



SC2000E Series Vision Sensor

Quick Start Guide

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FCC Compliance

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Conditions

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

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

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



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

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Symbol Conventions

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

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

Available Model

This manual is applicable to the SC2000E Series Vision Sensor.

Safety Instruction

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

Caution:

- In the use of the device, you must be in strict compliance with the electrical safety regulations of the nation and region.
- The device has a retinal blue light hazard. Do not observe the device in close range during its operation.
- Protective measures like wearing safety goggles are required when installing, maintaining and debugging the device.
- In the absence of proper protection, you should keep safety distance with the light source, or avoid direct eye exposure with the light source during device installation, operation, and maintenance.

- Do not connect multiple devices to the same power adapter, which may generate excessive heat or cause a fire.
- Make sure that the power is switched off when installing or wiring the device.
- If the device emits smoke, produces a peculiar smell, or makes noise, please switch off the power immediately, unplug the power cord, and contact the service center in time.
- To reduce the risk of fire or electric shock, do not expose the device to rain or moisture.
- 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).
- Use the power adapter provided by the official manufacturer. For the specific requirements of the power adapter, please refer to the device's specifications.
- Easy-to-use power-off equipment should be included in the building's installation wiring.
- Make sure that the device is firmly fixed when installing it in the use environment.
- In order to avoid heat accumulation, please keep ventilation around the device.
- Avoid installing the device in a vibration or shock environment, and keep the device away from electromagnetic interference (ignorance may cause device damage).
- Avoid placing the device in places exposed to direct sunlight or poor ventilation, or near heat sources such as heaters (ignorance may cause a fire hazard).
- Do not install the indoor device in an environment where it may be exposed to water or other liquids.
- Do not use the device in extremely hot, cold, dusty, corrosive, or high-humidity environment. For specific temperature and humidity requirements, please refer to the device's specifications.
- Avoid aiming the lens at strong light like lighting, sunlight or laser beams, etc. Otherwise, the image sensor will be damaged.
- Do not touch the image sensor directly. If it is necessary to clean, moisten a soft and clean cloth with alcohol and gently wipe away the dust. When the device is not in use, add a dust cover to protect the image sensor.
- Please understand that you are responsible for the reasonable configuration of all passwords and other related device security settings, and properly keep your user name and password.
- Please keep all original package materials of the device properly, so that when a problem occurs, use the package materials to pack the device and send it to the agent or return it to the manufacturer for disposal. We shall not assume any responsibility for accidental damages during transportation caused by non-original package materials.

Electromagnetic Interference Prevention

- During the installation and use of the device, measures of electromagnetic interference prevention should be taken. Otherwise, phenomena like image exception and false triggering of the device may occur.
- Make sure to isolate and install the device through an insulated bracket.
- During the installation and use of the device, high voltage leakage must be avoided.
- When connecting the device and metal accessories, they must be connected firmly to maintain good conductivity.

- It is recommended to use an isolated adapter to power the device.
- The unused cables of the device must be insulated.
- Use a figure-eight bundle method if the device cable is too long.
- Do not wire the device and other equipment (especially servo motors/high-power equipment) together, and keep wiring spacing above 10 cm. If it cannot be avoided, make sure to shield cables.
- To avoid the accumulation of static electricity, other devices on site like machines, internal components, etc. must share the same ground.
- 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.
- The device can be powered by 220 VAC with low-power equipment, but make sure to avoid the same power supply as servo motors/high-power equipment.
- 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.
- 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.

Personnel Requirement

Quality requirements for installation and maintenance personnel: Qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills:

- The basic knowledge and operation skills of low voltage wiring and low voltage electronic circuit connection.
- The ability to comprehend the contents of this manual.

Contact Information

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Chapter 1 Overview

1.1 Introduction

With built-in positioning and measurement algorithms, SC2000E series vision sensor can detect object's existence, count patterns and spot, etc. It can be monitored and operated via the SCMVS client. It can output results via RS-232 and Ethernet, and cooperate with other processes via IO. The vision sensor supports multiple result output methods and customized result text output.

1.2 Key Feature

- Adopts embedded hardware platform for high-speed image processing.
- Adopts built-in positioning and measurement algorithms to detect object's existence, count patterns and spots, etc.
- Multiple IO interfaces for input and output signals.
- Multiple indicators for displaying device status.
- Adopts light source to ensure uniform brightness in the illuminated area.
- Supports multiple communication protocols, including Serial Port, TCP, UDP, FTP, Profinet, Modbus, Ethernet/IP, etc.

Note

- The device's functions may differ by models.
 - Refer to the user manual of the SCMVS client software for detailed device operations.
-

Chapter 2 Appearance

Note

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

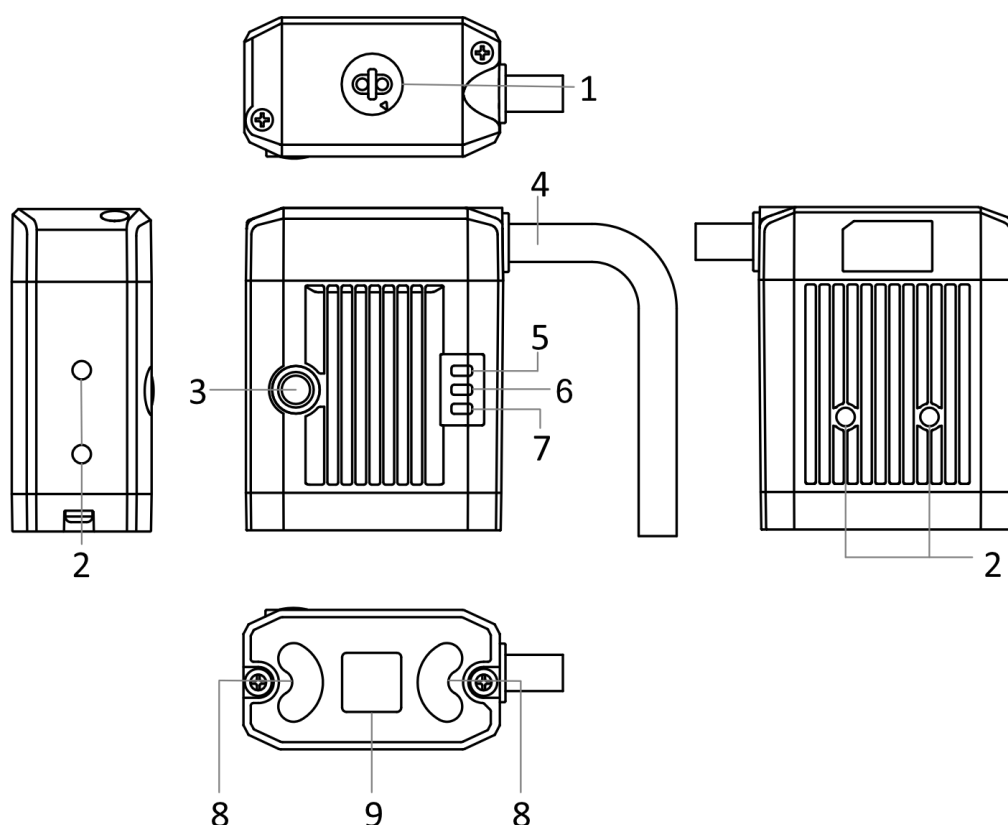


Figure 2-1 Appearance

Table 2-1 Component Description

No.	Name	Description
1	Focus Knob	It is used to adjust focal length manually.
2	Screw Hole	It is used to fix the device to the installation position. You should use M3 screw.
3	Trigger Button	When the device is in trigger mode, press the button and the device triggers once.
4	SR Cable	SR cable connector provides power, digital I/O, Ethernet, and serial port.

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No.	Name	Description
5	LNK Indicator	It is a network status indicator. The indicator is flashing green when the network transmission is normal. Otherwise, it is unlit.
6	STS Indicator	It is a status indicator. The indicator is green when the device operate normally. When errors occur during the device starts or operates, it is red.
7	PWR Indicator	It is a power indicator. The indicator is red during the device's power-on process. After the device is powered on, the indicator is green.
8	Light Source	It is the LED light source used to provide light when the device acquires images.
9	Sensor	It is used to acquire images.

Chapter 3 17-Pin Interface and Cable

3.1 17-Pin Interface

Read the following section to get definitions of 17-pin interface.

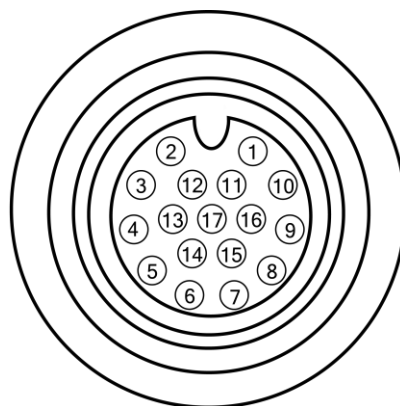


Figure 3-1 17-Pin Interface

Table 3-1 Pin Definitions

No.	Signal	I/O Signal Source	Description	Supplied Cable
1	DC_PWR	--	Direct current power supply positive	Red open cable
2	--	--	--	Brown open cable
3	--	--	--	--
4	RS232_TX	--	RS-232 serial port output	Green open cable
5	RS232_RX	--	RS-232 serial port input	Green/white open cable
6	MDI0+	--	Fast Ethernet signal MDI0+	RJ45 connector
7	MDI1-	--	Fast Ethernet signal MDI1-	RJ45 connector
8	GPI02	Line 2+	Input I/O	Blue/white open cable
9	--	--	--	--
10	GPI03	Line 3+	Output I/O	Brown/white open cable

No.	Signal	I/O Signal Source	Description	Supplied Cable
11	GND	Line 0/1/2/3-	Direct current power supply negative	Black open cable
12	--	--	--	--
13	--	--	--	Purple open cable
14	MDI0-	--	Fast Ethernet signal MDI0-	RJ45 connector
15	MDI1+	--	Fast Ethernet signal MDI1+	RJ45 connector
16	GPI00	Line 0+	Bi-directional I/O, and it is the trigger by default.	Gray open cable
17	GPI01	Line 1+	Bi-directional I/O, and it is used to switch project by default.	White open cable

3.2 17-Pin Cable

You should use the supplied 17-pin cable to wire the device as shown below. The cable has a RJ45 connector that corresponds to 6th, 7th, 14th, and 15th pins of the 17-pin interface.

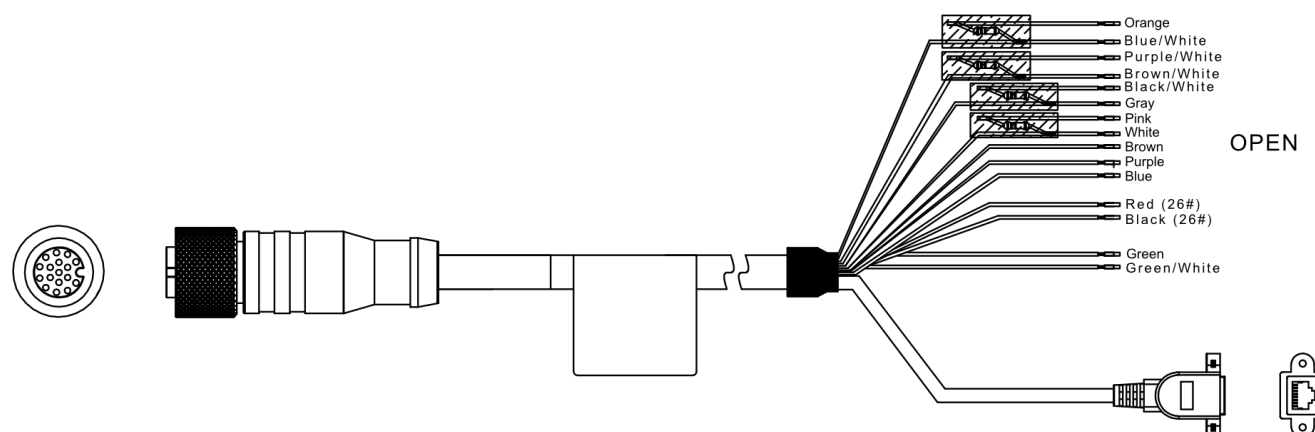


Figure 3-2 17-Pin Cable

Note

- The open lines of the supplied 17-pin cable can be wired according to the actual demands.
- Four lines of the supplied 17-pin cable does not correspond to the device's 17-pin interface. The black/white line is Line 0's pull-up and pull-down resistor, the pink line is Line 1's pull-up and pull-down resistor, the orange line is Line 2's pull-up and pull-down resistor, and purple/white line is Line 3's pull-up and pull-down resistor.

Chapter 4 Installation

4.1 Installation Preparation

You need to prepare following accessories before installation.

Table 4-1 Accessories

No.	Name	Quantity	Description
1	17-Pin Cable	1	It refers to the supplied 17-pin cable that is included in the package.
2	Power Adapter or Switch Power Supply	1	You should select suitable power adapter or switch power supply according to the device power supply and consumption. You need to purchase separately.
3	Screw Package	1	It refers to the supplied M3 screws that are used to fix the device to the installation position.

4.2 Install Device

Before You Start

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

Steps

1. Use M3 screws to fix the device to the installation position.
2. Connect the 17-pin M12 connector of the cable to the device, insert RJ45 connector of the cable into a switch or a PC for debugging images or transmitting data.
3. Connect the device to a power adapter or a switch power supply for power supply.

Chapter 5 Device Connection

Device connection to the client software is required for device's configuration and remote operations. This section introduces how to install the client software, set PC and device network, connect the device to the client software, etc.

5.1 Set PC Network

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

Steps



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

Steps

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

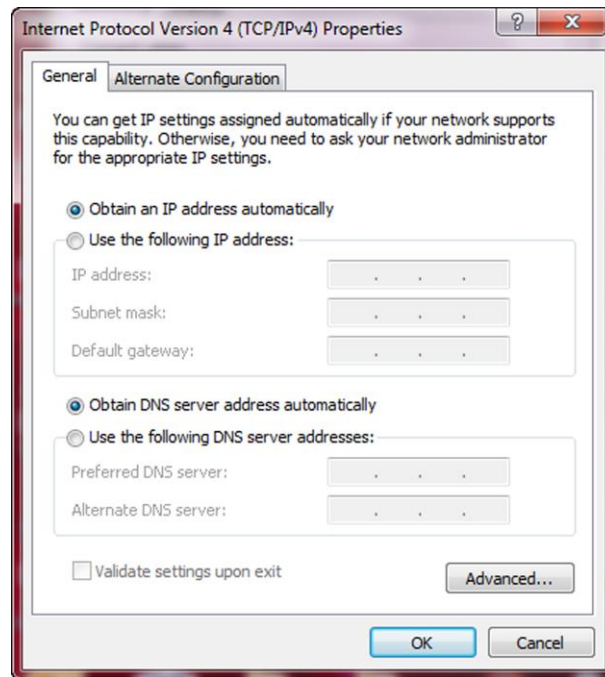


Figure 5-1 Set PC Network

3. Set NIC property.

- 1) Go to NIC settings page: **Control Panel** → **Hardware and Sound** → **Device Manager** → **Network Adapter**.
- 2) Select corresponding network interface card, and click **Link Speed**.
- 3) Set **Speed and Duplex** as **Auto-Negotiation** or **100 Mbps**.

5.2 Turn off Firewall

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

Steps

Note

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

1. Go to Windows Firewall.

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

Windows 7 system: Click **Start** → **Control Panel** → **Windows Firewall**.

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

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

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

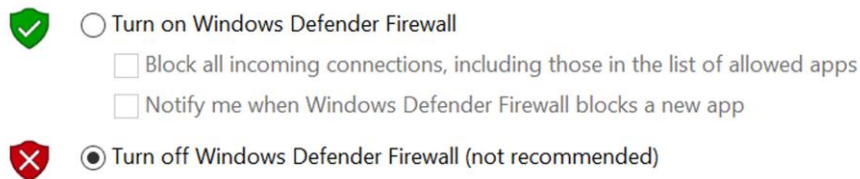


Figure 5-2 Windows Defender Firewall

4. Click **OK**.

5.3 Install Client Software

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

Note

- Check the Windows version. The client software is compatible with 32/64-bit Windows 7/10.
- You can get the client software installation package from <https://en.hikrobotics.com/>.
- The graphic user interface may differ by different versions of client software you use.

Steps

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

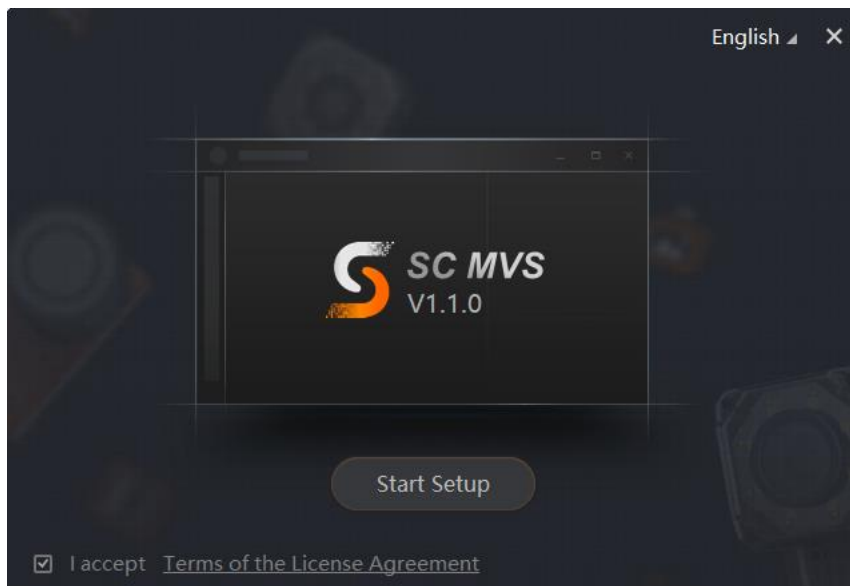


Figure 5-3 Installation Interface

5. Select installation directory and click **Next**.

6. Finish the installation according to the interface prompts.

5.4 Set Device Network

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

Steps

1. Double click the client software to run it.
2. Click  in the device list to find the device.
3. Right click the device to be connected.
4. Click **Edit IP Address**.
5. Set the IP address of the device in the same network segment with the PC.

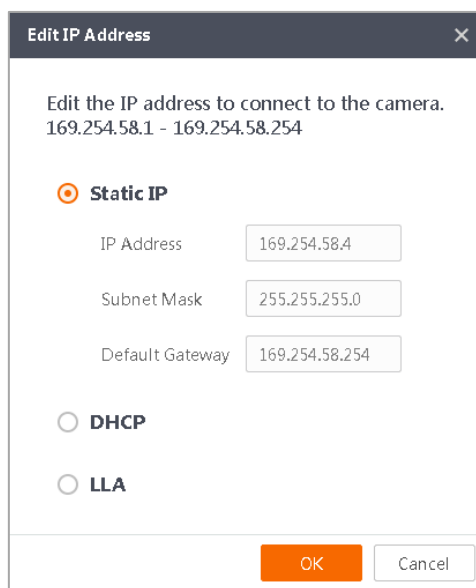


Figure 5-4 Edit IP Address

6. Click **OK**.

5.5 Login

Note

- Make sure that your device IP address is in the same network segment with the PC where you installed the client software before connecting the device to it.
 - The default login password is Abc1234, and it is highly recommended to change the password for the first time use.
 - Follow the guidance to find the password if you forget it.
 - Refer to the user manual of the SCMVS client software for detailed operation.
-

Steps

1. Click the device in the device list.
2. Enter password.
3. Click  to log in.

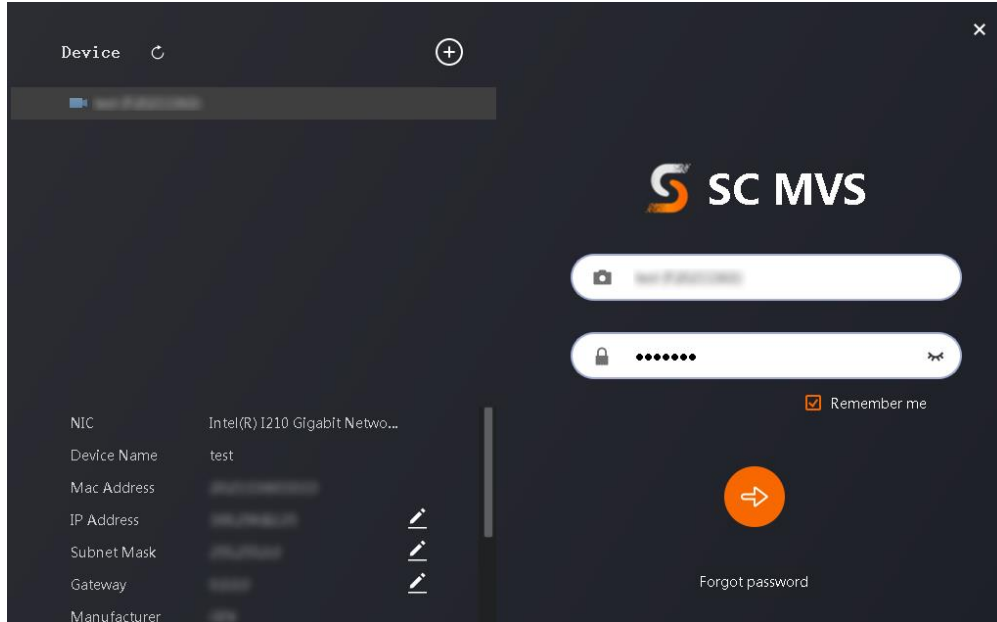


Figure 5-5 Login Interface

4. (Optional) Check **Remember me** to remember the password if necessary.

Note

If you forget password, click **Forgot Password** in the login interface to view the device's serial No., and mail it to the technical support personnel or call them to get the corresponding resetting file. After that, import the resetting file and reset the password as the default one.

Chapter 6 Client Layout and Operation Flow

6.1 Main Window Introduction

After logging into the client software, you can see the main window as shown below.

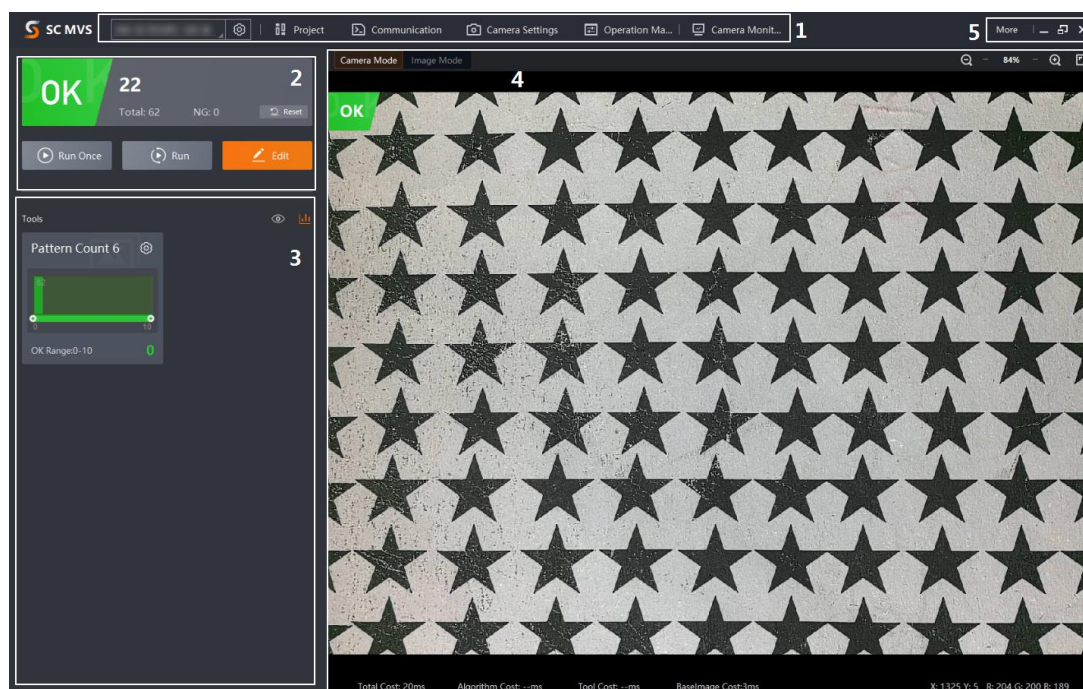


Figure 6-1 Main Window

Note

- The specific interfaces of the client software may differ by its versions.
- The client software loads and runs previous projects after logging in. If there is no project, the client software will create and run a new project.

Table 6-1 Main Window Description

No.	Name	Description
1	Menu Bar	The menu bar includes project, communication, camera settings, operation management, and camera monitoring.
2	Project Status Display Area	This area displays operation results of current projects in real time. You can run, stop or edit projects here.
3	Tool Status Display Area	This area displays operation results of vision tools loaded in projects in real time. You can edit various parameters of tools here.

No.	Name	Description
4	Live View Window	This area displays images and results under camera mode and image mode in real time. Under image mode, you can import images into the device.
5	Other Areas	You can switch languages and cameras, view the user manual and client version information here.

6.2 Operation Flow

Note

- Refer to the user manual of the SCMVS client software for detailed parameter settings and operations.
- Click **More** on the upper right corner of the client software, and click **User Manual** to open it.

You can follow the overall operation flow below to operate the device via the client software.

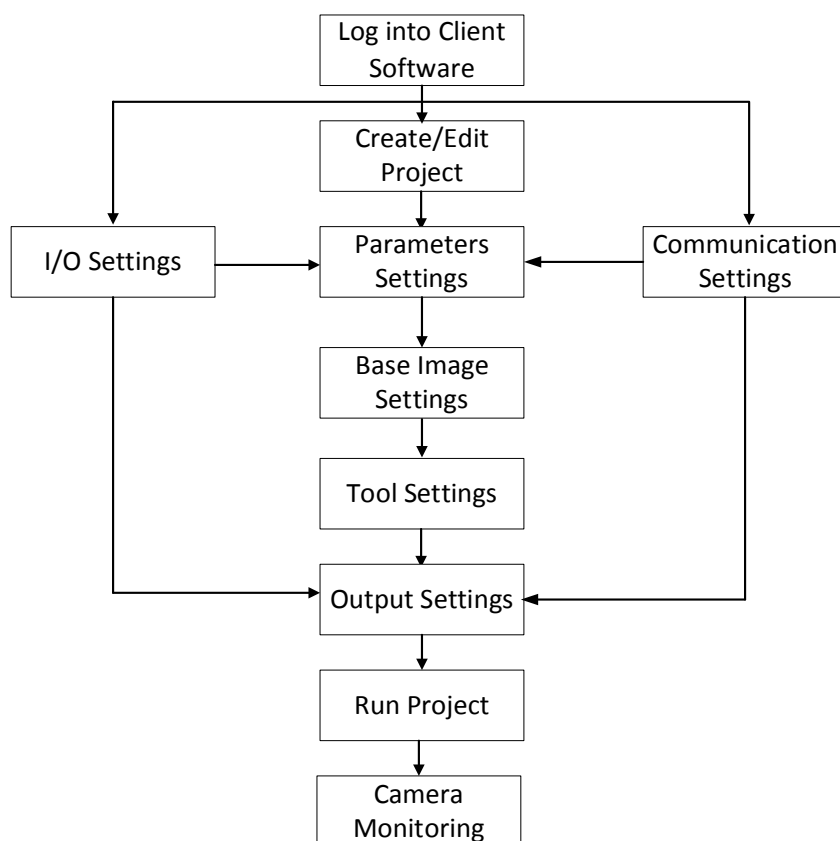


Figure 6-2 Operation Flow

Chapter 7 I/O and Serial Port Introduction

This section introduces the electrical feature and wirings of the device's I/O and serial port. The device has two configurable bi-directional I/Os (Line 0/1), one input signal (Line 2), one output signal (Line 3), and one RS-232.

Note

By default, the I/O type of Line 0 is trigger, and the I/O type of Line 1/2 is used to switch project.

7.1 Input Signal

The device has one input signal (Line 2) and two configurable bi-directional I/Os (Line 0/1) that can be configured to input signal, and their internal circuit is shown below.



Figure 7-1 Internal Circuit of Input Signal

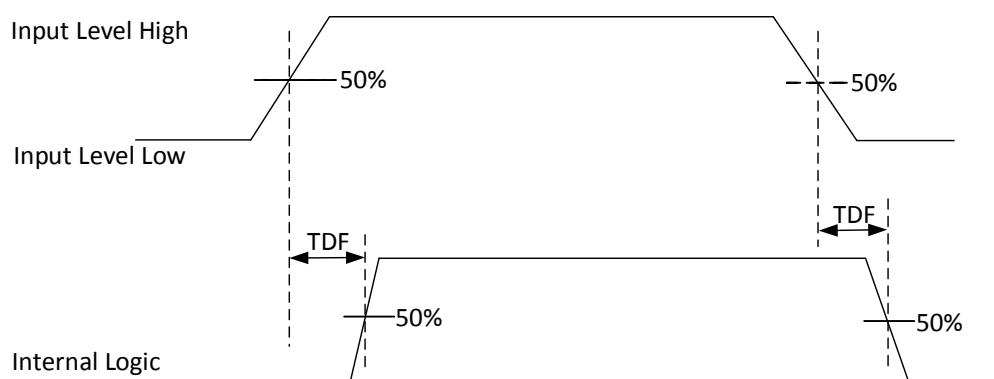


Figure 7-2 Input Logic Level

Table 7-1 Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	1 VDC
Input Logic Level High	VH	2 VDC

Parameter Name	Parameter Symbol	Value
Input Falling Delay	TDF	200 ns
Input Rising Delay	TDR	1 μ s

7.2 Output Signal

The device has one output signal (Line 3) and two configurable bi-directional I/Os (Line 0/1) that can be configured to output signal, and their internal circuit is shown below.

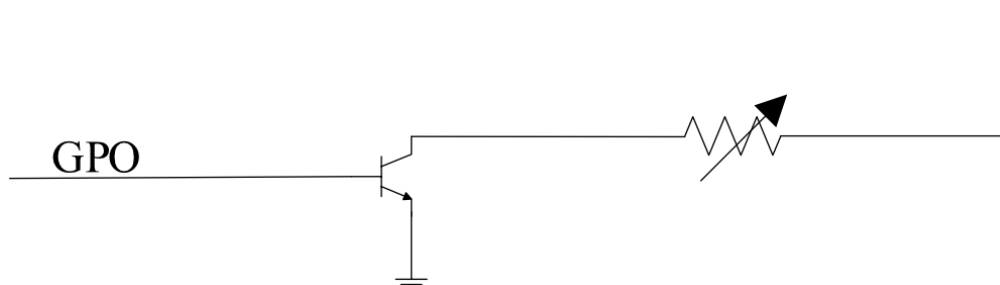


Figure 7-3 Internal Circuit of Output Signal

Note

- The polarity of the device's output signal can be configured to NPN type via the client software. The NPN internal circuit is shown above.
- The max. output current is 25 mA.

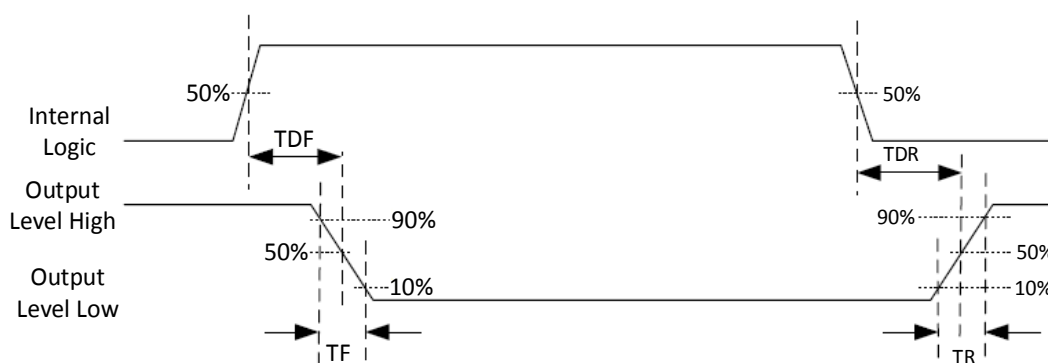


Figure 7-4 Output Logic Level

When the external voltage is 12 VDC and pull-up resistor is 1 K Ω , output electric feature is shown below.

Table 7-2 Output Electrical Feature

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	500 mV

Parameter Name	Parameter Symbol	Value
Output Logic Level High	VH	12 VDC (external pull-up resistor)
Output Falling Delay	TDF	330 ns
Output Rising Delay	TDR	4.4 μ s
Output Falling Time	TF	116 ns
Output Rising Time	TR	3.8 μ s

Relation between different external voltages and output logic level low is shown below.

Table 7-3 Parameters of Output Logic Level Low

External Voltage	Output Logic Level Low (VL)
3.3 VDC	180 mV
5 VDC	260 mV
12 VDC	500 mV
24 VDC	900 mV

7.3 I/O Wiring

The device can receive input signals from external devices and output signals to external devices. This section introduces how to wire the device's I/O.

Note

- The input and output signals mentioned in this section are the bi-directional I/O signal whose I/O type is configured as trigger and output correspondingly.
- The pull-up and pull-down resistors in wiring figures below need to wire with correct open lines.
- The voltage of VCC should be equal to or less than that of PWR. Otherwise, the device's output signal may have exception.
- The device figures below are for reference only, and the actual one you got should prevail.

7.3.1 Input Wiring

Note

Input signal wiring may differ by external device types.

PNP Device

If you use the pull-down resistor of the supplied 17-pin cable, the wiring is shown below.

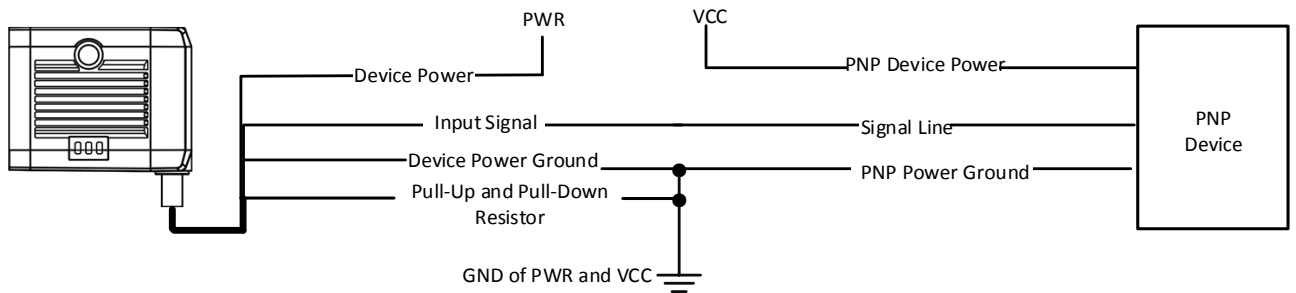


Figure 7-5 Input Signal Connecting to PNP Device (Pull-Down Resistor of 17-Pin Cable Used)

If you use external pull-down resistor, it is recommended to use 1 K Ω pull-down resistor.

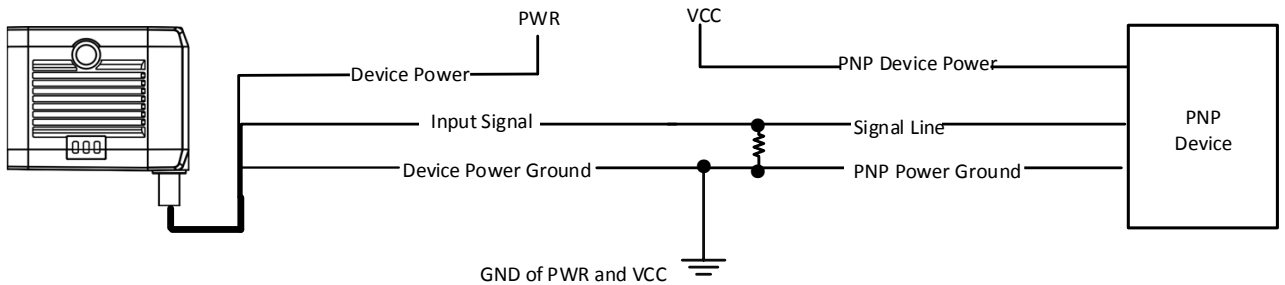


Figure 7-6 Input Signal Connecting to PNP Device (External Pull-Down Resistor Used)

NPN Device

If the VCC of NPN device is 12 VDC or 24 VDC, and the pull-up resistor of the supplied 17-pin cable is used.

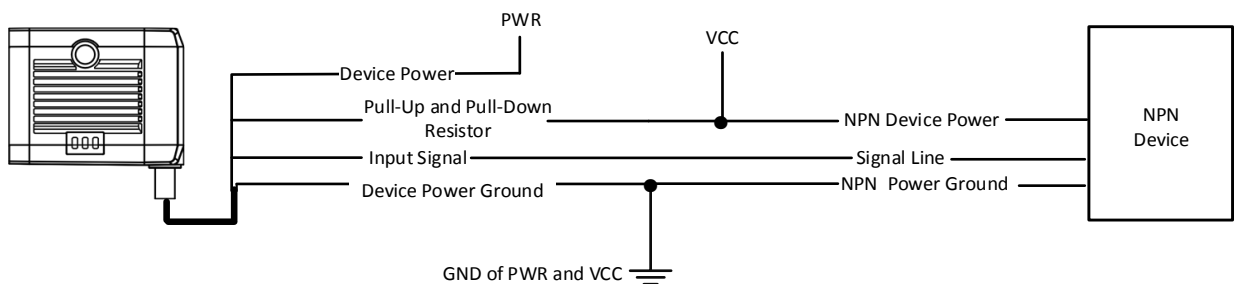


Figure 7-7 Input Signal Connecting to NPN Device (Pull-Up Resistor of 17-Pin Cable Used)

If the VCC of NPN device is 12 VDC or 24 VDC and the external pull-up resistor is used, it is

recommended to use 1 K Ω pull-up resistor.

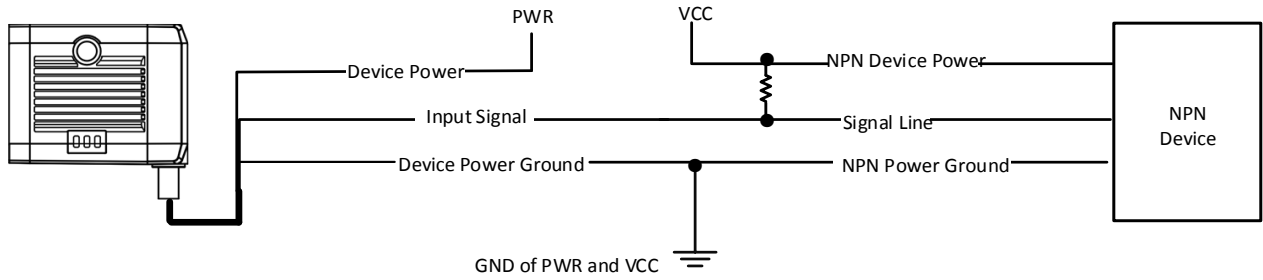


Figure 7-8 Input Signal Connecting to NPN Device (External Pull-Up Resistor Used)

Switch

If the input signal is switch, and its wiring is shown below.

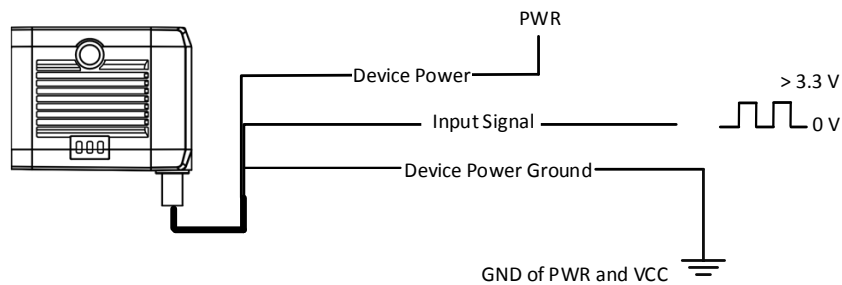


Figure 7-9 Input Signal Connecting to Switch

7.3.2 Output Wiring

Note

Output signal wiring may differ by external device types.

PNP Device

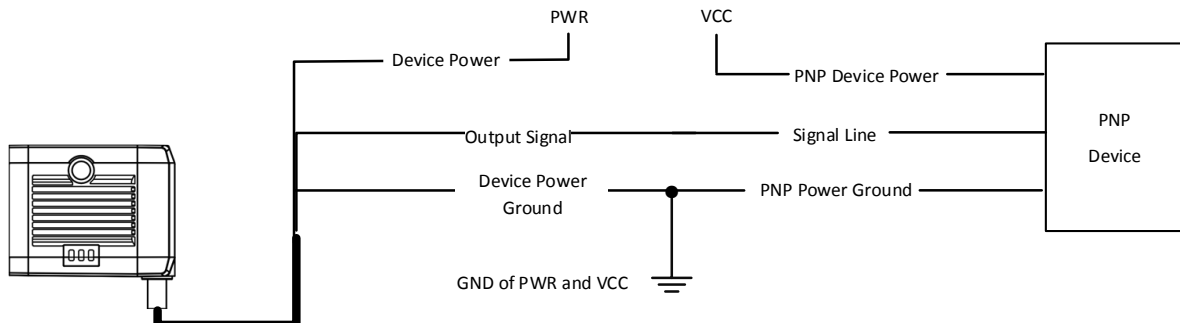


Figure 7-10 Output Signal Connecting to PNP Device

NPN Device

If the VCC of NPN device is 12 VDC or 24 VDC, and the pull-up resistor of the supplied 17-pin cable is used.

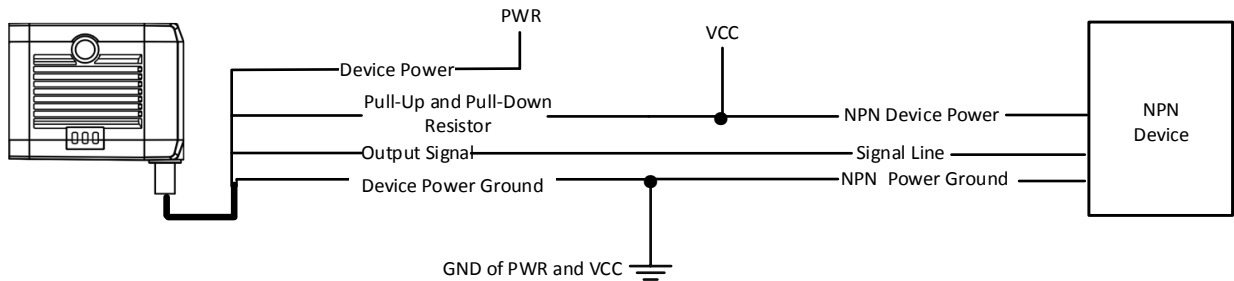


Figure 7-11 Output Signal Connecting to NPN Device (Pull-Up Resistor of 17-Pin Cable Used)

If the VCC of NPN device is 12 VDC or 24 VDC and the external pull-up resistor is used, it is recommended to use 1 K Ω pull-up resistor.

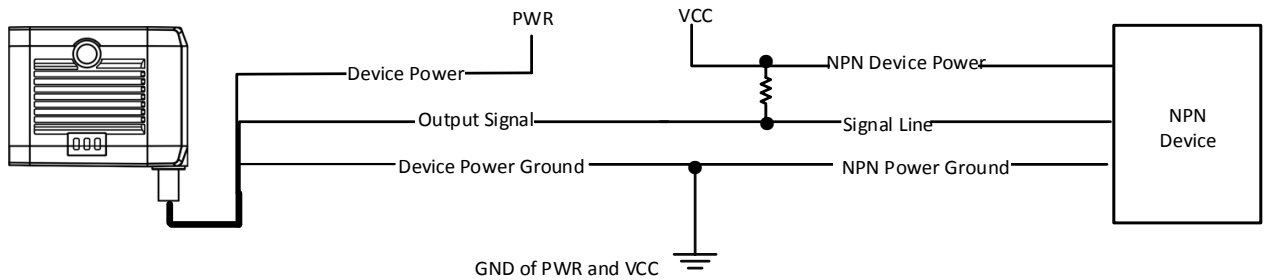


Figure 7-12 Output Signal Connecting to NPN Device (External Pull-Up Resistor Used)

7.4 RS-232 Serial Port

The device supports outputting data via RS-232 serial port, and you can set serial port communication via the client software. Refer to the user manual of the SCMVS client software for details. The supplied 17-pin cable has open lines of RS-232 serial port, which are 4th and 5th pin of the 17-pin interface.

Chapter 8 FAQ (Frequently Asked Question)

8.1 Why the client software cannot list devices?

Reason

- Device is not started up normally.
- Network connection exception occurs.

Solution

- Check device power wiring (observe PWR indicator).
- Check network connection (observe LNK indicator). Ensure the device and the PC are in the same network segment.

8.2 Why the image is not smooth in live view?

Reason

The network transmission speed is not up to 100 Mbps.

Solution

Check if the network transmission speed is up to 100 Mbps.

8.3 Why the image is very dark?

Reason

- The brightness of light source is not enough.
- Exposure and gain values are too small.

Solution

- Increase the brightness of light source, or use brighter lamps.
- Increase exposure and gain values according to actual demands.

8.4 Why there is no image in live view?

Reason

Although trigger mode is enabled, there is no trigger signal.

Solution

Send trigger signal to device or disable trigger mode.

8.5 What can I do if I forget the login password?

Solution

Click **Forgot Password** in the login interface to view the device serial No., and mail it to the technical support personnel or call them to get the corresponding resetting file. After that, import the resetting file and reset the password as the default one.



See Far, Go Further