

Hikrobot Co., Ltd.

VC5000 Series Vision Controller

User Manual

HIKROBOT

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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 VC5000 series vision controller.

Contact Information

Hangzhou Hikrobot Co., Ltd.

E-mail: global.support@hikrobotics.com

Website: <https://en.hikrobotics.com/>

Contents

Chapter 1 Safety Instruction	1
1.1 Safety Claim	1
1.2 Safety Instruction	1
1.3 Electromagnetic Interference Prevention.....	3
Chapter 2 Overview	4
2.1 Introduction	4
2.2 Key Feature.....	4
Chapter 3 Appearance	5
Chapter 4 Installation and Access to Device	7
4.1 Installation Preparation.....	7
4.2 Install Device	8
4.3 Adjust Fan Speed	10
4.4 Access to Device.....	10
Chapter 5 Interface Description	12
5.1 Power Interface	12
5.2 I/O Interface	12
5.2.1 Interface Type and Pin Definition.....	13
5.2.2 Opto-Isolated Input	15
5.2.3 Opto-Isolated Output	16
5.2.4 Digital-Isolated Low-Side Driver Output	18
5.2.5 Differential Input	19
5.2.6 Differential Output	21
5.3 Built-In Interface.....	22
5.4 Extended Slot	23
5.5 Serial Port	24
Chapter 6 Demonstration Tool	26
6.1 Main Interface	26
6.2 Device Control	27
6.3 Version Information.....	28

6.4 Running Log	29
6.5 Parameter Control.....	29
6.5.1 RS-485 Control	29
6.5.2 Input Control.....	31
6.5.3 Timer Control.....	32
6.5.4 Counter Control	33
6.5.5 Light Source Control.....	34
6.5.6 Output Control.....	35
6.5.7 Edge Information	36
6.6 All Level Values	37
Chapter 7 System Reinstallation	38
Chapter 8 FAQ (Frequently Asked Question).....	39
8.1 Why the monitor screen is black?.....	39
8.2 Why the system is blue screen or crashes, or frequent reboots?.....	39
8.3 Why there is no signal feedback of GPIO input and electrical level change?.....	39
8.4 Why does the device fail to be opened again after the firmware upgrade is completed?	40
Chapter 9 Revision History	41

Chapter 1 Safety Instruction

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

1.1 Safety Claim

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

1.2 Safety Instruction

Caution

- Do not install the device if it is found that the device and accessories are damaged, rusted, water ingress, model mismatch, missing parts, etc., when unpacking.
- Avoid storage and transportation in places such as water splashing and rain, direct sunlight, strong electric fields, strong magnetic fields, and strong vibrations.
- Avoid dropping, smashing or vigorously vibrating the device and its components.
- It is forbidden to install the indoor device in an environment where it may be exposed to water or other liquids. If the device is damp, it may cause fire and electric shock hazard.
- Place the device in a place out of direct sunlight and ventilation, away from heat sources such as heaters and radiators.
- Install the device in a stable position. Otherwise, dumping may cause serious personal injury or death.
- In the use of the device, you must be in strict compliance with the electrical safety regulations of the nation and region.
- Use the power adapter provided by the official manufacturer. The power adapter must meet the Limited Power Source (LPS) requirements. For specific requirements, please refer to the device's technical specifications.
- 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.

- Make sure that the device is installed in good condition, the wiring is firm, and the power supply meets the requirements before powering on the device.
- Avoid powering off the device by plugging and unplugging the power cord directly if the device has a power switch.
- If the device emits smoke, odor or noise, please turn off the power and unplug the power cord immediately, and contact the dealer or service center in time.
- It is strictly forbidden to touch any terminal of the device when operating it. Otherwise there is a danger of electric shock.
- It is strictly forbidden for non-professional technicians to detect signals during device operation, otherwise it may cause personal injury or device damage.
- It is strictly forbidden to maintain the device is powered on. Otherwise, there is a danger of electric shock.
- 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.
- Check the surface of the device and accessories for damage, rust, bumps, etc. when unpacking.
- Check whether the quantity and information of the device and accessories are complete after unpacking.
- Store and transport the device according to the storage and transport conditions of the device, and the storage temperature and humidity should meet the requirements.
- It is strictly prohibited to transport the device in combination with items that may affect or damage the device.
- Quality requirements for installation and maintenance personnel:
 - Qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills.
 - The basic knowledge and operation skills of low voltage wiring and low voltage electronic circuit connection.
 - The ability to comprehend the contents of this manual.
- Please read the manual and safety instructions carefully before installing the device.
- Please install the device strictly according to the installation method in this manual.
- The device should be securely fastened to a fixed mounting plate to prevent injury.
- The device should not be placed with exposed flame sources, such as lighted candles.
- To ensure good ventilation, please maintain a clearance of at least 100 mm around the device.

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

The VC5000 series vision controller adopts Intel® 12th processor and has DDR5 memory. It supports 32-channel GPIO and multiple-channel light source control. It also has multiple interfaces like GigE, USB 2.0, and USB 3.0. The vision controller provides solutions for vision applications, and is widely applicable to multi-camera localization, detection, and recognition, etc.

2.2 Key Feature

- Adopts 12th generation Intel® CPU to offer strong performance.
- Provides PCIe expansion slot to connect to image frame grabber or graphics card.
- Supports 32-channel GPIO and some models support NPN/PNP switching for output.
- Adopts GigE interfaces for stable data transmission.
- Supports multiple-channel light source for synchronous control.

 **Note**

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

Chapter 3 Appearance

Note

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

The VC5000 series vision controller has two types:

- **Type I device:** It refers to the device without PCIe expansion slot. For type I device, only 4-pin power interface is used to supply power to the system.
- **Type II device:** It refers to the device with PCIe expansion slot. For the type II device, the 2-pin power interface is used to supply power to the graphics card, and 4-pin power interface to supply power to the system.

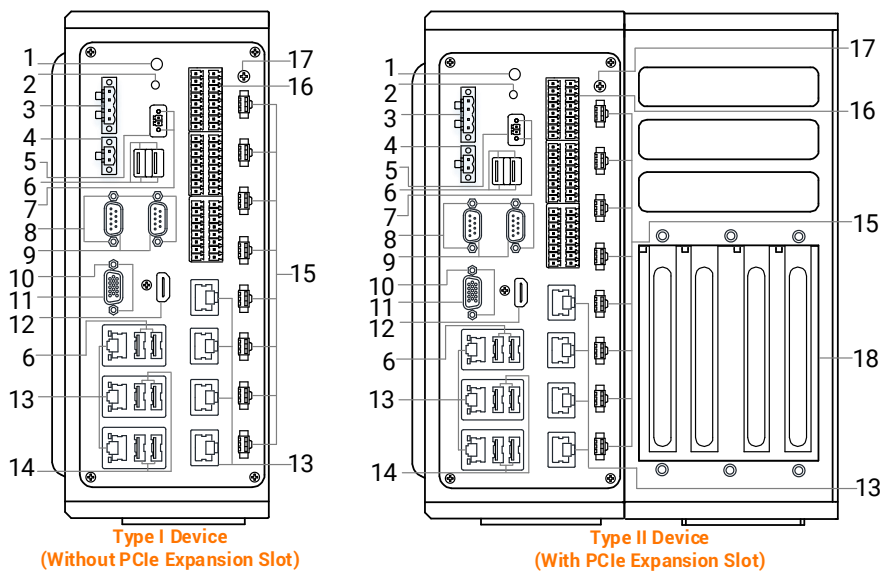




Figure 3-1 Appearance of Type I and Type II Devices

Table 3-1 Component Description

No.	Name	Description
1	Power Switch / Power Indicator	It is used to power on/off the device. Press it shortly to power on the device, and long press it for 5 seconds to power off. The indicator is solid green when the device is switched on.
2	HDD Indicator	It indicates HDD status. The indicator is flashing green when the HDD reads and writes data.
3	4-Pin Power Interface	It provides power to the system.
4	2-Pin Power Interface	It provides power to the graphics card.

VC5000 Series Vision Controller User Manual

No.	Name	Description
		 Note Only type II device has the 2-pin power interface.
5	Remote Switch Interface	It is used to power on/off the device remotely. Press it shortly to power on the device, and long press it for 5 seconds to power off.
6	USB 2.0 Interface	It is used to connect to the USB 2.0 peripherals, such as keyboard, mouse, and USB flash drive.
7	Screw Hole for Remote Switch Interface	It is used to fix the remote switch interface.
8	Screw Hole for Serial Port	It is used to fix the serial port.
9	Serial Port	It is used for serial communication.
10	Screw Hole for VGA Interface	It is used to fix the VGA interface.
11	VGA Interface	It is used to transmit video signal.
12	HDMI Interface	It is used to transmit video signals.
13	GigE Interface	It is used to transmit network signal.
14	USB 3.0 Interface	It is used to connect to the USB 3.0 peripherals, such as USB-type camera, keyboard, mouse, and USB flash drive.
15	Light Source Interface	It is used to connect to the industrial light source. The device has 8-channel 24 V constant-voltage light source interface. You can set related parameters such as light source brightness, duration, etc. via SDK or Demo.
16	GPIO Interface	It provides I/O function.
17	GND Screw	It is used to connect ground wire.
18	PCIe Expansion Slot	It is used to connect to frame grabber, graphics card, or motion control card.  Note Only type II device has the PCIe expansion slot.

Note



For devices that support PoE, the maximum load of PoE single-port is 15 W, and the total load is 20 W.

Chapter 4 Installation and Access to Device

4.1 Installation Preparation

You need to prepare following accessories before installation.

Table 4-1 Accessories

No.	Name	Quantity	Description
1	Power Adapter or Switch Power Supply	1	It refers to an appropriate power adapter or switch power supply. You should purchase separately according to power supply and power consumption of the device.  Note Please contact the technical support to get the wiring method.
2	Mounting Plate	2	They are used to fix the device to other mechanical structures, and are included in the package.
3	Screws and Shock Pad	Several	They are used to fix the device and install the hard disk, and are included in the package.  Note For type I device, the 3.5" screws for hard disk installation are provided. For type II device, the 2.5" screws and 3.5" screws for hard disk installation are provided.

You can use an industrial power supply to provide DC power supply for the device. When using it, please observe the following precautions:

- Before carrying out any installation or maintenance work, make sure that the power supply is disconnected from the AC power and that there is no risk of accidental reconnection due to human negligence or wiring issues.
- Do not install the power supply in a humid environment, near liquid, in high-temperature conditions, in direct sunlight, or near flame sources.
- The industrial power supply has exposed high-voltage terminals. Please install it in an enclosed case or cabinet to prevent accidental contact by personnel.
- Maintain sufficient insulation distance between the internal components of the power supply and the screws.
- Ensure that the air intake of the cooling fan and holes for heat dissipation are unobstructed, and keep a distance of at least 10 cm from each other. If adjacent

equipment generates heat, keep it at least 10 cm to 15 cm away from the power supply.

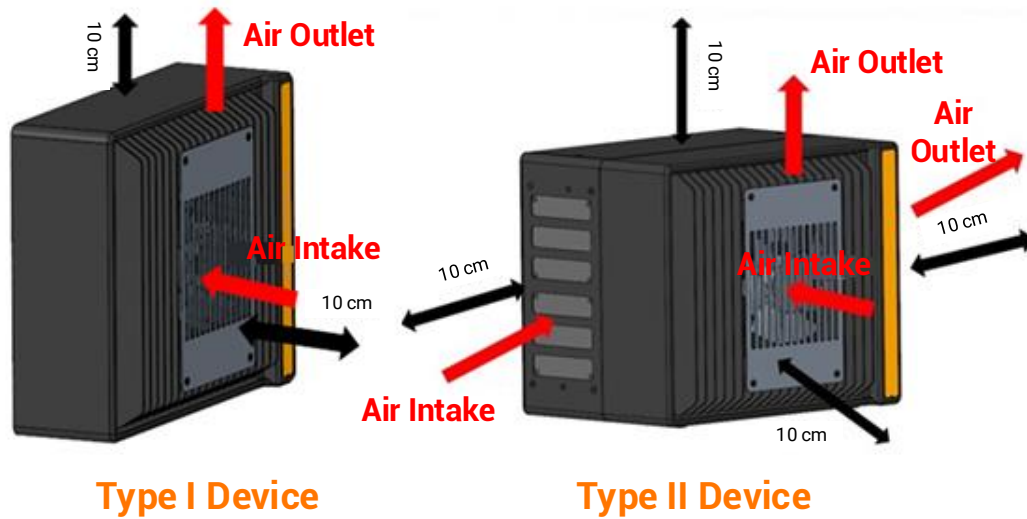


Figure 4-1 Air Intake and Air Outlet

- Make sure the power supply is properly grounded before use.
- When using the power supply, do not exceed the upper limit of its output current and output power. Refer to the power supply's nameplate for specific parameters.
- Non-standard installations or using the power supply in high-temperature environments will increase the temperature of the internal components, potentially reducing output power.
- The power supply contains high-voltage circuits that pose a risk. If any abnormalities occur, disconnect the power first and have it inspected by a technician with professional electrical qualifications. Do not attempt to open the casing yourself.
- Avoid touching the power supply terminals within 5 minutes after the power has been cut off to prevent the risk of electric shock.

4.2 Install Device

You should install the device before using it. The device supports two installation methods, including placing on the workbench and installation via screw hole. You should select the installation method according to actual demands.

Before You Start

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

Note

- The appearance is subject to change, and the actual device you purchased shall prevail.
 - Here we take the type I device as an example.
-

Place on Workbench

You can directly place the device on a workbench for usage, as shown below. The feet pads of the device should be facing on the workbench.

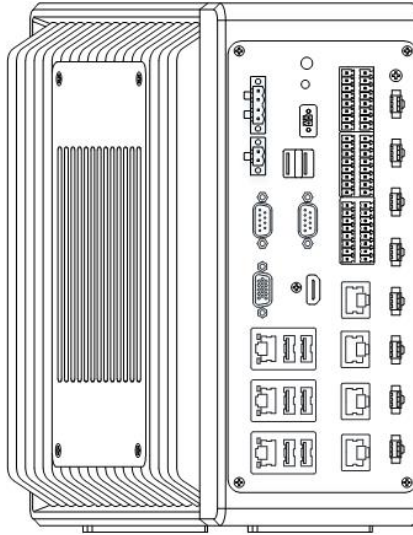
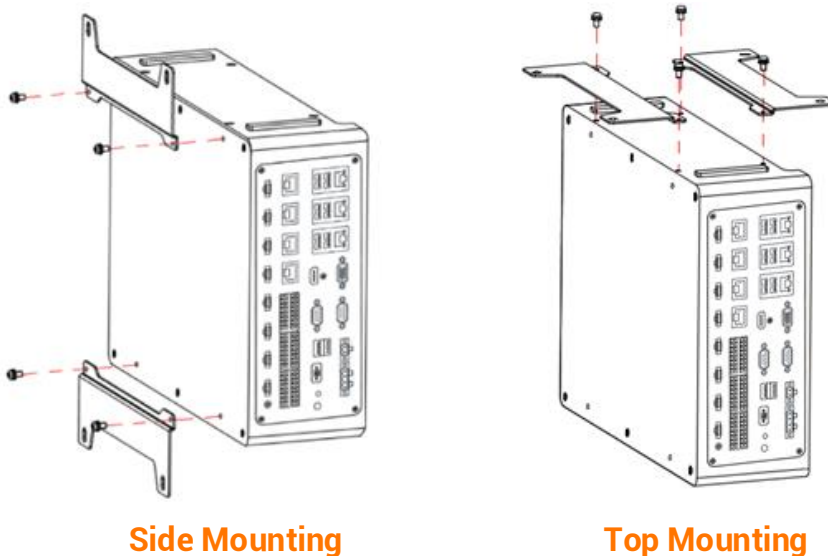


Figure 4-2 Place on Workbench (Type I Device)

Installation via Screw Hole

Use four M4 screws to fix the device to a mounting plate, and then fix to other mechanical structures, as shown below.

For type I device, side mounting and top mounting are supported, and for type II device, only side mounting is supported.



Side Mounting

Top Mounting

Figure 4-3 Side Mounting

Note

Some device models have a built-in mechanical hard disk. Please install the devices in a location as far away from the source of vibration as possible. If the vibration environment is unavoidable, do not place the device freely on the workbench. Securely fix the device and add cushioning materials (such as foam or silicone) between the device and the contact surface.

4.3 Adjust Fan Speed

There are two fans in the device for heat dissipation. The fan speed is automatically adjusted by default. If you need to set it manually, please follow the steps below.

Steps

1. Power on the device, and press **F2** to go to the settings page.
2. Go to **Advanced** page, and click **SIO IT8786E** → **Fan Control**.
3. Select **Manual** as **Mode** in both **Fan 1 Control** and **Fan 2 Control**.
4. Click **PWM Steps [0-255]**, and set the PWM value according to the needs.

Note

- The pulse width value is between 0 and 255. The higher the value, the higher the fan speed.
- The output value of PWN is equal to PWN value divided by 256 and multiplied by 100%.

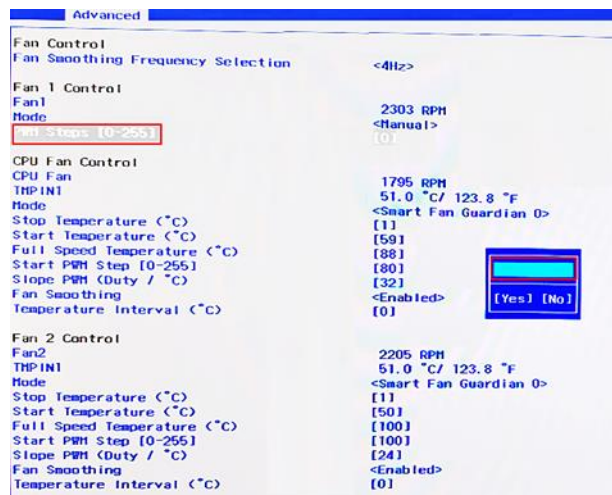


Figure 4-4 Set PWM

5. Click **Yes** to save the settings.
6. Go to **Exit** page, and click **Exit Saving Changes** → **Yes** to save changes and exit.

4.4 Access to Device

You can operate the device on the monitor by connecting them via HDMI interface or VGA

interface, or you can remotely access the device via the PC that is in the same network segment with the device.

 **Note**

- The default user name of the device is **Administrator**, and the password is **Operation666**.
 - For security, it is highly recommended to change the default password for the first-time use.
-

Chapter 5 Interface Description

5.1 Power Interface

The device's power interface is used to connect to the power adapter. Currently, there are two types of power interface, including 2-pin and 4-pin.

For the type II device, the 2-pin power interface is used to supply power to the graphics card, and 4-pin power interface to supply power to the system. For type I device, only 4-pin power interface is used.

4-Pin Power Interface

On the left side of the 4-pin power interface is two 0 V connectors, and you can select one to connect to power supply negative. On the right side of the power interface is two 24 V connectors, and you can select one to connect to power supply positive.

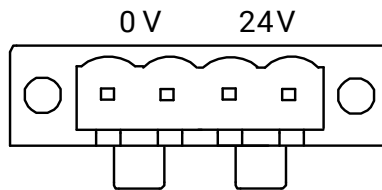


Figure 5-1 4-Pin Power Interface

2-Pin Power Interface

On the left side of the 2-pin power interface is a 0 V connector, and you can connect it to power supply negative. On the right side, it is a 24 V connector, and you can connect it to power supply positive.

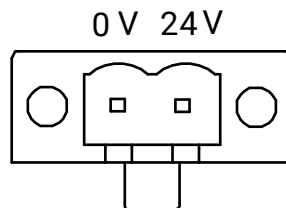


Figure 5-2 2-Pin Power Interface

5.2 I/O Interface

The vision controller supports multiple-channel I/O, and some models support NPN/PNP

switching for output.

5.2.1 Interface Type and Pin Definition

The device has an 8 in 20 out GPIO interface that can be configured as 4-channel non-isolated bi-directional I/O. The interface has 48 pins, and you can refer to the following figure and table for pin definitions.

Note

You should refer to the table below and the label attached to GPIO cable when wiring.

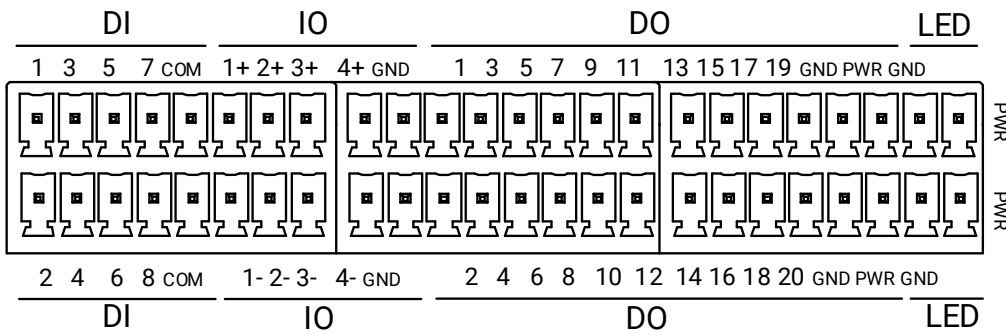


Figure 5-3 GPIO Interface

Table 5-1 Pin Definitions of GPIO Interface

Type	Name	Description	Name	Description
Opto-Isolated Input	DI1	Opto-isolated input 1	DI6	Opto-isolated input 6
	DI2	Opto-isolated input 2	DI7	Opto-isolated input 7
	DI3	Opto-isolated input 3	DI8	Opto-isolated input 8
	DI4	Opto-isolated input 4	DI_COM	Input common port (polarity-free)
	DI5	Opto-isolated input 5	DI_COM	Input common port (polarity-free)
Opto-Isolated Output	DO1	Opto-isolated output 1	DO13	Digital-isolated low-side driver output 13
	DO2	Opto-isolated output 2	DO14	Digital-isolated low-side driver output 14
	DO3	Opto-isolated output 3	DO15	Digital-isolated low-side driver output 15
	DO4	Opto-isolated output 4	DO16	Digital-isolated low-side driver output 16

Type	Name	Description	Name	Description
	D05	Opto-isolated output 5	DO17	Digital-isolated low-side driver output 17
	D06	Opto-isolated output 6	DO18	Digital-isolated low-side driver output 18
	D07	Opto-isolated output 7	DO19	Digital-isolated low-side driver output 19
	D08	Opto-isolated output 8	DO20	Digital-isolated low-side driver output 20
	D09	Opto-isolated output 9	DO_PWR	DO module output power +
	D010	Opto-isolated output 10	DO_GND	DO module output power -
	D011	Opto-isolated output 11	DO_PWR	DO module output power +
	D012	Opto-isolated output 12	DO_GND	DO module output power -
Light Source Power Supply	L_PWR	Light source power supply +	L_GND	Light source power supply -
	L_PWR	Light source power supply +	L_GND	Light source power supply -
Bi-Directional Differential I/O	IO1+	Differential I/O 1 +	IO1-	Differential I/O 1 -
	IO2+	Differential I/O 2 +	IO2-	Differential I/O 2 -
	IO3+	Differential I/O 3 +	IO3-	Differential I/O 3 -
	IO4+	Differential I/O 4 +	IO4-	Differential I/O 4 -
	GND	System ground	GND	System ground

 **Note**

- When the DO module is used, the external power supply should be connected, and DO_PWR and DO_GND cannot be connected reversibly.
- The maximum power of light source single channel is 72 W, and the maximum total power of 8-channel is 190 W. It is recommended that the current-carrying capacity of power cord is no less than 8.3 A @ 24 V.

5.2.2 Opto-Isolated Input

For opto-isolated input, different input electrical level types correspond to varied voltage ranges.

Table 5-2 Voltage Range

Input Level	Voltage Range
Input level high	4 V to 24 V
Input level low	0 V to 3 V

Note

- It is recommended that the input current of driver is no less than 5 mA.
- Wiring may differ when connecting the device to different types of external devices.
- You can design circuit diagram for other external devices according to the diagrams below.
- When connecting to external devices, a pull-up resistor or pull-down resistor is optional.
- The voltage of VCC should be no greater than 24 V. Otherwise, the I/O interface may be damaged.

PNP Device

When connecting the device to PNP device, the wiring is shown below.

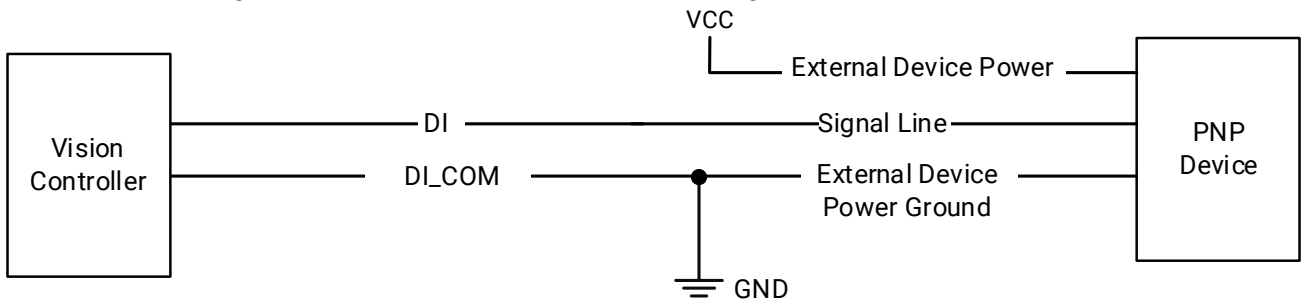


Figure 5-4 Connect to PNP Device

NPN Device

When connecting the device to NPN device, there are two different wirings as shown below.

- When DI_COM interface connects to GND of the NPN device, a pull-up resistor is required. If VCC is 12 V, a 1 kΩ pull-up resistor is recommended. If VCC is 24 V, a 4.7 kΩ pull-up resistor is recommended.

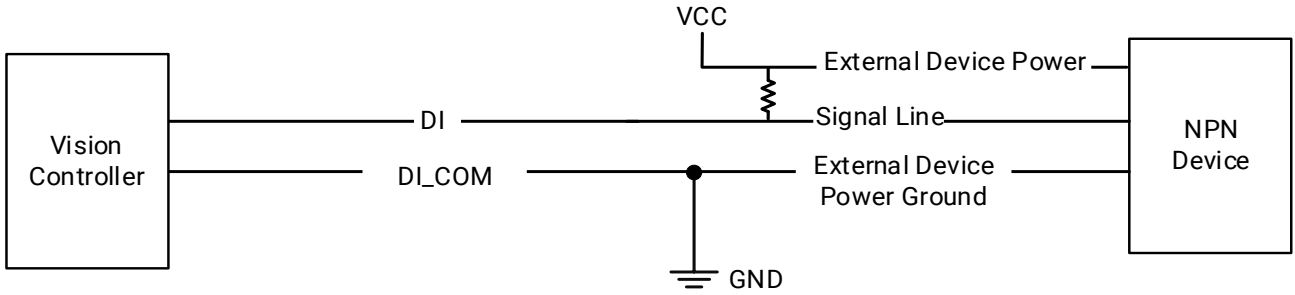


Figure 5-5 Connect to NPN Device with Pull-Up Resistor

When DI_COM interface connects to GND of the NPN device, a pull-up resistor is not required.

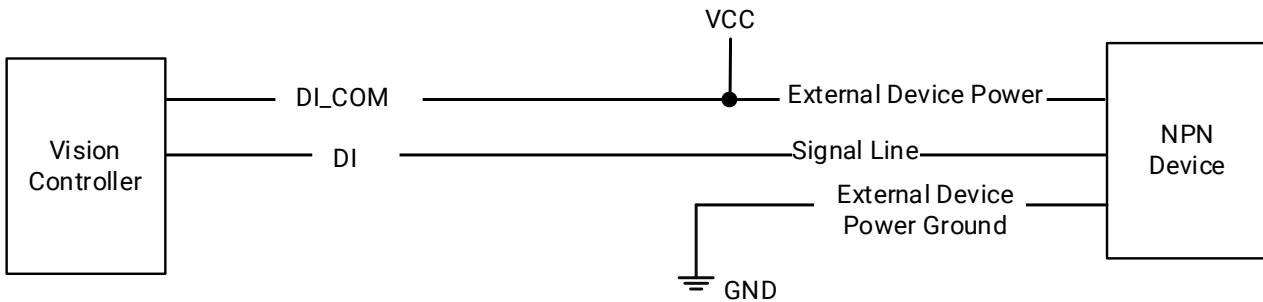


Figure 5-6 Connect to NPN Device Without Pull-Up Resistor

5.2.3 Opto-Isolated Output

The opto-isolated output of the device can output NPN or PNP signal. For opto-isolated output, different output electrical level types correspond to varied voltage ranges.

Note

- In PNP mode, the output has capabilities of strong pull-up and weak pull-down.
- In NPN mode, the output has capability of strong pull-down and has no pull-up capability.
- When the device's output connects external devices, the voltage range of EXT is from 8 V to 24 V, and the output current of each pin cannot be larger than 40 mA.
- EXT refers to the voltage between DO_PWR and DO_GND.

Table 5-3 Voltage Range

Input Level	Voltage Range
Input level high	EXT-0.3 V to EXT voltage value
Input level low	0 V to 0.4 V

Note

- When the device's output sends signal to external devices, you need to select different wirings in accordance with their electrical features and NPN or PNP signal.
- If the external load is a coil type relay, make sure that there are backward diodes on both

sides of the relay to protect it.

- You can design circuit diagram for other external devices according to the diagrams below.
 - The voltage of VCC should be no greater than 24 V. Otherwise, the I/O interface may be damaged.
 - The following content is related to DO1 to DO12.
-

External Load

When the device outputs PNP signal and connects external load like LED light, relay, buzzer, etc., its wiring is as follows.

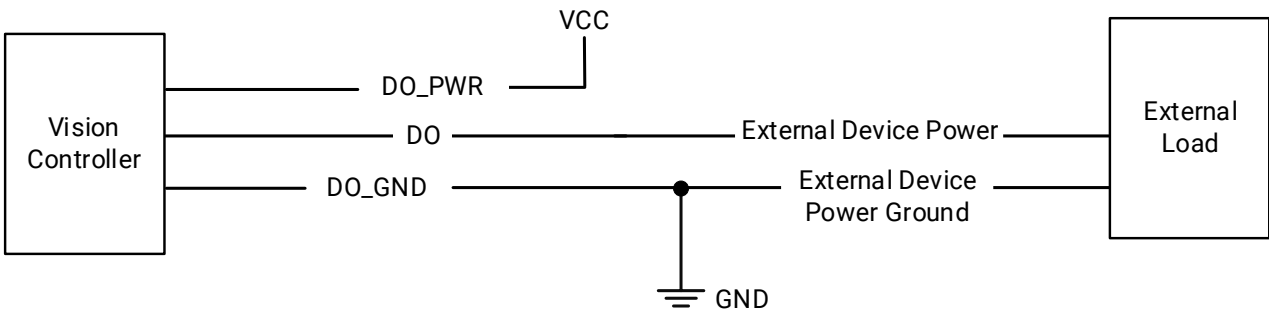


Figure 5-7 PNP Output Connecting to External Load

When the device outputs NPN signal and connects external load like LED light, relay, buzzer, etc., its wiring is as follows.

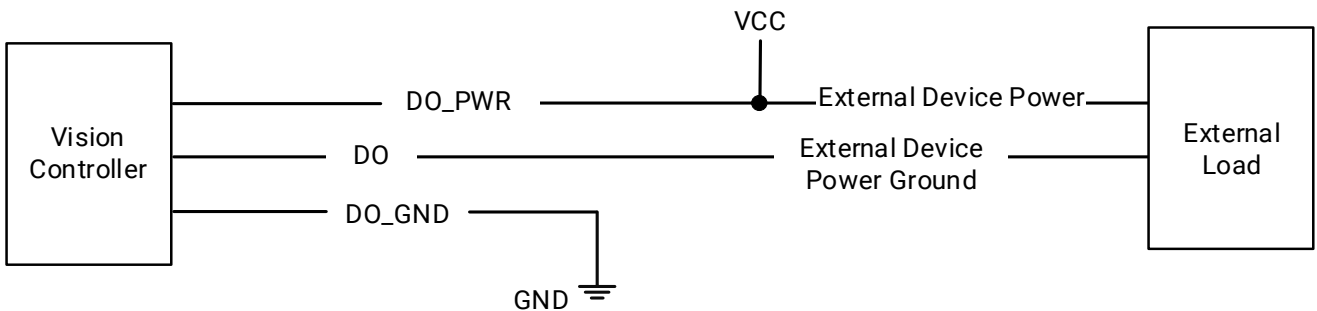


Figure 5-8 NPN Output Connecting to External Load

PLC

When the device's output connects with PLC (Programmable Logic Controller), the wiring is as follows. If it is source type of PLC, the device should be set to output NPN signal. If it is sink type of PLC, the device should be set to output PNP signal.

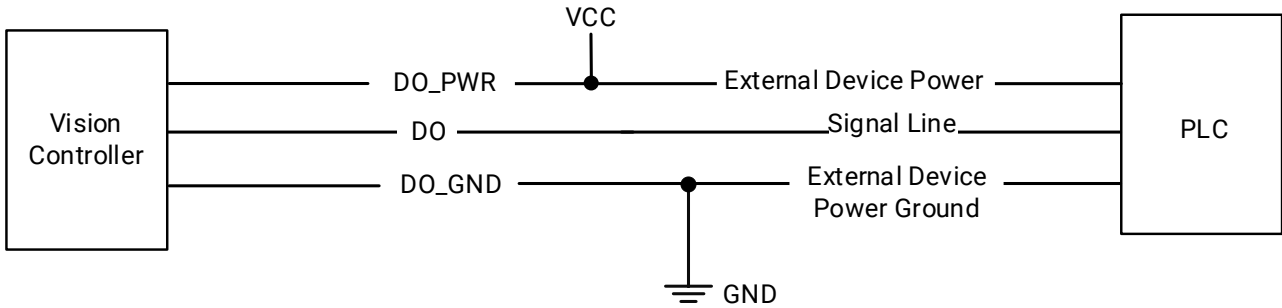


Figure 5-9 Connect to PLC

5.2.4 Digital-Isolated Low-Side Driver Output

Note

- The voltage of VCC should be no greater than 24 V. Otherwise, the I/O interface may be damaged.
- The maximum sinking current is 0.5 A. If the value is exceeded, the overcurrent protection will be triggered, and DO waveform oscillation be generated. So, please use an applicable trigger source device or resistor for current limiting.
- If the external device is a coil type relay, make sure that there are backward diodes on both sides of the relay to protect it.
- You can design circuit diagram for other external devices according to the diagrams below.
- The following content is related to DO13 to DO20.

PNP Device

When connecting the device to PNP device, the wiring is as shown below.

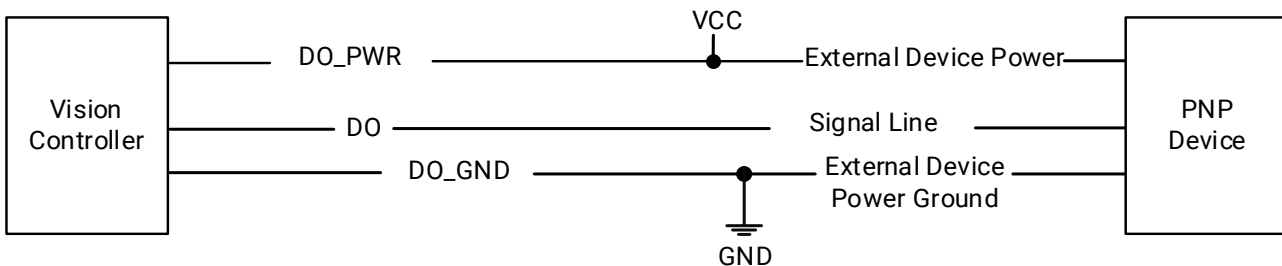


Figure 5-10 Connect to PNP Device

NPN Device

When connecting the device to NPN device, the wiring is as shown below.

When VCC of the NPN device is 12 V or 24 V and the pull-up resistor is used, the wiring is shown below.

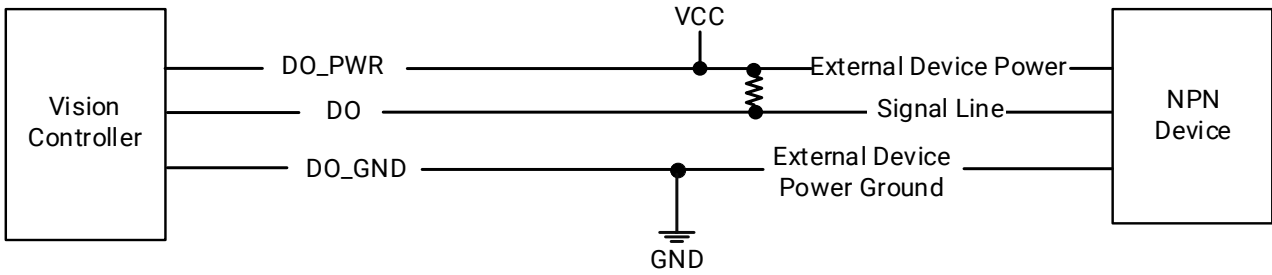


Figure 5-11 Connect to NPN Device with Pull-Up Resistor

Relation between different voltages of VCC and resistor value is shown below.

Table 5-4 Relation Between VCC and Resistor

VCC	R
12 VDC	1 kΩ
24 VDC	4.7 kΩ

5.2.5 Differential Input

The vision controller has four bi-directional non-isolated differential I/O signals, which can be set to input signals to trigger other devices.

Note

- Wirings are different if I/O signal is configured as differential input or single-ended input.
- Make sure the hardware trigger signal source is input signal. Refer to section [Demonstration Tool](#) for details.
- The voltage of VCC should be no greater than 24 V. Otherwise, the I/O interface may be damaged.
- The GND is the system ground (non-isolated). Please distinguish between the GND and DO_GND for on-site wiring. Otherwise, incorrect wiring may lead to device damage.

The wiring is shown below if differential signal source provides trigger signal.

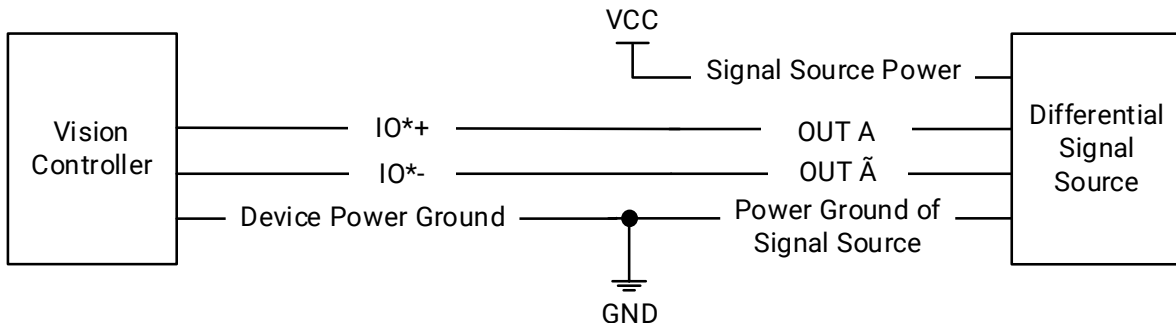


Figure 5-12 Differential Input Wiring

There are two wirings as shown below if the PNP single-ended signal source provides the

signal source.

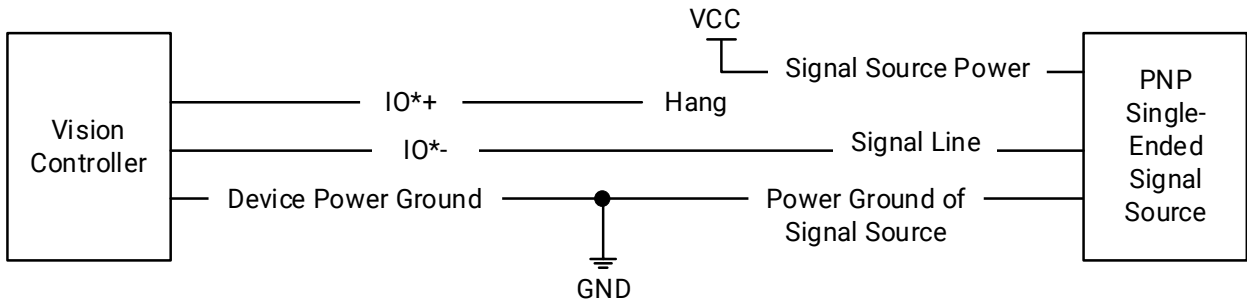


Figure 5-13 PNP Single-Ended Input Wiring Without Pull-Down Resistor

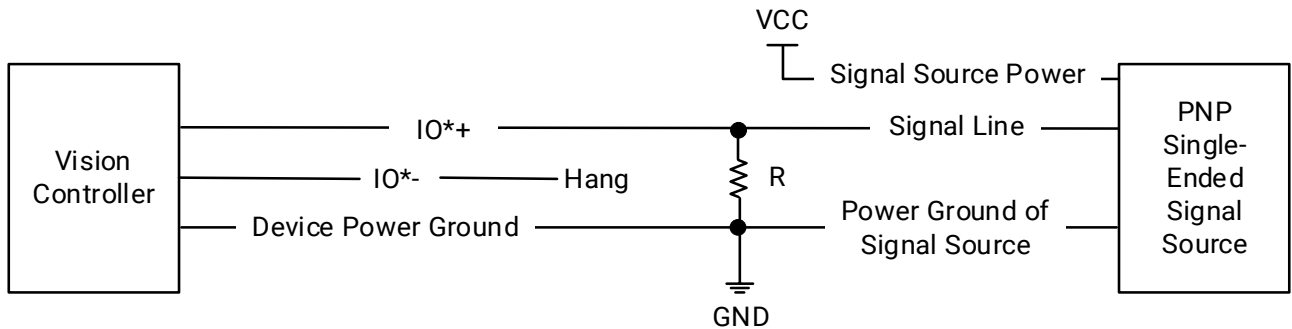


Figure 5-14 PNP Single-Ended Input Wiring with Pull-Down Resistor (1 KΩ to 4.7 KΩ)

There are two wirings as shown below if the NPN single-ended signal source provides the signal source.

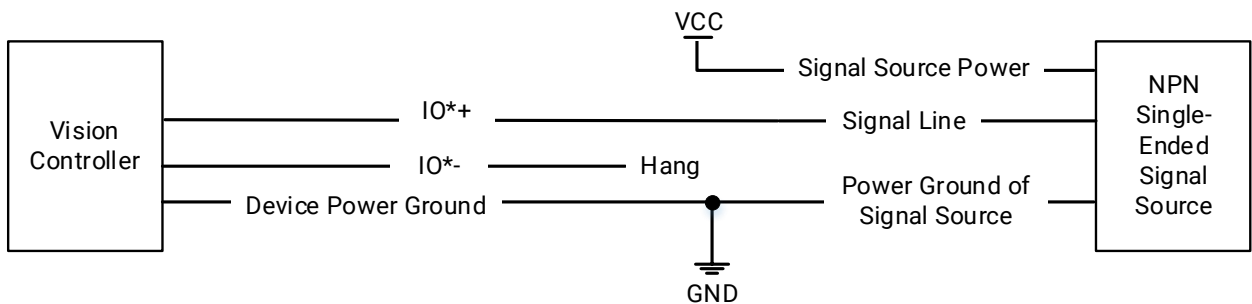


Figure 5-15 NPN Single-Ended Input Wiring Without Pull-Up Resistor

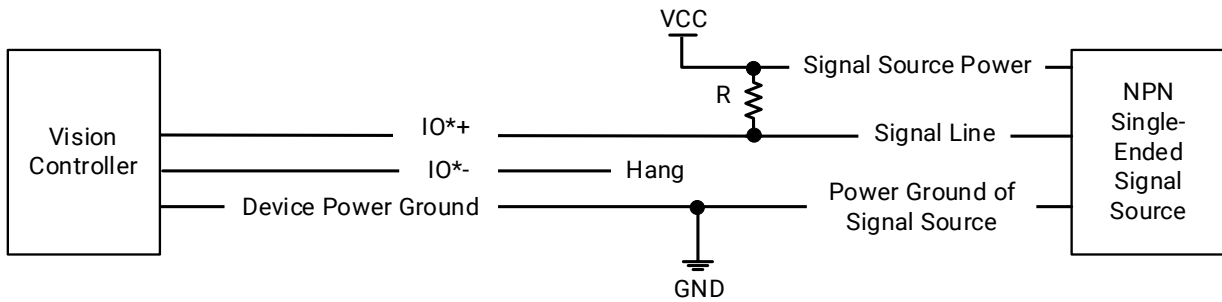


Figure 5-16 NPN Single-Ended Input Wiring with Pull-Up Resistor (1 K Ω to 10 K Ω)

5.2.6 Differential Output

The vision controller's four bi-directional non-isolated differential I/O signals can be configured as output signals to trigger other devices.

Note

- Wirings are different if I/O signal is configured as differential output or single-ended output.
- The voltage of VCC should be no greater than 24 V. Otherwise, the I/O interface may be damaged.
- The GND is the system ground (non-isolated). Please distinguish between the GND and DO_GND for on-site wiring. Otherwise, incorrect wiring may lead to device damage.

The wiring is shown below if the I/O signal is configured as differential output.

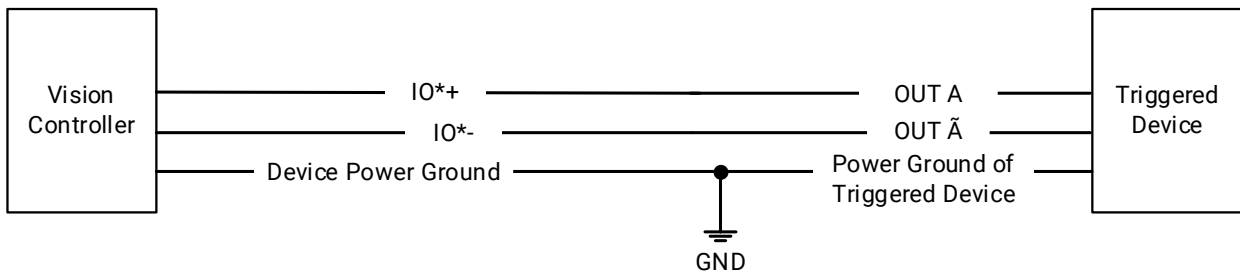


Figure 5-17 Differential Output Wiring

A pull-up resistor is required if I/O signal is configured as the single-ended output, and the resistor ranges from 1 K Ω to 10 K Ω . The VCC of single-ended signal should be matched with the triggered voltage.

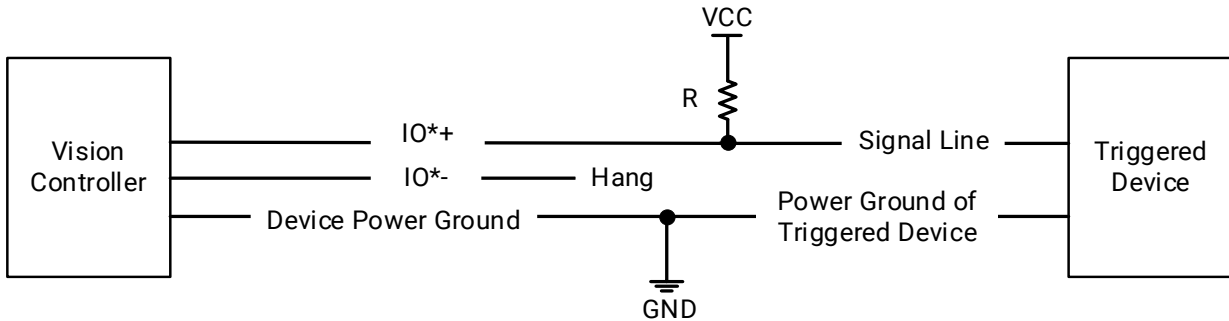


Figure 5-18 Single-Ended Output Wiring with Pull-Up Resistor (1 K Ω to 10 K Ω)

5.3 Built-In Interface

The device has multiple built-in interfaces. See the figure below.

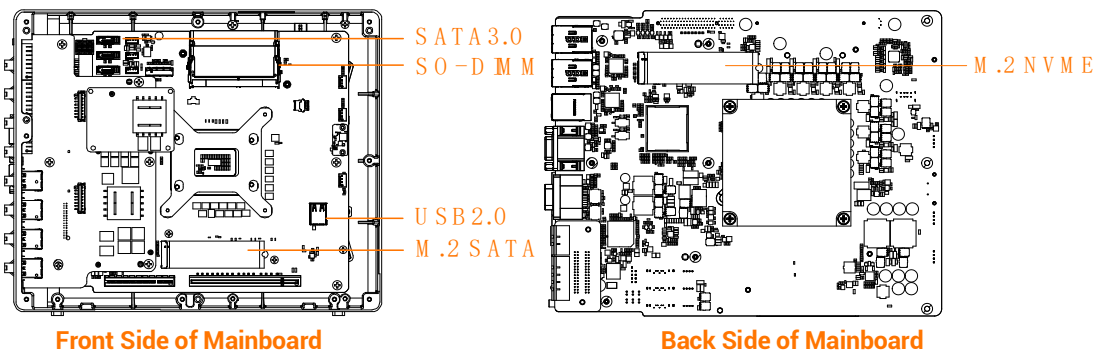


Figure 5-19 Built-In Interface

- SATA3.0: It connects to the extended hard disk.
- SO-DIMM: It connects to the extended memory modules. The device has two memory slots. If the memory capacity or bandwidth cannot meet the requirements, please contact technical support for device upgrade. Self-installation of memory modules is not recommended.
- USB2.0: It connects to the USB flash disk or the dongle.

Note

The built-in USB interface has two layers, and only the first layer can be used.

- M.2 SATA: It connect to the extended solid state disk, and the system disk is installed in the device.
- M.2 NVME: It connect to the extended solid state disk.

Note

Only type II device has the M.2 NVME interface.

Follow the steps and figure below to uninstall the mainboard before using.

Steps

1. Remove the screws and the bottom cover.
2. Remove the hard disk bracket and heat dissipating sheet metal.

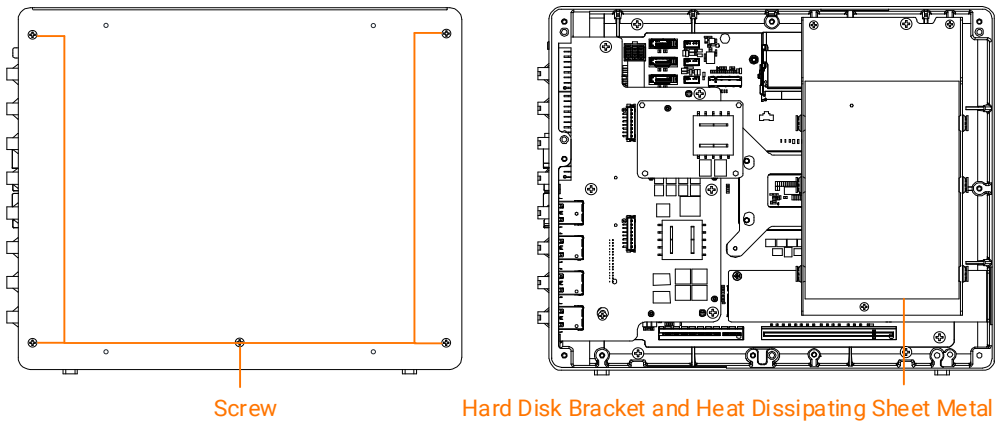


Figure 5-20 Uninstallation

5.4 Extended Slot

The type II device has 4 PCIe extended slots that are used to connect to frame grabber, graphics card, or motion control card, etc.

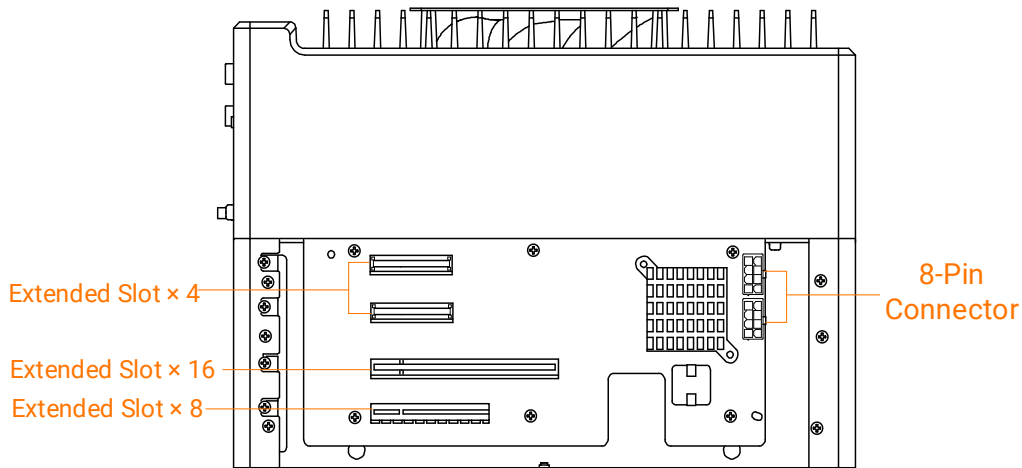


Figure 5-21 Extended Slot

For the type II device, refer to the following content of the wiring steps of graphics card.

Steps

1. Disconnect the power.
2. Remove the screws, bottom cover, and plate.

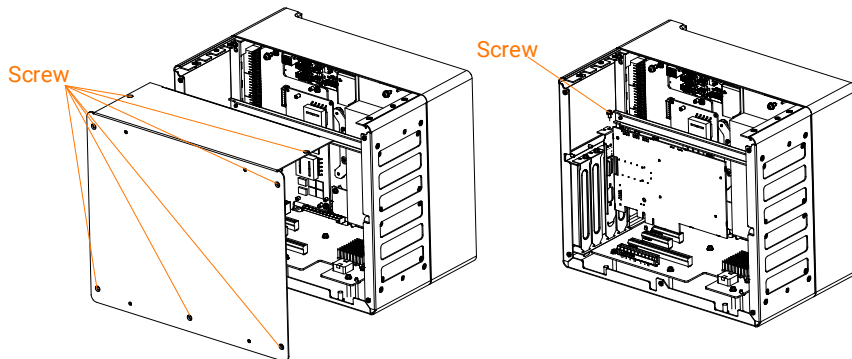


Figure 5-22 Remove Screws

3. Insert the graphics card to the corresponding slot.

Note

- The type I device does not support the graphics card.
- The graphics card of TDP ≤ 220 W is supported.
- The PCIe $\times 8$ shares the bit width with the PCIe $\times 16$. When the PCIe $\times 8$ slot is not used, the PCIe $\times 16$ slot will provide full bandwidth. When the PCIe $\times 8$ slot is used, the PCIe $\times 16$ slot will only provide half of the bandwidth.
- When a thicker graphics card is used in PCIe $\times 16$ slot, the space of PCIe $\times 8$ slot will be occupied, making the PCIe $\times 8$ slot unavailable.

4. Connect one end of the auxiliary power cord to the ATX interface of the graphics card, and connect another end to the 8-pin white connector on the back of the mainboard.
5. Connect to the 2-pin green power interface for powering the graphics card.
6. Connect to the 4-pin green power interface for powering the system.

5.5 Serial Port

The device has a standard D-sub 9-pin communication interface. The serial port is RS-232 by default, and you can configure it to RS-485 or RS-422 via BIOS settings or Demo settings.

Note

- Serial port corresponds to COM 1 and COM 2 in the default operating system.
- Refer to the following content for BIOS settings, and refer to section [RS-485 Control](#) for demo settings.

Steps

1. Press **F2** to enter BIOS setting window after powering on the device.

2. Go to **Advanced** → **Super IO Configuration** → **Serial Port 1 Configuration**.
3. Set **Serial Mode** to **RS485 HALF**, or **RS485/422 FULL** according to actual demands.

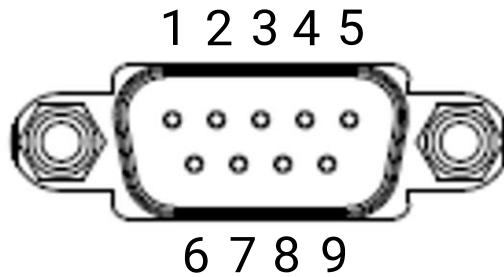


Figure 5-23 Serial Port

Table 5-5 RS-232 Pin Definitions

Pin No.	Description	Pin No.	Description
1	DCD	6	DSR
2	SIN	7	RTS
3	SOUT	8	CTS
4	DTR	9	RI
5	GND	--	--

Table 5-6 RS-485 Pin Definitions

Pin No.	Description
1	D-
2	D+
5	GND

Table 5-7 RS-422 Pin Definitions

Pin No.	Description
1	TX (B)
2	TX (A)
3	RX (A)
4	RX (B)
5	GND

Chapter 6 Demonstration Tool

6.1 Main Interface

You can use the controller software as demonstration tool to set parameters of the device.

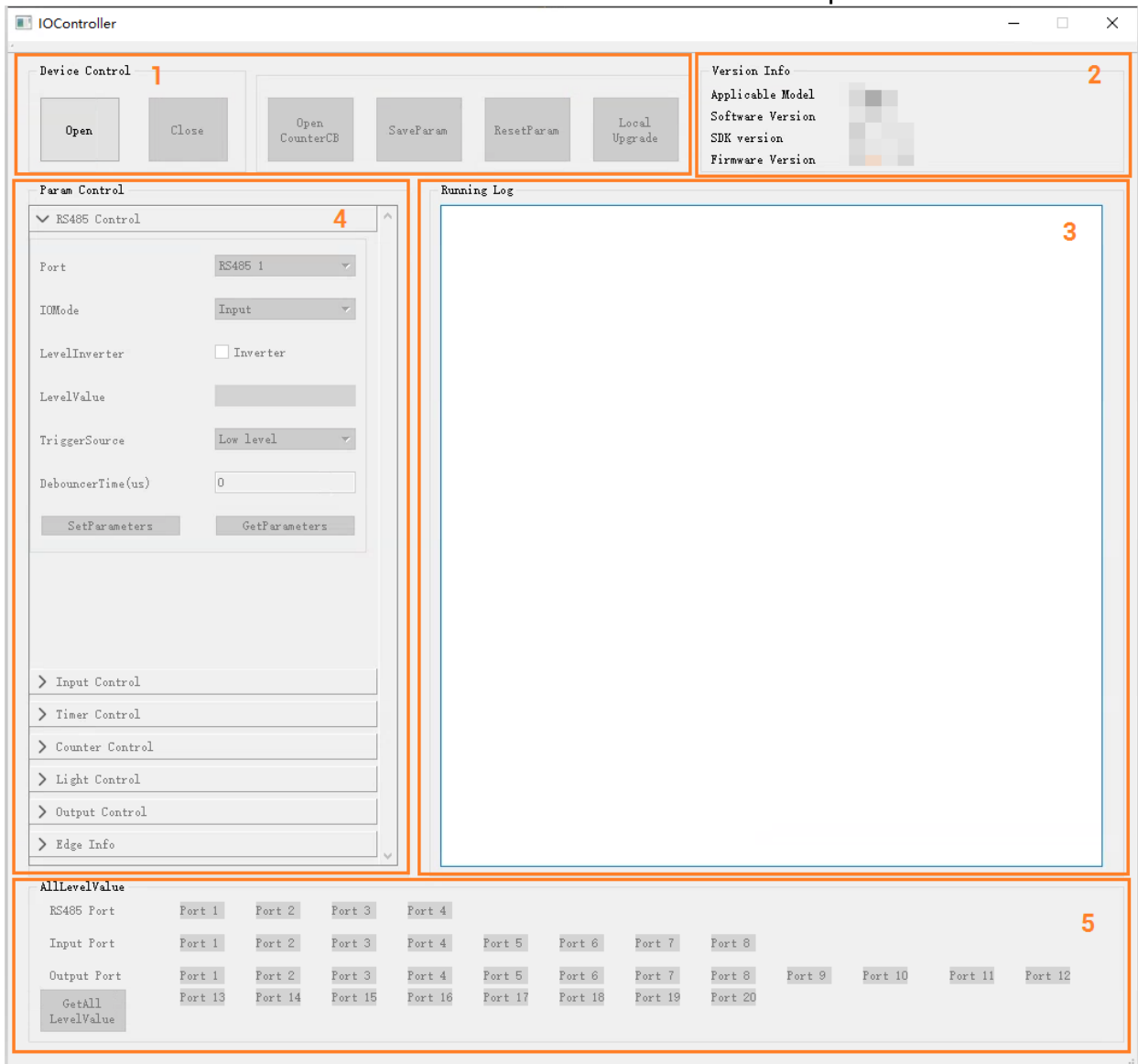


Figure 6-1 Main Window

Note

The graphic user interface may differ by versions of the software you use or the device firmware. Please refer to the actual one

Table 6-1 Main Window Description

No.	Area Name	Description
1	Device Control	You can open or close the device communication. Refer to section Device Control .
2	Version Information	You can see the applicable model. Refer to section Version Information .
3	Running Log	You can see the log information. Refer to section Running Log .
4	Parameter Control	You can set input/output-related parameters. Refer to section Parameter Control .
5	All Level Values	You can get all level values. Refer to section All Level Values .

The device can control I/O output or light source output via Demo. Refer to the flow below.

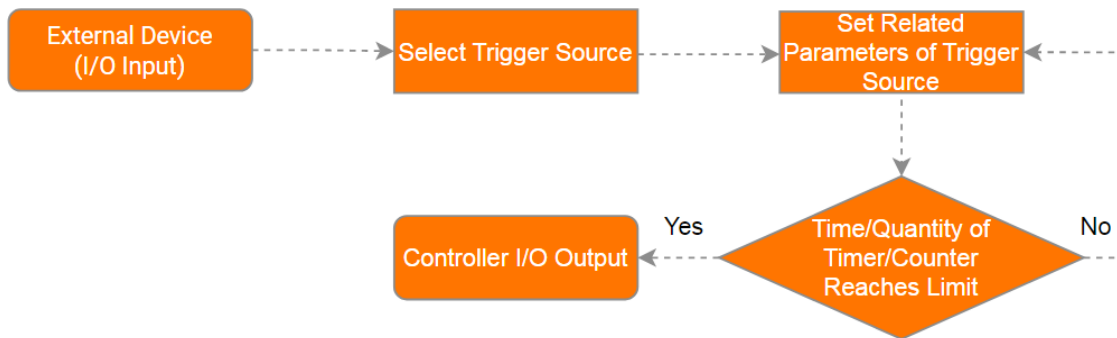


Figure 6-2 Input/Output Flow

6.2 Device Control

You can create and initialize SDK resource, control device communication, execute counter parameter, save or reset parameter, and upgrade firmware.

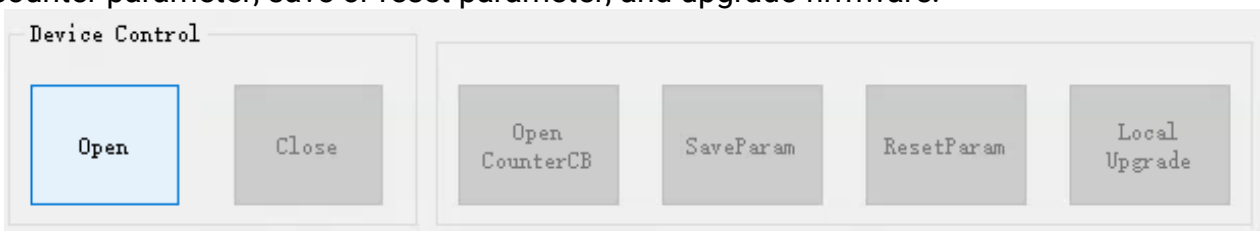


Figure 6-3 Device Control

Table 6-2 Device Control Parameter

Parameter Name	Description
Open/Close	You can open or close the device communication to set or get parameters.
Open CounterCB	This parameter is used with CallBackEnable in Counter Control . After CallBackEnable and Open CounterCB are enabled, the signal will be captured and processed via a callback function when the counter reaches the set value in Counter Control . This function is mostly used in the encoder-related scene for secondary development. Refer to section Counter Control .
SaveParam	<p>You can click the button to save current settings.</p> <p>Note</p> <p>It is recommended to save all settings after you have configured all parameters for minimizing resource consumption and enhancing system efficiency.</p>
ResetParam	<p>You can click the button to restore to factory settings.</p> <p>Note</p> <p>After you click the button, all saved parameters will be cleared.</p>
Local Upgrade	<p>After you click the button, select the firmware upgrade file in DAV format that is matched with the current device.</p> <div data-bbox="603 1205 1311 1424" style="border: 1px solid gray; padding: 5px; margin: 10px auto; width: fit-content;"> </div> <p style="text-align: center;">Figure 6-4 Firmware Upgrade</p> <p>Note</p> <p>After the firmware is upgraded, please restart the device to get the related parameters.</p>

6.3 Version Information

You can view the applicable model, software version, SDK version, and firmware version.



Figure 6-5 Version Information

6.4 Running Log

You can view the running log in this module, such as calling process or error message.

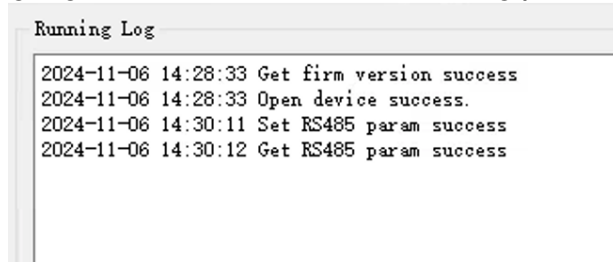


Figure 6-6 Running Log

6.5 Parameter Control

You can set RS-485, input/output, timer, counter, light source, and edge information.

Steps


1. Select the module as needed. Only **Edge Info** has the **Module** parameter.
2. Select the port as needed. The port No. corresponds to the I/O.
3. Click **GetParameters**, and the system will get current parameters from the device.
4. Set the port-related parameters.
5. Click **SetParameters**, and the system will synchronize the changes to the device.
6. Repeat the steps above to complete the configuration.

6.5.1 RS-485 Control

You can set and get parameters of RS-485 1/2/3/4, select I/O mode, and set level inverter, level value, trigger source, and debouncer time.

Table 6-3 RS-485 Control Parameter

Parameter Name	Description
Port	You can select RS485 1/2/3/4 .
IOMode	You can select Input or Output .

Parameter Name	Description
LevelInverter	When you select Inverter , the high level will be inverted to low level, and low level inverted to high level.
LevelValue	You can view level value via the color. Red refers to high level, and green refers to low level.
TriggerSource	It is valid when the Output is set as IOMode . You can select Low Level, High Level, RS485 Input 1/2/3/4, Input1/2/3/4/5/6/7/8, Timer 1/2/3/4/5/6/7/8, and Counter 1/2/3/4.  Note The trigger source cannot be the same as the port No. For example, if the port is RS485 1 , the trigger source cannot be set to Input 1 .
DebouncerTime	It is valid when the Input is set as IOMode . If the DebouncerTime you set is greater than the time of trigger signal, this trigger signal will be ignored. The unit is μ s, and the value should be from 0 to 20000000.

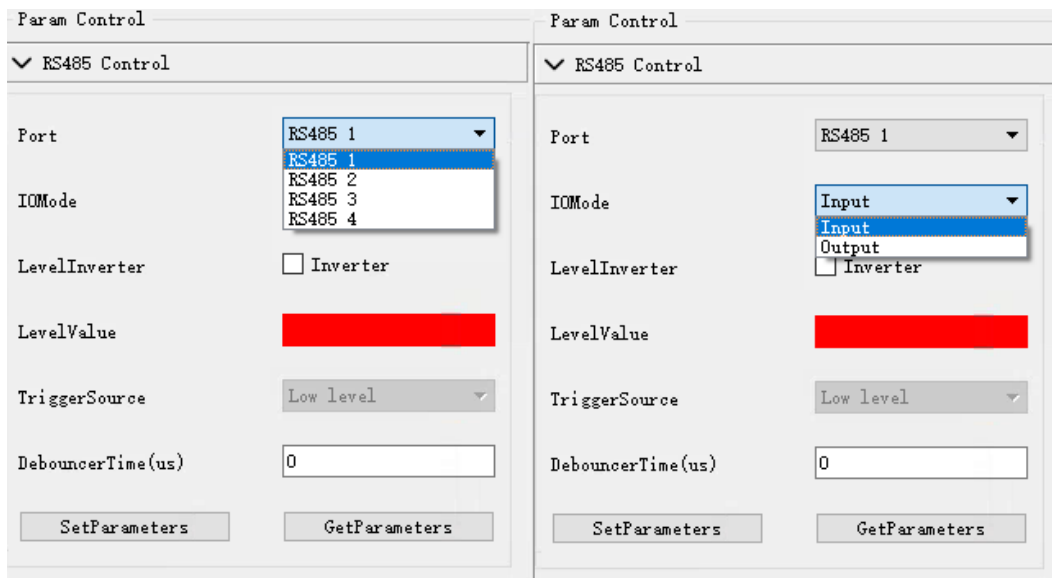


Figure 6-7 RS-485 Control (Input Mode)

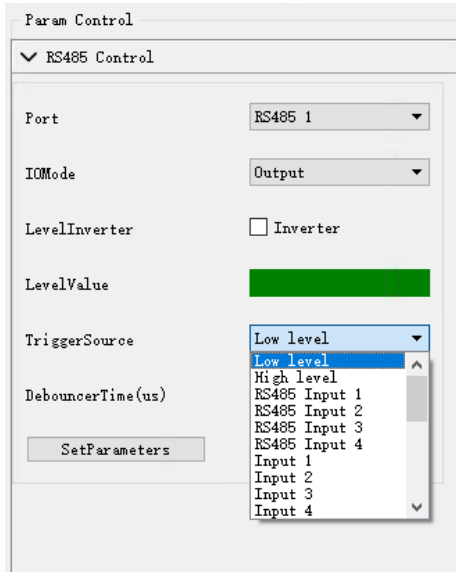


Figure 6-8 RS-485 Control (Output Mode)

6.5.2 Input Control

You can set and get parameters of Input 1/2/3/4/5/6/7/8, select I/O mode, and set level inverter, level value, and debouncer time.

Table 6-4 Input Control Parameter

Parameter Name	Description
Port	You can select Input 1/2/3/4/5/6/7/8 .
IOMode	Input is selected.
LevelInverter	When you select Inverter , the high level will be inverted to low level, and low level inverted to high level.
LevelValue	You can view level value via the color. Red refers to high level, and green refers to low level.
DebouncerTime	If the DebouncerTime you set is greater than the time of trigger signal, this trigger signal will be ignored. The unit is μs , and the value should be from 0 to 20000000.

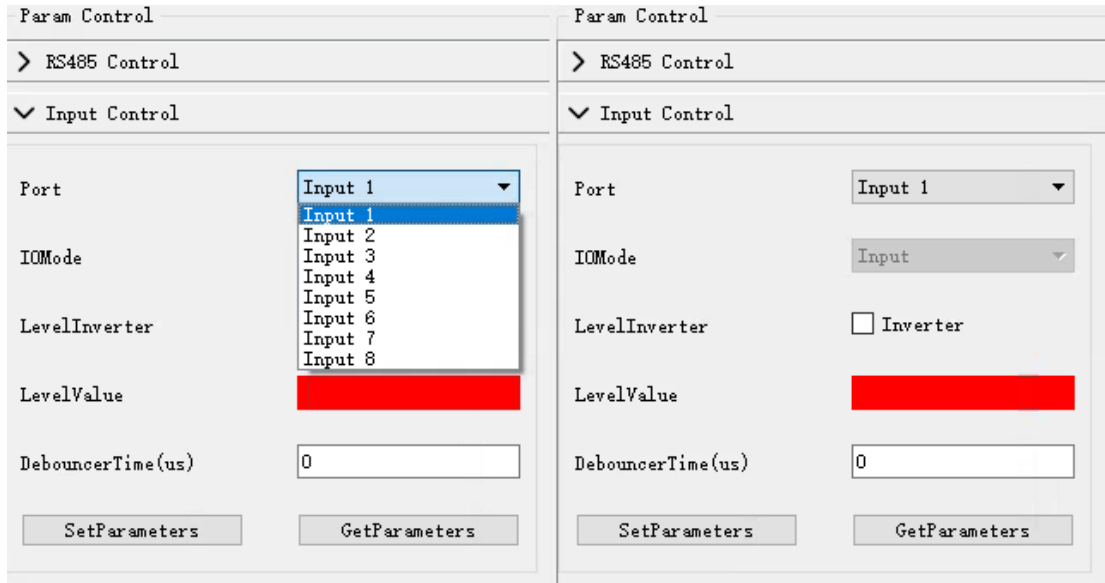


Figure 6-9 Input Control

6.5.3 Timer Control

You can control output and light source via the timer control. In this module, you can set and get parameters of Timer 1/2/3/4/5/6/7/8, and set output inverter, trigger source, trigger mode, trigger delay time, software trigger, duration time, delay time, and output number.

Table 6-5 Timer Control Parameter

Parameter Name	Description
Port	You can select Timer 1/2/3/4/5/6/7/8 .
OutputInverter	You can click Execute to invert the output signal of the timer.
TriggerSource	You can select a trigger source to control the output signal of the timer. Software, Continuous, RS485 Input 1/2/3/4, Input1/2/3/4/5/6/7/8, Timer 1/2/3/4/5/6/7/8, and Counter 1/2/3/4 can be selected.
TriggerMode	It includes rising edge, falling edge, any edge, high level, and low level.
TriggerDelayTime	It allows the device to add a delay between the receipt of trigger signal and the moment the trigger becomes active.
TriggerSoftware	It is valid when Software is set as the TriggerSource . You can click Execute to output signal according to the settings.
DurationTime	It refers to the time of the high level signal output by the timer in one cycle.
DelayTime	It refers to the time of the low level signal output by the timer

Parameter Name	Description
	in one cycle.
OutputNumber	It refers to the number of periodic signals output by a single trigger.

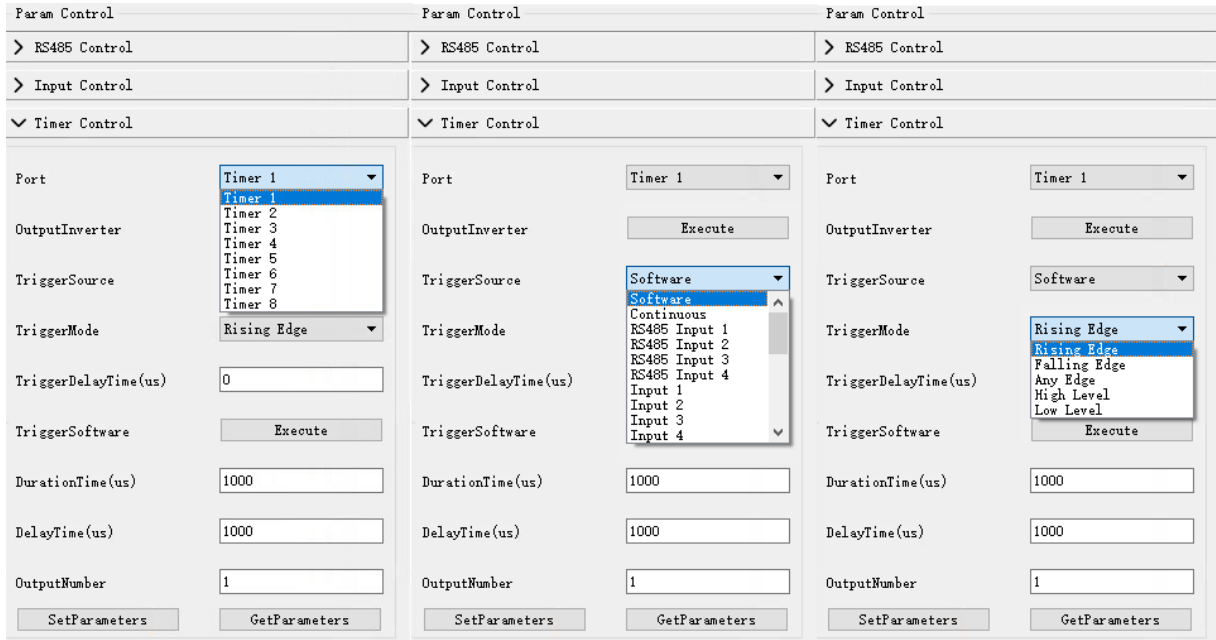



Figure 6-10 Timer Control

6.5.4 Counter Control

You can control output and light source via the counter control. In this module, you can set and get parameters of Counter 1/2/3/4, and set trigger source, trigger mode, counter number, callback enable, and counter reset.

Table 6-6 Counter Control Parameter

Parameter Name	Description
Port	You can select Counter 1/2/3/4 .
TriggerSource	You can select a trigger source to control the output signal of the counter. RS485 Input 1/2/3/4, Input1/2/3/4/5/6/7/8, Timer 1/2/3/4/5/6/7/8, and Counter 1/2/3/4 can be selected.
TriggerMode	It includes rising edge, falling edge, and any edge.
CounterNumCfg	When the counter reaches the set value, the signal will be output.
CallBackEnable	When the function is not enabled, the signal will be output directly.

Parameter Name	Description
	<p>When you enable this function, the signal will be captured and processed via a callback function when the counter reaches the set value. This function is mostly used in the encoder-related scene for secondary development.</p> <p> Note</p> <p>The CallBackEnable and Open CounterCB in the home page should be enabled together to achieve the callback function.</p>
CounterReset	You can click Execute to recount.

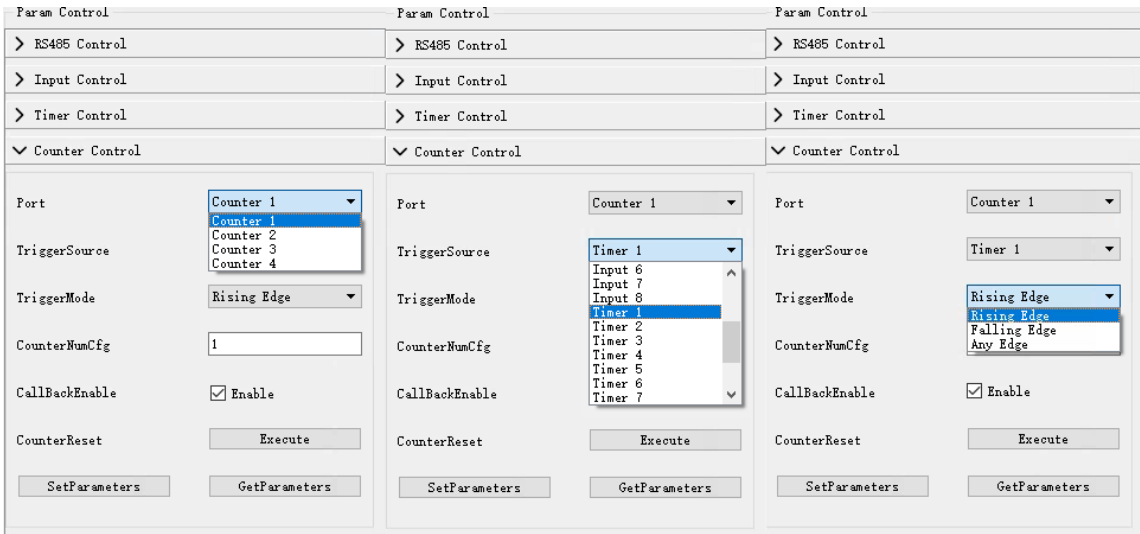


Figure 6-11 Counter Control

6.5.5 Light Source Control

You can set and get parameters of Light 1/2/3/4/5/6/7/8, and set trigger source, trigger mode, brightness, and duration time.

 **Note**

Make sure the light source is connected.

Table 6-7 Light Source Control Parameter

Parameter Name	Description
Port	You can select Light 1/2/3/4/5/6/7/8 .
TriggerSource	You can select a trigger source to turn on or turn off the light source. Off, On, RS485 Input 1/2/3/4, Input1/2/3/4/5/6/7/8, Timer 1/2/3/4/5/6/7/8, and Counter 1/2/3/4 can be selected.

Parameter Name	Description
TriggerMode	It includes rising edge, falling edge, and any edge.
Brightness	You can set the brightness of the light source. The value should be from 0 to 100.
DurationTime	You can set the duration that the current brightness is maintained during a single trigger. The unit is μ s, and the value should be from 0 to 20000000.

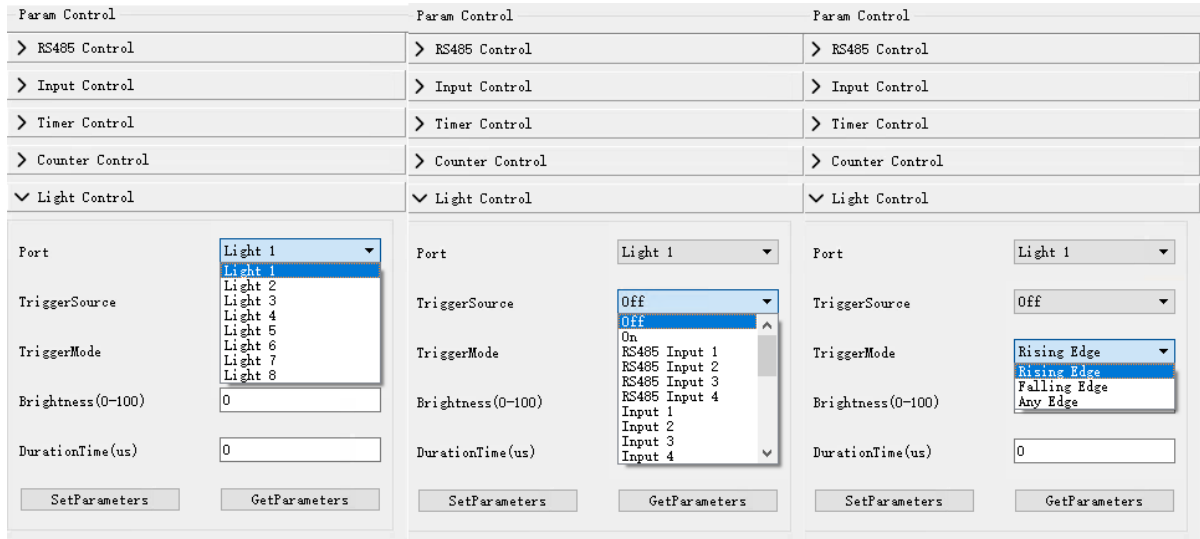


Figure 6-12 Light Source Control

6.5.6 Output Control

You can set and get parameters of Output 1 to 20, select I/O mode, and set level inverter, level value, trigger source, and polarity.

Table 6-8 Output Control Parameter

Parameter Name	Description
Port	You can select Output 1 to 20.
IOMode	Output is selected.
LevelInverter	When you select Inverter , the high level will be inverted to low level, and low level inverted to high level.
LevelValue	You can view level value via the color. Red refers to high level, and green refers to low level.
TriggerSource	You can select a trigger source from the drop-down list. Low Level, High Level, RS485 Input 1/2/3/4, Input1/2/3/4/5/6/7/8, Timer 1/2/3/4/5/6/7/8, and Counter

Parameter Name	Description
	1/2/3/4 can be selected.
Polarity	For 1 to 12, PNP and NPN can be switched. For 13 to 20, only NPN is supported for the device.

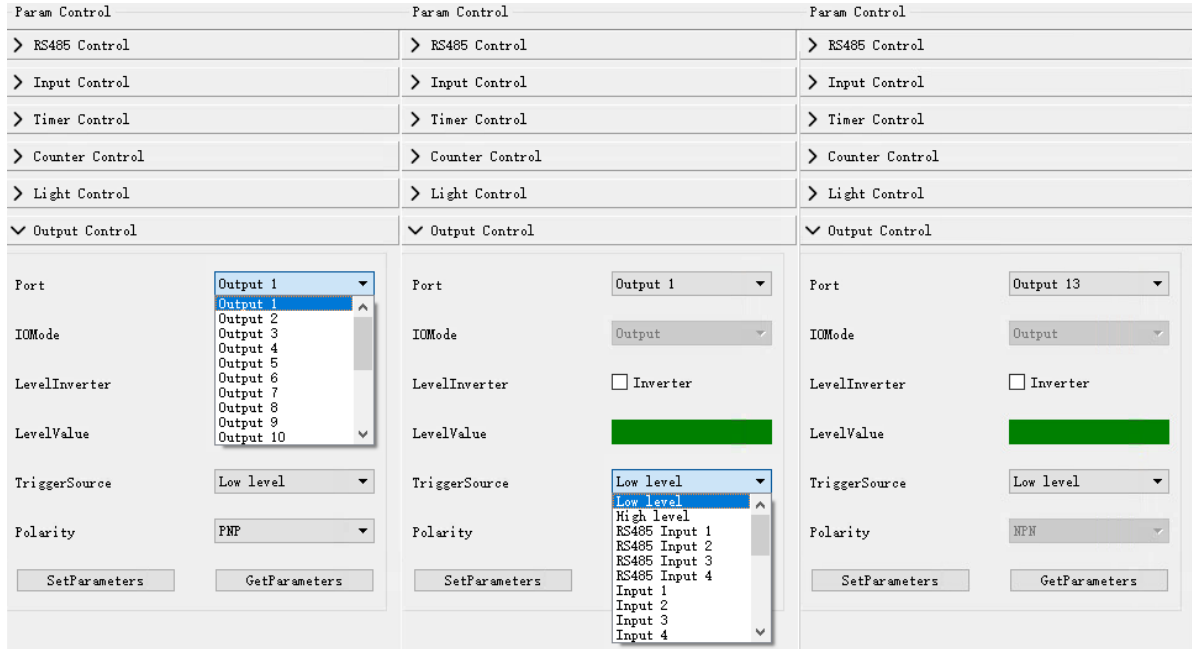


Figure 6-13 Output Control

6.5.7 Edge Information

You can set and get parameters of RS-485 Input/Output, Input/Output, Timer, and Counter.

Table 6-9 Edge Information Parameter

Parameter Name	Description
Module	You can select RS-485 Input/Output, Input/Output, Timer, and Counter .
Port	You can select RS-485 Input/Output 1 to 4, Input 1 to 8, Output 1 to 20, Timer 1 to 8, and Counter 1 to 4.
PostEdgeCount	You can view the counting of rising edge.
NegEdgeCount	You can view the counting of falling edge.
CountReset	You can click Execute to clear all edge information.

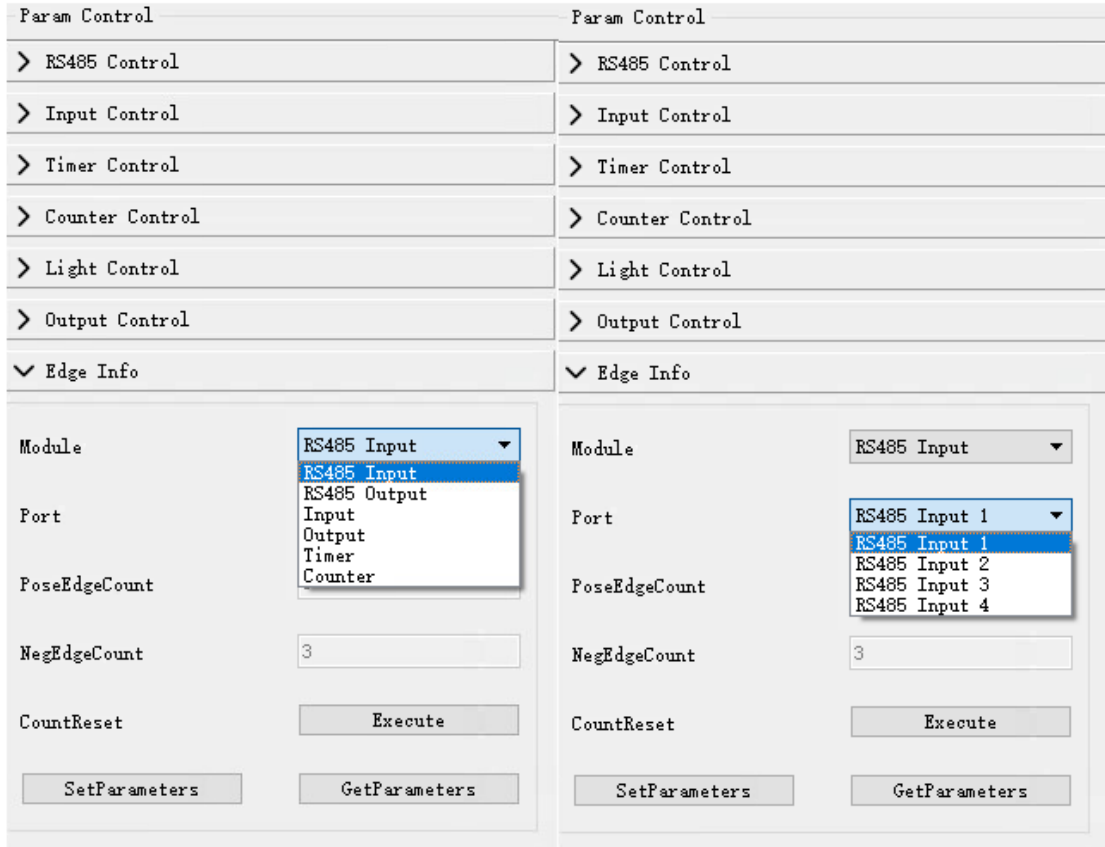


Figure 6-14 Edge Information

6.6 All Level Values

You can click **GetAll LevelValue** to get all level values of RS-485 port, input port, and output port. Red refers to the high level, and green refers to the low level.

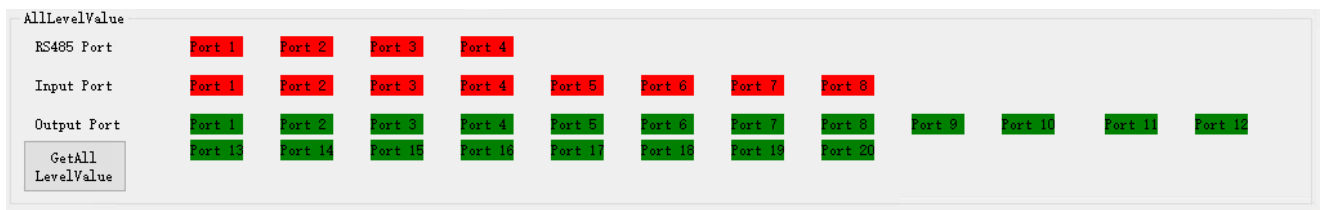


Figure 6-15 All Level Values

Chapter 7 System Reinstallation

The default system of the device is Windows 10. If the system exception occurs, or you need to use other systems, system reinstallation is required.

You can reinstall the system by connecting the USB flash drive, USB optical disk driver, mobile hard disk, etc. to the vision controller. Here we take the reinstallation via USB flash drive as an example.

Before You Start

Please contact the technical support to get WePE tool for creating a PE disk.

Note

The tool will format the USB flash drive. Please back up your files.

Steps

1. Connect the USB flash drive to the vision controller.
2. Open WePE tool, and install to the USB flash drive with the default settings.
3. Follow the two methods below to set in the BIOS.

Method 1

Steps

1. Power on the device, and press **F7** to enter **Boot Manager** window.
2. Find the USB device you used, and press **Enter** to start system reinstallation.

Method 2

Steps

1. Power on the device, and press **F2** to enter BIOS setting window.
 2. Go to **Boot** → **Change Boot Order**, and press **Enter** to enter setting list.
 3. Press **-/+** to set the used USB device as the first startup device.
 4. Press **F10 Save & Exit** to start system reinstallation.
-

Note

After system reinstallation is finished, you should set the hard disk as the first startup device.

Chapter 8 FAQ (Frequently Asked Question)

8.1 Why the monitor screen is black?

Problem

The monitor screen is black.

Solution

- Reconnect the HDMI or VGA cable.
- Reboot the device.
- After restarting the device, press **Ctrl + Alt + Delete**, and press **Delete** quickly until the screen is turned on.
- Long hold **F8** to enter the security mode after powering on, delete or uninstall the software or driver that is installed before, and then restart the device.
- Reinstall the operating system again. The default system of the device is 64-bit Windows Embedded Standard 10.

8.2 Why the system is blue screen or crashes, or frequent reboots?

Problem

The system is blue screen or crashes, or frequent reboots.

Solution

- Reboot the device.
- Long hold **F8** to enter the security mode after powering on, delete or uninstall the software or driver that is installed before, and then restart the device.
- Try to solve the problem according to the error codes and hints of blue screen.
- Reinstall the operating system again. The default system of the device is 64-bit Windows Embedded Standard 10.

8.3 Why there is no signal feedback of GPIO input and electrical level change?

Problem

There is no signal feedback of GPIO input and electrical level change.

Solution

- Check if the signal source has any edge signal trigger; check if the parameters are correctly configured (for example, filter parameter, mode configuration delay).
- If the electrical output level does not change, check if the wirings are correct (C port and G port need external power supply) and check if the parameter settings are completely enabled.
- Replace the device and check if the I/O port is burned out.

8.4 Why does the device fail to be opened again after the firmware upgrade is completed?

Problem

The device fails to be opened again after the firmware upgrade is completed

Solution

Restart the device. After the firmware is upgraded, the changes will take effect after the device is restarted.

Chapter 9 Revision History

Table 9-1 Revision History

Version	Revision Date	Revision Details
V1.0.1	Sept. 23, 2025	Edit the section 4.2 Install Device. Edit the max. total power of light interface.
V1.0.0	Dec. 5, 2024	Original version.



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Hikrobot Co., Ltd.

Tel: 400-989-7998

Website: <https://en.hikrobotics.com/>

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