SC2000E(Mini) Series Vision Sensor

Quick Start Guide

Legal Information

About this Manual

The Manual includes instructions for using and managing the Product. Pictures, charts, images and all other information hereinafter are for description and explanation only. The information contained in the Manual is subject to change, without notice, due to firmware updates or other reasons. Please find the latest version of this Manual at the Hikrobot website (***https://en.hikrobotics.com***). Please use this Manual with the guidance and assistance of professionals trained in supporting the Product.

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Regulatory Information

⌐ⁱ**Note**

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

FCC Information

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

FCC compliance: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference 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.

—Reorient or relocate the receiving antenna.

—Increase the separation between the equipment and receiver.

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

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

FCC Conditions

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

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

EU Conformity Statement

CE

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 RoHS Directive 2011/65/EU.

2012/19/EU (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: *http://www.recyclethis.info*

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*

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(Mini) Series Vision Sensor.

Safety Instruction

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

Laws and Regulations

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

Power Supply

- When wiring or dismounting, make sure that the device power is cut off, and do not operate under electrification.
- Avoid contact with exposed circuit. When the device is powered on, avoid contact with

exposed junctions and parts.
- DO NOT connect multiple devices to one power adapter, to avoid over-heating or fire hazards caused by overload.
- Make sure the plug is properly connected to the power socket.

Transportation

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

Using Environment

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

Electrostatic Protection

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

Maintenance

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

Cleaning

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

Installation

Please do not install the product on vibrating surface or places that are vulnerable to impact.

Personnel Requirement

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

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

Contact Information

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Website: *https://en.hikrobotics.com/*

Contents

Chapter 1 Overview

1.1 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.

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.
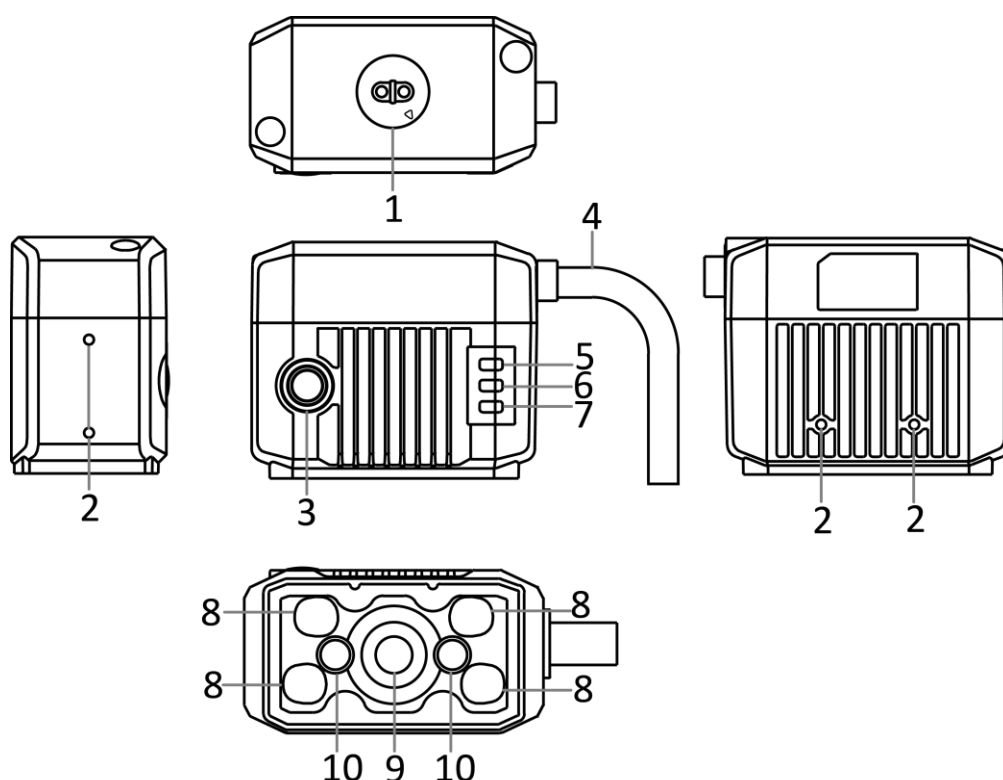
Figure 2-1 Appearance

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 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. The indicator is flashing green when the network transmission is normal. Otherwise, it is unlit.

No.	Name	Description
6	STS Indicator	It is a status indicator. The indicator is green when the solution loads normally. When the device starts or loading the solution fails, it is red.
7	PWR Indicator	It is a power indicator. The indicator is green when the device operates normally. When the device starts or exception occurs, it is red.
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 3 17-Pin Interface and Cable

3.1 17-Pin Interface

Read the following section to get definitions of 17-pin interface.
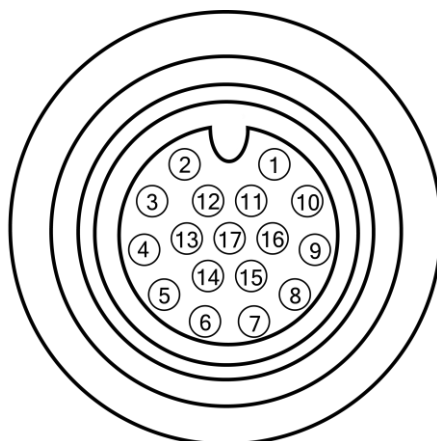
Figure 3-1 17-Pin Interface

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	DB9 serial port
5	RS232_RX	--	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	GPIO2	Line 2+	Bi-directional I/O, and it is output by default.	Blue/white open cable
9	--	--	--	--

No.	Signal	I/O Signal Source	Description	Supplied Cable
10	GPIO3	Line 3+	Bi-directional I/O, and it is output by default.	Brown/white open 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	GPIO0	Line 0+	Bi-directional I/O, and it is the trigger by default.	Gray open cable
17	GPIO1	Line 1+	Bi-directional I/O, and it is used to switch solutions by default.	White open cable

3.2 17-Pin Cable

You should use the supplied 17-pin cable to wire the device. The cable has a DB9 serial port connector that corresponds to 4th and 5th pins of the device's 17-pin interface, and a RJ45 connector that corresponds to 6th, 7th, 14th, and 15th pins of the 17-pin interface.

⚠️**Caution**

You cannot use the 12 V power plug of the DB9 serial port connector and power supply open line to power the device at the same time. Otherwise, damaging to the power supply may occur.
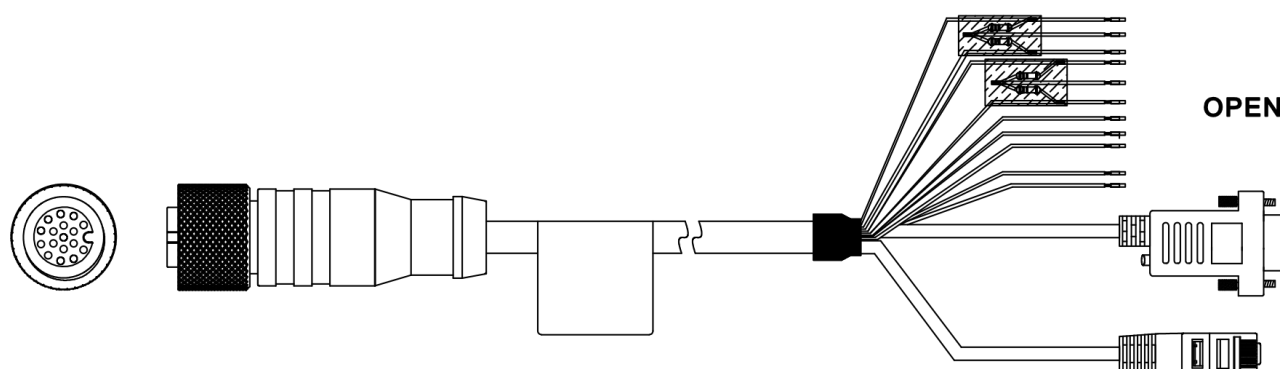
OPEN

Figure 3-2 17-Pin Cable

☐**i****Note**

- The open lines of the supplied 17-pin cable can be wired according to the actual demands.
- Two lines of the supplied 17-pin cable does not correspond to the device's 17-pin interface. The pink line is Line 0/1's pull-up and pull-down resistor, and the purple/white line is Line 2/3'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	Network Cable	1	It refers to category 5 network cable or above. You need to purchase separately.
3	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.
4	Screw Package	1	It refers to the supplied M2 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 M2 screws to fix the device to the installation position.
2. Use the supplied 17-pin cable to wire the device to a suitable power adapter or switch power supply.
3. Use the network cable to connect the device via the 17-pin cable's RJ45 connector to a switch or a network interface card.

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 Install Client Software

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

ℹ️Note

- 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.
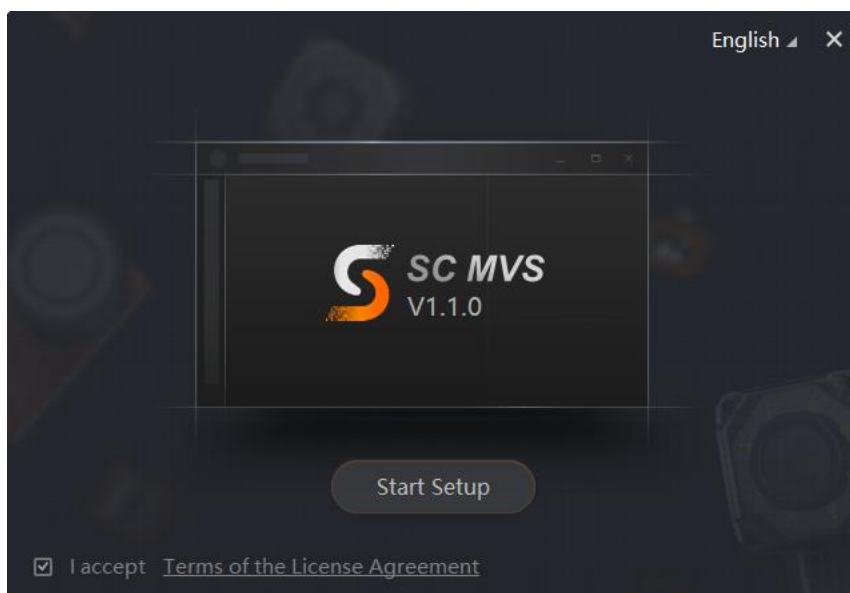3. Read and check **Terms of the License Agreement**.
4. Click **Start Setup**.

Figure 5-1 Installation Interface

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

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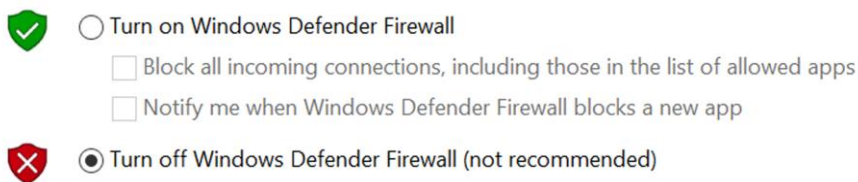3. Select **Turn off Windows Defender Firewall (not recommended)**.

Figure 5-2 Windows Defender Firewall

4. Click **OK**.

5.3 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

> **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.
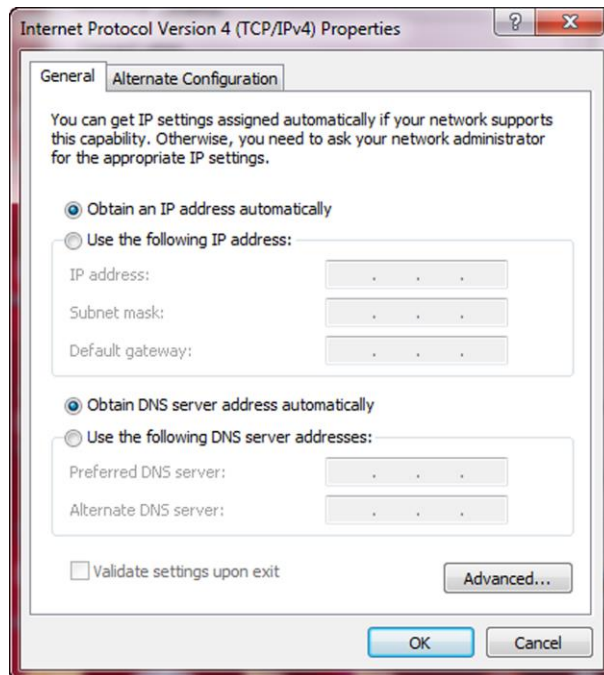

Figure 5-3 Set PC Network

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**.

5.4 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.
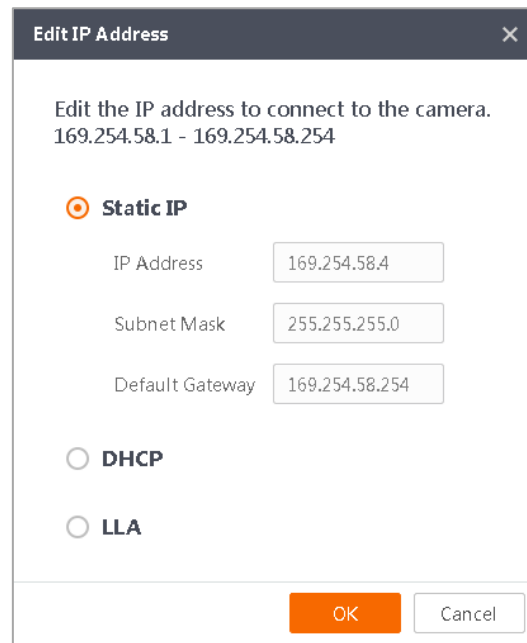
Figure 5-4 Edit IP Address

6. Click **OK**.

5.5 Login

□**i****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.

Chapter 6 Client Layout and Operation Flow

6.1 Main Window Introduction
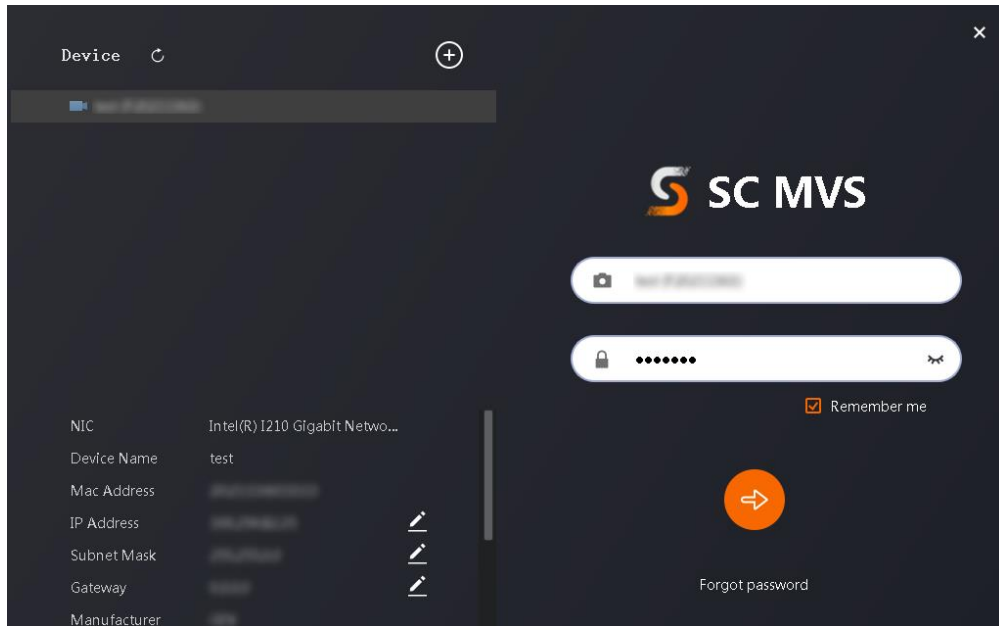
After logging into the client software, you can see the main window as shown below.
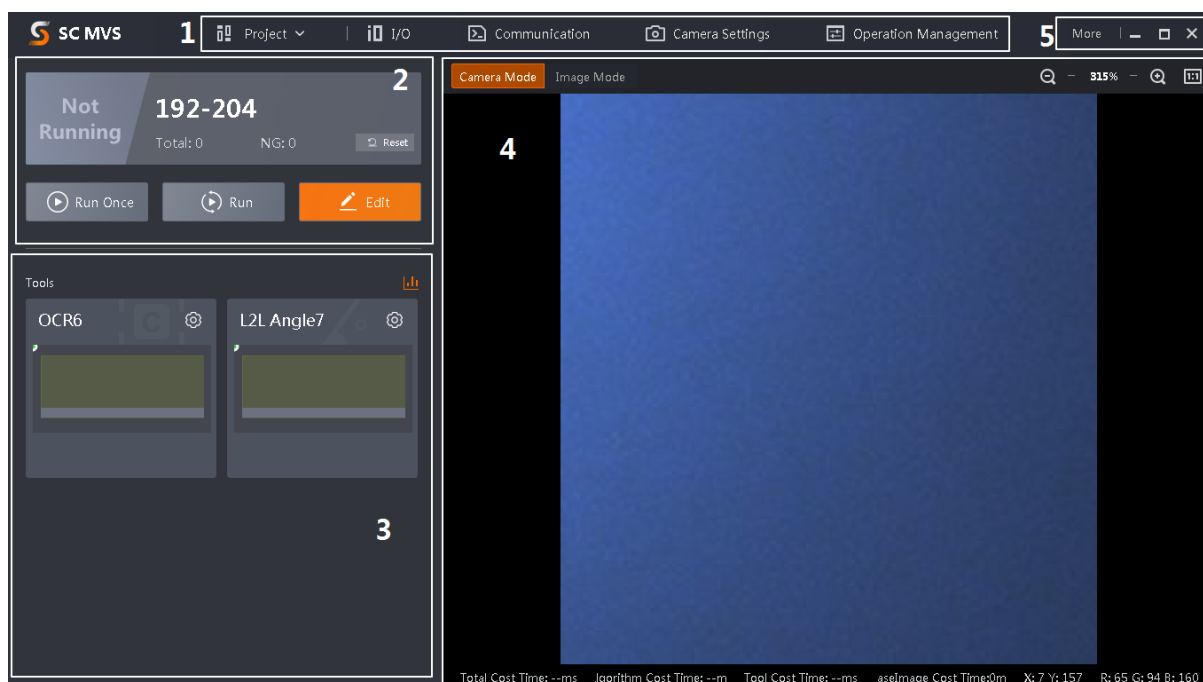
Figure 6-1 Main Window

📖**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, 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.

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.
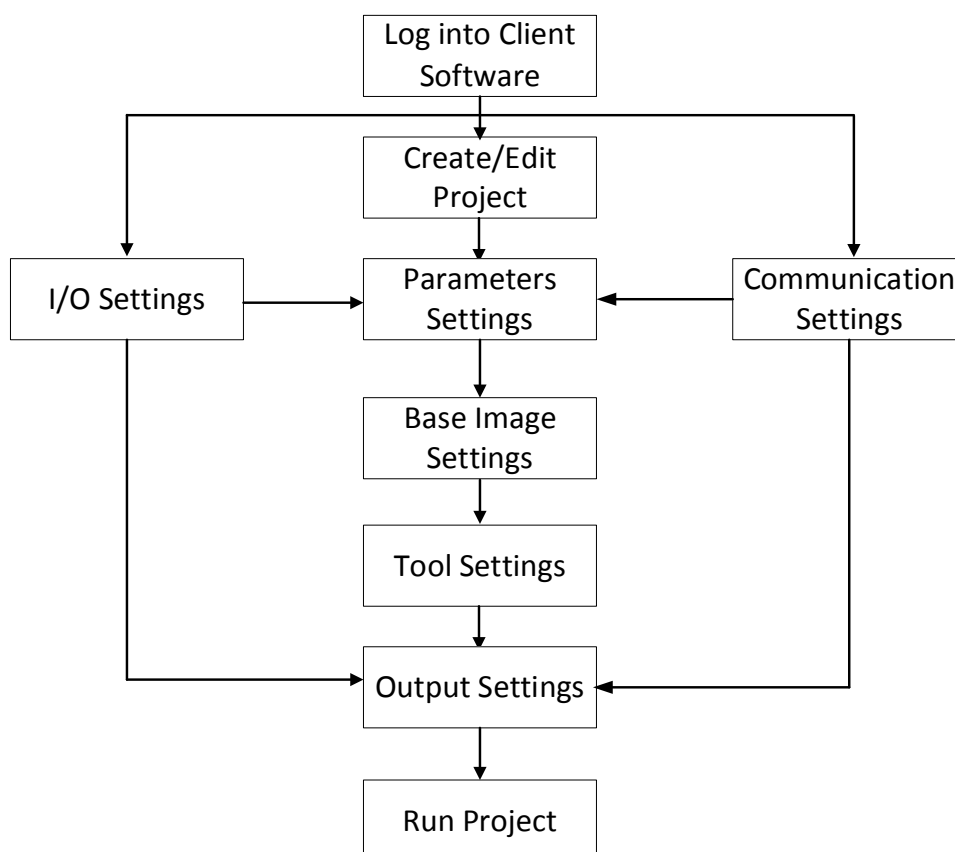
```
                    ┌─────────────────┐
                    │ Log into Client │
                    │    Software     │
                    └─────────────────┘
                             │
                    ┌─────────────────┐
                    │   Create/Edit   │
                    │     Project     │
                    └─────────────────┘
                             │
┌──────────────┐    ┌─────────────────┐    ┌─────────────────┐
│ I/O Settings │───▶│   Parameters    │◀───│ Communication   │
│              │    │    Settings     │    │    Settings     │
└──────────────┘    └─────────────────┘    └─────────────────┘
                             │
                    ┌─────────────────┐
                    │   Base Image    │
                    │    Settings     │
                    └─────────────────┘
                             │
                    ┌─────────────────┐
                    │  Tool Settings  │
                    └─────────────────┘
                             │
                    ┌─────────────────┐
                    │ Output Settings │◀──
                    └─────────────────┘
                             │
                    ┌─────────────────┐
                    │   Run Project   │
                    └─────────────────┘
```

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 four configurable bi-directional I/O (Line 0/1/2/3) and one RS-232. The I/O type can be configured as trigger, switch solution 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 solution, and the I/O type of Line 2/3 is output.

7.1 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.
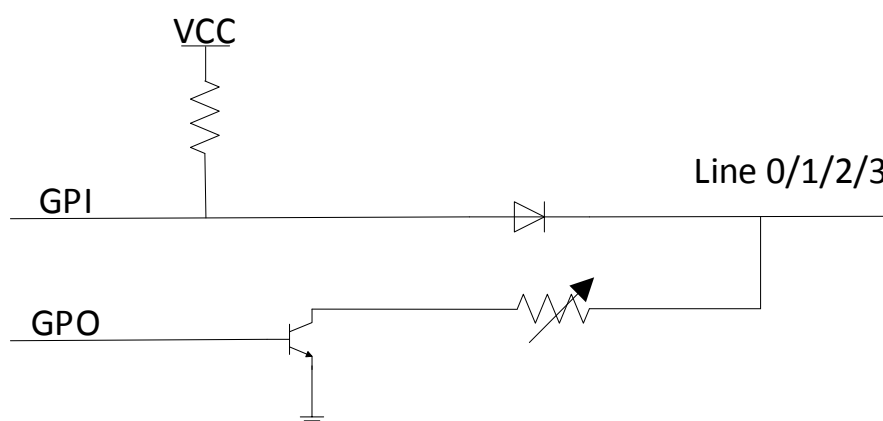

Figure 7-1 Internal Circuit of Bi-Directional Signal

7.1.1 Configure as Input Signal

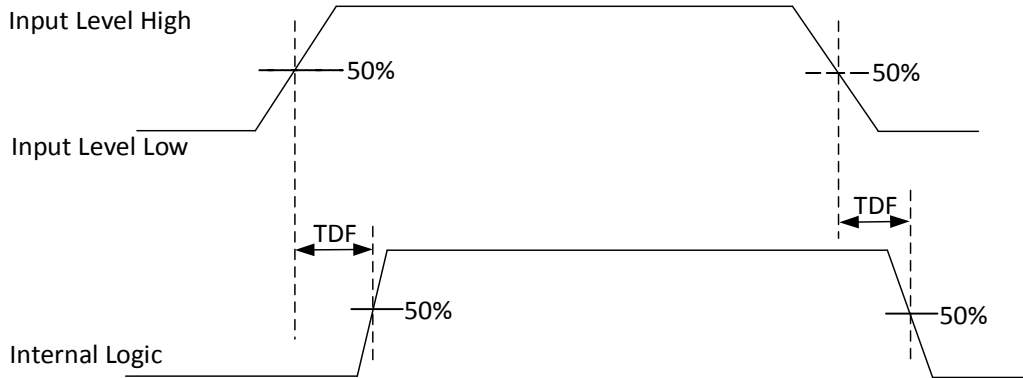If the bi-directional I/O is configured as input signal, and its logic level and electrical feature are shown below.

Figure 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
Input Falling Delay	TDF	200 ns
Input Rising Delay	TDR	1 µs

7.1.2 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.
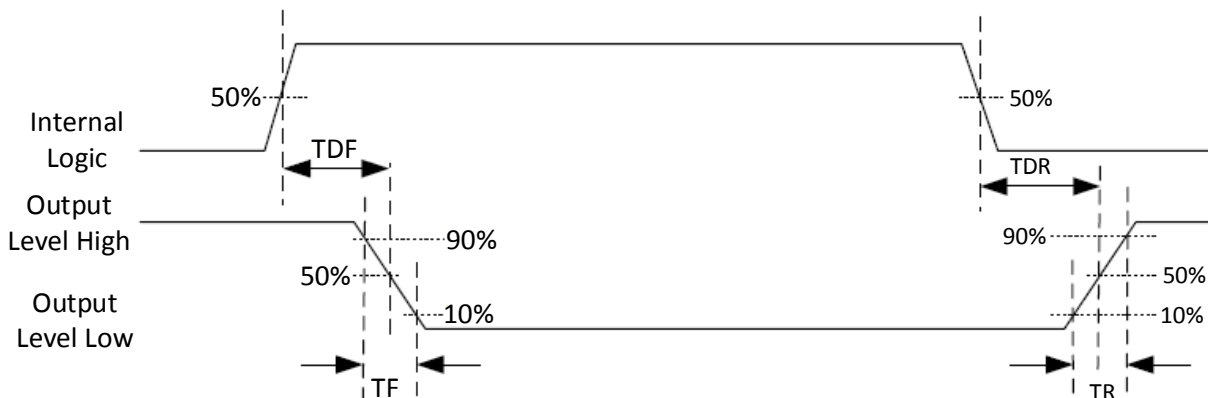

Figure 7-3 Output Logic Level

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

Table 7-2 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 µs
Output Falling Time	TF	116 ns
Output Rising Time	TR	3.8 µs

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

7.2 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.

[i]**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.
- 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.

7.2.1 Input Wiring

> **Note**
> Input signal wiring may differ by external device types.

PNP Device

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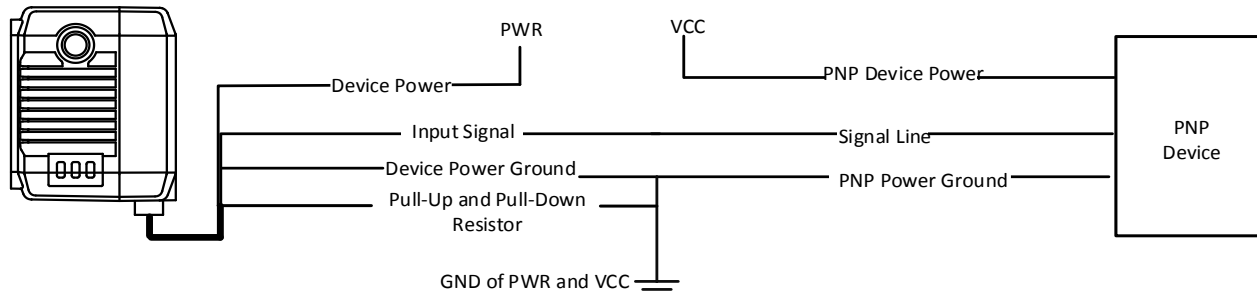

Figure 7-4 Input Signal Connecting to PNP Device (Pull-Down Resistor of 17-Pin Cable Used)

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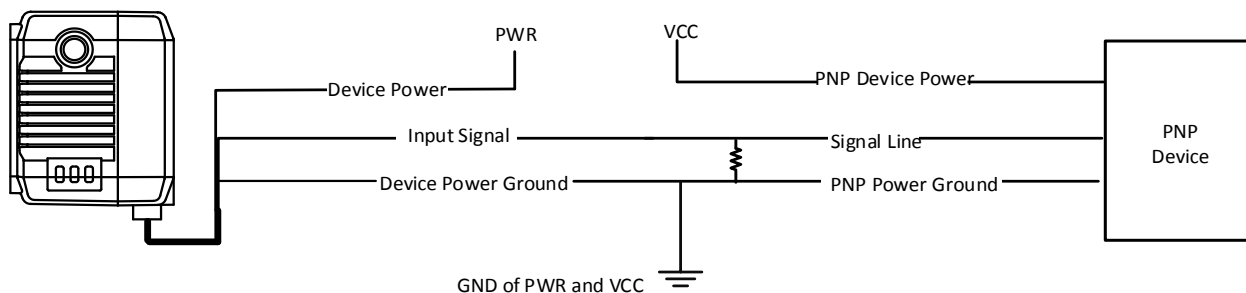

Figure 7-5 Input Signal Connecting to PNP Device (External Pull-Down Resistor Used)

NPN Device

If the VCC of NPN device is 12 VDC or 24 VDC, and the pull-up resistor of the supplied 17-pin cable is used.
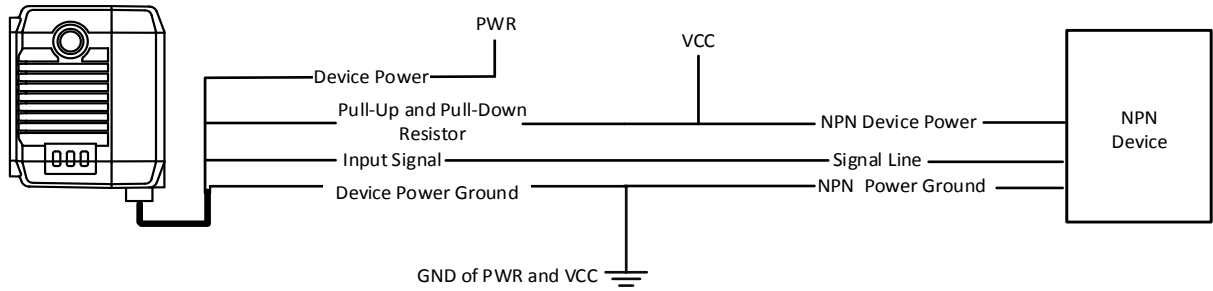
Figure 7-6 Input Signal Connecting to NPN Device (Pull-Up Resistor of 17-Pin Cable Used)

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 KΩ pull-up resistor.
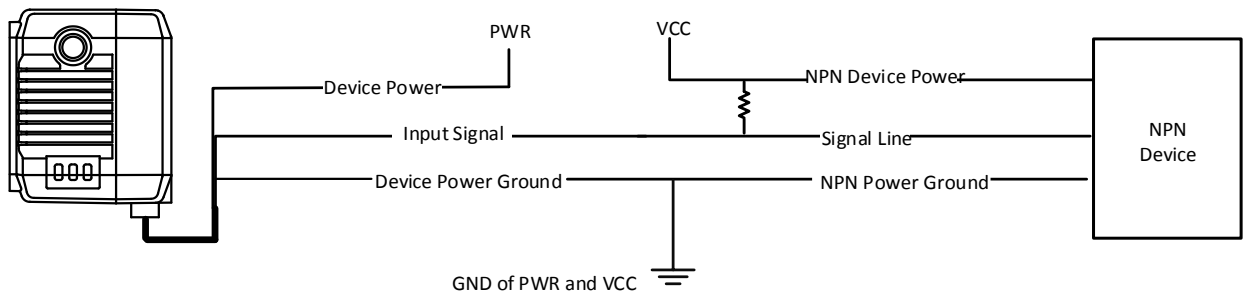

Figure 7-7 Input Signal Connecting to NPN Device (External Pull-Up Resistor Used)

Switch

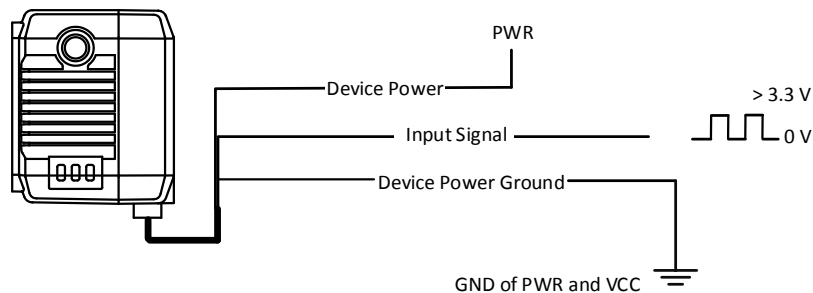If the input signal is switch, and its wiring is shown below.

Figure 7-8 Input Signal Connecting to Switch

7.2.2 Output Wiring

ⓘ**Note**

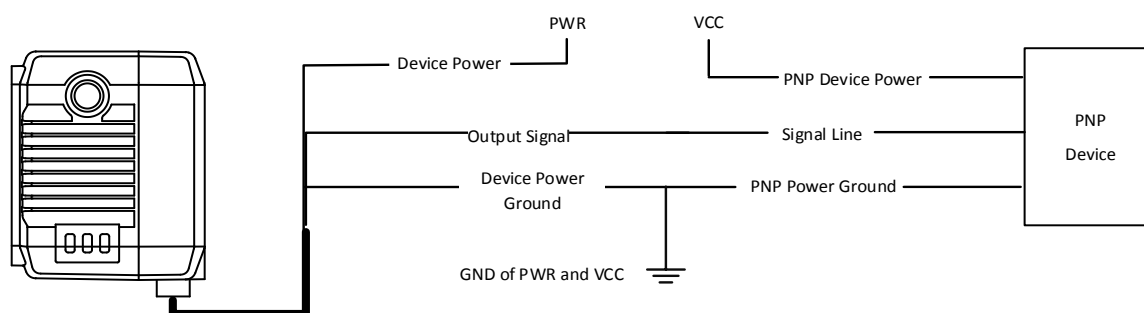Output signal wiring may differ by external device types.

PNP Device

Figure 7-9 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 17-pin cable is used.
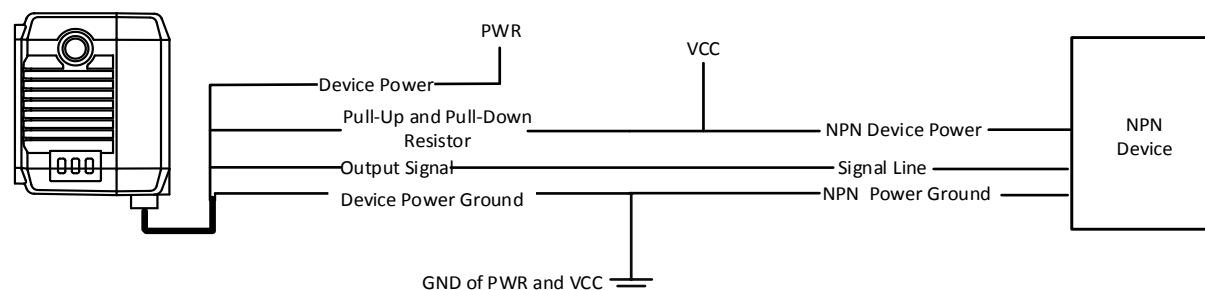

Figure 7-10 Output Signal Connecting to NPN Device (Pull-Up Resistor of 17-Pin Cable Used)

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 KΩ pull-up resistor.
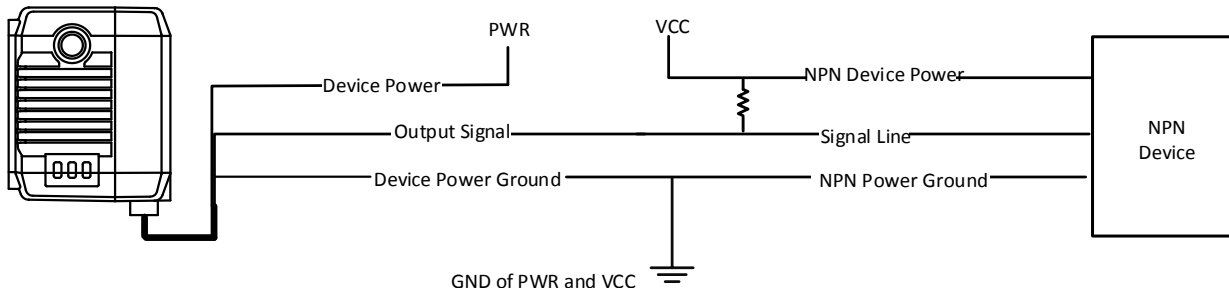

Figure 7-11 Output Signal Connecting to NPN Device (External Pull-Up Resistor Used)

7.3 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.
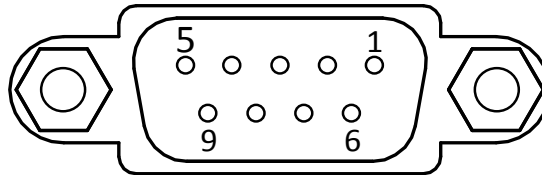

Figure 7-12 DB9 Serial Port Connector

Table 7-4 Pin Definitions

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

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

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