for lighting after device outputs event source, and the unit is μs.
- **Line Out Ahead Time:** It sets how earlier the external light starts lighting before the device outputs event source information, and the unit is μs.

Without Light Source

If you select **Non-Lighting** as **Light Type**, all lights will be turned off, and you do not need to set any parameters.

8.3.6 Set Smart Tune

The smart tune function allows you to adjust the device's focus position, exposure, gain, etc. by one-key operation, and supports self-adaptive adjustment.
The smart tune function has two methods to be realized, including smart tune by pressing tune button and smart tune via the client software.

Note

The smart tune function is supported by some device models and firmware versions.

Smart Tune by Pressing Tune Button

Note

- The parameters of the smart tune may differ by device models and firmware versions.
- During the process of smart tune, the focus parameters and self-adaptive parameters will be adjusted in turn.

Steps

1. Go to **Image Setting**, click **All Features** on the right corner, and find **SmartTuneControl**.
2. Enable **Button Tune**, and disconnect the device from the client software.

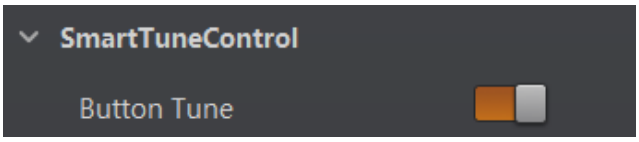


Figure 8-9 Button Tune

Note

Smart tune by pressing the tune button is not supported if the device is connected to the client software.

3. Hold the tune button for 3 seconds, and the device starts smart tune.
   - During smart tune process, the status indicator flashes in green and red colors alternatively.
   - If smart tune succeeds, the status indicator is solid green lasting 3 seconds and then restores.
   - If smart tune fails, the status indicator is solid red lasting 3 seconds and then restores.
4. (Optional) Hold the button for 3 seconds again during smart tune process, and the smart tune will be cancelled.

Smart Tune via Client Software

Apart from pressing tune button to realize smart tune, you can also configure parameters via the client software to realize it.

Before You Start

Make sure that the device is not in trigger mode, and its running mode is test.

Steps

1. Go to **Image Setting**, click **All Features** on the right corner, and find **SmartTuneControl**.

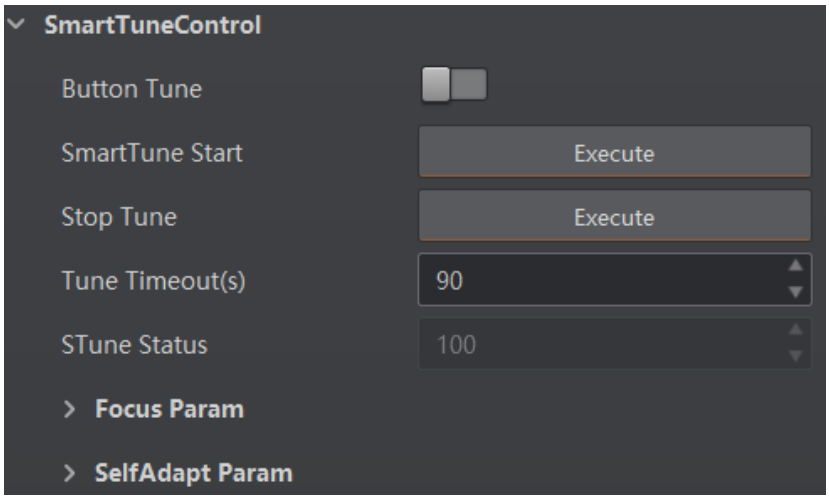


Figure 8-10 Smart Tune Control

2. (Optional) Set **Tune Timeout.** If the self-adaptive adjustment exceeds configured value, it will stop automatically and show the timeout information.
3. Click **Execute** in **Smart Tune Start** to let the device start smart tune, and a window of smart tune will be displayed for you to view the effect.

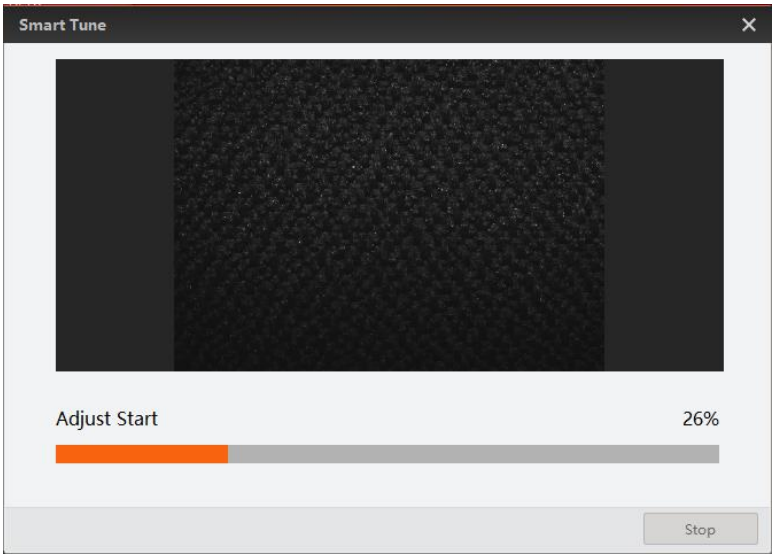


Figure 8-11 Smart Tune Start

4. (Optional) View smart tune process via **Smart Tune Status**.
5. (Optional) Click **Execute** in **Stop Tune** to stop smart tune process.
6. (Optional) You can set focus-related parameters and self-adaption parameters via **Focus Param** and **SelfAdapt Param**.

Note

Refer to section ***Set Focus*** and section ***Set Self-Adaptive Adjustment*** for details.

8.3.7 Set Focus

The device supports the auto focus function according to the code position in the field of view. Currently, three types of auto focus are supported, including global auto focus, global manual focus, and ROI focus.

Note

Make sure that the device's running mode is test before performing focus, and switch to the normal running mode after the focus is completed.

Global Auto Focus

The global auto focus allows you to adjust lens focus in a global field of view just by once.

Steps

1. Go to **Image Settings** → **Focus Param** → **Focus Mode Selector**, and select **Whole Area Focus**.

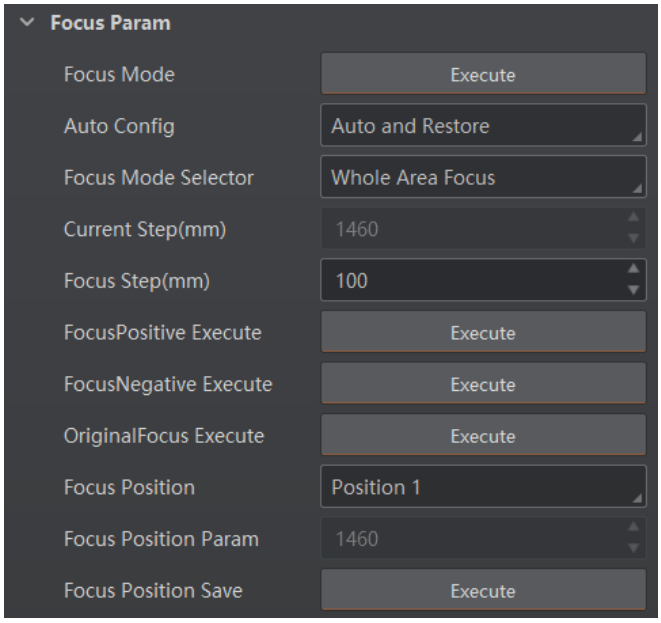


Figure 8-12 Global Focus

2. Click in the live view window, and click it again to stop acquisition and make sure there is an image in the window.
3. Select the focus mode in **Auto Config**:

- **Full Auto**: In this mode, the device will automatically change parameters like focus position, exposure, gain, Gamma and light source when adjusting focus.
- **Motor Only**: In this mode, the device will change focus position only when adjusting focus.
- **Auto and Restore**: In this mode, the device will automatically change parameters like focus position, exposure, gain, Gamma and light source when adjusting focus, and keep

focus position and restore other parameters after completing focus adjustment.
4. Click **Execute** in **Auto Focus Start**, and the device starts to adjust focus automatically.

Note

Focus-related parameters cannot be configured during auto focus process. After the auto focus is finished, parameters can be configured again.

5. (Optional) Select the position parameter from **Focus Position**.
6. (Optional) View the score in **Focus Score** after the auto focus is finished.

Global Manual Focus

The global manual focus requires manual focus according to the images displayed in the live view window.

Steps

1. Go to **Image Settings** → **Focus Param** → **Focus Mode Selector**, and select **Whole Area Focus**.
2. Click  in the live view window, and click it again to stop acquisition and make sure there is an image in the window.
3. (Optional) Select **Focus Position** according to actual demands and **Focus Position Param**.
4. Set **Focus Step** according to actual demands.
5. Click **Execute** in **Focus Positive Execute** and **Focus Negative Execute** to adjust focus position.
6. (Optional) View **Focus Score** to know the score of the focus adjustment.
7. (Optional) Select the position parameter from **Focus Position**, and click **Execute** in **Focus Position Save** to save the focus position after adjusting focus.
8. (Optional) Click **Execute** in **Original Focus Execute** to let the focus back to its original position.

ROI Focus

The ROI focus allows you to adjust lens focus in the ROI by drawing specific area.

Note

The ROI focus is applicable to the scenario where multiple codes with different depth of fields exist.

Steps

1. Go to **Image Settings** → **Focus Param** → **Focus Mode Selector**, and select **ROI Area Focus**.

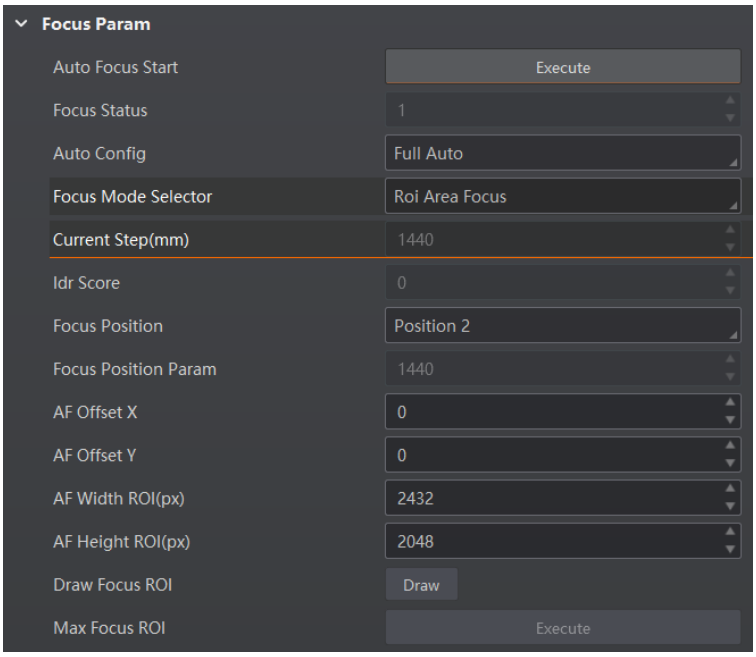


Figure 8-13 ROI Focus

2. Click  in the live view window, and click it again to stop acquisition and make sure there is an image in the window.
3. Click **Draw** in **Draw Focus ROI**, and draw ROI by dragging the mouse in live view window.

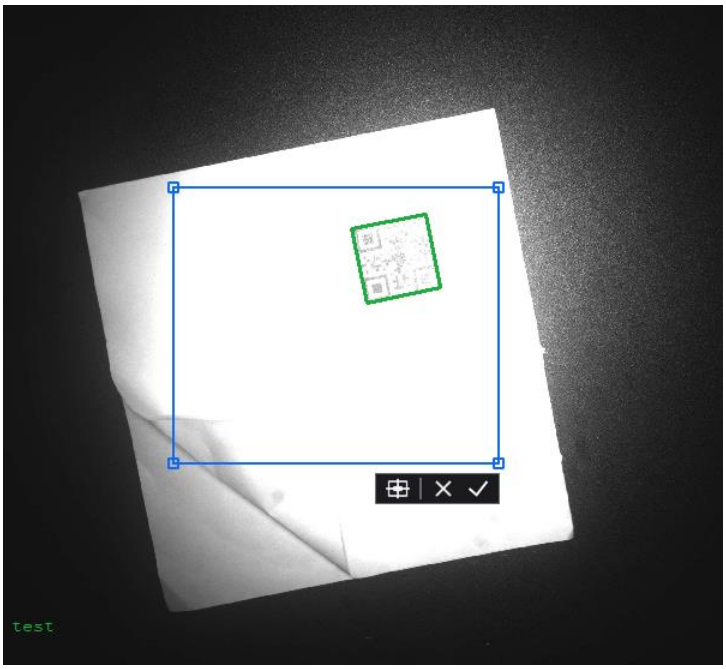


Figure 8-14 Draw Focus ROI Area

4. (Optional) Set the following parameters to adjust ROI size and position.

- **AF Offset X**: It is X coordinate of the upper-left corner in ROI where you execute auto focus.
- **AF Offset Y**: It is Y coordinate of the upper-left corner in ROI where you execute auto focus.

- **AF Width ROI(px)**: It refers to the width in ROI where you execute auto focus.
- **AF Height ROI(px)**: It refers to the height in ROI where you execute auto focus.

5. (Optional) Click **Execute** in **Max. Focus ROI** to have a global focus.
6. (Optional) Repeat Step 3 if you want to set multiple ROIs.
7. Refer to Step 3 to Step 6 in global focus to set auto focus.

8.3.8 Set Self-Adaptive Adjustment

The function of self-adaptive adjustment can automatically adjust exposure, gain, code type, light source, and other parameters to have a better code reading effect.

Note

The function and parameters of self-adaptive adjustment may differ by device models.

Before You Start

Make sure you have connected the device to the client software and have stopped acquisition.

Steps

1. Go to **Image Settings** → **SelfAdapt Param**.
2. Select **Adjust Source** according to actual demands.

- **Default Param**: It adjusts the default parameters.
- **Polling Param**: It adjusts parameters configured in polling. After **Polling Param** is selected as **Adjust Source**, you should select a polling parameter group from **Polling Param Index** and enable or disable **Focus Enable**.

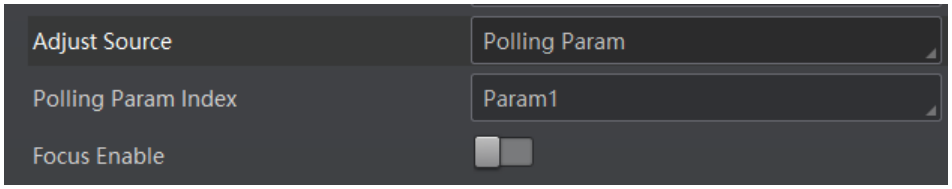


Figure 8-15 Polling Parameter

3. (Optional) Set **Exposure Max** or **Gain Max** according to actual demands.

- **Exposure Max**: It sets the max. exposure during the self-adaptive adjustment.
- **Gain Max**: It sets the max. gain during the self-adaptive adjustment.

4. (Optional) Set self-adaptive code type in **Code Type Mode**.

- **Code SelfAdapt**: All code types added in field of view will be self-adaptive.
- **1D Code**: 1D code types added in field of view will be self-adaptive.
- **2D Code:** 2D code types added in field of view will be self-adaptive.
- **Stack Code:** Stacked code types added in field of view will be self-adaptive.

5. (Optional) Set light source parameters in **Lighting Mode**.

- **Light Adapt**: The client software will select the best one from all lighting options during the self-adaptive adjustment.

- **All Light Enable**: All light sources will be turned on during self-adaptive adjustment process.
- **All Light Disable**: All light sources will be turned off during self-adaptive adjustment process.

6. Click **Execute** in **Adjust Start**. The device will automatically acquire images and perform self-adaptive adjustment, and stop acquisition after adjustment is completed.

Note

If the adjustment is completed, the client software displays the spent time and prompts adjustment succeeded, and the exposure and gain are the values configured in the self-adaptive adjustment. If the adjustment failed or is timeout, the client software prompts adjustment failure or timeout.

8.3.9 Set Mirror X

The device supports the mirror X functions.
Go to **Image Settings** → **Other Features** to set **Mirror X** according to actual demands. If the parameter is enabled, the image will be reversed in a horizontal way.

Note

The **Mirror X** is enabled by default, and it may differ by device models.

8.3.10 Set Test Pattern

Test pattern helps troubleshooting image problems and images in the test pattern are only for test. When exceptions occur in images acquired by the device in real time, you can check if images in the test pattern have similar problems to determine the cause of an exception.

Note

- The test pattern is available in the test or raw running mode.
- Specific parameters of this function may differ by device models.

Go to **Image Settings** → **Other Features**, and set **Test Pattern** according to actual demands.

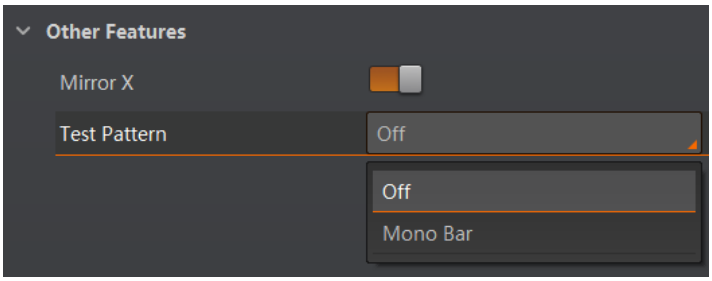


Figure 8-16 Set Test Pattern

8.4 Code Algorithm Settings

The code reader supports reading multiple types of 1D code, 2D code, and stacked codes, and you can add and set code parameters via the client software.

8.4.1 Add Code

Adding code before you set code parameters via the client software. In **Algorithm Settings**, you can add different types of codes according to actual demands.
In **Algorithm Settings**, you can select types of codes to be read, and set the **Number of 1D Code**, **Number of 2D Code**, or **Number of Stack Code** according to actual demands.

Note

- For different models of the device, the specific parameters may differ, and the actual device you purchased shall prevail.
- The number of selected symbologies and codes may affect the code recognition time. More symbologies or more codes selected may consume more time to recognize codes in the image. Please select code according to the actual demands.
- The code reader may output actual code quantity when the actual code quantity is less than the code quantity set in the client software.

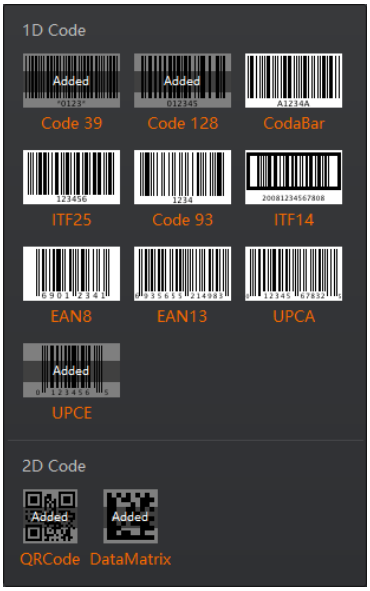


Figure 8-17 Add Codes

8.4.2 Set Code Reading ROI

Algorithm ROI (Region of Interest) allows the device to execute algorithms and read codes

on the specific area you selected, improving code reading efficiency.
Currently, multiple ROIs can be configured, and the device outputs codes according to the ROI No. (e.g. Region 1, Region 2, and Region 3…) in turn. The client software supports drawing single group of ROI, drawing ROIs in Batch, and drawing ROI via chessboard.

Note

- If no code is recognized in the algorithm ROI, the device will output “noread”.
- Before drawing ROIs, make sure that there is an image in the live view window after stopping preview.
- If no algorithm ROI is enabled, the full screen is the algorithm ROI by default.
- This function may differ by device models.

Draw Single Group of ROI

Steps

1. Go to **Algorithm Settings**, and find **Algorithm ROI**.
2. Click **Draw** in **Draw ROI** to draw the ROI in the live view window.

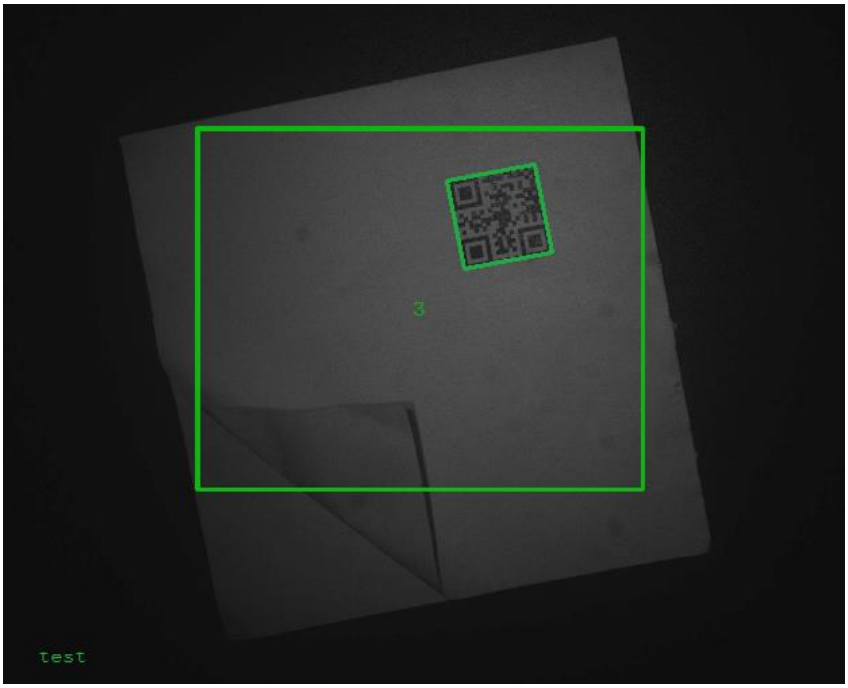


Figure 8-18 Draw ROI

3. (Optional) Repeat Step 2 to draw multiple ROIs according to actual demands.

Note

The client software only parse codes in the ROI you drawn.

4. (Optional) Set other ROI-related parameters according to the actual demands.
- **ROI Index**: It indicates different ROIs and ranges from 0 to 149 corresponds 1 to 150 ROIs.

- **AlgoRegionWidth**: It refers to the width in algorithm ROI.
- **AlgoRegionHeight**: It refers to the height in algorithm ROI.
- **AlgoRegionLeftX**: It refers to the X coordinate of the upper-left corner in algorithm ROI.
- **AlgoRegionLeftY**: It refers to the Y coordinate of the upper-left corner in algorithm ROI.

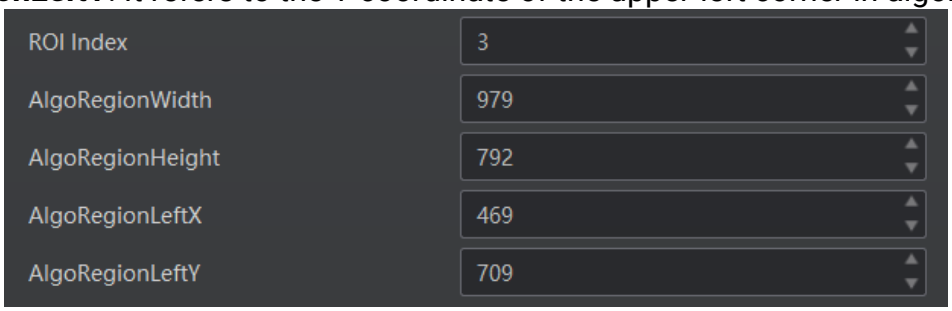


Figure 8-19 ROI Parameters

5. (Optional) Click **Execute** in **Restore Max. Algorithm ROI** to restore the ROI to the full screen.
6. (Optional) Click **Execute** in **Clear All ROI** to delete all ROIs.
7. (Optional) Right-click the ROI and click **Delete** to delete the selected ROI.
8. (Optional) Enable **ROI Link IO Enable** in **Algorithm Control**, and there will be prompts by the output device when codes are not read in any ROI.

Note

Make sure that the output device is connected when using this function.

Draw ROI in Batch

Steps

1. Go to **Algorithm Settings**, and find **Algorithm ROI**.
2. Click **Batch** to set parameters according to actual demands.
- **Area Offset**: It sets the pixel quantity from the starting point when the ROI is in horizontal and vertical direction from the full resolution.
- **Area Size**: It sets the pixel quantity in the horizontal and vertical direction of the ROI.
- **ROI Number**: It sets the row and column quantity.
- **Row Spacing**: It sets the interval between rows.
- **Column Spacing**: It sets the interval between columns.

3. Click **OK** after settings.
4. Repeat other optional steps mentioned in drawing single group of ROI according to actual demands.

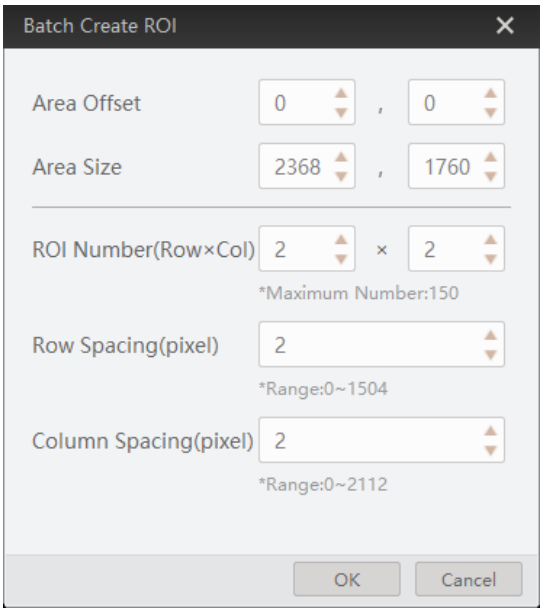


Figure 8-20 Draw ROI in Batch

5. (Optional) Enable **ROI Link IO Enable** in **Algorithm Control**, and there will be prompts by the output device when codes are not read in any ROI.

Note

Make sure that the output device is connected when using this function.

Draw ROI via Chessboard

Steps

1. Go to **Algorithm Settings**, and find **Algorithm ROI**.
2. Click **Execute** in **Chessboard ROI**, set parameters, and click **OK** after setting.

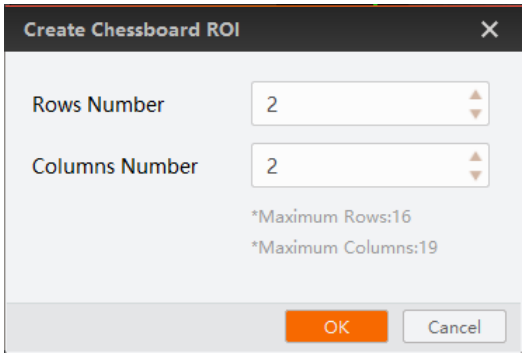


Figure 8-21 Create Chessboard ROI

3. (Optional) Click to restore the ROI to full screen, and click to clear all ROIs.
4. Click after creating ROI, and the red frame becomes green as shown below.

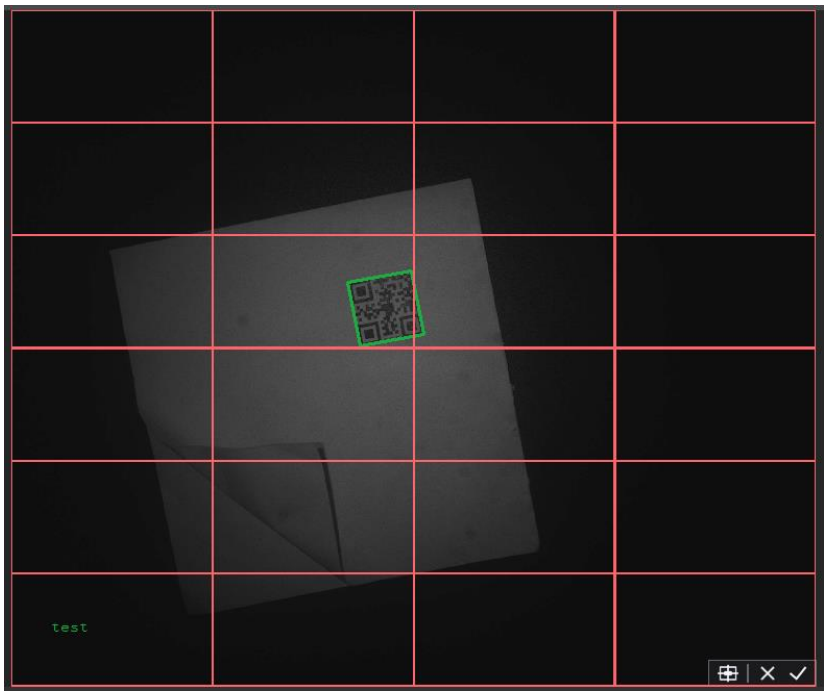


Figure 8-22 Draw ROI via Chessboard

Note

The figures above are for reference only. Refer to the actual conditions.

5. Repeat other optional steps mentioned in drawing single group of ROI.
6. (Optional) Enable **ROI Link IO Enable** in **Algorithm Control**, and there will be prompts by the output device when codes are not read in any ROI.

Note

- The figures above are for reference only. Refer to the actual conditions.
- When no ROIs are enabled, the current ROI defaults to full screen.
- When some ROIs are enabled, the disabled ROI is located at the top-left corner (0, 0) with a size of 128 × 128 pixels.

8.4.3 Set Algorithm Parameter

In **Algorithm Parameter**, select **1DCode**, **2DCode** or **StackCode** as **Arithmetic Type**, and then you can set the related parameters.

Note

- You should have selected at least one type of 1D code, 2D code or stacked code.
- For different models of the device, the specific parameters may differ, and the actual device you purchased shall prevail.

Set 1D Code

Waiting Time

Waiting time refers to the maximum running time of algorithm, and its unit is ms. The code reader will stop parsing the images and return results if the time is exceeded the waiting time configured. When the value is set as 0, the actual running time of algorithm will prevail.

Code Color

It defines the readable code color. **WhiteCodeOnBlackWall** means that the client software can recognize the white code with black background. **BlackCodeOnWhiteWall** means that the client software can recognize the black code with white background. **Adaptive** means that the device can recognize both types of codes mentioned above. However, the reading time will be longer compared with the above two modes.

Code 39 Check

Enable this parameter if Code 39 uses the parity bit.

Note

You need to select **Code 39** in **Select Code**.

ITF 25 Check

Enable this parameter if ITF 25 uses the parity bit.

Note

You need to select **ITF 25** in **Select Code**.

Code Quality Enable

If it is enabled, the client software will judge the quality of 1D code and output overall grade. Currently, this parameter is only applicable to Code 39 and Code 128.

Code Score Enable

If it is enabled, the client software will evaluate the code reading environment for 1D code and output code score.

Accurate Timeout Enable

If it is enabled, the accuracy of algorithm timeout will improve.

GS1 Format Analysis

If it is enabled, raw data strings from codes will be parsed into structured data fields with clear meanings; when disabled, the unprocessed raw material will be output.

Set 2D Code

Waiting Time

Waiting time refers to the maximum running time of algorithm, and its unit is ms. The code reader will stop parsing the images and return results if the time is exceeded the waiting time configured. When the value is set as 0, the actual running time of algorithm will prevail.

Algorithm Running Mode

It is used to be set the algorithm operating mode. It includes **HighSpeed**, **HighPerformance**, and **Balance**. **HighSpeed** focuses on recognition speed, and the algorithm can recognize the code rapidly, while **HighPerformance** refers to the algorithm can recognize the code that has distortion, spot or white gap, but its recognition speed is slow. **Balance** refers to the algorithm makes a balance between speed and performance.

2D Code Max. Size

It refers to the max. recognizable code width. The 2D code will not be recognized if its width exceeds the configured value.

Mirror Mode

It is useful when the recognized image is a mirror one, mirroring in X coordinate. Three modes are available: **Adaptive**, **Mirror**, and **NonMirror**.

Downsampling Level

It refers to the pixel sample size that the code reader takes. Increasing this parameter will improve the code reading efficiency at the expense of code recognition rate.

Code Color

It defines the readable code color. **WhiteCodeOnBlackWall** means that the client software can recognize the white code with black background. **BlackCodeOnWhiteWall** means that the client software can recognize the black code with white background. Adaptive means that the device can recognize both types of codes mentioned above. However, the reading time will be longer compared with the above two modes.

Discrete Flag

Continuous stands for the minimum units in the "L" shaped sides of the DM code are continuous, or the minimum units in the concentric square like ⧈ or ■ in the QR code are continuous. Usually the continuous code uses squares as the minimum units.
Discrete stands for the minimum units in the "L" shaped sides of the DM code are discrete, or the minimum units in the concentric square like ⧈ or ■ in the QR code are discrete. Usually the discrete code uses dots as the minimum units.
Adaptive stands for the device can recognize both continuous code and the discrete code.

QR Distortion Correction

If the QR code or DM code is distorted, you can enable this parameter to improve code recognition rate. The parameter is disabled by default.

Note

If you enable this parameter, the more time will be consumed to recognize the codes in the image.

DM Code Shape

It defines the recognizable code shape. **Square** stands for square mode: If the 2D code is square shaped, it can be recognized by the device. **Rectangle** stands for rectangle mode: If the 2D code is rectangle shaped, it can be recognized by the device. **Adaptive** stands for compatible mode: The device can recognize 2D codes of both the above-mentioned two shapes.

2D Code Quality Enable

If it is enabled, the client software will judge the quality of 2D code and output overall grade. Currently, this parameter is only applicable to DM code and QR code.

Code Score Enable

If it is enabled, the client software will evaluate the code reading environment for 2D code and output code score.

Accurate Timeout Enable

If it is enabled, the accuracy of algorithm timeout will improve.

GS1 Format Analysis

If it is enabled, raw data strings from codes will be parsed into structured data fields with clear meanings; when disabled, the unprocessed raw material will be output.

Set Stacked Code

Waiting Time

Waiting time refers to the maximum running time of algorithm, and its unit is ms. The code reader will stop parsing the images and return results if the time is exceeded the waiting time configured. When the value is set as 0, the actual running time of algorithm will prevail.

Code Score Enable

If it is enabled, the client software will evaluate the code reading environment for stacked code and output code score.

Accurate Timeout Enable

If it is enabled, the accuracy of algorithm timeout will improve.

8.4.4 Set Code Quality Evaluation

The code quality evaluation function judges the quality of codes and outputs overall grade.

Currently, only 1D code and 2D code support code quality evaluation.

Note

- The function of code quality evaluation may differ by device models.
- In test running mode, this function is enabled by default. In normal mode, you need to enable it manually.
- This function is also supported for multiple codes in the field of view.

Set 1D Code Quality Evaluation

The 1D code quality evaluation function uses the ISO15416 standard to judge the quality of codes and output overall grade. Currently, this function is only applicable to Code 39, Code 128, ITF25, EAN8, EAN13, UPCA, and ITF14.

Note

Make sure that the device's running mode is Normal.

Steps

1. Go to **Algorithm Settings** → **Algorithm Parameter**, and select **1DCode** as **Arithmetic Type**.
2. Enable **Code Quality Enable**.
3. Enable different quality evaluation standards according to actual demands.

Table 8-6 1D Code Quality Evaluation Standards

Parameter	Description
Decodability	It evaluates whether the code has enough basic information to be decoded.
Symbol Contrast	It evaluates the difference between the max. brightness value and the min. brightness value of the code area.
Modulation	It evaluates the degree of change in terms of brightness.
Edge Determination	It evaluates how well the number of edges read by the code matches the configured number of edges.
Minimum Reflectance	It evaluates the ratio of the min. brightness value to the max. brightness value.
Minimum Edge Contrast	It evaluates the min. value of the reflectivity difference of the strip connecting the spaces.
Decode Enable	It evaluates whether the code recognition is successful or not.
Defects	It evaluates codes or spaces for defects or dirt.

4. Set the evaluation value for A/B/C/D grade according to actual demands.

Note

- If the actual code reading value of the device is greater than the grade A evaluation value, the evaluation standard is grade A.
- If the actual code reading value is between grade A and grade B, the evaluation standard is grade B.
- If the actual code reading value is between grade B and grade C, the evaluation standard is grade C.
- If the actual code reading value is between grade C and grade D, the evaluation standard is grade D.
- If the actual code reading value is lower than the D grade, the evaluation standard is F grade.
- The client software selects the worst grade among all the evaluation standards as the grade judgment result of the code. The A grade means that the code quality is best, and F grade means that code quality is worst.

5. (Optional) Set **Quality1DMaxNum** to configure the number of codes to be evaluated. If the actual number of codes exceeds the configured value, the later codes will not be evaluated.
6. (Optional) Go to **Feature Tree** → **Code Algorithm Params**, and select **1D Rating Standard**.

Note

For example, if **1D Rating Standard** is **C**, and then the client software will output codes with A/B/C grade and codes with D/F will be filtered.

7. Click to start acquisition, and the client software will display the overall code quality in the history record area.

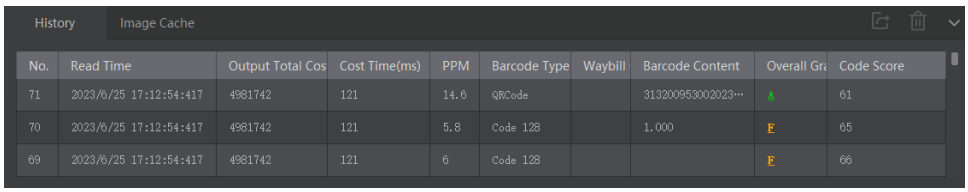


Figure 8-23 Overall Code Quality

Set 2D Code Quality Evaluation

The 2D quality evaluation function uses the ISO29158 and ISO15415 standards to judge the quality of codes and output overall grade.

Note

- The specific parameters may differ by device models and firmware versions.
- Make sure that the device's running mode is Normal, and QR Code or Data Matrix is selected.

Steps

1. Go to **Algorithm Settings**, and select **2DCode** as **Arithmetic Type**.
2. Enable **2D Code Quality Enable**.
2. Set **Iso Edition**, including Iso15415 and Iso29158
- Iso15415 is applicable to the quality evaluation for label 2-dimensional codes.
- Iso29158 is applicable to the quality evaluation for DPM format 2-dimensional codes.
3. Set **Verify Edition**, including standard mode and HIK mode.
- Standard mode is a standard quality evaluation mode.
- HIK mode is a professional quality evaluation mode.
4. When HIK mode is selected, you can set the evaluation criteria based on your actual demands. If enabled, the rating standard is used to evaluate the code quality.

Table 8-7 2D Code Quality Evaluation Standards

Parameter	Description
TDCRDecode	It evaluates whether the code recognition is successful or not.
TDCRSymbolContrast	It evaluates the difference between the max. brightness value and the min. brightness value of the code area.
TDCRModulation	It evaluates the degree of change in terms of brightness.
TDCRFixedPatternDamage	It evaluates the damage of code formats.
TDCRAxialNonuniformity	It evaluates the distortion degree of the code's vertical and horizontal sizes.
TDCRUnusedErrorCorrection	It evaluates the code for grid damage which might reduce the error correction capability of the code.
TDCRGridNonuniformity	It evaluates the distortion of the grids in the code.
TDCRPrintGrowth	It evaluates whether the size of each unit of the code is uniform

5. Set the evaluation value for A/B/C/D grade according to actual demands.
   - If the actual code reading value is greater than the grade A evaluation value, the evaluation standard is grade A.
   - If the actual code reading value is between grade A and grade B, the evaluation standard is grade B.
   - If the actual code reading value is between grade B and grade C, the evaluation standard is grade C.
   - If the actual code reading value is between grade C and grade D, the evaluation standard is grade D.
   - If the actual code reading value is lower than the grade D evaluation value, the

evaluation standard is grade F.

- The client software selects the worst grade among all the evaluation standards as the grade judgment result of the code. The A grade means that the code quality is best, and F grade means that code quality is worst.

6. (Optional) Go to **Feature Tree** → **Code Algorithm Params**, and select **1D Rating Standard**.

Note

For example, if **1D Rating Standard** is **C**, and then the client software will output codes with A/B/C grade and codes with D/F will be filtered.

7. Click to start acquisition, and the client software will display the overall code quality in the history record area.

8.4.5 Set Code Score

The code score function evaluates the code-reading environment for codes and outputs code score.

Note

- The function of code score may differ by device models.
- In test mode, this function is enabled by default. In normal mode, you need to enable it manually.
- The code score is determined by two factors including image quality and print quality of codes. The range of code score is between 0 and 100, and the higher the score, and easier the code can be read.

Steps

1. Go to **Algorithm Settings**, and enable **Code Score Enable**.

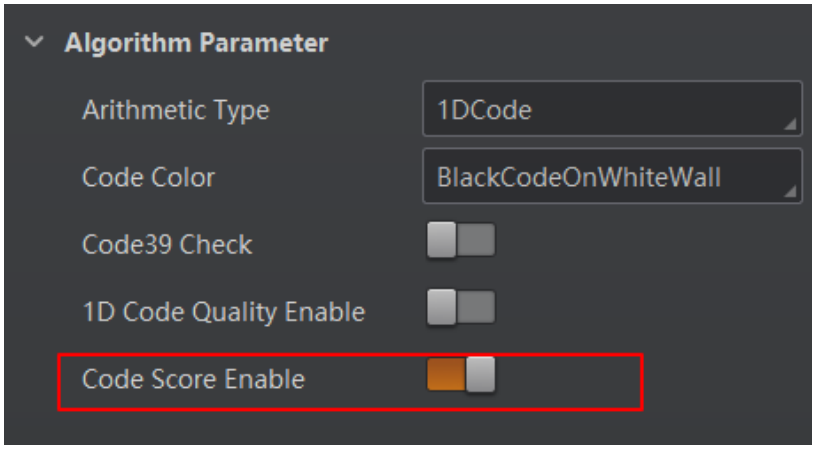


Figure 8-24 Enable Code Score Enable

2. Click to start acquisition, and the client software will display specific code score in the history record area.

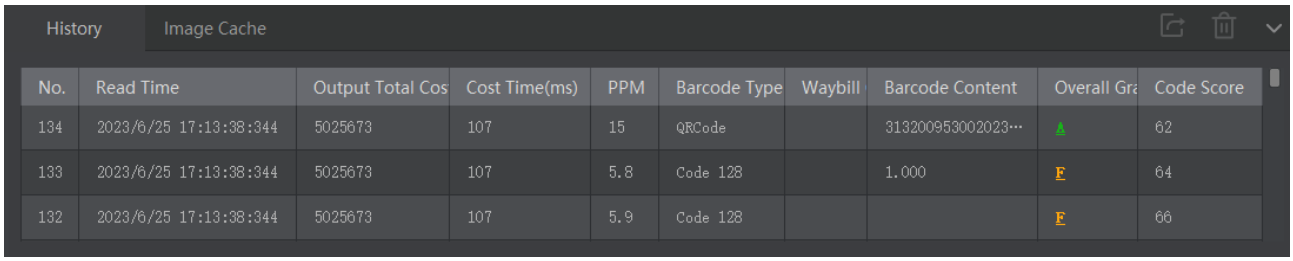


Figure 8-25 Code Score

3. (Optional) If the code score is low, go to **Image Settings**, and adjust parameters such as exposure time, gain, Gamma, and light source.

Note

If the code score is still low after adjusting, the code may have poor printing quality.

8.5 Signal Input Settings

The input settings allow you to configure the trigger-related parameters. You can enable trigger mode to let the acquisition of image data occur only when the trigger source is generated.

8.5.1 Set Trigger Mode

The device has 2 types of trigger mode: Internal trigger mode and external trigger mode.

- **Internal Trigger Mode**: The device acquires images via its internal signals.
- **External Trigger Mode**: The device acquires images via external signals like software signal and hardware signal. The trigger source of external trigger mode includes software, TCP, UDP, etc.

8.5.2 Enable Internal Trigger Mode

In internal trigger mode, the device acquires images via its internal signals. You have 2 methods to enable the internal trigger mode:

- Click **I/O Control Settings** → **Input** → **Trigger Mode**, and select **Off** as **Trigger Mode**.
- In the live view page, click to enable the internal trigger mode.

8.5.3 Enable External Trigger Mode

In external trigger mode, the device acquires images via external signals like software signal

and hardware signal. You have 2 methods to enable the external trigger mode:

- Click **I/O Control Settings** → **Input** → **Trigger Mode**, and select **On** as **Trigger Mode**.
- In the live view page, click  to enable the external trigger mode.

Set and Execute Software Trigger Mode

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

Steps

1. Click **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **Software** as **Trigger Source**.
4. Click **Execute** in **Trigger Source** to send trigger commands.

You can also enter **Auto Trigger Time**, and then enable **Enable Auto Trigger** to let the client software automatically send trigger signal to device according to the interval you set.

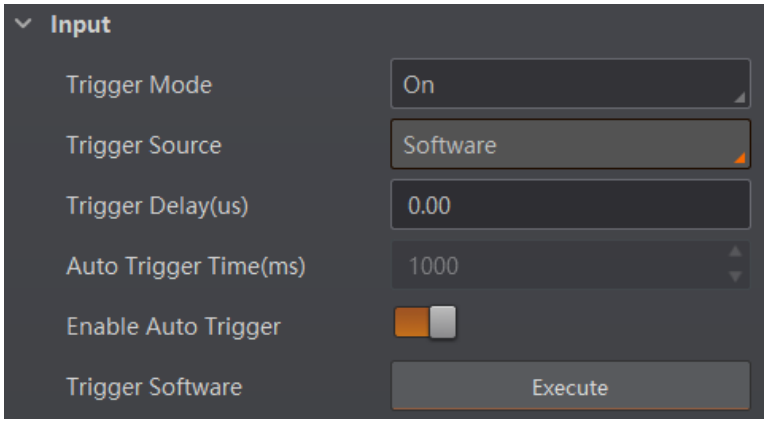


Figure 8-26 Set and Execute Software Trigger Mode

Set and Execute Hardware Trigger Mode

Steps

1. Go to **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select the specific line as **Trigger Source** according to the actual demands.
4. Set **Debounce Time** and **Trigger Activation** according to the actual demands.

Note

- When selecting **Rising Edge** or **Falling Edge** as **Trigger Activation**, you can set **Trigger Delay**.
- When selecting **Level High** or **Level Low** as **Trigger Activation**, you can set **Start Delay Time** and **End Delay Time**.

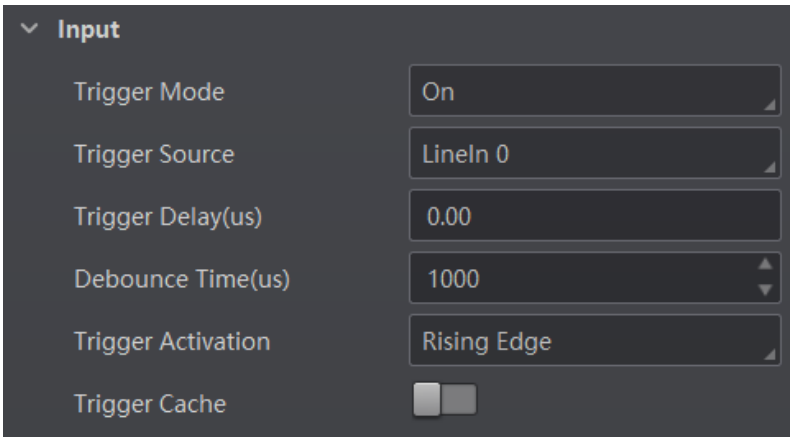


Figure 8-27 Set and Execute Hardware Trigger Mode

Note

- **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. It is 0 by default and the unit is μs. The sequence diagram of trigger delay is shown below.

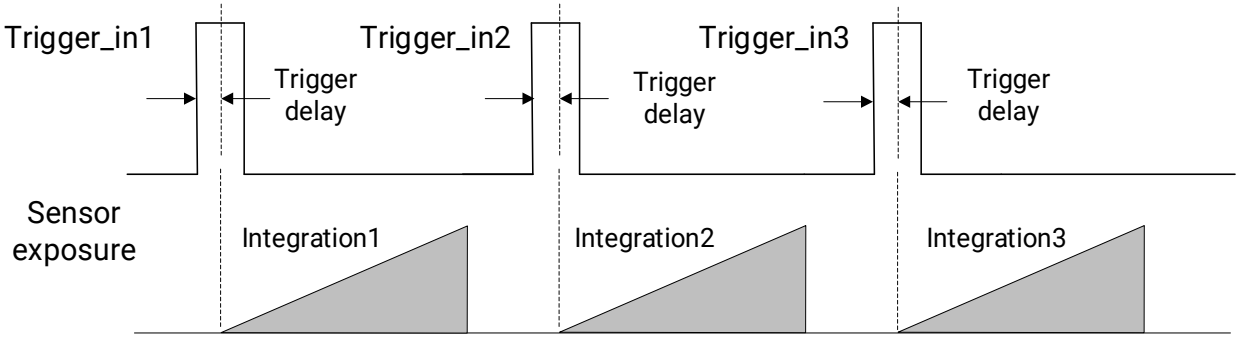


Figure 8-28 Sequence Diagram of Trigger Delay

- **Trigger Debounce**: The trigger debounce function allows the device to filter out unwanted short external trigger signal that is input to the device. The sequence diagram of trigger delay is shown below.

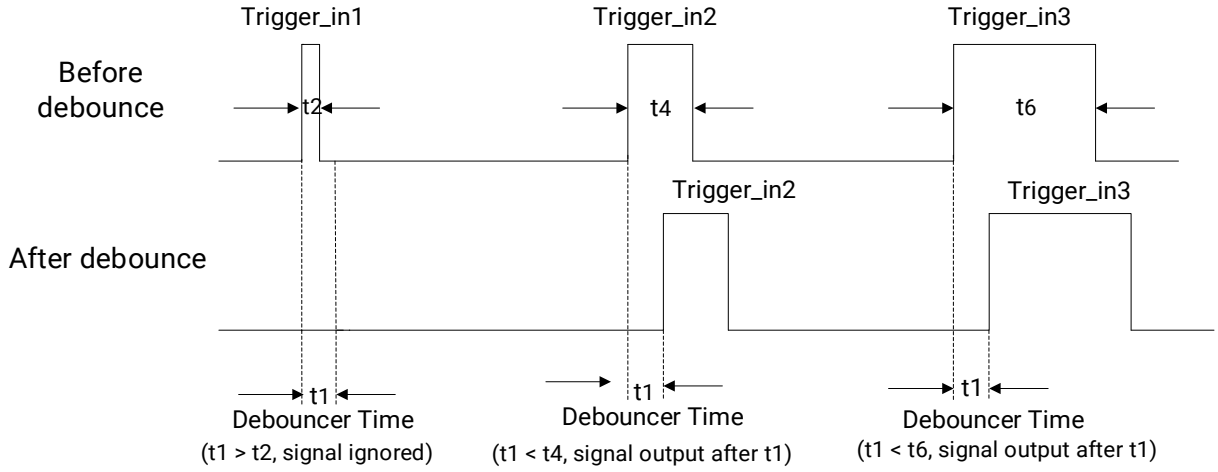


Figure 8-29 Sequence Diagram of Trigger Debounce

- **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 four trigger signals at most.
  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** is enabled or not.
  - The 1st trigger signal will be ended and the 2nd trigger signal be processed if **Trigger Cache** is disabled.

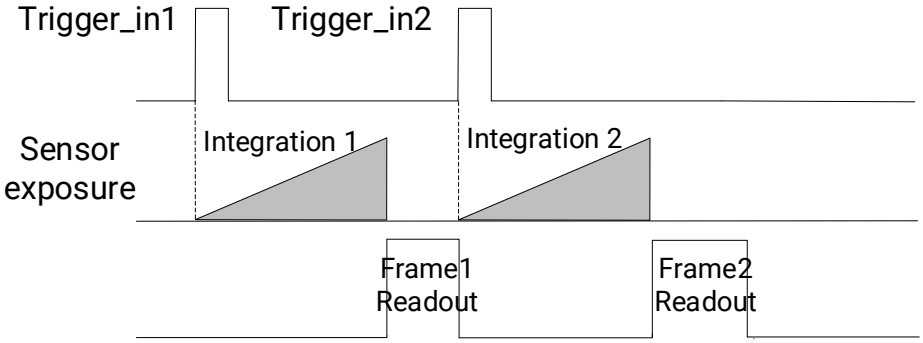


Figure 8-30 First Frame Ended

  - The 2nd trigger signal will be saved if **Trigger Cache** 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, the 2nd trigger signal's 1st frame image is created normally.

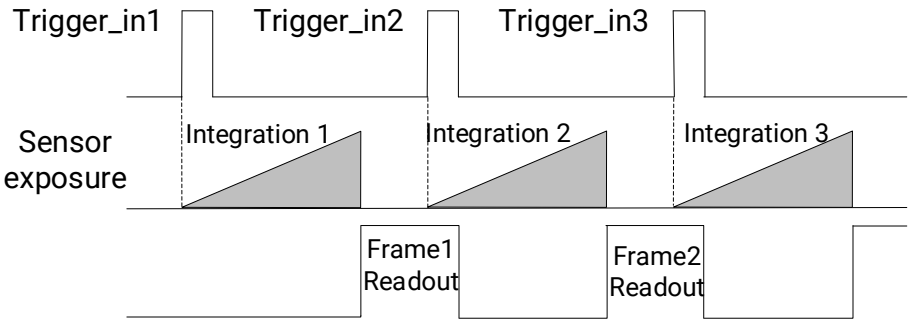


Figure 8-31 Second Frame Created Normally

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, the device will delay this exposure time, making sure that this exposure time is not earlier than the device's last frame creation time of the 1st trigger signal.

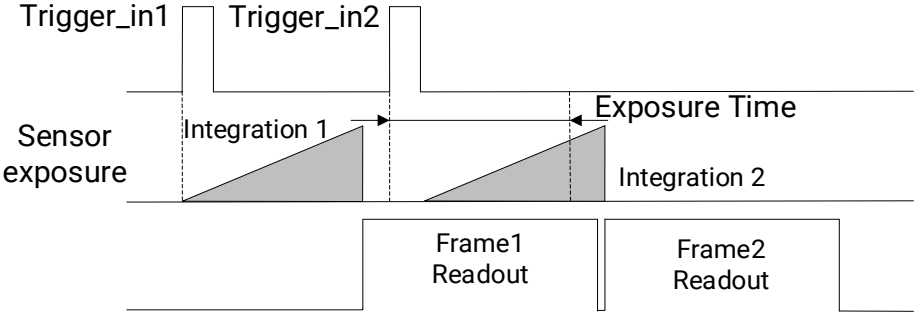


Figure 8-32 Sequence Diagram

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

Set and Execute Counter Trigger Mode

Counter specifies that the trigger source will be generated after the set number of valid signals appears. For example, if you set the **Count Number** to **3**, the trigger source will be generated after 3 signals appear.

Steps

1. Go to **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **Counter 0** as **Trigger Source**.
4. Set **Trigger Delay**, **Count Number**, **Count Source**, and **Trigger Activation**.

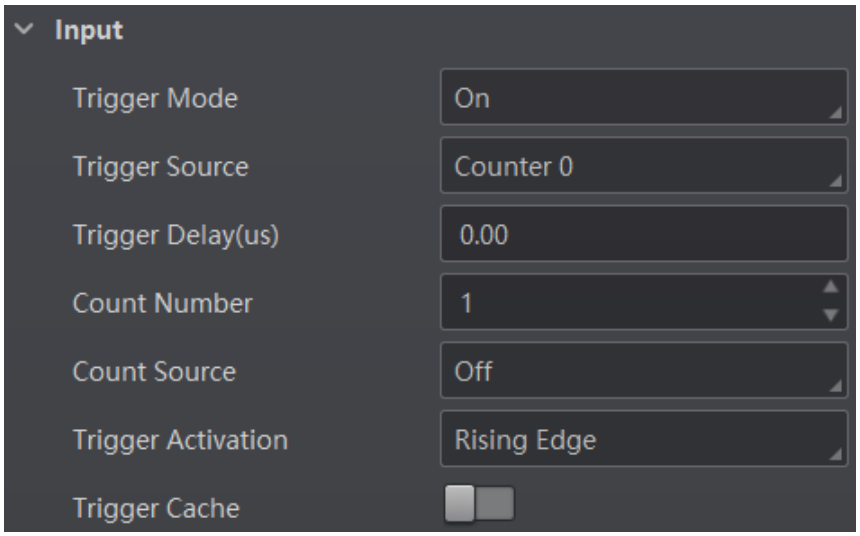


Figure 8-33 Set and Execute Counter Trigger Mode

Set and Execute TCP Trigger Mode

TCP start specifies the TCP server as the source for the trigger signal. When the server receives the specified string text, the trigger signal will be output.

Steps

1. Go to **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **TCP Start** as **Trigger Source**.
4. Set **Trigger Delay**, **TCP Trigger Port**, **TCP Trigger Text Format**, and **TCP Start Trigger Text**, and enable **Consistent Trigger** according to the actual demands.

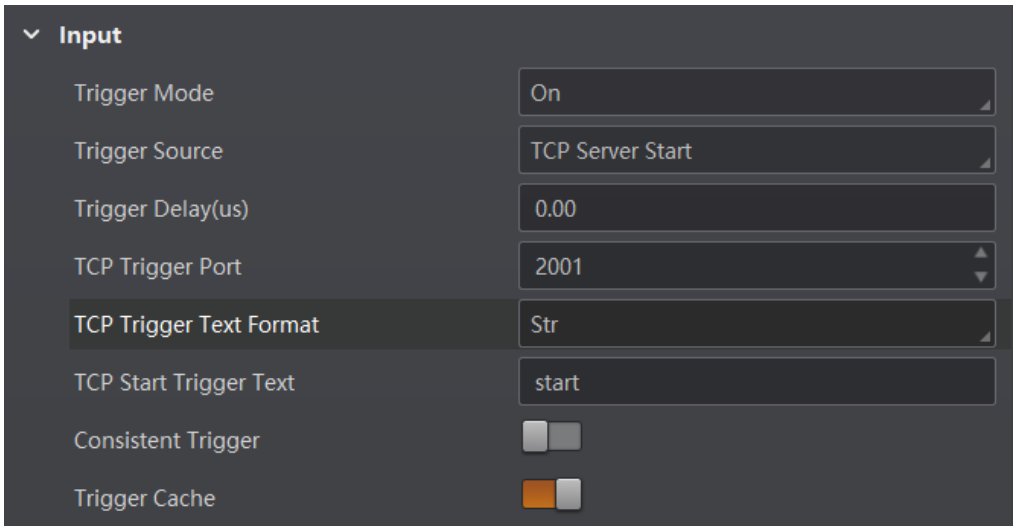


Figure 8-34 Set and Execute TCP Trigger Mode

Set and Execute UDP Trigger Mode

UDP start specifies the UDP server as the source for the trigger signal. When the server receives the specified string text, the trigger signal will be output.

Steps

1. Go to **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **UDP Start** as **Trigger Source**.
4. Set **Trigger Delay**, **UDP Trigger Port**, **UDP Trigger Text Format**, and **UDP Start Trigger Text**, and enable **Consistent Trigger** according to the actual demands.

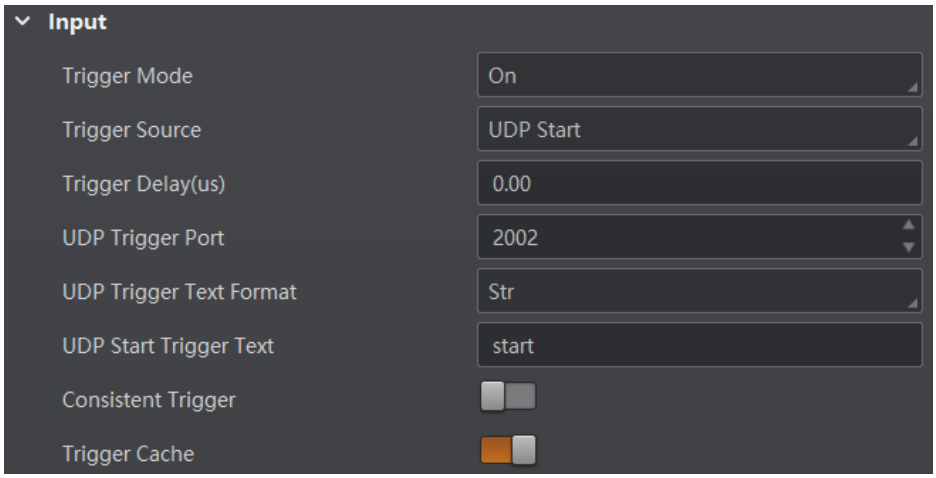


Figure 8-35 Set and Execute UDP Trigger Mode

Set and Execute Serial Port Trigger Mode

Serial start specifies the serial port as the source for the trigger signal. When the serial port receives the specified string text, the trigger signal will be output.

Steps

1. Go to **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **Serial Start** as **Trigger Source**.
4. Set **Trigger Delay**, **Serial Baudrate**, **Serial Data Bits**, **Serial Parity**, **Serial Stop Bits**, **Serial Trigger Text Format**, and **Serial Start Trigger Text**, and enable **Consistent Trigger** according to the actual demands.

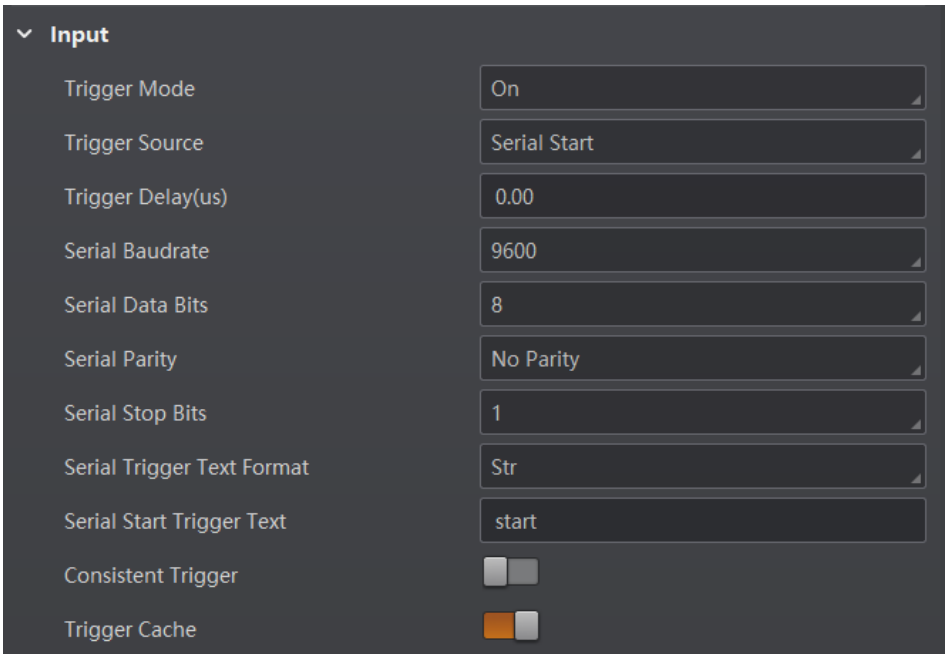


Figure 8-36 Set and Execute Serial Port Trigger Mode

Set and Execute Self Trigger Mode

Self trigger allows you to trigger the device according to the trigger period you configured.

Steps

1. Click **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **Self Trigger** as **Trigger Source**.
4. Set **Self Trigger Period** and **Self Trigger Count** according to the actual demands.

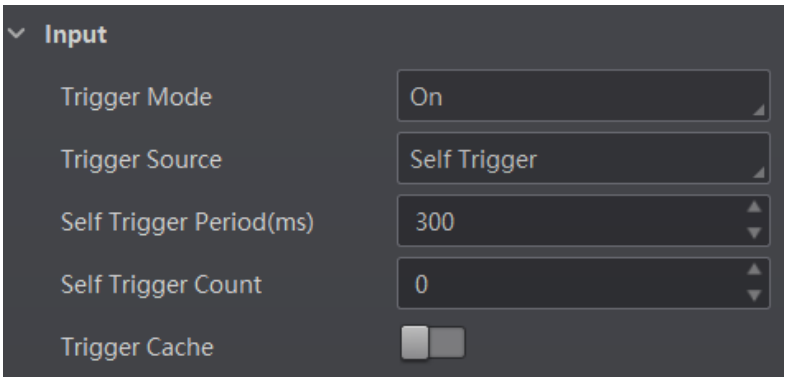


Figure 8-37 Set and Execute Self Trigger Mode

Note

- If the self-trigger count is set to 0, it means that it can be triggered indefinitely until the execution of self-trigger stops.

- The self-trigger time shall be set to be greater than the reciprocal of the actual frame rate.

Set and Execute Main Sub Mode

When the main code reader is triggered, the trigger signals will be sent to the sub code readers.

Steps

1. Click **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **Main Sub** as **Trigger Source**.
4. Set **Trigger Delay** and **Trigger Cache** according to the actual demands.

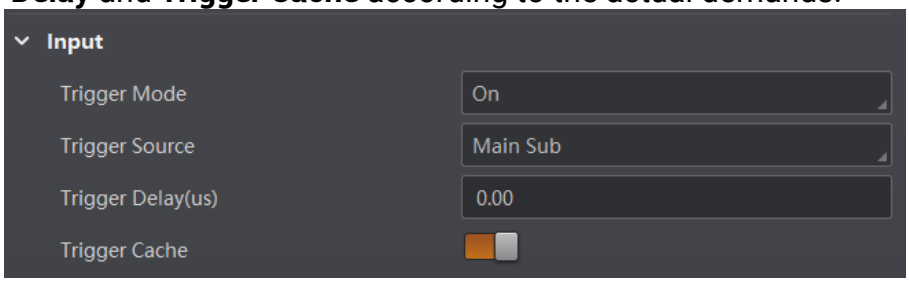


Figure 8-38 Set and Execute Main Sub Mode

Set and Execute TCP Client Start Mode

The external device sends TCP commands as the TCP client to the code reader to acquire images.

Steps

1. Click **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **TCP Client Start** as **Trigger Source**.
4. Set **TCP Dst Trigger IP/Port**, **TCP Client Trigger Text Format**, and **TCP Client Start Trigger Text**, and enable **Consistent Trigger** according to the actual demands.

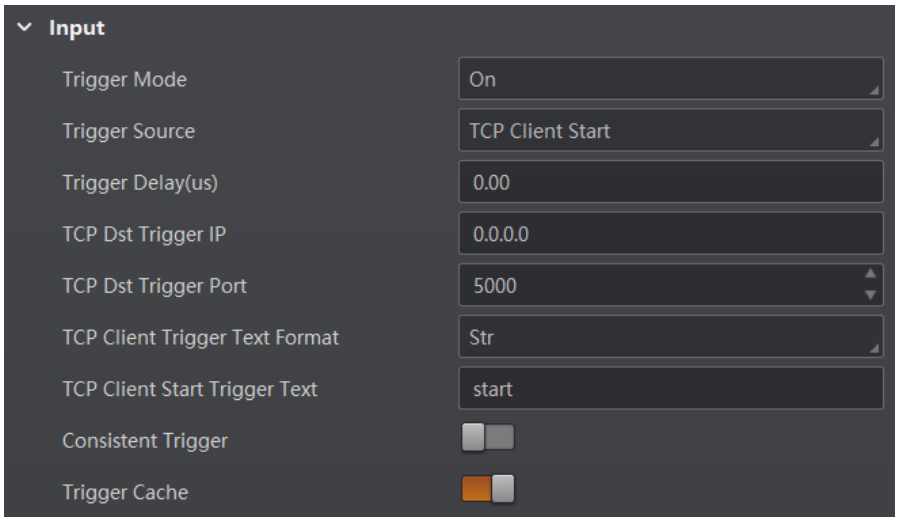


Figure 8-39 Set and Execute TCP Client Start Mode

Set and Execute Brightness Mode

When the brightness of the field of view changes, the code reader is triggered to acquire images and output code information automatically. The code reader monitors the change of image brightness value in real time and starts code reading when the change exceeds the configured sensitivity threshold.

Steps

1. Click **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **Brightness** as **Trigger Source**.
4. Set **Brightness Sensitivity**, **Brightness Unrespond Time**, and **Brightness Timeout**, according to the actual demands.

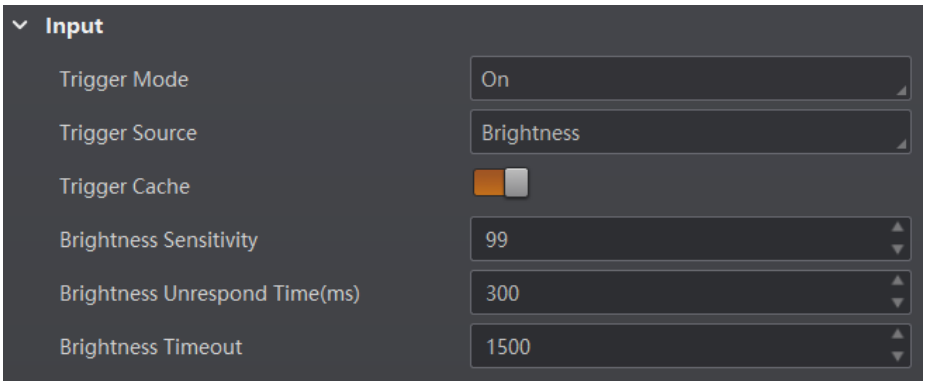


Figure 8-40 Set and Execute Brightness Mode

Set and Execute ToF Mode

The code reader is triggered to acquire images and read code based on the distance

changes detected by the ToF sensor.

Note

This function is available for the device with ToF sensor.

Steps

1. Click **I/O Control Settings** → **Input** → **Trigger Mode**.
2. Select **On** as **Trigger Mode**.
3. Select **TOF** as **Trigger Source**.
4. Enable **Trigger Cache** according to the actual demands.

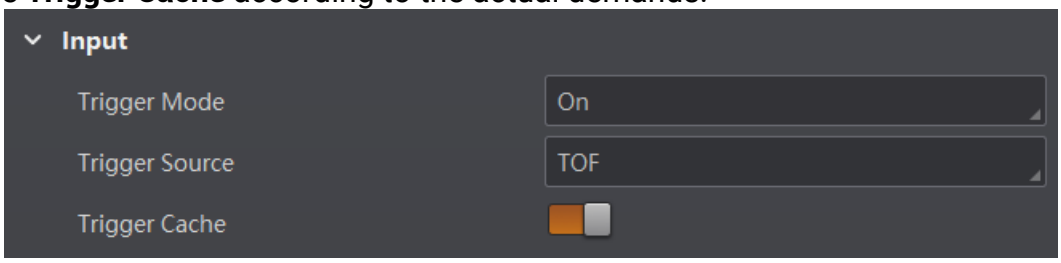


Figure 8-41 Set and Execute ToF Mode

Note

Refer to the ***IDMVS Client Software User Manual*** for the details of all input parameters.

8.5.4 Stop Trigger

The device supports stopping trigger via TCP server, TCP client, UDP, IO, and serial port. You can also set code reading timeout duration or max. code amount to be read to stop trigger. After a trigger is stopped, the device will not respond to the trigger again.

Note

For specific trigger stopping methods, refer to the actual device you got.

Stop Trigger via TCP Sever

When the TCP server receives the specified string text, the trigger will be stopped.

Steps

1. Go to **I/O Control Settings** → **Stop Trigger**.
2. Enable **TCP Stop Trigger Enable**.
3. Set following parameters according to actual demands.

- **TCP Trigger Port**: It is 2001 by default.
- **TCP End Trigger Format**: You can select the text format from the drop-down list, including **Str** and **Hex**.
  - If **Str** is selected, enter the text in string format in the box next to **TCP Stop Trigger**

Text.
  - If **Hex** is selected, enter the text in hexadecimal format in the box below **TCP Trigger End String**. If needed, you can click ⊞ to open the ASCII Cross Reference Table and click a table cell to add the corresponding content to the text box.
- **TCP Stop Trigger Text**: It sets the stop trigger text, and it is **stop** by default.

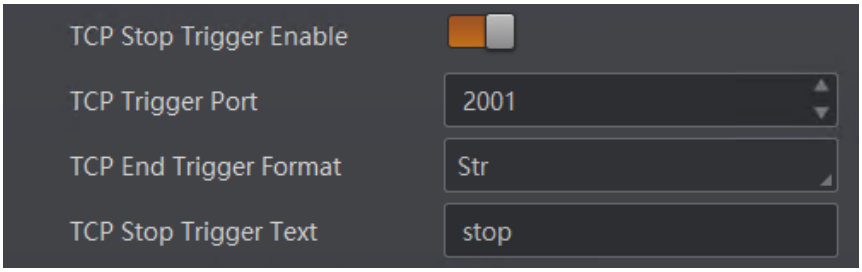


Figure 8-42 Stop Trigger via TCP Server

Stop Trigger via TCP Client

When the TCP client receives the specified string text, the trigger will be stopped.

Steps

1. Go to **I/O Control Settings** → **Stop Trigger**.
2. Enable **TCP Client End Trigger Enable**.
3. Set following parameters according to actual demands.

- **Tcp Dst Trigger IP**: Set the IP address of the TCP client target server.
- **Tcp Client Trigger Port**: Set the port No. of the TCP client trigger.
- **Tcp Client End Trigger Format**: You can select the text format from the drop-down list, including **Str** and **Hex**.
  - If **Str** is selected, enter the text in string format in the box next to **TCP Stop Trigger Text**.
  - If **Hex** is selected, enter the text in hexadecimal format in the box below **TCP Trigger End String**. If needed, you can click ⊞ to open the ASCII Cross Reference Table and click a table cell to add the corresponding content to the text box.
- **Tcp Client Stop Trigger Text**: It sets the stop trigger text, and it is **stop** by default.

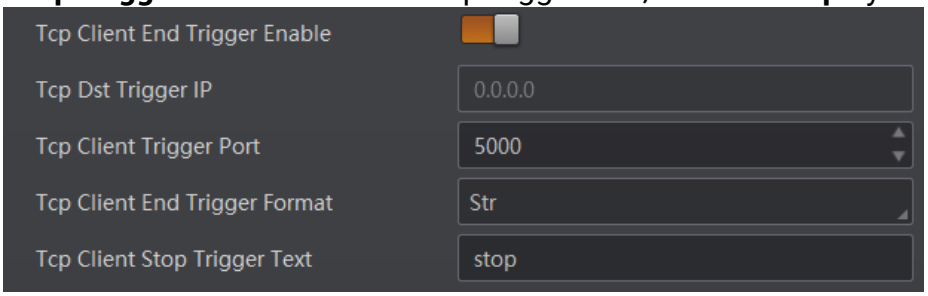


Figure 8-43 Stop Trigger via TCP Client

Stop Trigger via UDP

When the UDP receives the specified string text, the trigger will be stopped.

Steps

1. Go to **I/O Control Settings** → **Stop Trigger**.
2. Enable **UDP Stop Trigger Enable**.
3. Set following parameters according to actual demands.

- **UDP Trigger Port**: It is 2002 by default.
- **UDP End Trigger Format**: You can select the text format from the drop-down list, including **Str** and **Hex**.
  - If **Str** is selected, enter the text in string format in the box next to **UDP Stop Trigger Text**.
  - If **Hex** is selected, enter the text in hexadecimal format in the box below **UDP Trigger End String**. If needed, you can click ⊞ to open the ASCII Cross Reference Table and click a table cell to add the corresponding content to the text box.
- **UDP Stop Trigger Text**: It sets the stop trigger text, and it is **stop** by default.

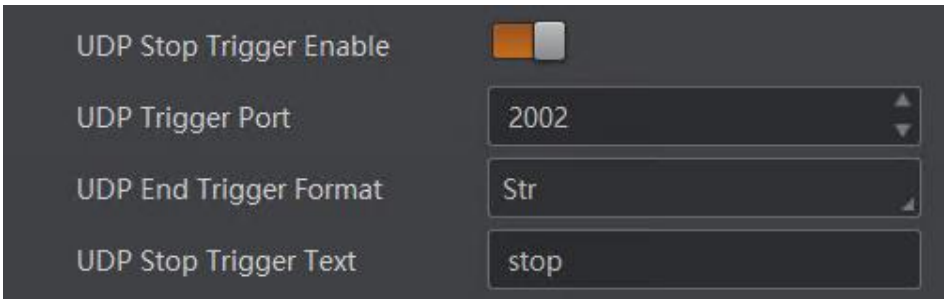


Figure 8-44 Stop Trigger via UDP

Stop Trigger via I/O

Stopping trigger via IO allows you to select hardware or software trigger source to stop the device from acquiring images.

Steps

1. Go to **I/O Control Settings** → **Stop Trigger**.
2. Enable **IO Stop Trigger Enable**.
3. Select sources from **LineIn 0/1/2** and **Software Trigger End** as **IO Stop Trigger Selector**.
4. (Optional) Set trigger polarity (rising edge and falling edge) if **LineIn 0/1/2** is selected as **IO Stop Trigger Selector**. If the trigger source of the input signal is the same as that of the trigger stopping via I/O, there is no need to select.
5. (Optional) Click **Execute** in **Software Stop Trigger** to stop trigger if **SoftwareTriggerEnd** is

selected as **IO Stop Trigger Selector**.

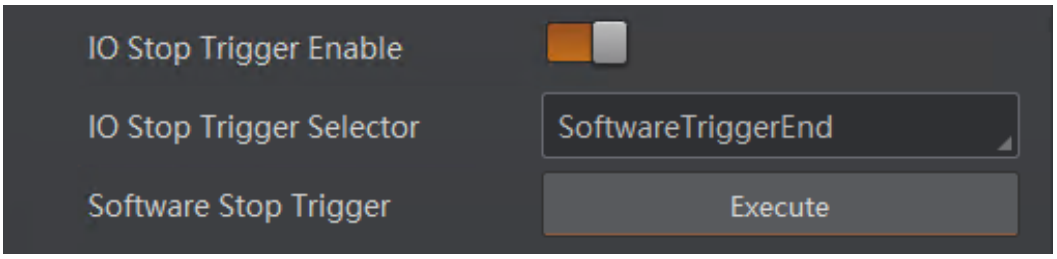


Figure 8-45 Stop Trigger via IO

Stop Trigger via Serial Port

When the specified serial port receives the specified string text, the trigger will be stopped.

Steps

1. Go to **I/O Control Settings** → **Stop Trigger**.
2. Enable **Serial Stop Trigger Enable**.
3. Set following parameters according to actual demands.

- **Serial End Trigger Format**: When receiving the specified trigger text, the server will output a trigger signal. You can select the text format from **Str** or **Hex**.
  - If **Str** is selected, enter the text in string format in the box next to **Serial Stop Trigger Text**.
  - If **Hex** is selected, enter the text in hexadecimal format in the box below **Serial Trigger Stop String**. If needed, you can click + to open the ASCII Cross Reference Table and click a table cell to add the corresponding content to the text box.

Note

Hex is supported only when the data bits of the serial port is 8.

- **Serial Stop Trigger Text**: It sets the trigger text of serial port stop, and it is **stop** by default.
- **Serial Baudrate**: It sets the baud rate of the serial port, and it is 9600 by default.
- **Serial Data Bits**: It sets the data bits of the serial port, and it is 8 by default.
- **Serial Parity**: It sets the parity of the serial port, and it is **No Parity** by default.
- **Serial Stop Bits**: It sets the stop bits of the serial port, and it is 1 by default.

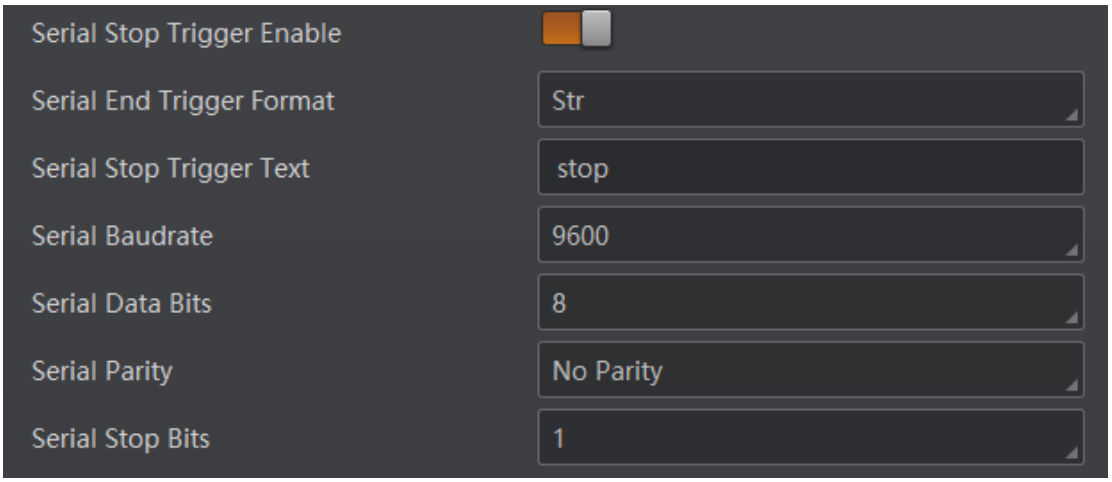


Figure 8-46 Stop Trigger via Serial Port

Stop Trigger via Timeout Duration

Note

TimeOut Stop Trigger Enable is only available when the device running mode is set to Normal and the Trigger Mode is On.

When the trigger time reaches the specified maximum value (ms), the trigger will be stopped.
You can enable **TimeOut Stop Trigger Enable**, and set **Maximum Output Limited Time** according to actual demands.

Note

The range of **Maximum Output Limited Time** is between 0 ms and 10000 ms.

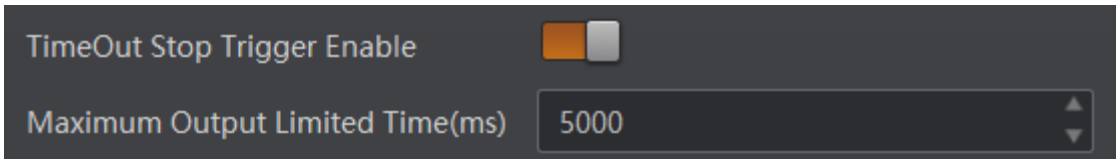


Figure 8-47 Stop Trigger via Timeout Duration

Stop Trigger via Code Number

Note

CodeNum Stop Trigger Enable is only available when the device running mode is set to Normal and the Trigger Mode is On.

This function means that the code quantity output by the device is restricted to the settings

you configured here.
You can enable **CodeNum Stop Trigger Enable**, and set **CodeNum Stop Trigger Min** and **CodeNum Stop Trigger Max** according to actual demands.

Note

- If the output code quantity is smaller than configured **CodeNum Stop Trigger Min**, and the device will output codes continuously.
- If the output code quantity is smaller than configured **CodeNum Stop Trigger Max**, and the device will stop outputting codes.
- If the output code quantity is between configured **CodeNum Stop Trigger Min** and **CodeNum Stop Trigger Max**, and the device will read and output codes according to trigger signals.
- If **CodeNum Stop Trigger Min** is same with **CodeNum Stop Trigger Max**, and the device will stop outputting codes when the number of output codes reaches the configured number.



Figure 8-48 Stop Trigger via Code Number

8.6 Signal Output Settings

8.6.1 Select Output Signal

The device's output signal can control external devices like PLC, flashing light, etc. Click **I/O Control Settings** → **Output** → **Line Out Selector** to select output signals.

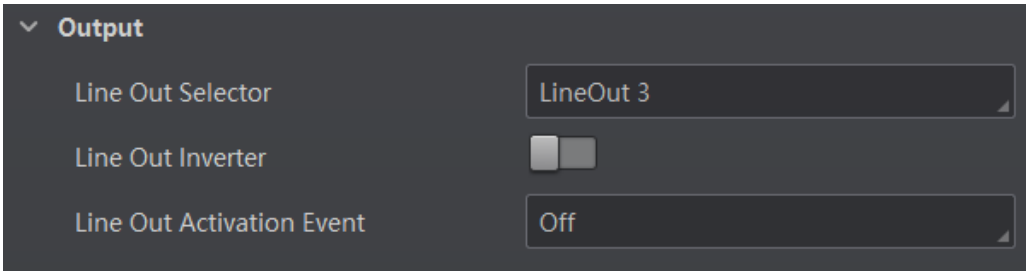


Figure 8-49 Select Output Signal

8.6.2 Set Event Source

Note

The specific event sources may differ by device models and firmware versions.

The device supports outputting different trigger signals according to the event source you select. Click **I/O Control Settings** → **Output** → **Line Out Activation Event** to select event source.
The device supports following event sources.

Note

- **Off** refers to no event source.
- You need to set different parameters when selecting various event sources.

Select Acquisition Start Active

If you select **AcquisitionStartActive** as **Line Out Activation Event**, you can set its output delay time and duration.
- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

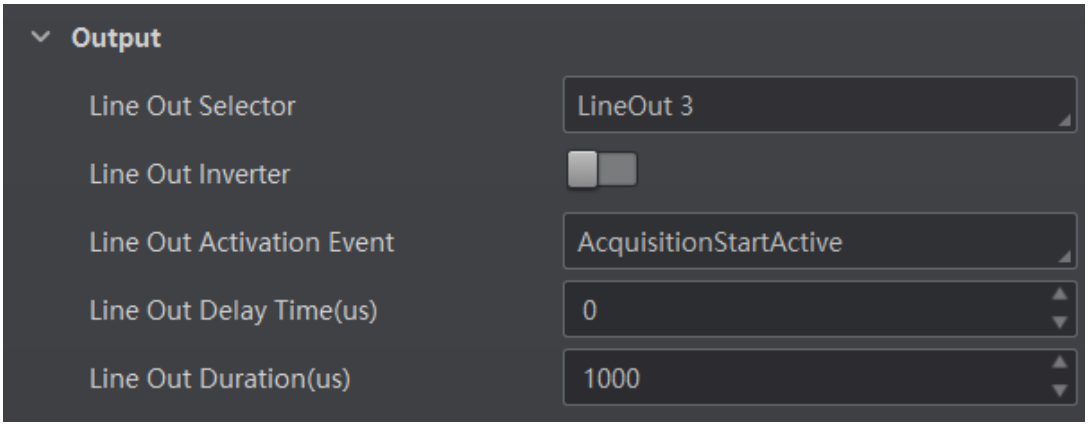


Figure 8-50 Select Acquisition Start Active

Select Acquisition Stop Active

If you select **AcquisitionStopActive** as **Line Out Activation Event**, you can set its output delay time and duration.
- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

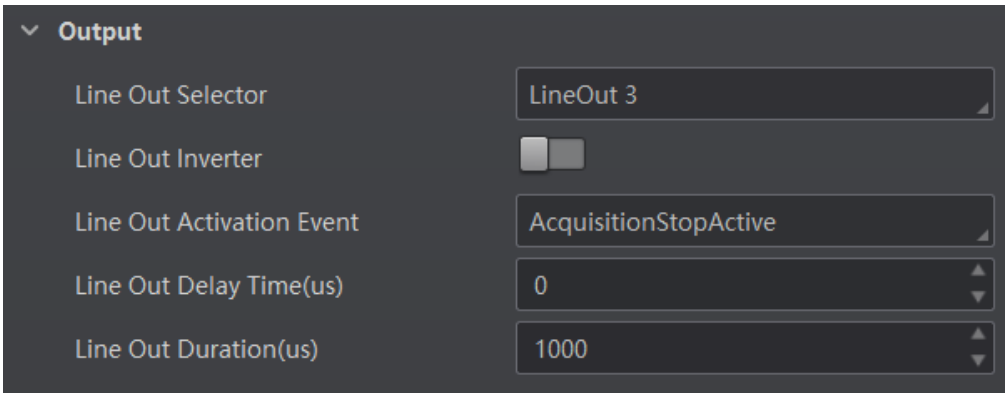


Figure 8-51 Select Acquisition Stop Active

Select Frame Burst Start Active

If you select **FrameBurstStartActive** as **Line Out Activation Event**, you can set its output delay time and duration.

- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

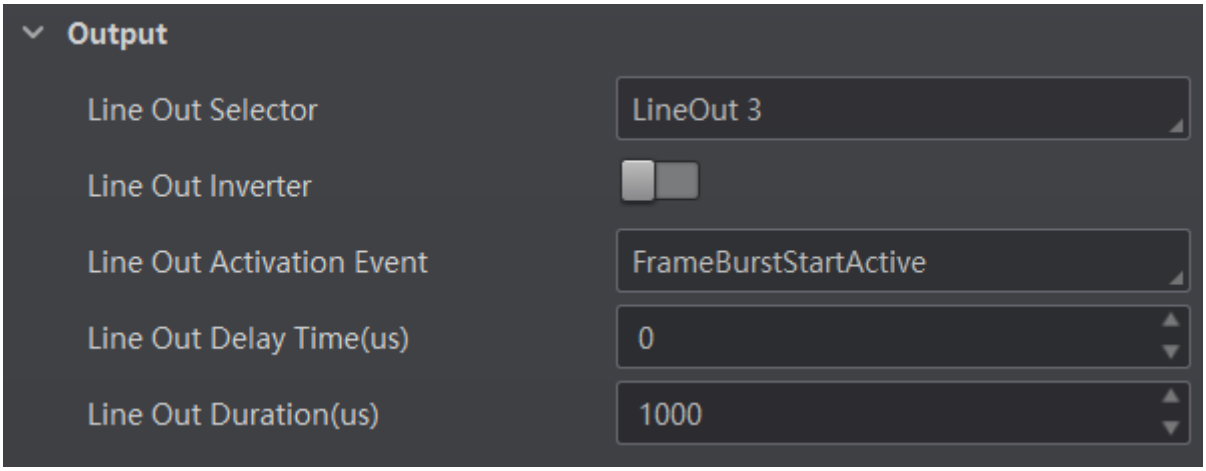


Figure 8-52 Select Frame Burst Start Active

Select Frame Burst Stop Active

If you select **FrameBurstStopActive** as **Line Out Activation Event**, you can set its output delay time and duration.

- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

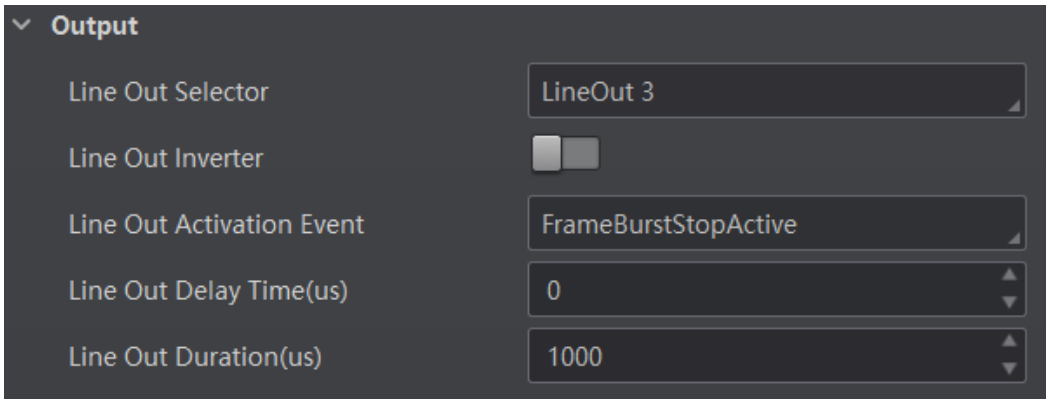


Figure 8-53 Select Frame Burst Stop Active

Select Exposure Start Active

If you select **ExposureStartActive** as **Line Out Activation Event**, you can set its output delay time, duration and advance time.

- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration Time**: It sets the time duration of the output signal.
- **LineOut Ahead Time**: It sets the advance time of outputting the output signal.

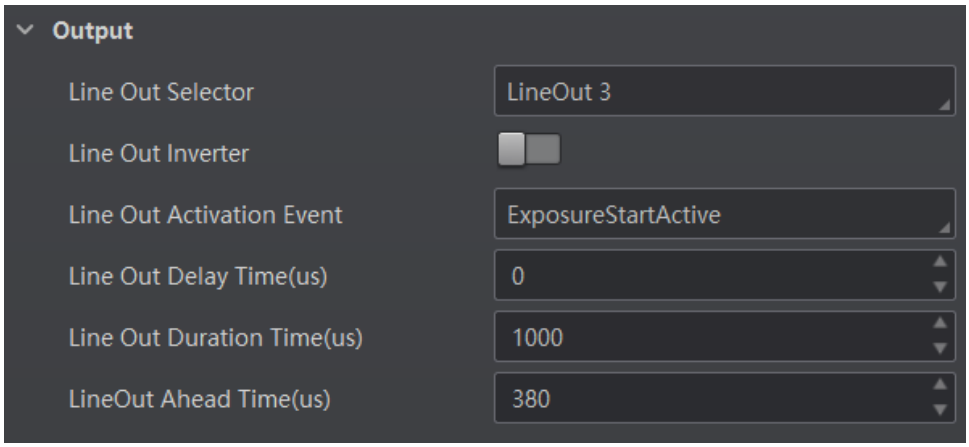


Figure 8-54 Select Exposure Start Active

Select Soft Trigger Active

If you select **SoftTriggerActive** as **Line Out Activation Event**, you can set its output delay time, duration, and execute outputting signal manually.

- **Line Trigger Software**: Click **Execute** in **Line Trigger Software** to output the signal manually.
- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

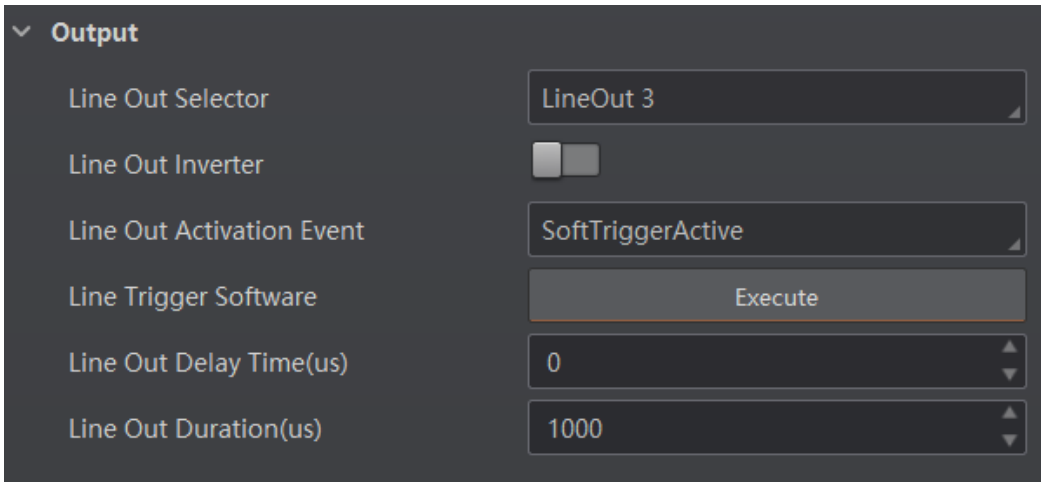


Figure 8-55 Select Soft Trigger Active

Select Hard Trigger Active

If you select **HardTriggerActive** as **Line Out Activation Event**, you can set its output delay time, duration, trigger source, and trigger activation.

- **Hardware Trigger Source**: It sets the hardware trigger source.
- **Hardware Trigger Activation**: It sets the trigger activation of input signal, including **Rising Edge** and **Falling Edge**.
- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

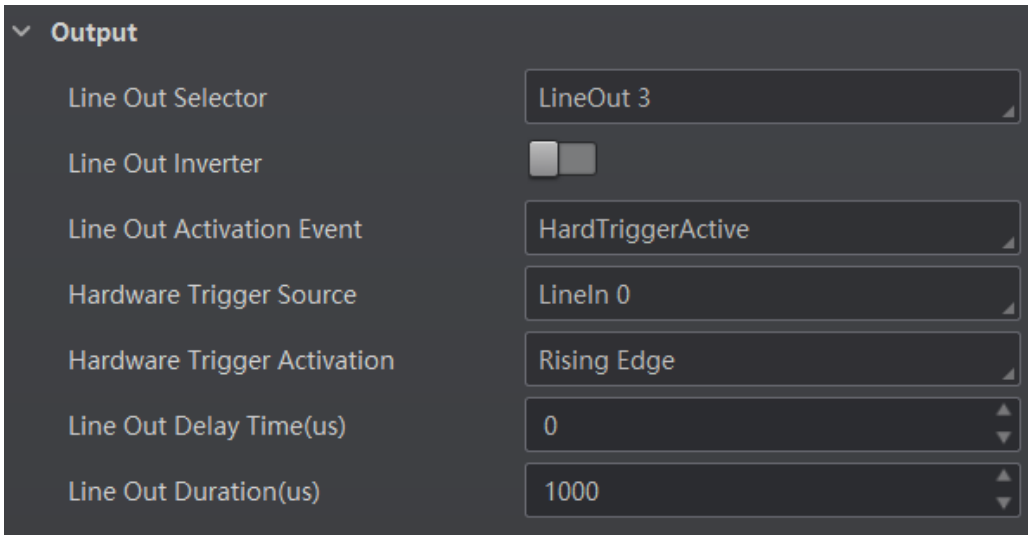


Figure 8-56 Select Hard Trigger Active

Select Counter Active

If you select **CounterActive** as **Line Out Activation Event**, you can set its output delay time

and duration.

- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

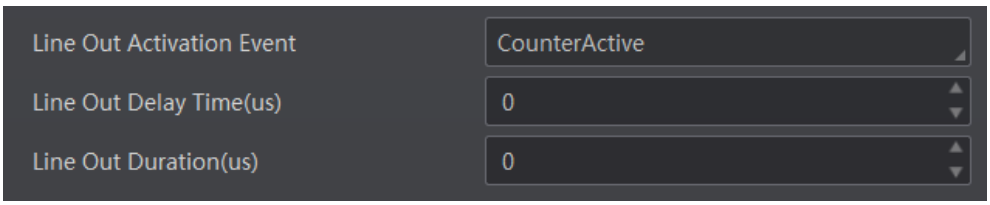


Figure 8-57 Select Counter Active

Select Timer Active

If you select **TimerActive** as **Line Out Activation Event**, you can set its output duration and period.

- **Line Out Duration**: It sets the time duration of the output signal.
- **Line Out Period**: It sets the time period of the output signal.

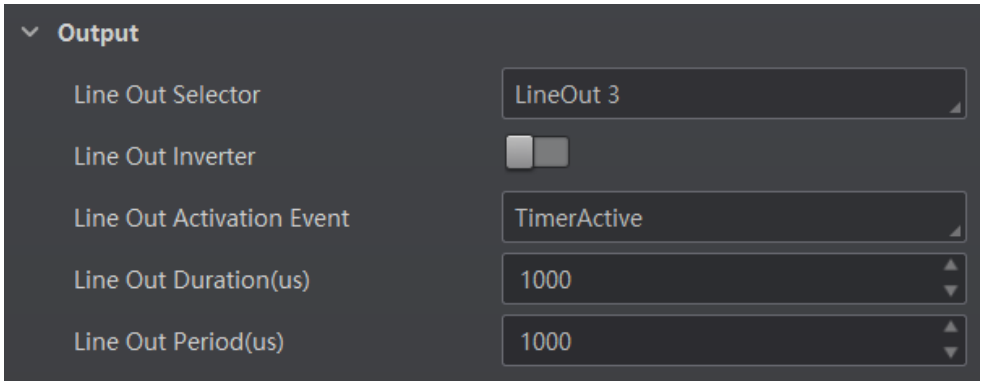


Figure 8-58 Select Timer Active

Select No Code Read

If you select **NoCodeRead** as **Line Out Activation Event**, you can set its output delay time and duration.

- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

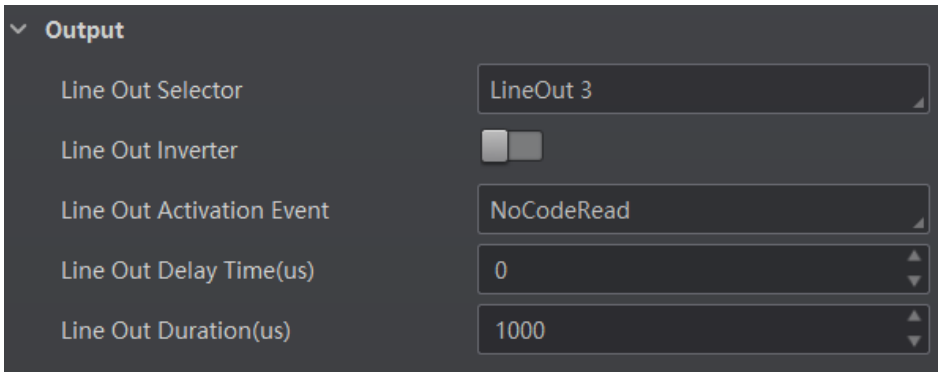


Figure 8-59 Select No Code Read

Select Read Success

If you select **ReadSuccess** as **Line Out Activation Event**, you can set its output delay time and duration.

- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

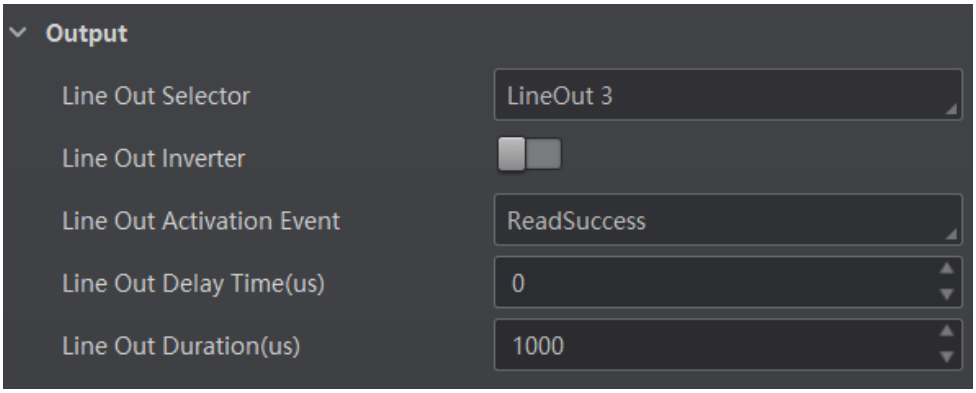


Figure 8-60 Select Read Success

Select Light Strobe Long

If you select **LightStrobeLong** as **Line Out Activation Event**, you do not need to set any parameters.

Select Compare Success

If you select **Compare Success** as **Line Out Activation Event**, you can set its output delay time and duration.

- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

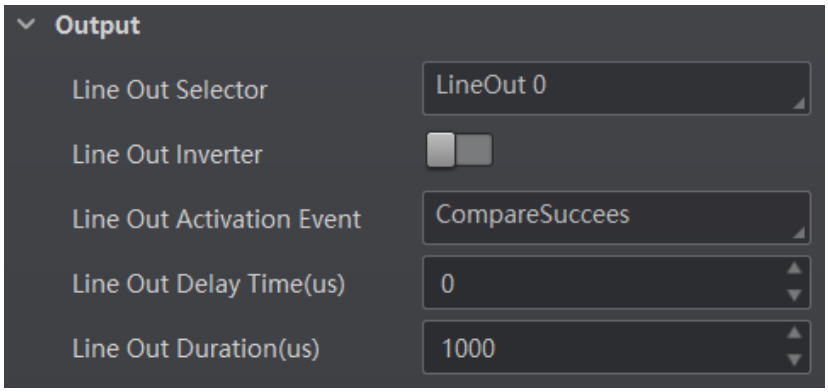


Figure 8-61 Select Compare Success

Select Compare Fail

If you select **Compare Fail** as **Line Out Activation Event**, you can set its output delay time and duration.

- **Line Out Delay Time**: It sets the delay time for outputting the output signal.
- **Line Out Duration**: It sets the time duration of the output signal.

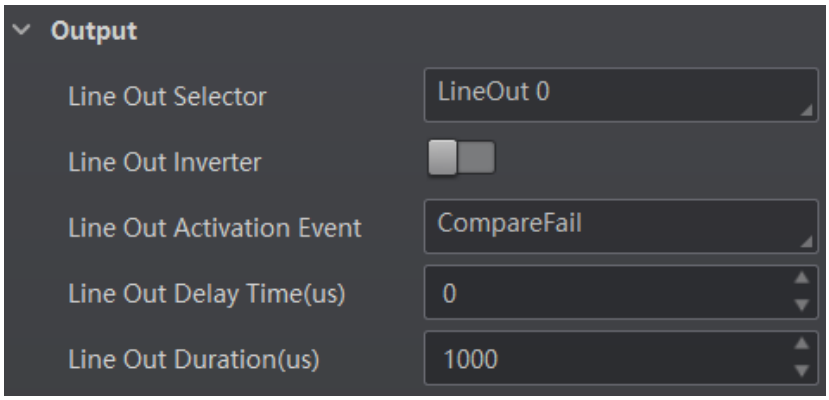


Figure 8-62 Select Compare Fail

Select Command Control IO

If you select **CommandControlIO** as **Line Out Activation Event**, you do not need to set any parameters.

- **Control Start Str**: It sets the start string of command control.
- **Control Stop Str**: It sets the stop string of command control.
- **Control IO Consist Output Enable**: When it is enabled, the client starts output when receiving the start string and ends output only when receiving the stop string.

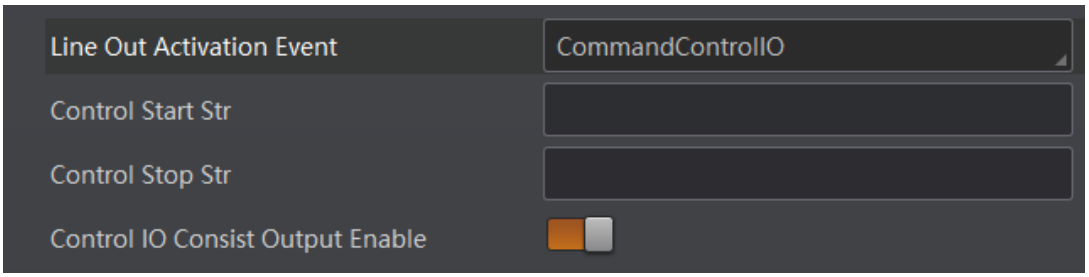


Figure 8-63 Select Command Control IO

8.6.3 Enable Line Inverter

The line inverter function allows the device to invert the electrical signal level of an I/O signal, and meet requirements of different devices for high or low electrical signal level.
You can go to **I/O Control Settings** → **Output**, and enable **Line Out Inverter**.

Note

The **Line Out Inverter** function is disabled by default.



Figure 8-64 Enable Line Out Inverter

8.7 Communication Settings

The communication protocol is used to transmit and output code reading result and image. The communication protocol is related to the device modes. With various device modes, the device supports different communication protocols and corresponding parameters.

- If the device's running mode is **Test** or **Raw**, it only supports **SmartSDK** protocol and no parameter settings are required.
- If the device's running mode is **Normal**, it supports **SmartSDK**, **TCP Client**, **Serial**, **FTP**, **TCP Server**, **Profinet**, **Melsec/SLMP**, **EthernetIp**, **ModBus**, **UDP**, and **Fins** communication protocols, and you need to set corresponding parameters.

Note

- The supported communication protocols may differ by device models.
- The specific parameters of communication protocols may differ by device models.
- If you need communication command for reference, you can open the Communication Commands document by clicking **Help** → **Communication Matrix** on the top menu bar.

8.7.1 Set SmartSDK

If you select **SmartSDK** as the communication protocol, you can configure the following parameters.

Table 8-8 SmartSDK Communication Protocol

Parameter	Description
SmartSDK Protocol	If enabled, the device will output data via SmartSDK.
Encode JPEG Flag	The device will compress images in JPG format after enabling it.
Quantity of JPG	It sets the image compression quality, and it ranges from 50 to 99.

8.7.2 Set TCP Client

If you select **TCP Client** as the communication protocol, you can configure the following parameters.

Table 8-9 TCP Client Communication Protocol

Parameter	Description
Output Result Buffer	If enabled, when the TCP server is abnormal, the device will cache the images. When the server returns to normal, the device will send the cached images to the server. You can configure **Output Result Buffer Number** to determine the number of the images that the device will cache.
TCP Protocol	If enabled, the device will output data via the TCP server.
TCP Dst Addr	Enter the IP address of the server that receives data output by the code reader.
TCP Dst Port	Enter the port No. of the server that receives data output by the code reader.
TCP Return From Io Ctrl	If enabled, the output result will be sent back to the triggered device. **Note** This parameter can be set when trigger source is TCP client.
Heartbeat Enable	If enabled, the software will send heartbeat text.
Barcode as Heartbeat	If enabled, you can set heartbeat text and time.
Heartbeat Text	Enter the content of heartbeat text.
Heartbeat Time	Set the duration of the heartbeat.

8.7.3 Set Serial

If you select **Serial** as the communication protocol, you can configure the following parameters.

Table 8-10 Serial Communication Protocol

Parameter	Description
Serial Protocol	If enabled, the code reader will output data via serial port.
Serial Baudrate	The baud rate of the serial port of the PC that receives data.
Serial Data Bits	Data bits of the serial port of the PC that receives data. **Note** The hexadecimal trigger is supported only when **Serial Data Bits** is 8.
Serial Parity	Parity bits of the serial port of the PC that receives data.
Serial Stop Bits	Stop bits of the serial port of the PC that receives data.

8.7.4 Set FTP

If you select **FTP** as the communication protocol, you can configure the following parameters.

Table 8-11 FTP Communication Protocol

Parameter	Description
FTP Protocol	If enabled, the code reader will output data via FTP server.
FTP Host Addr	IP address of the FTP host.
FTP Host Port	Port No. of the FTP host.
FTP User Name	User name of the FTP.
FTP User PWD	Password of the FTP.

8.7.5 Set TCP Server

If you select **TCP Server** as the communication protocol, you can configure the following parameters.

Table 8-12 TCP Server Communication Protocol

Parameter	Description
TCP Server Enable	If enabled, the code reader will output data via TCP server.
TCP Return From Io Ctrl	If enabled, the output result will be sent back to the triggered device.

Parameter	Description
	Note This parameter can be set when trigger source is TCP server.
TCP Server Port	The port No. of the TCP server that receives data output by code reader.
TCP Server Flexible Connect Enable	Upon client disconnection, the server automatically disconnects from the client and releases resources for subsequent devices. As long as there are available resources, subsequent devices can connect to the server without limitation.
TCP Server Heartbeat Enable	If enabled, the client sends a heartbeat packet to the server at a fixed interval to check whether the information transmission channel is working properly.
TCP Server Barcode As Heartbeat	If enabled, the code read by the client can be sent as heartbeat packets.
TCP Server Heartbeat Text	Set the beginning and end of the heartbeat data. The value is **heartbeat** by default.
TCP Server Heartbeat Time	Set the interval for sending heartbeat packets, in seconds. If no heartbeat response is received within the configured time, the client will release the code reader.

8.7.6 Set Profinet

If you select **Profinet** as the communication protocol, you can configure the following parameters.

Table 8-13 Profinet Communication Protocol

Parameter	Description
Profinet Enable	If enabled, the device will output data via Profinet protocol.
Profinet Device Name	Enter the name of the code reader, which is used for code reader recognition in Profinet protocol communication.

8.7.7 Set MELSEC

If you select **MELSEC** as the communication protocol, you can configure the following parameters.

Table 8-14 MELSEC Communication Protocol

Parameter	Description
MELSEC Protocol Enable	If enabled, the code reader will output data via MELSEC protocol.
MELSEC Destination IP Address	It refers to the IP address of the Programmable Logic Controller (PLC) connected to the code reader.
MELSEC Destination Port	It refers to the port No. of the MELSEC protocol channel on the PLC.
MELSEC Data Base Address	It refers to the address of the data base of the PLC for receiving the data outputted by the code reader. The default value is 0.
MELSEC State Base Address	It refers to the address of the state base of the PLC, which is used for sending trigger signal to the code reader and receiving trigger result and code reading results from the code reader. The default value is 0.
MELSEC Network Number	It refers to the MELSEC protocol network No. to communicate with.
MELSEC PLC Number	It refers to the No. of the PLC to be connected to the code reader.
MELSEC Module I/O Number	It refers to the No. of the target module.
MELSEC Module Station Number	It refers to the No. of the target module station.
MELSEC Timeout	It refers to the maximum waiting time for PLC response.

8.7.8 Set Ethernet/IP

If you select **EthernetIp** as the communication protocol, you can configure the following parameters.

Table 8-15 Ethernet/IP Communication Protocol

Parameter	Description
EthernetIP Enable	If enabled, the code reader will output data via Ethernet/IP protocol.

8.7.9 Set ModBus

If you select **Modbus** as the communication protocol, you can configure the following

parameters.

Table 8-16 ModBus Communication Protocol

Parameter	Description
ModBus Enable	If enabled, the code reader will output data via ModBus protocol.
ModBus Mode	Select a mode from **Server** and **Client**.
ModBus Server IP	If **Client** is selected as **ModBus Mode**, you should go to **Communication Control** to set the IP address.
ModBus Server Port	If **Client** is selected as **ModBus Mode**, you should go to **Communication Control** to set the port No.
ModBus Control Space	The value is "holding_register" by default and not editable.
ModBus Control Offset	Offset of the control address. The default value is 0.
ModBus Control Size (Word)	The value is 2 by default.
ModBus Status Space	It sets status space and it is “input_register” by default.
ModBus Status Offset	It sets status offset and it is 0 by default.
ModBus Status Size (Word)	It is 2 by default.
ModBus Result Space	It set result space and it is “input_register” by default.
ModBus Result Offset	It is 4 by default.
ModBus Result Byte Swap	If it is enabled, the client software will swap ModBus results.

8.7.10 Set UDP

If you select **UDP** as the communication protocol, you can configure the following parameters.

Table 8-17 UDP Communication Protocol

Parameter	Description
UDP Protocol Enable	If enabled, the code reader will output data via User Datagram Protocol (UDP).
UDP Dst Ip	The IP address of the PC receiving the output data.
UDP Dst Port	The port of the PC receiving the output data.

8.7.11 Set Fins

If you select **Fins** as the communication protocol, you can configure the following parameters.

Table 8-18 Fins Communication Protocol

Parameter	Description
Fins Enable	If enabled, the code reader will output data via TCP/UDP FIN.
Fins Communication Mode	Select UDP or TCP as the communication mode.
Fins Server IP	It sets the server IP of Fins.
Fins Server Port	It is 9600 by default.
Fins Data Format	Select 16 bit or 32 bit as the data format.
Fins Control Poll Interval (ms)	It sets how often to read data.
Fins Control Space	It sets storage space of the control area.
Fins Control Offset	It sets the start offset address of the control area.
Fins Status Space	It sets storage space of the status area.
Fins Status Offset	It sets the start offset address of the status area.
Fins Result Space	It sets storage space of the result area.
Fins Result Offset	It sets the start offset address of the result area.

8.7.12 Set SLMP

If you select **SLMP** as the communication protocol, you can configure the following parameters.

Table 8-19 SLMP Communication Protocol

Parameter	Description
SLMP Enable	If it is enabled, the code reader will output data via Seamless Message Protocol (SLMP).
SLMP Dst Addr	It sets the IP address of the Programmable Logic Controller (PLC) to be connected.
SLMP Dst Port	It sets the port No. of the Programmable Logic Controller (PLC) to be connected.
SLMP Data BaseAddr	It sets the base address of the data field.

Parameter	Description
SLMP State BaseAddr	It sets the base address of the state field.
SLMP Network Num	It sets the network No. of access station.
SLMP PLC Num	It sets the PLC No.
SLMP Module I/O Num	It sets the target module I/O No.
SLMP Module Station Num	It sets the target station No.
SLMP Timeout	It sets the waiting time for PLC to respond.

8.8 Data Processing Settings

In **Data Processing**, you can set filter rules for reading codes and other data processing related parameters.

Note

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

8.8.1 Set Filter Rule

You can set rules via **Filter Rule** to filter unwanted codes to improve the reading efficiency.

Normal Filter Mode

If the device's running mode is normal, trigger mode is on, and filter mode is normal, you can set following parameters according to actual demands.

- **Instant Output Mode Enable:** If it is enabled, the device will output barcode data immediately once a code is read. If not enabled, the barcode data will be outputted after the device trigger process ends.
- **Min. Output Time(ms):** Define the minimum time duration (unit: ms) for data output. The duration starts from trigger time. Note: The parameter is only available when the running mode is set to Normal mode and the trigger mode is enabled.
- **Numeral Filter:** If enabled, the device will only parse and read the numeral contents of the codes, and the non-numeral contents will be filtered out.
- **CodeLen Max Num**: It refers to the max. length of the code for output.
- **Code Offset Num:** Define the offset for the start character of the barcode data.
  For example, if you set the value to 3, the code reader will output data starting from the third character of the barcode data. The first and second characters will NOT be outputted.
- **Begin with Specific Character for Result:** enabled, the device will only read the codes which begin with a specific character string.
- **Begins with**: Enter the character string.

- **UPCA Fill Zero**: If it is enabled, when the content of the UPCA code is less than 13 digits, zero will be added at the beginning of the code. It is available only when the running mode is Normal, and the UPCA code is enabled.
- **Include Specific Character in Barcode:** If enabled, the device will only read the codes which include a specific character string.
- **Character**: Enter the character string.
- **Exclude Specific Character in Barcode:** If enabled, the device will only read the codes without a specific character string.
- **Character**: Enter the character string.
- **Regular Expression Filter Enable:** If it is enabled, the device will only read the barcodes which contain the configured character string(s).
- **Max. Code Length:** If the length of a code is longer (in terms of the number of characters) than the configured value, the device will NOT parse the code.
  For example, if you set the value to 9, the device will not parse the codes which contain more than 9 characters.
- **Min. Code Length:** If the length of a code is shorter (in terms of the number of characters) than the configured value, the device will NOT parse the code.
  For example, if you set the value to 6, the device will not parse the codes which contain fewer than 6 characters.
- **History Filter Mode**: You can select **Time-based** and **Quantity-based**.
  Time-based: Set **Filter Time(ms)**. Duplicate codes are filtered within the set time range.
  Quantity-based: Set **Max. History Code Number**. The codes are filtered when the maximum number of history codes is reached. The default value is 20, and the range is 1 to 20.
- **Read Times Threshold:** If the reading results of a barcode is same for the configured times, the barcode will be regarded as valid and its data will be outputted. Or the barcode will be regarded as invalid and its data will not be outputted.
- **De-duplication Enable**: If it is enabled, the repeated code information will be filtered within specific trigger times. You can set trigger times in **De-duplication Windows Size**, and its default value is 1.
- **De-duplication By ROI**: If it is enabled, the device will filter information based on drawn ROIs.
- **Cut Mode**: **Simple Cut** or **Range Cut** can be selected.
  - **Simple Cut**: Set start/end offset of the code via **Code Start Offset Num** and **Code End Offset Num**. It will cut the specific length of code contents from starting/ending, and the remaining part will be outputted.
  - **Range Cut**: Cut the code via the character expressions. For example, the code content is 123456789, and the output will be performed based on the following expressions:
    Character expression (5) will output 5;
    Character expression (1-4) will output 1234;
    Character expression (1-4,6-9) will output 12346789;
    Character expression (1-4,8-) will output 123489;
    Character expression (1-) will output 123456789.

Note

- The parameters, such as **Instant Output Mode Enable**, **Min. Output Time**, **CodeLen Max Num**, **Code Offset Num**, **De-duplication Enable**, **De-duplication Windows Size**, **De-duplication By ROI**, **and Cute Mode**, are only available when the running mode is set to Normal mode and the trigger mode is enabled.
- When **De-duplication Enable** is disabled, no filtering will be performed.

Regular Expression Filter Mode

The device supports filtering codes via the regular expression.

Steps

1. Select **Regular Expression** as the **Filter Mode**, and click **Set** in **Regular Expression Filter** to enter regular expression filter settings window.
2. Import local files or add customized filter rules to set the regular expression.

- Import local files: Click **Import** to import local .xml files, and click **OK** to finish.

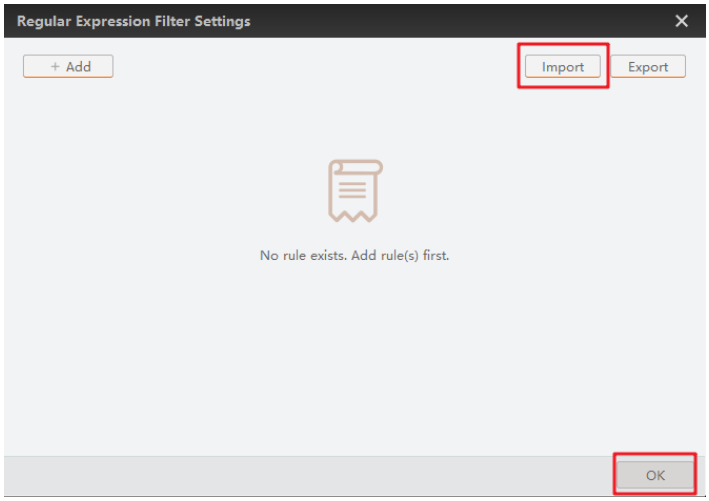


Figure 8-65 Regular Expression Filter Settings

- Add customized filter rule: Click **Add** and set related parameters in the popped-up window, and click **OK** after configuring parameters.

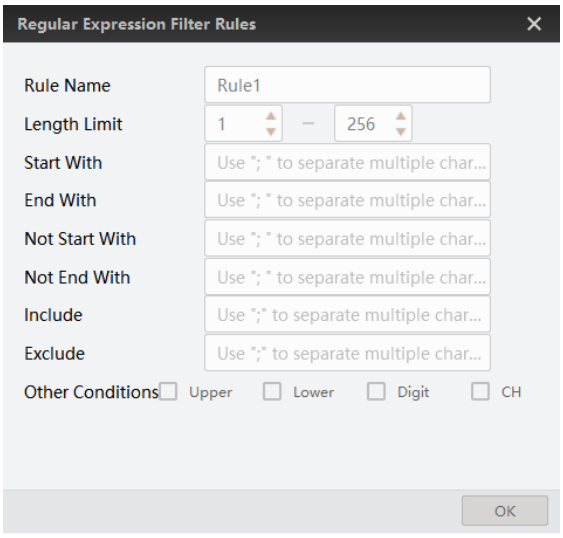


Figure 8-66 Enter Customized Regular Expression Filter Rules

Table 8-20 Filter Rule Parameters

Parameter	Description
Rule Name	The default rule name is Rule 1, and you can edit it according to actual demands.
Length Limit	It sets the length range of the code, and its upper limit is 256.
Start With	It sets the specific start with code. You can use semicolon to separate if there are multiple characters. **Note** If multiple characters are used, code meeting one of these characters is valid.
End With	It sets the specific end with code. You can use semicolon to separate if there are multiple characters. **Note** If multiple characters are used, code meeting one of these characters is valid.
Not Start With	It excludes the specific start with code. You can use semicolon to separate if there are multiple characters. **Note** If multiple characters are used, code meeting one of these characters is valid.
Not End With	It excludes the specific end with code. You can use semicolon to separate if there are multiple characters.

Parameter	Description
	Note If multiple characters are used, code meeting one of these characters is valid.
Included	It sets the code with specific content. You can use semicolon to separate if there are multiple characters. **Note** If multiple characters are used, code meeting all these characters is valid.
Excluded	It sets the code without specific content. You can use semicolon to separate if there are multiple characters. **Note** If multiple characters are used, code meeting all these characters is valid.
Other Conditions	You can select uppercase, lowercase, digit or Chinese.

3. After setting filter rule, enter the code in **Code Check** to check if the filter rule is successful.

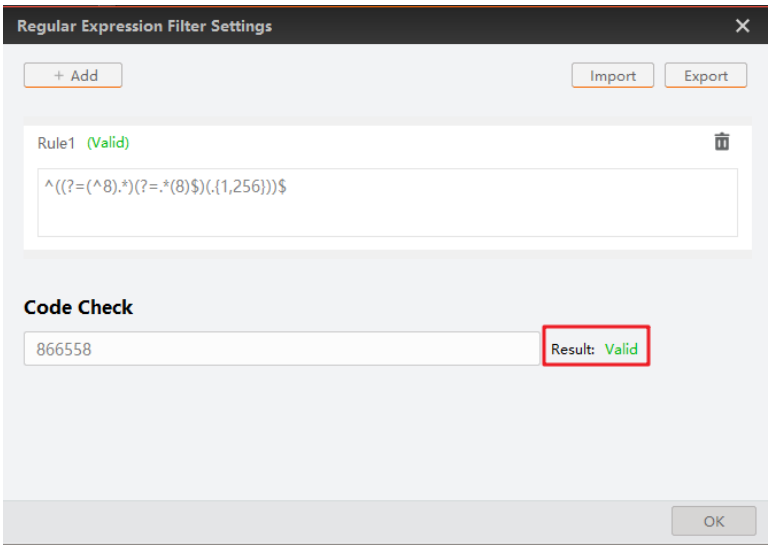


Figure 8-67 Code Check

Note

If the filter rule you configured is correct, the result is valid. Otherwise, it is invalid.

4. (Optional) Click to delete unwanted filter rules.
5. (Optional) Click **Export** to export configured filter rules to local PC.

Note

The filter rule parameters of the regular expression may differ by device models and firmware versions.

8.8.2 Data Processing Settings

You can configure the contents contained in the output code information.

Note

- The actual parameters displayed may vary with different communication protocols. For details about communication settings, refer to section ***Communication Settings***.
- The specific parameters and parameter order may differ by the device's running mode, trigger mode, device models and firmware versions.

SmartSDK

- **Sorting Rules**: Specify the sorting rules of output images. Multiple sorting rules are supported.
- **One By One Enable**: If it is enabled, the device will send one piece of code information each time in accordance with the specified interval. You can set the interval via **One By One Interval** and the default value 100 ms.
- **Local Save Picture Mode**: It includes **Off** and **NoRead**. You can select **NoRead** to let the device save images when no code is read.

Note

The Local Save Picture function is valid when the running mode is Normal, and the trigger mode is on.

- **Local Picture Type**: It sets the image saving type, including JPEG and BMP.
- **Local Override Strategy**: It includes **Off**, **Max Count**, **Loop Max Count**, and **Reserve Space**. **Off** means that disk will not be overridden. **Max Count** means that the device will save image quantity configured in **Local Override Max. Count**, and no more imaged will be saved when the disk is full. **Loop Max Count** means that after the image quantity is reached the number configured in **Local Override Max. Count**, the device will delete the first image and continue to save the latest image. **Reserve Space** means that the device will save images when the disk is safe in terms of storage space. If the available disk space is lower than configured value, images will be deleted.
- **Local Override Max. Count**: You need to set this parameter when selecting **Max Count** or **Loop Max Count** as **Local Override Strategy**.
- **Local Picture Name Content**: It selects what contents you want to display in file name,

including frame time, trigger No. and frame No.

- **Local Time Format**: It selects a format type from the drop-down list for the time stamp contained in the file name. Take YYYYMMDD_HHMMSSFFF as an example, (from the left to the right) YYYY represents year, MM represents month, DD represents date, HH represents hour, MM represents minute, SS represents second, and FFF represents millisecond.
- **Local Save Picture Strategy**: It sets the picture saving method. Four methods are available, including recently frame, all frames, range frames and specific frame. If specific frame is selected as **Local Save Picture Strategy**, you need to set **Local Picture Index**.
- **Mirror Text Enable**: You can customize mirror characters in the data processing. The mirror characters can be defined through the mirror text parameters, while non-mirror characters defined through the non-mirror text parameters.
- **L-Side Angle Enable**: You can set the acceptable angle range and output text of the L-side angle of the DM code through the following parameters.

Note

This parameter can be used only when the running mode is Normal and DM code is enabled.

- 1/2/3/4 Area Start: It refers to the angle start position of the 1/2/3/4 area.
- 1/2/3/4 Area End: It refers to the angle end position of the 1/2/3/4 area.
- 1/2/3/4 Area Text: It refers to the output text in the 1/2/3/4 area.
- Text out of Area: It refers to the output text out of the 1/2/3/4 area.

FTP

When the communication protocol is FTP, set the following parameters of data processing:

- **Sorting Rules**: Specify the sorting rules of output images. Multiple sorting rules are supported.
- **One By One Enable**: If it is enabled, the device will send one piece of code information each time in accordance with the specified interval. You can set the interval via **One By One Interval** and the default value 100 ms.
- **Local Save Picture Mode**: It includes **Off** and **NoRead**. You can select **NoRead** to let the device save images when no code is read.

Note

The Local Save Picture function is valid when the running mode is Normal, and the trigger mode is on.

- **Local Picture Type**: It sets the image saving type, including JPEG and BMP.
- **Local Override Strategy**: It includes **Off**, **Max Count**, **Loop Max Count**, and **Reserve Space**. **Off** means that disk will not be overridden. **Max Count** means that the device will save image quantity configured in **Local Override Max. Count**, and no more imaged will be saved when the disk is full. **Loop Max Count** means that after the image quantity is reached the number configured in **Local Override Max. Count**, the device will delete the

first image and continue to save the latest image. **Reserve Space** means that the device will save images when the disk is safe in terms of storage space. If the available disk space is lower than configured value, images will be deleted.

- **Local Override Max. Count**: You need to set this parameter when selecting **Max Count** or **Loop Max Count** as **Local Override Strategy**.
- **Local Picture Name Content**: It selects what contents you want to display in file name, including frame time, trigger No. and frame No.
- **Local Time Format**: It selects a format type from the drop-down list for the time stamp contained in the file name. Take YYYYMMDD_HHMMSSFFF as an example, (from the left to the right) YYYY represents year, MM represents month, DD represents date, HH represents hour, MM represents minute, SS represents second, and FFF represents millisecond.
- **Local Save Picture Strategy**: It sets the picture saving method. Four methods are available, including recently frame, all frames, range frames and specific frame. If specific frame is selected as **Local Save Picture Strategy**, you need to set **Local Picture Index**.
- **Output Retrans Enable**: Enable to allow data re-transmission. Specify the limit of re-transmission attempts in **Output Retrans Number**.
- **FTP Picture Name Format**: Click  to select one or multiple items to be contained in the picture name. The selected items will be displayed in the frame. You can also enter more contents directly in the frame.
- **FTP Transmission Conditions**: Set the condition to upload the data output by the device to FTP server.
  - **All**: Always upload the data.
  - **ReadBarcode**: Upload the data only when the code is read by the device.
  - **NoReadBarcode**: Upload the data only when no code is read by the device.
- **FTP Transmission Result Contain**: Select contents to upload to the FTP server.
  - **JustResult**: Only upload the content of the code.
  - **JustPicture**: Only upload the code image.
  - **ResultAndPicture**: Upload both the content of the code and the code image.
- **FTP Time Format**: Select a format type from the drop-down list for the time stamp contained in the file name.

Note

Take YYYYMMDD_HHMMSSFFF as an example, (from the left to the right) YYYY represents year, MM month, DD date, HH hour, MM minute, SS second, FFF millisecond.

- **FTP Result Prefix**: It sets the prefix of FTP file name, including **No**, **Result** and **All**. **No** stands for no prefix for file name, and all images are saved in FTP root directory. **Result** stands for all images that code reading successfully will be saved in Read directory, and all images that code reading failed will be saved in Noread directory. **All** stands for all images will be saved in All directory.
- **FTP Save Picture Strategy**: Select from the drop-down list the picture saving strategy from **Recent Frame**, **All Frames**, **Range Frames**, and **Specific Frame** accordingly. If **Specific**

Frame is selected, you can specify the frame by entering its index in the box of FTP Picture Index.

Other Communication Protocols

When the communication protocol is TCP Client / Serial / TCP Server / Profinet / MELSEC / EthernetIp / Modbus / SLMP / FINS, set the following parameters of data processing.

Note

Here we use "***" to represent the specific protocol name.

- **Sorting Rules**: Specify the sorting rules of output images. Multiple sorting rules are supported.
- **One By One Enable**: If it is enabled, the device will send one piece of code information each time in accordance with the specified interval. You can set the interval via **One By One Interval** and the default value 100 ms.
- **ROI Output Noread Enable**: Enable this to set the default output content if no code is read during transmission. Edit the output text in **Output NoRead Text**.
- **Local Save Picture Mode**: It includes **Off** and **NoRead**. You can select **NoRead** to let the device save images when no code is read.

Note

The Local Save Picture function is valid when the running mode is Normal, and the trigger mode is on.

- **Local Picture Type**: It sets the image saving type, including JPEG and BMP.
- **Local Override Strategy**: It includes **Off**, **Max Count**, **Loop Max Count**, and **Reserve Space**. **Off** means that disk will not be overridden. **Max Count** means that the device will save image quantity configured in **Local Override Max. Count**, and no more imaged will be saved when the disk is full. **Loop Max Count** means that after the image quantity is reached the number configured in **Local Override Max. Count**, the device will delete the first image and continue to save the latest image. **Reserve Space** means that the device will save images when the disk is safe in terms of storage space. If the available disk space is lower than configured value, images will be deleted.
- **Local Override Max. Count**: You need to set this parameter when selecting **Max Count** or **Loop Max Count** as **Local Override Strategy**.
- **Local Picture Name Content**: It selects what contents you want to display in file name, including frame time, trigger No. and frame No.
- **Local Time Format**: It selects a format type from the drop-down list for the time stamp contained in the file name. Take YYYYMMDD_HHMMSSFFF as an example, (from the left to the right) YYYY represents year, MM represents month, DD represents date, HH represents hour, MM represents minute, SS represents second, and FFF represents millisecond.
- **Local Save Picture Strategy**: It sets the picture saving method. Four methods are available, including recently frame, all frames, range frames and specific frame. If specific frame is

selected as **Local Save Picture Strategy**, you need to set **Local Picture Index**.

- ***** Output Format**: Click **Edit** to select one or multiple items to be contained in the picture name and click **Save**. The selected items will be displayed in the frame below. You can also enter more contents directly in the frame.

Table 8-21 Output Format Identifier

No.	Data	Identifier	No.	Data	Identifier
1	Code Content	<code_content>	16	Newline	<line_feed>
2	Code Type	<code_type>	17	Enter	<carriage_return>
3	Code Angle	<code_angle>	18	Horizontal Tab	<horizontal_tab>
4	Code Vertex coordinates	<code_vertex_pos>	19	Vertical Tab	<vertical_tab>
5	Code Center coordinates	<code_cen_pos>	20	Station ID	<station_id>
6	Trigger Total Time	<total_time>	21	Code Reading Time	<frame_code_time>
7	Trigger Start Time	<trig_start_time>	22	Code Score	<code_eval_score>
8	Mirror	<code_mirror>	23	Code Quality	<code_quality>
9	Trigger No.	<trigger_num>	24	Code Quality Sub Item (Grade)	<code_sub_quality_grade>
10	Frame No.	<frame_num>	25	Code Quality Sub Item (Score)	<code_sub_quality_score>
11	Polling Group ID	<polling_group_id>	26	Total Image Quantity	<total_frame_cnt>
12	ROI ID	<code_roi_id>	27	OK Image Quantity	<ok_frame_cnt>
13	Code Quantity	<code_num>	28	NG Image Quantity	<ng_frame_cnt>
14	Algorithm Time	<algo_time>	29	Code Reading Rate	<reading_rate>
15	PPM	<ppm>			

- ***** Format Check**: Click **Execute** in ***** Format Check** to check if you entered is right in format, and the check result will be displayed in ***** Format Check Result**.
- ***** Output Noread**: Enable this to set the default output content if no code is read during transmission. Edit the output text in **Output NoRead Text**.

- *** **Output Start Text**: The contents of the start part of the data output. You can set the contents as desired.
- *** **Output Stop Text**: The contents of the end part of the data output. You can set the contents as desired.
- *** **Output Barcode Enter Character Enable**: Whether to show input character in the data.
- *** **Output Barcode Newline Character Enable**: Whether to show new-line character in the data.
- *** **Output Barcode Carriage Return Enable**: Whether to show carriage return in the data.
- ***Add NoRead Enable**: When the code content read does not meet the specified min. code length, this parameter will add the content to the required length for output.
  - **Off**: Output the code content.
  - **Add Noread**: Add the content to the required length for output.
  - **Just Noread**: Output Noread without adding.
- **Code Pos Width Enable**: When the code coordinates do not meet the specified length, this parameter will add 0 to the required length for output. The length of the code coordinates can be set in **Code Pos Width**.
- **CodeNum End Trigger Min**: If it is enabled, the device will stop triggering and save the current image when the code recognized by the device does not meet the min. length requirement.
- **Mirror Text Enable**: You can customize mirror characters in the data processing. The mirror characters can be defined through the mirror text parameters, while non-mirror characters defined through the non-mirror text parameters.
- **L-Side Angle Enable**: You can set the acceptable angle range and output text of the L-side angle of the DM code through the following parameters.

Note

This parameter can be used only when the running mode is Normal and DM code is enabled.

- 1/2/3/4 Area Start: It refers to the angle start position of the 1/2/3/4 area.
- 1/2/3/4 Area End: It refers to the angle end position of the 1/2/3/4 area.
- 1/2/3/4 Area Text: It refers to the output text in the 1/2/3/4 area.
- Text out of Area: It refers to the output text out of the 1/2/3/4 area.

8.9 Contrast Control Settings

Note

You need to set device's running mode as normal before using this function.

The contrast control function compares the data that the device reads with preset data and outputs contrast result. The result can be used as the event source of trigger signal, including **Contrast Success** and **Contrast Fail**. This function has two ways to contrast,

including regular contrast and consecutive number contrast.

Regular Contrast

The regular contrast requires you to set code contents in advance, and the client software will contrast the data that the device reads with preset contents and outputs comparison result.

Steps

1. Go to **Data Processing** → **Contrast Control**., enable **Contrast Enable**, and select **Regular** as **Contrast Rules**.
2. Set **Start Position** that means the stating position of the comparison.
3. Set **Character Number** that means the comparison quantity.
4. Set code contents in **Wildcard String**.

Note

You can use wildcard * and ?. * stands for multiple strings you can use, and ? stands for one string you can use. * can be used once only and ? can be used many times.

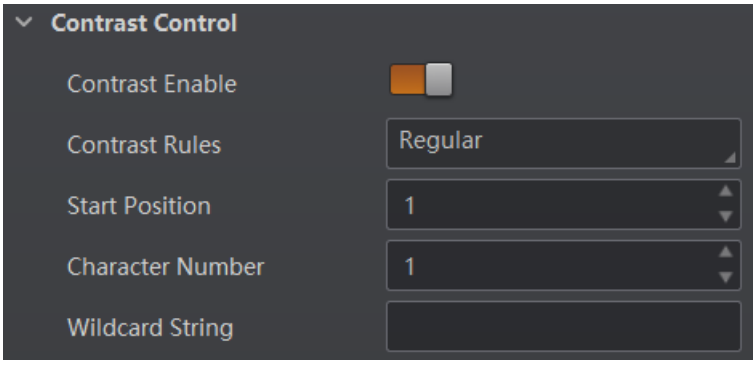


Figure 8-68 Regular Contrast

Consecutive Number Contrast

The consecutive number contrast requires you to set consecutive code rules, and the client software will contrast the data that the device reads with preset rules and outputs contrast result.

Steps

1. Go to **Data Processing** → **Contrast Control**., enable **Contrast Enable**, and select **Consecutive Number** as **Compare Rules**.
2. Set **Start Position** that means the stating position of the comparison.
3. Set **Digital Number** that means the comparison quantity.
4. Set **Step** that means the client software will increase or decrease the preset value after each comparison according the step you set.

Note

- If the preset value after increase or decrease exceeds the digital number you set, and then the preset value will become 0.
- The base value displays the preset value.

5. (Optional) Click **Execute** in **Contrast Reset** to reset comparison. After that, the client software will use the first code it reads as the preset value.

Here we take start position (3), digital number (2) and step (2) as an example to explain the consecutive number comparison:

- If the first code that the device reads is ur96k, and then the preset value is 96. The preset value increases to 98 (96+2).
- If the second code is yr98kjkfd, and comparison succeeds. The preset value increases to 100 (98+2).
- If the third code is kl99fjkd, and comparison fails. The preset value does not increase.
- If the fourth code is kl00djf, and comparison succeeds. The preset value increases to 02 (00+2).

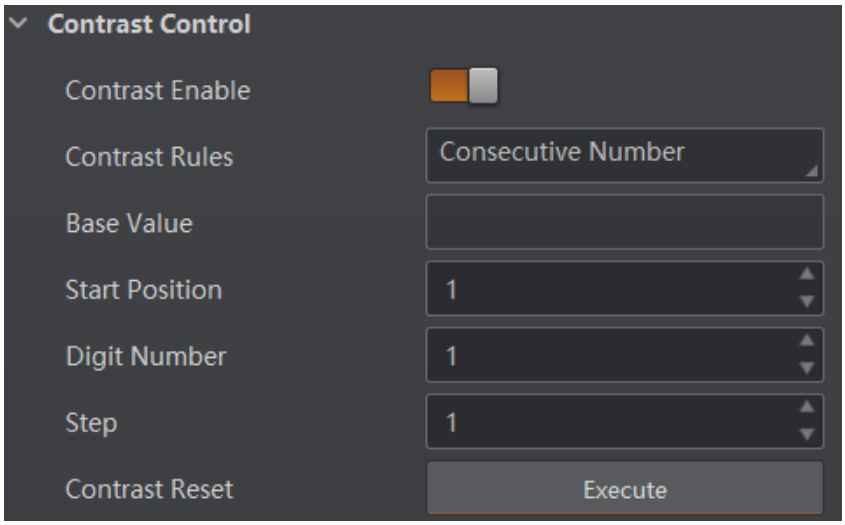


Figure 8-69 Consecutive Number Contrast

8.10 Characters Replace

Note

This section is available for IDMVS V5.0 and later.

The **Characters Replace** function allows you to standardize code output by replacing

specified characters or performing case conversion on the decoded content.

Steps

1. On the Navigation Bar of the IDMVS main window, go to **Operator Settings** → **Data Processing** → **Characters Replace**.

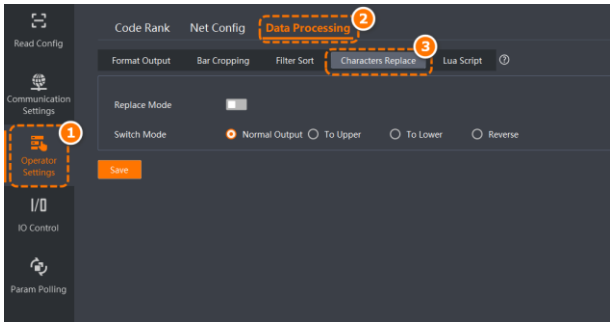


Figure 8-70 Characters Replace

2. On the **Characters Replace** page, you can set rules to replace specific characters in the decoded code content.
   1) Enable **Replace Mode**.
   2) Click **Add** under **Character Set**.
   3) In the **Original Text** and **Replace With** columns of the rule list, enter the character(s) to be replaced and the replaced character(s), respectively.

      You can click next to the input filed and select characters from the **ASCII Table**.
   4) Repeat the above steps to add multiple character replacement rules.

      To delete a rule, select the box next to the rule and click **Delete** to remove it.
3. In the **Switch Mode** section, select a switch mode.
   - **Normal Output**: No case conversion is applied.
   - **To Upper**: Converts all lowercase letters to uppercase.
   - **To Lower**: Converts all uppercase letters to lowercase.
   - **Reverse**: Converts lowercase letters to uppercase and uppercase letters to lowercase.
4. Click **Save** to apply the settings.

Result

If the configured rules and parameters of **Switch Mode** are like the example below, when the original code content is "A12345678A", the final output could be "1bb1".

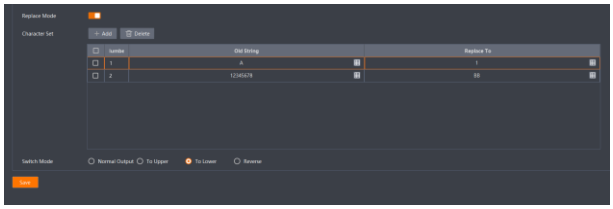


Figure 8-71 Example of Characters Replace

8.11 Multi-Reader Synchronization

Note

This section is available for IDMVS V5.0 and later.

When multiple code readers are simultaneously capturing images for code reading, they can work together through the multicast or main-sub operation mode. This achieves synchronized triggering and efficient data transmission across multiple code readers. Additionally, the multi-frame can be set in IDMVS main interface to preview images from multiple code readers.
Synchronization between code readers set by multicast mode and main-sub operation mode serves different application scenarios. You can select the appropriate mode based on requirements.

Table 8-22 Comparison of Networking Modes

Networking Mode	Primary Purpose	Working Principle	Application Scenario
Multicast	Synchronize trigger numbers	Main and sub code readers are triggered simultaneously. The main sends the trigger number to all sub devices. All code readers transmit their reading results to the decoding platform, which merges the results based on the trigger number and outputs a unified result.	It is applicable for multi-side scanning in logistics scenarios. The decoding platform integrates output from all main and sub code readers to achieve coordination of multi-reader.
Main-Sub Operation	Data integration or transmission of multiple code readers	Main and sub code readers are triggered simultaneously. Sub code readers send reading results to the main and the main integrates and transmits the reading results to the corresponding host or client system.	It is applicable for scenarios with limited communication ports, multi-station setups, or large-area scanning requiring coordinated output.

8.11.1 Main-Sub Configuration

Main-sub network configuration consists of one main code reader and multiple sub code readers, allowing cooperation of multiple code readers. This section takes two code readers as an example to guide you through the configuration process.

In main-sub operation mode, one code reader is set as the main, while others are set as

sub code readers. Sub code readers send their decoded results to the main, and the main merges or forwards the data and sends to the connected host system (PC or PLC). This enables coordination among multiple code readers. The diagrams of independent mode and cooperation mode are as follows.

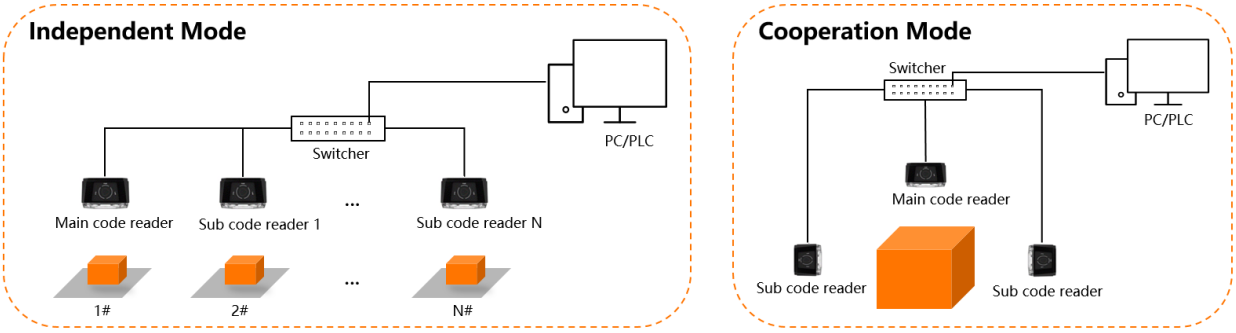


Figure 8-72 Diagram of Working Mode

Table 8-23 Mode Overview

Mode	Description	Use Case	Benefits
Independent	The main only forwards its own and sub devices' data to the host. No data merging is performed.	Each code reader scans code on different positions, and data are received by one host (PC or PLC).	Reduces the number of host-side communication ports. Only one port can forward all data to the host.
Cooperation	The main merges its own and data of sub devices before sending to the host.	It is applicable for large object or object with multiple sides which require multi-angle reading.	Merges duplicate codes, and simplifies host-side integration and processing.

Steps

1. Connect two or more code readers as needed.
2. Go to **Operator Settings** → **Net Config** → **Main Sub Configuration** in the Navigation Bar of the IDMVS main window.

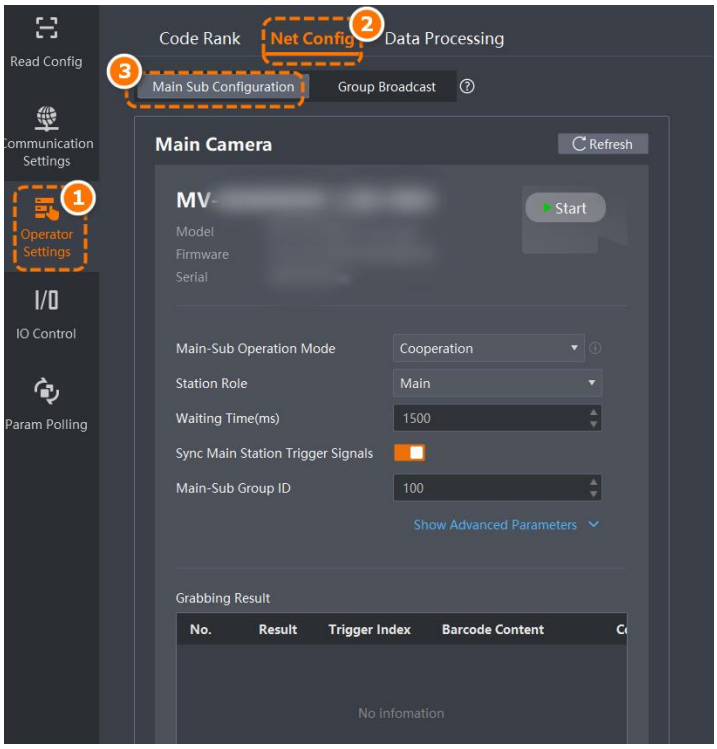


Figure 8-73 Main Sub Configuration

3. Under the **Main Sub Configuration** tab, set the parameters for the main code reader.

Common Parameters

Main-Sub Operation Mode

You can select whether to enable or configure the mode of the current connected code readers. The available modes are as follows.

Note

Hover over behind the mode selection box to view a data flow diagram for each mode.

- **Off**: Main-sub configuration feature is disabled.
- **Independent**: Sub code readers send decoded data to the main, and the main sends its own data and forwards data of sub devices without merging. The data processing of the codes is completed at each device. This is suitable for scenarios involving multiple production lines. By using the main code reader for data forwarding, the occupation of communication ports can be reduced.
- **Cooperation**: The sub code reader sends decoding results to the main for data processing. The main merges the data from both sub and its own stations based on its processing logic, and then outputs a consolidated package. This mode is suitable for scenarios requiring multi-side code integration due to limited coverage.

Note

The code symbologies used by the sub devices should be enabled in the main code reader; otherwise, decoded data may be filtered and lost.

Station Role

Set the role of the current connected code reader as **Main**.

Waiting Time (ms)

Set the max. waiting time for the main to receive sub data after triggering.

Note

- This parameter can be set only when you select **Cooperation** in **Main-Sub Operation Mode**.
- The value of the **Waiting Time** parameter should be greater than the total output processing time of the slowest sub code readers among all.

Sync Main Station Trigger Signals

Set if the main should send its trigger signal to the sub devices. When it is enabled, the trigger source of the sub code readers can be selected as **Cooperation**.

Note

This parameter can be set only when you select **Cooperation** in **Main-Sub Operation Mode**.

Main-Sub Group ID

Set the main-sub network group ID of the connected code readers. Devices with the same group ID are in the same main-sub network, and code readers in different main-sub network groups cannot access each other.

Advanced Parameters

Station Port

It refers to the port No. used for data transmission on the main station.

Sync Main Station ROI

Select whether to synchronize the ROI sequence numbers with the sub code readers. Once it is enabled, the ROI sequence numbers of the sub code readers can inherit the sequence numbers from the main and continue numbering.

Note

This parameter can be set only when you select **Main** in **Station Role**.

Display Sub Station Reading Data

Select whether to display the reading data of the sub station on the main station.

Once it is enabled, if the sub code readers reads a code, the code information can be displayed on the main code reader.

Query Sub Station ID

Enter the sub station ID and you can check the following information.

- **Sub Station IP**: It refers to the IP address of the sub code reader.
- **Sub Station Connection Status**: A value of 1 means that the data transmission is normal, otherwise it means that there is no connection.
- **Sub Station Name**: It refers to the user name of the sub code reader.
- **Sub Station Model**: It refers to the model name of the sub code reader.
- **Sub Station Serial Number**: It refers to the serial number of the sub code reader.

Note

When configuring the sub code reader, the main code reader information will also be displayed through parameters similar to the above.

4. Drag the connected code reader from the device list into the dashed box of **Sub Cameras** to quickly complete the main-sub configuration.

Note

- If you need to add multiple sub code readers, repeat this drag-and-drop method for each code reader.
- If a sub code reader does not show in the **Sub Cameras** area after being added, you can switch to that device and make sure its **Main-Sub Operation Mode** parameter is consistent with that of the main code reader.
- It is recommended to use code readers of the same series or model to set up a main-sub network. If mixed usage is necessary, it is advisable to configure the code reader with the lower resolution as the main station.

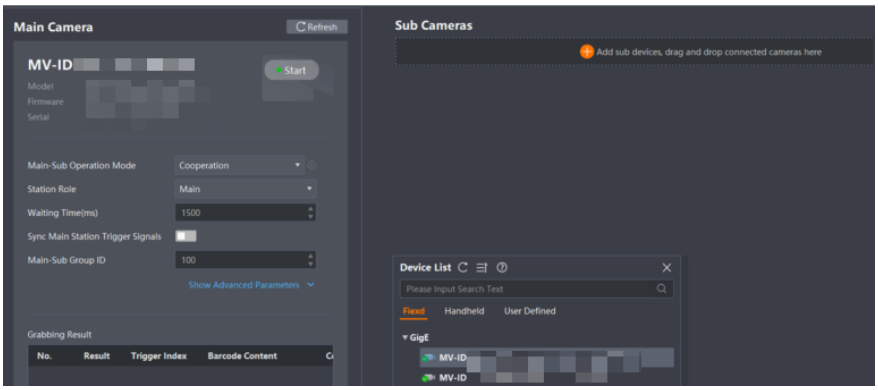


Figure 8-74 Example of Adding Sub Cameras

5. Double-click the sub code reader tab in the **Sub Cameras** area to open the configuration panel. Set the following parameters:

Common Parameters

Main-Sub Operation Mode

Select the same mode as the main code reader.

Station Role

Select **Sub**.

Main-Sub Group ID

Enter the same group ID as the main code reader to ensure they are in the same network.

Station ID

It will be automatically assigned once the connection to the main code reader is established.

Note

This parameter is read-only and cannot be edited.

Main Station IP

It will be automatically displayed once the connection to the main code reader is established.

Note

This parameter is read-only and cannot be edited.

Main Station Connection Status

A value of 1 means that the data transmission is normal, and 0 means that there is no connection.

Note

This parameter is read-only and cannot be edited.

Advanced Parameters

The following parameters are read-only and cannot be edited.

Main Station Name

It refers to the user name of the main code reader.

Main Station Model

It refers to the model name of the main code reader.

Main Station Serial Number

It refers to the serial No. of the main code reader.

6. Configure the main-sub station trigger source according to the actual scenario. For the operation details, refer to section ***Signal Input Settings***.

To ensure the consistency of all code readers when using the main-sub network, the

following two methods can be selected.

- Configure both main and sub code readers to use the same trigger source, such as LineIn 0/1/2/3. This ensures that all code readers are triggered simultaneously.
- Set the main code reader to any supported trigger source and configure the sub code readers to "Main Sub" as their trigger source. Both main and sub code readers can be triggered at the same time.

Note

It is not commended to use "Self Trigger" for the main and sub station. Because it is difficult to ensure consistent triggering between the main and sub devices.

7. Under the page of **Main Sub Configuration** of the Main Camera, you can operate the following configurations.
   - Start/Stop: You can start or stop image acquisition.

     Note

     When the trigger source of the sub code readers is set to "Main Sub", sub devices should be in image acquisition mode to receive and respond to the main station's trigger signal.

   - Check grabbing results: Check the decoding results in the **Grabbing Result** area. This view is consistent with the **History** section in the main window.
   - Remove sub devices: Click  in the sub station area.

What to do next

After the main-sub configuration is finished, you can proceed to configure data processing rules and data output settings. Refer to section ***Data Processing Settings*** and section ***Communication Settings*** for details.

8.11.2 Multicast

A multicast network of multiple code readers includes one main code reader and several sub code readers. The main code reader is used for synchronizing trigger numbers, while all code readers transmit decoding data to the code-reading platform independently.
The primary principle of multicast networking is to configure one of the code readers as the main device and the remaining code readers as sub devices. Both main and sub code readers trigger image acquisition simultaneously. The main code reader synchronizes trigger numbers with other sub code readers, and all code readers transmit decoding data to the code-reading platform. The platform integrates and processes the data based on trigger numbers and outputs integration results. This mode is suitable for logistics multi-side scanning scenarios (typically involving more than three code readers), enabling cooperation working across multiple cameras by integrating all outputs from main and sub code readers through the code reading platform.
You can go to **Operator Settings** → **Net Config** → **Group Broadcast** on the Navigation

Bar of the main window to configure the following parameters.

Note

IDMVS does not support simultaneous configuration of multicast and main-sub operation functions.

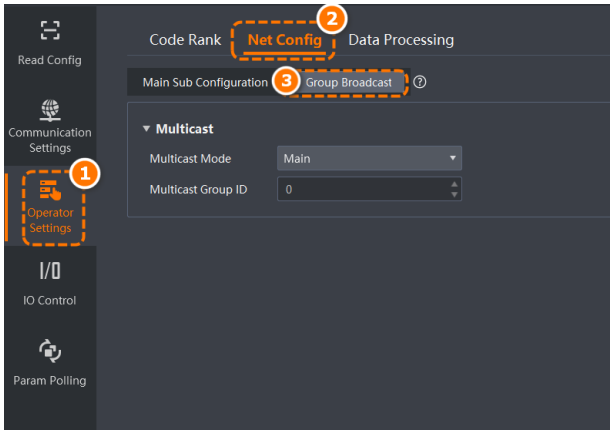


Figure 8-75 Group Broadcast

Multicast Mode

Select whether to enable multicast mode or configure the operating mode of the connected code reader. The supported modes are introduced below.

- **Off**: Disable multicast mode.
- **Main**: Configure the connected code reader as the main code reader, which simultaneously sends trigger numbers to sub code readers.
- **Sub**: Configure the connected code reader as the sub device.

Multicast Group ID

After selecting main or sub in **Multicast Mode**, you can specify the multicast group index of the code reader through this parameter. Devices with the same index belong to the same group.

8.11.3 Multi Frame

The client supports single- or multi-window previews. You can adjust the division based on the number of connected the code readers or other code reading requirements. The client provides three default divisions: 1-Window, 4-Window, and 9-Window. Custom divisions are also available if needed.

Before You Start

Make sure the code reader(s) has been connected.

Steps

1. Click **Multi Frame** on the quick access toolbar, and then select **1-Window**, **4-Window**, **9-Window**, or **Custom** as needed.

Note

If **Custom** is unselected, proceed to Step 3.

2. (Optional) Customize window division.
   1) In the **Custom Division** window, click **Add** in the upper-left corner.

   Note

   Up to 4 custom divisions can be added. You can select and click **Delete** to remove invalid divisions.

   2) Enter a division name and click **OK**.
   3) Select the optimal grid under **Window Division**, with options including **2x2**, **3x3**, and **4x4**.
   4) Adjust the division by clicking **Merge** to merge the adjacent windows or clicking **Split** to split the merged windows.

   Note

   Up to 16 windows are supported.

   5) Click **Save**.
3. Select code reader for preview.
   - In 1-window mode, the selected code reader is displayed by default. To switch windows, drag other connected code readers from the device list to the preview window. The 1-window preview is shown below.



Figure 8-76 1-Window Preview

   - In multi-window division, drag multiple connected code readers from the device list to the preview window. Click ✕ in the upper-right corner to unlink the code reader. A custom 3-window preview is shown below.



Figure 8-77 Multi-Window Preview

4. Click **Read Config** → **Fast Config** → **Real Grabbing** on the left, or click  on the left of the preview toolbar to check image capture.

What to do next

Refer to section ***Quick Start Guide*** for fast debugging of image capture and code reading, and preview real-time images in the preview area.

8.12 Lua Script

Note

- This section is available for IDMVS V5.0 and later.
- Lua Script is available for some device models.

The Lua Script is an embedded scripting language featuring concise syntax, high execution efficiency, and easy integration. IDMVS supports custom configurations for code reader format output and data filtering through Lua scripts.

In the navigation bar of the main interface, select **Operator Settings** → **Data Processing** → **Lua Script** to access the Lua Script page, as shown in the following picture.

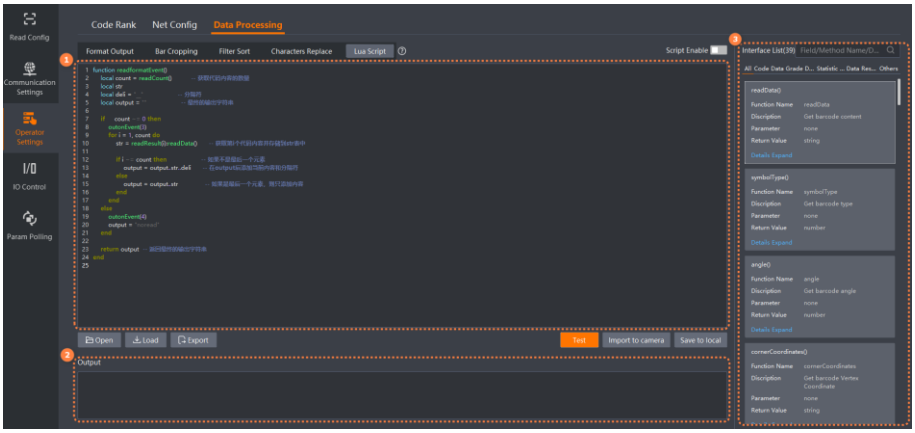


Figure 8-78 Lua Script

The descriptions of each module are in the table below.

Table 8-24 Lua Script Module Description

No.	Module Name	Function Description
1	Script Editing Area	It is used for editing Lua script code. **Note** The script editing area supports real-time syntax notification. Button functions in the script editing area are introduced below: ● **Script Enable**: Select whether to enable the format output function of the Lua Script. Once it is enabled, format output cannot be configured. **Note** When the script contains formatting-related API, it will be enabled automatically. ● **Open**: Open the local script files. ● **Load**: Load script files from the code reader. ● **Export**: Export Lua scripts from the code reader to the selected directory. ● **Test**: Execute the scripts in the script editing area and view the results in the output area. ● **Import to Camera**: Save the scripts in the script editing area to the connected code reader. ● **Save to Local**: Save the scripts in the script editing area as Lua files to the local.
2	Script Output Area	You can view script execution results here. ● If compilation is successful, this area will show ***Verify Success*** with test results. ● If compilation is failed, it will display error details and line numbers.
3	API List	Display supported Lua APIs and related descriptions. **Note** Some APIs provide sample codes. You can check and copy sample codes.

Using the Lua Script requires some cautions and procedures. Refer to the latest version of

IDMVS Client Software User Manual for details.

8.13 User Set Customization

In **Configuration Management**, you can set and manage the user set. A user set is a group of parameter values with all the settings needed to control the device, and you can save, load and switch different user sets.

- **Save Settings**: If you have set the device parameters as desired, you can save them into the user set. Go to **Config Management** → **Save Settings**, and click **UserSet1**, **UserSet2**, or **UserSet3** to save the current device settings.
- **Load Settings**: You can load the user set to restore the device to the saved group of parameter values again if required. Go to **Config Management** → **Load Settings**, and click **Default**, **UserSet1**, **UserSet2**, or **UserSet3** to load settings.

Note

The **Default** refers to restore the device parameter settings to the factory ones.

- **Start Settings**: The selected user set will be automatically loaded after the device being powered on. For example, if you select **Default**, the device parameter settings will be restored to the factory settings.

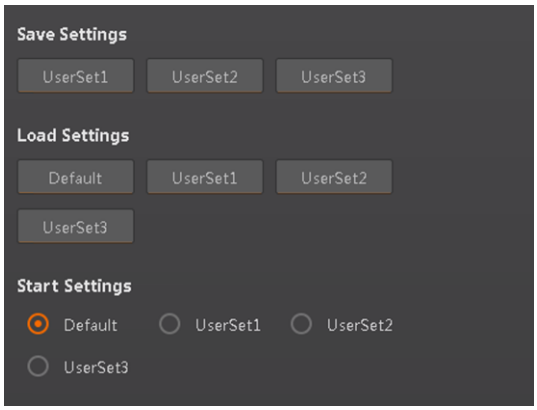


Figure 8-79 User Set Customization

8.14 Statistics Information

The statistics information in the feature tree helps you to count data related with code reading.

Note

You need to set device's running mode as normal before using this function.

Steps

1. Right click the device in **Device Connection**, and click **Feature Tree**.
2. Go to **Feature Tree**, find **Statistics Info.**, and select **Statistics Mode**:
- **All Frames** means the client software will display all data since the device is powered on.
- **Latest Frames** means the client software will display data of the last 10 frames.
3. View related parameters.
4. (Optional) Click **Execute** in **Reset Statistics** to reset statistics information.

Table 8-25 Parameter Description

Parameter Name	Description
Total Frame Number	The total frame quantity.
Read Frame Number	The quantity of frames that have been read codes.
Noread Frame Number	The quantity of frames that have not been read codes.
Read Rate	It refers to the code reading ratio.
Algo Time Ave	The average time of algorithm, and the unit is ms.
Algo Time Max	The max. time of algorithm, and the unit is ms.
Algo Time Min	The min. time of algorithm, and the unit is ms.
Read Time Ave	The average time of code reading, and the unit is ms.
Read Time Max	The max. time of code reading, and the unit is ms.
Read Time Min	The min. time of code reading, and the unit is ms.
Reset Statistics	Click **Execute** to reset statistics information.

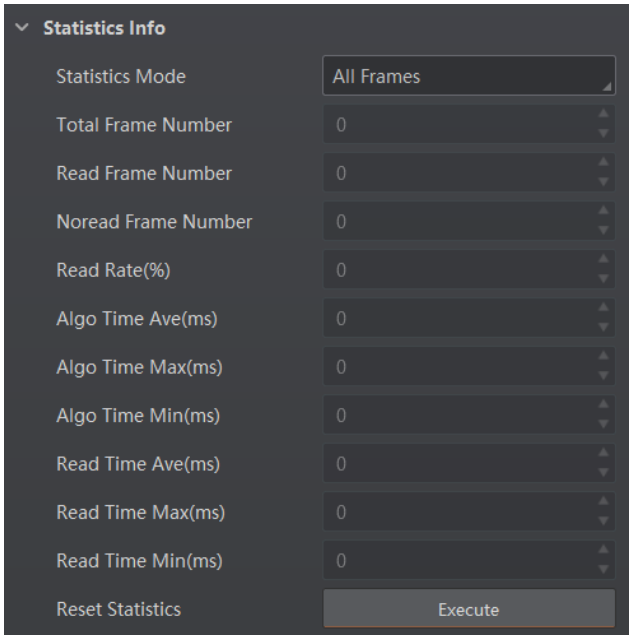


Figure 8-80 Statistics Information

8.15 Diagnose Event Report

The diagnose event report function monitors memory and CPU usage rate, and let you know when there is a crash, higher CPU usage rate, insufficient memory, and other events.

Steps

1. Right click the device in **Device Connection**, and click **Feature Tree**.
2. Go to **Feature Tree**, and find **Diagnose Event Report**.
3. View related information.
4. (Optional) Click **Execute** in **Reset Event** to clear all information.



Figure 8-81 Event Report

Chapter 9 FAQ (Frequently Asked Question)

9.1 Why there is no device listed after I run the IDMVS client software?

Table 9-1 Question 1

Possible Cause	Solution
The device is powered off.	Check the device's power connection (observe whether the PWR indicator is solid green) to make sure the device is powered up normally.
Network exception occurs.	Check the network connection (the LNK indicator is flashing green if the network exception occurs) to make sure the device can be connected to the network normally, and make sure that the PC and the device are in the same network segment.

9.2 Why the image is very dark?

Table 9-2 Question 2

Possible Cause	Solution
Insufficient brightness of light source.	Increase the brightness of light source appropriately, or change to a brighter one.
Too small value of exposure and gain.	Increase exposure and gain appropriately.

9.3 Why the image's frame rate is very low in the live view?

Table 9-3 Question 3

Possible Cause	Solution
Network circuitry speed is not 100 Mbps.	Check whether the network transit speed is 100 Mbps or not.

9.4 Why there is no image in the live view?

Table 9-4 Question 4

Possible Cause	Solution
The trigger mode is enabled, but there is no trigger signal.	Sent the trigger signal to the device, or disable the trigger mode.
Network circuitry speed is not 100 Mbps.	Check whether the network circuitry speed is 100 Mbps or not.

Chapter 10 Revision History

Table 10-1 Revision History

Version No.	Date	Revision Details
V4.0.2	Nov. 17, 2026	Edit Section ***17-Pin M12 Connector***.
V4.0.1	Jun. 15, 2026	Add input signal wiring in section ***Device with 3.0 Version***, and output signal wiring in section ***Device with 3.0 Version***.
V4.0.0	Mar. 12, 2026	Edit the whole structure and content.
V3.1.0	Sep. 21, 2022	Edit Section 17-Pin Interface Description.
V2.5.0	Feb. 9, 2022	● Edit Section Set Code Reading ROI. ● Edit Section Set 1D Algorithm Parameter. ● Edit Section Set 2D Algorithm Parameter. ● Edit Section Set Filter Rule. ● Edit Section Set Result Format.
V2.2.0	May. 10, 2021	● Edit Section Appearance. ● Edit Section Set Light Source. ● Add Section Set Self-Adaptive Adjustment. ● Edit Section Set 1D Algorithm Parameter. ● Edit Section Set 2D Algorithm Parameter. ● Add Section Set Code Quantity Evaluation. ● Add Section Set Stack Code Algorithm Parameter. ● Edit Section Set Code Reading ROI. ● Edit Section Set Filter Rule. ● Edit Section Set Result Format. ● Add Section Contrast Control Settings. ● Add Section Fins. ● Add Section Statistics Information. ● Add Section Event Report. ● Add Section Set Time.
V1.4.0	Sep. 29, 2020	● Edit Section Appearance. ● Edit Section I/O Wiring. ● Add Section Set Polling. ● Add Section Set Lens Focus. ● Edit Section Set Result Format. ● Edit Section Communication Settings.
V1.3.0	Dec. 3, 2019	Original version.

Appendix A ASCII Table

Note

The device with USB interface only supports the red color character only regarding setting prefix and suffix characters.

Table A-1 ASCII Table

Character	Value	Character	Value	Character	Value	Character	Value
NUL	0	(SPACE)	20	@	40	`	60
SOH	1	!	21	A	41	a	61
STX	2	"	22	B	42	b	62
ETX	3	#	23	C	43	c	63
EOT	4	$	24	D	44	d	64
ENQ	5	%	25	E	45	e	65
ACK	6	&	26	F	46	f	66
BEL	7	'	27	G	47	g	67
BS	8	(	28	H	48	h	68
HT	9	)	29	I	49	i	69
LF/NL	0a	*	2a	J	4a	j	6a
VT	0b	+	2b	K	4b	k	6b
FF/NP	0c	,	2c	L	4c	l	6c
CR	0d	-	2d	M	4d	m	6d
SO	0e	.	2e	N	4e	n	6e
SI	0f	/	2f	O	4f	o	6f
DLE	10	0	30	P	50	p	70
DC1/XON	11	1	31	Q	51	q	71
DC2	12	2	32	R	52	r	72
DC3/XOFF	13	3	33	S	53	s	73
DC4	14	4	34	T	54	t	74
NAK	15	5	35	U	55	u	75
SYN	16	6	36	V	56	v	76

Character	Value	Character	Value	Character	Value	Character	Value
ETB	17	7	37	W	57	w	77
CAN	18	8	38	X	58	x	78
EM	19	9	39	Y	59	y	79
SUB	1A	:	3A	Z	5A	z	7A
ESC	1B	;	3B	[	5B	{	7B
FS	1C	<	3C	\	5C	|	7C
GS	1D	=	3D	]	5D	}	7D
RS	1E	>	3E	^	5E	~	7E
US	1F	?	3F	_	5F	DEL	7F

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