# SC30 Motion Controller Hardware Manual

Sharing the Convenience and Happiness of a Smart Society with Humanity

## Revised History

| Issue date | Manual No. | Revision description | Remarks |
|---|---|---|---|
| 2021-06 | V0.1 | First edition | |
| 2022-06 | V0.42 | Update the wiring section | |
| 2022-08 | V1.0 | Correct the description of the local extension analogue module and the remote analogue module | |
| 2022-11 | V1.1 | Update local extension module specifications and wiring | |

## Preface

First of all, thank you for purchasing the SC series of programmable logic controllers and extension modules developed and manufactured by STEP Electric!

Always read this manual and the relevant instructions described in this manual carefully prior to using the product, and operate it properly with due regard to safety.

## Type of Manual

- The types of SC series manuals are as follows. Please refer to the corresponding manual according to the application.
- The manuals can be downloaded from the Company's homepage http://www.step-sigriner.com.cn.

**Manuals used for the SC series products**

| NO | Manual name | Content |
|---|---|---|
| 1. | SC Series Controller Software Operation Manual | Software installation, configuration, debugging, coding, etc. |
| 2. | SC Series Controller Software Programming Manual | Motion control programming, commonly used programming libraries, instructions, etc. |
| 3. | SC20 Controller Hardware Manual | SC20-related hardware interface, wiring and maintenance |
| 4. | SC30 Controller Hardware Manual | SC30-related hardware interface, wiring and maintenance |
| 5. | SC Series Controller Visual Interface Operation Instruction | Visual interface-related operation and programming |
| | | |

## Copyright & Trademark

# Contents

# Chapter 1 Prior to Use

## 1.1. Precautions and explanations

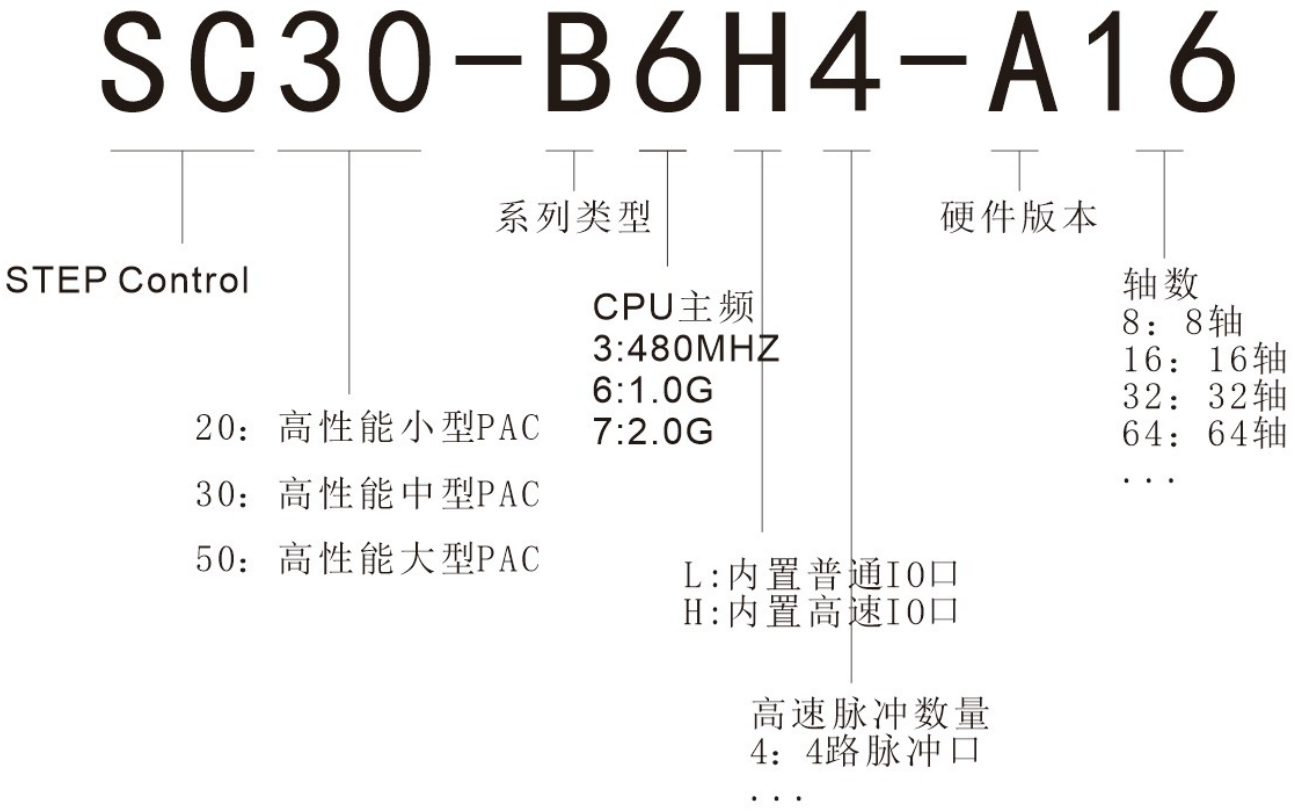
The following is a description of the matters that must be observed in order to prevent hazards to persons or damage to property.

- The hazards and the extent of the damage caused when used in the incorrect way are classified and described below.

| | |
|---|---|
| ⚠警告 WARNING | "Matters that may result in death or serious injury". |
| ⚠注意 Note | "Matters that may result in minor injury or cause damage to property". |
| ⃠ | Matters that cannot be performed. |
| ❗ | Matters that must be performed. |
| **⚠ WARNING** | |
| ❗ | ● Please take safety measures on the outside of the product so that the whole system can be secured in the event of a malfunction of the product or in the event of an exception due to external causes. |
| ⃠ | ● Never use in an environment containing combustible gases. Failure to do so may cause an explosion. |
| ⃠ | ● DO NOT throw this product into a fire, or else it may cause the battery and electronic parts to break. |
| **⚠ NOTES** | |
| ❗ | ● To prevent any excessive temperature rise and smoke, there should be some allowance for the parameters used in relation to the guaranteed characteristics and performance parameters of the product. |
| ⃠ | ● DO NOT disassemble or modify, otherwise unusual temperature rise and smoke may occur. |
| ⃠ | ● DO NOT touch the terminals while the power is ON. Failure to do so may result in electric shock. |
| ❗ | ● Please provide an E-stop circuit and interlock circuit in the external circuit. |
| ❗ | ● Please connect the wires and connectors properly. Poor contact between the cable and the connector may lead to unusual temperature rise and smoke. |
| ⃠ | ● DO NOT operate (connect, disassemble, etc.) with the power on. Failure to do so may result in electric shock. |
| ❗ | ● The protection function of the unit may be damaged if it is not used in the manner specified by the Company. |
| ❗ | ● The product has been developed and manufactured for use in industrial environments. |

## 1.2. Product naming convention

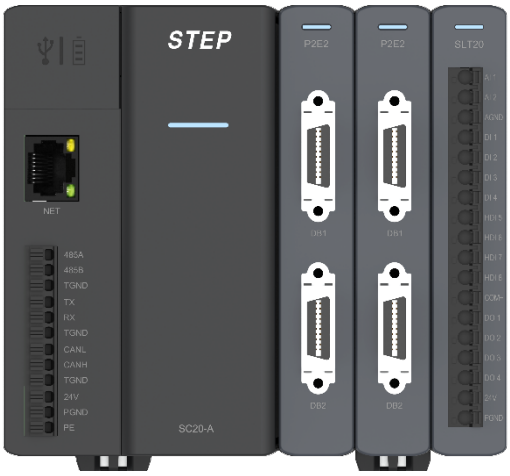
SC Series Naming Convention




| | |
|---|---|
| 20：高性能小型 PAC | 20: High-performance mini PAC |
| 30：高性能中型 PAC | 30: High-performance medium-sized PAC |
| 50：高性能大型 PAC | 50: High-performance large PAC |
| 系列类型 | Type of series |
| CPU 主频 | CPU dominant frequency |
| L：内置普通 IO 口 | L: Built-in common IO port |
| H：内置高速 IO 口 | H: Built-in high-speed IO port |
| 高速脉冲数量 | Number of high speed pulses |
| 4：4 路脉冲口 | 4: 4-channel pulse port |
| 硬件版本 | Hardware version |
| 轴数 | Number of axes |
| 8：8 轴 | 8: 8-axis |
| 16：16 轴 | 16: 16-axis |
| 32：32 轴 | 32: 32-axis |
| 64：64 轴 | 64: 64-axis |

*: As a reference for hashrate and ability to carry axes. The number of axes will vary slightly depending on

the software implementation.



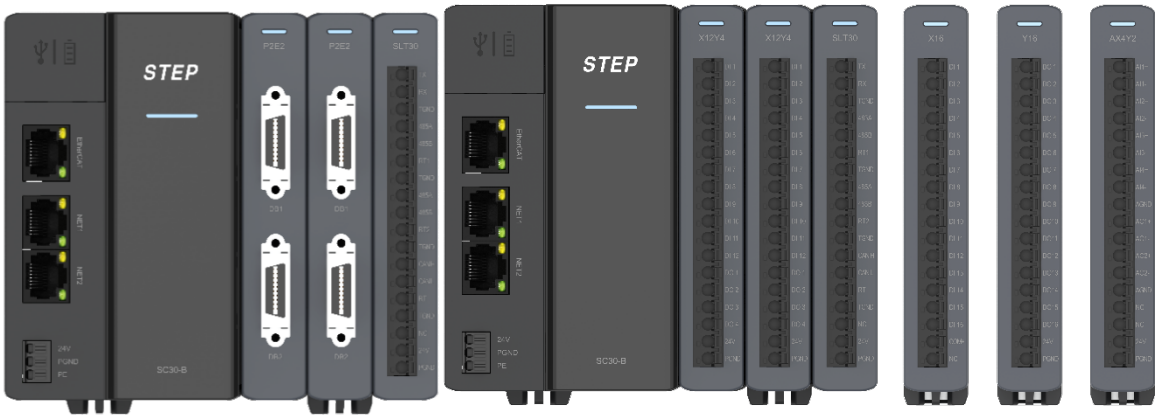

SC20-A3H of the SC20 series


SC30-B6H of the SC30-B series

# Chapter 2 Overview

# 2.1. Basic System Configuration

## 2.1.1. SC30 System Overview




Rendering of two versions of SC30_B with different optional modules and local extension boards

The SC30 Series Motion Controller is a medium-sized controller in a modular design.

### ■ Strong scalability

- ◆ Each controller supports the local extension of 32 extension modules. The local extension module enables module extension via internal bus protocols and supports digital I/O modules and analog I/O modules. Analog I/O module employs a 12-bit resolution converter chip to ensure highly accurate data acquisition;
- ◆ Remote extension of the rack is possible via various industrial fieldbuses such as Ether CAT, CAN Open, etc.
- ◆ Supports 2 Ethernet connection ports and 1 EtherCAT bus interface.

### ■ Powerful control functions

- ◆ Supports for 64-axis motion control via Ether CAT bus;
- ◆ Features single-axis acceleration and deceleration control, electronic gear, electronic cam, CNC, robotics and other motion control functions;
- ◆ Basic single-axis positioning is also possible via high-speed IO at up to 4 Mbps.

## 2.1.2. Type of unit module

### ■ Body of the Controller

| Type | Sub-system | Function | Product silkscreen |
|---|---|---|---|
| Body of the Controller | SC30 Controller | 64-axis motion controller<br>Transistor NPN output type | SC30_B |
| | Locally selectable axis-controlled high-speed counter module (optional) | For 2ch motor pulse control | P2E2 |
| | Local optional general digital I/O module (optional) | 24V<br>12 DIs and 4 DOs | X12Y4 |
| | Communication module | 1-channel CAN,<br>1-channel RS232,<br>and 2-channel RS485 communication interfaces | SLT30 |

### ■ Local expansion unit modules

| Type | Unit | Function | Product silkscreen |
|---|---|---|---|
| Digital modules | General digital output module for local extension | 24V<br>16-channel output<br>Transistor NPN type | Y16 |
| | General digital input module for local extension | 24V<br>16-channel input | X16 |
| | General digital I/O modules for local extension | 24V<br>8 inputs and 8 outputs | X8Y8 |
| Analog modules | General analog I/O modules for local extension | 0~10V<br>4 inputs and 2 outputs | AX4Y2 |

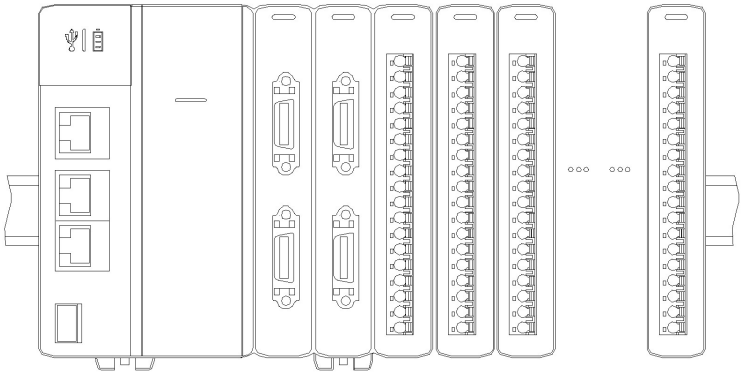
### ■ Remote extension unit modules

| Type | Unit | Function | Product silkscreen |
|---|---|---|---|
| Digital modules | Ether CAT extended remote digital I/O module | 24V<br>8-channel bidirectional configurable<br>16 DIs and 8 DOs<br>MOS tube output type | SX-CD433-HR |
| Hybrid modules | Ether CAT extended remote I/O hybrid module | 24V<br>8 DIs and 8 DOs | SX-D330A22-HR |

| | | | |
|---|---|---|---|
| | | 0~10V<br>4 AIs and 4 AOs | |

### 2.1.3. Limit on the number of extension units

Up to 32 general extension units can be installed on the right side of the SC30 controller.



## 2.2. Programming tool

### 2.2.1. Software operating environment and applicable cables

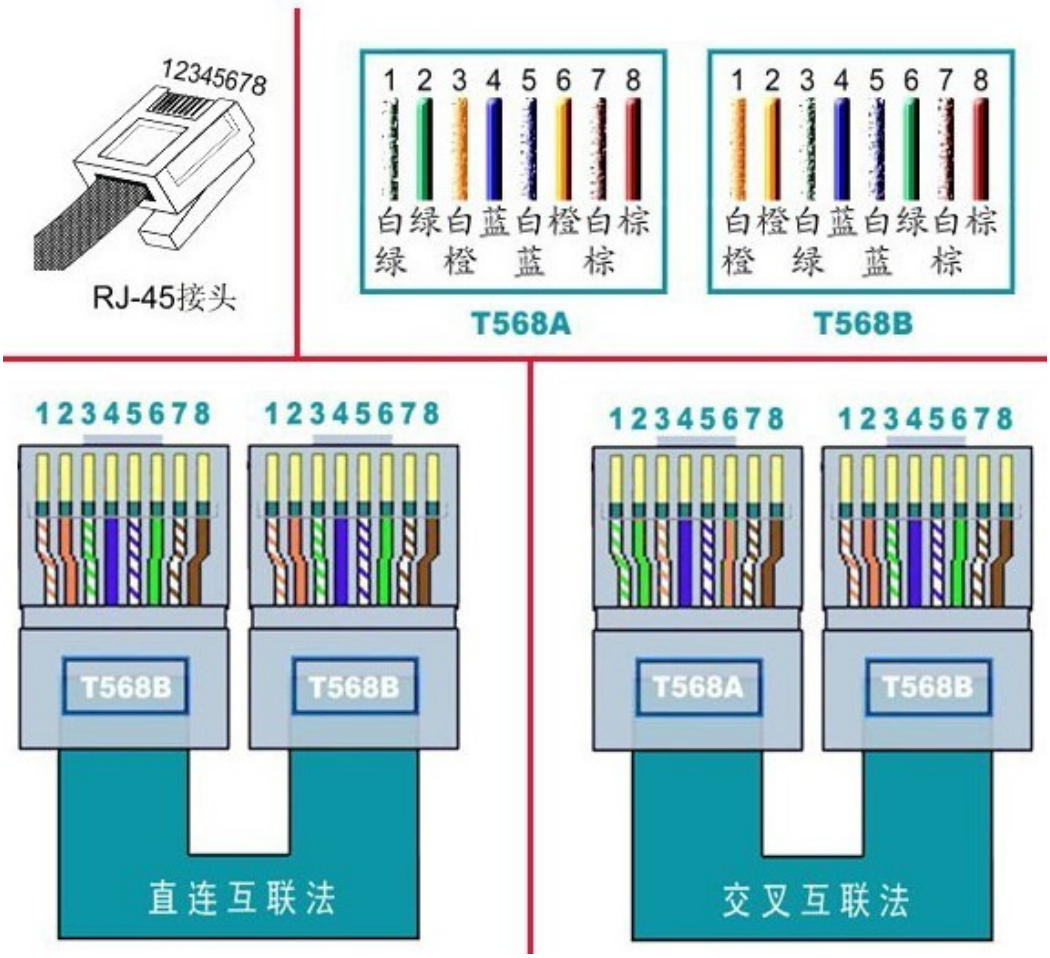
The programming software and software operating environment are described in the *SC Series Controller Software Manual*.

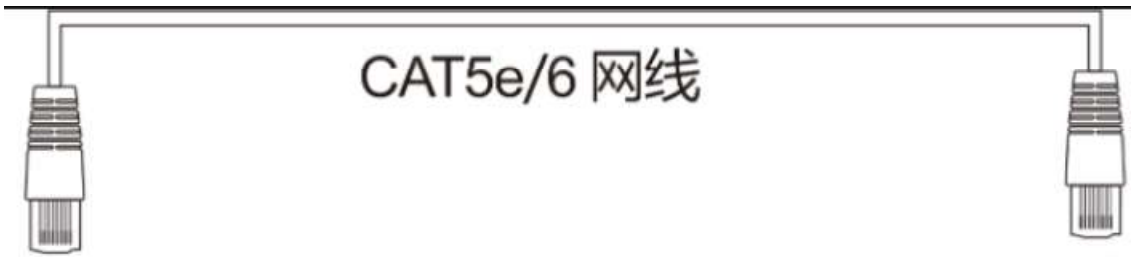
Computer connection cable

- Please use commercially available Ethernet 100Base-TX cables.

| Type of cables | Length |
|---|---|
| Ethernet 100Base-TX | Max. length 50m |

- The Ethernet cable connecting the controller to the PC supports auto-negotiation, AB registered jack direct connection or crossover.





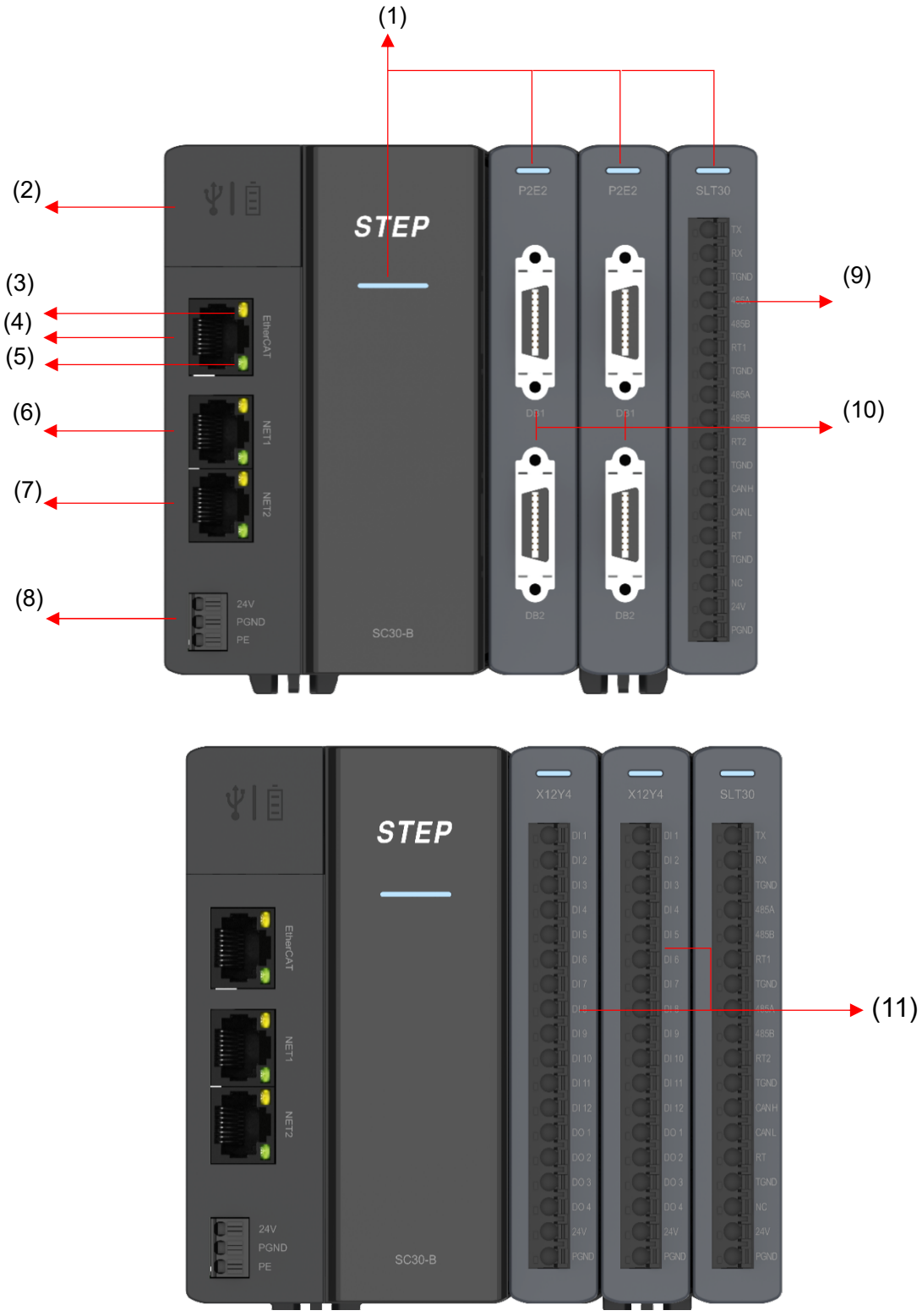

(PC side) (SC30 side)

| RJ-45 接头 | RJ-45 connectors |
|---|---|
| 白绿 | White and green |
| 绿 | Green |
| 白橙 | White and orange |
| 蓝 | Blue |
| 白蓝 | White and blue |
| 橙 | Orange |
| 白棕 | White and brown |
| 棕 | Brown |
| 白橙 | White and orange |
| 橙 | Orange |
| 白绿 | White and green |
| 蓝 | Blue |
| 白蓝 | White and blue |
| 绿 | Green |
| 白棕 | White and brown |
| 棕 | Brown |
| 直连互联法 | Direct interconnection method |
| 交叉互联法 | Cross-interconnection method |
| CAT5e/6 网线 | CAT5e/6 network cable |

# Chapter 3 System Components and Definitions of Ports

# 3.1. Name and Function of Each Part of the SC30 Controller

## 3.1.1. Names and functions



| No. | Name | Function |
|---|---|---|
| 1 | Status LED | It is the unit status LED<br>Please refer to "Names and functions of the status LEDs" |
| 2 | Flip-top cover | The interior contains:<br>USB-A socket, button cell pack, RESET button |
| 3 | EtherCAT,<br>Ethernet status LED | It is the LAN port status LED<br>Please refer to "Names and functions of the status LEDs" |
| 4 | LAN port 1<br>EtherCAT network port | It is the connector for the EtherCAT connection.<br>The default address of STEP.Eth0.IP is 192.168.1.11 |
| 5 | EtherCAT,<br>Ethernet status LED | It is the status LED for the LAN port<br>Please refer to "Names and functions of the status LEDs" |
| 6 | LAN port 2<br>NET1 network port | It is the connector for the Ethernet connection.<br>Default address of STEP.Eth1.IP is 192.168.0.11 |
| 7 | LAN port 3<br>NET2 network port | It is the connector for the Ethernet connection.<br>The default address of STEP.Eth2.IP is 192.168.39.220 |
| 8 | Power input interface | It is the power supply access to the controller<br>Please refer to the "Definition of the power supply interface" |
| 9 | Communication board interface | 1-channel RS232, 1-channel CAN and 2-channel RS485<br>Please refer to the "Definition of communication board interface" |
| 10 | Locally optional<br>Axis-controlled high-speed counter module interface | Divisible into 2 x 2ch axis-controlled motor interfaces (together forming a 4ch motor pulse control interface)<br>Please refer to "Definition of Locally Optional Axis Control Board Interfaces" |
| 11 | Locally optional<br>General I/O module interface | 24V<br>12ch digital inputs and 4ch digital outputs<br>Please refer to "Definition of the Locally Optional General I/O Board". |

### 3.1.2. Definition of the power supply interface

| No. | Name | Function |
|---|---|---|
| 1 | 24V | Power input 24V |
| 2 | GND | Power input ground |
| 3 | PE | Ground |

### 3.1.3. Names and functions of the status LEDs

| No. | Name | LED Color | Function |
|---|---|---|---|
| 1 | Module status LED display | LED tricolor light<br>Red, Blue, | Display the current module status<br>Refer to the "System Status" for details |

| | | | |
|---|---|---|---|
| | | Yellow | |
| 2 | EtherCAT, Ethernet communication status LED | Green and yellow. | For normal connection: the green LED is always ON.<br>For data transmission and reception: green and yellow LEDs flash simultaneously.<br>In case of fault: the orange LED is always ON |

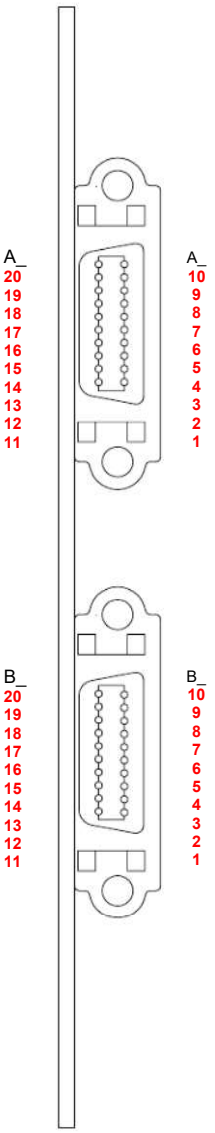
### 3.1.4. Definition of communication board interface

| No. | Name | Function | Port mapping in software |
|---|---|---|---|
| 1 | TX | RS232 transmitter | COM1 |
| 2 | RX | RS232 receiver | |
| 3 | TGND | Communication reference ground | |
| 4 | 485A | RS485 communication 1+ | COM2 |
| 5 | 485B | RS485 communication 1- | |
| 6 | RT1 | 485 terminating resistor | |
| 7 | TGND | Communication reference ground | |
| 8 | 485A | RS485 communication 2+ | COM3 |
| 9 | 485B | RS485 communication 2- | |
| 10 | RT2 | 485 terminating resistor | |
| 11 | TGND | Communication reference ground | |
| 12 | CANH | CAN+ | CAN1 |
| 13 | CANL | CAN- | |
| 14 | RT | CAN terminating resistor | |
| 15 | TGND | Communication reference ground | |
| 16 | NC | Empty pin | |
| 17 | 24V | Power input 24V | |
| 18 | PGND | Power reference ground | |

### 3.1.5. Definition of locally optional common I/O board interface

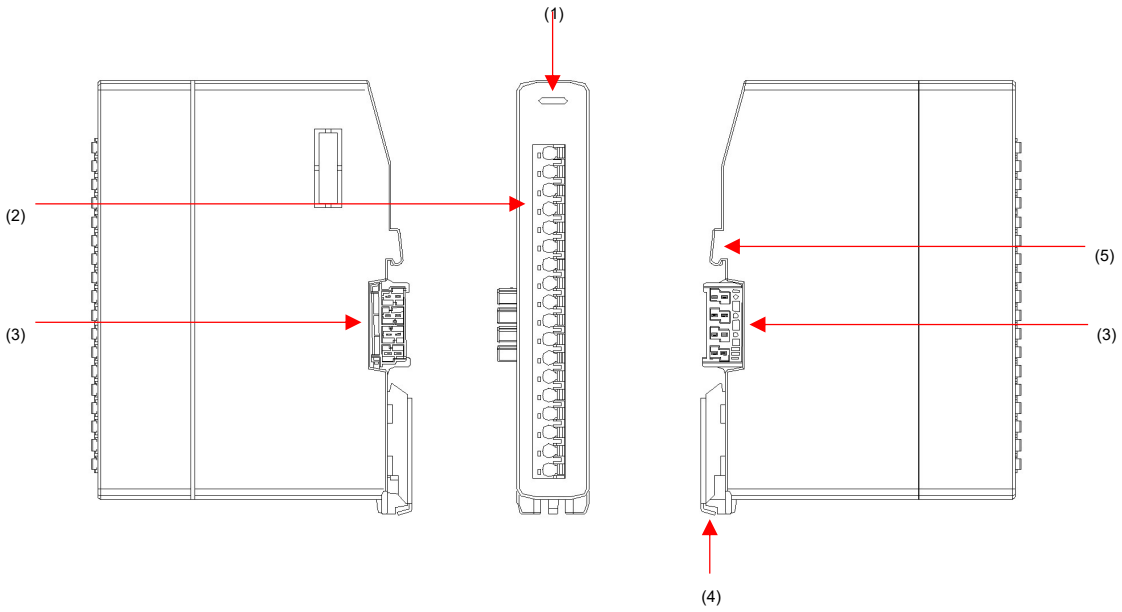
| No. | Name | Function |
|---|---|---|
| 1 | DI1 | Digital input |
| 2 | DI2 | Digital input |
| 3 | DI3 | Digital input |
| 4 | DI4 | Digital input |
| 5 | DI5 | Digital input |
| 6 | DI6 | Digital input |
| 7 | DI7 | Digital input |
| 8 | DI8 | Digital input |
| 9 | DI9 | Digital input |
| 10 | DI10 | Digital input |
| 11 | DI11 | Digital input |
| 12 | DI12 | Digital input |
| 13 | DO1 | Digital output |
| 14 | DO2 | Digital output |
| 15 | DO3 | Digital output |
| 16 | DO4 | Digital output |
| 17 | 24V | Supplementary power input |
| 18 | PGND | Supplementary power ground |

### 3.1.6. Interface definition for locally optional axis-controlled board high-speed counter module

| Arrangement of the optional axis-controlled high-speed counter board terminals | NO. | | Name | Purpose |
|---|---|---|---|---|
| | A_ | B_ | | |
|  | 1 | 1 | ECA1+ | Encoder A |
| | 2 | 2 | ECA1- | Encoder A |
| | 3 | 3 | ECB1+ | Encoder B |
| | 4 | 4 | ECB1- | Encoder B |
| | 5 | 5 | ECZ1+ | Encoder Z |
| | 6 | 6 | ECZ1- | Encoder Z |
| | 7 | 7 | OPC | Reserved high-speed DI+ |
| | 8 | 8 | PULS | Reserved high-speed DI- |
| | 9 | 9 | SRV_COIN | Servo positioning completion DI |
| | 10 | 10 | ALARM | Servo alarm DI |
| | 11 | 11 | +5V_ENC | Encoder power supply |
| | 12 | 12 | EGND | Encoder reference ground |
| | 13 | 13 | DR+ | Direction of command |
| | 14 | 14 | DR- | Direction of command |
| | 15 | 15 | PU+ | Command pulse |
| | 16 | 16 | PU- | Command pulse |
| | 17 | 17 | 24V | Power output |
| | 18 | 18 | GND_24V | Reference ground |
| | 19 | 19 | SRV_ON | Enable servo DO |
| | 20 | 20 | CLEAR | Clear servo alarm DO |

## 3.2. Extension unit

### 3.2.1. Name and function of each part of the SC30 Local Extension Unit




| No. | Name | Function |
|---|---|---|
| 1 | Status display LED | Display of module connection status by LEDs |
| 2 | I/O connectors (includes IO status LED display) | Connect input and output devices<br>Please refer to the "Definition of the Local Extension Digital I/O Board Interface"<br>Refer to "IO Status LED Display" |
| 3 | Power input interface | Offers the stable power supply with bottom bus connection |
| 4 | DIN hook | A hook used to fix the body to the DIN rail. |
| 5 | DIN-rail mounting part | A part that is mounted on the DIN rail. |

### 3.2.2. Interface definition of local extension I/O boards

#### ■ Interface definition of local extension digital input boards

| No. | Name | Function |
|---|---|---|
| 1 | DI1 | Digital input |
| 2 | DI2 | Digital input |
| 3 | DI3 | Digital input |
| 4 | DI4 | Digital input |
| 5 | DI5 | Digital input |
| 6 | DI6 | Digital input |
| 7 | DI7 | Digital input |
| 8 | DI8 | Digital input |
| 9 | DI9 | Digital input |
| 10 | DI10 | Digital input |
| 11 | DI11 | Digital input |
| 12 | DI12 | Digital input |
| 13 | DI13 | Digital input |
| 14 | DI14 | Digital input |
| 15 | DI15 | Digital input |
| 16 | DI16 | Digital input |
| 17 | COM | Common terminal |
| 18 | NC | Empty pin |
| SL-X16A01 only supports low level input, and COM is connected to 24V.<br>SL-X16C01 only supports low/high level inputs, and COM is connected to 24V or 0V. | | |

#### ■ Interface definition of local extension digital output boards

| No. | Name | Function |
|---|---|---|
| 1 | DO1 | Digital output |
| 2 | DO2 | Digital output |
| 3 | DO3 | Digital output |
| 4 | DO4 | Digital output |
| 5 | DO5 | Digital output |
| 6 | DO6 | Digital output |
| 7 | DO7 | Digital output |
| 8 | DO8 | Digital output |
| 9 | DO9 | Digital output |
| 10 | DO10 | Digital output |
| 11 | DO11 | Digital output |
| 12 | DO12 | Digital output |
| 13 | DO13 | Digital output |
| 14 | DO14 | Digital output |
| 15 | DO15 | Digital output |
| 16 | DO16 | Digital output |

| | | |
|---|---|---|
| 17 | 24V | IO supplementary power |
| 18 | PGND | IO reference ground |
| SL-Y16A01 only supports low level outputs. | | |

## ■ Interface definition of local extension digital I/O boards

| No. | Name | Function |
|---|---|---|
| 1 | DO1 | Digital output |
| 2 | DO2 | Digital output |
| 3 | DO3 | Digital output |
| 4 | DO4 | Digital output |
| 5 | DO5 | Digital output |
| 6 | DO6 | Digital output |
| 7 | DO7 | Digital output |
| 8 | DO8 | Digital output |
| 9 | DI1 | Digital input |
| 10 | DI2 | Digital input |
| 11 | DI3 | Digital input |
| 12 | DI4 | Digital input |
| 13 | DI5 | Digital input |
| 14 | DI6 | Digital input |
| 15 | DI7 | Digital input |
| 16 | DI8 | Digital input |
| 17 | 24V | IO supplementary power |
| 18 | PGND | IO reference ground |
| SL-X8Y8A01 supports low levels only. | | |

## ■ Interface definition of local extension analog I/O boards

| No. | Name | Function |
|---|---|---|
| 1 | AI1+ | Analog input positive (+) |
| 2 | AI1- | Analog input negative (-) |
| 3 | AI2+ | Analog input positive (+) |
| 4 | AI2- | Analog input negative (-) |
| 5 | AI3+ | Analog input positive (+) |
| 6 | AI3- | Analog input negative (-) |
| 7 | AI4+ | Analog input positive (+) |
| 8 | AI4- | Analog input negative (-) |
| 9 | AGND | Analog ground |
| 10 | AO1+ | Analog output positive (+) |
| 11 | AO1- | Analog output negative (-) |
| 12 | AO2+ | Analog output positive (+) |
| 13 | AO2- | Analog output negative (-) |

| | | |
|---|---|---|
| 14 | AGND | Analog ground |
| 15 | NC | Empty pin |
| 16 | NC | Empty pin |
| 17 | 24V | IO supplementary power |
| 18 | PGND | IO reference ground |

## 3.3. IO status LED display

| Name of module | IO status LED |
|---|---|
| Local communication module | Not supported, always OFF |
| Locally optional general I/O modules | Significant I/O bits, green LED is ON |
| Locally optional axis-controlled high-speed counter module | Not supported, N/A |
| Local extension digital input modules | Significant input bits, green LED is ON |
| Digital output module for local extension | Significant output bits, green LED is ON |
| Digital I/O modules for local extension | Significant I/O bits, green LED is ON |
| Analog I/O modules for local extension | Not supported, always OFF |

## 3.4. Module silkscreen description

| Name of module | Corresponding silkscreen |
|---|---|
| Local communication module | SLT30 |
| Locally optional general I/O modules | X12Y4 |
| Locally optional axis-controlled high-speed counter module | P2E2 |
| Local extension digital input modules | X16 |
| Digital output module for local extension | Y16 |
| Analog I/O modules for local extension | AX4Y2 |
| Digital I/O modules for remote extension | SX-CD433-HR |
| Analog-digital hybrid I/O modules for remote extension | SX-D330A22-HR |
| Digital I/O modules for local extension | X8Y8 |

# Chapter 4 Installation

# 4.1. Installation of the SC30 Series

## 4.1.1. Installation environment and space

### ■ Installation environment

When installing, use it within the general specifications.
● Ambient temperature: -20°C ~ +55°C
● Ambient humidity: 10%RH ~ 90%RH (no condensation at 25°C)
● IP grade: IP20
● Pollution class: IE33
● Altitude: up to 2000m above sea level
● EMC immunity level: according to EN 61000-6-X standard
● Installation position: in a control cabinet (made of metal with sufficient strength) with a protective structure of IP54 or greater.

Never use in the following environments:
● Places exposed to direct sunlight
● Places where rapid changes in temperature may cause condensation
● In environments with corrosive and flammable gases
● Places with a high concentration of dust, iron powder and salt
● Places and their environments where organic solvents such as petrol, thinner and alcohol or strong alkaline substances such as ammonia or sodium hydroxide are likely to adhere
● Places that may be subjected to direct vibration or shock and to direct splashing of water droplets
● In the vicinity of high-voltage power lines, high-voltage equipment, power lines, power equipment or equipment with transmitters such as amateur radio, and equipment generating high switching impulse currents (at least 100mm away)

### ■ Action

● To avoid electrostatic damage, do not touch the pins of the connector directly.
● Please discharge any static electricity carried by the human body before operating.
● The connector on the side of the unit can only be connected to the SC20 series.
● Use copper wire with a temperature rating of 80°C or more.

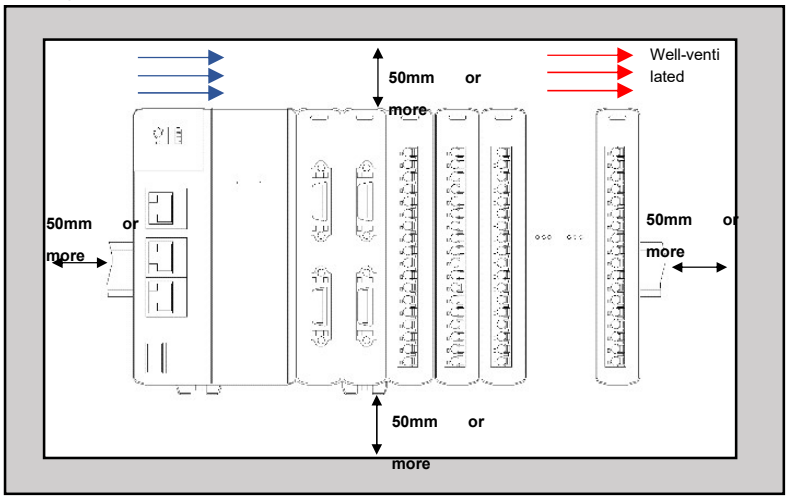
### ■ Considerations for cooling

● For cooling reasons, please install the unit in the direction shown below.
● DO NOT install the unit vertically, horizontally or upside down, as this may cause inadequate heat dissipation and result in abnormal internal heat generation.
● DO NOT install directly above equipment that generates a lot of heat such as heaters, transformers and high-capacity resistors.

### ■ Installation space

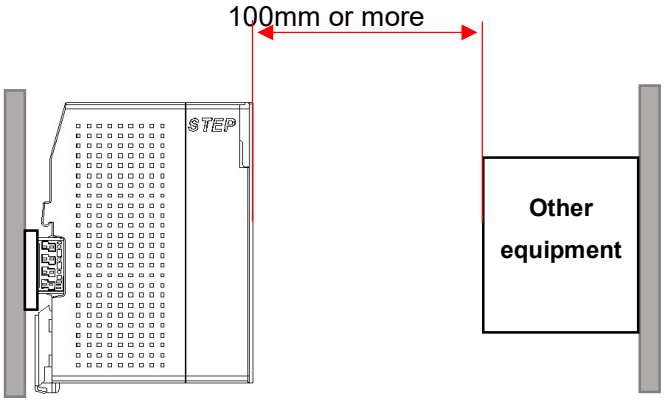
● To ensure ventilation space, install the unit at a distance of 50mm or more from other equipment and

wiring ducts.

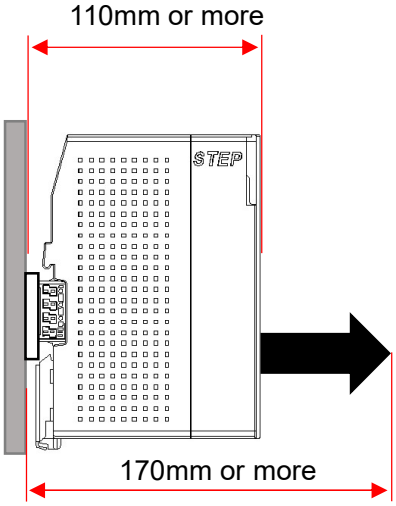



● DO NOT install directly above equipment that generates a lot of heat such as heaters, transformers and high-capacity resistors.

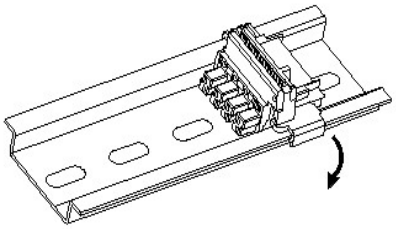
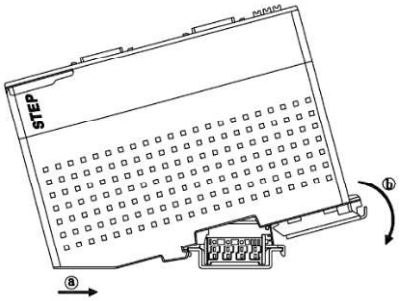
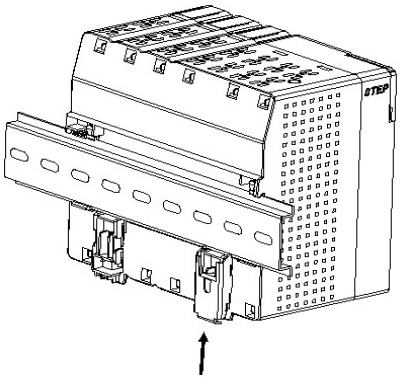
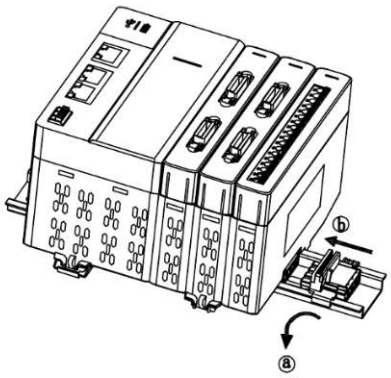
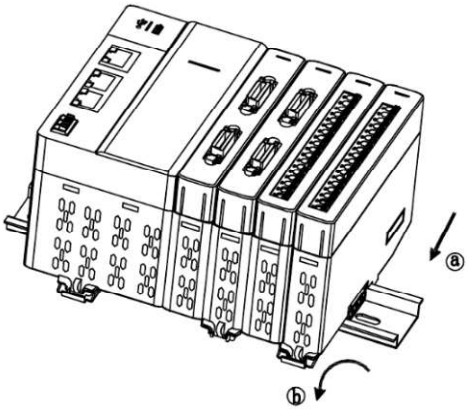
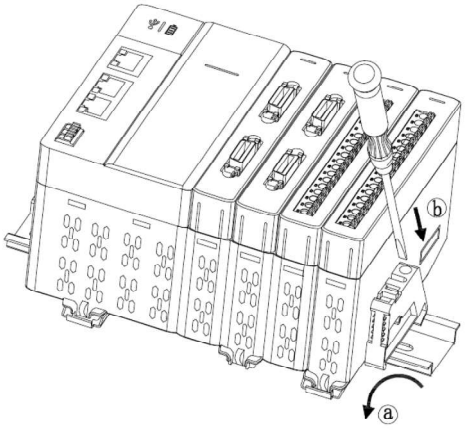
● To avoid the effect of radiated noise, install each unit with a distance of 100mm or more between the surface of the unit and power lines or electromagnetic switches. In particular, when mounting on the back of the control cabinet door, make sure that it is separated from other equipment by a certain distance.



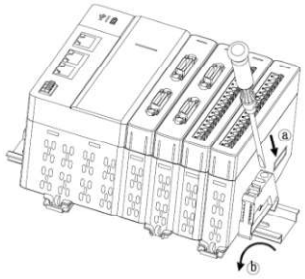
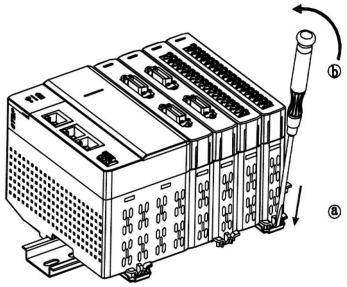
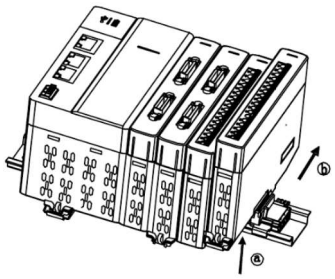
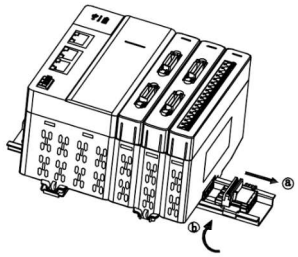
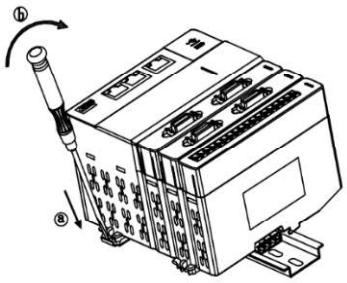
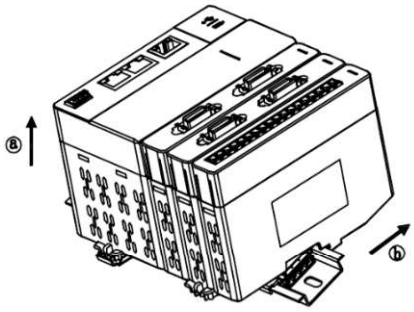

● To connect the tool software cable, make sure to leave more than 170mm of space on the mounting surface of the SC30 series.

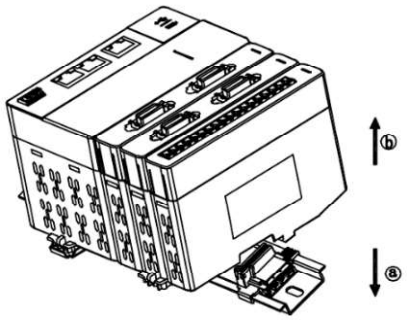


## 4.1.2. Steps for unit installation

| | |
|---|---|
| 1. Attach the bus connector to the rail. | 2. Slide the upper end of the unit mount onto the DIN rail and apply pressure to the side of the rail (a in the figure), then insert the lower end of the unit mount onto the DIN rail (b in the figure). |
|  |  |
| 3. Installation is finished when a "click" is sounded and the metal latch snaps into the DIN rail. | 4. Snap the bus connector down onto the rail (a in the figure), then slide it to the SC30 side and insert the male connector into the female connector (b in the figure). |
|  |  |
| 5. Slide the upper end of the extension I/O onto the DIN rail (a in the figure) and then insert the lower end onto the DIN rail (b in the figure). | 6. Snap the rail fixings into the rails (a in the figure) and tighten them with a screwdriver (b in the figure) and the installation is now completed. |
|  |  |

## 4.1.3. Dismantling of the unit

| | |
|---|---|
| 1. Unscrew the rail fixings with a screwdriver (a in the figure) and remove them from the rail (b in the figure). | 1. Snap the latch down with a screwdriver (a in the figure), then pry the screwdriver towards the extension unit and remove the metal latch at the bottom of the extension unit (b in the figure). |
|  |  |
| 2. The extension I/O unit can be successfully removed by lifting up the latch side first (a in the figure) and then pushing it out to the other side (b in the figure) | 3. Pull the bus connector outwards and separate the male and female plugs (a in the figure); flip the lower end of the unit upwards and separate it from the rail (b in the figure). |
|  |  |
| 4. Snap the latch down with a screwdriver (a in the figure), then pry the screwdriver towards the SC30 Controller to prise open the metal latch on the bottom of the unit (b in the figure). | 5. Pull the unit latch side up (a in the figure) and push it forward (b in the figure). |
|  |  |
| 6. Removal is done by separating the unit from the DIN rail (a and b in the figure). | |

| | |
|---|---|
|  | |

# Chapter 5 Wiring

# 5.1. Suggestions for cabling

## 5.1.1. Shielded cable grounding

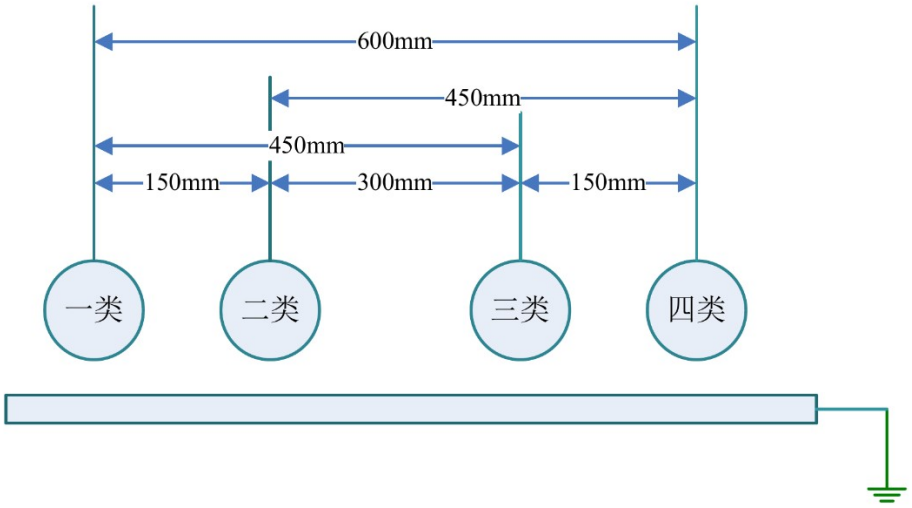
Shielded cables must be used for high-speed I/O, analog I/O, fieldbuses and communication signals. Grounding as close as possible to the module so that the cables after grounding are not affected by electromagnetic induction from the cables before grounding. For the shielded cables, the shielding exposed after stripping part of the sheath should be grounded to the conductive backplate with as large an area as possible to ensure good contact.

The method of soldering the shielding part of the shielded cable to PVC wire and grounding it through its front end would increase the high-frequency reactance and make the shielding effect weaker. Care should be taken to avoid it.

The analog signals are only single-end grounded on the side near the module, while the high-speed I/O, fieldbus and communication signal cable shielded wire need to be grounded at both ends.

## 5.1.2. Cabling requirements

LV cables (< 1KV) are generally categorized into four; only cables of the same category can be placed together to form a cable bundle, cables of different categories should be separated when cabling and generally not crossed and overlapped; when crossover is unavoidable, they should be crossed at right angles. The cables of different categories need to be spaced at a certain distance from each other. For cable lengths of less than 30m, the allowable minimum spacing is shown in the diagram below. When the length of the parallel cable runs increases, the spacing should be increased appropriately. In addition to maintaining spacing, shielding can also be achieved by putting together multiple shields between cables of different categories. To minimize cross-talk, all cables should be routed as close as possible to the (grounded) structural components to which the cabinet is grounded. For example, assembly panels for cabinets or rack components.




| | |
|---|---|
| 一类 | Cat 1 |
| 二类 | Cat 2 |
| 三类 | Cat 3 |

| | |
|---|---|
| 四类 | Cat 4 |

Diagram of cabling requirements for cables of different categories

[Note] Cat 1: Ethernet, EtherCAT;

Cat 2: Low-speed digital communication signals (RS232, RS485, CAN, etc.) and digital I/O signals

Cat 3: Low voltage AC distribution cables (e.g. PLC 220V AC power cables) or DC power cables (e.g. DC 24 power cables for switching power supply outputs)

Cat 4: Input and output cables, welding machine cables, and power cables for power converters

# 5.2. Wiring of the power supply

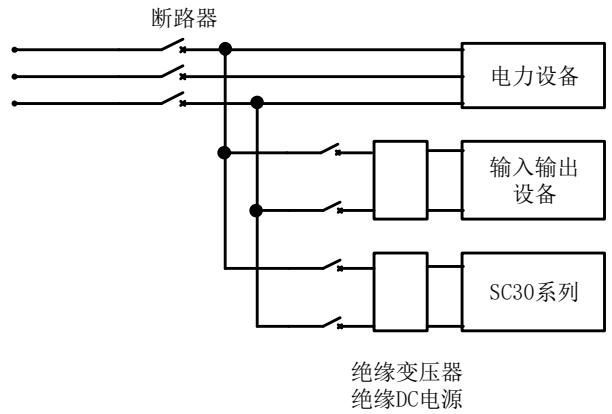
## 5.2.1. General considerations

### ■ Selection of power supplies

● Please use a power supply with low noise levels where possible.
● Although there is sufficient noise tolerance for noise overlapping the power supply lines, it is recommended to further reduce noise by using an isolation transformer/isolated power supply.

### ■ Separation of power supply systems

The cabling on the units, I/O devices and power equipment should each be separated from the system.




| | |
|---|---|
| 断路器 | Circuit breaker |
| 电力设备 | Power equipment |
| 输入输出设备 | I/O devices |
| SC30 系列 | SC30 Series |
| 绝缘变压器 | Insulating transformer |
| 绝缘 DC 电源 | Insulating DC power supplies |

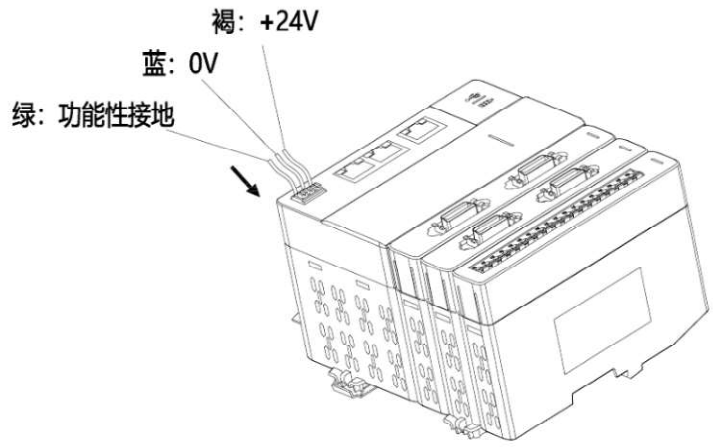
### ■ Power sequence

● Consider the order of power supply and disconnect the power to the controller before disconnecting the power to the input and output.
● If the power for the inputs and outputs is switched off before the power of the controller is switched off, the SC30 Controller may detect a change in the input level and trigger an unexpected sequential action.

## 5.2.2. Power supply for SC30 Controller

### ■ Wiring of the power supply

| Unit | Wiring diagram |
|---|---|

| | |
|---|---|
| SC30 Controller |  |

| | |
|---|---|
| 褐：+24V | Brown: +24V |
| 蓝：0V | Blue: 0V |
| 绿：功能性接地 | Green: Functional grounding |

## ■ Selection of the power supply

● To protect the circuit from abnormal voltages from the power supply line, use an isolated power supply with built-in protection circuitry in the power supply. (Reinforced insulation or double-insulated power supplies)

● Non-isolated types are used in the built-in regulator of the unit.

● Select a power supply with a capacity exceeding that of the unit to be connected. Also, choose a power supply of 24W or more, even in the lowest configuration.

## ■ Supply voltage

● Make sure that the voltage to be connected to the power supply is within the tolerance range.

| Rated input voltage | Allowable voltage range | Rated output capacity |
|---|---|---|
| 24V DC | 20.4V-28.8V DC | Above 24W |

## ■ Power supply cable

● Customized supply cable colors and labels are recommended.

Brown: 24V DC, Blue: 0V, Green: functional ground wire

● To reduce the effect of noise, twist the power cable (twisted wire processing).

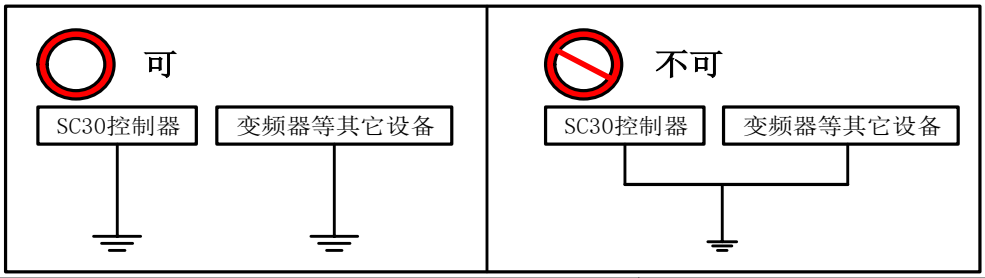
### 5.2.3. Grounding

## ■ Use of special grounding

● Be sure to use a Cat D (Cat 3) ground wire with a ground resistance of 100Ω or less.

● The grounding point should be as close as possible to the SC30 Controller to shorten the distance of the ground wire.

● When sharing grounding with other equipment, this can sometimes have the opposite effect and therefore a special ground wire must be used.

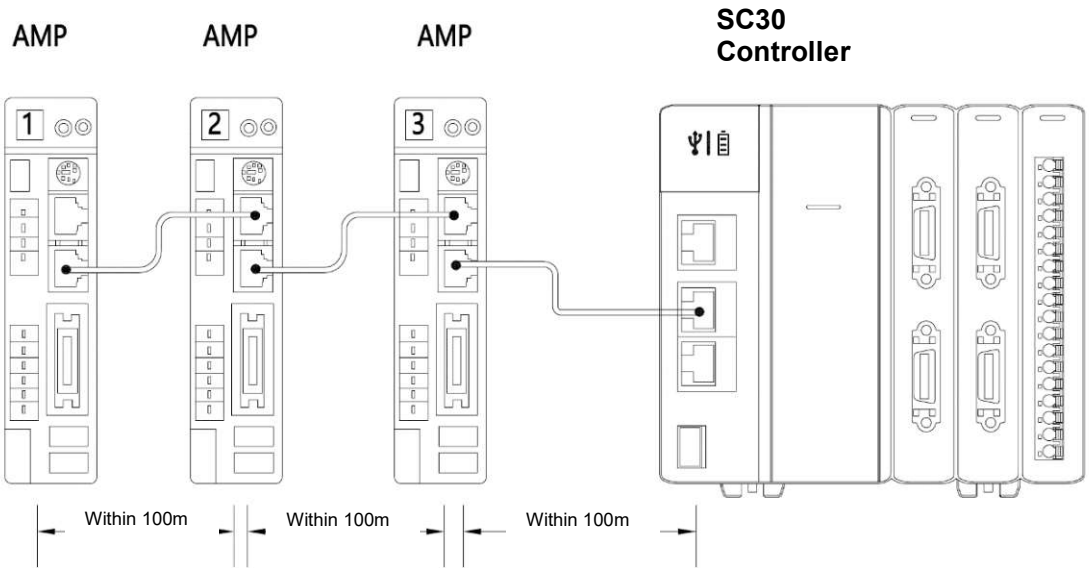



| | |
|---|---|
| 可 | Applicable |
| SC30 控制器 | SC30 Controller |
| 变频器等其它设备 | Other equipment such as inverter |
| 不可 | Not Applicable |
| SC30 控制器 | SC30 Controller |
| 变频器等其它设备 | Other equipment such as inverter |

## 5.3. Wiring of the network

Use a Cat 5e shielded LAN cable for network wiring. To prevent disconnection, connect the connector on the cable side securely to the network connector (RJ45 connector) of the main unit.

The length between the nodes should be within 100m and the total length of the communication loop should be within 200m.




● The LAN port of the Ethernet connected to the SC30 Controller is connected to the communication input port of the Servo Drive, the communication output LAN port of the driver is connected to the next Servo Drive, and so on. The communication connection is of a chain type.

# 5.4. General wiring specifications for I/O modules

## 5.4.1. General considerations for I/Os

### ■ Location of the wiring

The I/O wiring, as well as the wiring between these and the power cables, should be wired as far away from each other as possible. Do not route or bundle them in the same conduit. The I/O wiring should be at least 100mm away from the power and HV cables.

### ■ Selection of electrical wires

When wiring the input and output wires, select the diameter of the wire based on the current capacity.

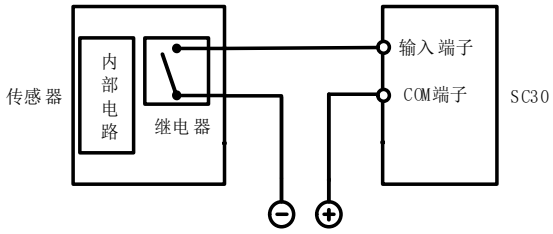
### ■ Power supply

Turn off the power to the SC30 before wiring. The connection of the SC30 Controller to the extension unit should also be carried out with the power off. If the connection is made while the power is ON, a fault or malfunction will occur.

## 5.4.2. Wiring on the input side

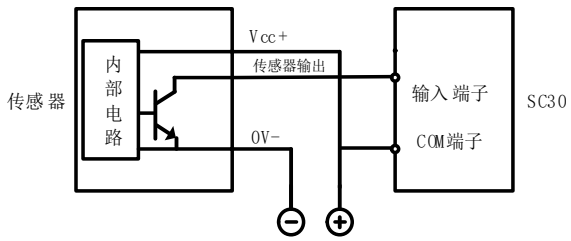
### ■ Connection with photoelectric sensor and proximity sensor

Relay output type



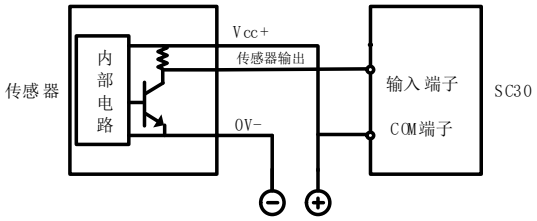

| | |
|---|---|
| 传感器 | Sensor |
| 内部电路 | Internal circuit |
| 继电器 | Relay |
| 输入端子 | Input terminal |
| COM 端子 | COM terminal |

NPN open collector output type



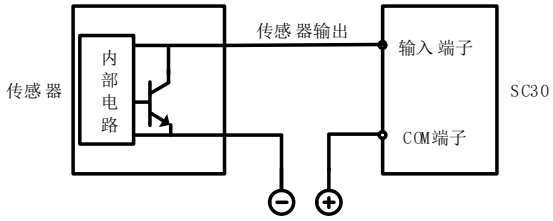

| | |
|---|---|
| 传感器 | Sensor |
| 内部电路 | Internal circuit |
| 传感器输出 | Sensor output |
| 输入端子 | Input terminal |
| COM 端子 | COM terminal |

Voltage output type




| | |
|---|---|
| 传感器 | Sensor |
| 内部电路 | Internal circuit |
| 传感器输出 | Sensor output |
| 输入端子 | Input terminal |
| COM 端子 | COM terminal |

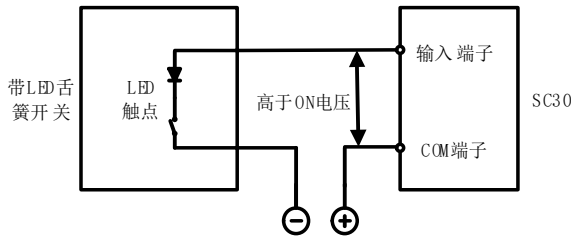
Two-wire output type




| | |
|---|---|
| 传感器 | Sensor |
| 内部电路 | Internal circuit |
| 传感器输出 | Sensor output |
| 输入端子 | Input terminal |
| COM 端子 | COM terminal |

## ■ Precautions when using the reed switch with LED

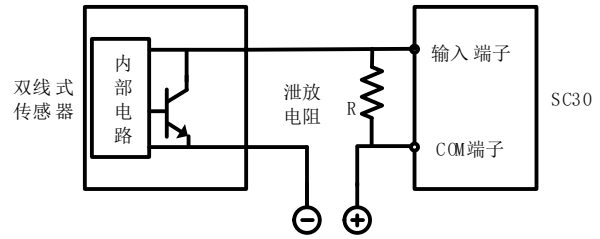
When LEDs are connected in series to the input contacts (e.g. reed switch with LED, etc.), apply a voltage greater than the ON voltage to the input terminals of the SC30. Please note in particular when connecting several switches in series.




| | |
|---|---|
| 带 LED 舌簧开关 | Reed switch with LED |
| LED 触点 | LED contacts |
| 高于 ON 电压 | Greater than ON voltage |
| 输入端子 | Input terminal |
| COM 端子 | COM terminal |

## ■ Precautions when using the two-wire sensor

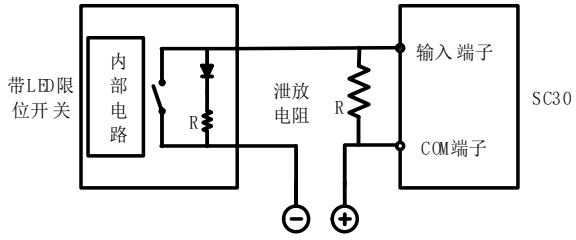
When using a two-wire photoelectric sensor or proximity sensor, if the input current to the SC30 cannot be cut off due to leakage current, connect the bleeder resistor as shown below.




| | |
|---|---|
| 双线式传感器 | Two-wire sensor |
| 内部电路 | Internal circuit |
| 泄放电阻 | Bleeder resistor |
| 输入端子 | Input terminal |
| COM 端子 | COM terminal |

## ■ Precautions when using the limit switch with LED

When using a limit switch with LED, if the input current to the SC30 cannot be cut off due to leakage current, connect the bleeder resistor as shown below.

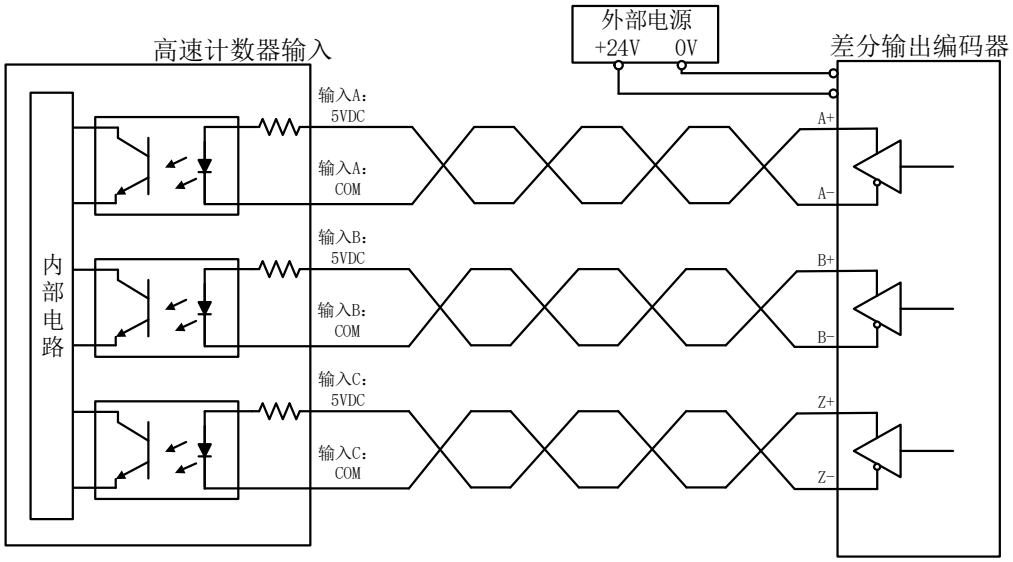



| | |
|---|---|
| 带 LED 限位开关 | Limit switch with LED |
| 内部电路 | Internal circuit |
| 泄放电阻 | Bleeder resistor |

| | |
|---|---|
| 输入端子 | Input terminal |
| COM 端子 | COM terminal |

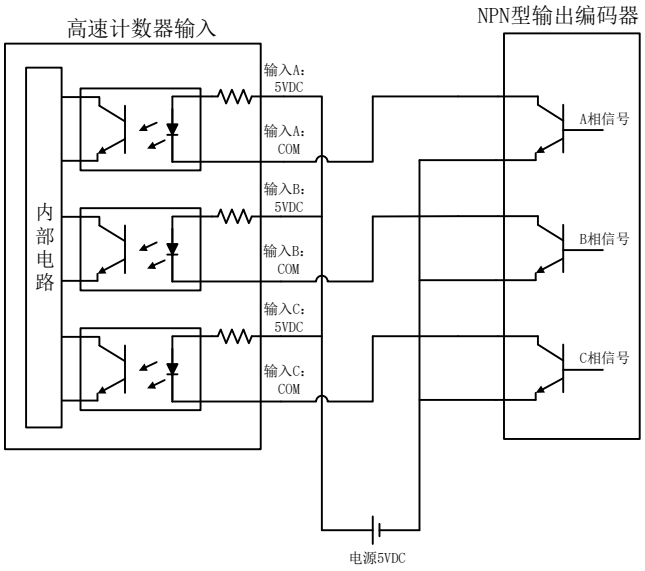
### 5.4.3. Axis-controlled high-speed counter input wiring

■ **Part 1. In case of line drivers with differential encoder input**



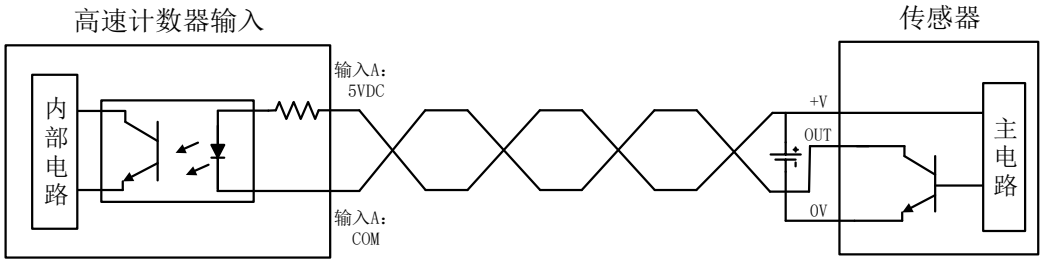

| | |
|---|---|
| 内部电路 | Internal circuit |
| 高速计数器输入 | High-speed counter input |
| 输入 A: 5VDC | Input A: 5VDC |
| 输入 A:COM | Input A: COM |
| 输入 B:5VDC | Input B: 5VDC |
| 输入 B:COM | Input B: COM |
| 输入 C:5VDC | Input C: 5VDC |
| 输入 C:COM | Input C: COM |
| 外部电源 | External power supply |
| 差分输出编码器 | Differential output encoder |

■ **Part 1. Transistor with encoder input - In case of open collector type**



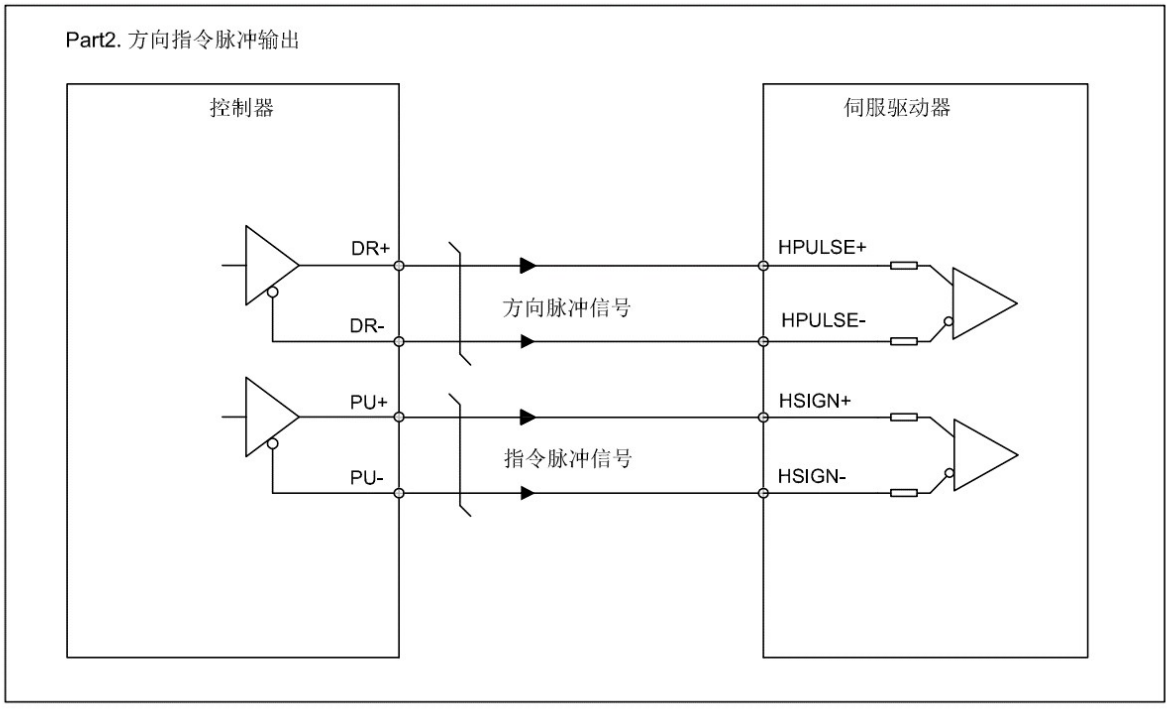

| | |
|---|---|
| 内部电路 | Internal circuit |
| 高速计数器输入 | High-speed counter input |
| 输入 A: 5VDC | Input A: 5VDC |
| 输入 A:COM | Input A: COM |
| 输入 B:5VDC | Input B: 5VDC |
| 输入 B:COM | Input B: COM |
| 输入 C:5VDC | Input C: 5VDC |
| 输入 C:COM | Input C: COM |
| NPN 型输出编码器 | NPN type output encoder |
| A 相信号 | Phase A signal |
| B 相信号 | Phase B signal |
| C 相信号 | Phase C signal |

## ■ Part 1. Sensor inputs




| | |
|---|---|
| 内部电路 | Internal circuit |
| 高速计数器输入 | High-speed counter input |
| 输入 A: 5VDC | Input A: 5VDC |
| 输入 A:COM | Input A: COM |
| 传感器 | Sensor |
| 主电路 | Main circuit |

## ■ Part 2. High-speed pulse command output (differential output)

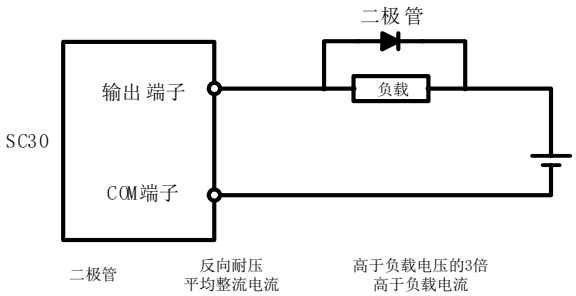



| | |
|---|---|
| Part2.方向指令脉冲输出 | Part 2. Directional command pulse output |
| 控制器 | Controller |
| 方向脉冲信号 | Directional pulse signal |
| 指令脉冲信号 | Command pulse signal |
| 伺服驱动器 | Servo driver |

## 5.4.4. Wiring on the output side

### ■ Protection circuit for inductive loads

For inductive loads, install a protection circuit in parallel with the load.

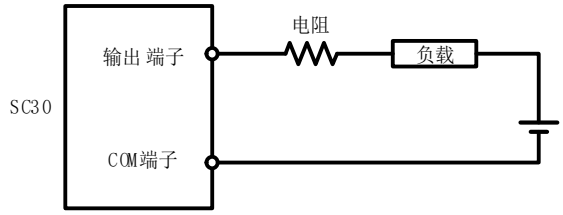



| | |
|---|---|
| 输出端子 | Output terminal |
| COM 端子 | COM terminal |
| 二极管 | Diode |
| 负载 | Load |
| 二极管 | Diode |
| 反向耐压 | Reverse withstand voltage |

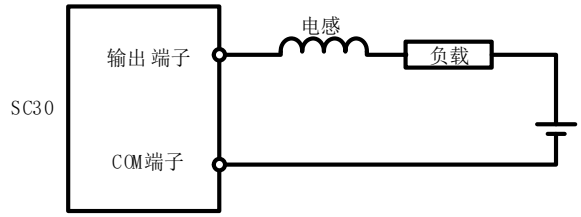
| | |
|---|---|
| 平均整流电流 | Average rectified current |
| 高于负载电压的 3 倍 | 3 times greater than the load voltage |
| 高于负载电流 | Greater than load current |

## ■ Precautions when using capacitive loads

When connecting a load with a high impulse current, to minimize its effect, install the following protection circuit.




| | |
|---|---|
| 输出端子 | Output terminal |
| COM 端子 | COM terminal |
| 电阻 | Resistance |
| 负载 | Load |

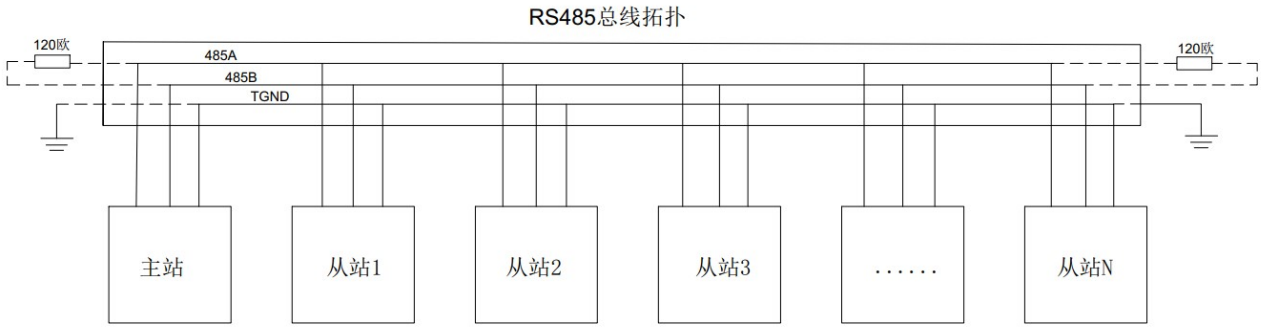



| | |
|---|---|
| 输出端子 | Output terminal |
| COM 端子 | COM terminal |
| 电感 | Inductance |
| 负载 | Load |

## 5.4.5. RS485 communication terminal resistor wiring

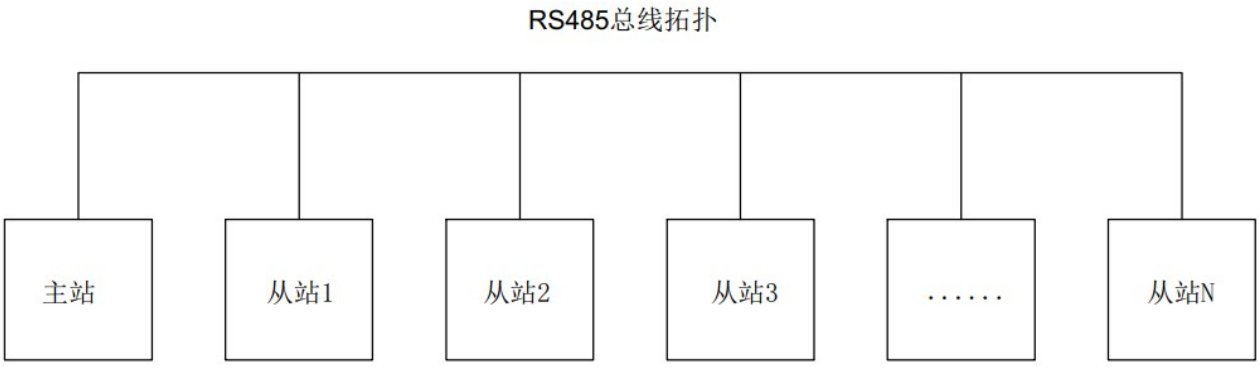
### ■ Topology structure

The RS485 bus connection topology is shown in the diagram below. The RS485 bus is recommended to be connected with a shielded twisted pair, while 485+ and 485- are connected with twisted pair; only 120 Ω termination matched resistors are connected at each end of the bus to prevent signal reflection; the reference grounds of all nodes 485 signals are connected together; a maximum of 128 nodes are connected and the distance between each node branch is less than 3M.




| RS485 总线拓扑 | RS485 bus topology |
|---|---|
| 120 欧 | 120 Ohms |
| 主站 | Master |
| 从站 1 | Slave 1 |
| 从站 2 | Slave 2 |
| 从站 3 | Slave 3 |
| 从站 N | Slave N |

When there are a large number of nodes, the 485 bus must be daisy-chained. If a branch line connection is required, the shorter the branch length from the bus to the node the better, less than 3m is recommended. The star connection is strongly discouraged.



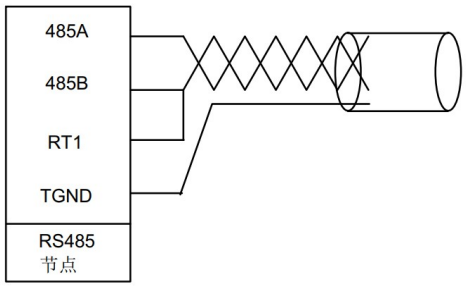

| RS485 总线拓扑 | RS485 bus topology |
|---|---|
| 主站 | Master |
| 从站 1 | Slave 1 |
| 从站 2 | Slave 2 |

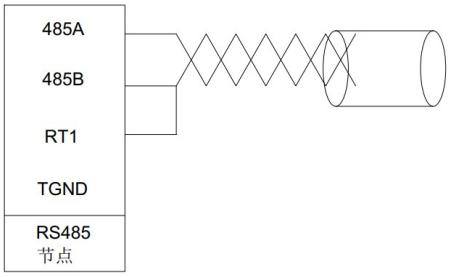
| | |
|---|---|
| 从站 3 | Slave 3 |
| 从站 N | Slave N |

## ■ Terminal wiring method

Please check that the field 485 bus contains three cables connected to the 485A, 485B and TGND terminals and that the terminals are not reversed or connected incorrectly. If shielded cables are used, it is particularly important that the shield is also connected to the TGND terminal. At any node or midway point, the shield must not be connected anywhere other than to the TGND of the node (including the field enclosure, equipment ground terminal, etc.).

Due to the attenuation effect of the cable, it is recommended to use AGW26 or thicker cable for all connection lengths greater than 3m. It is always recommended to use twisted pair cables for the 485A and 485B connection cables.




| | |
|---|---|
| RS485 节点 | RS485 nodes |

Diagram of TGND terminals available on site

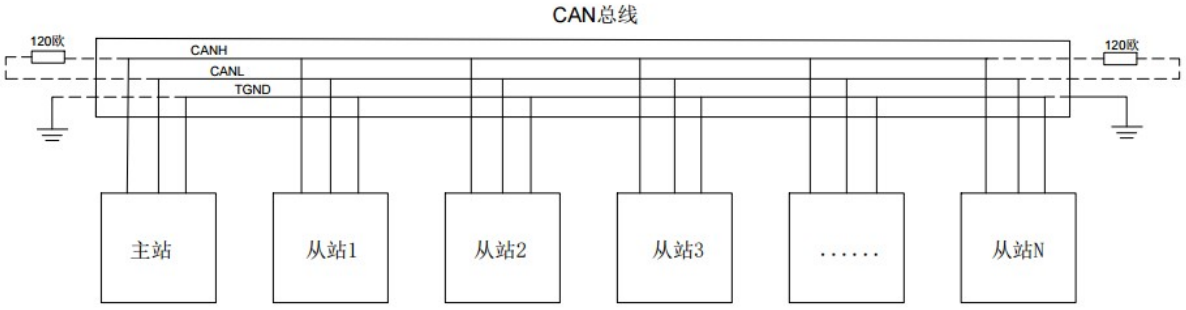
Diagram of TGND terminals not available on site

Connection of 120 Ω terminating resistors at each end of the bus will prevent the signal reflection. Terminating resistor RT1 is shorted to 485B using wire.

### 5.4.6. CAN communication terminal resistor wiring

## ■ Topology structure

The CAN bus connection topology is shown below. It is recommended to use a shielded twisted pair connection with two 120 Ω termination matching resistors at each end of the bus to prevent signal reflection. The shield is generally reliably grounded using a single point.

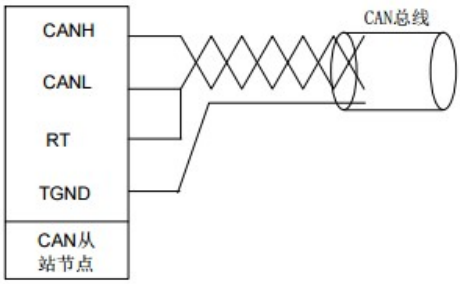



| | |
|---|---|
| CAN 总线 | CAN bus |

| | |
|---|---|
| 120 欧 | 120 Ohms |
| 主站 | Master |
| 从站 1 | Slave 1 |
| 从站 2 | Slave 2 |
| 从站 3 | Slave 3 |
| 从站 N | Slave N |

## ■ Terminal wiring method

A shielded twisted pair connection is recommended, as shown in the figure below, for the connection between the two controllers. The CANH and CANL of both sides are connected accordingly. The shield is generally reliably grounded using a single point. Do not bundle the cable with AC power cables, HV cables etc. when fixing it to avoid interference with the communication signal.

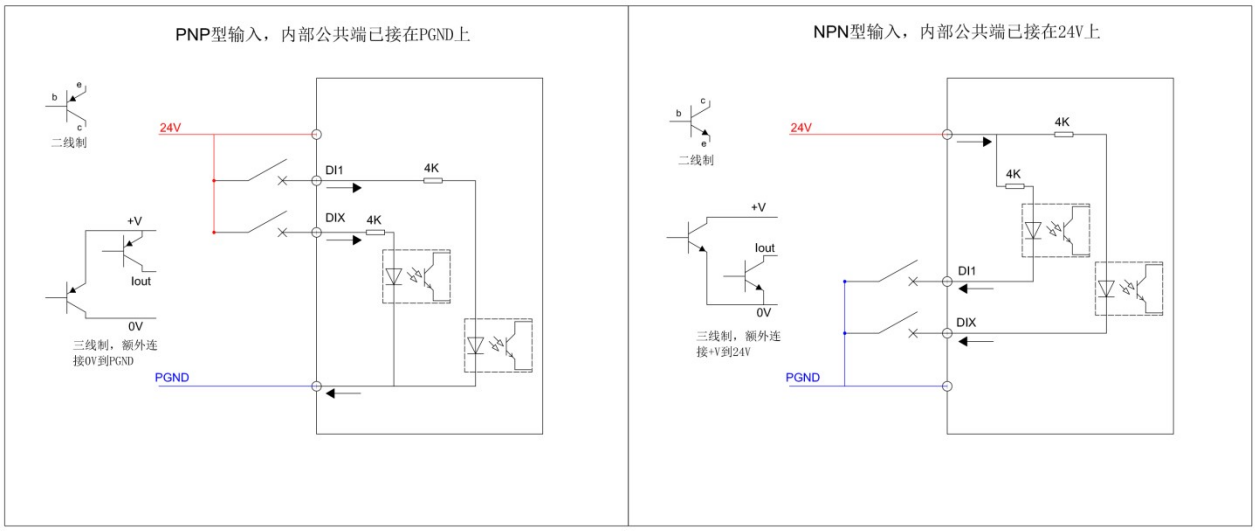



| | |
|---|---|
| CAN 总线 | CAN bus |
| CAN 从站节点 | CAN slave nodes |

Diagram of the wiring terminals

To enable the terminating resistor, short the RT pin of Pin 14 directly to the CANL terminal of Pin 13 with a wire. According to the ISO 11898, the size of the termination matching resistor is determined by the characteristic impedance of the transmission cable. For example, if the twisted pair has a characteristic impedance of 120 Ω, the two endpoints on the bus should also be provided with 120 Ω terminating resistors. In long-distance communication, the resistance value of the terminating resistor sometimes needs to be increased.

## 5.4.7. Instructions for DI input wiring




| | |
|---|---|
| PNP 型输入，内部公共端已接在 PGND 上 | PNP type input, with internal common already connected to PGND |
| 二线制 | Two-wire system |
| 三线制，额外连接 OV 到 PGND | Three-wire system, with OV additionally connected to PGND |
| NPN 型输入，内部公共端已接在 24V 上 | NPN type input, with internal common-terminal already connected to 24V |
| 二线制 | Two-wire system |
| 三线制，额外连接+V 到 24V | Three-wire system, with +V additionally connected to 24V |

Knowledge elements:

1. To determine which type of input is supported, simply determine whether the common terminal of the external device is connected at 24V (PNP type) or 0V (NPN type). Some of them support both types, where the common terminal of the internal circuit is not connected directly to the power supply, but a COM port is provided for the user to customize the connection to 24V or 0V, so that the common terminal of the external device can then also be changed. The internal photocoupler must of course be bidirectional at this point.

2. Source input corresponds to PNP input; sinking input corresponds to NPN input.

PNP type input wiring, external device common terminal connected to 24V, and signal output terminal connected to DIX. In the three-wire system, the signal output Iout is connected to DIX and the +V and 0V terminals are connected to both ends of the 24V supply, i.e. 24V and PGND.

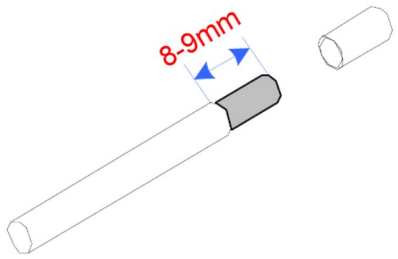
For NPN type input wiring, the common terminal of the external device is connected to PGND and the signal output to DIX. In the three-wire system, the signal output Iout is connected to DIX and the remaining two wires are connected to both ends of the power supply.

## 5.5. Module Terminal Signal Arrangement and Cable Production

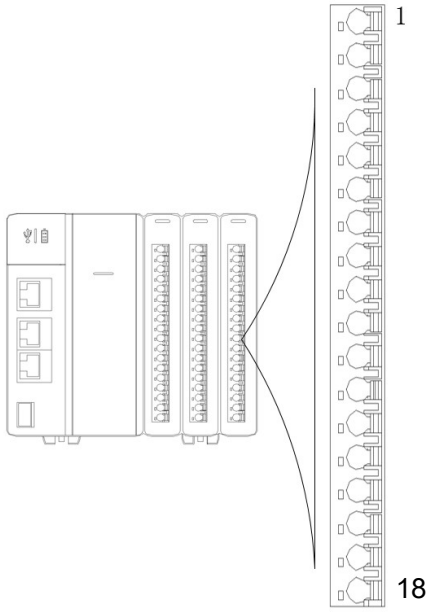
### 5.5.1. Cable production

The axis-controlled high-speed counter board uses DB20 connectors (to be customized) and the LAN port uses RJ45 (8P8C) plugs. All other I/O terminals are wired using the in-line connectors, which does not require a customized cluster socket.

■ **Diameter and specification of connection cables**

| Item | Reference data |
|---|---|
| Power supply wiring ($mm^2$) | 0.5-1.5 |
| I/O module ($mm^2$) | 0.2-1.5 |
| Cable stripping length (mm) | 8-9<br>  <br>Schematic diagram of wire stripping |

### 5.5.2. Signal Arrangement and Definition of Communication Board Terminals

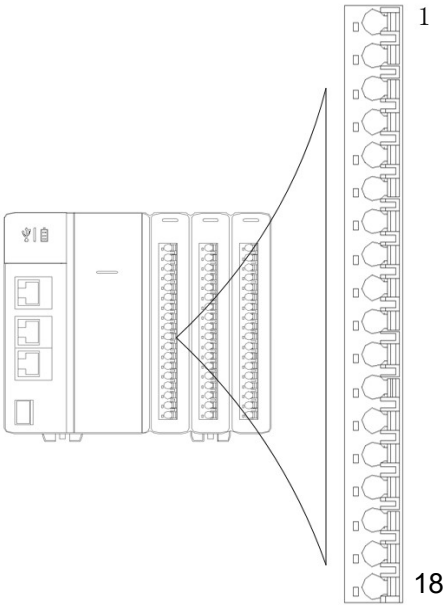
| Diagram of the terminal arrangement | No. | Name | Function |
|---|---|---|---|
|  | 1 | TX | RS232 transmitter |
| | 2 | RX | RS232 receiver |
| | 3 | TGND | Communication reference ground |
| | 4 | 485A | RS485 communication 1+ |
| | 5 | 485B | RS485 communication 1- |
| | 6 | RT1 | 485 terminating resistor |
| | 7 | TGND | Communication reference ground |
| | 8 | 485A | RS485 communication 2+ |
| | 9 | 485B | RS485 communication 2- |
| | 10 | RT2 | 485 terminating resistor |
| | 11 | TGND | Communication reference ground |
| | 12 | CANH | CAN+ |
| | 13 | CANL | CAN- |
| | 14 | RT | CAN terminating resistor |
| | 15 | TGND | Communication reference ground |
| | 16 | NC | Empty pin |
| | 17 | 24V | Power input 24V |
| | 18 | PGND | Power reference ground |

For the peripheral wiring, please refer to:

RS485 communication field wiring and termination resistor wiring

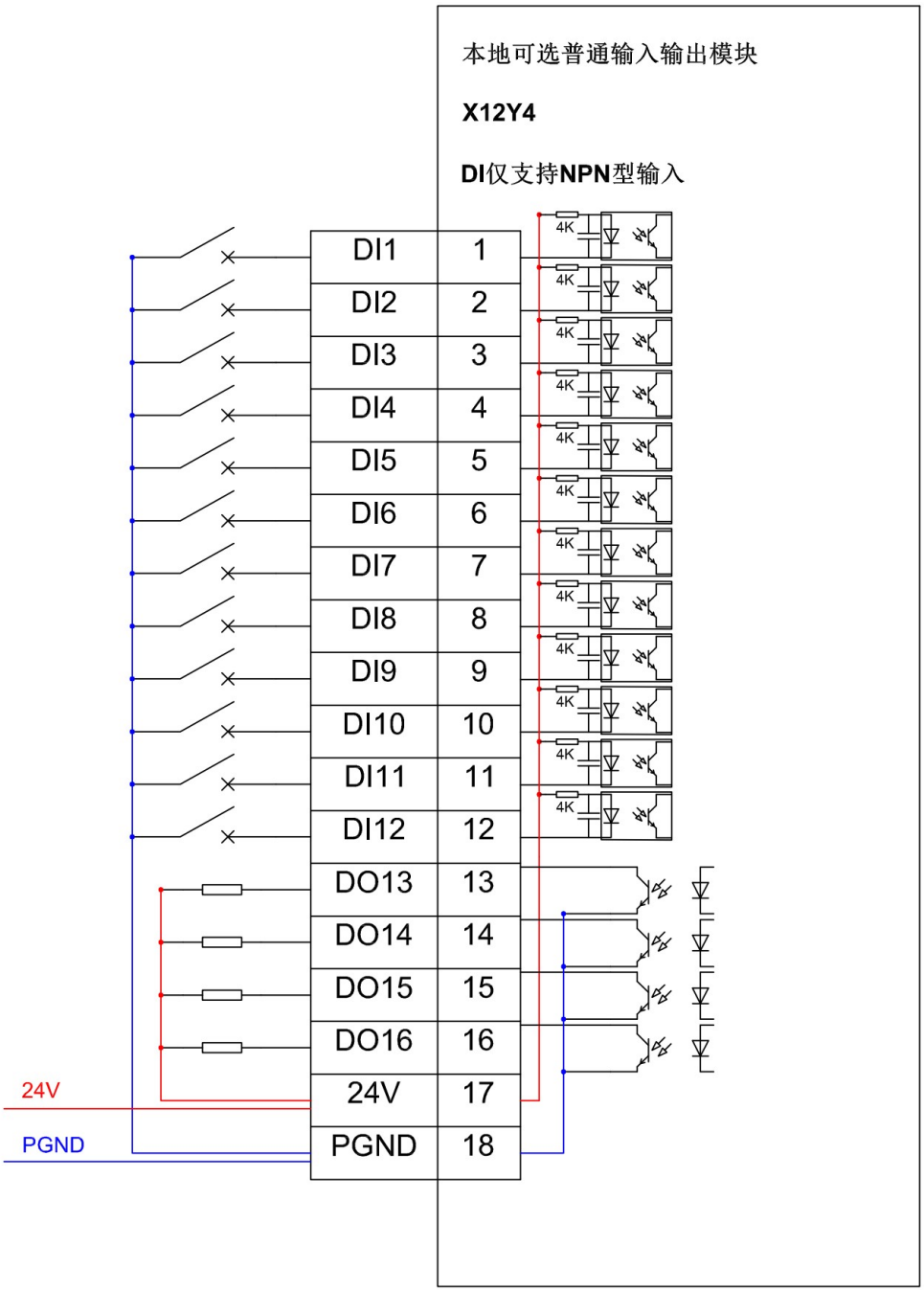
CAN communication field wiring and termination resistor wiring

### 5.5.3. Arrangement and definition of signals of locally optional general I/O board terminals

| Diagram of the terminal arrangement | No. | Name | Function | Remarks |
|---|---|---|---|---|
|  | 1 | DI1 | Digital input | Sinking input, active low |
| | 2 | DI2 | Digital input | Sinking input, active low |
| | 3 | DI3 | Digital input | Sinking input, active low |
| | 4 | DI4 | Digital input | Sinking input, active low |
| | 5 | DI5 | Digital input | Sinking input, active low |
| | 6 | DI6 | Digital input | Sinking input, active low |
| | 7 | DI7 | Digital input | Sinking input, active low |
| | 8 | DI8 | Digital input | Sinking input, active low |
| | 9 | DI9 | Digital input | Sinking input, active low |
| | 10 | DI10 | Digital input | Sinking input, active low |
| | 11 | DI11 | Digital input | Sinking input, active low |
| | 12 | DI12 | Digital input | Sinking input, active low |
| | 13 | DO1 | Digital output | Source output, active low |
| | 14 | DO2 | Digital output | Source output, active low |
| | 15 | DO3 | Digital output | Source output, active low |
| | 16 | DO4 | Digital output | Source output, active low |
| | 17 | 24V | Supplementary power input | —— |
| | 18 | PGND | Supplementary power ground | —— |

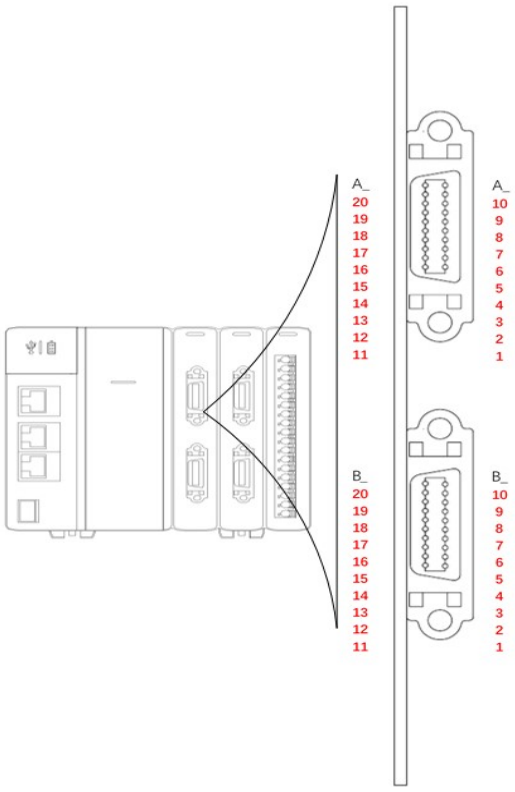
## ■ Peripheral wiring and internal module circuitry

The module X12Y4 only supports NPN type inputs. Three-wire or two-wire system? And NPN or PNP types? Please refer to the "Instructions for DI input wiring".
For module wiring, please connect as follows:




| | |
|---|---|
| 本地可选普通输入输出模块 | Locally optional general I/O modules |
| DI 仅支持 NPN 型输入 | DI only supports NPN type inputs |

### 5.5.4. Arrangement and definition of signals for locally optional axis-controlled high-speed counter board terminals

| Diagram of the terminal arrangement | NO. | | Name | Purpose |
|---|---|---|---|---|
| | A_ | B_ | | |
|  | 1 | 1 | ECA1+ | Encoder A |
| | 2 | 2 | ECA1- | Encoder A |
| | 3 | 3 | ECB1+ | Encoder B |
| | 4 | 4 | ECB1- | Encoder B |
| | 5 | 5 | ECZ1+ | Encoder Z |
| | 6 | 6 | ECZ1- | Encoder Z |
| | 7 | 7 | OPC | Reserved high-speed DI+ |
| | 8 | 8 | PULS | Reserved high-speed DI- |
| | 9 | 9 | SRV_COIN | Servo positioning completion DI |
| | 10 | 10 | ALARM | Servo alarm DI |
| | 11 | 11 | +5V_ENC | Encoder power supply |
| | 12 | 12 | EGND | Encoder reference ground |
| | 13 | 13 | DR+ | Direction of command |
| | 14 | 14 | DR- | Direction of command |
| | 15 | 15 | PU+ | Command pulse |
| | 16 | 16 | PU- | Command pulse |
| | 17 | 17 | 24V | Power output |
| | 18 | 18 | GND_24V | Reference ground |
| | 19 | 19 | SRV_ON | Enable servo DO |
| | 20 | 20 | CLEAR | Clear servo alarm DO |

The axis-controlled high-speed counter module uses DB20 plugs. The pins of the plugs are customized in accordance with the "Arrangement and definition of signals for locally optional axis-controlled high-speed counter board terminals".

**Description of the DB20 connector assembly**

| Item | Model |
|---|---|
| DB20 male connector  | SM-SCSI-20P |

## ■ Peripheral wiring and internal module circuitry

The terminals are wired in 3 parts, of which the wiring for Part 1 and Part 2 can be found below, and the last part is for the servo system signals. For signal functions, please refer to the "Arrangement and Definition of the Signals for the Terminals of the Locally Optional Axis-controlled High-Speed Counter Boards".

Servo signal DI inputs: SRV_COIN (servo positioning completion DI) and ALARM (servo alarm DI) support only the NPN type inputs.

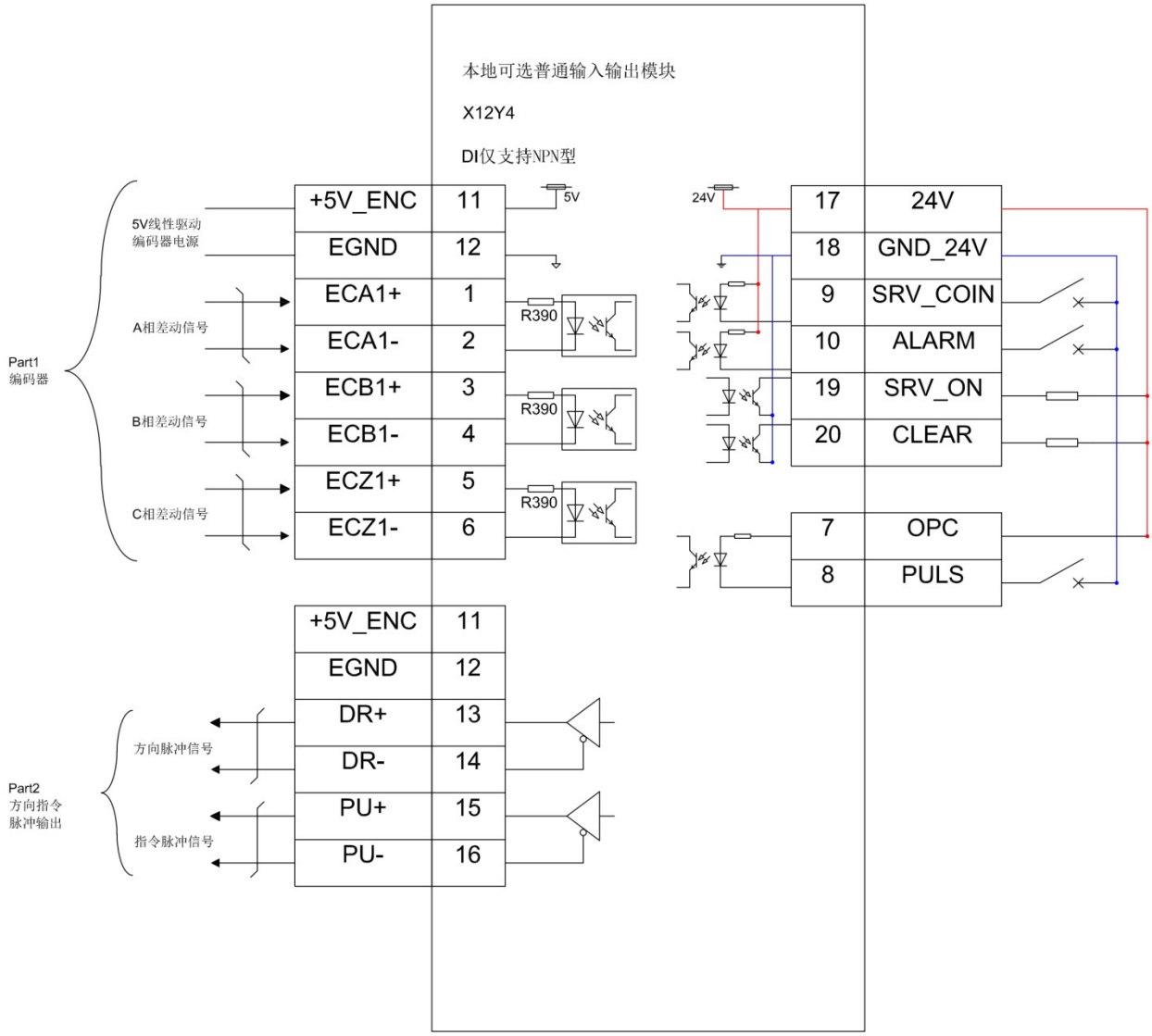
Servo signal DO outputs: SRV_ON (enable servo DO) and CLEAR (clear servo alarm DO) are of the NPN type output.

A set of high-speed DI inputs, OPC and PULS, are reserved for user customization, and the wiring supports NPN and PNP inputs. Only NPN type inputs are illustrated below. For the ways of NPN type and PNP type inputs, please refer to the "Instructions for DI input wiring".

Part 1. Encoders: Refer to the "Shaft-controlled high-speed counter input wiring".

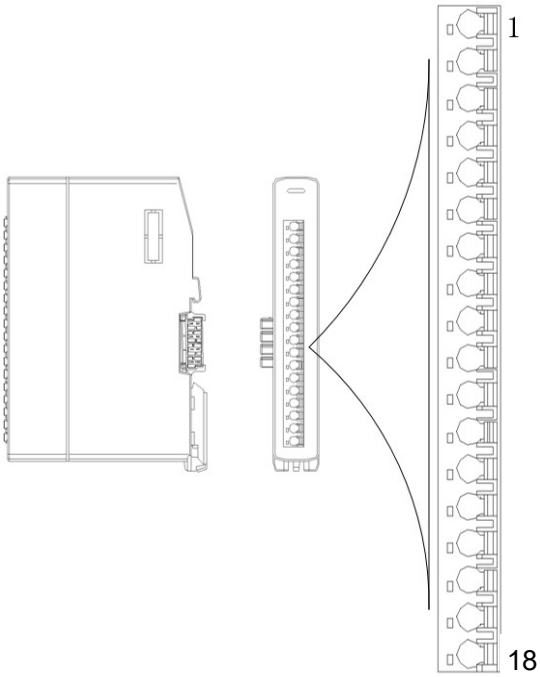
Part 2. Directional command pulse output: The signal is a 5V signal, so do not connect to a 24V system. Please refer to the "Axis-controlled high-speed counter input wiring".

Note: There are 5V and 24V systems coexisting in the terminals, it is necessary to pay attention to the terminal serial number to prevent 24V from being connected to the 5V system, which may cause serious consequences.




| | |
|---|---|
| 本地可选普通输入输出模块 | Locally optional general I/O modules |
| DI 仅支持 NPN 型 | DI only supports NPN type |
| 编码器 | Encoder |
| 5V 线性驱动编码器电源 | 5V linear drive encoder power supply |
| A 相差动信号 | A-phase differential signals |
| B 相差动信号 | B-phase differential signals |
| C 相差动信号 | C-phase differential signals |
| 方向指令脉冲输出 | Directional command pulse output |
| 方向脉冲信号 | Directional pulse signal |
| 指令脉冲信号 | Command pulse signal |

### 5.5.5. Arrangement and definition of the signals of the local extension digital input board terminals

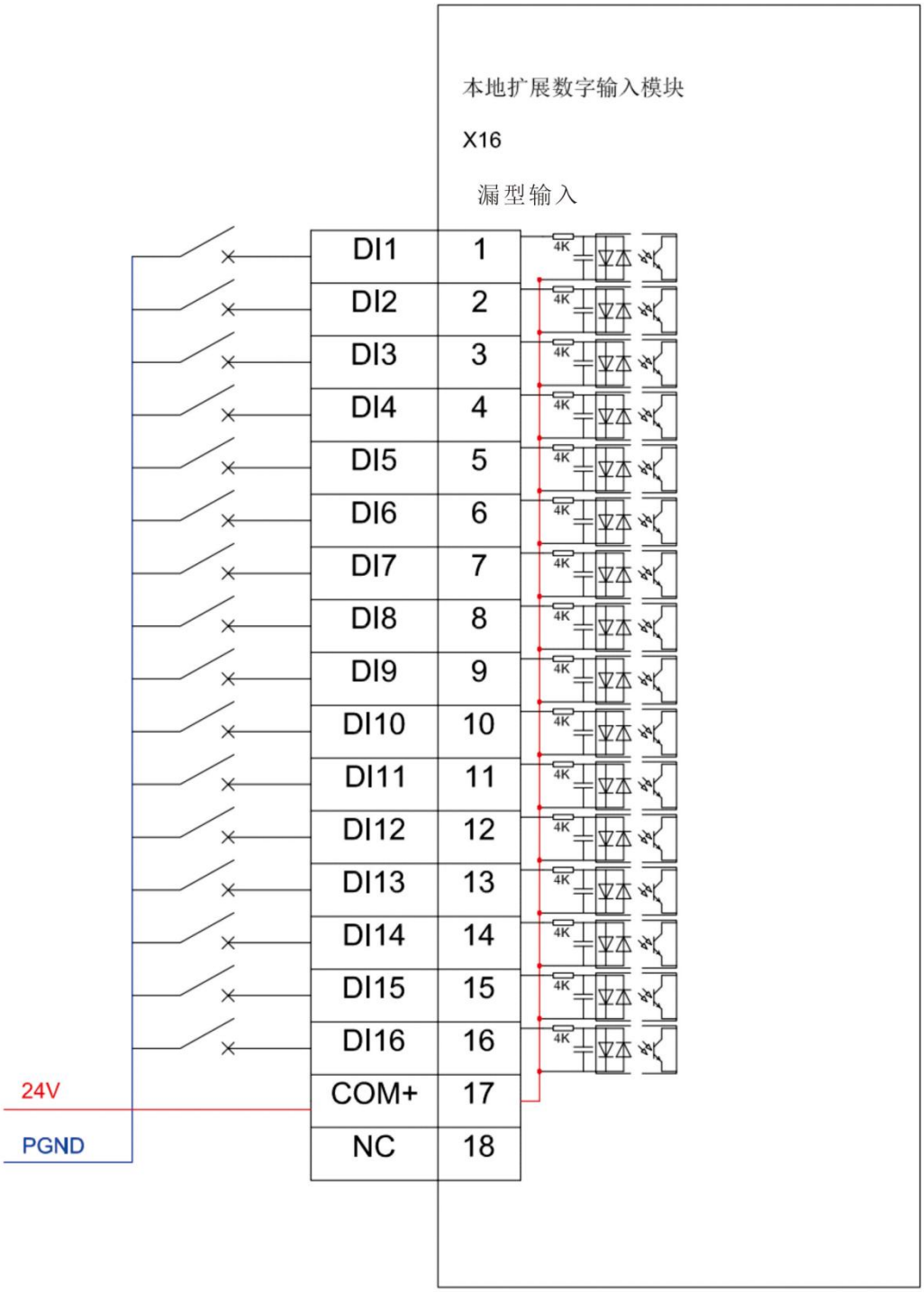
| Diagram of the terminal arrangement | No. | Name | Function | Remarks |
|---|---|---|---|---|
|  | 1 | DI1 | Digital input | Bidirectional optocoupler insulation |
| | 2 | DI2 | Digital input | Bidirectional optocoupler insulation |
| | 3 | DI3 | Digital input | Bidirectional optocoupler insulation |
| | 4 | DI4 | Digital input | Bidirectional optocoupler insulation |
| | 5 | DI5 | Digital input | Bidirectional optocoupler insulation |
| | 6 | DI6 | Digital input | Bidirectional optocoupler insulation |
| | 7 | DI7 | Digital input | Bidirectional optocoupler insulation |
| | 8 | DI8 | Digital input | Bidirectional optocoupler insulation |
| | 9 | DI9 | Digital input | Bidirectional optocoupler insulation |
| | 10 | DI10 | Digital input | Bidirectional optocoupler insulation |
| | 11 | DI11 | Digital input | Bidirectional optocoupler insulation |
| | 12 | DI12 | Digital input | Bidirectional optocoupler insulation |
| | 13 | DI13 | Digital input | Bidirectional optocoupler insulation |
| | 14 | DI14 | Digital input | Bidirectional optocoupler insulation |
| | 15 | DI15 | Digital input | Bidirectional optocoupler insulation |
| | 16 | DI16 | Digital input | Bidirectional optocoupler insulation |
| | 17 | COM+ | Common terminal | —— |
| | 18 | NC | Empty pin | —— |
| SL-X16A01 only supports low level input, and COM is connected to 24V.<br>SL-X16C01 only supports low/high level inputs, and COM is connected to 24V or 0V. | | | | |

## ■ Peripheral wiring and internal module circuitry

The DI input type of the module X16 supports both PNP and NPN inputs; however, it should be noted that all the inputs need to be of one type and that the internal common of each input is connected to COM when using, so it is not possible to use both PNP and NPN inputs. Refer to the "Instructions for DI input wiring" for the two DI input types!

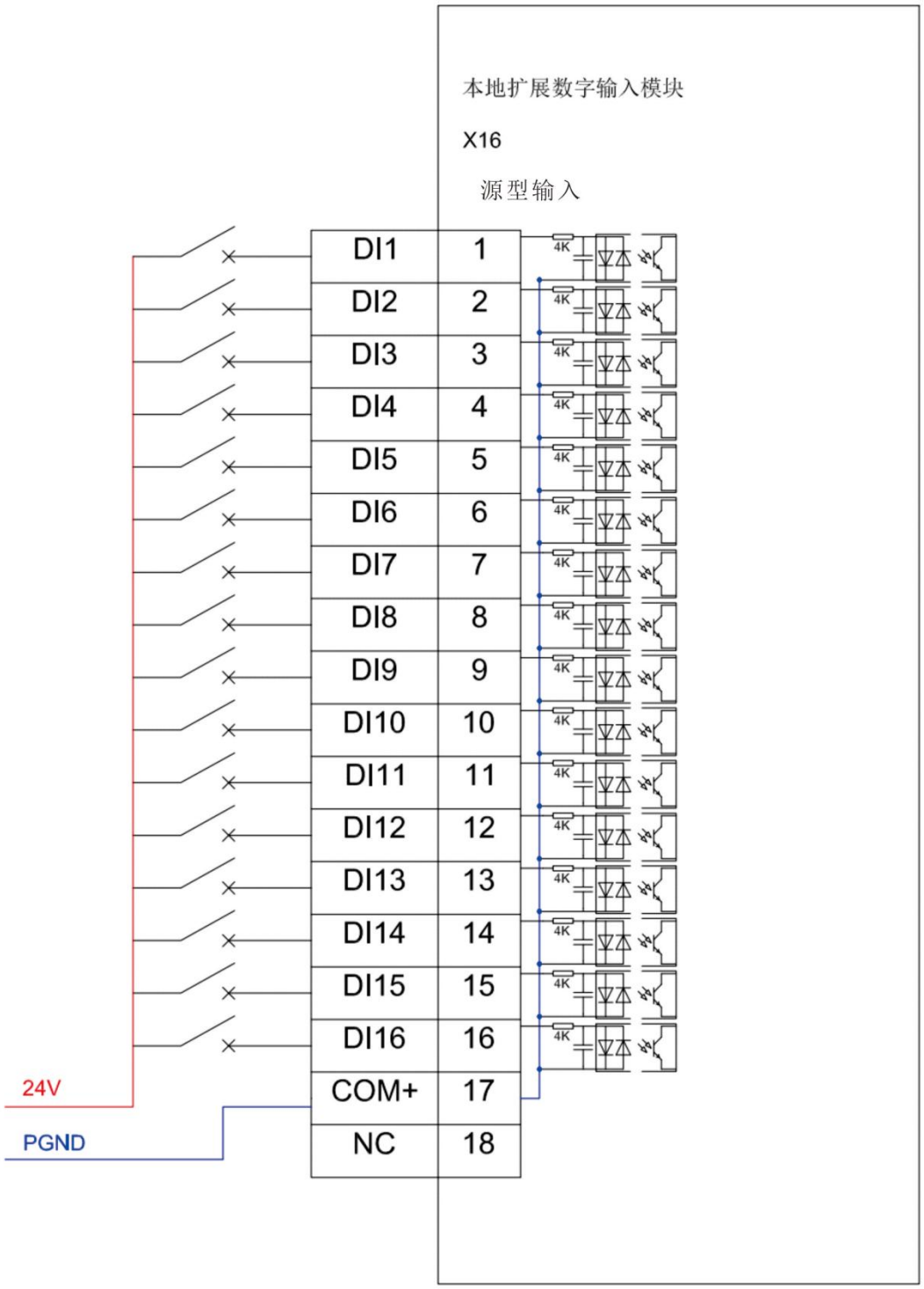
Note: All input types must be of one type!!!

**For NPN type inputs (sinking type signal inputs), please wire as follows:**



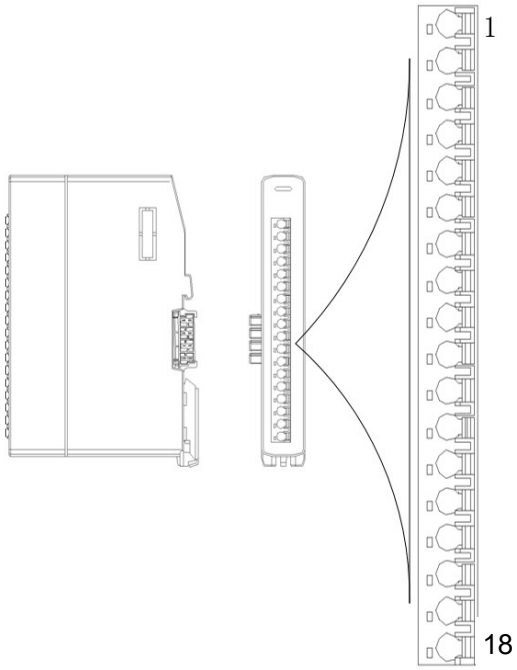
| | |
|---|---|
| 本地扩展数字输入模块 | Local extension digital input modules |
| 漏型输入 | Sinking input |

**For PNP type inputs (source type signal inputs), please wire as follows:**




| | |
|---|---|
| 本地扩展数字输入模块 | Local extension digital input modules |
| 源型输入 | Source-type input |

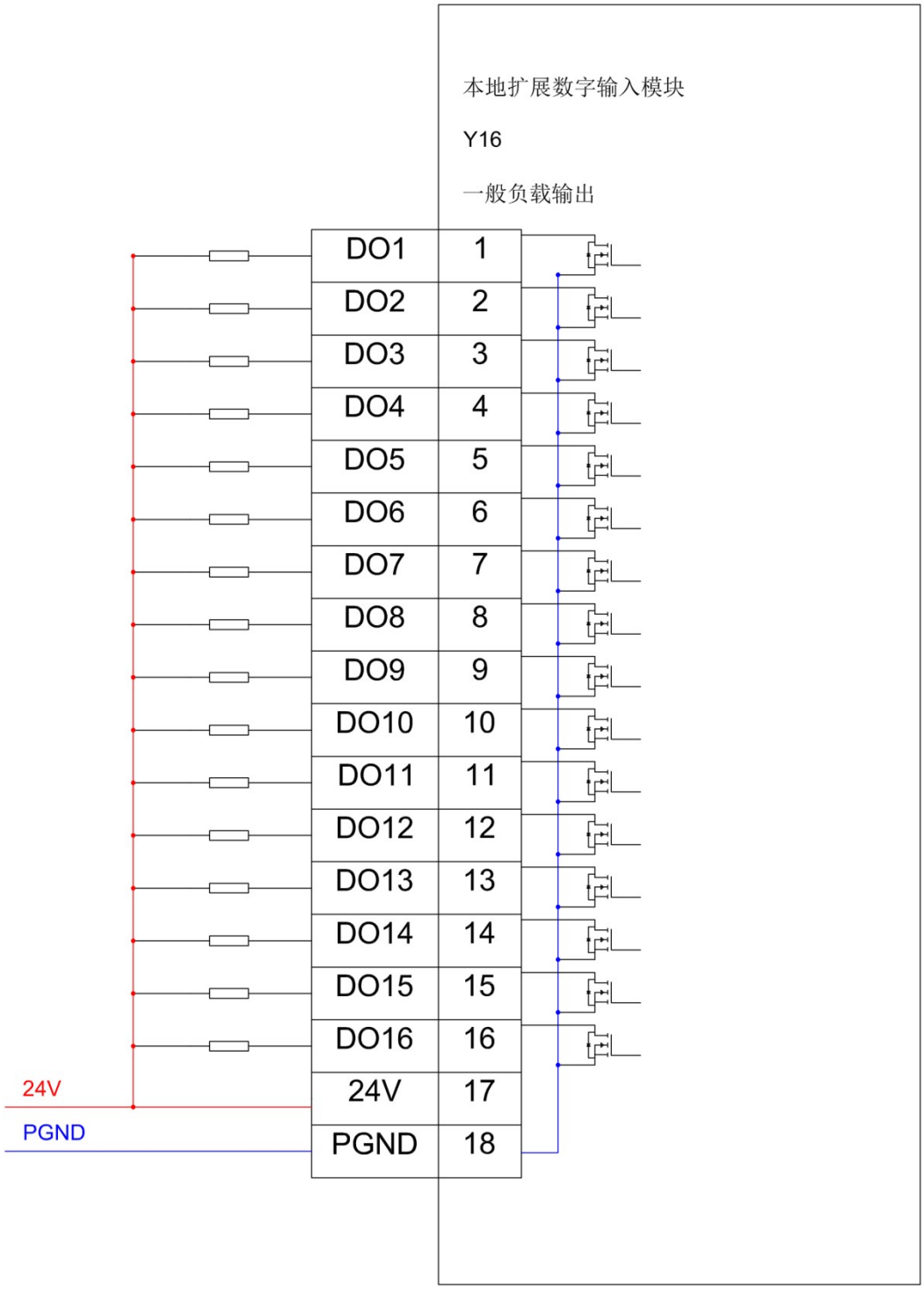
### 5.5.6. Arrangement and definition of the signals of the local extension digital output terminals

| Diagram of the terminal arrangement | No. | Name | Function | Remarks |
|---|---|---|---|---|
|  | 1 | DO1 | Digital output | Sinking output, active low |
| | 2 | DO2 | Digital output | Sinking output, active low |
| | 3 | DO3 | Digital output | Sinking output, active low |
| | 4 | DO4 | Digital output | Sinking output, active low |
| | 5 | DO5 | Digital output | Sinking output, active low |
| | 6 | DO6 | Digital output | Sinking output, active low |
| | 7 | DO7 | Digital output | Sinking output, active low |
| | 8 | DO8 | Digital output | Sinking output, active low |
| | 9 | DO9 | Digital output | Sinking output, active low |
| | 10 | DO10 | Digital output | Sinking output, active low |
| | 11 | DO11 | Digital output | Sinking output, active low |
| | 12 | DO12 | Digital output | Sinking output, active low |
| | 13 | DO13 | Digital output | Sinking output, active low |
| | 14 | DO14 | Digital output | Sinking output, active low |
| | 15 | DO15 | Digital output | Sinking output, active low |
| | 16 | DO16 | Digital output | Sinking output, active low |
| | 17 | 24V | IO supplementary power | |
| | 18 | PGND | IO reference ground | |

## ■ Peripheral wiring and internal module circuitry

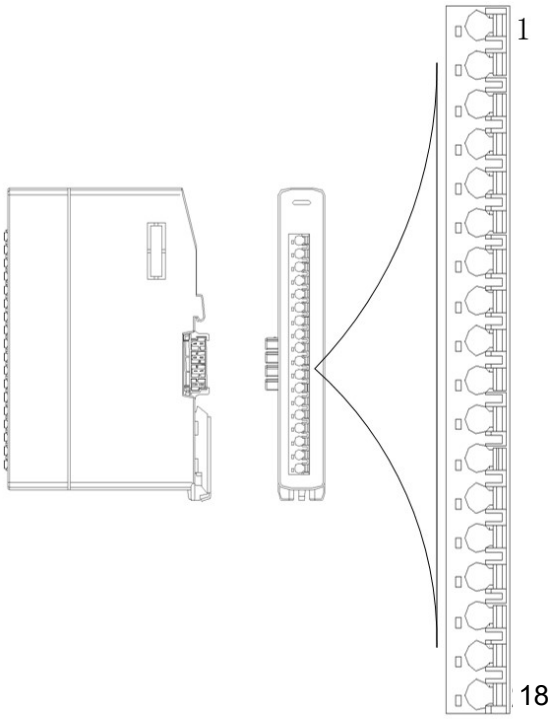
The DO input type of module Y16 is of a sinking type (NPN type output).

**When DO is a general load, please wire as follows:**



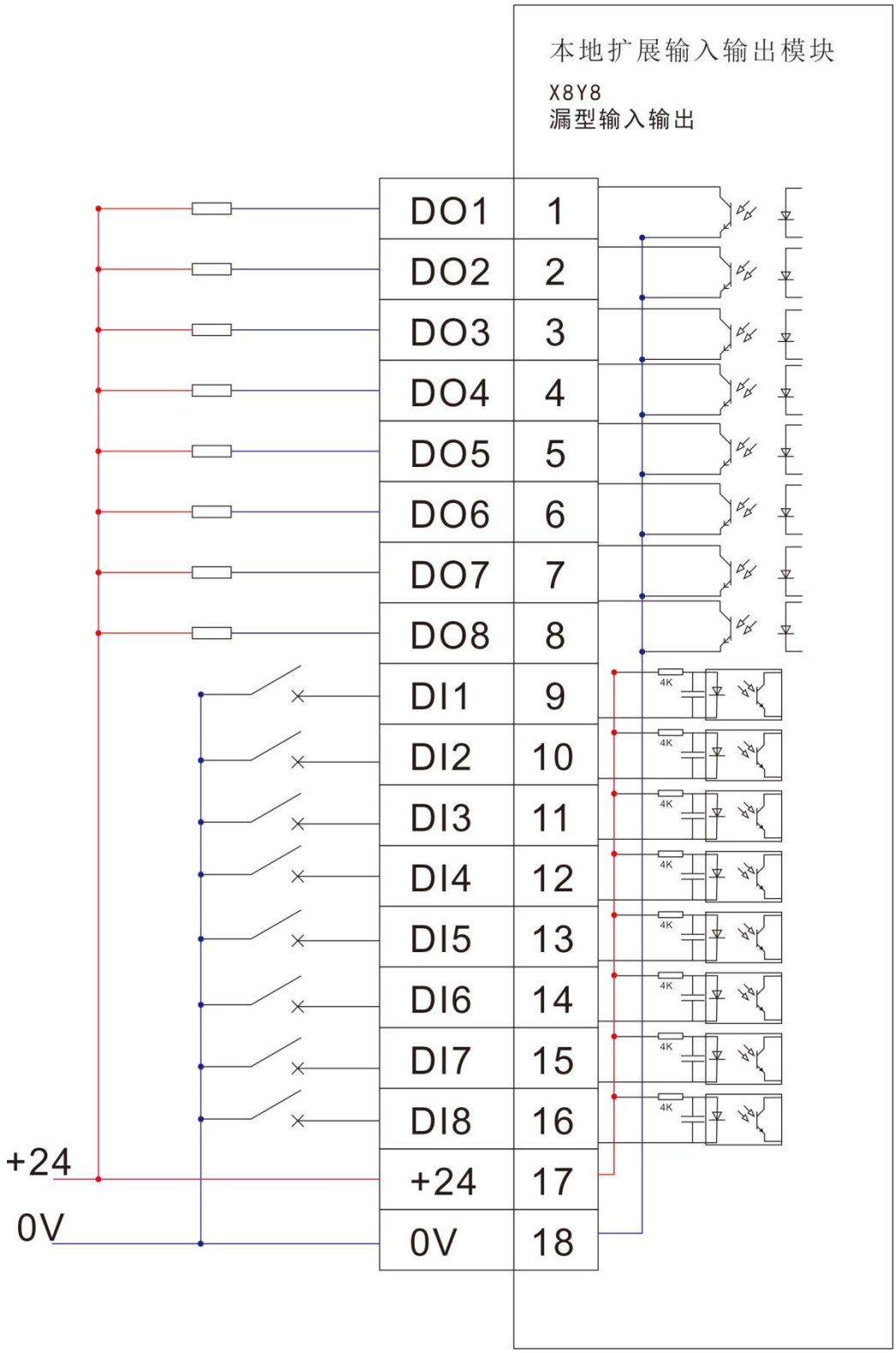

| | |
|---|---|
| 本地扩展数字输入模块 | Local extension digital input modules |
| 一般负载输出 | General load output |

### 5.5.7. Arrangement and definition of the signals of the local extension digital I/O terminals

| Diagram of the terminal arrangement | No. | Name | Function | Remarks |
|---|---|---|---|---|
|  | 1 | DO1 | Digital output | Sinking output, active low |
| | 2 | DO2 | Digital output | Sinking output, active low |
| | 3 | DO3 | Digital output | Sinking output, active low |
| | 4 | DO4 | Digital output | Sinking output, active low |
| | 5 | DO5 | Digital output | Sinking output, active low |
| | 6 | DO6 | Digital output | Sinking output, active low |
| | 7 | DO7 | Digital output | Sinking output, active low |
| | 8 | DO8 | Digital output | Sinking output, active low |
| | 9 | DI1 | Digital input | Sinking input, active low |
| | 10 | DI2 | Digital input | Sinking input, active low |
| | 11 | DI3 | Digital input | Sinking input, active low |
| | 12 | DI4 | Digital input | Sinking input, active low |
| | 13 | DI5 | Digital input | Sinking input, active low |
| | 14 | DI6 | Digital input | Sinking input, active low |
| | 15 | DI7 | Digital input | Sinking input, active low |
| | 16 | DI8 | Digital input | Sinking input, active low |
| | 17 | 24V | IO supplementary power | —— |
| | 18 | PGND | IO reference ground | —— |

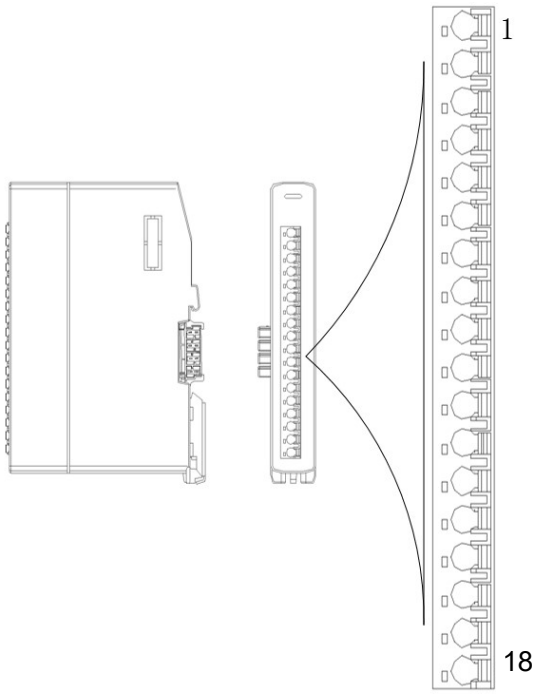
## ■ Peripheral wiring and internal module circuitry

The I/O type of the module X8Y8 is of a sinking type (active low).




| | |
|---|---|
| 本地扩展输入输出模块 | I/O modules for local extension |
| 漏型输入输出 | Sinking I/O |

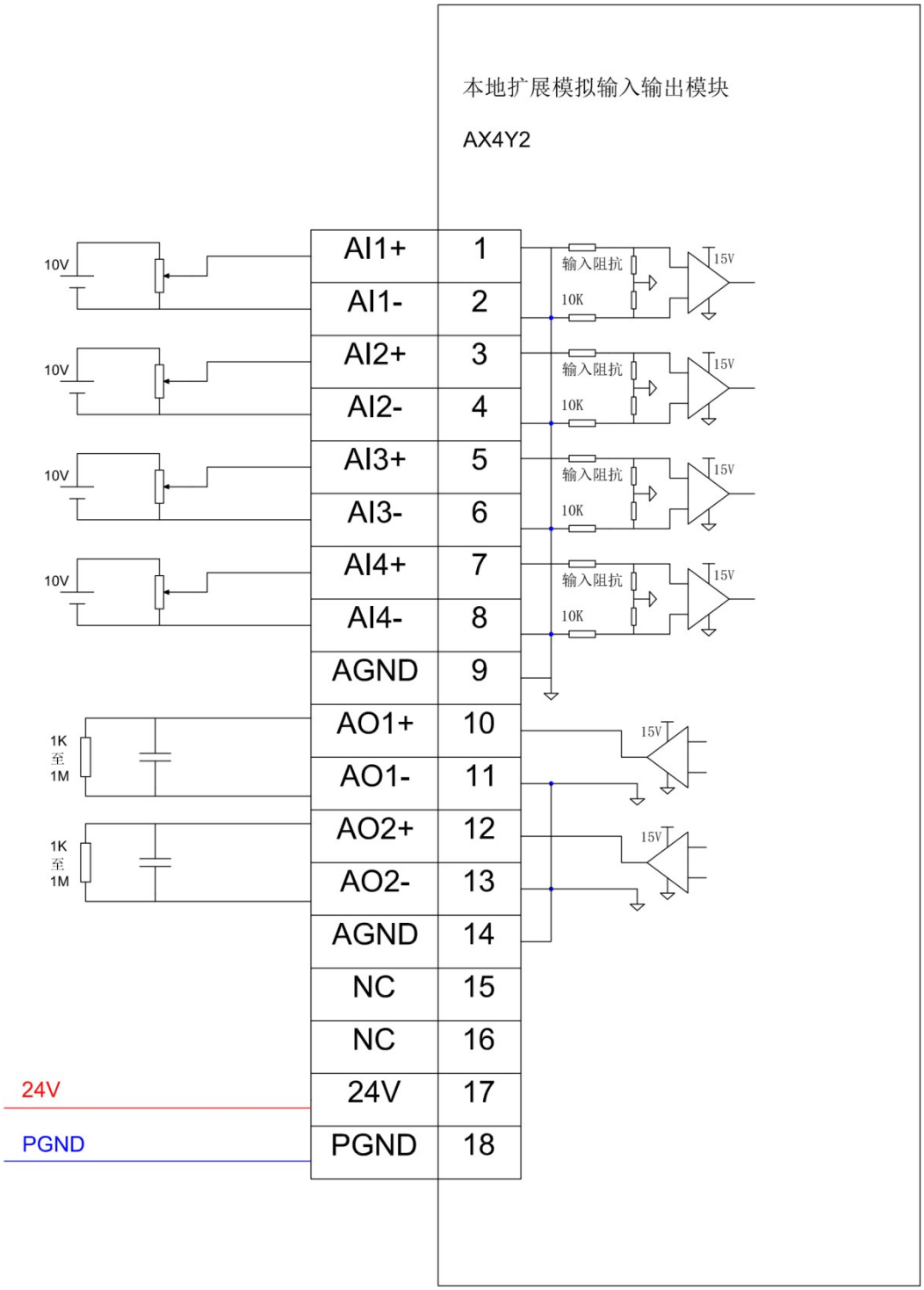
### 5.5.8. Arrangement and definition of the signals of the local extension analog I/O board terminals

| Diagram of the terminal arrangement | No. | Name | Function |
|---|---|---|---|
|  | 1 | AI1+ | Analog input positive (+) |
| | 2 | AI1- | Analog input negative (-) |
| | 3 | AI2+ | Analog input positive (+) |
| | 4 | AI2- | Analog input negative (-) |
| | 5 | AI3+ | Analog input positive (+) |
| | 6 | AI3- | Analog input negative (-) |
| | 7 | AI4+ | Analog input positive (+) |
| | 8 | AI4- | Analog input negative (-) |
| | 9 | AGND | Analog ground |
| | 10 | AO1+ | Analog output positive (+) |
| | 11 | AO1- | Analog output negative (-) |
| | 12 | AO2+ | Analog output positive (+) |
| | 13 | AO2- | Analog output negative (-) |
| | 14 | AGND | Analog ground |
| | 15 | NC | Empty pin |
| | 16 | NC | Empty pin |
| | 17 | 24V | IO supplementary power |
| | 18 | PGND | IO reference ground |
| Note: This analog module, powered by 24VDC via Pin17 and Pin18, supplies part of the power!!! | | | |

## ■ Peripheral wiring and internal module circuitry

AI input effective voltage range 0V - 10V. The input impedance is 10K. AO output effective voltage range 0V - 10V. Currently, AI supports only the voltage inputs.

**For the peripheral wiring of the module AX4Y2, connect as follows:**




| | |
|---|---|
| 1K 至 1M | 1K to 1M |
| 本地扩展模拟输入输出模块 | Analog I/O modules for local extension |
| 输入阻抗 | Input impedance |

# 5.6. Safety precautions

## 5.6.1. Safety precautions

### ■ Considerations in system design

● Malfunction is sometimes caused by the following reasons in systems using the SC30:
• Deviation in the start and stop times of the SC30's power supply and I/O devices and power equipment.
• Deviation in response time caused by momentary interruption.
• Exceptions to the SC30 main unit, external power supply and other equipment.
To prevent abnormalities or accidents in the whole system caused by such malfunctions, please take safety measures.

### ■ Setting of interlock circuits

● When controlling opposite movements of the motor, such as Forward and Reverse, set the interlock circuit outside the SC30.

### ■ Setting of the E-stop circuit

● Set the circuitry which cuts off the power to the output device in case of emergency to the outside of the SC30.

### ■ Power sequence

● Start the SC30 after the I/O devices and the power unit have been activated.
● When stopping the SC30, be sure to stop the SC30 before stopping the I/O device or power device if you are not sure how the program relates to the device.

- Since the power down hold circuitry is provided, the system hardware can be guaranteed to be reset by powering up again 30s after a power failure.

### ■ Grounding

● When installing the SC30 near equipment that generates high voltages due to switching operations of inverters, etc., do not use common grounding but a special ground with a ground resistance of 100Ω or less (Cat D/Cat 3 grounding).

## 5.6.2. Momentary interruption

### ■ Action in the event of a momentary interruption

● The SC30 will continue to operate if there is a momentary interruption of power for less than 10ms. The operation will change if it exceeds 10ms, depending on the conditions, such as the combination of units and the supply voltage. The same operation as a power reset may be generated.

# Chapter 6 Confirmation of Wiring

## 6.1. Suggestions for safety circuits

Necessary safety circuits need to be constructed for this equipment

For example:

1. Motor forward and reverse interlock circuit required for drive via servo;
2. Overrun switching circuit for motors;
3. Power circuit for emergency cut-off of output devices.

## 6.2. Confirmations when wiring

(1) Confirm the connection of each device

Please check that the devices are connected as designed.

(2) Confirm external safety circuit settings

Make sure that the wiring and installation of the safety circuit overrun switch based on the external circuit is properly installed.

(3) Confirm the setting of the power-on sequence

Please check that the power-on procedure is set to "Power ON Operation".

(4) Confirm that the LED display of the SC30 Controller is OK

Observe the status of the SC30 Controller LED when the power is switched on and consult the LED status display instructions. Determine whether the system is operating properly; if abnormalities occur, refer to the "Troubleshooting" section.

## 6.3. Power ON/OFF operation

### 6.3.1. Power ON operation

Power on the other load devices.
Power on the SC30 Controller.

### 6.3.2. OFF operation

Make sure that the load equipment has stopped operating and then power off the SC30 Controller.
Power off the load equipment.

# Chapter 7 Confirmations Prior to Operation

## 7.1. Confirm that the power ON and network is created

■ **Please power on according to the following procedures.**

Power on the I/O devices connected to the SC30 Controller.

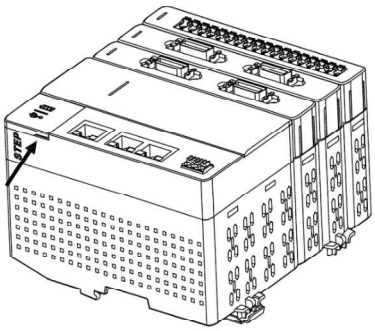
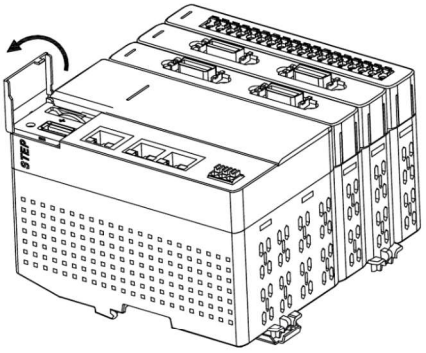
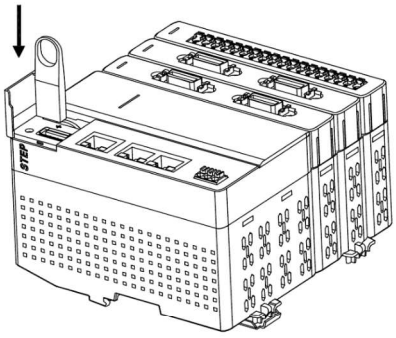
Power on the servo drive.

Power on the SC30 Controller.

Make sure that the SC30 Controller's action status LED is in the normal run state when the SC30 is powered on.

# Chapter 8 USB Flash Disk Operation

## 8.1. The way to insert the USB flash disk

| 1. Snap the side of the battery cover with your hand. | 2. Flip the battery cover upwards. | 3. Insert the USB flash disk into the appropriate port. |
|---|---|---|
|  |  |  |

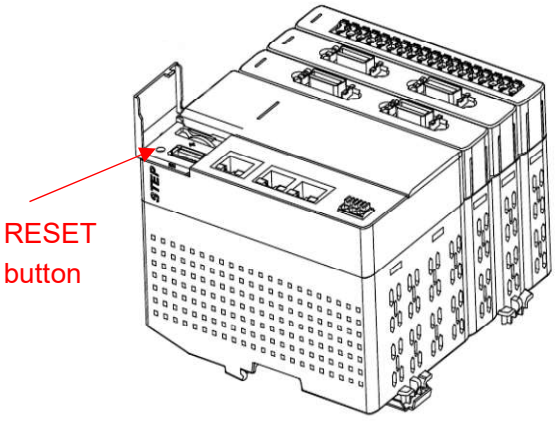
## 8.2. U-copy file operations

Please refer to the Software Manual.

# Chapter 9 System Reset

## 9.1. Reset the unit using the RESET button on the SC30 main unit

### ■ Position of the RESET button in SC30




### ■ Function of RESET button

| Item | Time required to press and hold the RESET button | Outcome |
|---|---|---|
| At start-up | Press and hold until the display lights up and then release | Delete the codesys project |
| | Long press until the display lights up, then continue for more than 3s | Access the USB flash disk to update the system firmware |
| Under operation | 2s | Stop the current program |

# Chapter 10 Troubleshooting

## 10.1. System status

| LED | Main module status | Handling |
|---|---|---|
| Blue LED always ON | Normal | |
| Red LED always ON | Program exceptions | Please check the System log |
| Red, blue and green | Not defined | |

| LED | Slave module | Handling |
|---|---|---|
| Blue LED always ON | Work properly | |
| Red LED always ON | Work improperly | Please check the status of the software |
| Blue LED flashes | Under communications | |

The OLED screen provides two lines of display information. User-defined information can be displayed via the library.

| OLED screen | Status |
|---|---|
| Power-on display | The default address of STEP.Eth1.IP is 192.168.39.220 |
| | The default address of STEP.Eth2.IP is 192.168.0.11 |
| IDLE | System ready, user program not running |
| RUN | User program in operation |
| STOP | User program stopped |

## 10.2. Solutions for exceptions

General solutions:

1. Double click on the problematic node in the left view, and check the status in the online state. Analyze and operation according to the error prompt.
2. Open the System Log to view the error message.
3. Please contact after-sales service for further information.

| Fault | Possible solution |
|---|---|
| Failure to log in to the controller | Confirm that the PC and the controller are on the same network segment and that the IPs are not duplicated;<br>Restart the gateway;<br>Switch off the emulation mode of the controller;<br>If it is an illegal user procedure, switch on and long press the RESET button. |
| No program running when the main panel displays IDLE | Download the user programs;<br>User illegal program, to be downloaded after modification |
| Red light of master module LED always ON | Check system logs to analyze the cause |
| Red light of slave module LED always ON | Please check the software status to analyze the cause |
| The system is starting up and stops at the startup picture | Firmware upgrade failed, or key files artificially deleted. Please contact the after-sales service. |

- Please provide the basic software version number, hardware model number, which can be viewed in the log, when contacting the after-sales service

# Chapter 11 Maintenance & Inspection

## 11.1. Inspection

To ensure optimal use, please carry out daily or periodic checks.

### ■ Inspection item

| Inspection item | Content | Judgment |
|---|---|---|
| Installation status | Mounting on DIN rail, looseness, unit looseness, wobbling | It should be securely installed. |
| Connection status | Connector is loosened | The connector should be free of looseness. |
| Surroundings | Ambient temperature and in-cabinet temperature<br>Ambient humidity and in-cabinet humidity | -20°C ~ +55°C<br>10%RH ~ 90%RH<br>It should be free of dust and corrosive gases. |

# Chapter 12 Specifications and Dimensional Drawings

## 12.1. Specification of the application environment

| Item | Specification |
|---|---|
| Rated voltage | 24V DC |
| Voltage tolerance range | 20.4V DC ~ 28.8V DC |
| Ambient temperature for operation | -20°C ~ +55°C |
| Ambient temperature for storage | -20°C ~ +80°C |
| Ambient humidity for operation | 10%RH ~ 90%RH, non-condensing |
| Ambient humidity for storage | 10%RH ~ 95%RH, non-condensing |
| Altitude | 0-2km (no limit) |
| | > 2km (ambient temperature decreases by 0.5°C per 100m) |
| IP grade | IP20 |
| Class of pollution | IE33 |
| Atmospheric pressure | 86Kpa ~ 106Kpa |
| Operating environment | It should be free of corrosive gases; free from heavy dust. |
| EMC immunity class | According to EN61000-6-X |
| Weight | < 0.5kg |

## 12.2. Performance specification

| Item | | Specification |
|---|---|---|
| Basic frequency of CPU | | 1GHz dual-core (default) or quad-core |
| RAM capacity | | 1G |
| FLASH capacity | | 8G |
| Power-down protection data size | | 128k |
| Power-down protection program mode | | Flash hold |
| Power-down hold power-up wait time | | 35s |
| Mains input | | Max. 1A for DC 22V - 28V |
| Instruction cycle | | 1ns |
| Module components | Max. number of points | 16,000 |
| | Max. number of local bus modules | 32 |
| | Max. number of remote EtherCAT nodes supported | > 128 |
| Motion control | Max. number of axes | 64 axes |
| | Max. number of pulse axes | 4 (integrated) + 16 (STEP LBUS extension) |
| | Number of axes within 1ms | 32 |
| | Number of linked interpolation axes | 32 |
| | Min. cycle time for Ether Cat axis control | 200us |
| | CNC+PLCOpen (electronic cams, groups of axes, etc.) | Support |
| Supported interfaces | | RS232/RS485/CAN/USB |
| Industrial bus | | Ether CAT/Modbus/CAN Open |
| Edge Computing/IoT | | Support |
| Development software | | STEP Automation Studio(codsys) |

### ■ List of current consumption

| Type of unit | | Current consumption | Current increase part |
|---|---|---|---|
| SC30 Controller Stand-alone | —— | 0.5A | —— |
| When connecting extension boards | Local extension digital input boards | —— | 0.1A |
| | Local extension digital output boards | —— | 0.1A |
| | Analog I/O boards for local extension | —— | 0.1A |
| | Digital I/O boards for local extension | —— | 0.1A |

## 12.3. Specification of SC30 Controller

### 12.3.1. High-speed input specification of the SC30 Controller

| Item | Specification | |
|---|---|---|
| | Input A, B, Z signals | |
| | 24V DC | 5V DC |
| Insulation mode | Optocoupler isolation | |
| Rated input voltage | 24V DC | 5V DC |
| Operating voltage range | 20.4V DC ~ 28.8V DC | 3.5V DC ~ 5.5V DC |
| Input resistance | 4.7kΩ | 510Ω |
| Min. ON voltage / Min. ON current | 10V DC / 4mA | 3V DC / 4mA |
| Max. OFF voltage / Max. OFF current | 2V DC / 2mA | 1V DC / 0.5mA |
| Common terminal mode | Independent common terminal at each point | |
| Fastest supported frequency | 4Mbps | |

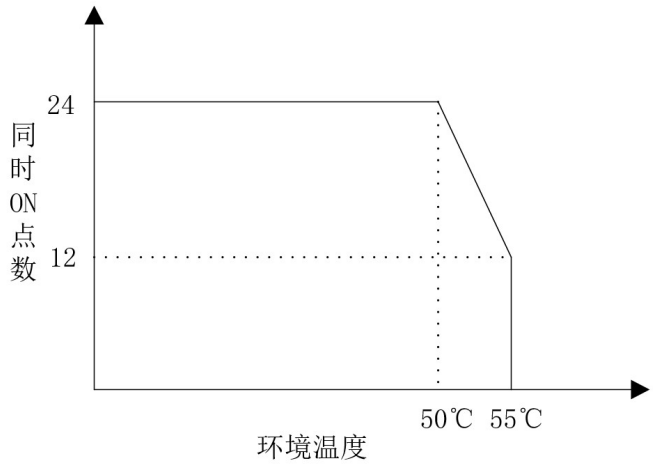
### 12.3.2. Specification of the high-speed (pulse) output of the SC30 Controller

| Item | Specification |
|---|---|
| Control loop voltage | 5V DC |
| Rated load current | 0.1A/point |
| Max. voltage drop at ON | 0.2V |
| Leakage current at OFF | Below 0.1mA |
| Output frequency | 4Mbps |
| Common terminal mode | 4 points / 1 common terminal |

### 12.3.3. Input specifications of the SC30 Controller

| Item | Specification |
|---|---|
| Insulation mode | Optocoupler insulation |
| Rated input voltage | 24V DC |
| Rated input current | Less than 6mA (24DC) |
| Input resistance | 4.7 kΩ |
| OFF voltage<br>/OFF current | 2.4V<br>/ 1mA |
| ON/OFF response time | > 0.01ms (less than 10k) |
| I/O refresh mode | Synchronous I/O refresh or free running refresh optional |
| Common terminal mode | 12 points / 1 common terminal |
| I/O connection mode | In-line connectors |

**■ Limit on the number of simultaneous ON points for the input of the controller (max. 24 points)**

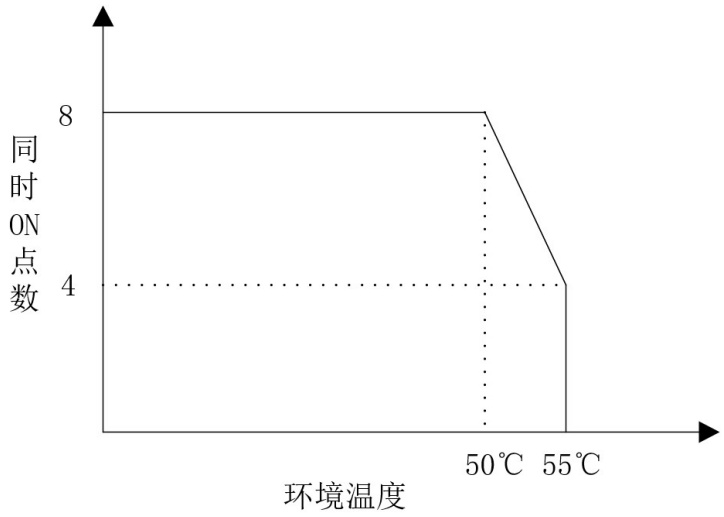



| | |
|---|---|
| 同时 ON 点数 | Simultaneous ON points |
| 环境温度 | Ambient temperature |

### 12.3.4. Output specifications of the SC30 Controller

| Item | Specification |
|---|---|
| Insulation mode | Optocoupler isolation |
| Output form | NPN output type |
| Working load voltage range | 20.4V DC ~ 28.8V DC |
| Max. load current | 0.5A |
| Max. surge current | 1A |
| I/O refresh mode | Synchronous I/O refresh or free running refresh optional |
| Max. voltage drop when ON | Below 1V |
| ON/OFF response time | > 0.01ms (less than 10k) |
| Circuit protection | Overcurrent, overvoltage, short circuit |
| Common terminal mode | 4 points / 1 common terminal |
| I/O connection mode | In-line connectors |

■ **Limit on the number of simultaneous ON points for the output of the controller (max. 8 points)**



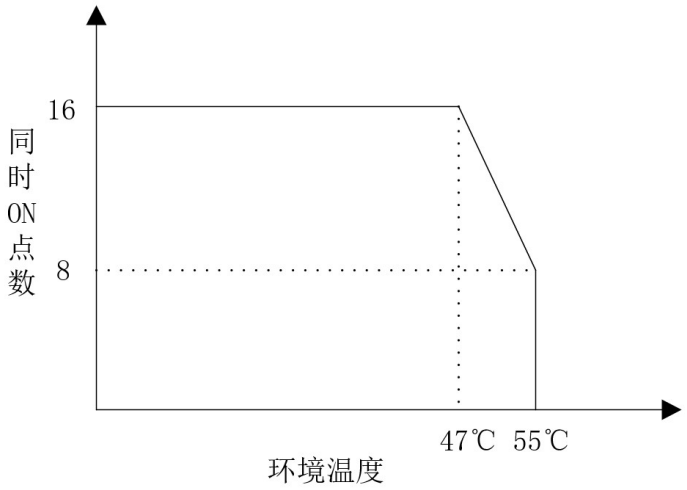

| | |
|---|---|
| 同时 ON 点数 | Simultaneous ON points |
| 环境温度 | Ambient temperature |

## 12.4. Specifications of local extension modules

### 12.4.1. Specifications for local extension digital input modules

| Item | Specification |
|---|---|
| Insulation mode | Optocoupler insulation |
| Rated input voltage | 24V DC |
| Rated input current | Less than 6mA (24DC) |
| Input resistance | 4.7kΩ |
| OFF voltage<br>/OFF current | 2.4V<br>/1mA |
| ON/OFF response time | > 0.01ms (less than 10k) |
| I/O refresh mode | Synchronous I/O refresh or free running refresh optional |
| Common terminal mode | Common anode connection/Common cathode connection |
| Power supply mode | Bottom bus |
| I/O connection mode | In-line connectors |

■ **Limit on the number of simultaneous ON points for the inputs of the local extension digital input board (max. 16 points)**

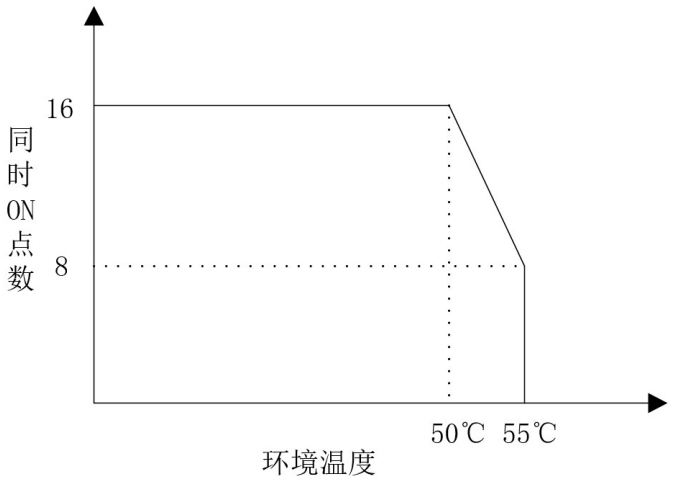



| | |
|---|---|
| 同时 ON 点数 | Simultaneous ON points |
| 环境温度 | Ambient temperature |

## 12.4.2. Specifications for local extension digital output modules

| Item | Specification |
|---|---|
| Insulation mode | Optocoupler isolation |
| Output form | NPN output type |
| Working load voltage range | 20.4V DC ~ 28.8V DC |
| Max. load current | 0.5A |
| Max. surge current | 1A |
| I/O refresh mode | Synchronous I/O refresh or free running refresh optional |
| Max. voltage drop when ON | Below 1V |
| ON/OFF response time | >0.01ms (less than 10k) |
| Circuit protection | Overcurrent, overvoltage, short circuit |
| Common terminal mode | 16 points / 1 common terminal |

### ■ Limit on the number of simultaneous ON points for local extended digital output (max. 16 points)




| | |
|---|---|
| 同时 ON 点数 | Simultaneous ON points |
| 环境温度 | Ambient temperature |

### 12.4.3. Specifications of local extension digital I/O modules

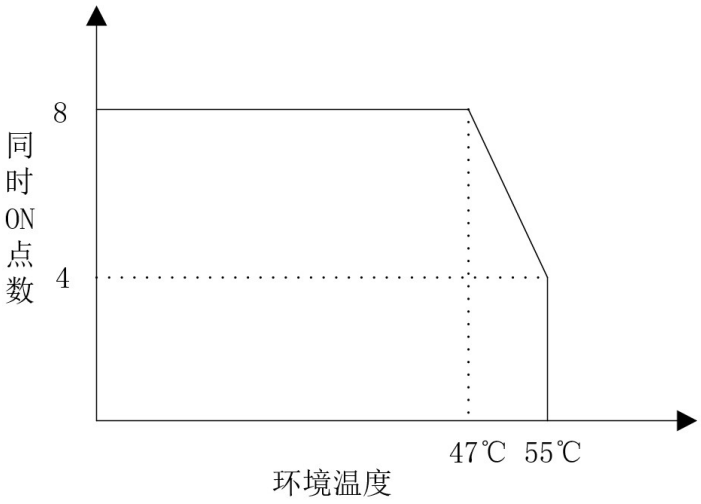
| Item | Specification |
|---|---|
| Insulation mode | Optocoupler insulation |
| Rated input voltage | 24V DC |
| Rated input current | Less than 6mA (24DC) |
| Input resistance | 4.7kΩ |
| Output form | NPN output type |
| Working load voltage range | 20.4V DC ~ 28.8V DC |
| Max. load current | 0.5A |
| Max. surge current | 1A |
| OFF voltage<br>/OFF current | 24V<br>/1mA |
| Max. voltage drop when ON | Below 1V |
| ON/OFF response time | > 0.01ms (less than 10k) |
| Circuit protection | Overcurrent, overvoltage, short circuit |
| I/O refresh mode | Synchronous I/O refresh or free running refresh optional |
| Common terminal mode | Common anode connection |
| I/O connection mode | In-line connectors |

### 12.4.4. Specifications of local extension analog modules

| Item | | Specification |
|---|---|---|
| Input specifications | Input channel | 8 |
| | Supply voltage | 0—10V |
| | Internal 5V power consumption | 0.1A |
| | Voltage input impedance | 10k |
| | Voltage input range | 0-10V |
| | Resolution | 12-bit |
| | Sampling time | 40us/channel |
| | Accuracy | 0.005V |
| | Limit voltage | +15V |
| | Max. common-mode voltage between channels | 15V |
| | Isolation mode | Between I/O terminals and power supply: capacitive isolation<br>Between channels: non-isolated |
| Output specifications | Output channel | 4 |
| | Supply voltage | 24V DC (20.4V ~ 28.8V DC) |
| | Internal 5V power | 0.1A |

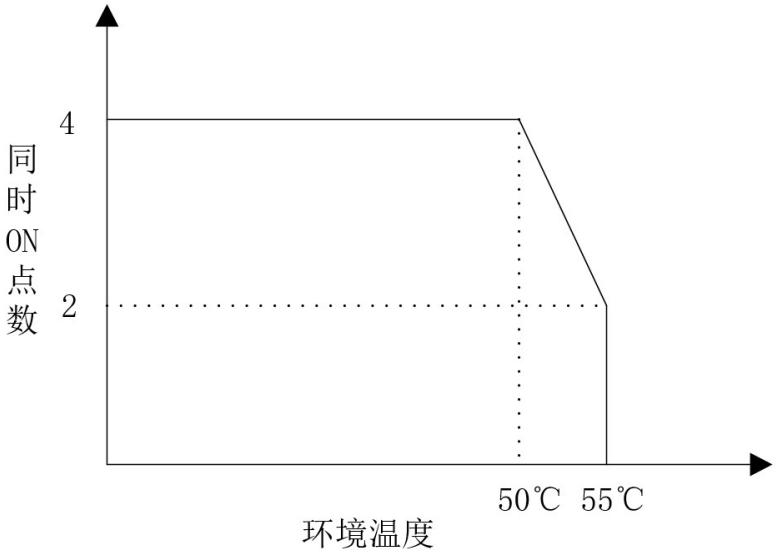
| | | |
|---|---|---|
| | consumption | |
| | Voltage output load | 1kΩ ~ 1MΩ |
| | Voltage output range | 0-10V |
| | Accuracy | 0.005V |
| | Resolution | 12-bit |
| | Transition time | 40us/channel |
| | Isolation mode | Between I/O terminals and power supply: capacitive isolation<br>Between channels: non-isolated |
| | Output short-circuit protection | None |
| Power supply mode | | 5V for control of bottom bus, and powered by 24V terminals |
| I/O connection mode | | In-line connectors |

## ■ Limit on the number of simultaneous ON points for the input of a local extension analog hybrid units (max. 4 points)




| | |
|---|---|
| 同时 ON 点数 | Simultaneous ON points |
| 环境温度 | Ambient temperature |

## ■ Limit on the number of simultaneous ON points for the input of local extension analog hybrid units (max. 2 points)




| | |
|---|---|
| 同时 ON 点数 | Simultaneous ON points |
| 环境温度 | Ambient temperature |

# 12.5. Specifications of integrated communication module

## 12.5.1. USB port specifications

| Item | Specification |
|---|---|
| Standard | USB2.0 Fullspeed |
| Connector shapes | Type A USB |

## 12.5.2. Specifications of COM ports

### ■ Specifications of RS-232 ports

| Item | Specification |
|---|---|
| Number of CHs | 1 |
| Physical layer | RS-232 |
| Transmission distance | Max. 15m |
| Type of communication | 1:1 communication |
| Mode of communication | Half-duplex |
| Transmission link | Multi-core shielded cable |
| Transmission rate | 9600/19200/38400/57600/115200bps |
| Connector mode | In-line connectors |

### ■ Specifications of RS485 ports

| Item | Specification |
|---|---|
| Number of CHs | 2 |
| Physical layer | RS-485 |
| Transmission distance | 1,000m (19.2 kbps)/100m (115.2 kbps) |
| Type of communication | 1:1 communication |
| Mode of communication | Half-duplex |
| Transmission link | Multi-core shielded cable |
| Transmission rate | Max. transmission rate of 115.2 kbps |
| Connection mode | In-line connectors |

## ■ Basic CAN port specifications

| Item | Specification |
|---|---|
| Number of CHs | 1 |
| Physical layer | CAN |
| Transmission distance | Max. 15m |
| Type of communication | 1: n communication |
| Mode of communication | Half-duplex |
| Transmission link | Multi-core shielded twisted pair |
| Transmission rate | 10K/20K/50K/125K/250K/500K/800K/1Mbps |
| Connection mode | In-line connectors |

### 12.5.3. LAN port specifications

| Item | | Specification | | |
|---|---|---|---|---|
| Port definitions | | 2-channel Ethernet | | 1-channel Ethernet |
| Default address | | STEP.Eth1.IP<br>Default address<br>192.168.0.11 | STEP.Eth2.IP<br>Default address<br>192.168.39.220 | |
| Communication interface | | Ethernet | | |
| Communication speed | | 100Mbps/10Mbps<br>Auto-negotiation | | 100Mbps |
| Physical layer | | 100BASE-TX | | |
| Transmission distance | | 100m (max. 100m, anti-interference measures such as the installation of ferrite cores are required for some applications) It is also recommended to locate the hub near the control panel and to use it within 10m) | | |
| Communication cable | | Twisted-pair cable (with shield: STP): Cat 5e or higher | | |
| Communication protocol | | TCP/IP | | |
| Number of slave connections | | ———— | | 64 |
| Topology structure | | Linear topology | | |
| Mode of communication | | Full/half-duplex mode | | |
| TCP/IP protocol | | TCP/IP (IPV4) compliant | | |
| Function | | Change and maintain network settings (IP, Subnet, Gateway)<br>Same/different network settings can be set between Ethernet ports<br>No routing between Ethernet ports | | |
| LED display | LINK | Lights up when a connection is established between devices on the Ethernet | | |
| | ACT | Flashes when communicating with the connected device in various ways, such as sending and receiving commands and responses | | |

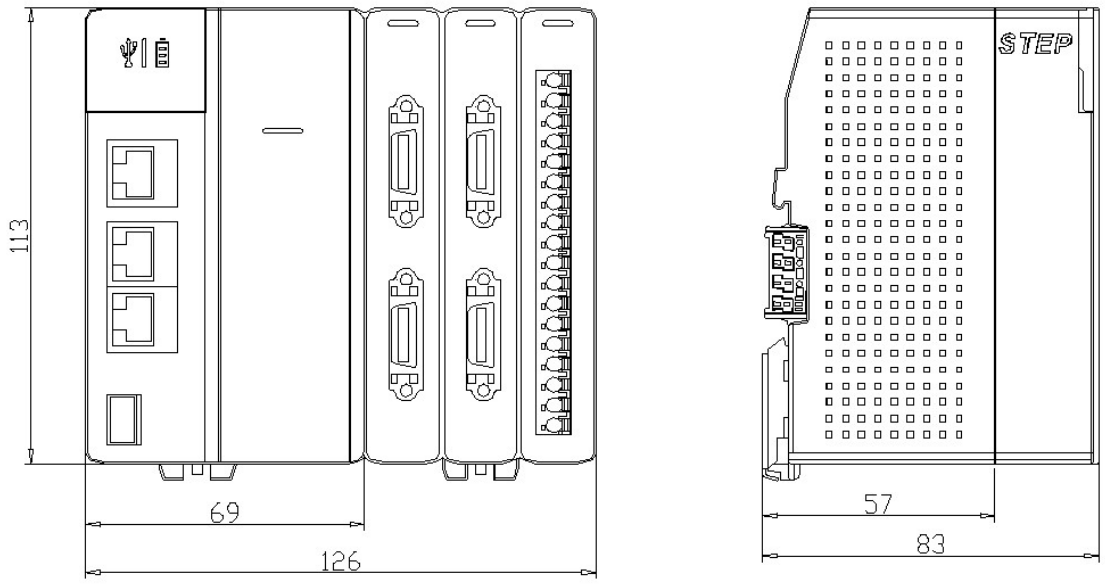
## 12.6. Other specifications

### 12.6.1. USB flash disk specifications

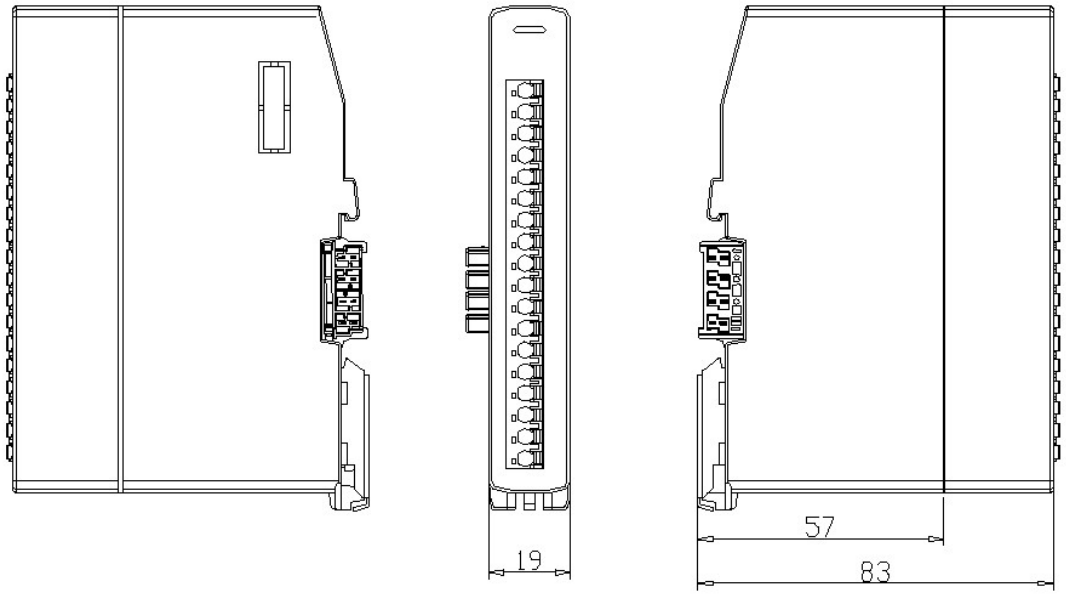
| Item | | Specification |
|---|---|---|
| USB flash disk | Max. capacity supported | Unlimited |
| | Standards supported | USB2.0 |
| | Action detection | None |

## 12.7. Dimensional drawing

### 12.7.1. Dimensional drawing of the SC30 Controller




### 12.7.2. Dimensional drawing of the SC30 local extension module



# Chapter 13 Appendix 1 Notes on Upgrade/Warranty

## 13.1. Warranty

### ■ Warranty period

The warranty period is 1 year from the date of purchase or 1 year and 6 months from the month of manufacture.

### ■ Warranty coverage

In the event of a breakdown caused by our company during the warranty period, we will replace or repair the defective part of the purchased machine unit. Moreover, the liability of our company is limited to the replacement and repair of the purchased machine, and we are not liable for any damage caused to you or third parties as a result of the breakdown of the purchased machine.
We shall not be liable for any damage to you or to third parties due to the machine being in poor condition under any of the following circumstances, other than those stated in the "Warranty period".
1. If the machine is not assembled or used in accordance with the instructions or precautions described herein
2. When the machine is not matched to the product assembled in the machine
3. If the matters described herein that rely on you cannot be matched
4. In the event that the machine is in poor condition for reasons other than us

### ■ Precautions for use

- Precautions for the export of the product and machines fitted with the product
- If the end-user or end-use of the product is associated with military or weapons, the product is subject to export control under the *Foreign Exchange and Foreign Trade Control Act of Japan*. Therefore, adequate checks and necessary export procedures are required when exporting such products.
- The product is designed and manufactured for general industrial products, and is not intended for use in machinery or systems related to human life.
- Set-up, wiring, operation, maintenance and spot checks must be carried out by experts with knowledge of product use.
- Please install a safety device if a major accident or damage to the equipment is predicted due to the failure of the product.
- The product is designed for general industrial products. DO NOT use the product in atomic energy control, aerospace equipment, transportation agencies, medical equipment, safety equipment, etc., where the safety of people is at stake, or in special environments.
- Please also check the noise immunity of the machine yourself as the wiring conditions (grounding method, cable length, shielding of the signal cable) may affect the noise immunity.

- Smoke may be visible to the extent of a cigarette, depending on the fault content of the product. Please take this into account when using in clean rooms.
- Falling goods may be caused if the product is overloaded, so please handle according to the label.
- DO NOT use the volatile oils, thinners, alcohols, acidic and alkaline detergents, as they may cause discoloration or damage to the outer box.
- Please dispose of the product as industrial waste when it is discarded.
- You are advised to check the appropriateness of the finished product in terms of laws and regulations, as well as the construction, dimensions, life span and characteristics of the installed equipment and components.
- Please note that the product cannot be guaranteed to function properly if used in excess of the specifications of the product.

The contents of this manual (style, software version, etc.) are subject to change without prior notice due to improvements in product performance.

## 13.2. Repair and maintenance

1. For repair and maintenance, please contact the product agent first;

2. If the product has already been loaded into the device, please contact the device manufacturer first.

## 13.3. Technical Services

- Customer Technical Consultation

Tel: (86) 13917890469 (Engineer Zhong)

Consultation time: Monday-Sunday 9:00-17:30 (except specific holidays)

- After-sales technology and maintenance consultation (repair of faulty parts, purchase of maintenance parts and optional accessories)

After sales support: 400-168-2718

Purchase Enquiry: 13925286547 (Manager Zhou)

Consultation time: Monday-Sunday 9:00-17:30 (except specific holidays)

- Internet technical information