SC7000Pro Series Smart Camera

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

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 in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

● 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:

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

EU Conformity Statement

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, LVD Directive 2014/35/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
⚠Danger	Indicates a hazardous situation which, if not avoided, will or could 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 SC7000Pro Series Smart Camera.

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

Hangzhou Hikrobot Co., Ltd.
E-mail: tech_support@hikrobotics.com
Website: https://en.hikrobotics.com/

Contents

Chapter 1 Overview

1.1 Introduction

SC7000Pro series smart camera uses the sensor and optical components to acquire images, and adopts built-in deep learning algorithms to realize character and object recognition, object sorting, etc. It can be easily configured and operated via the SCMVS client software, and uses Ethernet to output vision tool results and customized results. SC7000Pro series smart camera is applicable to the consumer electronics, food and beverage, pharmaceutical, automobile industry, etc.

1.2 Key Feature

- Built-in deep learning algorithms to realize character and object recognition, object sorting, etc.
- Integrates general vision algorithms to achieve location, measurement, recognition, etc.
- Supports mechanical autofocus function to achieve fast debugging and configuration.
- Big memory and storage support image savings in loop with high performance.
- Adopts multiple I/O interfaces for controlling.
- Supports multiple communication protocols.
- Supports indicators displaying device status.

Note
- Key feature may differ by device models.
- Refer to the device's specification for detailed parameters.

Chapter 2 Appearance

Note

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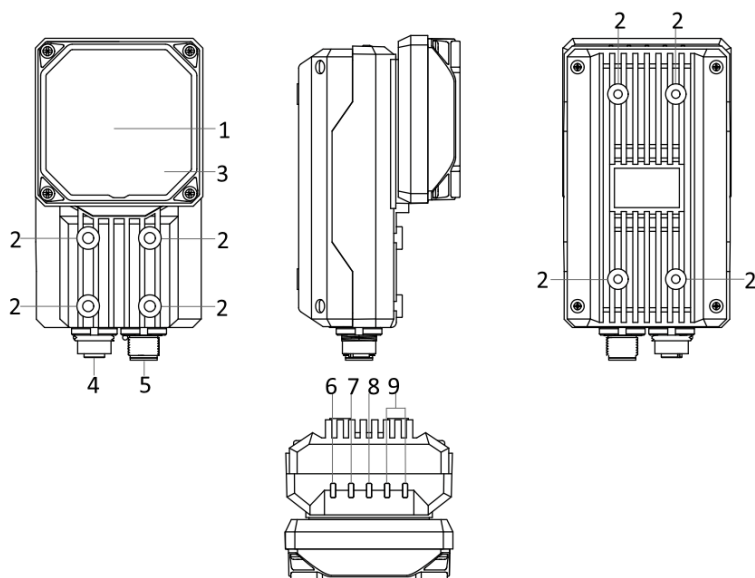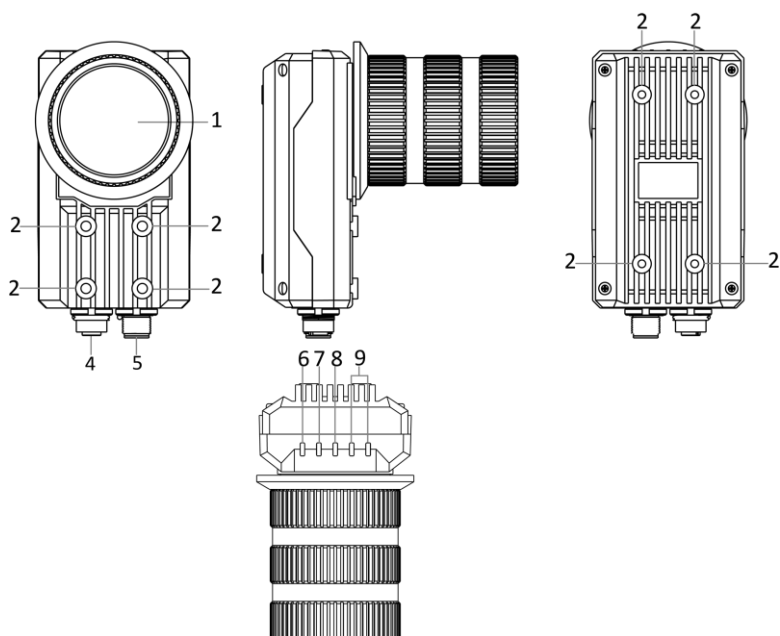

Figure 2-1 Appearance (Type I)

Figure 2-2 Appearance (Type II)

Table 2-1 Component Description

No.	Name	Description
1	Lens Cap	It can be replaced with other lens cap.
2	Screw Hole	It is used to fix the device to the installation position. It is recommended to use supplied M4 screws.
3	Light Source	It refers to LED lamps providing light. 📖**Note** ● The default color of LED lamps is white. Red, blue and NIR are optional. ● The type II device does not have own light source, and you can use an external light source instead.
4	Gigabit Ethernet Interface	It refers to gigabit Ethernet interface for transmitting data. The interface is designed with screw threads to tighten connection between the device and cable, and thus avoiding influence caused by vibration.
5	12-Pin M12 Interface	It provides power, input/output, and serial port signal. The interface is designed with screw threads to tighten connection between the device and cable, and thus avoiding influence caused by vibration.
6	PWR Indicator	It is the power indicator. The indicator is solid blue when the device operates normally.
7	LNK Indicator	It is network connection indicator. The indicator is solid green when the network transmission is normal.
8	ACT Indicator	It is network transmission indicator. The indicator is flashing yellow when the network transmission is normal. The flashing speed is related with data transmission speed.
9	U1/U2 Indicator	The device has 2 user indicators, U1 and U2. They are used to indicate whether some functions of the device are normal or not.

Chapter 3 12-Pin Interface and Indicator

3.1 12-Pin Interface

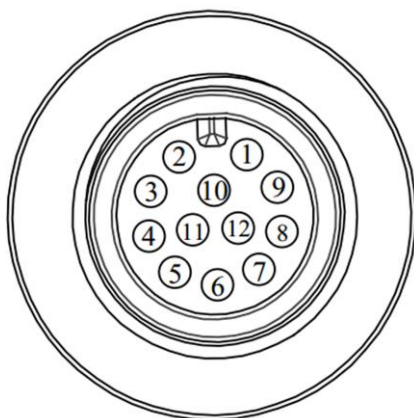Read the following section to get definitions of 12-pin M12 interface.

Figure 3-1 12-Pin M12 Interface

Table 3-1 Pin Definitions

No.	Signal	I/O Signal Source	Description
1	DC-PWR	--	Direct current power supply positive
2	GND	--	Power supply ground
3	OPTO_OUT0	Line 3 signal line	Opto-isolated output 3
4	OPTO_OUT1	Line 4 signal line	Opto-isolated output 4
5	OPTO_OUT2	Line 5 signal line	Opto-isolated output 5
6	OUT_COM	Line 3/4/5 signal ground	Output signal ground
7	OPTO_IN0	Line 0 signal line	Opto-isolated input 0
8	OPTO_IN1	Line 1 signal line	Opto-isolated input 1
9	OPTO_IN2	Line 2 signal line	Opto-isolated input 2
10	IN_COM	Line 0/1/2 signal ground	Input signal ground
11	RS-232_R	--	RS-232 serial port input
12	RS-232_T	--	RS-232 serial port output

⎕**i****Note**

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

3.2 Indicator

The device has five indicators, including PWR, LNK, ACK, U1 and U2 indicators. Read following sections to get the indicator status of the device.

- PWR indicator: It is the power indicator, and it is solid blue when the device operates normally.
- LNK indictor: It is the network connection indicator, and it is solid green when the network transmission is normal.
- ACK indictor: It is the network transmission indicator, and it is flashing yellow when the network transmission is normal. The flashing speed is related with data transmission speed.
- U1 indicator: It is user indicator 1. The indicator is solid red after the device creates Profinet communication.
- U2 indicator: It is user indicator 2. The indicator is slow flashing blue after the device is powered on.

Table 3-2 Indicator Status Definition

Status	Description
Solid	The indicator is in solid all the time.
Unlit	The indicator is unlit all the time.
Fast flashing	Flashing interval: 200 to 300 ms
Slow flashing	Flashing interval: 1000 ms
Very slow flashing	Flashing interval: 2000 ms

Chapter 4 Installation

4.1 Installation Preparation

You need to prepare following accessories before installation.

Table 4-1 Accessories

No.	Name	Quantity	Description
1	Lens	1	Some models of the device do not have lens. You need to purchase lens separately.
2	Lens Cap	1	The device has equipped with transparent lens cap by default. For some models of the device, you can use half or full polarization lens cap.
3	Light Source	1	Some models of the device have equipped with white LED lamps by default. Red, blue, or NIR light source is optional.
4	Power and I/O Cable	1	It refers to the 12-pin power and I/O cable.
5	Network Cable	1	It refers to the GigE network cable with an aviation connector.
6	DC Switch Power Supply	1	You need to purchase the DC switch power supply that meets the device's power supply and consumption requirement.

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 the related devices are powered off during the installation.

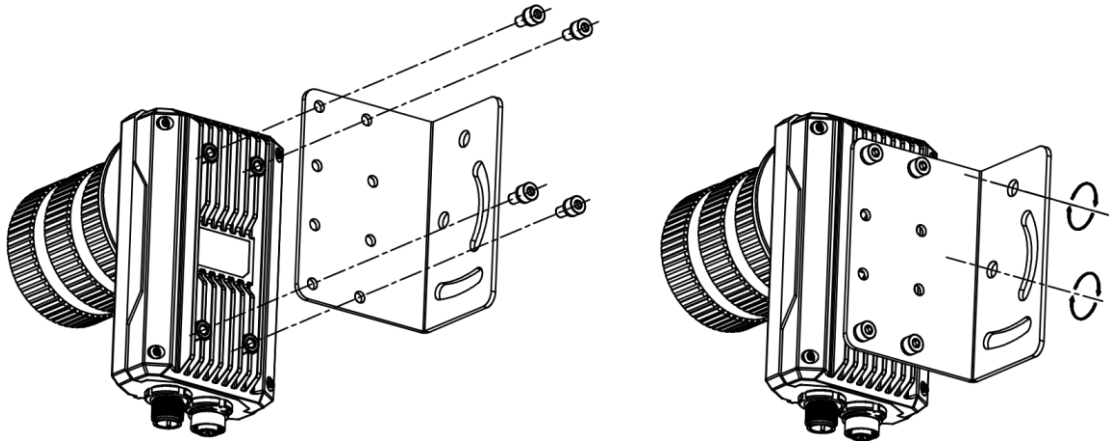⬚ⁱ**Note**

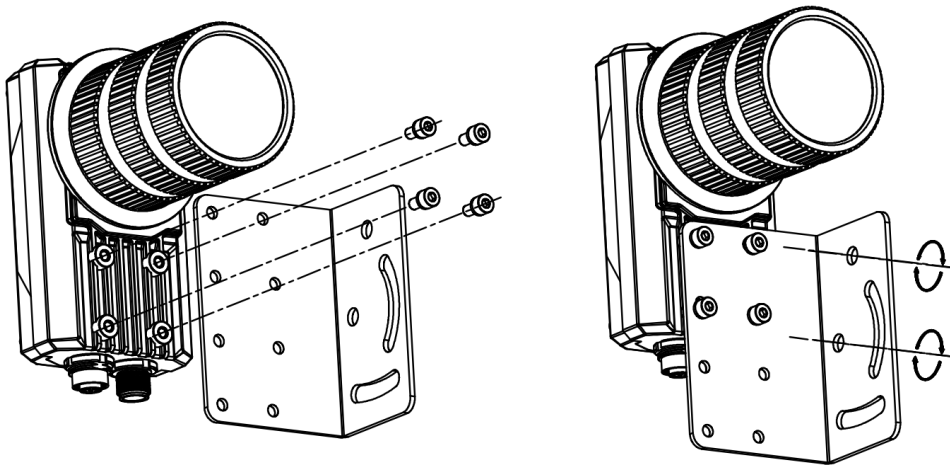Here we take type II device as an example to introduce the installation process.

Steps

1. Use M4 screw to fix the device to fixed bracket.
2. Select one of installation methods, and install the device to the installation position.
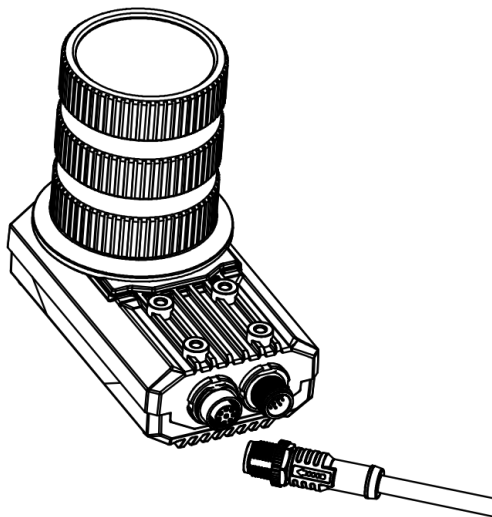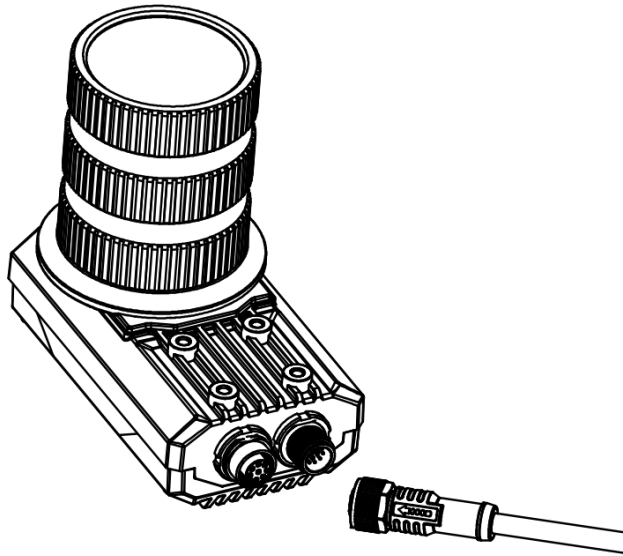
Figure 4-1 Rear Installation

Figure 4-2 Front Installation

3. Use the GigE network cable with RJ45 aviation connector to connect the device to a switch or a network interface card.

Figure 4-3 Network Cable Wiring

4. Use the power and I/O cable to connect the device to a DC switch power supply.

Figure 4-4 Power and I/O Wiring

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

ⓘ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.
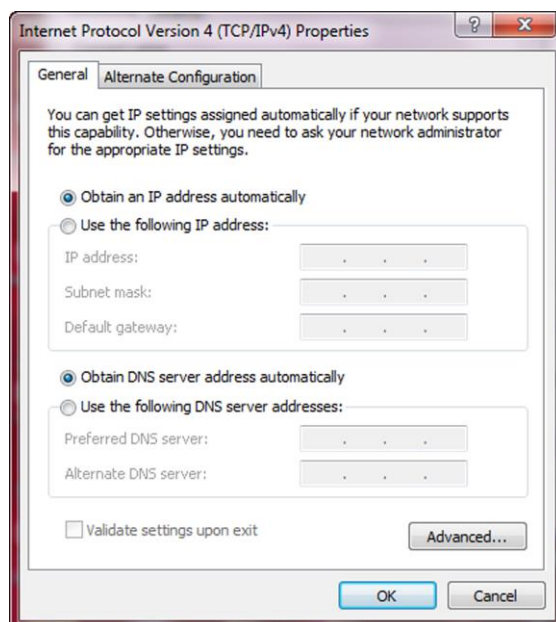● Or select **Use the following IP address** to set an IP address for the PC manually.

Figure 5-1 Set PC Network

⬚**i**Note

It is recommended to use the static IP address to reduce time for searching the device.

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 **Advanced**.
    3) Set **Jumbo Packet** value to **9014 Bytes**.

5.2 Install Client Software

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

⬚**i**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**.
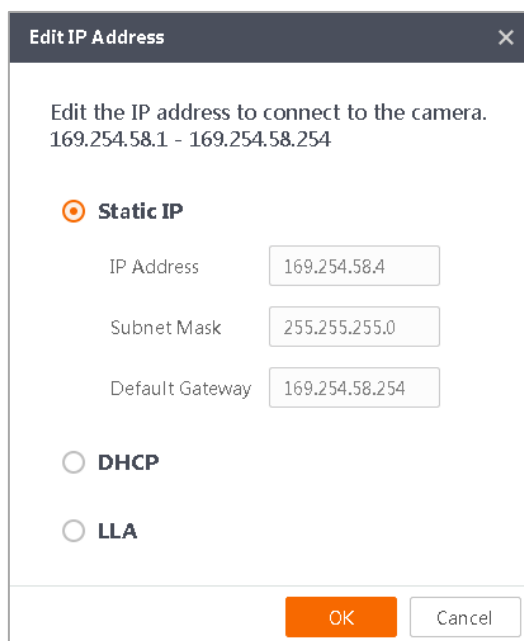

Figure 5-2 Installation Interface

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

5.3 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 5-3 Edit IP Address

6. Click **OK**.

5.4 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.
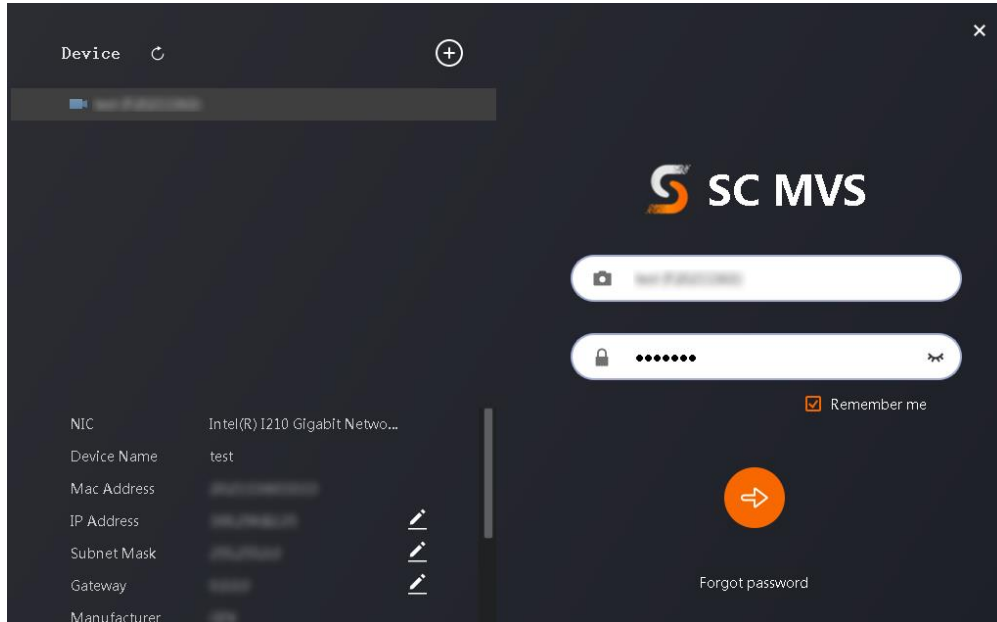
Figure 5-4 Login Interface

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

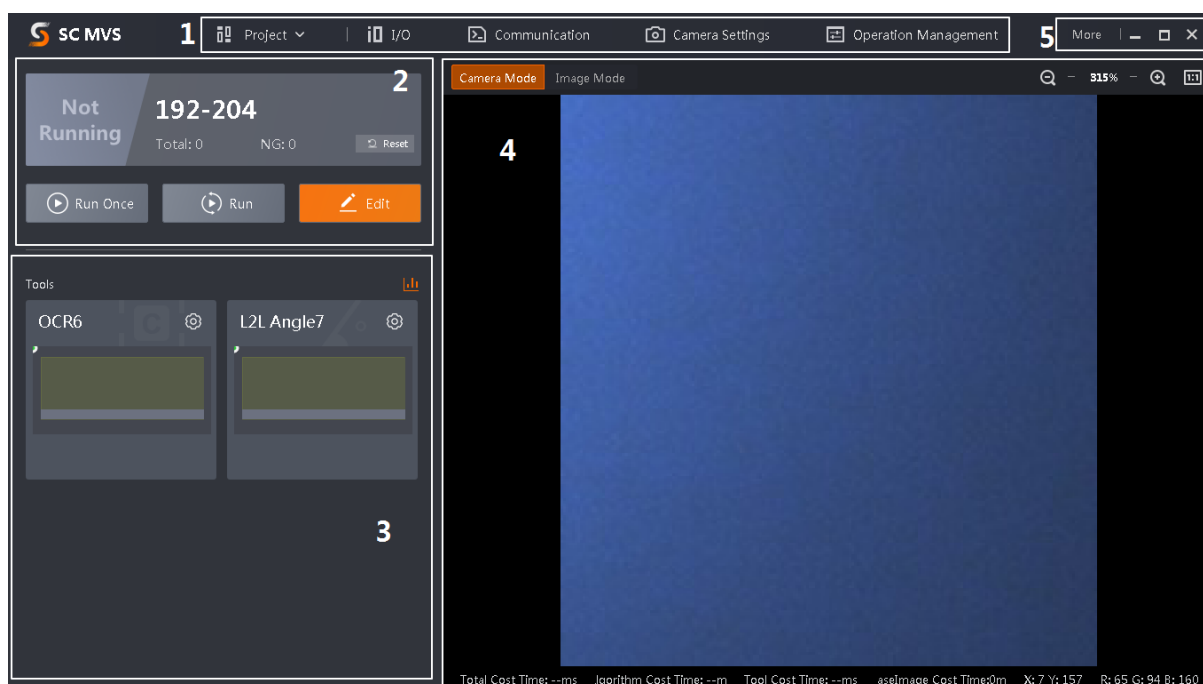After logging into the client software, you can see the main window as shown below.

Figure 6-1 Main Window

⌐ℹ**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.
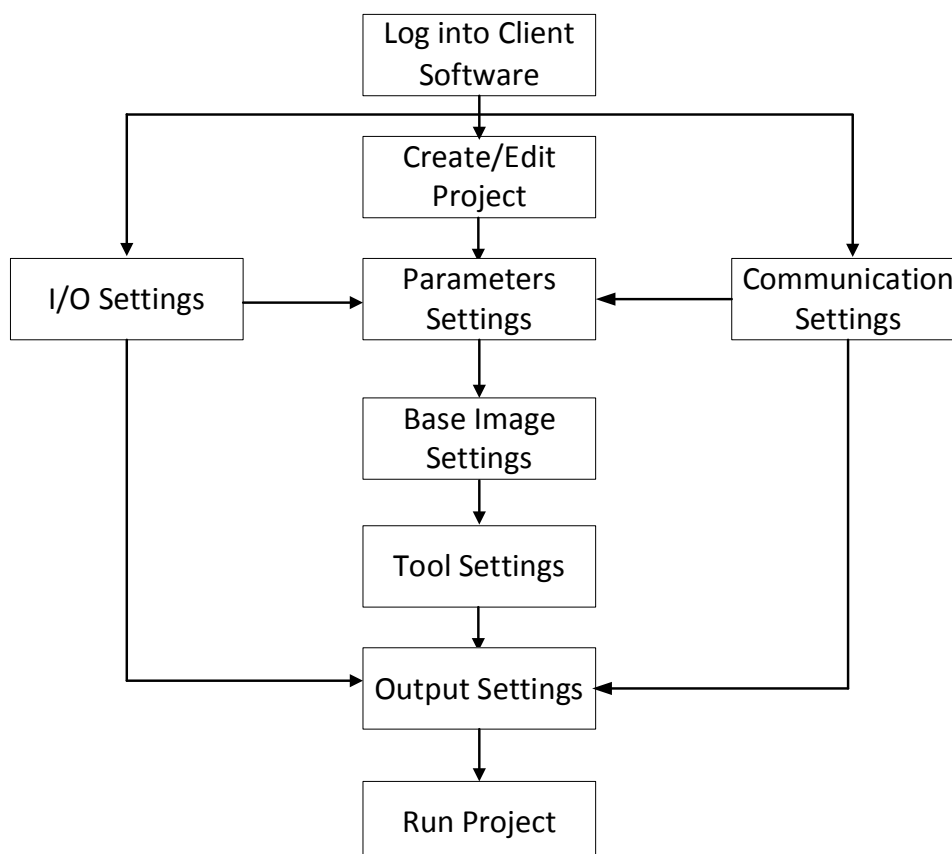
Log into Client Software

Create/Edit Project

I/O Settings → Parameters Settings ← Communication Settings

Base Image Settings

Tool Settings

Output Settings

Run Project

Figure 6-2 Operation Flow

Chapter 7 Electrical Feature and I/O Wiring

The device has three opto-isolated inputs (Line 0/1/2), three opto-isolated output (Line 3/4/5), and one RS-232 serial port.

7.1 Input Signal

The device's Line 0/1/2 is opto-isolated input, and their internal circuit is as follows.

☐**i**Note
● The input voltage ranges from 5 VDC to 30 VDC.
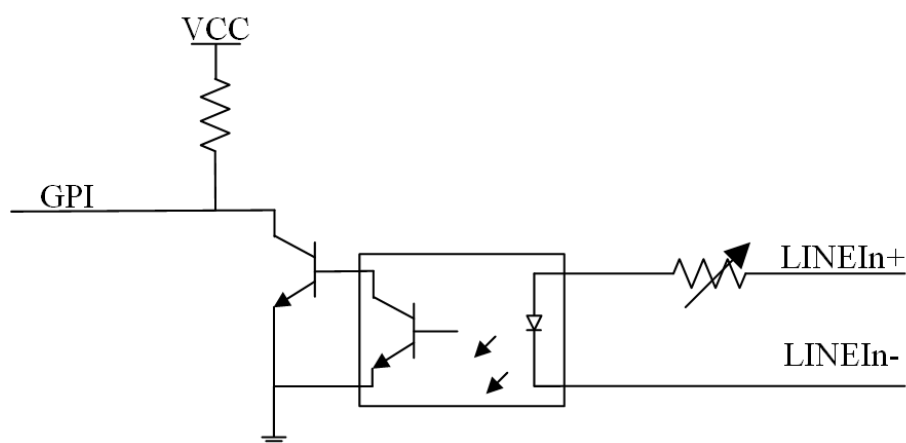● The breakdown voltage is 36 VDC. Keep voltage stable.
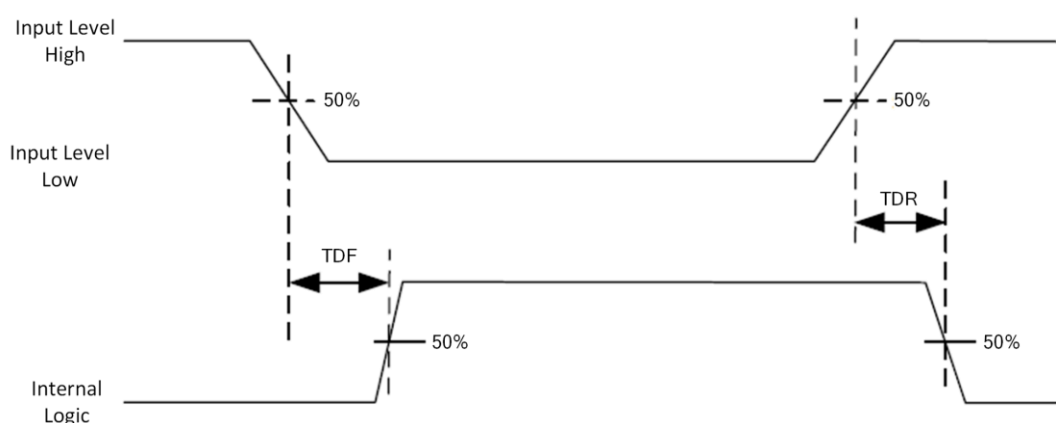

Figure 7-1 Internal Circuit of Input Signal

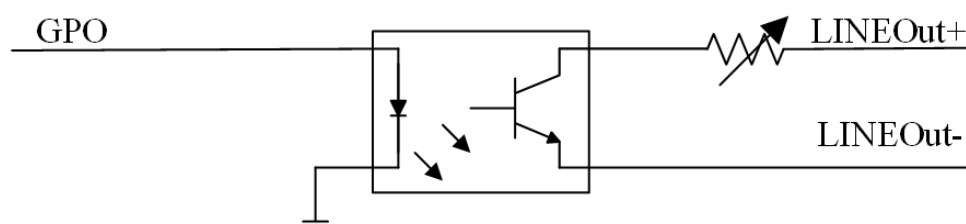**Figure 7-2 Input Logic Level**

Table 7-1 Input Electrical Feature

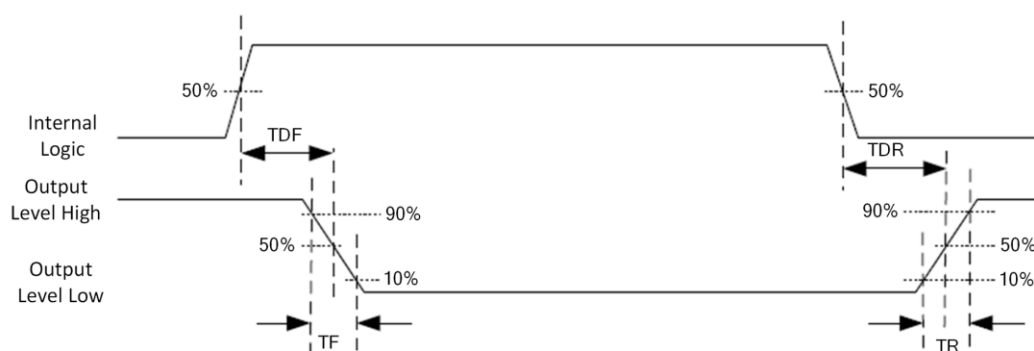| Parameter Name	Parameter Symbol	Value
Input Logic Level Low	VL	1.5 VDC
Input Logic Level High	VH	2 VDC
Input Falling Delay	TDF	81.6 µs
Input Rising Delay	TDR	7 µs

7.2 Output Signal

The device's Line 3/4/5 is opto-isolated output, and their internal circuit is as follows.

⌊ⁱ⌋**Note**

● The output voltage ranges from 5 VDC to 30 VDC.
● The maximum current is 200 mA.
● Do not directly connect with inductive load (e.g. DC motor, etc.) when outputting.

Figure 7-3 Internal Circuit of Output Signal

Figure 7-4 Output Logic Level

⌊ⁱ⌋**Note**

If the external voltage and resistance change, the corresponding current of output signal and output logic level low may differ.

Table 7-2 Output Electrical Feature

| Parameter Name	Parameter Symbol	Value
Output Logic Level Low	VL	730 mV
Output Logic Level High	VH	3.2 VDC
Output Falling Delay	TDF	6.3 µs
Output Rising Delay	TDR	68 µs
Output Falling Time	TF	3 µs
Output Rising Time	TR	60 µs

7.3 Input Signal Wiring

The device can receive external input signal via I/O interface.

ⅈNote

● Here we take type II device as an example to introduce input signal wiring.
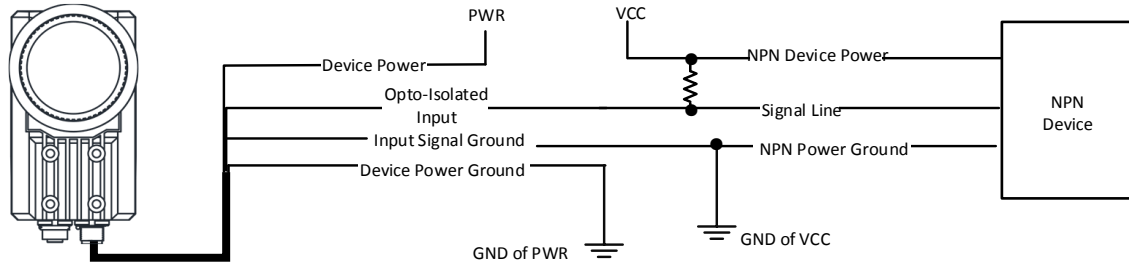● Input signal wiring may differ by external device types.

PNP Device
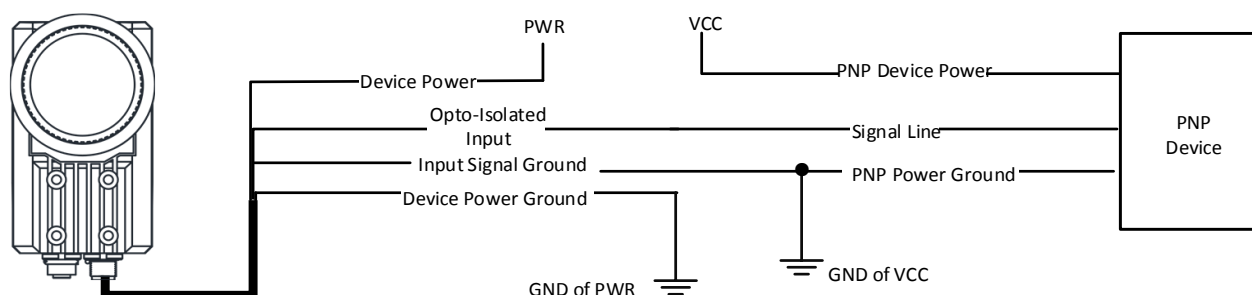
Figure 7-5 Input Signal Connecting to PNP Device

NPN Device

If the VCC of NPN device is 12 VDC or 24 VDC, it is recommended to use 1 KΩ pull-up resistor.

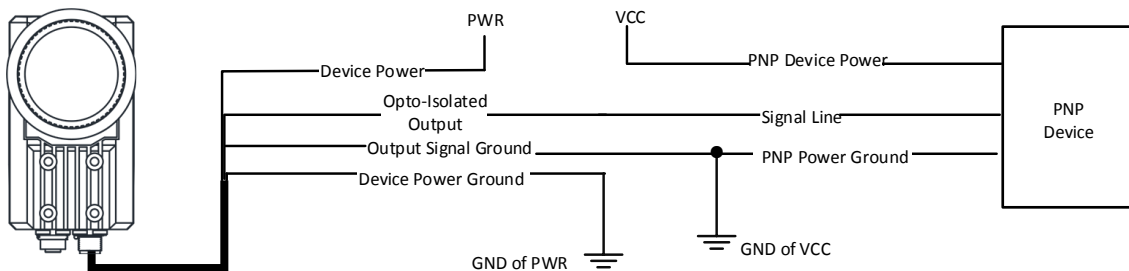**Figure 7-6 Input Signal Connecting to NPN Device**

7.4 Output Signal Wiring

The device can output signal to external device via I/O interface.

📖**Note**

- Here we take type II device as an example to introduce output signal wiring.
- Output signal wiring may differ by external device types.
- The voltage of VCC should not higher than that of PWR. Otherwise, the device's output signal may have exception.
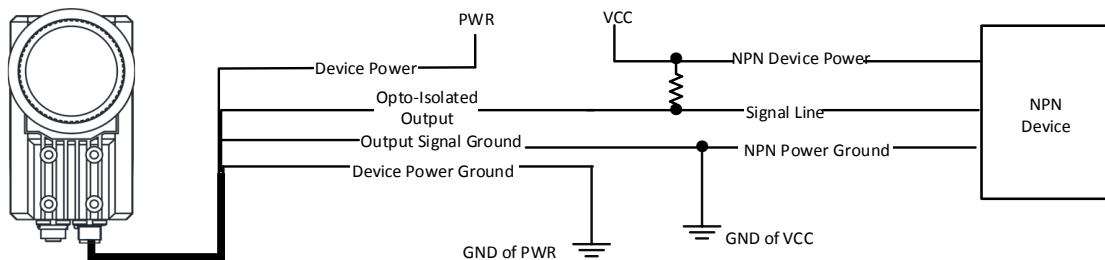
PNP Device

Figure 7-7 Output Signal Connecting to PNP Device

NPN Device

If the VCC of NPN device is 12 VDC or 24 VDC, it is recommended to use 1 KΩ pull-up resistor.

Figure 7-8 Output Signal Connecting to NPN Device

7.5 RS-232 Serial Port

The device supports outputting data via the RS-232 serial port. You can go to the communication settings of the client software to set related parameters.

7.5.1 Introduction

The 9-pin male connector and 25-pin male connector are commonly used serial ports, as shown below. You can refer to the table below for the specific pin name and function.
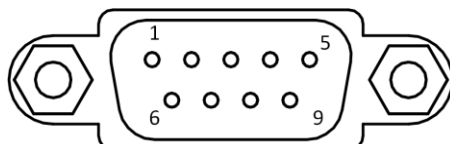

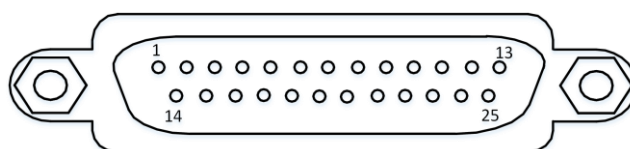**Figure 7-9 9-Pin Male Connector**

Figure 7-10 25-Pin Male Connector

Table 7-3 Pin Definitions

Serial Port Type	Pin No.	Name	Function
9-Pin Male Connector	2	RX	Receive data
	3	TX	Send data
	5	GND	Signal ground
25-Pin Male Connector	2	TX	Send data
	3	RX	Receive data
	7	GND	Signal ground

7.5.2 RS-232 Serial Port Wiring

You can refer to the figure below to wire the device with an external device via RS-232 serial port.
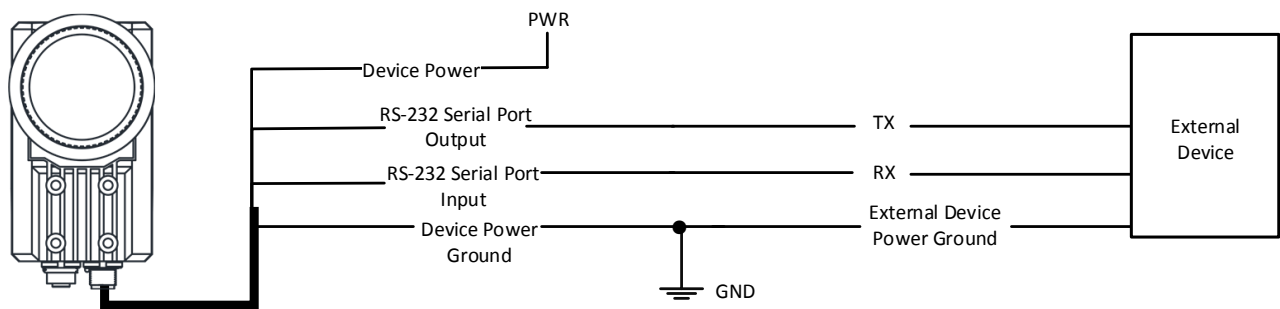
Figure 7-11 RS-232 Serial Port Wiring

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 and ACT indicators). Make sure that 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 1000 Mbps.

Solution

Check if the network transmission speed is up to 1000 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 the 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.

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