HIKROBOT

X86 Open Platform

User Manual

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Note

These clauses apply only to the products bearing the corresponding mark or information.

FCC Information

Please take attention that changes or modification not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC compliance: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

—Consult the dealer or an experienced radio/TV technician for help.

FCC Conditions

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

EU Conformity Statement

This product and - if applicable - the supplied accessories too are marked with "CE" and comply therefore with the applicable harmonized European standards listed under the EMC Directive 2014/30/EU, LVD Directive 2014/35/EU, the RoHS Directive 2015/863/EU amending 2011/65/EU.

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2006/66/EC (battery directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info

Symbol Convention

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

Symbol	Description
NOTE	Provides additional information to emphasize or supplement important points of the main text.
WARNING	Indicates a potentially hazardous situation, which if not avoided, could result in equipment damage, data loss, performance degradation, or unexpected results.

⚠ **DANGER**	Indicates a hazard with a high level of risk, which if not avoided, will result in death or serious injury.

Available Model

This manual is applicable to the X86 Open Platform.

Safety Instructions

These instructions are intended to ensure that the user can use the device correctly to avoid danger or property loss.

Laws and Regulations

The device should be used in compliance with local laws, electrical safety regulations, and fire prevention regulations.

Power Supply

- When wiring or dismounting, make sure that the device power is cut off, and do not operate under electrification.
- Avoid contact with exposed circuit. When the device is powered on, avoid contact with exposed junctions and parts.
- Use the power adapter provided by the regular manufacturer.
- Do not connect multiple devices to one power adapter, to avoid over-heating or fire hazards caused by overload.
- Make sure the plug is properly connected to the power socket.

Transportation

- The device contains precision optical components and electronic components. During transportation, storage and installation, incorrect operations like heavy pressure and violent vibration should be avoided. Otherwise, the device may be damaged.
- Avoid sudden collision, and pack the device with the accompanied carton and cushioning material or similar package.

Using Environment

- In order to reduce the risk of fire or electric shock, do not let the device get wet or damp.
- Do not drop objects onto the device and avoid vigorous vibration.
- Keep the device away from magnetic interference.
- Do not use the device in extremely heat, extremely cold, dusty environment, corrosive environment or high humidity environment.
- Do not aim the device lens at objects of strong light, such as the sun and incandescent lamp. Otherwise, the lens may be damaged.
- The device should be stored in dry environment without corrosive gas. Avoid placing the device in direct sunlight and poorly ventilated locations, or near heat sources such as heater or heating (ignoring this warning may lead to fire hazards).

- Do not operate in explosive environment.
- Keep the surrounding area well ventilated to avoid heat accumulation. Do not contact the radiator directly to avoid scald.

Electrostatic Protection

- Remove all conductive objects (such as jewelry, watch, etc.) on the device body before touching the device, and touch the grounding metal bracket by hand to release the static electricity.
- It is suggested to wear anti-static suit to prevent damage to the equipment caused by static electricity.
- When installing or maintaining the device, wear anti-static wristband or anti-static gloves. Make sure that the wristband is tightly attached to the skin and is reliably grounded.
- It is forbidden to touch exposed circuit boards with bare hands. Static electricity generated by human body may damage electrostatic sensitive components on circuit boards.
- When touching electrostatic sensitive components or devices, proper grounding measures must be taken.
- Put electrostatic sensitive components into anti-static bags for protection.
- It is suggested to place humidifier in dry environment to maintain suitable humidity and reduce static electricity generation.

Maintenance

- If the device is not working properly, contact the store or the nearest service center. Do not disassemble or modify the device in any way. (The company does not bear any liability for any problem arising from unauthorized modification or maintenance).
- Properly preserve all the original packaging materials of the device so that when problems arise, the device can be packed with packaging materials and sent to the agent or returned to the manufacturer for processing. The company does not bear any liability for accidental damage during transportation caused by non-original packaging.
- This device is a precision electronic device, no components can be maintained by user, do not disassemble the device arbitrarily.

Cleaning

Do not touch the image sensor directly. If the sensor needs to be cleaned, use a clean rag and wet it with alcohol, then gently wipe off the dirt; if the device is not in use, cover the image sensor with dust cover for protection.

Installation

Do not install the device on vibrating surface or places that are vulnerable to impact.

Personnel Requirement

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.

Contact Information

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Website: en.hikrobotics.com

Table of Contents

Chapter 1 Overview

1.1 Appearance

The dimension of the X86 open platform without light source and lens cover is shown in Figure 1-1.
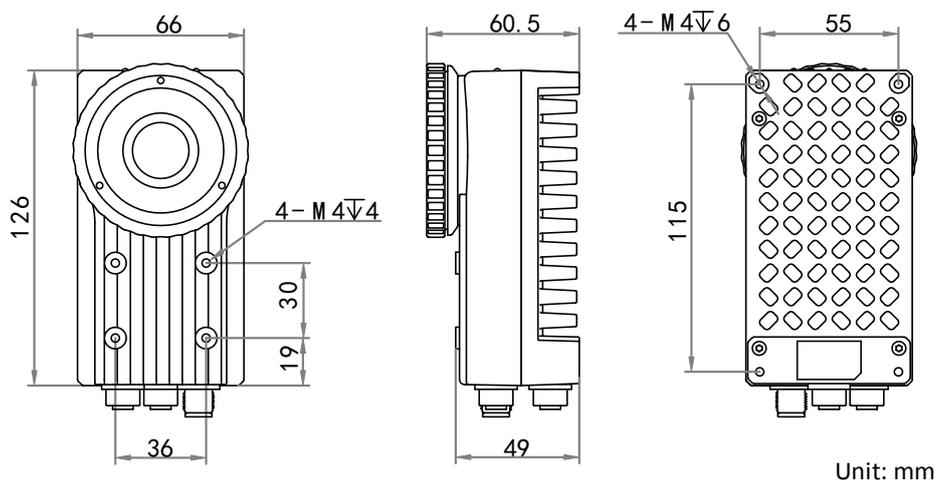
Unit: mm

Figure 1-1 X86 Open Platform without Light Source and Lens Cover

The dimension of the X86 open platform with light source and lens cover is shown in Figure 1-2.
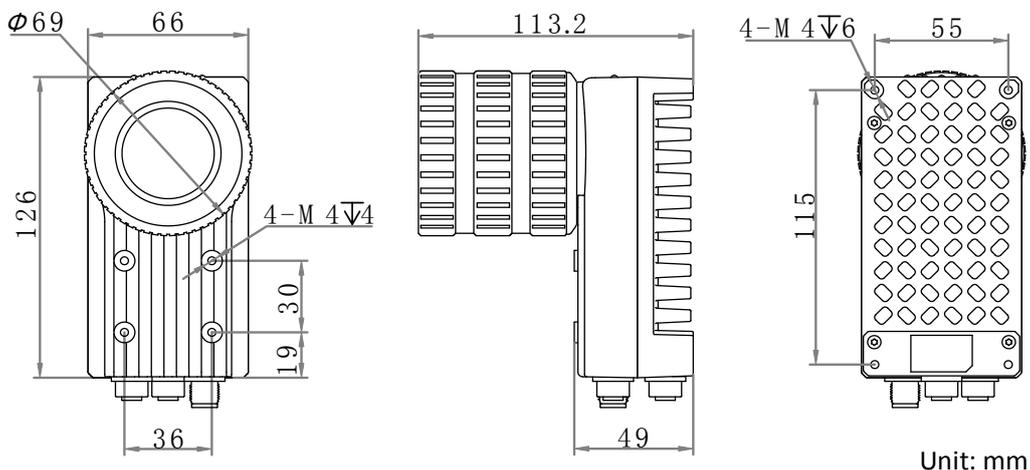
Unit: mm

Figure 1-2 X86 Open Platform with Light Source and Lens Cover

The device has 4 screw holes that are used to fix the device to the mounting bracket. It is recommended to use supplied M4 screws to fix the device. Otherwise, you are recommended to use metric M4 screws, and the length of screws should be shorter than the total length of mounting bracket thickness and screw hole depth.

⊡ **NOTE**

The lens mount of the device is C-mount.

1.2 Interface

The device has a RJ45 gigabit Ethernet interface with aviation connector, a 12-pin power and I/O interface, a 17-pin expansion interface. All interfaces are designed with screw threads to tighten connection between the device and cables, and thus avoid influence caused by vibration.
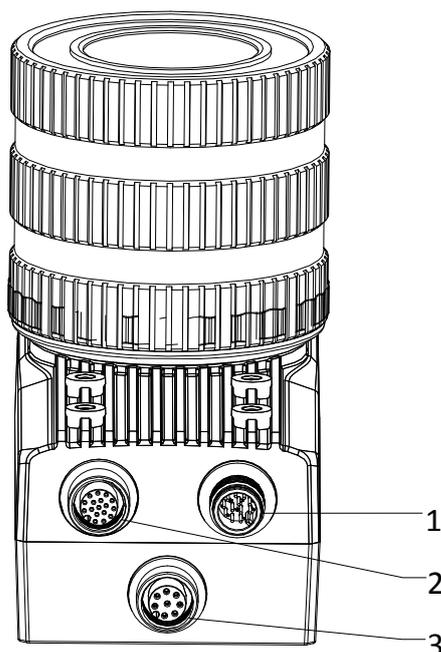

Figure 1-3 Interface

Table 1-1 Interface Description

No.	Description
1	Power and I/O Interface
2	Expansion interface
3	RJ45 gigabit Ethernet interface

1.3 Power and I/O Interface

The device has a 12-pin power and I/O interface as shown in Figure 1-4, and the respective pin definitions are shown in Table 1-2.
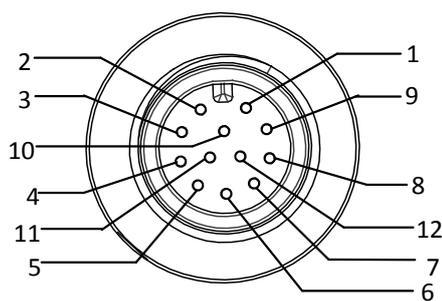
Figure 1-4 Power and I/O Interface

Table 1-2 Pin Definitions

No.	Signal	I/O Type	Description	Color
1	DC-PWR	Power supply	DC power +	White
2	GND	Power supply	Power ground	Brown
3	OPTO_OUT0	Output	I/O isolated output 0	Green
4	OPTO_OUT1	Output	I/O isolated output 1	Yellow
5	OPTO_OUT2	Output	I/O isolated output 2	Grey
6	OUT_COM	Output	Signal output COM	Pink
7	OPTO_IN0	Input	I/O isolated input 0	Blue
8	OPTO_IN1	Input	I/O isolated input 1	Red
9	OPTO_IN2	Input	I/O isolated input 2	Black
10	IN_COM	Input	Signal input COM	Purple
11	RS232_R	--	RS232 input	Grey/pink
12	RS232_T	--	RS232 output	Red/blue

⊡ i **NOTE**

The cable color here refers to the color of cable supplied. If cable of other manufacturers is used, the cable color may differ, and the actual cable you purchased shall prevail.

1.4 Expansion Interface

If the device has a 17-pin expansion interface, its interface and the respective pin definitions are shown below.
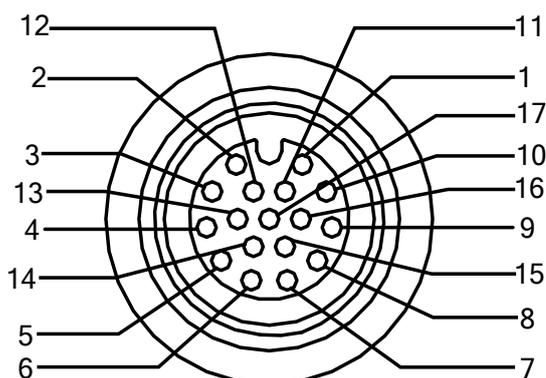

Figure 1-5 Expansion Interface

Table 1-3 Pin Definitions

No.	Signal	Description	Color
1	GND	VGA red ground	Blue
2	VGA_VSYNC_R	Vertical synchronization	White
3	GND	VGA blue ground	White/brown
4	PWR	Power + (5 VDC)	Red/white
5	GND	Power ground	Black/white
6	GND	VGA green ground	Pink
7	VGA_GREEN_CONN	VGA green	Brown
8	VGA_DDCDATA_CONN	DDC data	Orange

No.	Signal	Description	Color
9	GND	Digital ground	Black
10	VGA_RED_CONN	VGA red	Purple
11	VGA_HSYNC	Horizontal synchronization	Yellow
12	VGA_BLUE_CONN	VGA blue	Light green
13	USB +	USB +	Green
14	USB -	USB -	White
15	VGA_DDCLK_CONN	DDC clock	Grey
16	VGA _+V5S_CONN	VGA power	Red
17	--	--	--

NOTE

The cable color here refers to the color of cable supplied. If cable of other manufacturers is used, the cable color may differ, and the actual cable you purchased shall prevail.

1.5 Indicator

The device has 5 indicators, including power indicator, network connection indicator, network transmission indicator, user indicator 1, and user indicator 2, as shown below.
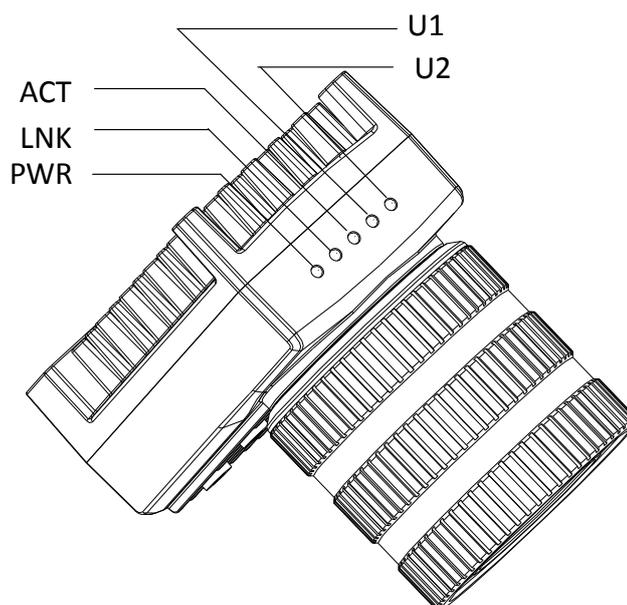
Figure 1-6 Indicator

Table 1-4 Indicator Description

Name	Indicator	Description
PWR	Power Indicator	The indicator is solid blue when the device is powered on.
LNK	Network Connection Indicator	The indicator is solid green when the network is connected.
ACT	Network Transmission Indicator	The indicator is flashing yellow when the network transmission is normal. Indicator's flashing speed is related to data transmission speed.
U1	User Indicator 1	--
U2	User Indicator 2	--

When the device is in different status, indicator will display corresponding status.

Table 1-5 Device Status and Indicator Status

Device Status	Power Indicator	Network Connection Indicator	Network Transmission Indicator	User Indicator 1	User Indicator 2	Solution
Power on	Solid blue	Solid green	Slow or fast yellow flash	Unlit	Slow blue flash	--
Power exception	Unlit	Unlit	Unlit	Unlit	Unlit	Check power wiring.
Network exception	Solid blue	Unlit	Unlit	Unlit	Slow blue flash	Check network wiring.
Device software exception	Solid blue	Solid green	Flash yellow	Unlit	Unlit	Restart the device.
Device exception	Solid blue	Solid green	Solid yellow	Unlit	Unlit	Restart the device.

⌊i⌋ **NOTE**

When the indicator is flashing fast or slowly, its unlit interval is 0.2 s to 0.3 s, and 1 s respectively.

Chapter 2 Device Installation

2.1 Accessory

You need to prepare following accessories before installation.

Table 2-1 Recommended Accessories

No.	Name	Quantity	Description
1	Power and I/O Cable	1	It refers to the 12-pin power and I/O cable.
2	Network Cable	1	It refers to the RJ45 network cable with aviation connector.
3	Interface Expansion Cable	1	The interface expansion cable has VGA and USB interfaces at one end, and an aviation connector at the other end.
4	DC Switching Power Supply	1	Power adapter above 12 VDC, 2 A or 24 VDC, 1 A.
5	Lens	1	It refers to C-mount lens.
6	Mounting Bracket	1	It is used to fix the device.
7	Waterproof Lens Cover	1	It is used to protect lens and light source.

2.2 Install and Change Lens

Follow steps below to install or change lens.

Steps:

1. Screw out the waterproof lens cover, and take out the lamp cup.

2. Install the required C-mount lens to the device, or change the lens.

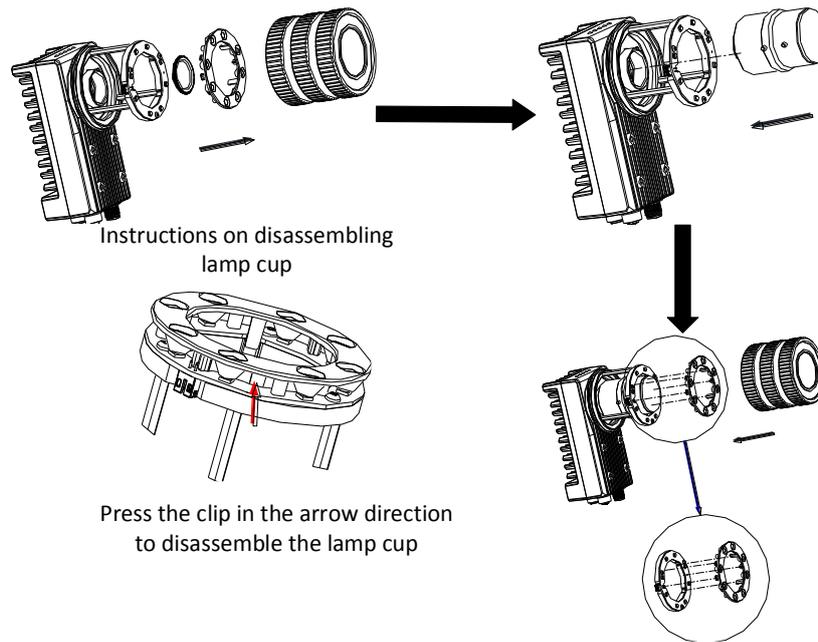3. Reinstall the lamp cup and the lens cover again.

Instructions on disassembling lamp cup

Press the clip in the arrow direction to disassemble the lamp cup

Figure 2-1 Install Lens

Instructions on disassembling lamp cup

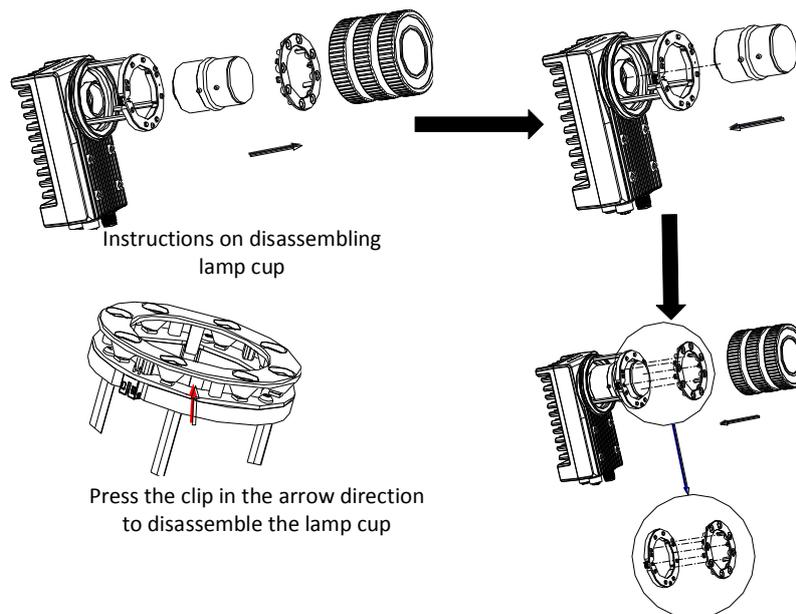Press the clip in the arrow direction to disassemble the lamp cup

Figure 2-2 Change Lens

2.3 Install Device

The figures below show 3 installation methods of the device. You can use M4 screws to fix the device to the required position.
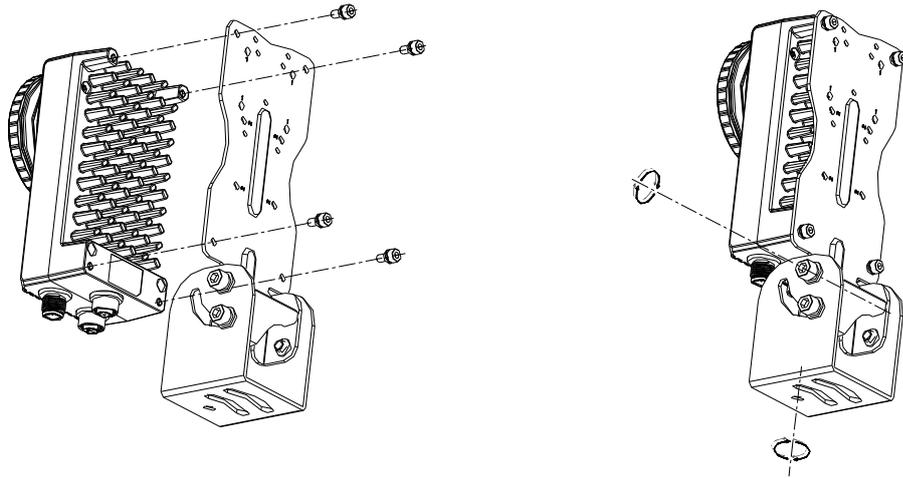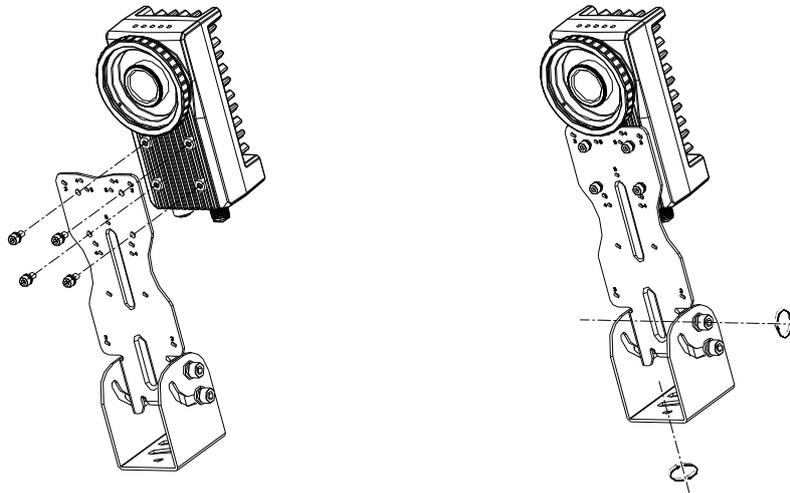
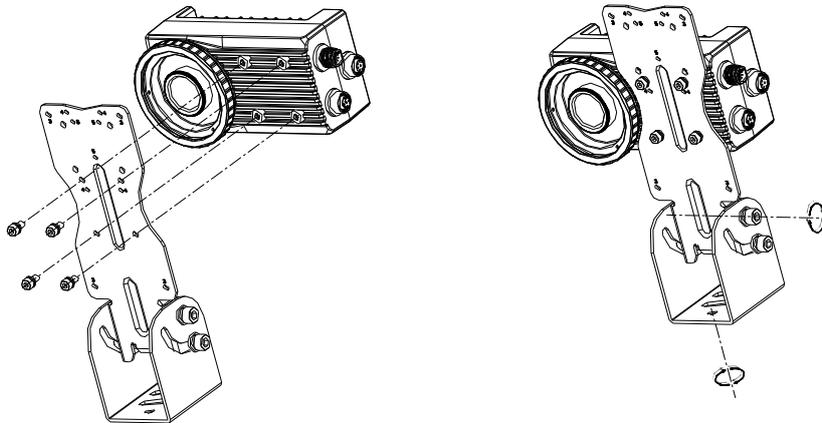Figure 2-3 Installation Method 1

Figure 2-4 Installation Method 2

Figure 2-5 Installation Method 3

2.4 Wiring

Follow steps below to wire the device.

Steps:

1. Use 8-pin RJ45 network cable with aviation connector to connect the device to a switch or a network interface card (NIC).
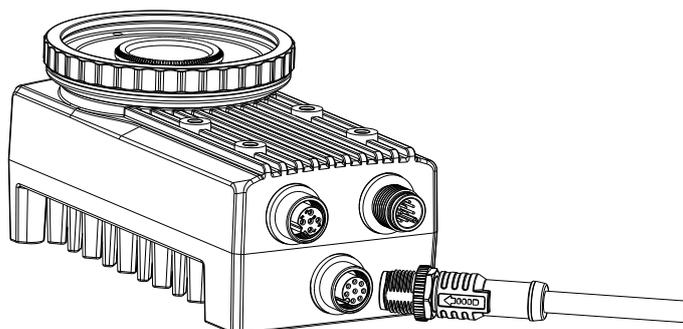

Figure 2-6 Connect Network Cable

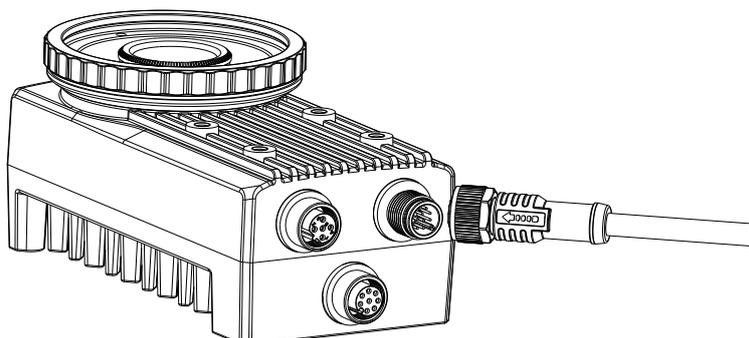2. Use 12-pin power and I/O cable to connect the device to a proper power adapter or switching power supply.

Figure 2-7 Connect Power and I/O Cable

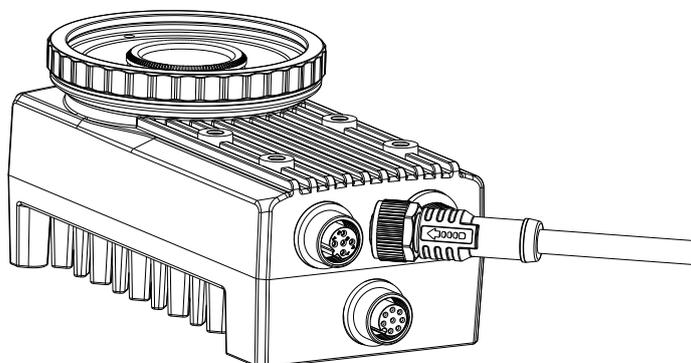3. If expansion interface is required, connect corresponding cable, as shown below.

Figure 2-8 Connect Expansion Interface Cable

4. If the expansion interface board is used for power supply, you only need to connect the power cord to corresponding interfaces of the expansion interface board.
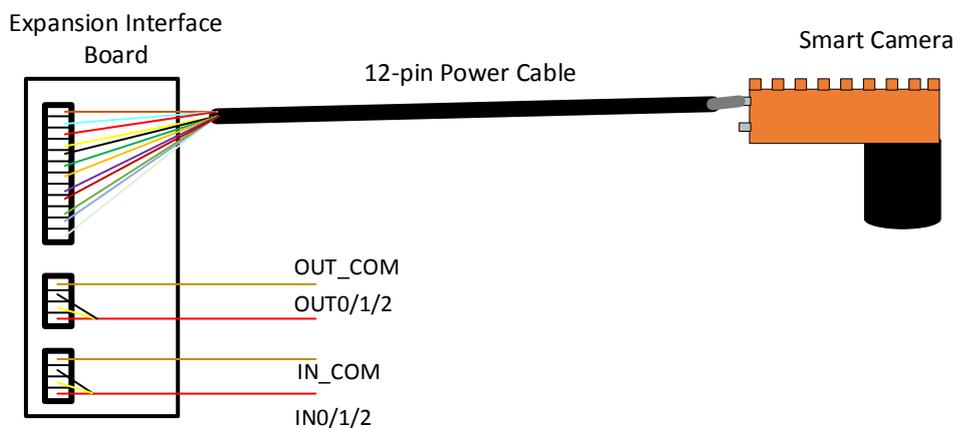

Figure 2-9 Expansion Interface Board Wiring

⌐i⌐ **NOTE**

● If device's built-in light source is not used, you can use 10 VDC to 30 VDC for power supply.

● If device's built-in light source is used, you have to use 20 VDC to 30 VDC for power supply.

Chapter 3 Device Connection

3.1 Install MVS Client

MVS client software is used to connect the device, set its parameters, etc.

NOTE

● The MVS client software is compatible with 32/64-bit Windows XP/7/10, 32/64-bit Linux, and 64-bit MacOS operating systems. Here we take Windows as an example.

● The graphic user interface may differ by different versions of the client software you use.

● You can download Windows version client software from *en.hikrobotics.com*. For other versions, you can mail to tech_support@hikrobotics.com to get client software installation package.

Steps:

1. Double click the MVS installation package.

2. Select the language.

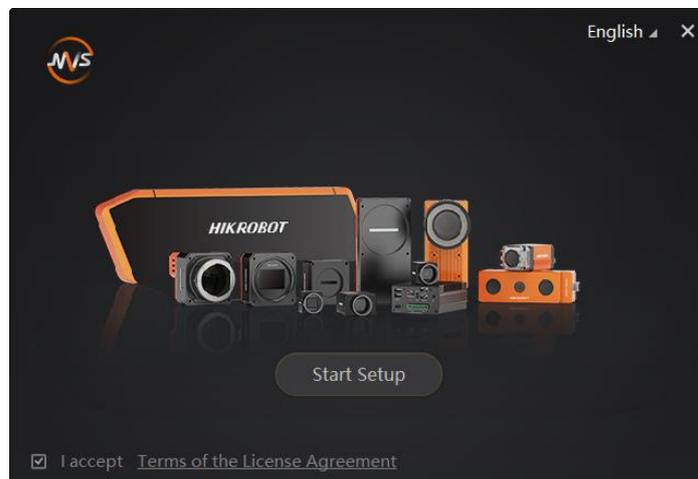3. Read and check **Terms of the License Agreement**.

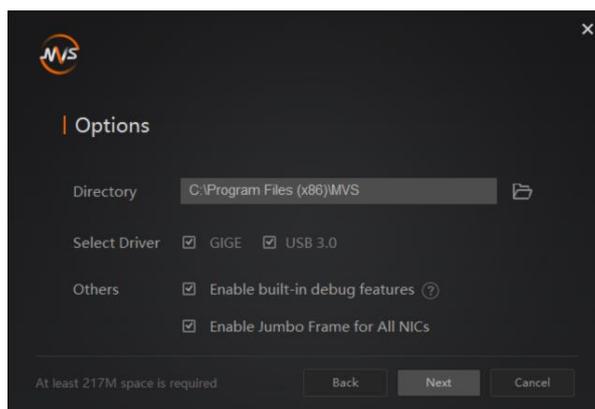Figure 3-1 Installation Interface

4. Click **Start Setup**.

Figure 3-2 Default Settings

5. Keep default settings, and click **Next**.

6. Finish the installation according to the interface prompts.

3.2 Turn off Firewall

To ensure stable client running and image transmission, you are recommended turning off Windows firewall before using the client software.

[i] **NOTE**

For different Windows versions, the path name or interface may differ.

Steps:

1. Go to Windows Firewall.

● Windows XP system: Click **Start** > **Control Panel** > **Security Center** > **Windows Firewall**.

● Windows 7 system: Click **Start** > **Control Panel** > **Windows Firewall**.

● Windows 10 system: Click **Start** > **Control Panel** > **System and Security** > **Windows Defender Firewall**.

2. Click **Turn Windows Defender Firewall on or off** on the left.

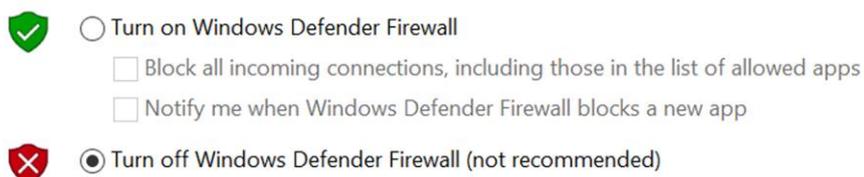3. Select **Turn off Windows Defender Firewall (not recommended)**.

Figure 3-3 Windows Defender Firewall

4. Click **OK**.

3.3 Set PC Network

To ensure stable image transmission and normal communication between the PC and the camera via client software, you need to set the PC network before using the client software.

📖 **NOTE**

For different Windows versions, the path name or interface may differ.

Steps:

1. Go to PC network settings page: **Start** > **Control Panel** > **Network and Internet** > **Network and Sharing Center** > **Change adapter settings**.

2. Select NIC and set the IP obtainment mode.

   - Select **Obtain an IP address automatically** to get an IP address of the PC automatically.

   - Select **Use the following IP address** to set an IP address for the PC manually.

3. Set NIC property via the PC.

   1) Go to NIC settings page: **Control Panel** > **Hardware and Sound** > **Device Manager** > **Network Adapter**.

   2) Select corresponding network interface card, and click **Advanced**.

   3) Set **Jumbo Packet** value to 9014 Bytes, **Transmit Buffers** and **Receive Buffers** to 2048, **Interrupt Moderation Rate** to Extremum.

4. (Optional) Set NIC property via the MVS.
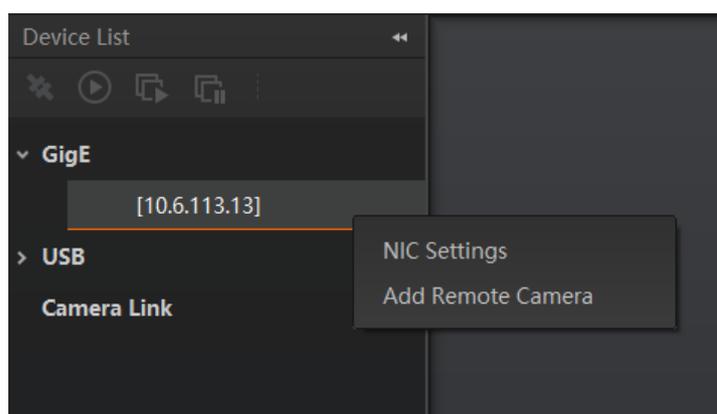
   1) Right click the Ethernet, and click **NIC Settings**.

Figure 3-4 NIC Settings

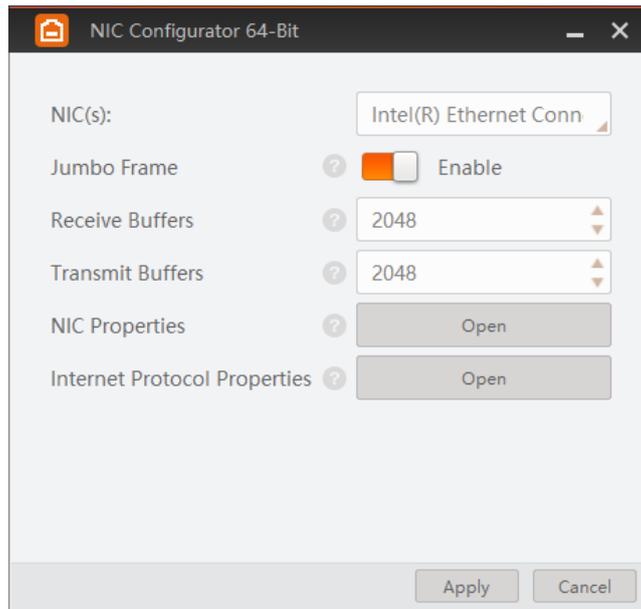   2) Enable **Jumbo Frame**, and set **Receive Buffers** and **Transmit Buffers** to 2048.

Figure 3-5 NIC Configurator

⬛ **NOTE**

The max. value of receive buffers and transmit buffers may differ by network interface cards.

3.4 Set Device Network

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

Steps:

1. Double click the client software to run it.

2. Click ⟳ in device list to search the device.

3. Select a device to be connected.

4. Right click the device, and click **Modify IP**.

5. Set the IP address of the device in the same network segment with the PC
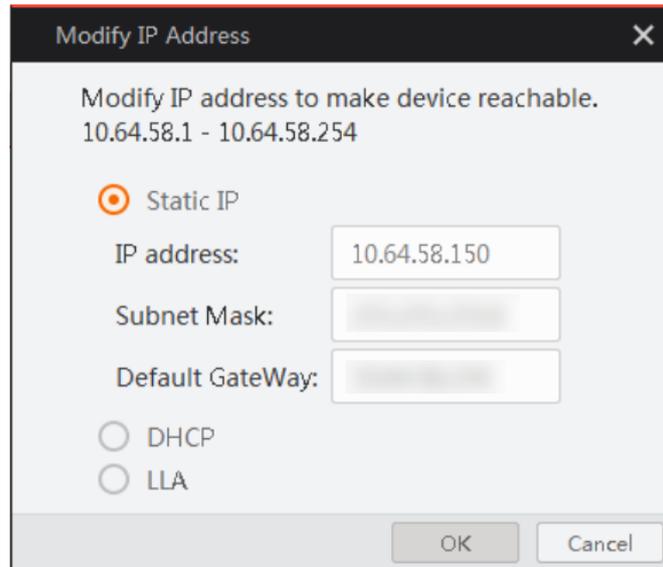
6. Click **OK**.

Figure 3-6 Modify Device IP Address

3.5 Connect Device to Client Software

Make sure your device IP address is in the same network segment with the PC where you installed the client software before connecting the device to it.

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

Chapter 4 Device Setting

4.1 Main Window

After connecting to the device, the MVS client can read the device attributes and display them in tree format. The main window and its description are shown in Figure 4-1 and Table 4-1 respectively.
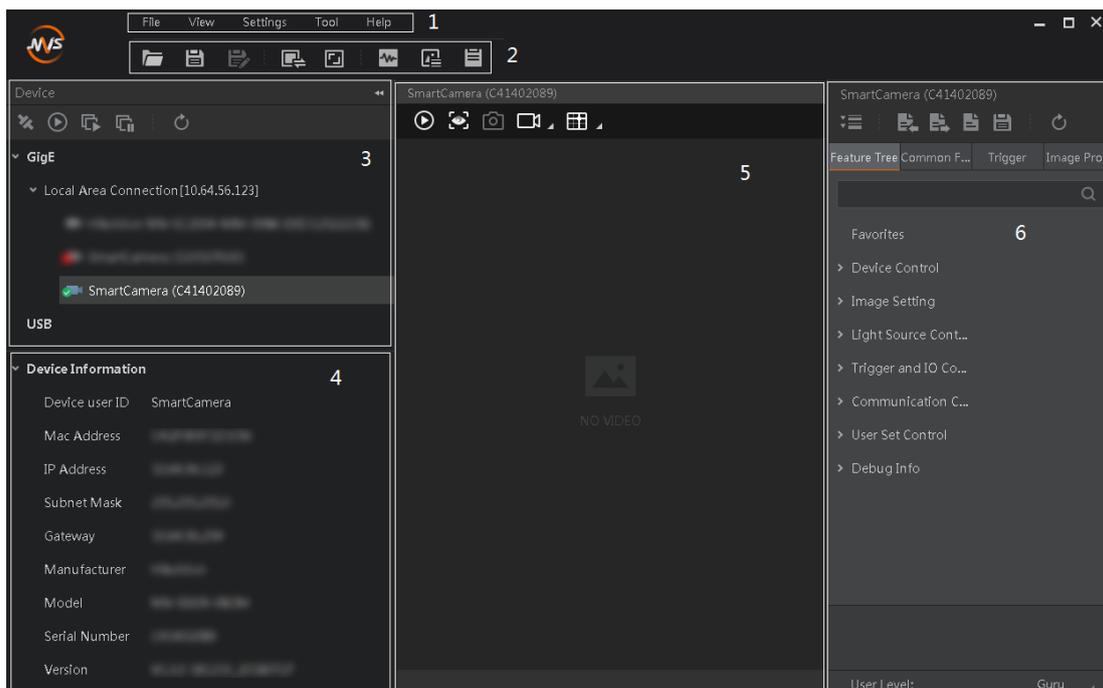

Figure 4-1 Main Window

📖 **NOTE**

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

Table 4-1 Description of the Main Window

No.	Area Name	Description
1	Menu Bar	Function modules including File, View, Settings, Tool, and Help.
2	Control Toolbar	The control toolbar provides quick operations for images.
3	Device List Panel	Display current device list, and provide icons for connecting/disconnecting device, start/stop acquisition, and refreshing device list.

No.	Area Name	Description
4	Device Information Panel	Display the network interface information and the device information.
5	Display Window	View the real-time image of the device.
6	Feature Panel	Display and configure the device's specific attributes.

4.2 Set Parameters

The device setting supports 3 types of user level: Beginner, Expert and Guru, which displays different device attributes. For Guru Level, it provides the most comprehensive camera attribute for professional use. Here we take Guru Level as an example.
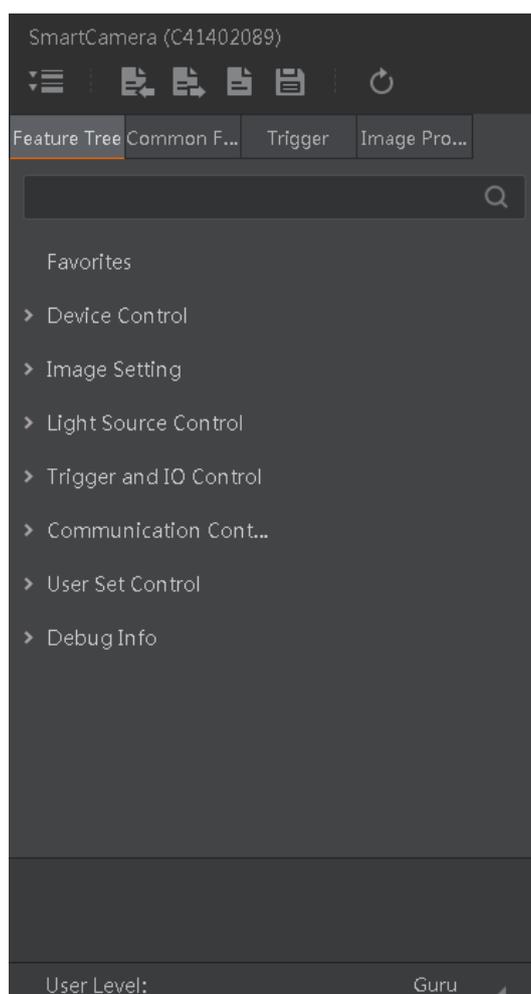

Figure 4-2 Feature Tree

Table 4-2 Attribute Description

Attribute	Description
Device Control	You can view device information, edit its name and reset the device.
Image Setting	You can view device's frame rate, and set exposure, gain, brightness, Gamma, etc.
Light Source Control	You can view and set related parameters of supplement light.
Trigger and IO Control	You can view and set device's debugging information.
Communication Control	You can view and set data communication method.
User Set Control	You can save or load the device's parameters, set the default parameters when running the software, confirm certain information via two user indicators.
Debug Info.	You can view device running time, etc.

[i] **NOTE**

For specific attributes, please refer to the actual device you got.

Chapter 5 Image Acquisition

5.1 Set Frame Rate

You can set frame rate as shown below.

Steps:

1. Click **Image Setting** > **Acquisition Frame Rate**.

2. Enter frame rate according to actual demands.

Figure 5-1 Set Frame Rate

[i] **NOTE**

The **Resulting Frame Rate** displays the device's real-time frame rate.

5.2 Set Trigger Mode

The device has 2 types of trigger mode, including internal trigger mode and external trigger mode. The trigger mode principle and parameter setting are shown below.

Table 5-1 Trigger Mode Principle and Parameter

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

You can set trigger mode as shown below.

Steps:

1. Click **Trigger and IO Control** > **Trigger Mode**.

2. Select **Off** or **On** as **Trigger Mode**.

[i] **NOTE**

Off refers to the internal trigger mode, and **On** refers to the external trigger mode.

5.3 External Trigger Mode

5.3.1 Set External Trigger Source

There are 3 types of external trigger sources, including software trigger, hardware trigger, and counter trigger. Their principle and parameter setting are shown below.

Table 5-2 Principle and Parameter of External Trigger Mode

External Trigger Source	Parameter	Parameter Value	Principle
Software trigger	Trigger and IO Control > Trigger In Source	Software	The software sends trigger signal to the X86 open platform to acquire images.
Hardware trigger	Trigger and IO Control > Trigger In Source	LineIn 0, LineIn 1, LineIn 2	External device connects X86 open platform via I/O interface. External device sends trigger signal to the platform to acquire images.
Counter trigger	Trigger and IO Control > Trigger In Source	Counter 0	The counter sends trigger signal to the platform to acquire images.

You can set trigger source as shown below.

Steps:

1. Click **Trigger and IO Control** > **Trigger In Source**.

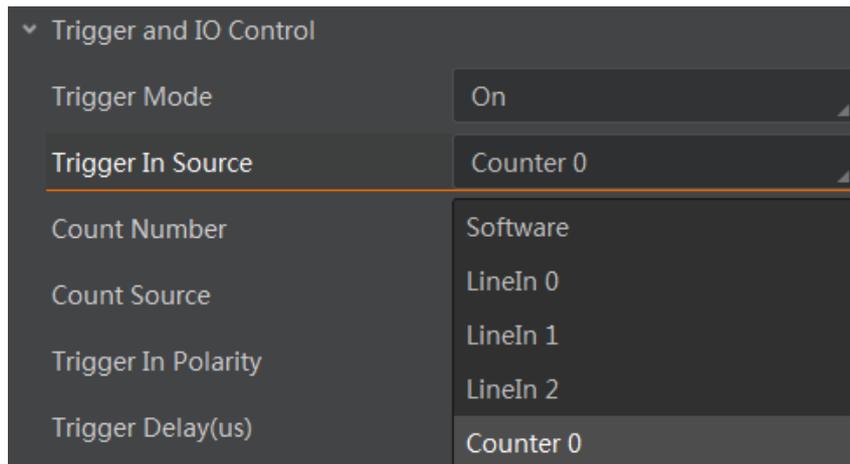2. Select trigger source according to actual demands.

Figure 5-2 Set External Trigger Source

ⓘ **NOTE**

These 3 external trigger sources are valid only when the **Trigger Mode** is **On**.

5.3.2 Set Software Trigger

You can set software trigger as shown below.

Steps:

1. Click **Trigger and IO Control** > **Trigger Mode**.

2. Select **On** as **Trigger Mode**.

3. Select **Software** as **Trigger In Source**, and click **Execute** in **Software Trigger In** to send trigger commands.
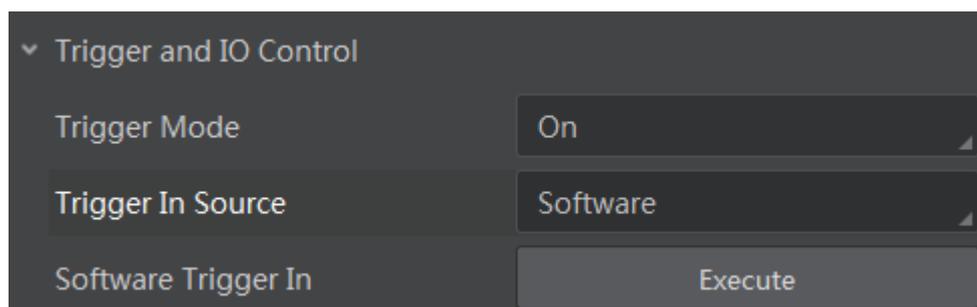

Figure 5-3 Set Software Trigger

5.3.3 Set Hardware Trigger

You can set hardware trigger as shown below.

Steps:

1. Click **Trigger and IO Control** > **Trigger Mode**.

2. Select **On** as **Trigger Mode**.

3. Select **LineIn 0**, **LineIn 1**, or **LineIn 2** as **Trigger In Source** according to actual demands.

5.3.4 Set Counter Trigger

The counter trigger provides frequency division to the external trigger signal. You can set counter trigger as shown below.

Steps:

1. Click **Trigger and IO Control** > **Trigger Mode**.

2. Select **On** as **Trigger Mode**.

3. Select **Counter 0** as **Trigger In Source**.

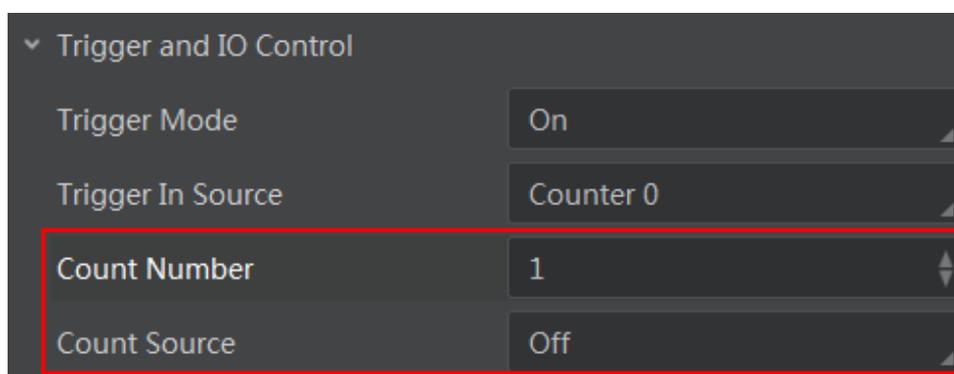4. Set **Count Number** according to actual demands, and its range is from 1 to 1023.

Figure 5-4 Set Counter Trigger

5.4 Trigger Related Parameters

Under hardware trigger, you can set trigger polarity, burst frame count, trigger delay, and trigger debouncer.

5.4.1 Set Trigger Polarity

You can set trigger activation as shown below.

Steps:

1. Click **Trigger and IO Control > Trigger In Polarity**.

2. Select **Rising Edge**, **Falling Edge**, **High Level** and **Low Level** as **Trigger In Polarity** according to actual demands.

5.4.2 Set Burst Frame Count

Steps:

1. Click **Image Setting** > **Acquisition Burst Frame Count**.

2. Enter proper value according to actual demands, and its range is from 0 to 1023.

When Burst Frame Count= 3, 1 trigger signal outputs 3-frame image. The sequence diagram of burst frame count is shown below.
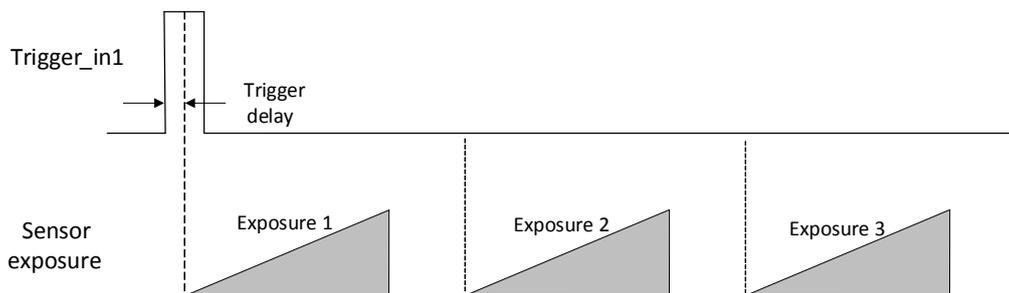

Figure 5-5 Sequence Diagram of Burst Frame Count

5.4.3 Set Trigger Delay

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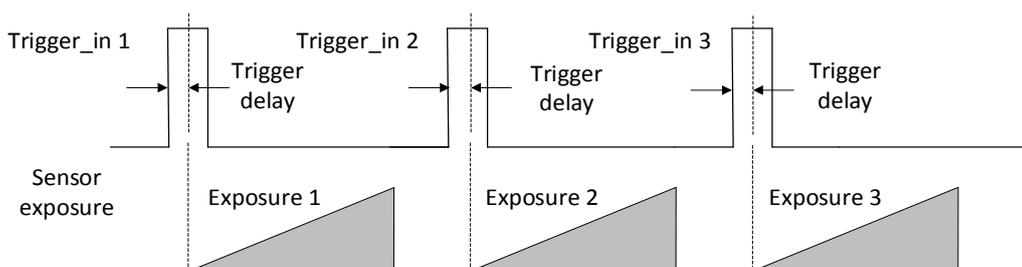

Figure 5-6 Signal Delay Sequence Diagram

You can set proper value in **Trigger Delay**, and its range is from 0 µs to 16000000 µs.
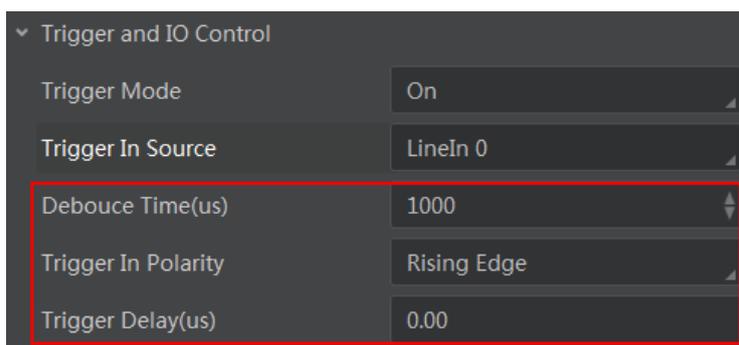
Figure 5-7 Set Trigger Delay

When triggering via **High Level** or **Low Level**, you can also set **Start Delay Time(µs)** and **End Delay Time(µs)**, as shown below.
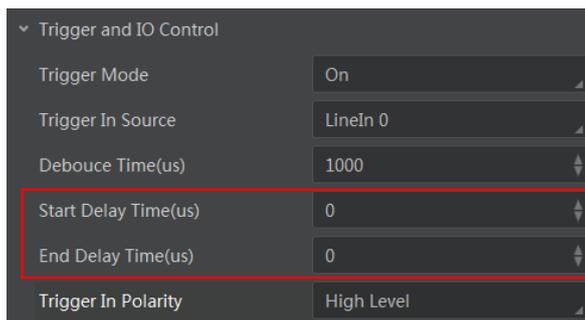
Figure 5-8 Set Start and End Delay Time

5.4.4 Set Trigger Debouncer

The external trigger input signal of the device may have signal bounce that may cause false trigger. Thus, it is necessary to debounce the external trigger signal, and its sequence diagram is shown below.
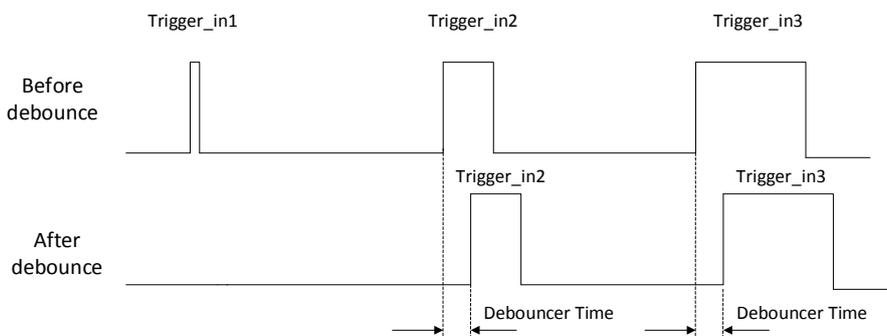

Figure 5-9 Trigger Debouncer Sequence Diagram

You can set trigger debouncer as shown below.

Steps:

1. Click **Trigger and IO Control > Debouce Time(μs)**.

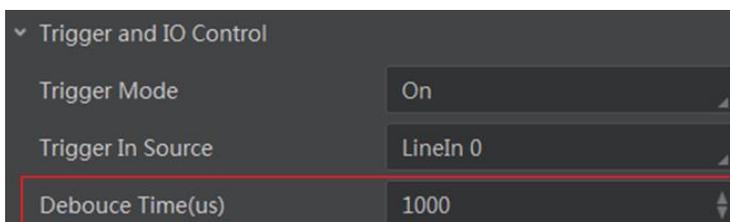2. Enter proper value in **Debouce Time(μs)** according to actual demands.

Figure 5-10 Set Trigger Debouncer

[i] **NOTE**

When the configured deboucer time is longer than the trigger signal time, this trigger signal will be ignored.

Chapter 6 I/O Output

6.1 Set Output Signal

The device has 3 output signals, including LineOut 0, LineOut 1, and LineOut 2, which are used to control external devices such as flashing light, etc. You can select output signal as shown below.

Steps:

1. Click **Trigger and IO Control** > **Line Out Selector**.

2. Select **LineOut 0**, **LineOut 1**, or **LineOut 2** as **Line Out Selector** according to actual demands.
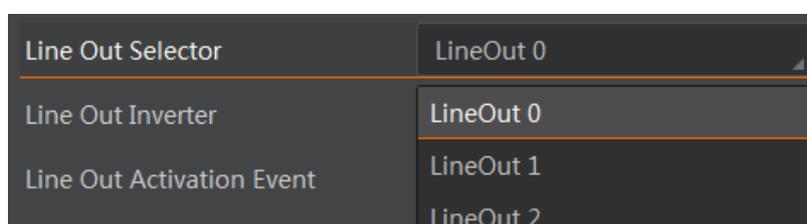

Figure 6-1 Select Output Signal

6.2 Set Output Event

Steps:

1. Click **Trigger and IO Control** > **Line Out Activation Event**.

2. Select different output events as **Line Out Activation Event** according to actual demands.
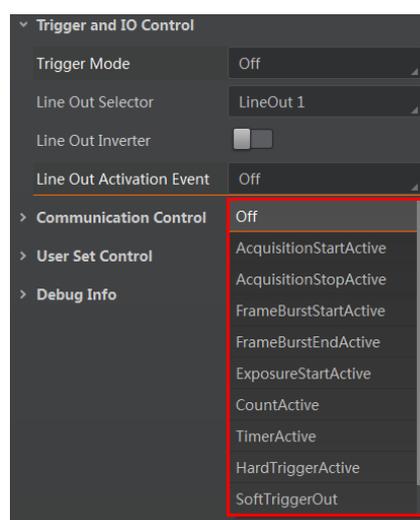

Figure 6-2 Set Output Event

For specific **Line Out Activation Event**, please refer to following table for details.

Table 6-1 Output Event

No.	Name	Description
1	Off	It refers to disable **Line Out Activation Event**.
2	AcqusitionStartActive	It refers to output one I/O edge signal when starting acquisition.
3	AcqusitionStopActive	It refers to output one I/O edge signal when stopping acquisition.
4	FrameBurstStartActive	It refers to output one I/O edge signal when starting triggering and acquiring images under Burst mode.
5	FrameBurstEndActive	It refers to output one I/O edge signal when stopping triggering and acquiring images under Burst mode.
6	ExposureStartActive	It refers to output one I/O edge signal when starting exposure.
7	CountActive	It refers to output one I/O edge signal when counter output is enabled.
8	TimerActive	It refers to output one I/O edge signal when timer output is enabled.
9	HardTriggerActive	It refers to output one I/O edge signal when hardware trigger acquisition.
10	SoftTriggerOut	It refers to output one I/O edge signal when software trigger acquisition.
11	SoftTriggerLevelOut	It refers to output one I/O level signal when software trigger acquisition.

3. Set **Line Out Delay Time(μs)**, **Line Out Duration Time(μs)**, or **LineOut Ahead Time(μs)** for different output events according to actual demands, as shown below.
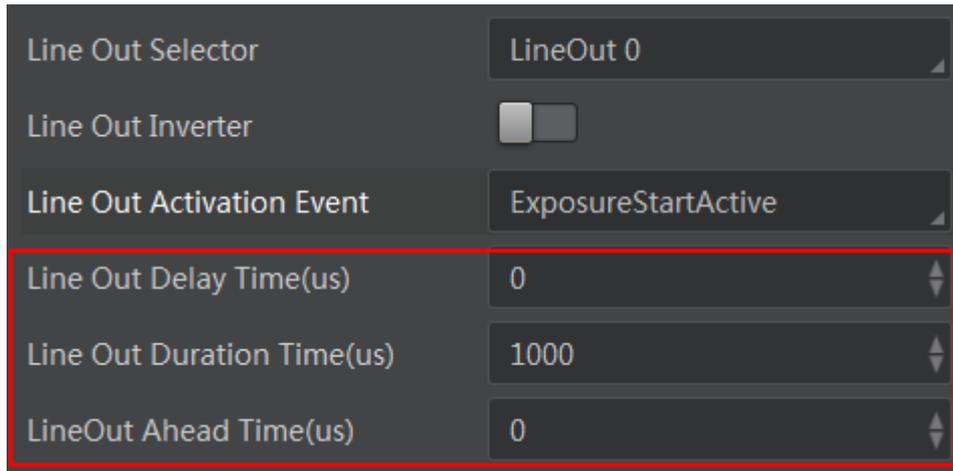
Figure 6-3 Set Output Delay, Duration or Ahead Time

Chapter 7 I/O Wiring

7.1 I/O Input Wiring

I/O interface input wiring method is shown below, and its input voltage ranges from 5 VDC to 30 VDC.
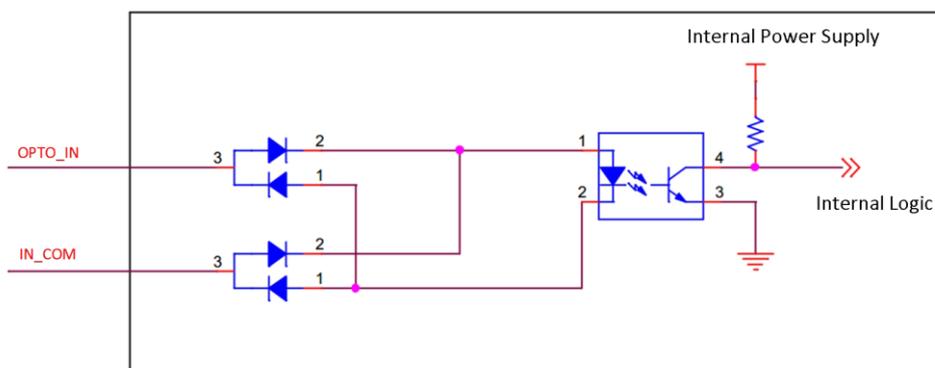

Figure 7-1 I/O Input Wiring

● If the input device is NPN signal (suspended or power negative), IN_COM should be connected with input device power positive, and signal line with corresponding input interface.
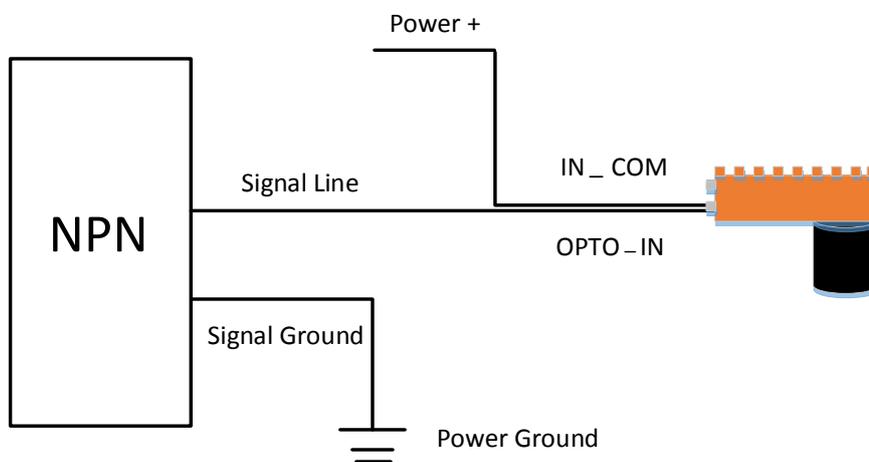

Figure 7-2 Connecting to NPN Device

● If the input device is PNP signal (suspended or power positive), IN_COM should be connected with input device power negative, and signal line with corresponding input interface.
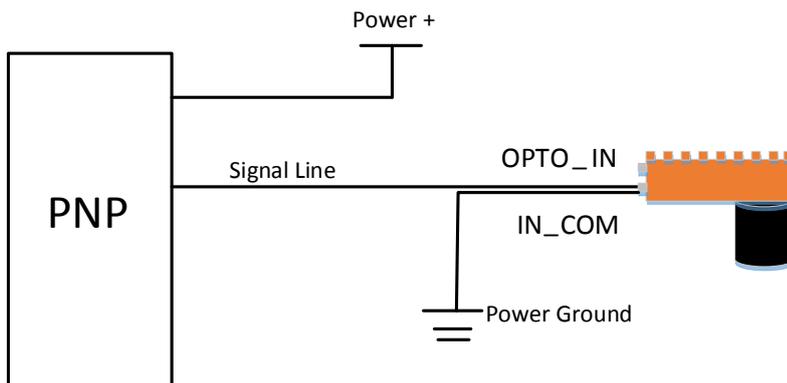
Figure 7-3 Connecting to PNP Device

7.2 I/O Output Wiring

I/O interface output is open-circuit output, as shown below. Input voltage ranges from 5 VDC to 30 VDC, and current cannot exceed 200 mA.
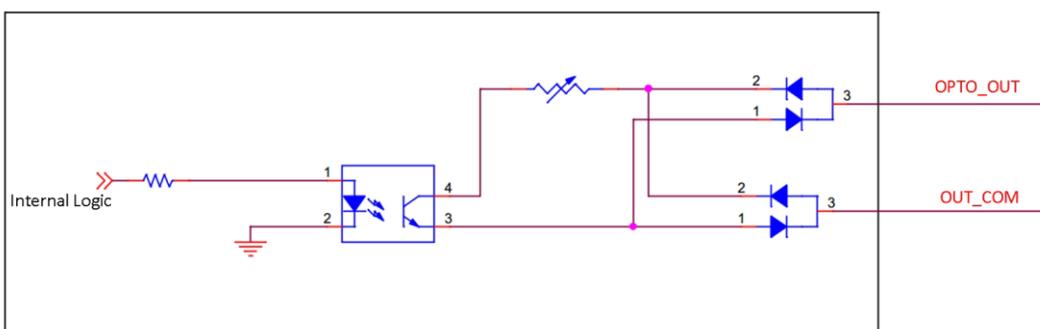

Figure 7-4 I/O Output Wiring

● If the output device is NPN signal (suspended or power negative), OUT_COM should be connected with input device power positive, and signal line with corresponding input interface.
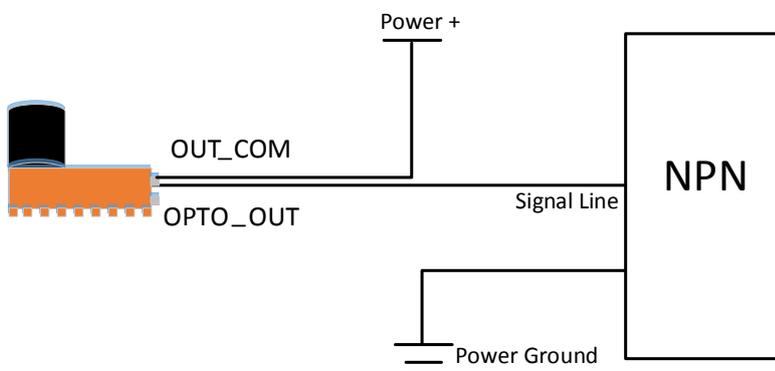

Figure 7-5 Connecting to NPN Device

● If the output device is PNP signal (suspended or power positive), the OUT_COM should be connected with input device power negative, and signal line with corresponding input interface.
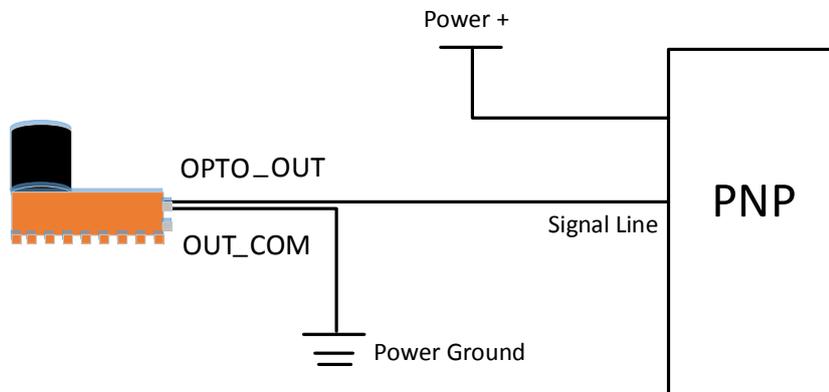

Figure 7-6 Connecting to PNP Device

ⓘ **NOTE**

Do not directly connect with inductive load (e.g. relay, DC motor, etc.) when outputting.

Chapter 8 Image Parameter

8.1 Set Frame Rate

You can set frame rate as shown below.

Steps:

1.   Click **Image Setting** > **Acquisition Frame Rate**.

2.   Enter frame rate according to actual demands.

Figure 8-1 Set Frame Rate

NOTE

The **Resulting Frame Rate** displays the device's real-time frame rate.

8.2 Set ROI

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

Steps:

1.   Click **Image Setting**, and find **Image Width**, **Image Height**.

2.   Enter proper value in **Image Width** and **Image Height** according to actual demands.
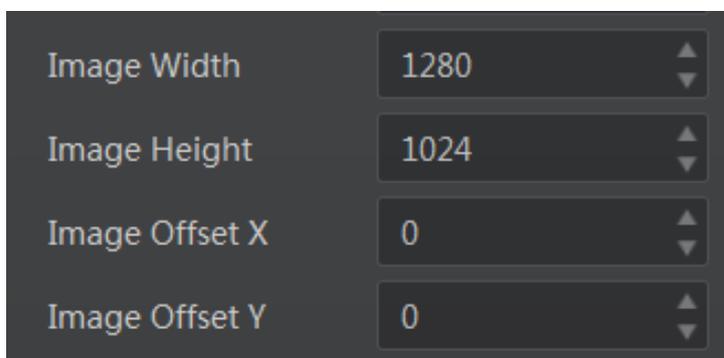

Figure 8-2 Set ROI

📖 **NOTE**

Image Offset X refers to the horizontal coordinate of the upper left corner of the ROI, and **Image Offset Y** refers to the vertical coordinate of the upper left corner of the ROI.

8.3 Set Pixel Format

📖 **NOTE**

The mono device supports Mono 8 format only, and color device supports Mono 8, Bayer 8, and RGB 8 format. You can set pixel format as shown below.

Steps:

1. Click **Image Setting** > **Pixel Format**.

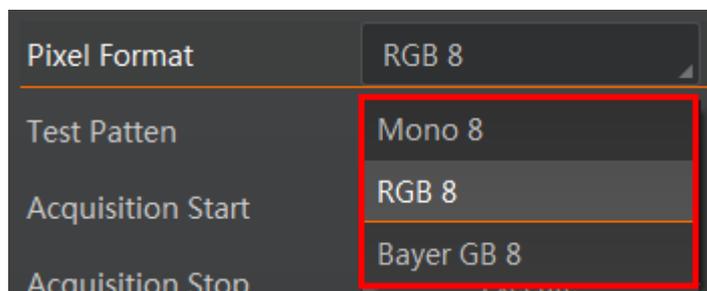2. Set **Pixel Format** according to actual demands.

Figure 8-3 Set Pixel Format

8.4 Set Exposure Mode

📖 **NOTE**

The X86 open platform supports exposure function. For specific exposure range that the device supports, please refer to the specifications of the device.

The device has 3 types of exposure: **Off**, **Once** and **Continuous**. The exposure mode and principle are shown below.

Table 8-1 Exposure Mode and Principle

Exposure Mode	Parameter	Parameter Value	Principle
Off	Image Setting > Exposure Auto	Off	The device exposures according to the value configured by user in **Exposure Time(μs)**.

Exposure Mode	Parameter	Parameter Value	Principle
Once	Image Setting > Exposure Auto	Once	The device adjusts the exposure time automatically according to the image brightness. After adjustment, it will switch to **Off** mode.
Continuous	Image Setting > Exposure Auto	Continuous	The device adjusts the exposure time continuously according to the image brightness.

You can set exposure mode as shown below.

Steps:

1. Click **Image Setting** > **Exposure Auto**.

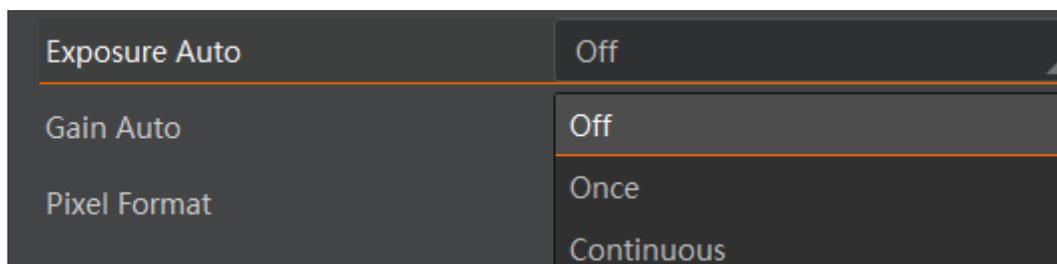2. Set **Exposure Auto** according to actual demands.

Figure 8-4 Set Exposure Mode

When **Exposure Auto** is **Off**, you can set exposure time by enter proper value in **Exposure Time(µs)**.

Figure 8-5 Set Exposure Time

[i] **NOTE**

When the device is under **Once** or **Continuous** exposure mode, if trigger mode is enabled, the device will automatically switch to **Off** exposure mode.

8.5 Set Gain

📖 **NOTE**

The X86 open platform supports gain function. For specific gain range that the device supports, please refer to the specifications of the device.

The device has 3 types of gain: **Off**, **Once** and **Continuous**. The gain mode and principle are shown below.

Table 8-2 Gain Mode and Principle

Gain Mode	Parameter	Parameter Value	Principle
Off	Image Setting > Gain Auto	Off	The device adjusts gain according to the value configured by user in **Gain(dB)**.
Once	Image Setting > Gain Auto	Once	The device adjusts the gain automatically according to the image brightness. After adjustment, it will switch to **Off** Mode.
Continuous	Image Setting > Gain Auto	Continuous	The device adjusts the gain continuously according to the image brightness.

You can set gain as shown below.

Steps:

1. Click **Image Setting** > **Gain Auto**.
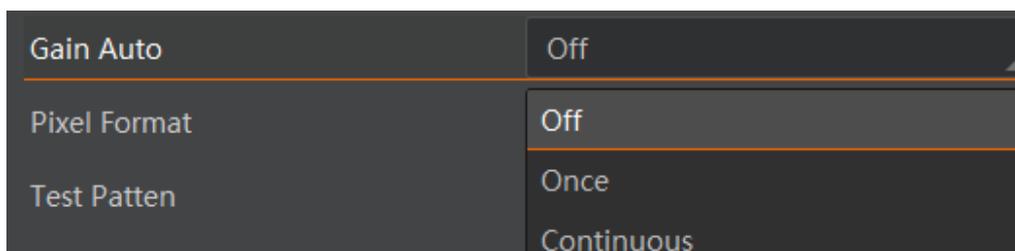
2. Set **Gain Auto** according to actual demands.

Figure 8-6 Set Gain Mode

When **Gain Auto** is **Off**, you can set gain value by enter proper value in **Gain(dB)**.

Gain(dB)	0.00

Figure 8-7 Set Gain Value

[i] **NOTE**

● When the device is under **Once** or **Continuous** gain mode, if trigger mode is enabled, the device will automatically switch to **Off** gain mode.

● When the gain becomes larger, the image noise is increased. There is a certain constraint relation between automatic exposure and automatic gain. When the image is dark, the device increases the exposure time first, and when exposure time reaches max. value, the device adjusts gain. When the image is bright, the device reduces gain value first, and when gain reaches min. value, the device adjusts exposure time.

8.6 Set Gamma Correction

The X86 open platform supports Gamma correction function. Generally, the output of the camera's sensor is linear with the photons that are illuminated on the photosensitive surface of the sensor. Gamma correction provides a non-linear mapping mechanism as shown below.

● Gamma value between 0.5 and 1: image brightness increases, dark area becomes brighter.

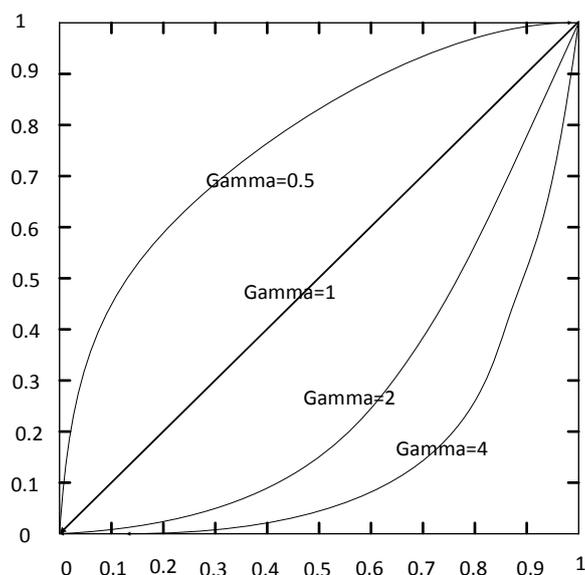● Gamma value between 1 and 4: image brightness decreases, dark area becomes darker.

Figure 8-8 Gamma Curve

You can set Gamma correction as shown below.

Steps:

1. Click **Image Setting** > **Gamma.**

2. Enter proper value in **Gamma** according to actual demands, and its range is from 1 to 4.

Gamma	1.00

Figure 8-9 Set Gamma Correction

8.7 Set Brightness

The X86 open platform supports brightness function. After setting brightness, the device will automatically adjust exposure or gain to let the image brightness reach target value.

[i] **NOTE**

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

Steps:

1. Click **Image Setting** > **Brightness**.

2. Enter proper value in **Brightness** according to actual demand.

Brightness	64

Figure 8-10 Set Brightness

[i] **NOTE**

Under **Once** or **Continuous** exposure mode, or **Once** or **Continuous** gain, the higher the brightness value, the brighter the image will be.

8.8 Set Image Reverse

The X86 open platform supports horizontal reverse image output. Horizontal reverse refers to the image reverses in a horizontal way. You can set image reverse as shown below.

Steps:

1. Click **Image Setting** > **Mirror X**.

2. Enable **Mirror X** according to actual demands.

Figure 8-11 Enable Mirror X

8.9 Set Test Pattern

The X86 open platform supports test pattern function. When there is exception in real-time image, you can check whether image of test mode have similar problem to determine the reason.

You can set test pattern as shown below.

Steps:

1. Click **Image Setting** > **Test Pattern**.

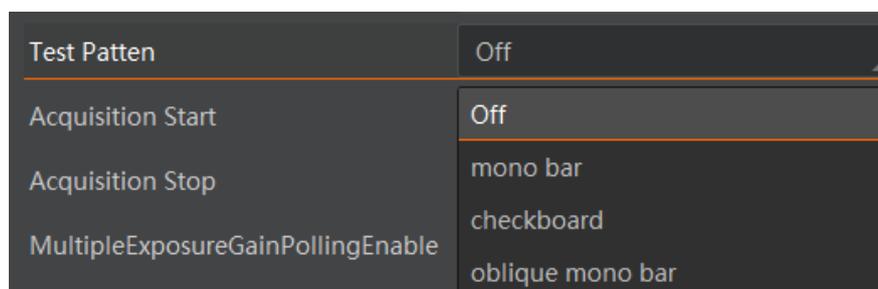2. Set **Test Pattern** according to actual demands.

Figure 8-12 Set Test Pattern

The camera offers 5 test patterns, including **mono bar**, **checkboard**, **oblique mono bar**, **Vertical Stripe**, and **Transver SeStripe**, as shown below.
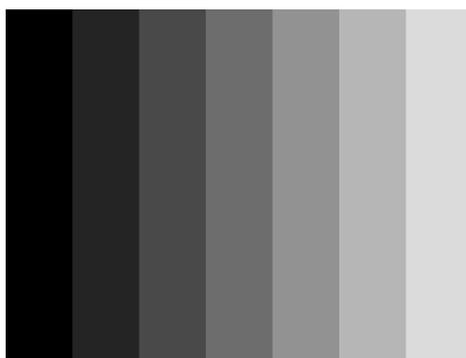
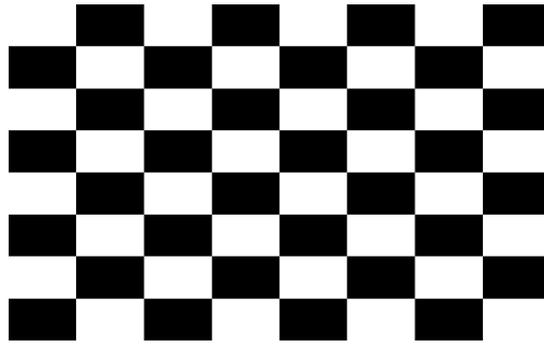

Figure 8-13 Mono Bar Test Pattern
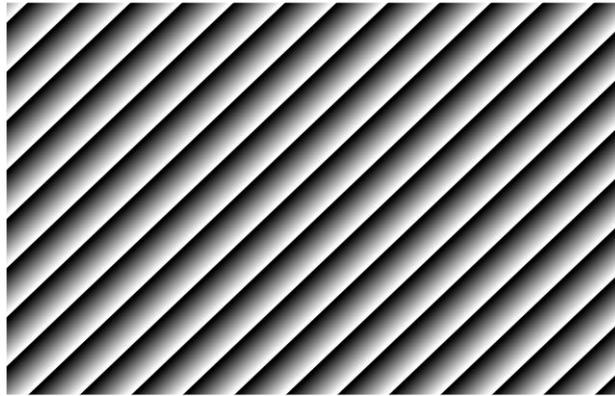
Figure 8-14 Checkboard Test Pattern

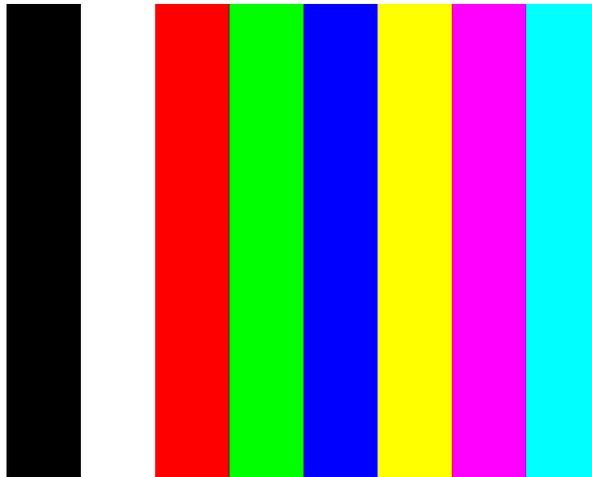Figure 8-15 Oblique Mono Bar Test Pattern

Figure 8-16 Vertical Stripe Test Pattern

Figure 8-17 Transver SeStripe Test Pattern

ℹ️ **NOTE**

Vertical Stripe and **Transver SeStripe** are only available for color device.

8.10 Set White Balance

ℹ️ **NOTE**

White balance is only available for color device.

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

Table 8-3 White Balance Status Description

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

You can set white balance as shown below.

Steps:

1. Click **Image Setting** > **Balance White Auto** and **Balance Ratio Selector**.

2. Set **Balance White Auto** and corresponding **Balance Ratio Selector** according to actual demands.
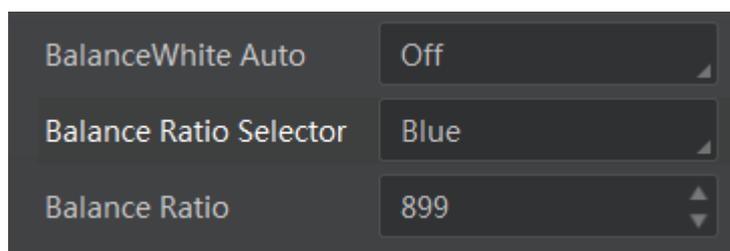

Figure 8-18 Set Balance White

8.11 Set Hue

ⓘ **NOTE**

Hue function is only available for color device.

You can set hue as shown below.

Steps:

1. Click **Image Setting** > **Hue Enable**.

2. Enable **Hue Enable**.

3. Enter proper value in **Hue** according to actual demand, and its default value is 128.

Figure 8-19 Set Hue

8.12 Set Saturation

📖 **NOTE**

Saturation function is only available for color device.

You can set saturation as shown below.

Steps:

1. Click **Image Setting** > **Saturation Enable**.

2. Enable **Saturation Enable**.

3. Enter proper value in **Saturation** according to actual demands, and its default value is 128.
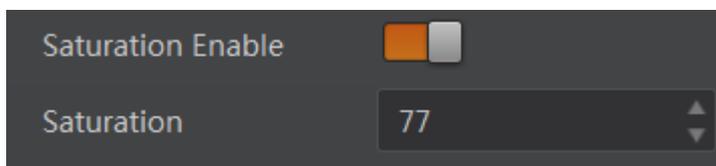

Figure 8-20 Set Saturation

📖 **NOTE**

The higher the saturation value, and more colorful the color will be.

8.13 Multiple Exposure

📖 **NOTE**

This function may differ by device models.

The X86 open platform supports multiple exposure gain mode that can set four groups of exposure time and gain.

Steps:

1. Click **Image Setting** > **Multiple Exposure Gain Polling Enable**.

2. Enable **Multiple Exposure Gain Polling Enable**.

3. Enter proper value in four groups of exposure time and gain according to actual demands, as shown below.

MultipleExposureGainPollingEnable	
First Exposure Time(us)	799.00
FirstGain(dB)	0.00
Second Exposure Time(us)	5000.00
SecondGain(dB)	3.00
Third Exposure Time(us)	10000.00
ThirdGain(dB)	7.00
Fourth Exposure Time(us)	1000000.00
FourthGain(dB)	10.00

Figure 8-21 Multiple Exposure Gain Polling Enable

ⓘ **NOTE**

When acquiring images, the device will set each image's exposure and gain in turn according to configured these four groups of parameters.

Chapter 9 Other Functions

9.1 Device Control

In the **Device Control** interface, you can view device information, edit device name, reset device, etc.

Steps:

1. Open the client software.

2. Go to **Device Control** and open the list.

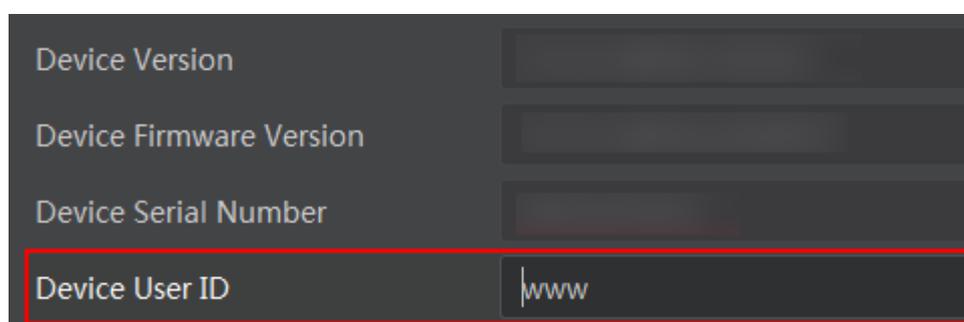3. Enter device name in the **Device User ID**.

Figure 9-1 Edit Device User ID

You can click **Execute** in **Device Rest** to reset the device, as shown below.
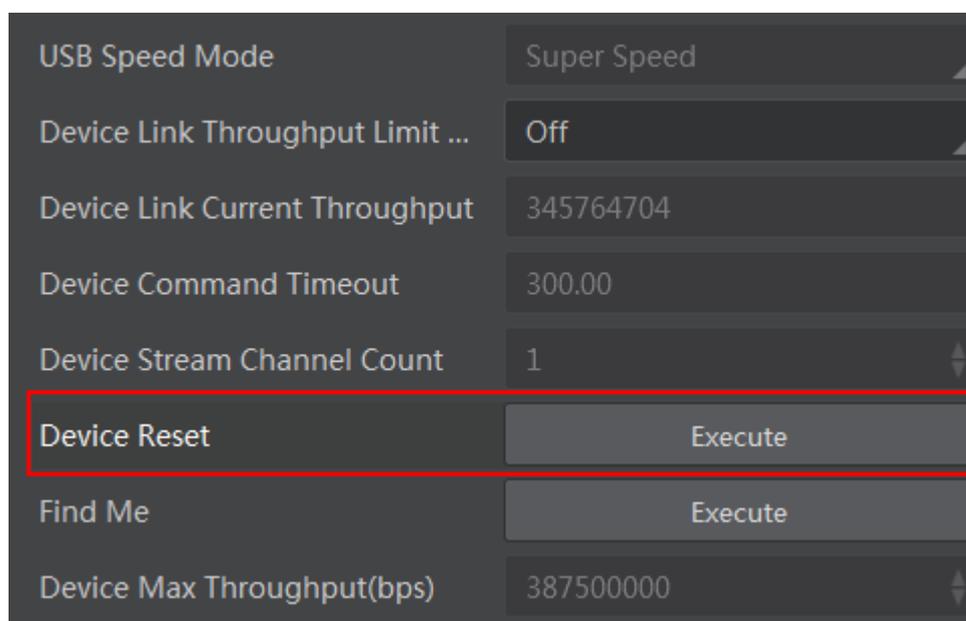

Figure 9-2 Reset Device

9.2 Set Light Source

For some models of X86 open platform that have light source and lens cover, you can set light source via MVS client.

Steps:

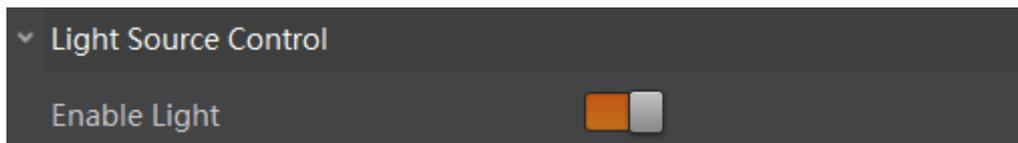1. Click **Light Source Control** > **Enable Light**.

2. Enable **Enable Light**.

Figure 9-3 Enable Light

3. (Optional) Enter proper value in **Lighting Duration(μs)** and **Lighting Ahead Time(μs)** to set light source flashing time, and ahead time before exposure respectively.

[i] **NOTE**

For models of X86 open platform that do not have light source and lens cover do not support this function.

9.3 Save and Load User Set

The device supports 4 sets of parameters, including 1 default set and 3 custom sets. The relation among 4 sets of parameters is shown below.
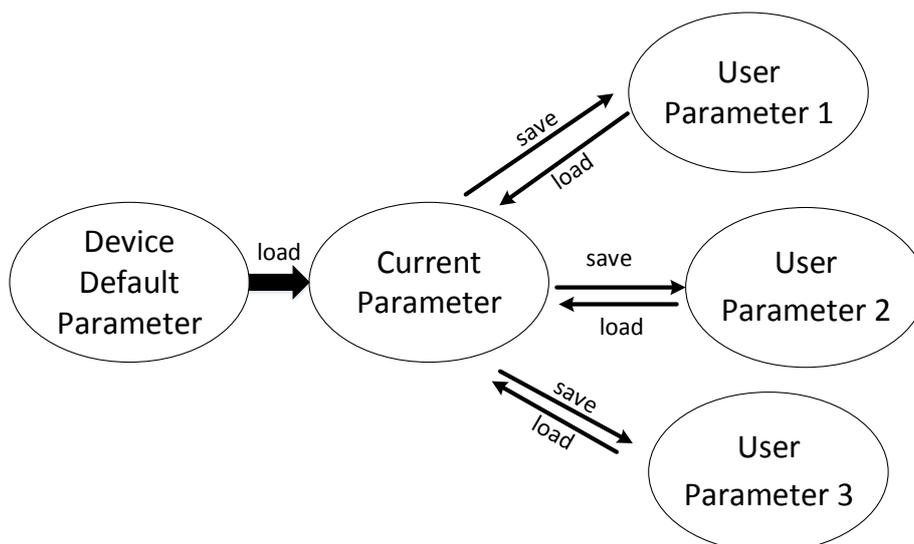

Figure 9-4 Parameter Relation

You can save parameters, load parameters and set user default as shown below.

● **Save Parameters**

Steps:

1. Click **User Set Control**, and select a user set in **User Set Selector**. Here we take selecting **User Set 1** as an example.

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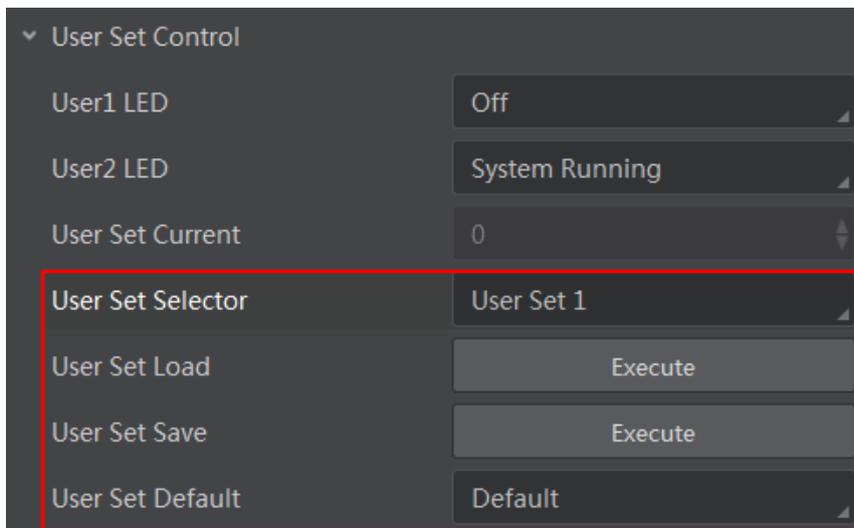

Figure 9-5 Save and load User Set

● **Load Parameters**

Steps:

1. Click **User Set Control**, and select a user set in **User Set Selector**. Here we take selecting **User Set 1** as an example.

2. Click **Execute** in **User Set Load** to load parameters to the device.

● **Set User Default**

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

[i] **NOTE**

● Save the custom parameters setting and select it as the default one, otherwise the device adopts the default set every time after it being rebooted.

● 0 stands for the default factory set, 1 stands for the user set 1, 2 stands for the user set 2, and 3 stands for the user set 3.Set Indicator

9.4 Set Indicator

The device has 2 indicators, including User1 LED, and User2 LED. You can view these indicators to check the device's operation status, as shown below.
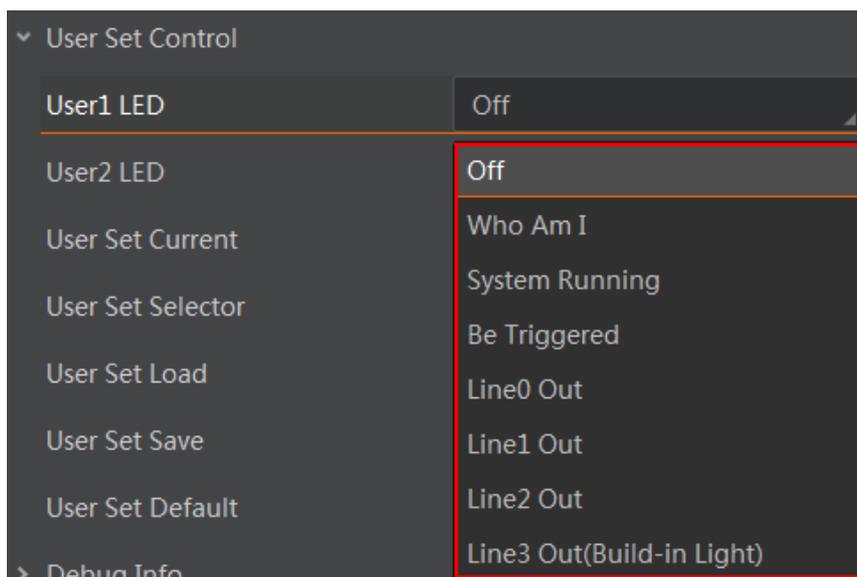
Figure 9-6 Set Indicator

For specific indicator functions, please refer to following table for details.

Table 9-1 Indicator Function Description

No.	Name	Description
1	Off	It refers to disable this function.
2	Who Am I	When selected, click **Execute**, and indicator flashes once. You can see which device you are operating.
3	System Running	When the device is running properly, the indicator keeps flashing.
4	Be Triggered	When trigger signal inputs, indicator flashes once.
5	Line0 Out	When Line0 Out outputs signal, indicator flashes once.
6	Line1 Out	When Line1 Out outputs signal, indicator flashes once.
7	Line2 Out	When Line2 Out outputs signal, indicator flashes once.
8	Line3 Out(Build-in Light)	When Light port outputs and connects to a light source device, indicator flashes once.

📖 **NOTE**

It is not recommended to change the default status of User2 LED indicator.

9.5 Set Communication Control

In communication control interface, you can view the number of bytes per image in the transmission stream, and set data packet size.

Steps:

1. Click **Communication Control** > **Payload Size(B)**.

2. Check value in **Payload Size(B)**.

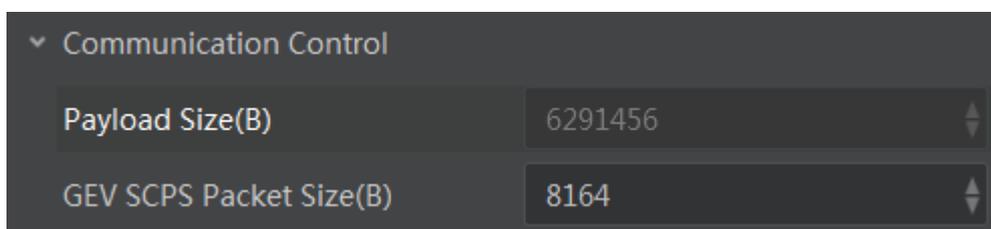3. Set **GEV SCPS Packet Size(B)** according to actual demands.

Figure 9-7 Set Communication Control

9.6 Update Firmware

9.6.1 Update Firmware via MVS

The device supports updating firmware via MVS client.

📖 **NOTE**

● Before updating, make sure power cable and others are properly connected.

● Please use the firmware package of the corresponding device model for updating.

Steps:

1. Click **Tool > Firmware Updater** to open the update interface.

2. Click 🔲 to select the device you want to update.

3. Click 📁 to select the update file in the local computer.
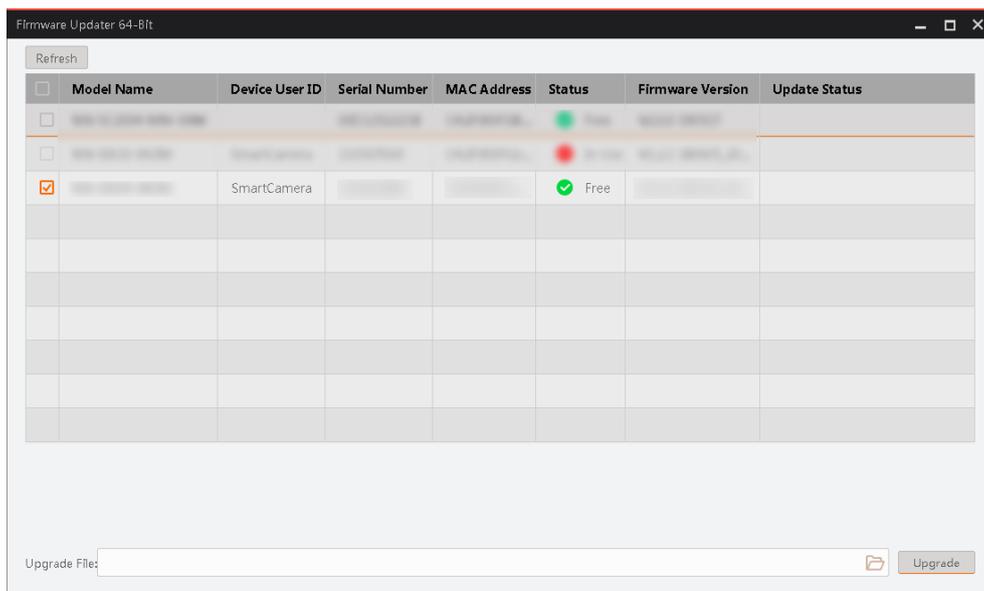
4. Click **Upgrade** to start upgrading.

Figure 9-8 Update Firmware via MVS

> **NOTE**

- You can only update the firmware when the camera is free, and the camera will reboot automatically after updating the firmware.

- The firmware updating process may take a few minutes, please wait patiently.

9.6.2 Update Firmware via MvOPCUpgrade

The device supports updating firmware via the tool of MvOPCUpgrade.

> **NOTE**

- By default, the tool is located in \Program Files(x86)\MVS\ Development\Bin\win32.

- For different Windows versions, the tool location directory may differ. Please refer to the actual condition.

Steps:

1. Find the tool, and double click it.

2. Click **Search**, and select the device you want to update.

3. Select the corresponding update file.

4. Click **Upgrade** to start upgrading.

Chapter 10 Development Guide

10.1 Enter X86 Open Platform

Function development needs to be configured inside the X86 open platform. You can use a VGA or HDMI cable to connect display and external devices, or use a personal computer to operate via remote desktop.

Steps:

1. Find the IP address of the platform in the device information panel.

2. Use remote desktop tool to connect to the IP address.

3. Enter user name and password to enter the platform. Default user name is **administrator**, and password is **Operation666**.

📖 **NOTE**

You are highly recommended to change the password after first login, and use remote control as needed.

10.2 Operation Process

10.2.1 Adjust Image

Steps:

1. After entering the platform remotely, find the client software, and double click to open it.

Figure 10-1 MVS Client

2. Use the client to connect to the platform, and adjust image according to **Section 8 Image Parameter**.

10.2.2 Use SDK

The X86 open platform SDK contents are integrated with the MVS client. Follow the steps below to view the SDK development material.

Steps:

1. Right click MVS icon, and select **Open file location**.

2. Go back 2 levels of directory to find the **Development** folder.

Figure 10-2 SDK Directory

3. Read the development guide manual and node list, learn how to call platform via the sample program, and embed your program to use.

[i] **NOTE**

You can contact technical support personnel via e-mail: *tech_support@hikrobotics.com* for help if you have any problem.

10.2.3 Use Third-Party Software

The X86 open platform supports installing Halcon and Labview software for operation. The supported software versions are shown below.

Table 10-1 Supported Versions

Software Name	Supported Versions
Halcon	Halcon 10/11/12/13/17/18/19.
Labview	Labview 2013/2014/2015/2018/2019.

If you need to encrypt software, you can write encrypted information into the platform's internal memory by calling "MV_OPC_WriteMemory" interface. In the software, you can read and verify encrypted information by calling "MV_OPC_ReadMemory" interface.

For specific interface calling, please refer to the steps below.

[i] **NOTE**

For different Windows versions, the location directory of files mentioned below may differ. Please refer to the actual condition.

Steps:

1. Right click MVS icon, and select **Open file location**.

2. Go back 2 levels of directory to find the **Development** folder.

3. Go to **Samples\VC\SimpleSamples\FlashDemo**, and find **FlashDemo**.

Figure 10-3 Find FlashDemo

4. Obtain flash memory address.

5. Write data into flash memory by calling "MV_OPC_WriteMemory" interface.

6. Obtain flash memory data by calling "MV_OPC_ReadMemory" interface.

[i] **NOTE**

If you use third-party software, you need to obtain corresponding dongle.

● **Obtain Stream via Labview Software**

You can use Labview software to obtain stream for X86 open platform.

Steps:

1. Right click MVS icon, and select **Open file location**.

2. Go back 2 levels of directory to find the **Development** folder.

3. Go to **Samples\Labview\Samples**, and find **Samples.lvproj**.

Figure 10-4 Find Samples.lvproj

4. Open **Samples.lvproj** to load **MvCameraPatch.dll** file, which is located in \MVS\Development\Samples\Labview\ MvLVLib\x86.

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Figure 10-5 Load MvCameraPatch.dll

5. Open Labview software, as shown below.

Figure 10-6 Front Panel Window

6. Click **Window** > **Display Flow Diagram** to open flow diagram.

7. Right click in the flow diagram, select **VI** and open folder.

8. Go back 1 level of directory to open **Vls** folder to call sub VI program, as shown below.
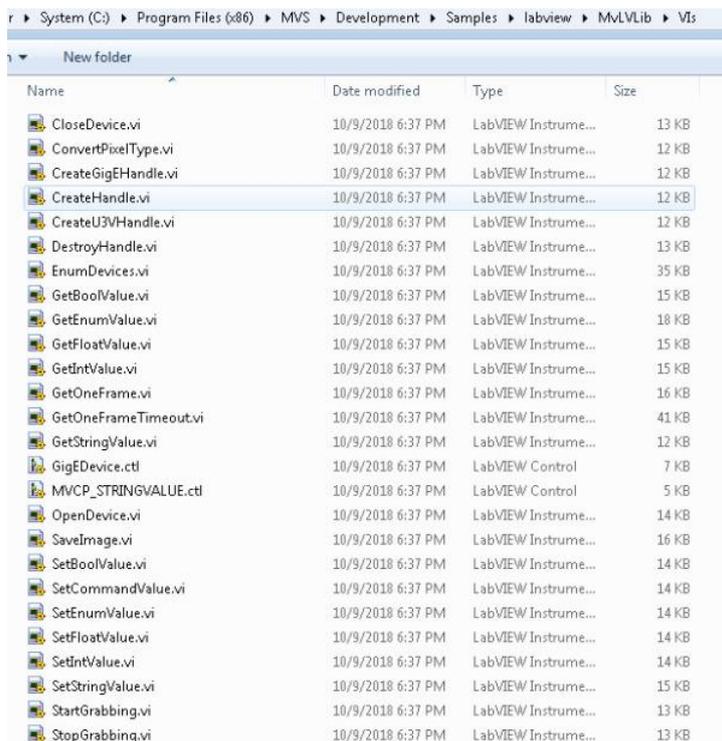
Figure 10-7 Call VI Program

9. Right click in the blank space of the front panel, and set corresponding controller according to actual demands.

10. After programing, click **Open Device** to open the device, and click **Start** to obtain stream.

Figure 10-8 Obtain Stream

● **Obtain Stream via Halcon Software**

You can use Halcon software to obtain stream for X86 open platform. You can use this software in 2 ways: install the software into your PC to connect the platform, or install the software into X86 open platform.

When installing the software into your PC to connect the platform, you can use Halcon software to obtain stream as follows.

Steps:

1. Install Halcon software into your PC.

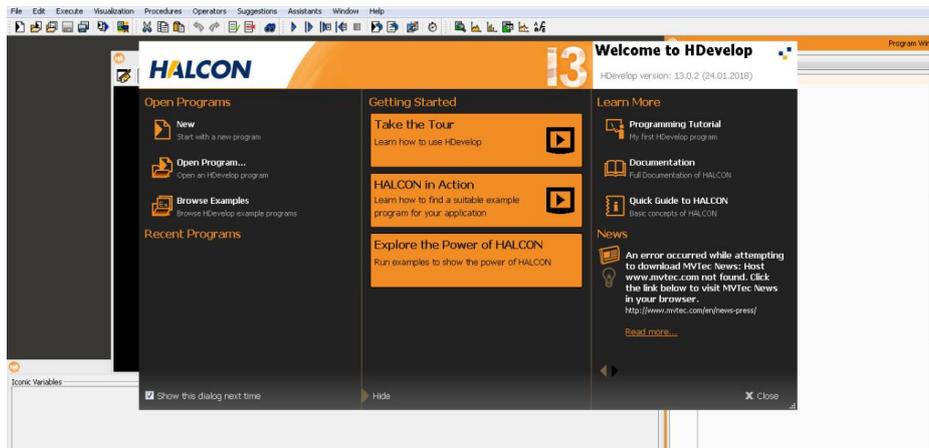2. Open the software, and enter main interface, as shown below.

Figure 10-9 Main Interface

3. Click **Asistants** in menu bar to select **Open Image Acquisition** from drop-down list.

Figure 10-10 Select Open Image Acquisition

4. Enter **Image Acquisition** interface, select **Source** tab, and click **Auto-detect Interfaces** to automatically detect and acquire images.
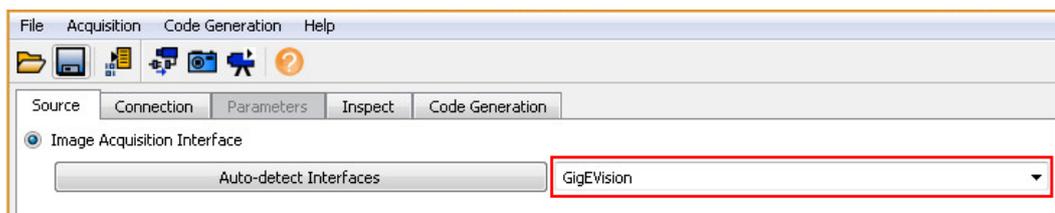

Figure 10-11 Click Auto-detect Interfaces

5. Select **Connection** tab, and click **Connect** to connect device. If the device is detected, there will be a device name displayed in the right side of **Device**.
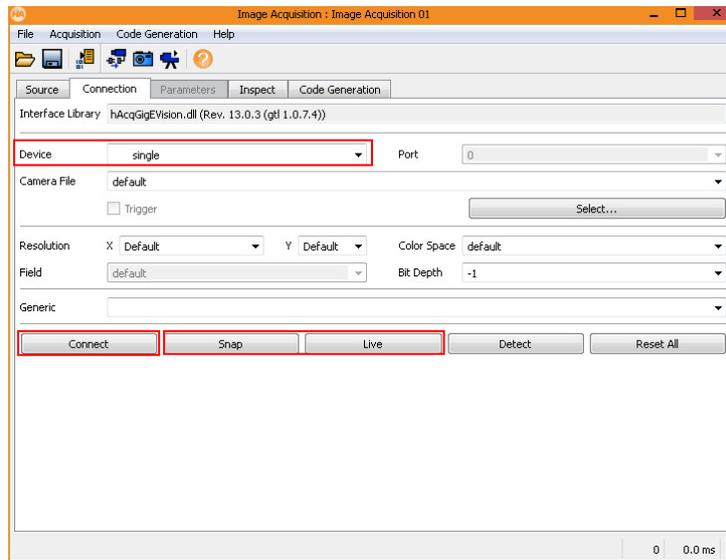

Figure 10-12 Connect Device

6. You can click **Snap** to acquire single frame image, and click **Live** to acquire images continuously. In **Graphics Window**, you can obtain image information.

Figure 10-13 Obtain Stream via Halcon Software

7. Select **Parameters** tab in **Image Acquisition** interface to set specific image parameters.
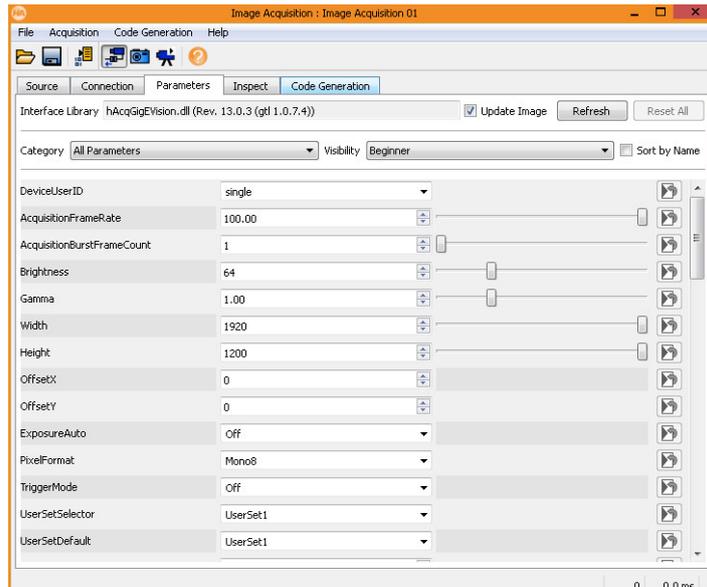
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Figure 10-14 Set Image Parameters

When installing the software into X86 open platform, you can use Halcon software to obtain stream as follows.

Steps:

1. Right click MVS icon, and select **Open file location**.

2. Go to **MVS\Development\ ThirdPartyPlatformAdapter\HalconHDevelop**, and select **hAcqMVision.dll** file according to Halcon version and computer operation system.
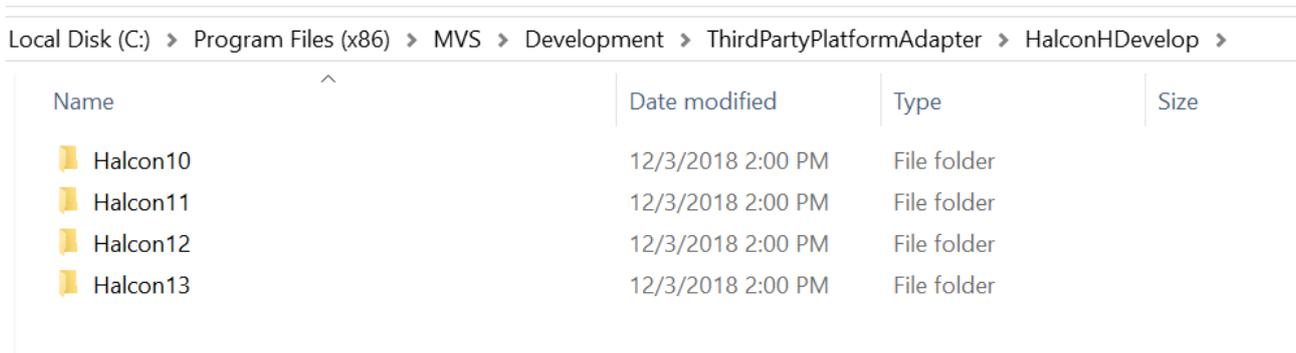

Figure 10-15 Find HAcqMVision.dll File

3. Install **hAcqMVision.dll** file into the Halcon software installation directory.

4. After installing, open Halcon software, and enter **Image Acquisition** interface.

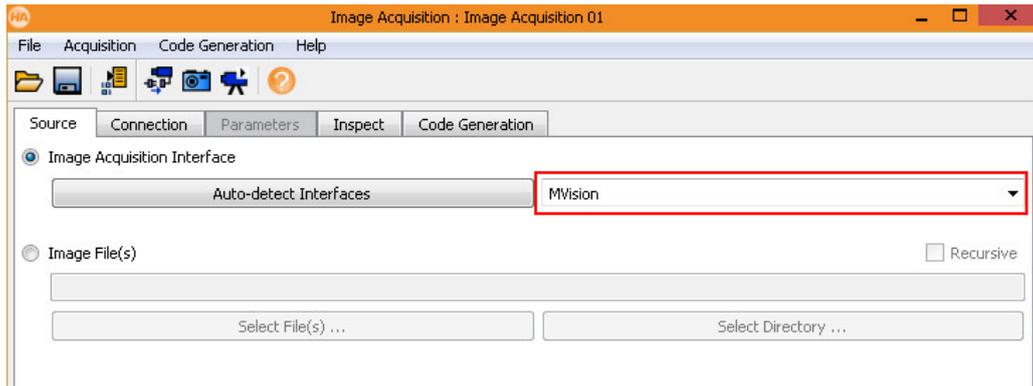5. Select **Source** tab, and select **MVision**, as shown below.

Figure 10-16 Select MVision

6. Connect device, and obtain images.

Chapter 11 Trouble Shooting

Table 11-1 Trouble Shooting

No.	Trouble	Possible Reason	Solution
1	No device found when running the client.	Device is not started up normally, or network cable connection error.	Check device power wiring (observe PWR indicator), and check network connection (observe LNK and ACT indicator).
2	Live view is black.	Lens aperture is closed.	Open lens aperture.
		Exposure time is too short.	In client, go to **Image Setting**, set **Exposure Auto** as **Once**, and set **Gain Auto** as **Once**.
3	Poor live view image quality.	The network may be fast Ethernet.	Confirm whether the network transmission speed is 1 Gbps and PC NIC is the gigabit NIC, etc.
		Incorrect jumbo frame setting.	Set jumbo frame as 9 KB, or 9014 bytes.
4	No image during live view.	Although trigger mode is enabled, there is no trigger signal.	In client, go to **Trigger and IO Control**, and set **Trigger Mode** as **Off**.
		The computer firewall or third-party anti-virus software blocks image data.	Turn off computer firewall and third-party anti-virus software, or add the client into the allow list of anti-virus software.

See Far, Go Further

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