

Hangzhou Hikrobot Technology Co.,Ltd.

SC2000E (Mini) Series Vision Sensor

Quick Start Guide

HIKROBOT

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-

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This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.




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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 SC2000E (Mini) series vision sensor.

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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.
- This is a Class A device. In the living environment, this device may cause radio interference. In this case, the user may be required to take practical measures against the interference.
- 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.
- It is strictly forbidden to wire, maintain, and disassemble the device is powered on.

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Otherwise, there is a danger of electric shock.

- Before powering on the device, please confirm that the device is installed in good condition, the wiring is firm, and the power supply meets the requirements.
- 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.
- Avoid aiming the image sensor at strong light (such as laser beams), otherwise the image sensor will be damaged.
- It is forbidden to touch the image sensor directly. If it is necessary to clean, please moisten the soft clean cloth with 75% or less alcohol and gently wipe off the dust.
- Keep clean of the device's image acquisition window. It is recommended to use cleaning water to wipe off the dust. When the device is not in use, please add a dust cover to protect the image acquisition window.
- 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.
- Please read the manual and safety instructions carefully before installing the device.
- Quality requirements for installation and maintenance personnel:
 - Qualification certificate or working experience in weak current system installation and maintenance, and relevant working experience and qualifications. Besides, the personnel must possess the following knowledge and operation skills.
 - The basic knowledge and operation skills of low voltage wiring and low voltage electronic circuit connection.
 - The ability to comprehend the contents of this manual.
- Do not expose the device directly to flashlights, high-frequency switch lighting devices, or to sunlight, which may affect the performance.

1.3 Electromagnetic Interference Prevention

- Make sure that the shielding layer of cables is intact and 360° connected to the metal connector when using shielded cables.
- Do not route the device together with other equipment (especially servo motors, high-power devices, etc.), and control the distance between cables to more than 10 cm. Make sure to shield the cables if unavoidable.
- The control cable of the device and the power cable of the industrial light source must be wired separately to avoid bundled wiring.
- The power cable, data cable, signal cable, etc. of the device must be wired separately. Make sure to ground them if the wiring groove is used to separate the wiring and the wiring groove is metal.
- During the wiring process, evaluate the wiring space reasonably, and do not pull the cables hard, so as not to damage the electrical performance of the cables.
- If the device is powered on and off frequently, it is necessary to strengthen the voltage isolation, and consider adding a DC/DC isolation power supply module between the device and the adapter.
- Use the power adapter to supply power to the device separately. If centralized power supply is necessary, make sure to use a DC filter to filter the power supply of the device separately before use.
- The unused cables of the device must be insulated.
- When installing the device, if you cannot ensure that the device itself and all equipment connected to the device are well grounded, you should isolate the device with an insulating bracket.
- To avoid the accumulation of static electricity, ensure that other equipment (such as machines, internal components, etc.) and metal brackets on site are properly grounded.
- During the installation and use of the device, high voltage leakage must be avoided.
- Use a figure-eight bundle method if the device cable is too long.
- When connecting the device and metal accessories, they must be connected firmly to maintain good conductivity.
- Use a shielded network cable to connect to the device. If you use a self-made network cable, make sure that the shielding shell at the aviation head is well connected to the aluminum foil or metal braid of the shielding cable.

Chapter 2 Overview

2.1 Introduction

With built-in positioning and measurement algorithms, SC2000E (Mini) 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.

2.2 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 RS-232, 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 3 Appearance

Note

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

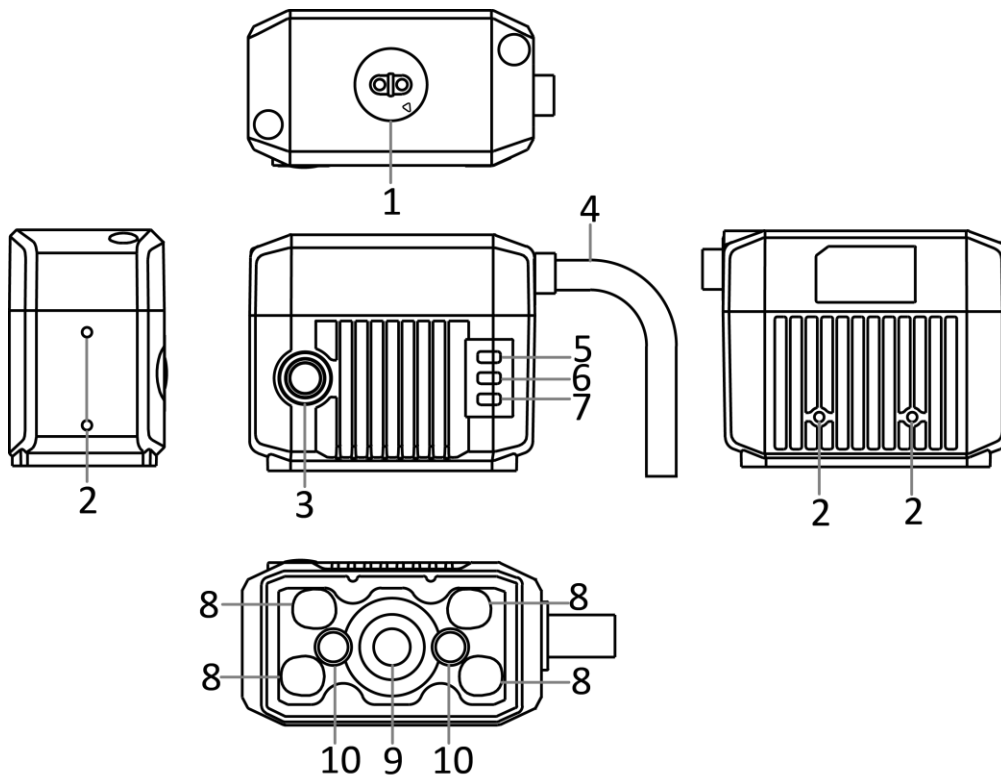


Figure 3-1 Appearance

Table 3-1 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 M2 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, I/O, Ethernet, and serial port.
5	LNK Indicator	It is a network status indicator.
6	STS Indicator	It is a status indicator.

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No.	Name	Description
7	PWR Indicator	It is a power indicator.
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.
10	Aiming Light	It helps to indicate the field of view and aim targets.

Chapter 4 Interface and Cable

4.1 17-Pin Interface

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

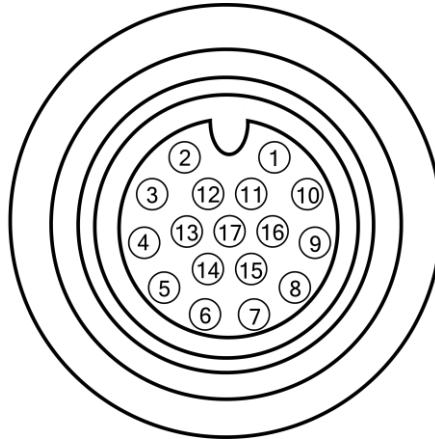


Figure 4-1 17-Pin Interface

Table 4-1 Pin Definitions

No.	Signal	I/O Signal Source	Description	Supplied Cable
1	DC_PWR	--	Direct current power supply positive	8-pin connector
2	--	--	--	8-pin connector
3	--	--	--	Purple/white open cable
4	RS232_T X	--	RS-232 serial port output	DB9 serial port
5	RS232_R X	--	RS-232 serial port input	DB9 serial port
6	MDI0+	--	Fast Ethernet signal MDI0+	RJ45 connector
7	MDI1-	--	Fast Ethernet signal MDI1-	RJ45 connector
8	GPI02	Line 2+	Bi-directional I/O, and it is output by default.	8-pin connector
9	--	--	--	8-pin connector

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No.	Signal	I/O Signal Source	Description	Supplied Cable
10	GPI03	Line 3+	Bi-directional I/O, and it is output by default.	8-pin connector
11	GND	Line 0/1/2/3-	Direct current power supply negative	8-pin connector
12	--	--	--	Pink open cable
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.	8-pin connector
17	GPI01	Line 1+	Bi-directional I/O, and it is used to switch projects by default.	8-pin connector

4.2 17-Pin M12 Cable

You should use the supplied 17-pin M12 cable to wire the device.

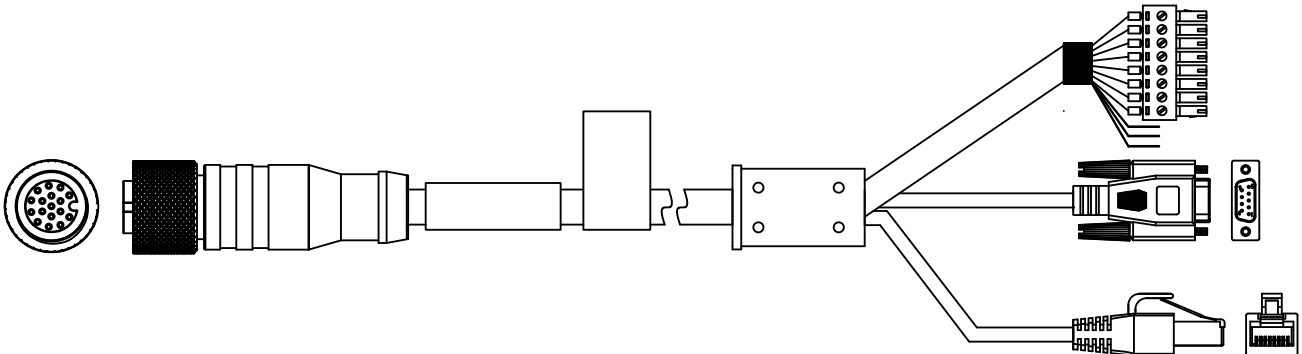


Figure 4-2 17-Pin M12 Cable (RJ45 Connector)

- The RJ45 connector corresponds to 6th, 7th, 14th, and 15th pins of the 17-pin interface.
- The DB9 serial port connector corresponds to 4th and 5th pins of the device's 17-pin interface.
- The open line corresponds to 3rd, 12th, and 13th pins of the device's 17-pin interface.

Caution

The open lines of the supplied 17-pin cable cannot be wired with the SC2000E series device.

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- The 8-pin connector corresponds to other pins of the device's 17-pin interface. You can wire according to the actual demands.

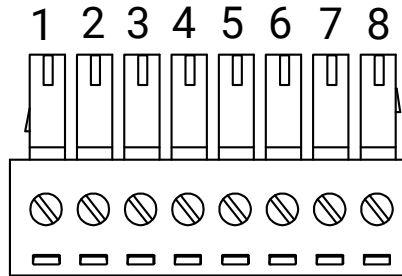










Figure 4-3 8-Pin Connector

Table 4-2 Pin Definitions

No.	Signal	Description	Color	
1	DO_5	--		Brown
2	DO_4	--		Blue
3	DO_3	Non-isolated output		Brown/White
4	DI_2	Non-isolated input		Blue/White
5	DI_1	Can be configured as input or output; input by default		White
6	DI_0	Can be configured as input or output; input by default		Gray
7	GND	Direct current power supply negative		Black
8	POWER_IN	Direct current power supply positive		Red

 **Note**

You should refer to the table above and the label attached to the supplied power and I/O cable to wire the device.

Chapter 5 IO Box and Indicator

5.1 IO Box

The IO box can be used for wiring with pull-up and pull-down resistors when devices connect to the external NPN/PNP devices.

- Device: Connect to the top terminal of the IO box via the supplied cable.
- External device: Connect to the bottom terminal according to the actual demands.
- Pull-up and pull-down resistor: **DOWN** means pull-down resistor, and **UP** means pull-up resistor.

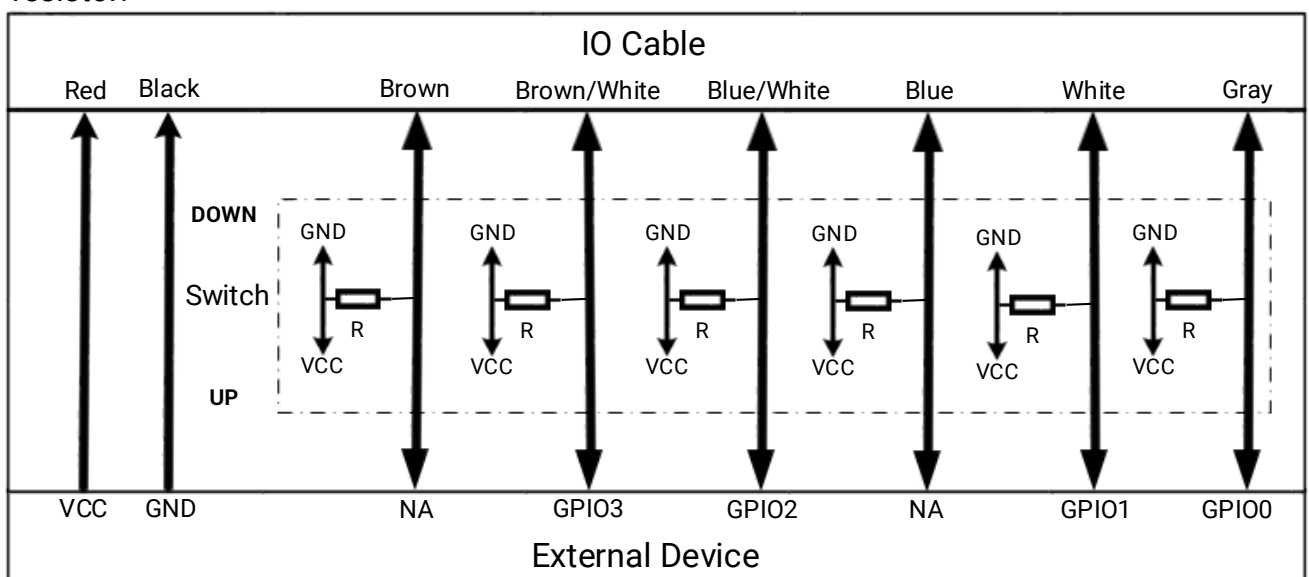


Figure 5-1 IO Box

Note

- Whether the IO box is included in the package may differ by device models. Please refer to the actual one.
- When the pull-up resistor is used to wire with IO box, the voltage of IO box should be the same as that of the device.

5.2 Indicator

The device has three indicators, including PWR indicator, LNK indicator, and STS indicator.

- PWR indicator: It indicates the device's power supply status. The indicator is solid green if the power supply is normal. When exception occurs or the device starts, the indicator is

solid red.


- LNK indicator: It is the network connection indicator, and it is flashing green when the network transmission is normal. Otherwise, it is unlit.
- STS indicator: It indicates the device's status. The indicator is solid green if the project is loading. When exception occurs or the device starts, the indicator is solid red.

Chapter 6 Installation

6.1 Installation Preparation

You need to prepare following accessories before installation.

Table 6-1 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	IO Box	1	<p>It refers to the IO box that is used for wiring with pull-up and pull-down resistors when devices connect to the external NPN/PNP devices.</p> <hr/> <p> Note Whether the IO box is included in the package may differ by device models. Please refer to the actual one.</p> <hr/>

6.2 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 M2 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 supplied 8-pin connector to a power adapter or a switch power supply for power supply.

Chapter 7 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.

7.1 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.

Note

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.

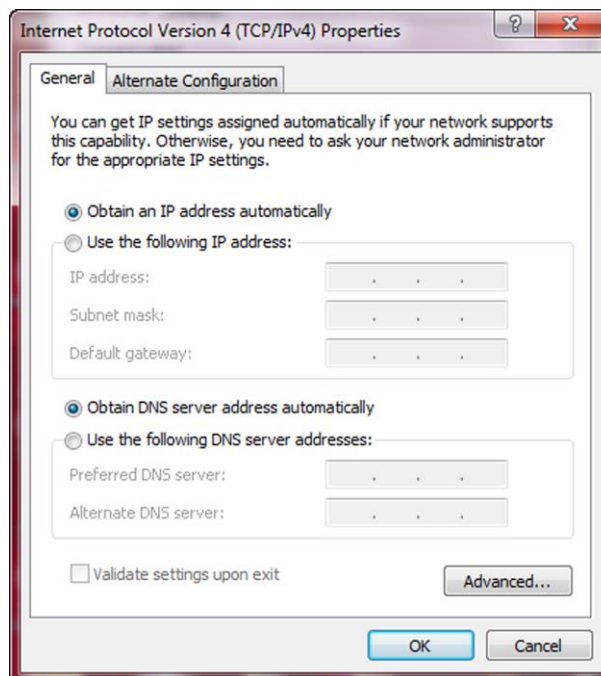


Figure 7-1 Set PC Network

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**.

7.2 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 7-2 Installation Interface

5. Select installation directory and click **Next**.
6. Finish the installation according to the interface prompts.

7.3 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.

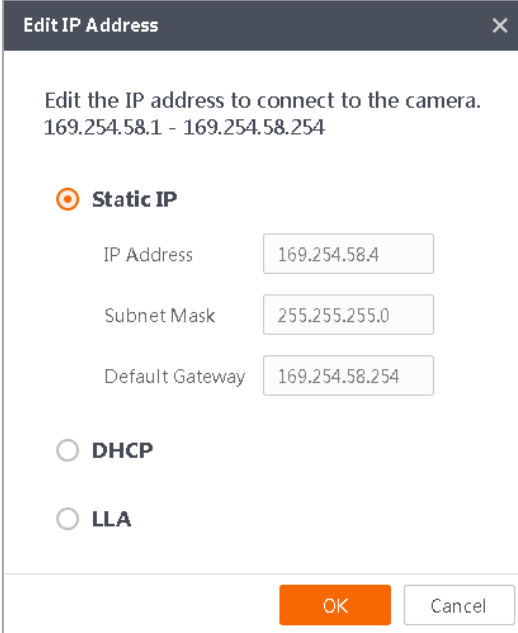


Figure 7-3 Edit IP Address

6. Click **OK**.

7.4 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 7-4 Login Interface

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

Chapter 8 Client Layout and Operation Flow

8.1 Main Window Introduction

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

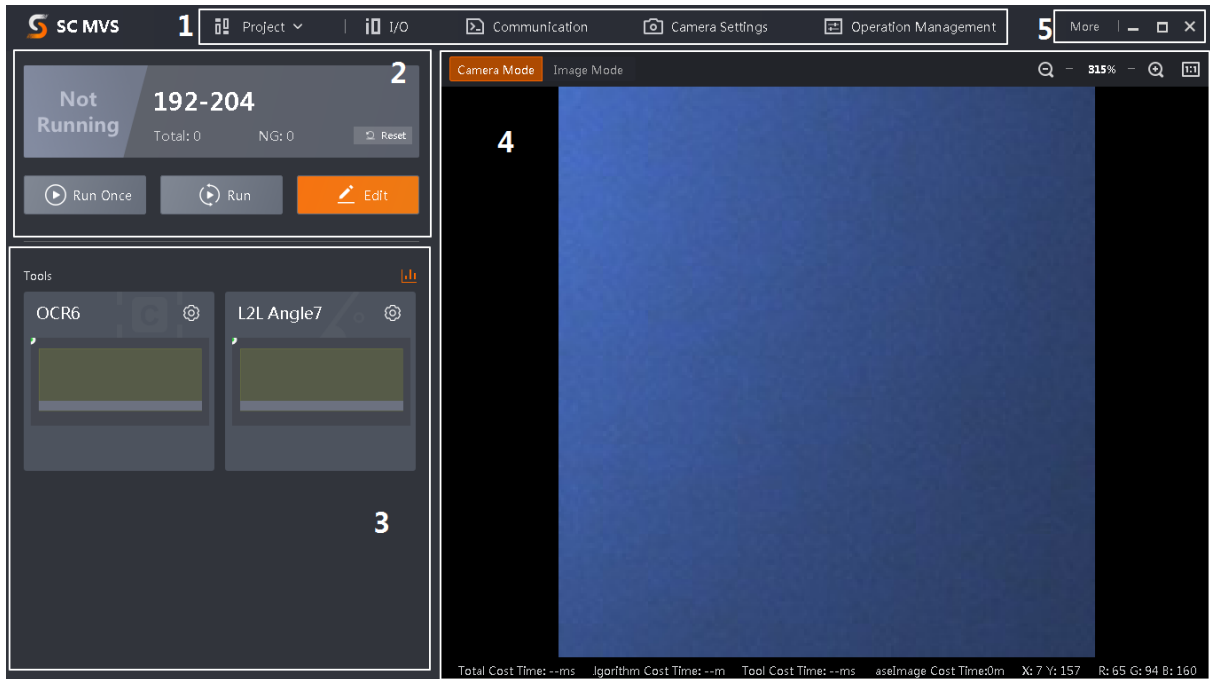


Figure 8-1 Main Window

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 8-1 Main Window Description

No.	Name	Description
1	Menu Bar	The menu bar includes project, I/O settings, communication settings, camera settings, and operation management.
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.

8.2 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.

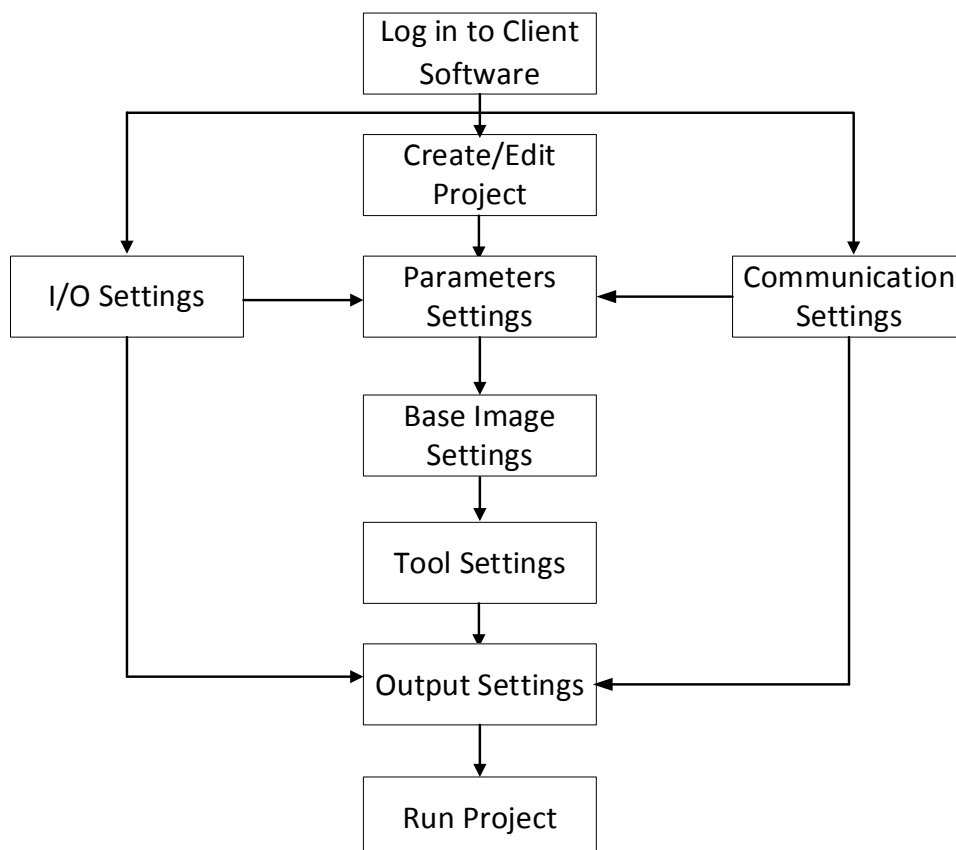


Figure 8-2 Operation Flow

Chapter 9 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 four configurable bi-directional I/Os (Line 0/1/2/3) and one RS-232. The I/O type can be configured as trigger, project switch, or output.

Note

- Only one I/O signal can be configured as trigger.
- By default, the I/O type of Line 0 is trigger, the I/O type of Line 1 is used to switch project, and the I/O type of Line 2/3 is output.

9.1 Bi-Directional Signal

The device has four bi-directional I/O (Line 0/1/2/3) and you can set them as input signal or output signal according to demands.

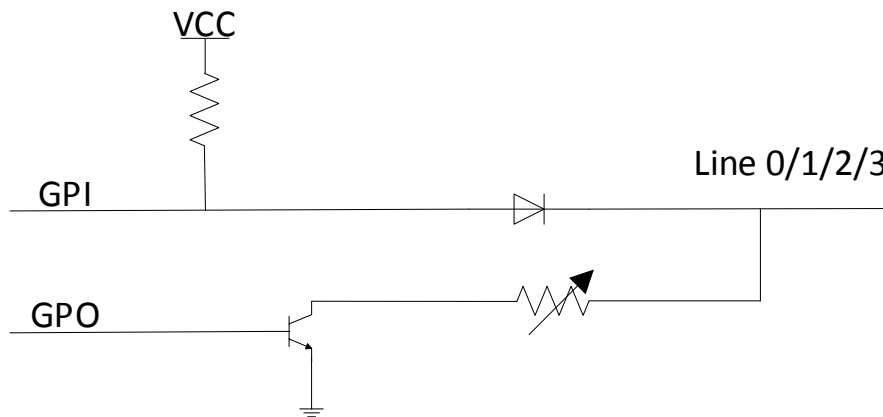


Figure 9-1 Internal Circuit of Bi-Directional Signal

9.1.1 Configure as Input Signal

If the bi-directional I/O is configured as input signal, and its logic level and electrical feature are shown below.

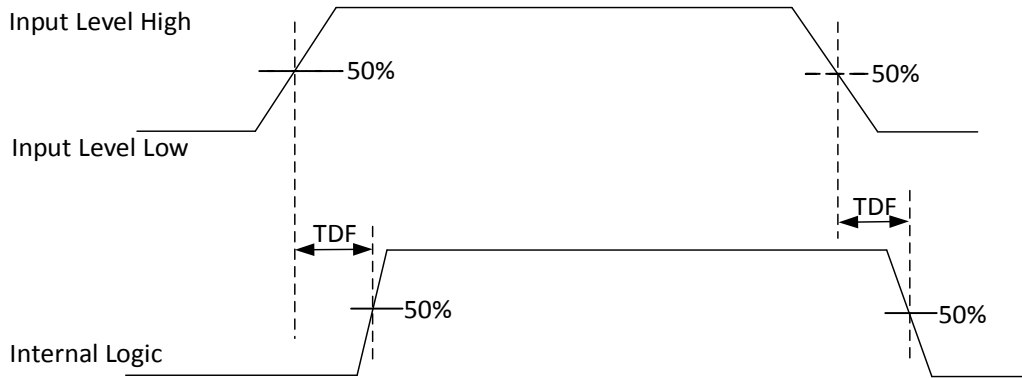


Figure 9-2 Input Logic Level

Table 9-1 Input Electrical Feature

Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	1 VDC
Input Logic Level High	VH	2 VDC
Input Falling Delay	TDF	200 ns
Input Rising Delay	TDR	1 μs

9.1.2 Configure as Output Signal

If the bi-directional I/O is configured as output signal, its output signal polarity is NPN, and its logic level and electrical feature are shown below.

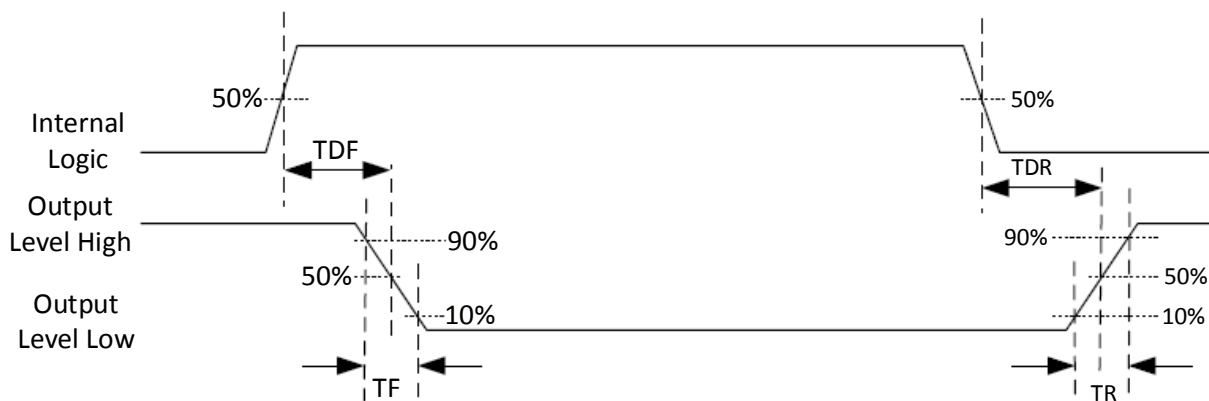


Figure 9-3 Output Logic Level

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

Table 9-2 Output Electrical Feature

Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	500 mV
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 9-3 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

9.2 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 IO box.
 - Here we take Line 2 as an example to introduce I/O wiring.
 - 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.
-

9.2.1 Input Wiring

Note

Input signal wiring may differ by external device types.

PNP Device

If you use the pull-down resistor of the supplied IO box, the wiring is shown below.

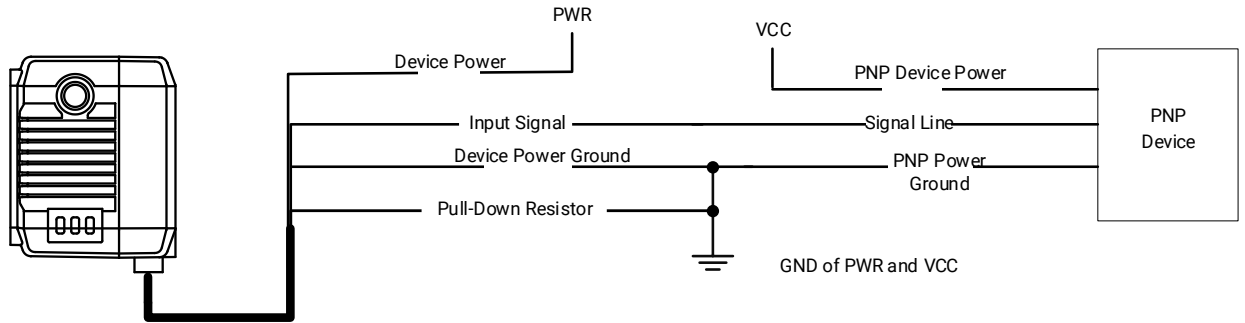


Figure 9-4 Input Signal Connecting to PNP Device (Pull-Down Resistor of IO Box Used)

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

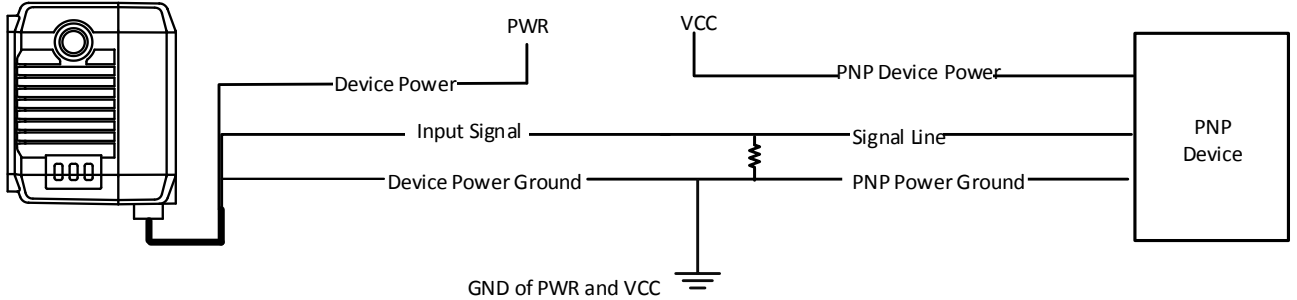


Figure 9-5 Input Signal Connecting to PNP Device (External Pull-Down Resistor Used)

NPN Device

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

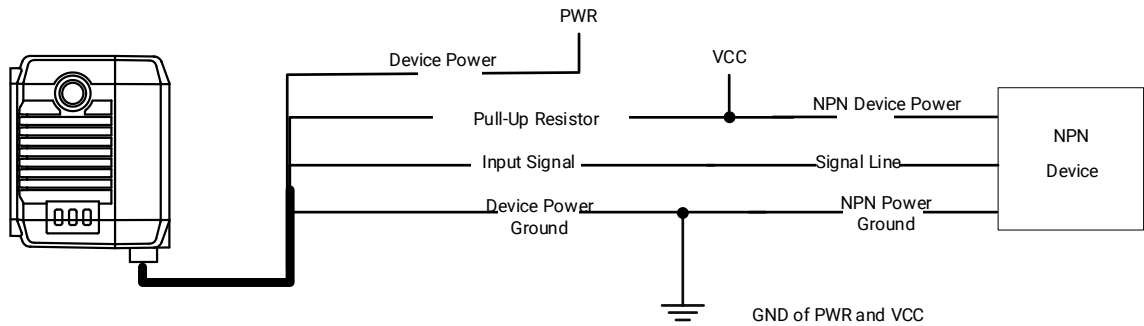


Figure 9-6 Input Signal Connecting to NPN Device (Pull-Up Resistor of IO Box Used)

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.

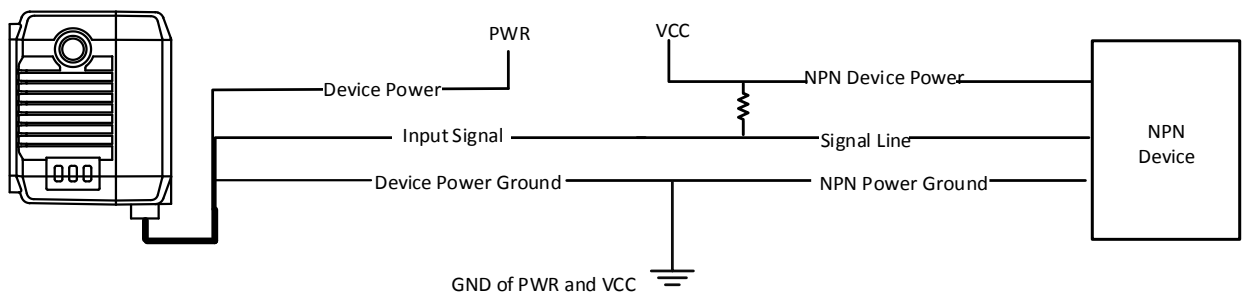


Figure 9-7 Input Signal Connecting to NPN Device (External Pull-Up Resistor Used)

Switch

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

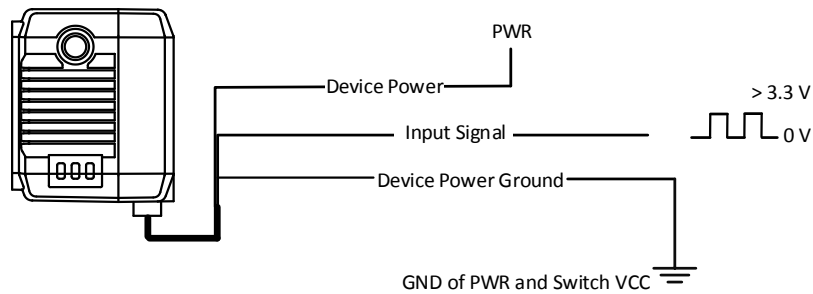


Figure 9-8 Input Signal Connecting to Switch

9.2.2 Output Wiring

Note

Output signal wiring may differ by external device types.

PNP Device

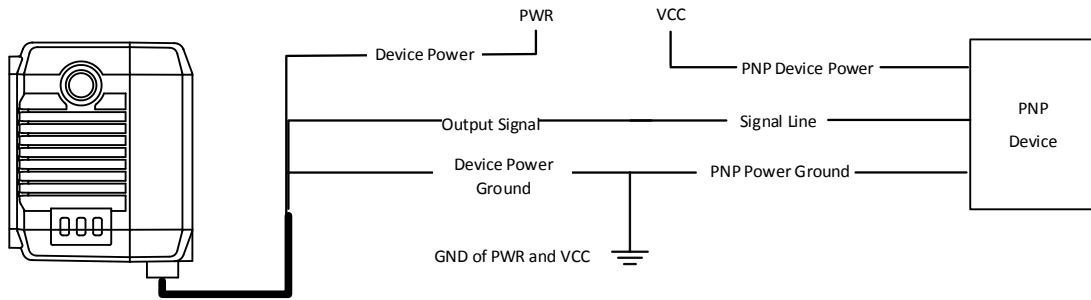


Figure 9-9 Output Signal Connecting to PNP Device

NPN Device

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

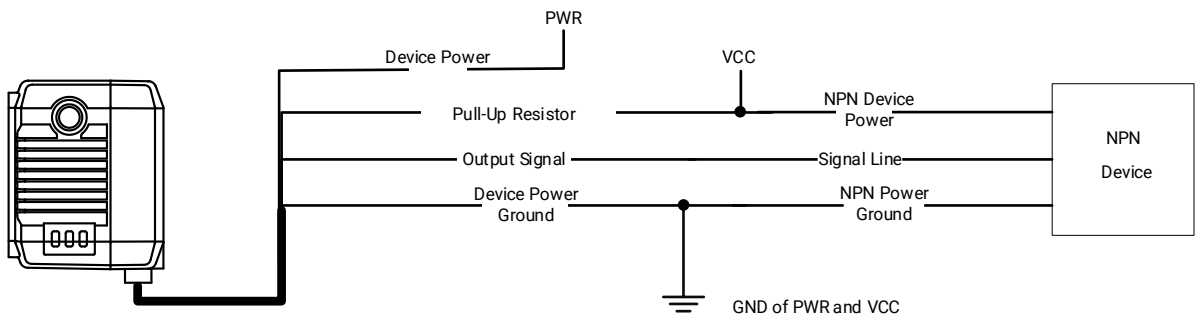


Figure 9-10 Output Signal Connecting to NPN Device (Pull-Up Resistor of IO Box Used)

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 KΩ pull-up resistor.

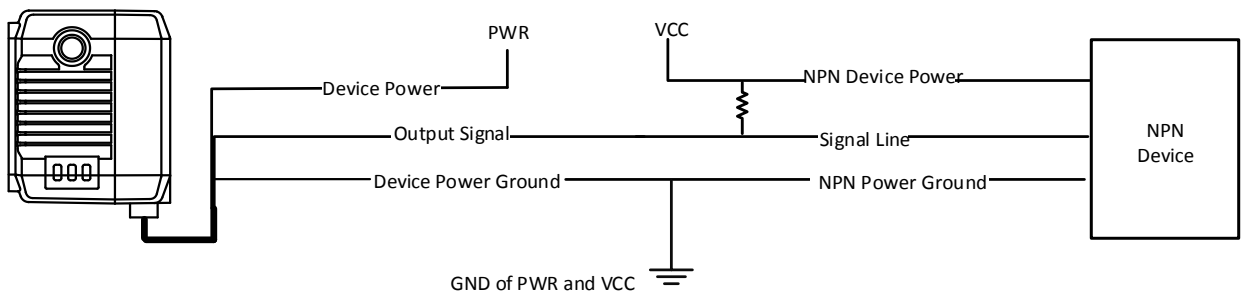


Figure 9-11 Output Signal Connecting to NPN Device (External Pull-Up Resistor Used)

9.3 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 a DB9 RS-232 serial port. Refer to the figure and table below for pin definitions.

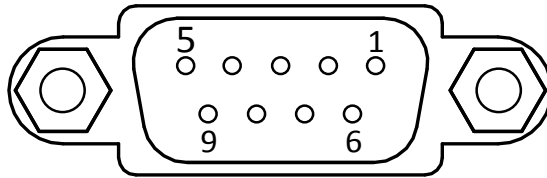


Figure 9-12 DB9 Serial Port Connector

Table 9-4 Pin Definitions

Pin No.	Name	Description
2	TX	Transmits data
3	RX	Receives data
5	GND	Signal ground

Chapter 10 FAQ (Frequently Asked Question)

10.1 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.

10.2 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.

10.3 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.

10.4 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.

10.5 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.



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