

Hangzhou Hikrobot Technology Co.,Ltd.

VC3000 Series Vision Controller

User Manual

HIKROBOT

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Symbol Conventions

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

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

Available Model

This manual is applicable to the VC3000 series vision controller.

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Chapter 1 Safety Instruction

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

1.1 Safety Claim

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

1.2 Safety Instruction

Caution

- Do not install the device if it is found that the device and accessories are damaged, rusted, water ingress, model mismatch, missing parts, etc., when unpacking.
- Avoid storage and transportation in places such as water splashing and rain, direct sunlight, strong electric fields, strong magnetic fields, and strong vibrations.
- Avoid dropping, smashing or vigorously vibrating the device and its components.
- It is forbidden to install the indoor device in an environment where it may be exposed to water or other liquids. If the device is damp, it may cause fire and electric shock hazard.
- Place the device in a place out of direct sunlight and ventilation, away from heat sources such as heaters and radiators.
- 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.
- Caution: If the device has battery, risk of explosion if battery is replaced by an incorrect type. Dispose of used batteries according to the instructions.
- Please dispose of the device in strict accordance with the relevant national or regional regulations and standards to avoid environmental pollution and property damage.

Note

- Check whether the device's package is in good condition, whether there is damage, intrusion, moisture, deformation, etc. before unpacking.
- Check the surface of the device and accessories for damage, rust, bumps, etc. when unpacking.
- Check whether the quantity and information of the device and accessories are complete after unpacking.
- Store and transport the device according to the storage and transport conditions of the device, and the storage temperature and humidity should meet the requirements.
- It is strictly prohibited to transport the device in combination with items that may affect or damage the device.
- Quality requirements for installation and maintenance personnel:
 - Qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills.
 - The basic knowledge and operation skills of low voltage wiring and low voltage electronic circuit connection.
 - The ability to comprehend the contents of this manual.
- Please read the manual and safety instructions carefully before installing the device.
- Please install the device strictly according to the installation method in this manual.
- The case of the device may be overheated, and it needs to be powered off for half an hour before it can be touched.
- The device should not be placed with exposed flame sources, such as lighted candles.

1.3 Electromagnetic Interference Prevention

- Make sure that the shielding layer of cables is intact and 360° connected to the metal connector when using shielded cables.
- Do not route the device together with other equipment (especially servo motors, high-power devices, etc.), and control the distance between cables to more than 10 cm. Make sure to shield the cables if unavoidable.
- The control cable of the device and the power cable of the industrial light source must be wired separately to avoid bundled wiring.
- The power cable, data cable, signal cable, etc. of the device must be wired separately. Make sure to ground them if the wiring groove is used to separate the wiring and the wiring groove is metal.
- During the wiring process, evaluate the wiring space reasonably, and do not pull the cables hard, so as not to damage the electrical performance of the cables.
- If the device is powered on and off frequently, it is necessary to strengthen the voltage isolation, and consider adding a DC/DC isolation power supply module between the device and the adapter.
- Use the power adapter to supply power to the device separately. If centralized power supply is necessary, make sure to use a DC filter to filter the power supply of the device separately before use.
- The unused cables of the device must be insulated.
- When installing the device, if you cannot ensure that the device itself and all equipment connected to the device are well grounded, you should isolate the device with an insulating bracket.
- To avoid the accumulation of static electricity, ensure that other equipment (such as machines, internal components, etc.) and metal brackets on site are properly grounded.
- 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 VC3000 series vision controller adopts high performance CPU and supports multiple-channel GPIO. It has multiple interfaces like GigE, USB 2.0, and USB 3.0. For some models, the vision controller can be installed with additional light source and IO extended modules. It is applicable to consumer electronics, food and pharmaceutical, transportation, and so on.

2.2 Key Feature

- Adopts Intel® CPU to offer strong performance.
- Provides expansion slot to connect with image frame grabbers.
- Supports multiple-channel GPIO and NPN/PNP switching for output.
- Adopts GigE interfaces for stable data transmission.
- Built-in USB interface for on-site maintenance is optional.
- Light source and IO extended modules are optional.

Note

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

Chapter 3 Appearance

3.1 Main Module Appearance

Currently, the device has two types of appearance as shown below.

- Type I device: The type I device model name ends with letter P, e.g., MV-VC310*P.
- Type II device: The type II device model name ends with letter H, e.g., MV-VC310*H.
- Type III device: The type III device model name ends with letter X, e.g., MV-VC310*X.

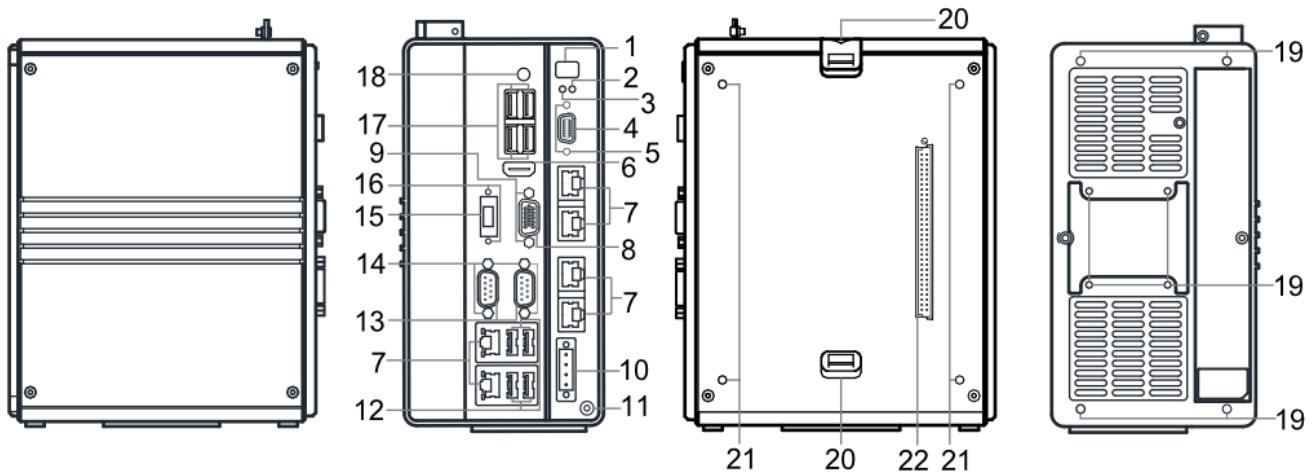


Figure 3-1 Main Module Appearance (Type I Device)

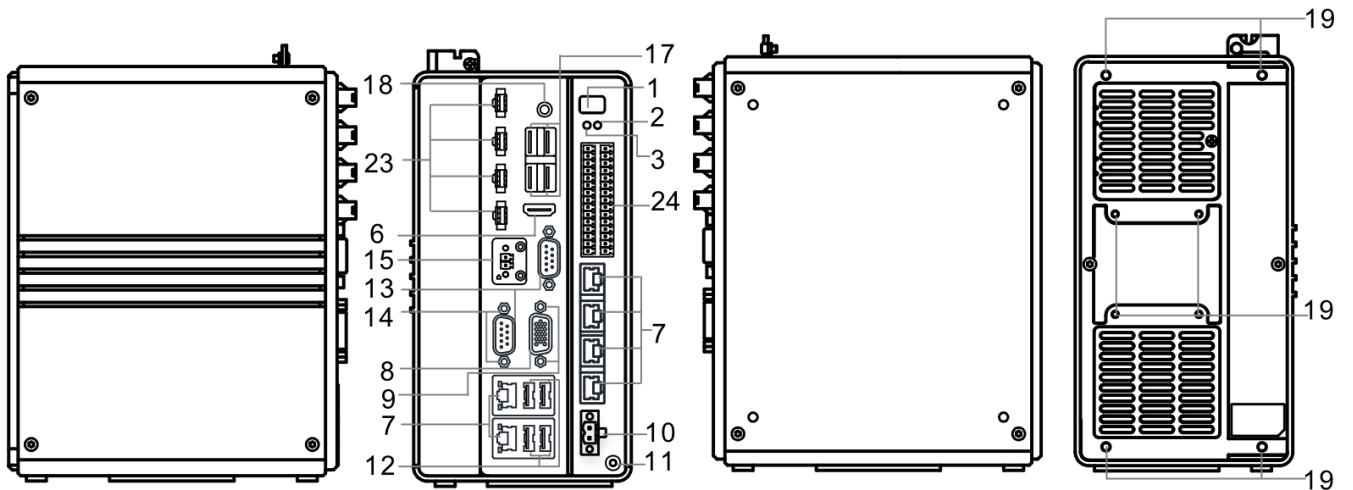


Figure 3-2 Main Module Appearance (Type II Device)

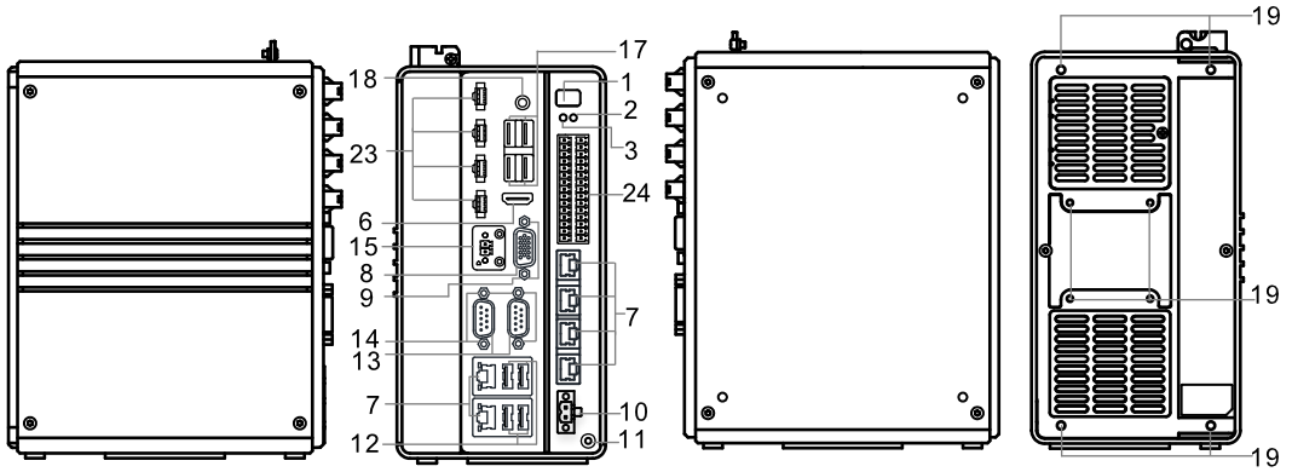





Figure 3-3 Main Module Appearance (Type III Device)

Table 3-1 Main Module Appearance Description

No.	Name	Description
1	Power	It is used to power on/off the device. Press it shortly to power on the device, and long press it for 4 s to power off.
2	Power Indicator	It indicates device power status. The indicator is solid green when the device is switched on.
3	HDD Indicator	It indicates HDD status. The indicator is flashing red when the HDD reads and writes data.
4	GPIO Interface	It provides input and output function. Note Only the type I device has GPIO interface.
5	Screw Hole for GPIO Interface	It is used to fix GPIO interface. Note Only the type I device has the screw hole for GPIO interface.
6	HDMI Interface	It is used to transmit audio and video signals.
7	GigE Interface	It is used to transmit network signal.
8	VGA Interface	It is used to transmit video signal.
9	Screw Hole for VGA Interface	It is used to fix VGA interface.
10	Power Interface	It provides power supply.
11	GND Hole	It is used to connect ground wire.

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No.	Name	Description
12	USB 2.0 Interface	It is used to connect USB flash drive, portable HDD, etc.  Note The max. loading of a single USB2.0 interface is 2.5 W, and the total loading of USB2.0 interfaces is 2.5 W.
13	Serial Port	It is used for serial communication.
14	Screw Hole for Serial Port	It is used to fix serial port.
15	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 4 seconds to power off.
16	Screw Hole for Remote Switch Interface	It is used to fix remote switch interface.
17	USB 3.0 Interface	It is used to connect USB flash drive, portable HDD, etc.
18	Audio Interface	It is used to transmit audio signal.
19	Screw Hole	It is used to fix the device, and you should use M3 or M4 screw.
20	Snap Fit Component	It is used to connect extended module.
21	Connection Hole	It is used to connect main module with extended module.
22	Connection Plug	It is used to connect the plug of extended module.
23	Light Interface	It is used to connect the industrial light source.  Note Only type I and type III devices have the light interface.
24	IO Interface	 Note Only type I and type III devices have the IO interface.

Note

For Type I and Type II devices that support PoE:

- The maximum load of PoE single-port is 15 W, and the total load is 20 W.
 - If the CPU is fully loaded, the total load of the PoE and USB interfaces cannot exceed 37 W. If all interfaces need to be fully loaded, it is recommended to use the adapter with an output power of more than 160 W.
-

3.2 Extended Module Appearance

For some models, the device can be installed with light source and IO extended modules.

Note

- Type II and type III devices do not support installing the extended module.
- Up to two light source extended modules or two IO extended modules can be installed to the device at the same time.

3.2.1 Light Source Extended Module

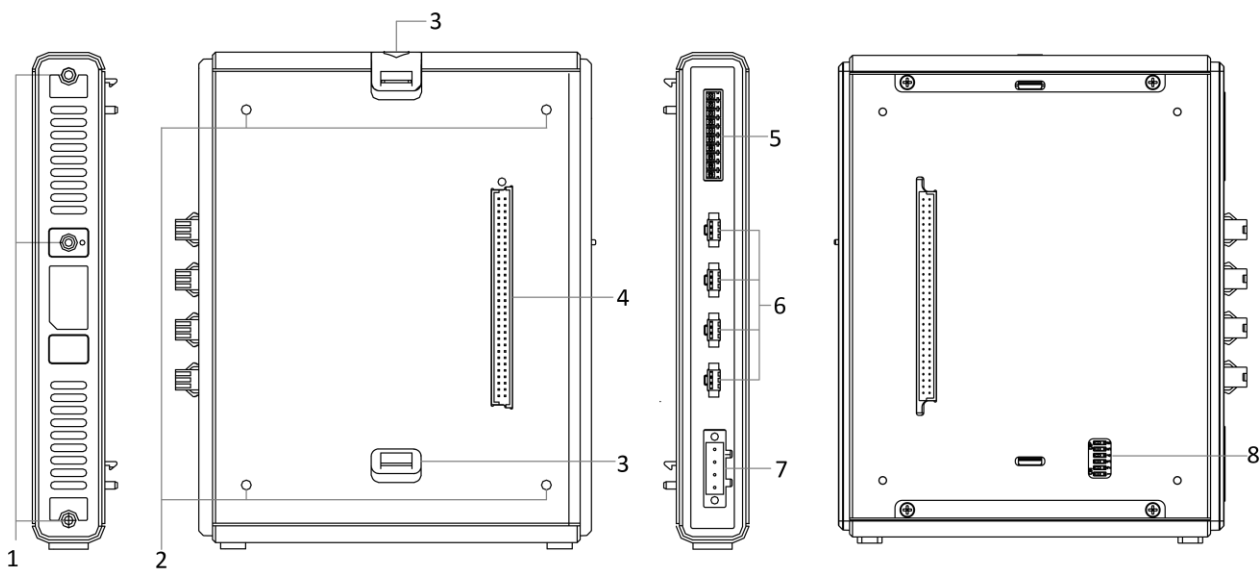


Figure 3-4 Light Source Extended Module Appearance

Table 3-2 Appearance Description of Light Source Extended Module

No.	Name	Description
1	Screw Hole	It is used to fix the extended module, and you should use M3 or M4 screw.
2	Connection Hole	It is used to connect with the main module or another extended module.
3	Snap Fit Component	It is used to connect another extended module.
4	Connection Plug	It is used to connect the plug of extended module.
5	Light Source Trigger Interface	It is used to trigger external devices via this interface.
6	Light Source Interface	It is used to connect light source.

No.	Name	Description
7	Power Interface	It provides power supply for light source extended module.
8	DIP Switch	<p>It is used to switch the serial port No. The serial port No. ranges from COM 11 to COM 12, and the corresponding DIP switch No. is from 5 to 6.</p> <p>Note</p> <p>If you have multiple extended modules, the DIP switch takes effect only when you set 1 DIP switch No. to ON of each module, and the ON DIP switch No. is different among modules.</p>

3.2.2 IO Extended Module

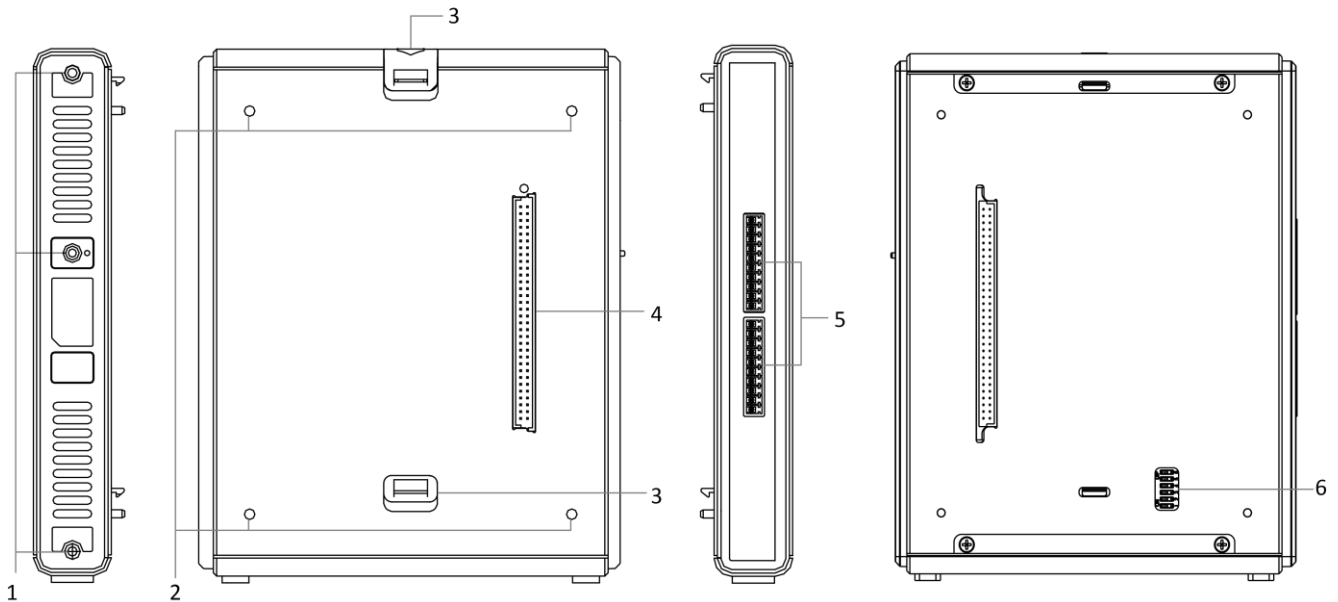



Figure 3-5 IO Extended Module Appearance

Table 3-3 Appearance Description of IO Extended Module

No.	Name	Description
1	Screw Hole	It is used to fix the extended module, and you should use M3 or M4 screw.
2	Connection Hole	It is used to connect with the main module or another extended module.
3	Snap Fit Component	It is used to connect another extended module.


No.	Name	Description
4	Connection Plug	It is used to connect the plug of extended module.
5	GPIO Interface	It provides input and output function.
6	DIP Switch	<p>It is used to switch the serial port No. The serial port No. ranges from COM 11 to COM 12, and the corresponding DIP switch No. is from 5 to 6.</p> <p> Note</p> <p>If you have multiple extended modules, the DIP switch takes effect only when you set 1 DIP switch No. to ON of each module, and the ON DIP switch No. is different among modules.</p>

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	1	It refers to the suitable power adapter that is included in the package.  Note Device models of MV-VC350*X and MV-VC370*X do not have power adapter in the package.
2	GPIO Cable	1	It refers to the supplied GPIO cable of main module that is included in the package.
3	Mount Plate	1 to 2	It is used to fix device and other mechanical structures, and you need to purchase it separately.
4	Bracket	1	It is used to mount the mount plate, and you need to purchase it separately.
5	Screws	Several	They are used to fix the device, and are included in the package.
6	Light Source Extended Module (Optional)	1 to 2	You need to purchase it separately.
7	IO Extended Module (Optional)	1 to 2	You need to purchase it separately.

4.2 Install Main Module

Note

The images below are for reference only.

It is easy to install the main module, and you can install it vertically or horizontally according to actual demands.

Before You Start

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

4.2.1 Vertical Mounted

Steps

1. Use four M4 screws to vertically mount the main module to the mount plate.
2. Fix the main module to other mechanical structures via the mount plate.

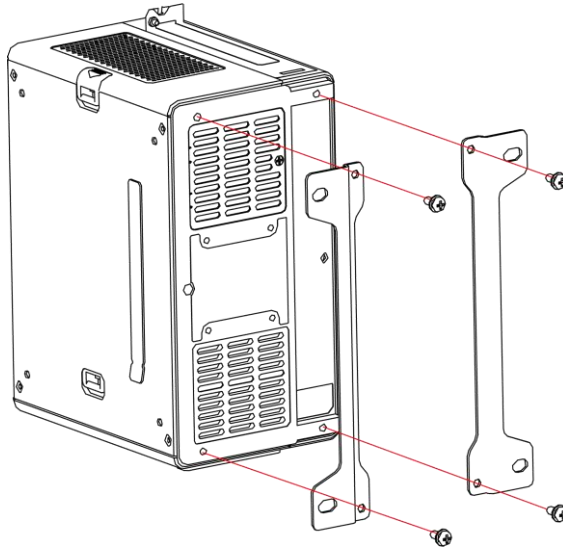


Figure 4-1 Vertical Mounting of Main Module

4.2.2 Horizontal Mounted

Steps

1. Use four M3 screws to horizontally mount the main module to the mount plate.
2. Fix the main module to other mechanical structures via the bracket.

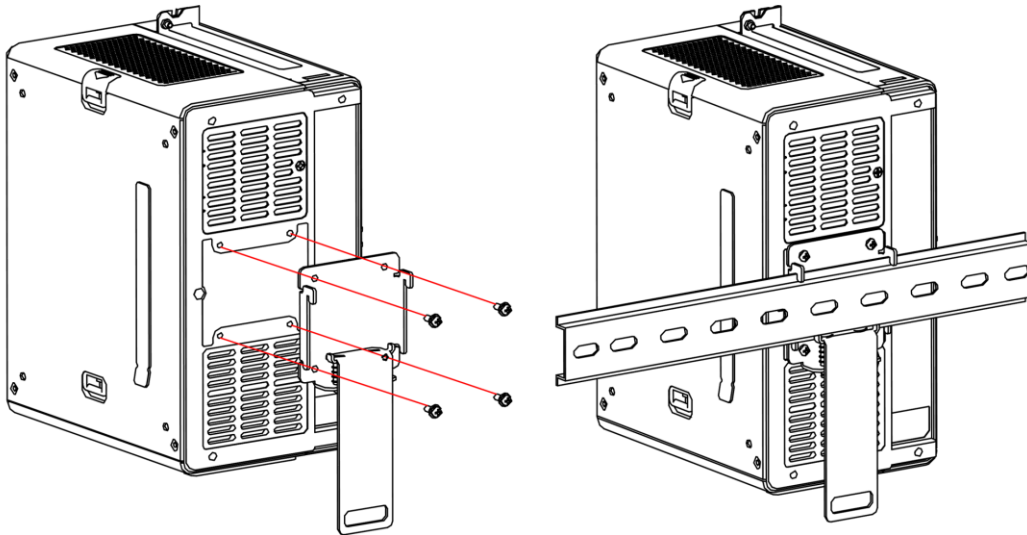


Figure 4-2 Horizontal Mounting of Main Module

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 machine. Securely fix the device and add cushioning materials (such as foam or silicone) between the device and the contact surface.

4.3 Install Extended Module

Note

The type II device does not support installing the extended module.

Before You Start

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

Steps

1. Install the extended module to the main module.
-

Note

Make sure the corresponding parts of the main module are correctly connected with those of extended module.

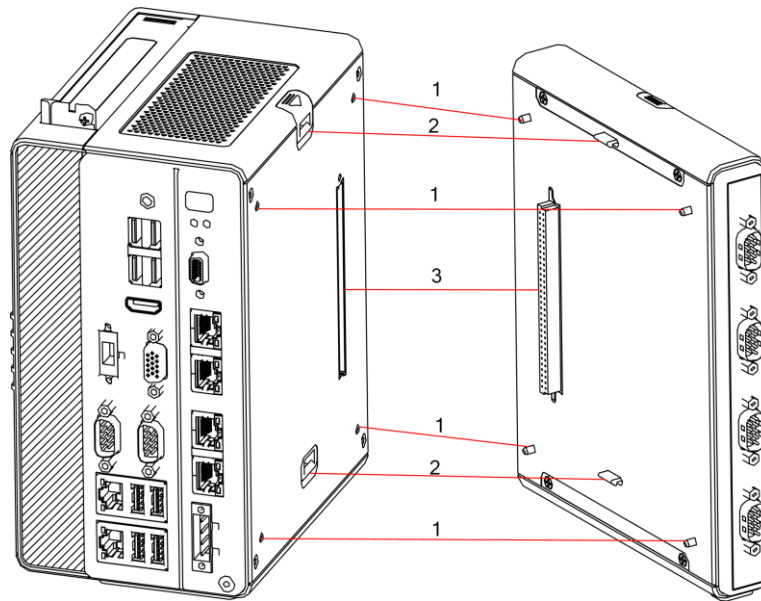


Figure 4-3 Install Extended Module to Main Module

2. Fix the device to the mount plate.
 - Use four M4 screws to vertically mount the device to the mount plate.
 - Use five M3 screws to horizontally mount the device to the mount plate.
3. Fix the device to other mechanical structures via the mount plate or bracket.

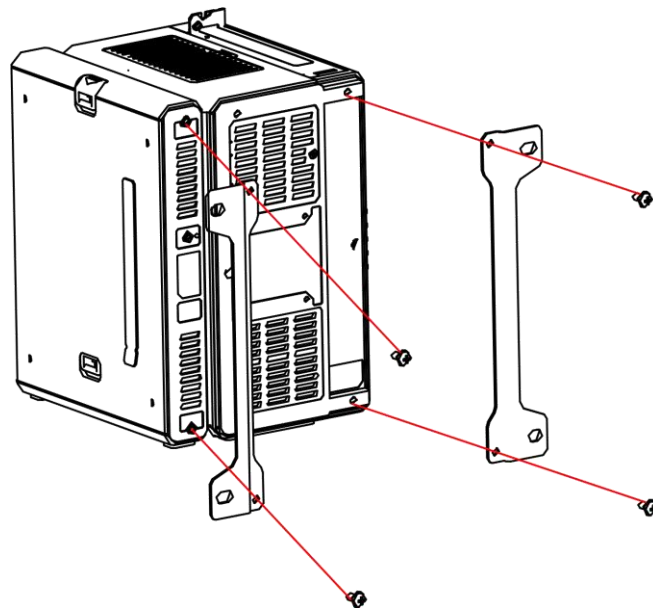


Figure 4-4 Vertical Installation

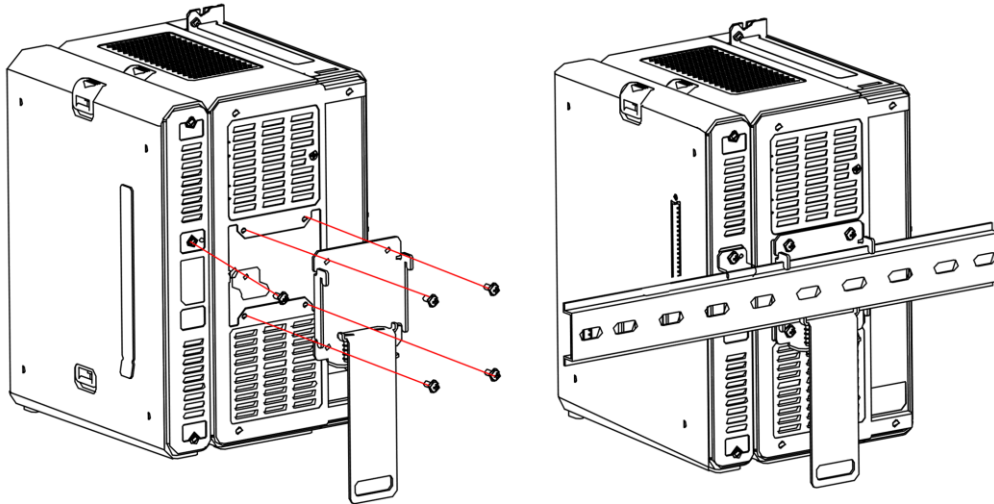


Figure 4-5 Horizontal Installation

4.4 Access to Device

You can operate the device on the monitor by connecting them via HDMI or VGA cable. 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 Main Module Interface

5.1.1 Power Interface

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

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.

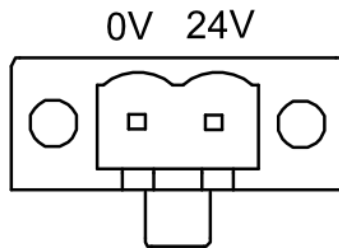


Figure 5-1 2-Pin Power Interface

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

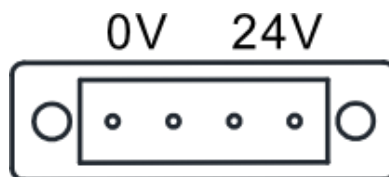


Figure 5-2 4-Pin Power Interface

5.1.2 IO Interface

The main module supports multiple-channel IO and NPN/PNP switching for output. Currently, there are two types of IO interfaces, including 11-channel GPIO and 24-channel IO.

11-Channel GPIO Interface

For the device with 11-channel GPIO interface, you need to use following GPIO cable.

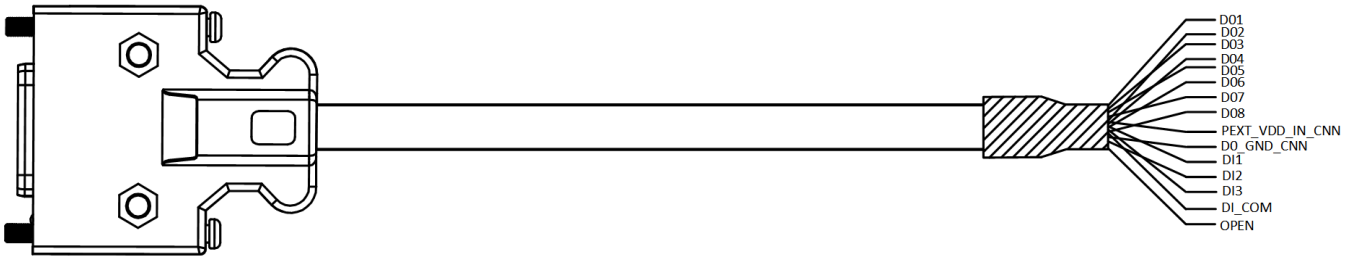


Figure 5-3 11-Channel GPIO Cable

The device's GPIO Interface has 15 pins, and you can refer to the following table for pin definitions.

Note

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

Table 5-1 Pin Definitions of 11-Channel GPIO Interface

Type	Name	Description	Cable Color
Opto-isolated Input	DI 1	Opto-isolated input 1	Red/White
	DI 2	Opto-isolated input 2	Green/White
	DI 3	Opto-isolated input 3	Green
	DI_COM	Opto-isolated input signal ground	Blue
Opto-isolated Output	DO 1	Opto-isolated output 1	Purple
	DO 2	Opto-isolated output 2	Black
	DO 3	Opto-isolated output 3	Gray
	DO 4	Opto-isolated output 4	Brown
	DO 5	Opto-isolated output 5	White
	DO 6	Opto-isolated output 6	Red
	DO 7	Opto-isolated output 7	Pink/Red
	DO 8	Opto-isolated output 8	Orange/White

Type	Name	Description	Cable Color
	PEXT_VDD_IN_CNN	Opto-isolated output external power +	Orange
	DO_GND_CNN	Opto-isolated output external power -	Yellow
External	OPEN	GND	--

24-Channel IO Interface

The image and pin definitions of the 24-channel IO interface are shown below.

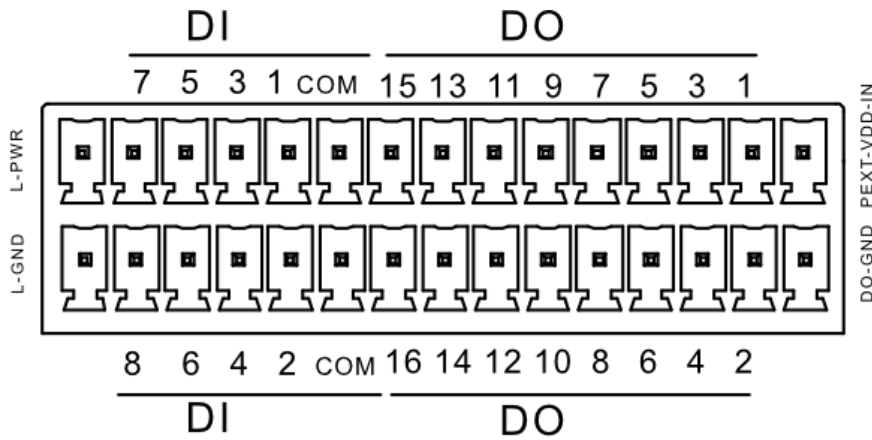


Figure 5-4 24-Channel IO Interface

Table 5-2 Pin Definitions of 24-Channel IO Interface

Type	Name	Description	Name	Description
Opto-isolated Input	DI 1	Opto-isolated input 1	DI 6	Opto-isolated input 6
	DI 2	Opto-isolated input 2	DI 7	Opto-isolated input 7
	DI 3	Opto-isolated input 3	DI 8	Opto-isolated input 8
	DI 4	Opto-isolated input 4	DI_COM	Input common port (without polarity)
	DI 5	Opto-isolated input 5	DI_COM	Input common port (without polarity)
Opto-isolated Output	DO 1	Opto-isolated output 1	DO 10	Opto-isolated output 10
	DO 2	Opto-isolated output 2	DO 11	Opto-isolated output 11
	DO 3	Opto-isolated output 3	DO 12	Opto-isolated output 12
	DO 4	Opto-isolated output 4	DO 13	Opto-isolated output 13

Type	Name	Description	Name	Description
	DO 5	Opto-isolated output 5	DO 14	Opto-isolated output 14
	DO 6	Opto-isolated output 6	DO 15	Opto-isolated output 15
	DO 7	Opto-isolated output 7	DO 16	Opto-isolated output 16
	DO 8	Opto-isolated output 8	PEXT_VD D_IN	Opto-isolated output external power +
	DO 9	Opto-isolated output 9	DO_GND	Opto-isolated output external power -
Light Source Power Supply	L_PWR	Light source power supply +	L_GND	Light source power supply -

 **Note**

The power of light source is 80 W. It is recommended that the current carrying capacity of the power supply cable should be $\geq 3.5 \text{ A @}24 \text{ V}$.

Opto-Isolated Input Wiring

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

- When the input electrical level type is high electrical level, the voltage range is from 4 V to 24 V.
- When the input electrical level type is low electrical level, the voltage range is from 0 V to 3 V.

 **Note**

- It is recommended that the drive input current should be $\geq 5 \text{ mA}$.
- Here we take 11-channel GPIO interface as an example for introducing opto-isolated input wiring.
- Wiring may differ when connecting the main module to different types of external devices.
- You can design circuit diagram for other external devices according to the diagrams below.
- The type II device must be connected to pull-down resistor and pull-up resistor when connecting to external devices, while the type I device is optional.

PNP Device

When connecting the main module to PNP device, the wiring is shown below if the resistor is not used.

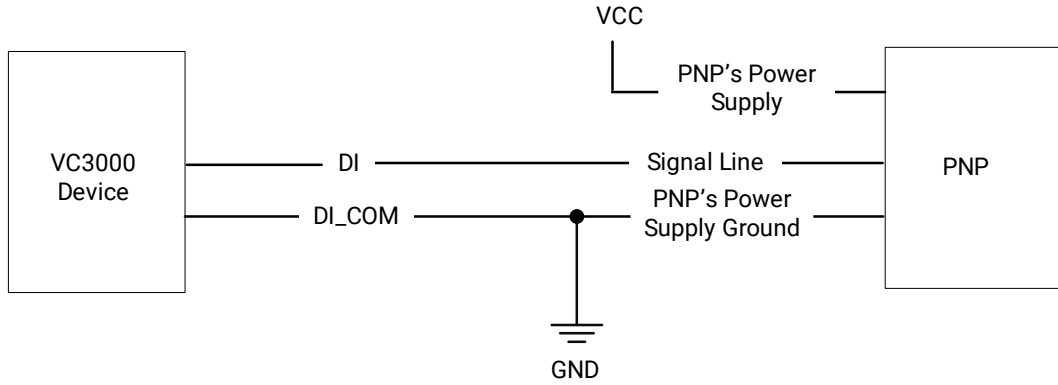


Figure 5-5 Connect to PNP Device without Resistor

When connecting the main module to PNP device, the wiring is shown below if 4.7 kΩ pull-down resistor is used.

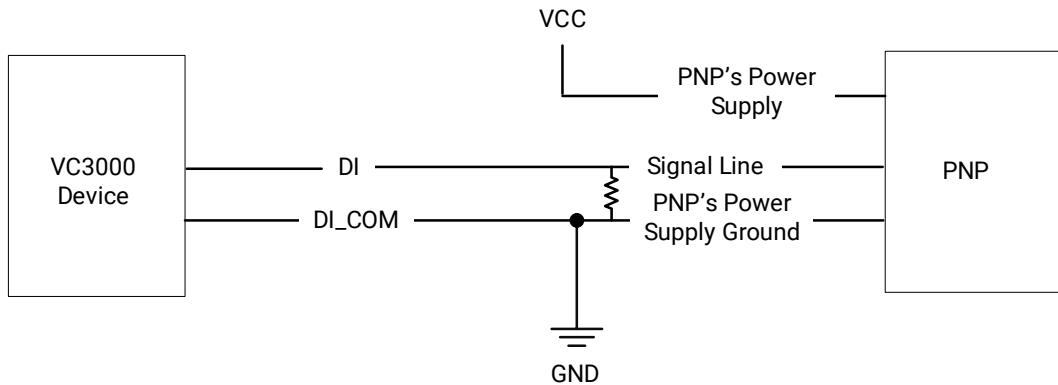


Figure 5-6 Connect to PNP Device with Resistor

NPN Device

When connecting the main module to NPN device, the wiring is shown below if the resistor is not used.

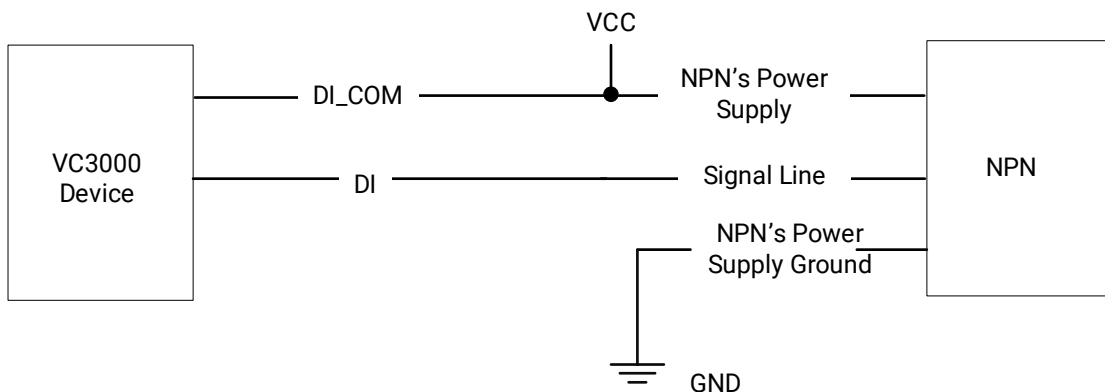


Figure 5-7 Connect to NPN Device without Resistor

When connecting the main module to NPN device, the wiring is shown below if 4.7 k Ω pull-up resistor is used.

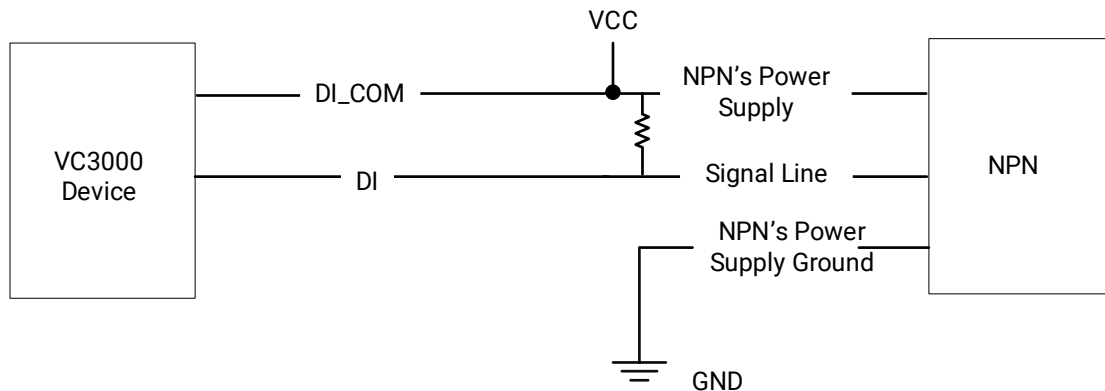


Figure 5-8 Connect to NPN Device with Resistor

Opto-Isolated Output Wiring

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

Note

When the main module's output connects external devices, the voltage range of EXT is from 7 V to 24 V, and the output current of each pin cannot be larger than 40 mA.

- When the output electrical level type is high electrical level, the voltage range is from EXT-0.3 V to EXT voltage value.
- When the output electrical level type is low electrical level, the voltage range is from 0 V to 0.4 V.

Note

- When the main module'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.

External Load

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

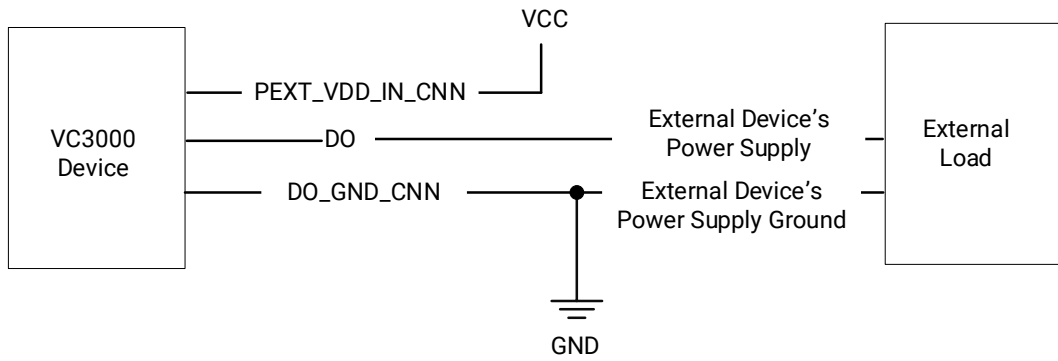


Figure 5-9 PNP Output Connecting External Load

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

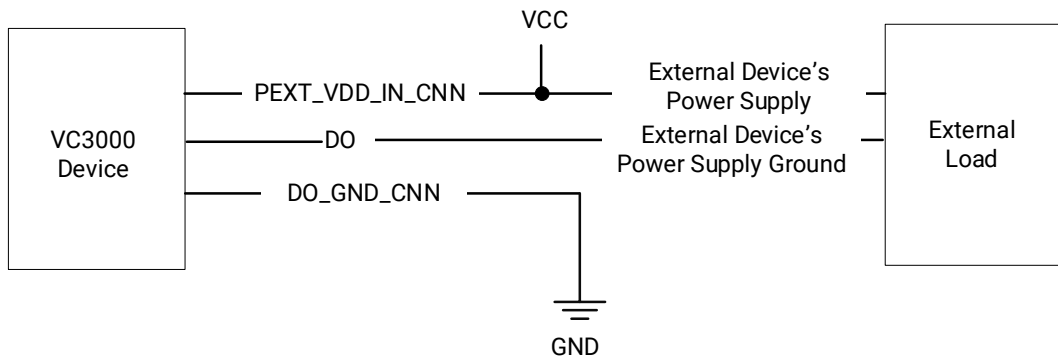


Figure 5-10 NPN Output Connecting External Load

PLC

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

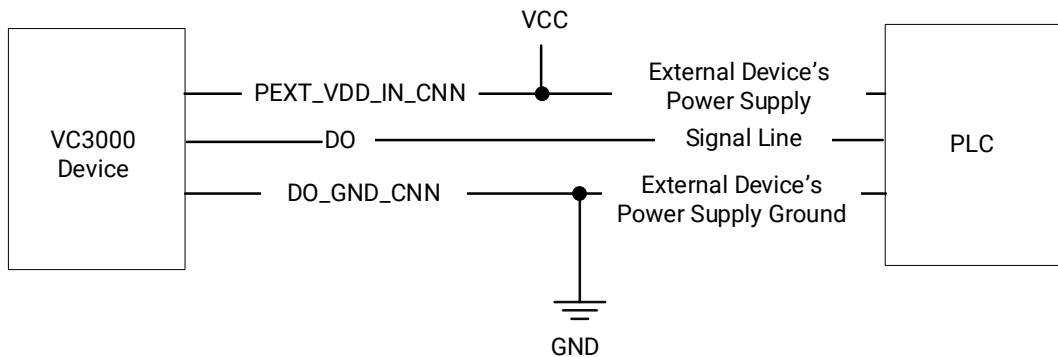


Figure 5-11 Connect to PLC

5.1.3 Built-in USB Interface

The main module has one built-in USB2.0 interface for installing dongle or USB flash disk. The location of built-in USB interface is shown below, and you can use a screwdriver to remove the panel.

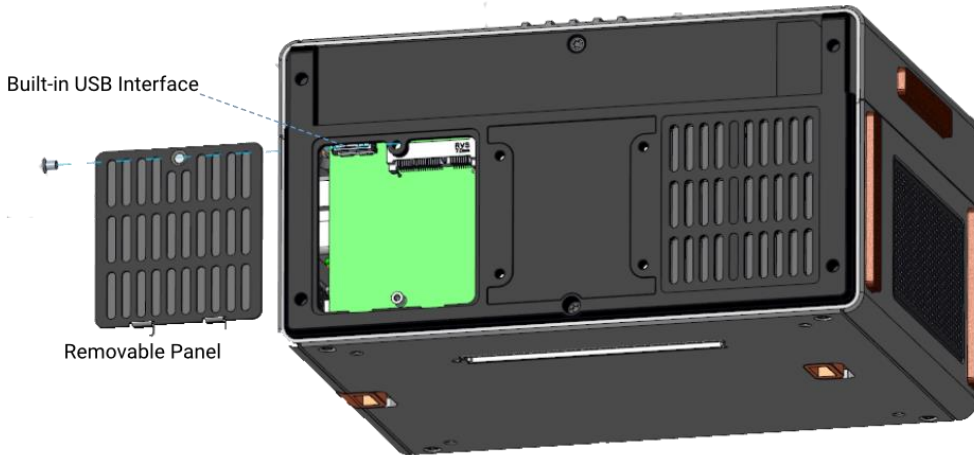


Figure 5-12 Built-in USB Interface

5.1.4 mSATA Interface

The main module has one built-in mSATA interface for connecting the solid state disk. The location of the interface is shown below, and you can use a screwdriver to remove the panel.

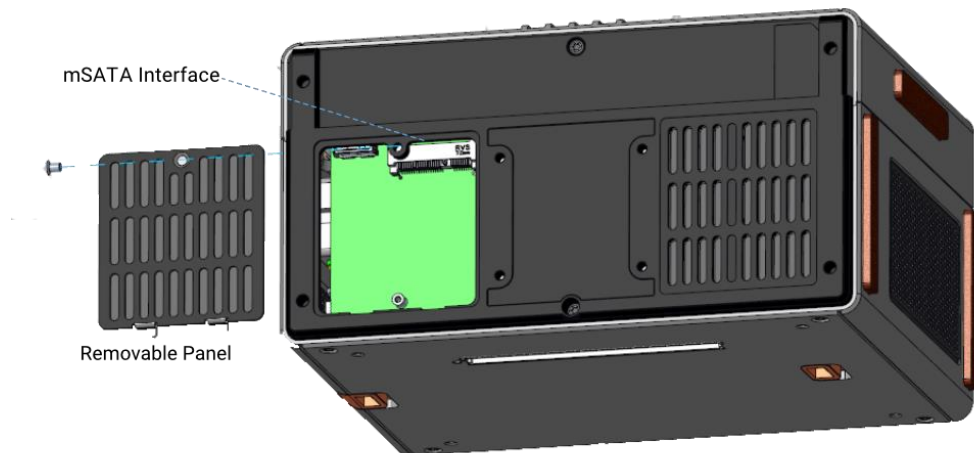


Figure 5-13 mSATA Interface

5.1.5 Extended Slot

The main module has a PCIe extended slot that is used to connect frame grabber, graphics card, or motion card, etc.

Note

The extended slot may differ by device model, and the actual product you purchased shall prevail.

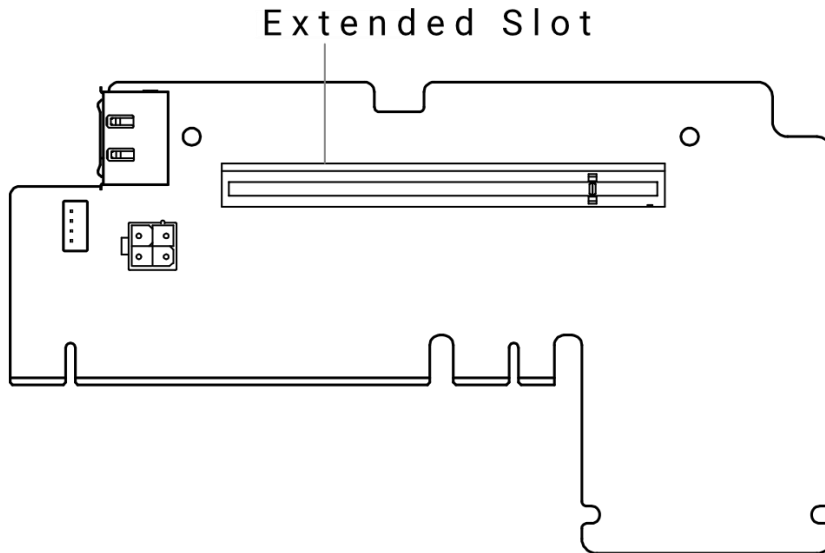


Figure 5-14 Extended Slot (Type I and Type II Devices)

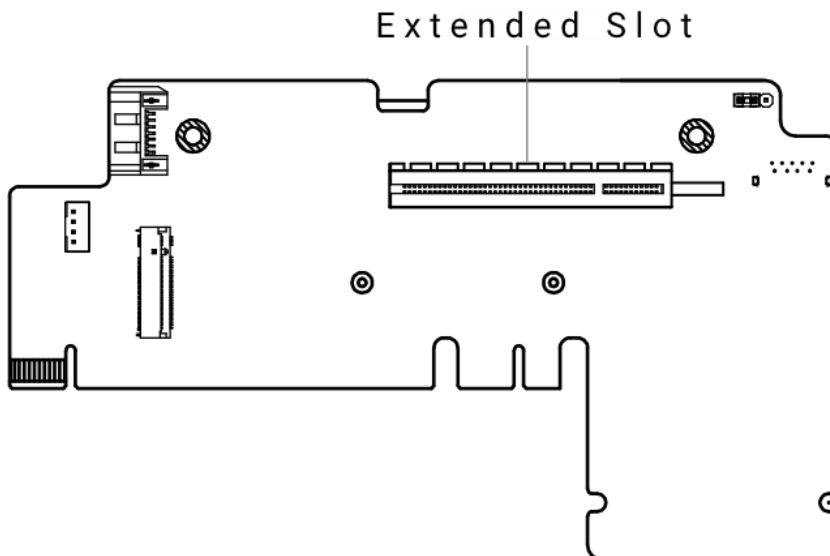


Figure 5-15 Extended Slot (Type III Device)

5.1.6 Serial Port

The main module has 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.

Note

- Only some device models support configuring RS-232 to RS-485 or RS-422. Refer to the device's specifications for details.
- Serial port corresponds to COM 1 and COM 2 in the default operating system.

Steps

1. Press **DELETE** to enter BIOS setting window after powering on the device.
2. Go to **Chipset** → **Super IO Configuration** → **Serial Port 1 Configuration**.
3. Set **Serial Mode** to **RS232**, **RS485 HALF**, or **RS485/422 FULL** according to actual demands.

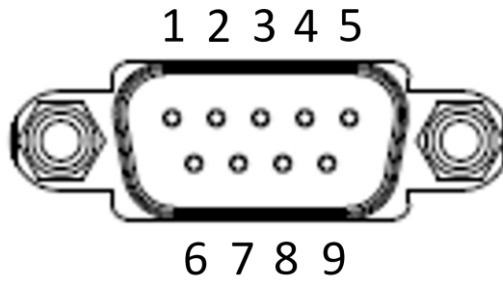


Figure 5-16 Serial Port

Table 5-3 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 5-4 RS-485 Pin Definitions

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

Table 5-5 RS-422 Pin Definitions

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

5.1.7 Memory Slot

The main module has two memory slots, and it is inserted with a 8 GB memory ram by default. You can add extra memory ram according to actual demands.

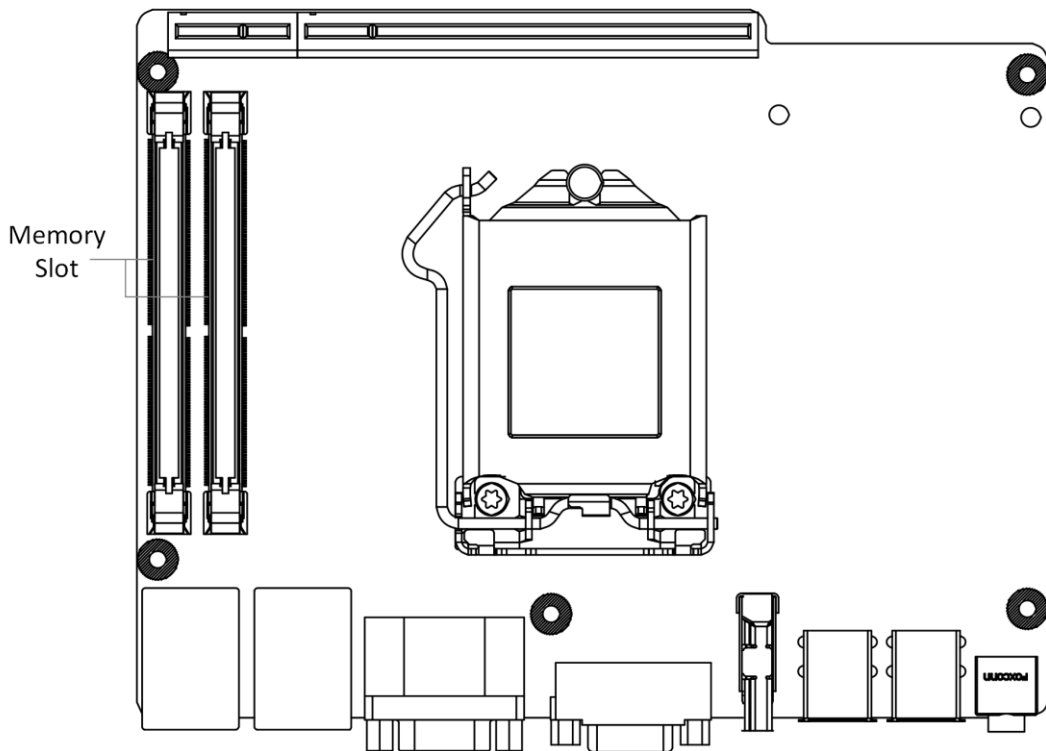


Figure 5-17 Memory Slot (Type I Device)

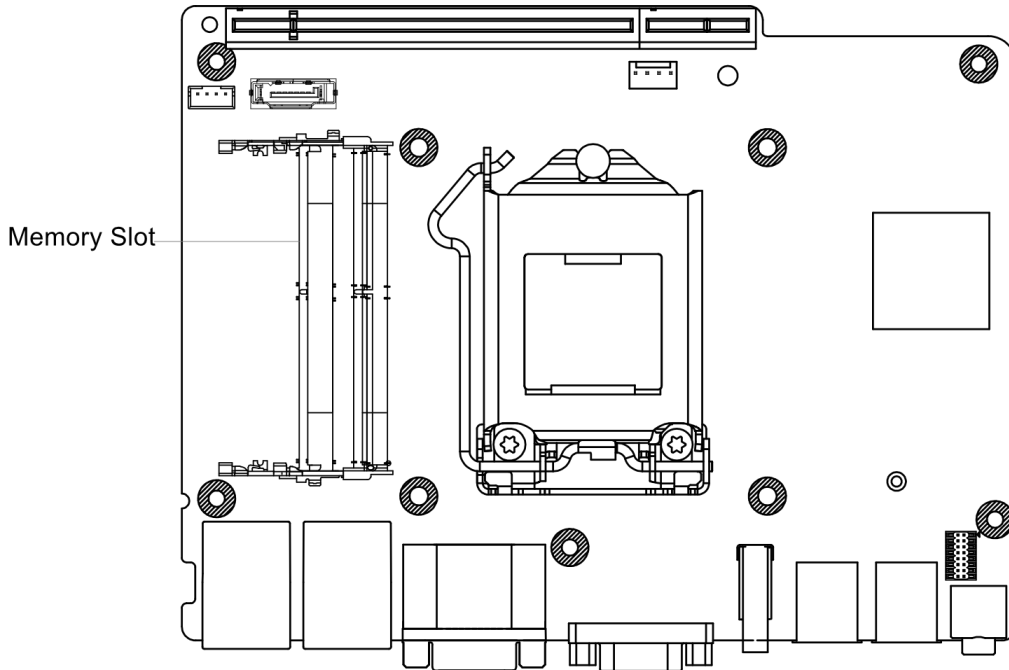


Figure 5-18 Memory Slot (Type II and Type III Devices)

5.2 Extended Module Interface

5.2.1 Light Source Extended Module Interface

The light source extended module provides light source trigger interface, and different external devices can control the light source via this trigger interface and SDK or Demo.

Note

Wiring may differ when using different external devices to control the light source trigger interface.

Switch

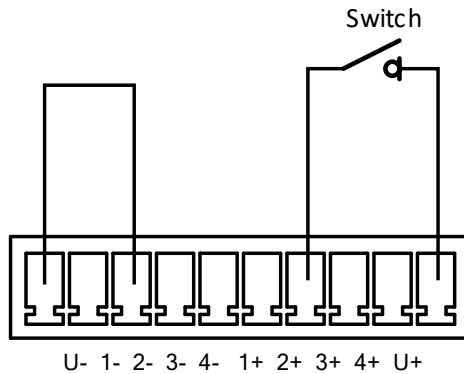


Figure 5-19 Switch Controlling Light Source

PNP Device

If PNP device is used to control the light source trigger interface, it is recommended to use 4.7 k Ω pull-down resistor.

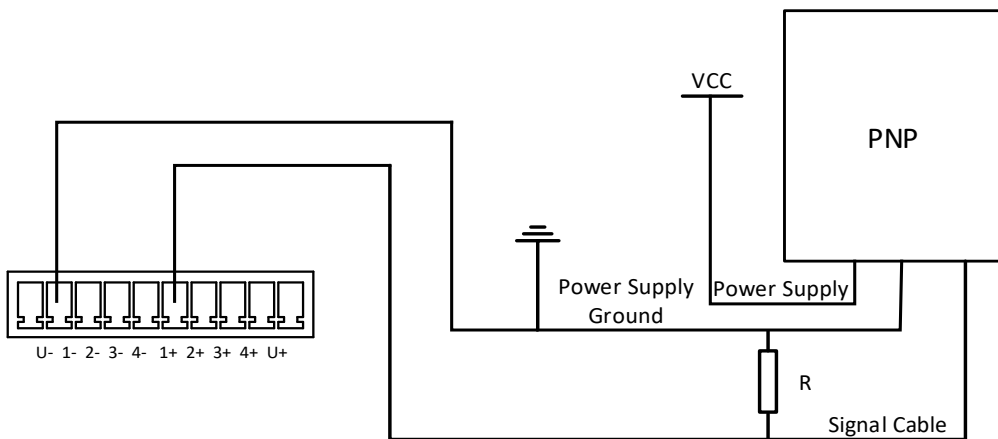


Figure 5-20 PNP Device Controlling Light Source

NPN Device

If NPN device is used to control the light source trigger interface, it is recommended to use 4.7 k Ω pull-up resistor.

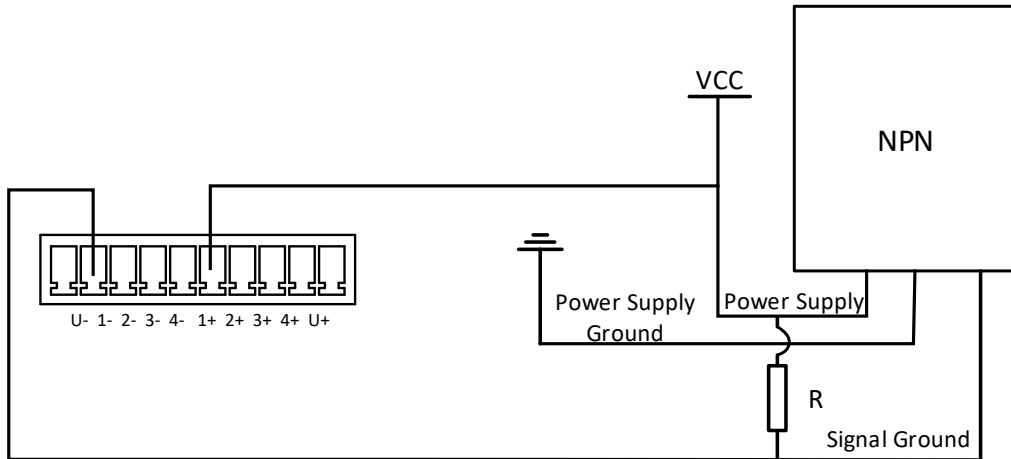


Figure 5-21 NPN Device Controlling Light Source

Note

The type II device must be connected to pull-down resistor and pull-up resistor when connecting to external devices, while the type I device is optional.

5.2.2 IO Extended Module Interface

The IO extended module supports 16-channel GPIO and NPN/PNP switching for output. The GPIO interface has 20 pins, and you can refer to the following table for pin definitions.

Table 5-6 Pin Definitions of GPIO Interface

Name	Description	Name	Description
DI 1	Opto-isolated input 1	DO 1	Opto-isolated output 1
DI 2	Opto-isolated input 2	DO 2	Opto-isolated output 2
DI 3	Opto-isolated input 3	DO 3	Opto-isolated output 3
DI 4	Opto-isolated input 4	DO 4	Opto-isolated output 4
DI 5	Opto-isolated input 5	DO 5	Opto-isolated output 5
DI 6	Opto-isolated input 6	DO 6	Opto-isolated output 6
DI 7	Opto-isolated input 7	DO 7	Opto-isolated output 7
DI 8	Opto-isolated input 8	DO 8	Opto-isolated output 8
DI_COM	Opto-isolated input signal ground	DO_G	Opto-isolated output signal ground
DI_COM	Opto-isolated input signal ground	DO_EXT	Opto-isolated output external interface

Opto-Isolated Input Wiring

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

- When the input electrical level type is high electrical level, the voltage range is from 4 V to 24 V.
- When the input electrical level type is low electrical level, the voltage range is from 0 V to 3 V.

Note

- It is recommended that the drive input current should be ≥ 5 mA.
- Wiring may differ when connecting the GPIO interface of IO extended module to different types of external devices.
- You can design circuit diagram for other external devices according to the diagrams below.

PNP Device

When connecting the main module to PNP device, the wiring is shown below if the resistor is not used.

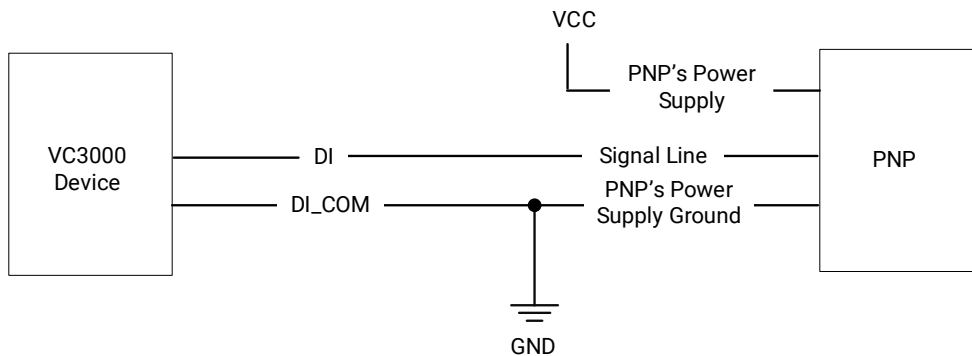


Figure 5-22 Connect to PNP Device without Resistor

When connecting the main module to PNP device, the wiring is shown below if 4.7 k Ω pull-down resistor is used.

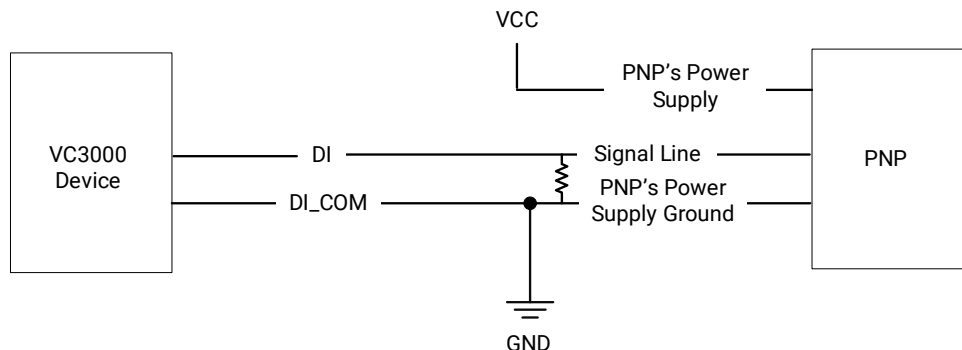


Figure 5-23 Connect to PNP Device with Resistor

NPN Device

When connecting the main module to NPN device, the wiring is shown below if the resistor is not used.

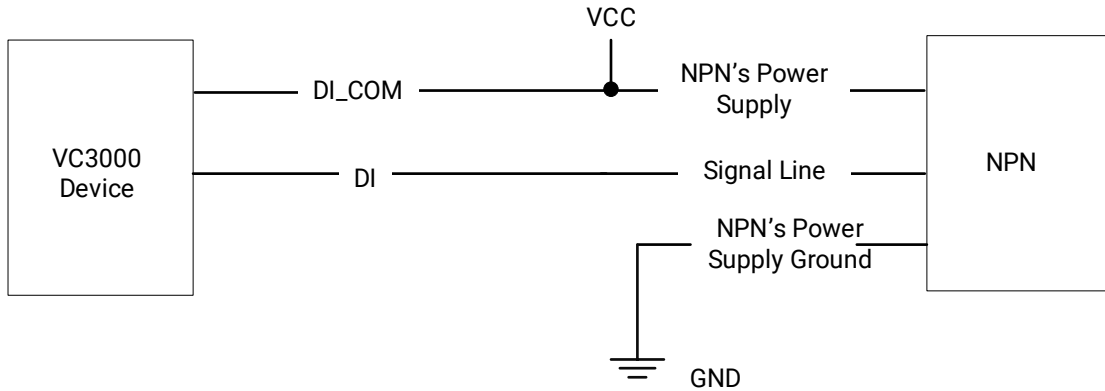


Figure 5-24 Connect to NPN Device without Resistor

When connecting the main module to NPN device, the wiring is shown below if 4.7 kΩ pull-up resistor is used.

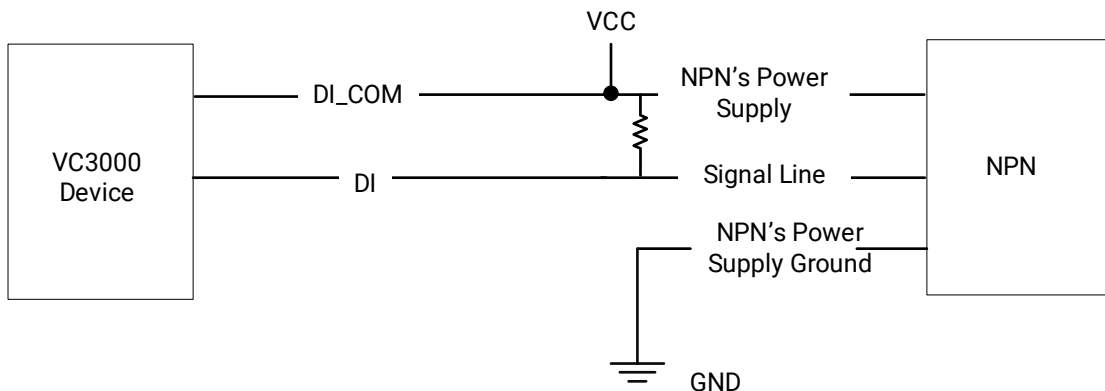


Figure 5-25 Connect to NPN Device with Resistor

Note

The type II device must be connected to pull-down resistor and pull-up resistor when connecting to external devices, while the type I device is optional.

Opto-Isolated Output Wiring

The opto-isolated output of the IO extended module can output NPN or PNP signal. Regarding opto-isolated output, different output electrical level types correspond to varied voltage ranges.

Note

When the IO extended module's output connects external devices, the voltage range of EXT is from 7 V to 24 V, and the output current of each pin cannot be larger than 40 mA.

- When the output electrical level type is high electrical level, the voltage range is from EXT-0.3 V to EXT voltage value.
- When the output electrical level type is low electrical level, the voltage range is from 0 V to 0.4 V.

Note

- When the IO extended module'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.

External Load

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

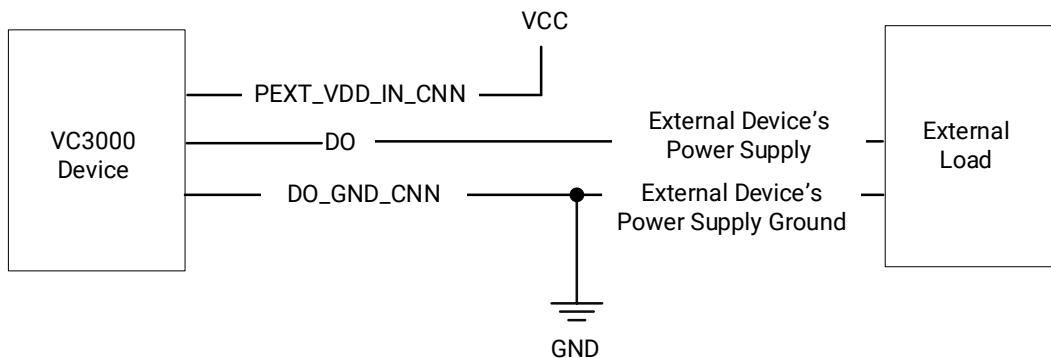


Figure 5-26 PNP Output Connecting External Load

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

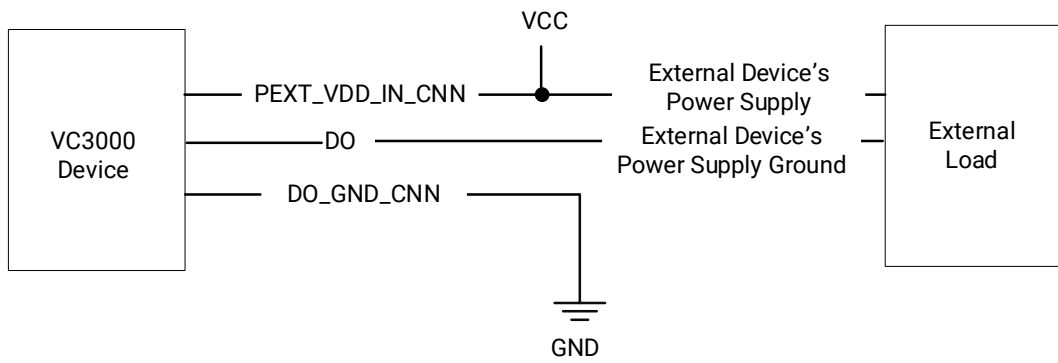


Figure 5-27 NPN Output Connecting External Load

PLC

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

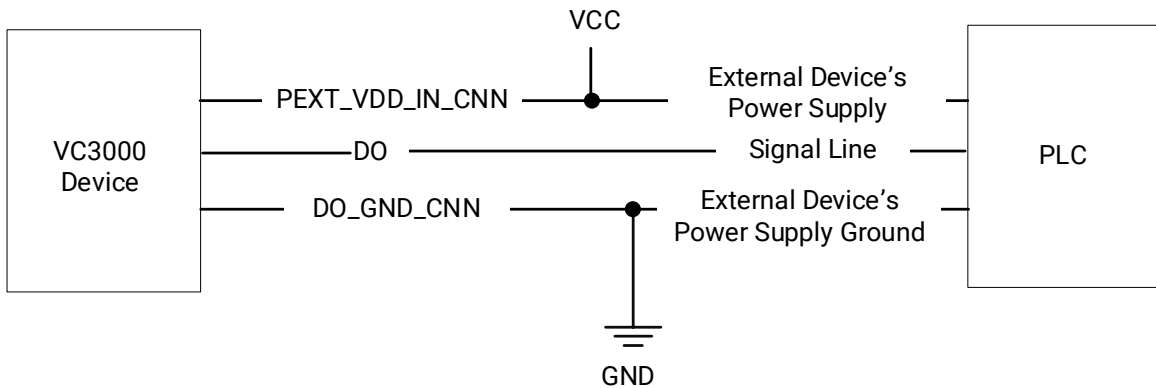


Figure 5-28 Connect to PLC

Chapter 6 Demonstration Tool

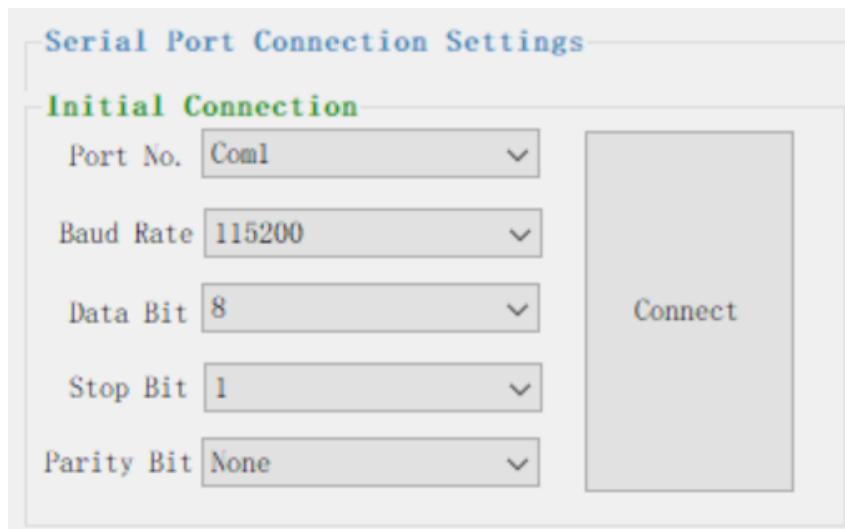
You can use the demonstration tool to set parameters of the device and extended modules.

6.1 Serial Port Connection Settings

6.1.1 Set Connection

The serial port connection settings allow you to connect the main module or set connection between the main module and the extended module.

After connecting the extended module to the main module physically, you can set the corresponding serial port No., baud rate, data bit, stop bit, and parity bit on the VC3000 Controller, and click **Connect**.



The screenshot shows a software window titled "Serial Port Connection Settings". Inside, there is a section labeled "Initial Connection" with five dropdown menus for configuration: "Port No." (set to Com1), "Baud Rate" (set to 115200), "Data Bit" (set to 8), "Stop Bit" (set to 1), and "Parity Bit" (set to None). To the right of these settings is a large "Connect" button.

Figure 6-1 Set Connection

Note

- After clicking **Connect**, other modules of the VC3000 Controller become operable, and you can **Disconnect** to stop.
- The serial port No. is related with DIP switch. The serial port No. ranges from COM 11 to COM 12, and the corresponding DIP switch No. is from 5 to 6. For example, if you switch DIP switch to No. 5, you should select COM 11 as the serial port No. to set connection between main module and the extended module. Otherwise, setting connection may fail.
- Serial port corresponds to COM 1 and COM 2 in the default operating system.
- It is recommended to use the default value of baud rate, data bit, stop bit, and parity bit.

6.1.2 View Message Window

The message window displays logs of the demonstration tool in real time. You can click **Clear** or **Save** to clear or save messages in TXT format.

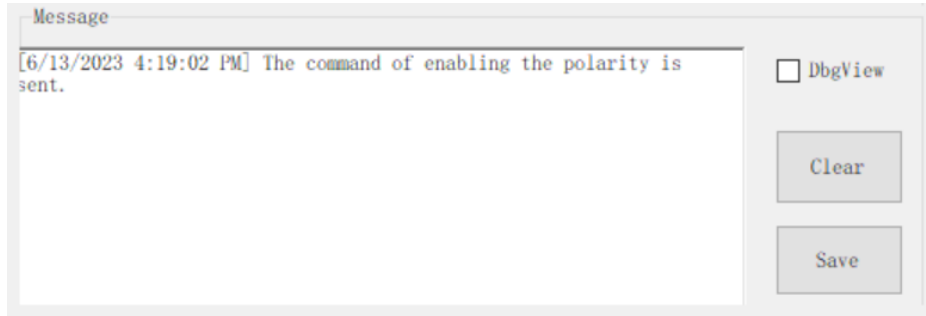


Figure 6-2 Message Window

6.2 RS-232/485/422 Settings

The demonstration tool supports selecting different device types and serial port types.

Device Type

Go to **RS232/485/422 Settings** → **Hard Type**, and select corresponding device type according to actual demands.

- OLD_VC3000: It stands for VC3000 and VC3000P devices.
- New_VC3000: It stands for VC3000H device.
- VC3000X: It stands for VC3000X device.

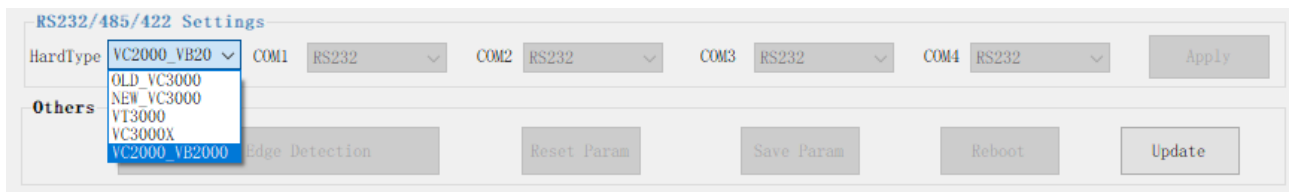


Figure 6-3 Device Type

Note

You should select the corresponding device in **Hard Type** before setting the light source and IO/GPIO.

Serial Port Type

The serial port of the main module is RS-232 by default. For some device types, you can

configure RS-232 to RS-485 or RS-422 via the demonstration tool.

Note

- Only some device models support configuring RS-232 to RS-485 or RS-422. Refer to the device’s specifications for details.
- Serial port corresponds to COM 1 and COM 2 in the default operating system.

Go to **RS232/485/422 Settings**, set **COM 1** and **COM 2** according to actual demands, and click **Apply**.



Figure 6-4 Serial Port Type

6.3 Light Source Settings

The demonstration tool supports setting parameters of the light source. You can select specific light source port, set its duration and brightness, etc.

Note

- Make sure that the light source has been connected to the device’s light source interface.
- You should select the corresponding device in **Hard Type** before setting the light source.
- **Port**: It selects the corresponding trigger port of the light source.
- **Duration**: It sets the duration of the light source after triggering.

Note

If the duration is 0, the light source will turn on or turn off according to the trigger signal. If the trigger signal persists, the light source will be solid. If the trigger signal disappears, the light source will be turned off.

- **Brightness**: It sets the brightness of the light source.
- **Status**: It includes **On**, **Off** or **Trigger**. You need to set **Trigger Input** if you select **Trigger** as **Status**.
- **Trigger Signal**: It includes **Rising Edge** or **Falling Edge**.
- **Trigger Input**: It sets trigger input signal source of the light source, and is valid only when the **Status** is **Trigger**. After setting **Trigger Input**, you need to click **Trigger Apply**.

Go to **Light Source Settings**, select **Port**, and set **Duration** and **Brightness** according to actual demands.

Regarding **Status**, you can check **On**, **Off** or **Trigger** to let the light source turn on or turn off after receiving a trigger signal that can be **Rising Edge** or **Falling Edge**. Click **Apply** after

setting light source parameters.

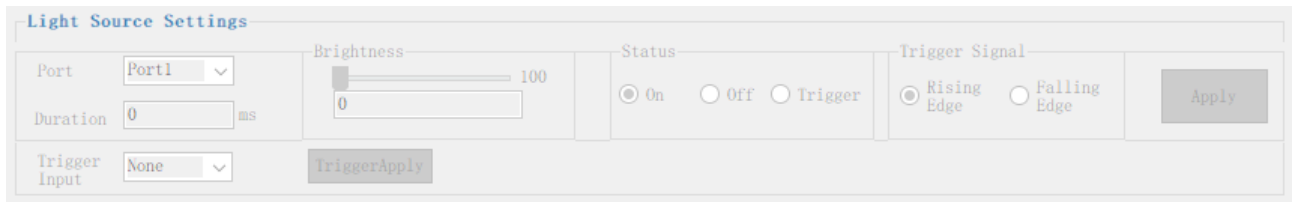


Figure 6-5 Light Source Settings

6.4 IO Settings

The IO settings allow you to set the input and output parameters of the device or IO extended module. You can detect the electrical level of the input signal, select the output port and the output mode, and enable output, etc.

Note

You should select the corresponding device in **Hard Type** before setting the IO.

Input Settings

Select **Port**, set **Trigger Signal**, and **Upload Signal** according to actual demands. Enter **Trigger Delay** and **Debouncer Time** to delay the trigger signal received time, and to filter out unwanted short input signals respectively. Click **Apply** after settings.

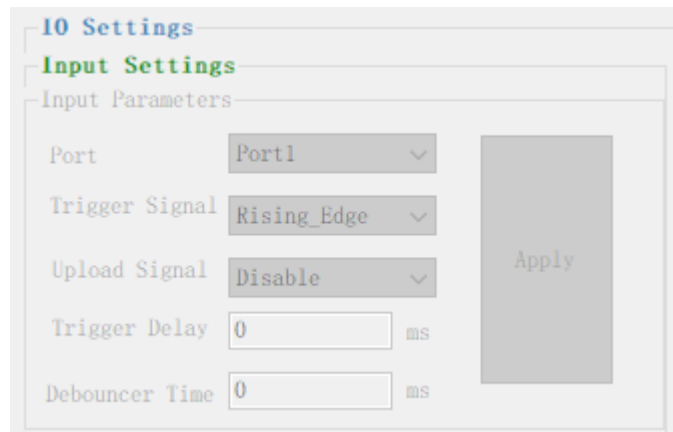


Figure 6-6 Input Settings

Input Detection

Click **Detect** in **Input Signal Detection** to get the electrical level of the input port. Red color

stands for the high electrical level, and green color stands for the low electrical level.

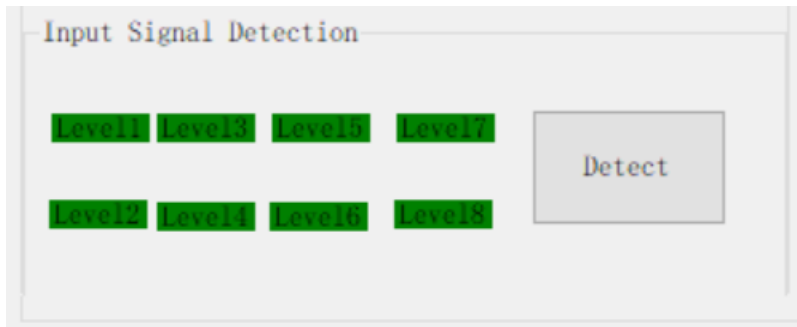


Figure 6-7 Input Detection

Output Settings

In **Output Settings**, you can set these parameters: **Polarity**, **Trigger Input**, **Port**, **Mode**, **Electrical Level**, **Duration**, **Pulse Period**, and **Pulse Width**. Click **Save** after settings.

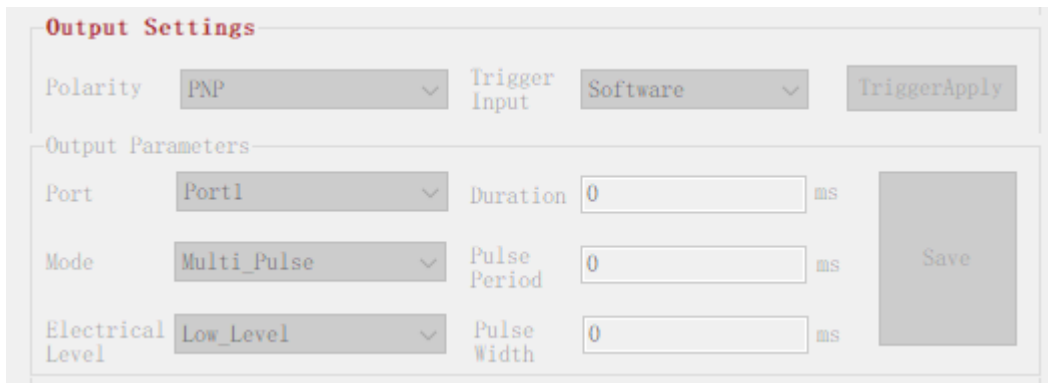


Figure 6-8 Output Settings

Note

Pulse Period and **Pulse Width** are only available when you select **Multipulse** as **Mode**.

After above-mentioned settings, if you want to let the port output signals, you should check the specific port No., and click **Enable**. Otherwise, click **Disable** instead.



Figure 6-9 Enable Output

6.5 GPIO Settings

The GPIO settings allow you to detect the electrical level of the input signal, set output polarity, enable high or low electrical level, etc.

Note

The GPIO settings are only available for the type I device. You should select the corresponding device in **Hard Type** before setting the GPIO.

Input Settings

Go to **GPI**, click **Detect**, and you can view the electrical level of the input port.

Note

Red color stands for the high electrical level, and green color stands for low electrical level.

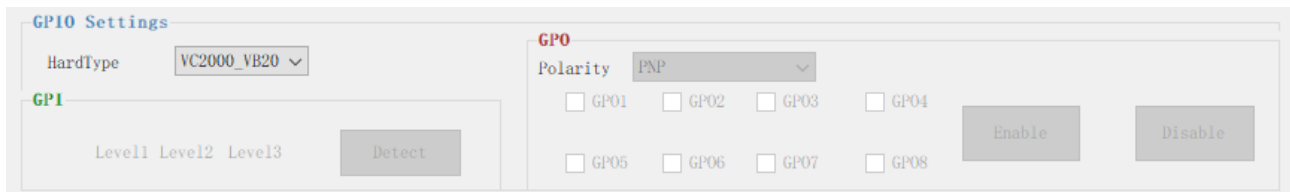


Figure 6-10 Input Settings of GPIO

Output Settings

Go to **GPO**, and select **PNP** or **NPN** as **Polarity** according to actual demands. Check the specific output port, and click **Enable** or **Disable** to enable high electrical level or low electrical level correspondingly according to actual demands.

Note

If you click **Enable**, the output port you selected will turn into red color. If you click **Disable**, it will turn into green color.

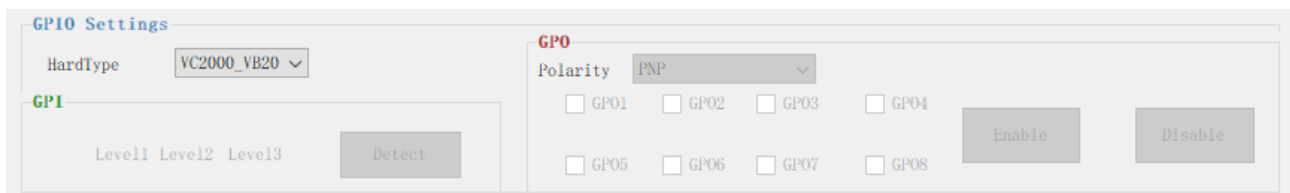


Figure 6-11 Output Settings of GPIO

6.6 Other Function Settings

- You can click **Enable Edge Detection** to view the input edge signals and its quantity via **Message** window in real time.

 **Note**

The **Enable Edge Detection** becomes **Disable Edge Detection** after you click it once, and you can click **Disable Edge Detection** to disable edge detection function.

- You can click **Reset Param** to reset all parameters you configured in the demonstration tool.
- You can click **Save Param** to save currently configured parameters.
- You can click **Reboot** to reboot the device.
- You can click **Update** to update the device's firmware.



Figure 6-12 Other Function Settings

Chapter 7 Firmware Update of Extended Module

You can use **Light Board Firmware Utility** to update the firmware of light source extended module and IO extended module.

Steps

1. Select the corresponding COM port in **Connection type**.
2. Click **Connect** in **Connection check**.
3. Click **ARROW** in **Load file** to select the updating file.
4. Click **Start** to update firmware.

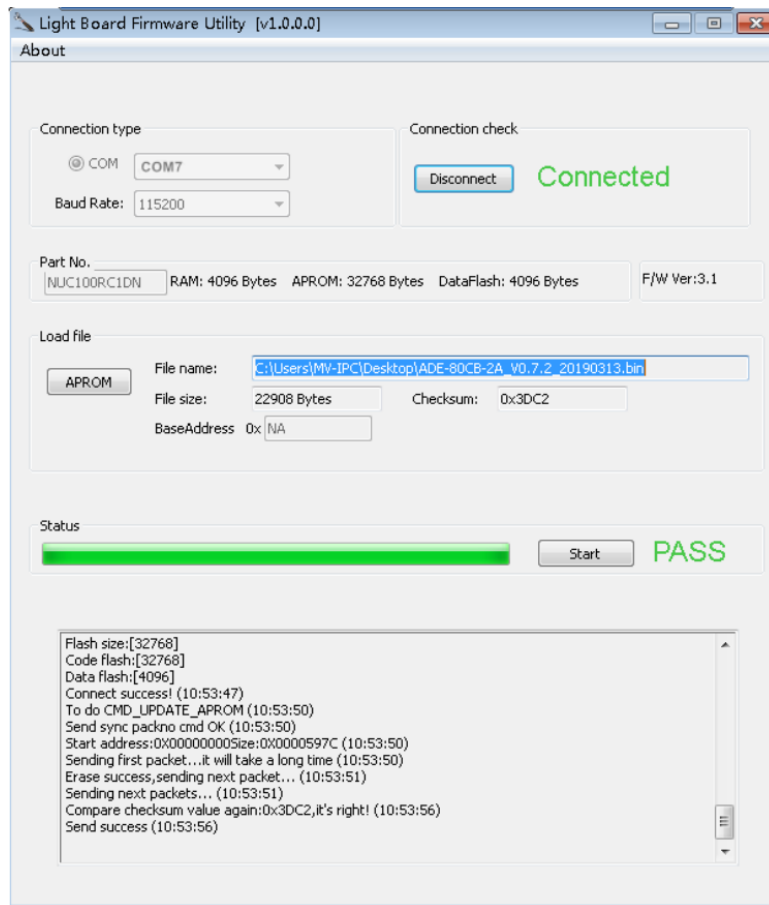


Figure 7-1 Firmware Update of Extended Module

Note

- The GUI of Light Board Firmware Utility may differ by versions.
- Contact the technical support to get the **Light Board Firmware Utility** and updating file.

Chapter 8 System Reinstallation

The default system of the vision controller is Windows 10. If the system exception occurs, or you need to use other systems, and then system reinstallation is required. You can reinstall system by connecting the vision controller to USB flash disk, USB optical disk driver, mobile hard disk, etc. After connection, you need to set in BIOS as follows.

Note

The specific system reinstallation steps may differ by device models.

Method 1

Steps

1. Press **F7** to enter startup option window.
2. Find the USB device you used in the list, and press **Enter** to start system reinstallation.

Method 2

Steps

1. Power on the vision controller, and press **DELETE** to enter BIOS setting window.
2. Go to **Boot** sub-menu, and select **Change Boot Order**.
3. Press **Enter** to enter settings list, and use **-/+** to change the USB device you used as the first start-up item.
4. Press **F10 Save & Exit**, and enter system reinstallation.

Note

After system reinstallation, you need to set 1st boot device in **Boot Priority Order** as HDD (Hard Disk Drive).

Chapter 9 FAQ (Frequently Asked Question)

9.1 Why the monitor screen is black?

Problem

The monitor screen is black.

Solution

- Reconnect the HDMI or VGA cable.
- Reboot the device.
- After rebooting 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 reboot the device.
- Reinstall the operating system again. The default system of the device is 64-bit Windows Embedded Standard 10.

9.2 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 reboot 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.

9.3 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 IO port is burned out.

9.4 Why the demonstration tool can run extended modules, but setting parameters failed?

Problem

Mismatch between the serial port No. and the DIP switch No. that is set as ON.

Solution

- Check if there is correct corresponding relation between the serial port No. and the DIP switch No. that is set as ON. The serial port No. ranges from COM 11 to COM 12, and the corresponding DIP switch No. is from 5 to 6.
- If there are multiple extended modules, make sure that each module only has one DIP switch No. that is set as ON, and does not conflict with other module's DIP switch settings.



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