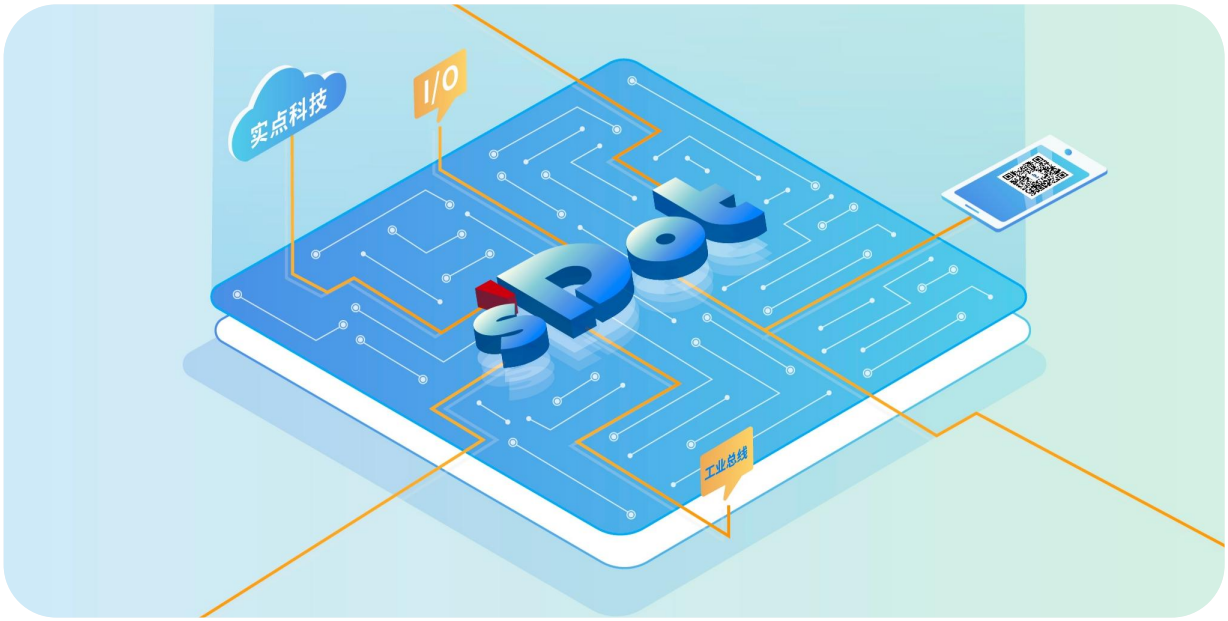

PROFINET

PN4 Series Integrated I/O

User Manual

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Table of contents

1 Product Overview

1.1 Product Introduction

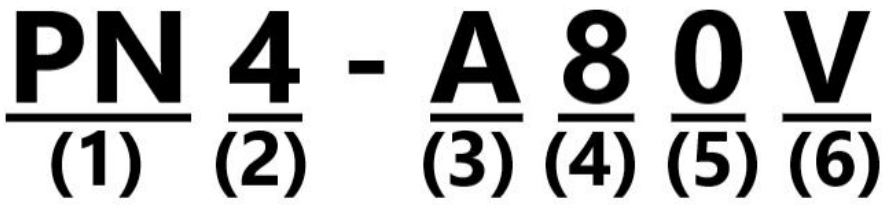
The PN4 series integrated I/O modules, using the PROFINET bus, are compact, fast, and easy to wire. With pluggable terminals and simple configuration, they offer users a variety of options for high-speed data acquisition, optimized system configuration, simplified field wiring, and improved system reliability.

1.2 Product Features

- **Small size**
  It has a compact structure and occupies little space.
- **Fast**
  100Mbps industrial Ethernet port.
- **A wide variety**
  The I/O is comprehensive, including digital, analog, temperature, and pulse modules, which can meet the application needs of different applications.
- **Easy to diagnose**
  The innovative channel indicator light design is placed close to the channel, making the channel status clear at a glance and facilitating inspection and maintenance.
- **Easy configuration**
  It is easy to configure and supports major mainstream PROFINET master stations.
- **Easy installation wiring**
  Mounted on DIN 35 mm standard rails.
  It adopts spring-loaded terminals, ensuring stable and quick wiring.

2 Naming Rules

2.1 Naming Rules



Serial Number	Meaning	Value description				
(1)	Bus Protocol	PN: Abbreviation for PROFINET protocol				
(2)	Product Series	4: Integrated I/O				
(3)	I/O types	A: Analog Empty: Digital				
(4)	Number of input signal points	Analog: 0, 4, 8 Digital: 0, 8, 16, 24, 32				
(5)	Number of output signal points	Analog: 0, 4, 8 Digital: 0, 8, 16, 24, 32				
(6)	Input/output characteristics	**Digital**			**Analog**	
		coding	Input	Output	coding	illustrate
		A	NPN, 3ms	NPN, 0.5A	I	0~20 mA, 4~20 mA
		B	PNP, 3ms	PNP, 0.5A	V	-10~+10 V, 0~+10 V, -5~+5 V, 1~5 V
		J	Compatible with	relay		

			NPN/PNP, 3ms		
		P	Compatible with NPN/PNP, 3ms	PNP	

2.2 Model List

Model	Product Description	
PN4-3200A	32-channel digital input module, NPN type	
PN4-3200B	32-channel digital input module, PNP type	
PN4-0032A	32-channel digital output module, NPN type	
PN4-0032B	32-channel digital output module, PNP type	
PN4-1616A	16-channel digital input/output module, NPN type	
PN4-1616B	16-channel digital input/output module, PNP type	
PN4-1600A	16-channel digital input module, NPN type	
PN4-1600B	16-channel digital input module, PNP type	
PN4-0016A	16-channel digital output module, NPN type	
PN4-0016B	16-channel digital output module, PNP type	
PN4-0808A	8-channel digital input/output module, NPN type	
PN4-0808B	8-channel digital input/output module, PNP type	
PN4-2408A	24-channel digital input, 8-channel digital output module, NPN type	
PN4-2408B	24-channel digital input, 8-channel digital output module, PNP type	
PN4-0824A	8-channel digital input, 24-channel digital output module, NPN type	
PN4-0824B	8-channel digital input, 24-channel digital output module, PNP type	
PN4-0012J	12-channel relay output module	
PN4-1612J	16-channel digital input and 12-channel relay output module, input compatible with NPN/PNP types.	
PN4-1616P	16-channel digital input/output module, input compatible with NPN/PNP, output type PNP.	
PN4-A80V	8-channel analog voltage input module	Selectable measuring range: -10~+10 V, 0~+10 V. -5~+5 V, 1~5 V
PN4-A40V	4-channel analog voltage input module	
PN4-A08V	8-channel analog voltage output module	
PN4-A04V	4-channel analog voltage output module	
PN4-A80I	8-channel analog current input module	Selectable measuring range: 0~20 mA, 4~20 mA
PN4-A40I	4-channel analog current input module	
PN4-A08I	8-channel analog current output module	
PN4-A04I	4-channel analog current output module	
XX4-C10_4	Public End Extension Module	

3 Product Parameters

3.1 General parameters

Interface parameters	
Bus Protocol	PROFINET
Number of I/O stations	According to the main site
Data transmission medium	EthernetCAT5 cable
Transmission distance	≤100 m (station-to-station distance)
Transmission rate	100 Mbps
Bus interface	2×RJ45
Technical parameters	
Configuration method	via the main site
power supply	24 VDC (18V~36V)
Electrical isolation	500 VAC
weight	130 g
size	102×72×25 mm
Operating temperature	-10℃~+60℃
Storage temperature	-20℃~+75℃
relative humidity	95%, no condensation
Protection level	IP20

3.2 Digital parameters

Digital input	
Rated voltage	24 VDC (18V~30V)
Signal Points	8, 16, 24, 32
Signal Type	NPN/PNP
"0" signal voltage (PNP)	-3~+3 V
"1" signal voltage (PNP)	15~30V
"0" signal voltage (NPN)	15~30V
"1" signal voltage (NPN)	-3~+3 V
Input filtering	3 ms
Input current	4 mA
Isolation methods	Optical isolation
Isolation and withstand voltage	500 VAC
Channel indicator lights	Green LED lights
Digital output	
Rated voltage	24 VDC (18V~30V)
Signal Points	8, 16, 24, 32
Signal Type	NPN/PNP
Load type	Resistive load, inductive load
Single-channel rated current	NPN type Max: 500 mA PNP type, maximum: 500 mA
Port protection	Overvoltage protection, overcurrent protection
Isolation methods	Optical isolation
Isolation and withstand voltage	500 VAC
Channel indicator lights	Green LED lights
Relay output	
Rated voltage	24 VDC (18V~30V)
Signal Points	12
Isolation methods	Optocouplers, relays
Rated load	2A single-channel relay output
Common terminal wiring method	4 points / 1 public terminal
Channel indicator lights	Green LED lights

3.3 Analog parameters

3.3.1 Technical parameters

Analog input	
Input points	4, 8
Input signal (voltage type)	0: -10~+10 V(-32768~32767) 1: 0~+10 V (0~65535) 2:-10~+10 V(-27648~27648) 3: 0~+10 V (0~27648) 4:-5~+5V(-27648~27648) 5:1~5 V (0~27648)
Input signal (current type)	0:4~20 mA (0~65535) 1:0~20 mA (0~65535) 2:4~20 mA (0~27648) 3:0~20 mA (0~27648)
resolution	16 bit
Sampling rate	≤1 ksps
accuracy	±0.1%
Input impedance (voltage type)	≥2 kΩ
Input impedance (current type)	100 Ω
Isolation and withstand voltage	500 VAC
Channel indicator lights	Green LED lights
Analog output	
Output points	4, 8
Output signal (voltage type)	0: -10~+10 V(-32768~32767) 1: 0~+10 V (0~65535) 2:-10~+10 V(-27648~27648) 3: 0~+10 V (0~27648) 4:-5~+5V(-27648~27648) 5:1~5 V (0~27648)
Output signal (current type)	0:4~20 mA (0~65535) 1:0~20 mA (0~65535) 2:4~20 mA (0~27648) 3:0~20 mA (0~27648)
resolution	16 bit
accuracy	±0.1%
Load impedance (voltage type)	≥2 kΩ
Load impedance (current type)	≤200 Ω
Isolation and withstand voltage	500 VAC
Channel indicator lights	Green LED lights

3.3.2 Voltage input/output range selection and code value table

Voltage input/output range selection and code value range						
Range selection	0	1	2	3	4	5
Measuring range	-10~+10 V	0~+10 V	-10~+10 V	0~+10 V	-5~+5 V	1~5V
Code value range	-32768 ~32767	0~65535	-27648 ~27648	0~27648	-27648 ~27648	0~27648
Voltage input calculation formula	D=(65535/20)*U	D=(65535/10)*U	D=(55296/20)*U	D=(27648/10)*U	D=(55296/10)*U	D=(27648/4)*U-6912
Voltage output calculation formula	U=(D*20)/65535	U=(D*10)/65535	U=(D*20)/55296	U=(D*10)/27648	U=(D*10)/55296	U=(D+6912)*4/27648
Code value mapping table	Please seeTable 3-1 Voltage Code Value Table.					

Note: D represents the code value, and U represents the voltage.

sheet3- 1Voltage code value table

range / Voltage	0 (default)	1	2	3	4	5
	-10~+10V	0~+10V	-10~+10V	0~+10V	-5~+5V	1~5V
	code value	code value	code value	code value	code value	code value
-10	-32768	-	-27648	-	-	-
-9	-29491	-	-24883	-	-	-
-8	-26214	-	-22118	-	-	-
-7	-22938	-	-19354	-	-	-
-6	-19661	-	-16589	-	-	-
-5	-16384	-	-13824	-	-27648	-
-4	-13107	-	-11059	-	-22118	-
-3	-9830	-	-8294	-	-16589	-
-2	-6554	-	-5530	-	-11059	-
-1	-3277	-	-2765	-	-5530	-
0	0	0	0	0	0	-
1	3277	6554	2765	2765	5530	0
2	6554	13107	5530	5530	11059	6912
3	9830	19661	8294	8294	16589	13824
4	13107	26214	11059	11059	22118	20736
5	16384	32768	13824	13824	27648	27648
6	19661	39321	16589	16589	-	-
7	22938	45875	19354	19354	-	-
8	26214	52428	22118	22118	-	-
9	29491	58982	24883	24883	-	-
10	32767	65535	27648	27648	-	-
	Code value = (65535/20) * voltage	Code value = (65535/10)*Voltage	Code value = (55296/20) * voltage	Code value = (27648/10) * voltage	Code value = (55296/10)*Voltage	Code value = (27648/4)*Voltage-6912
	Voltage =((code value * 20) / 65535	Voltage = (Code value * 10) /65535	Voltage = (Code value * 20) / 55296	Voltage = (Code value * 10) / 27648	Voltage = (Code value * 10) /55296	Voltage = (code value +6912)*4/27648

3.3.3 Current input/output range selection and code value table

Analog current input/output range selection and code value range				
Range selection	0	1	2	3
Measuring range	4~20 mA	0~20 mA	4~20 mA	0~20 mA
Code value range	0~65535	0~65535	0~27648	0~27648
Current input calculation formula	D=(65535/16)*I-16384	D=(65535/20)*I	D=(27648/16)*I-6912	D=(27648/20)*I
Current output calculation formula	I=(D+16384)*16/65535	I=(D*20)/65535	I=(D+6912)*16/27648	I=(D*20)/27648
code value Correspondence table	SeeTable 3-2 Current Code Value Table.			

Note: D represents code value, and I represents current.

sheet3- 2Current code value table

Range selection / **Measuring range** / **Current**	**0 (default)**	**1**	**2**	**3**
	4~20mA	**0~20mA**	**4~20mA**	**0~20mA**
	code value	**code value**	**code value**	**code value**
0	-	0	-	0
1	-	3277	-	1382
2	-	6554	-	2765
3	-	9830	-	4147
4	0	13107	0	5530
5	4096	16384	1728	6912
6	8192	19661	3456	8294
7	12288	22937	5184	9677
8	16384	26214	6912	11059
9	20479	29491	8640	12442
10	24575	32768	10368	13824
11	28671	36044	12096	15206
12	32767	39321	13824	16589
13	36863	42598	15552	17971
14	40959	45875	17280	19354
15	45055	49151	19008	20736
16	49151	52428	20736	22118

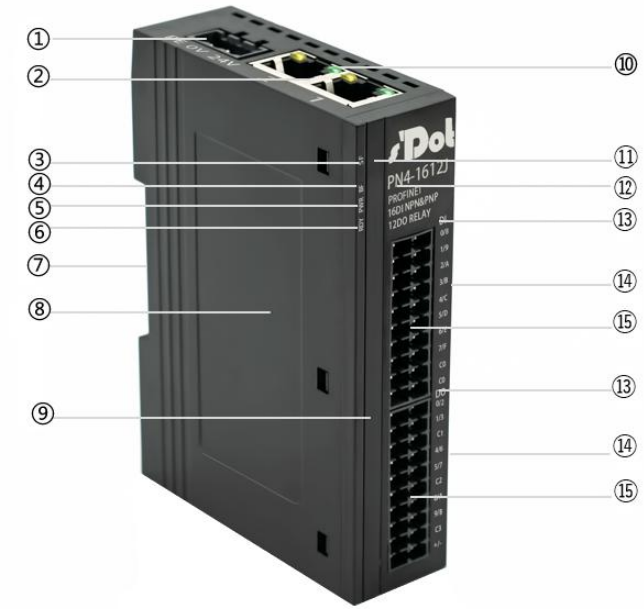
17	53247	55705	22464	23501
18	57343	58982	24192	24883
19	61439	62258	25920	26266
20	65535	65535	27648	27648
	Code value =(65535/16)*Current -16384	Code value = (65535/20) * current	Code value = (27648/16) * current - 6912	Code value = (27648/20) * current
	Current = (code value + 16384) * 16 / 65535	Current = (code value * 20) / 65535	Current = (code value + 6912) * 16 / 27648	Current = (code value * 20) / 27648

4 panel

4.1 Product Structure

Product Part Names and Functional

Descriptions



Serial Number	Name	Illustrate
①	Power interface	3P terminal
②	Bus interface	2 × RJ45
③	System Identifier	SF
④	Bus communication identifier	BF
⑤	Power indicator	PWR

⑥	Run ID	RDY
⑦	Guide rail slot	Suitable for mounting on DIN 35mm guide rails
⑧	Product Labels	Label module model, type, MAC address and other information
9	Channel indicator lights	Indicates the signal status of the corresponding channel.
⑩	Network port indicator light	Link and data transmission/reception status
⑪	System indicator lights	Indicator module status
⑫	Module identifier	Mark module model, bus type and other information.
⑬	signal identifier	Signal type identifier
⑭	Channel signage	Corresponding channel location marker
⑮	Channel Interface	2 × 20P terminal

4.2 Indicator light function

Name	Logo	Color	State	Status Description
Power indicator light	PWR	green	ON	Power supply is normal
			Extinguish	The product is not powered on or the power supply is abnormal.
Operating status indicator	RDY	green	ON	The system is running normally.
			Extinguish	Work abnormality
System fault indicator	SF	red	Extinguish	The module is working without any issues.
			Flashing	1Hz: Analog module dual-machine communication abnormality
			ON	The module is malfunctioning.
Communication Fault Indicator	BF	red	Extinguish	Network connection is normal
			Flashing	Network connection error
Network port status indicator	1	green	ON	Establish network connection
			Extinguish	No network connection or error
		yellow	Flashing	Connection established and data exchanged
			Extinguish	No data interaction or anomaly
	2	green	ON	Establish network connection
			Extinguish	No network connection or error
		yellow	Flashing	Connection established and data exchanged
			Extinguish	No data interaction or anomaly
Input channel status indicator	0 ~ F	green	ON	The module channel has a signal input.
			Extinguish	The module channel has no signal input or the signal input is abnormal.
Output channel status indicator	0 ~ F	green	ON	The module channel has signal output.
			Extinguish	The module channel has no signal output or the signal output is abnormal.

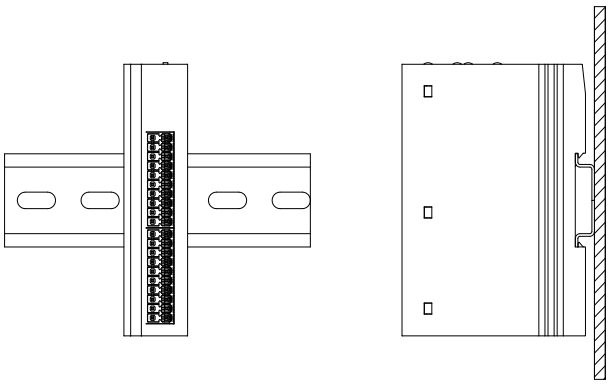
5 Installation and removal

Installation/Disassembly Precautions

- Ensure that the server rack has good ventilation (such as installing exhaust fans in the server rack).
- Do not install this device next to or above equipment that may cause overheating.
- Make sure the module is installed vertically and that there is sufficient clearance between the module and surrounding equipment.
- Installation and disassembly must be performed with the power off.

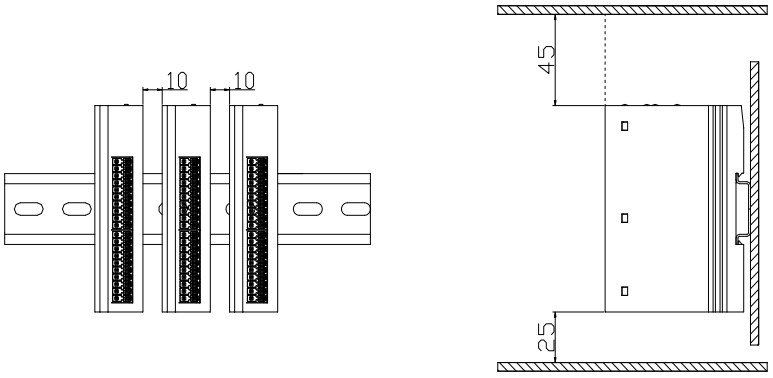
Installation direction

To ensure proper heat dissipation, the module must be installed vertically to ensure unobstructed airflow inside the module.



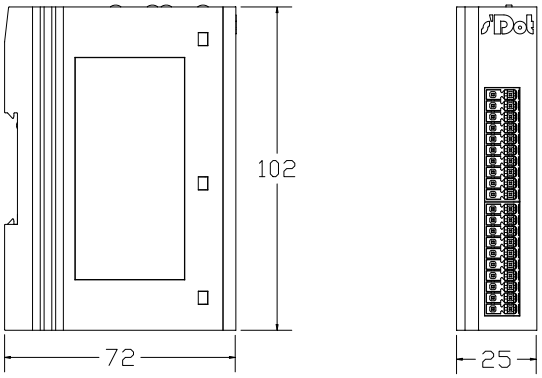
Minimum spacing

The module has an IP20 protection rating and must be installed inside a box or cabinet. During installation, please maintain the minimum spacing (unit: mm) between the module and other modules or heat-generating devices, or between the module and other devices or wiring channels above and below it, as shown in the diagram below.



5.1 External dimensions

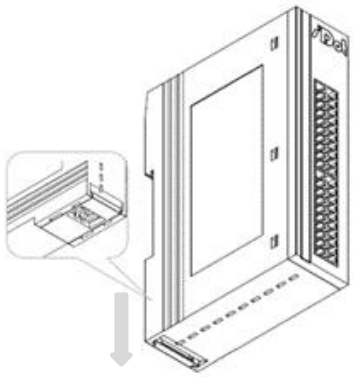
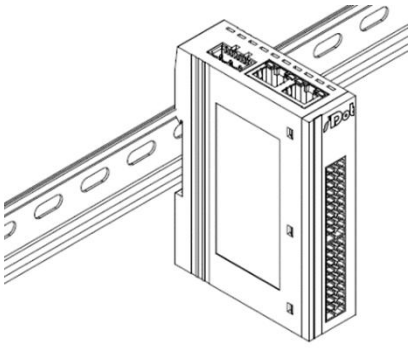
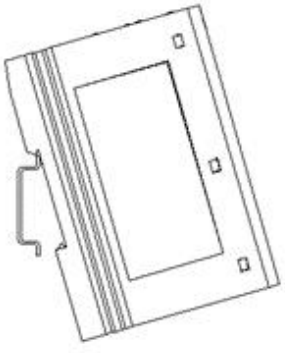
External dimensions (unit: mm)



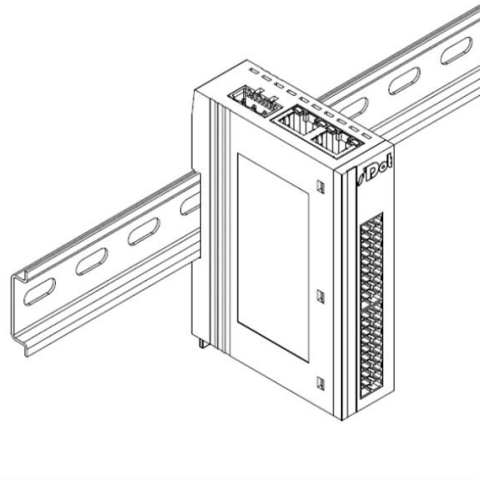
Installation method:

1. Top and bottom aligned;
2. DIN 35 mm guide rail, snap-on installation.

5.2 Installation and removal

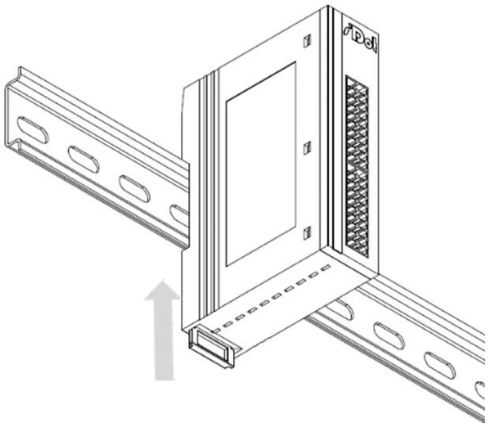
Install	step
 	Push the latch at the bottom of the module outwards, as shown in Figure ①, until you hear a "click" sound.
 	①② Align the upper edge of the module clip with the upper edge of the guide rail, and place the module into the guide rail, as shown in Figures ③ and ④.

③ ④



The modules are positioned as shown in Figure ⑤.

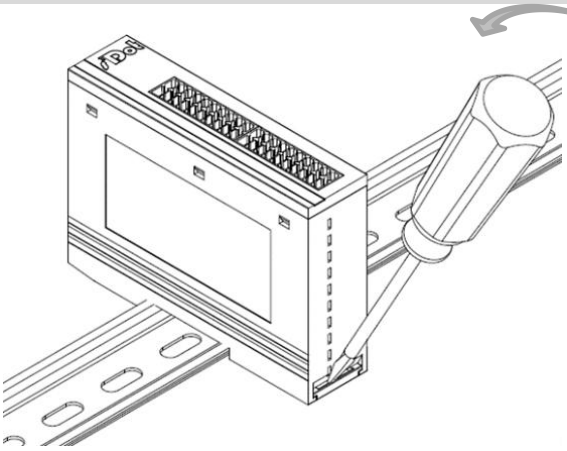
⑤



Push the clip along the guide rail until you hear a click, indicating that the module installation is complete, as shown in Figure 6.

⑥

Disassembly	**step**



Insert the flathead screwdriver into the clip and apply force towards the module (you will hear a sound), as shown in Figure 7. Then, remove the module by performing the reverse operation of installing the module.

6 Wiring

6.1 Terminal blocks

Terminal blocks		
Signal line terminals	Extreme number	2 × 20 P
	wire diameter	22~17 AWG 0.3~1.0 mm²
Power terminals	series	3 P
	wire diameter	22~16 AWG 0.3~1.5 mm2
Bus interface	2 × RJ45	UTP or STP of Category 5 or higher (STP recommended)

6.2 Wiring instructions and requirements

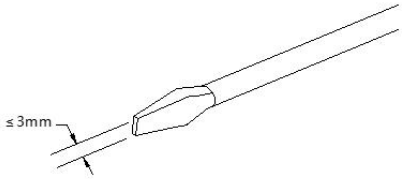
Power connection precautions

- The power supply for the module system side and the power supply for the field side should be configured and used separately. Do not mix them.
- The PE element must be reliably grounded.

Wiring tool requirements

The terminals feature a screwless design, allowing for easy installation and removal of cables.

Flathead screwdriver operation (size: ≤3mm).



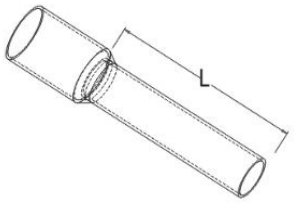
Stripping length requirements

Recommended stripping length: 10 mm.

Wiring method

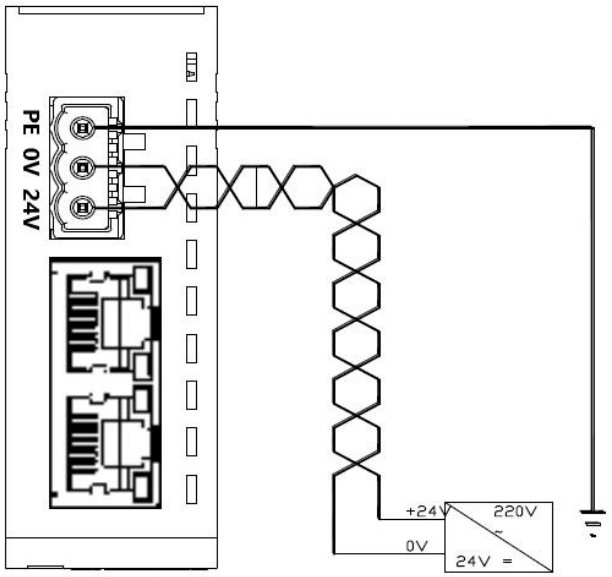
For a single-strand rigid wire, after stripping the wire to the corresponding length, press the button to insert the single-strand wire.

After stripping the wire to the corresponding length, use the corresponding standard cold-pressed terminal (tubular insulated terminal, see the table below for reference specifications) and press the button to insert the wire.

Specifications of tubular insulated ends		
Specifications	model	conductor cross-sectional area (mm^2)
	E0310	0.3
	E0510	0.5
	E7510	0.75
	E1010	1.0
Tubular insulated terminalsLThe length is10mm	E1510	1.5

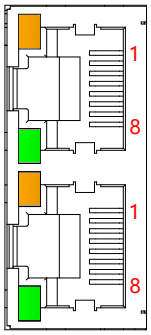
Power wiring

The module uses DC24V power, and twisted-pair cable is recommended for the power supply. The power connection is shown in the figure below.



Bus wiring

It uses a standard RJ45 network interface and a standard crystal connector, and the pin assignment is shown in the figure below.



pin number	Signal
1	TD+
2	TD-
3	RD+
4	one
5	one
6	RD-
7	one
8	one

☛ Precautions

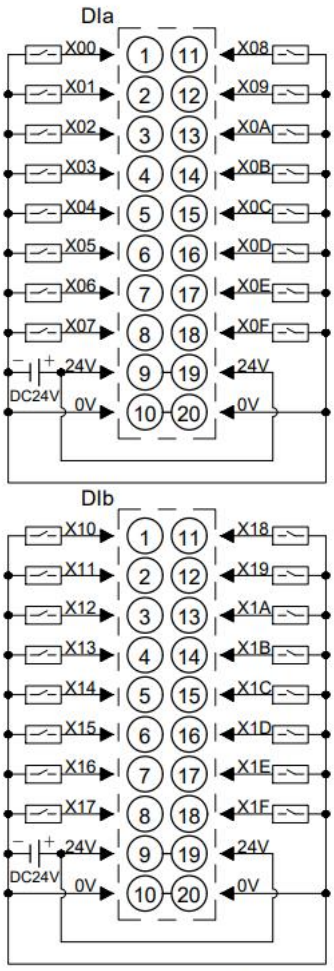
- Category 5 or higher double-shielded (braided mesh + aluminum foil) STP cables are recommended for use as communication cables.
- The length of cables between devices must not exceed 100 m.

Signal and load power wiring

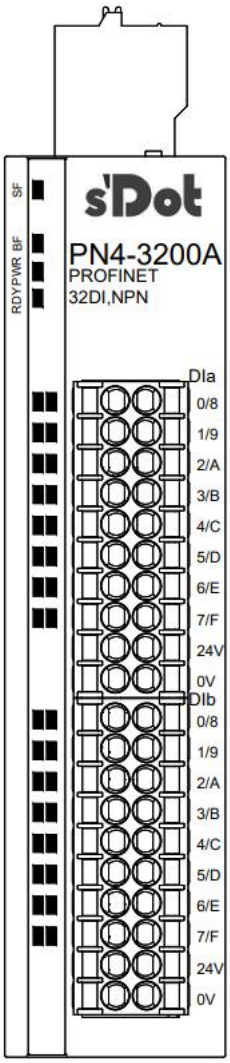
The load power supply uses a DC 24V power supply. For wiring the load power supply and signal lines, please refer to the corresponding I/O module wiring diagram and wiring method to press the cables into the terminal blocks (see details).6.3 I/O Module Wiring Diagram).

6.3 I/O module wiring diagram

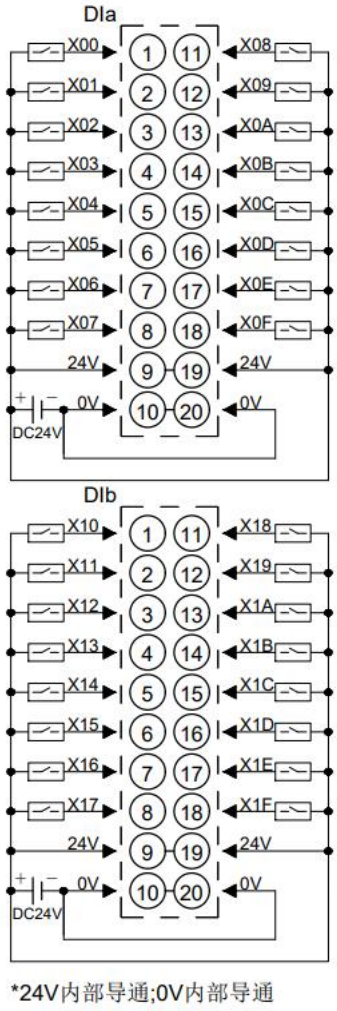
6.3.1 PN4-3200A



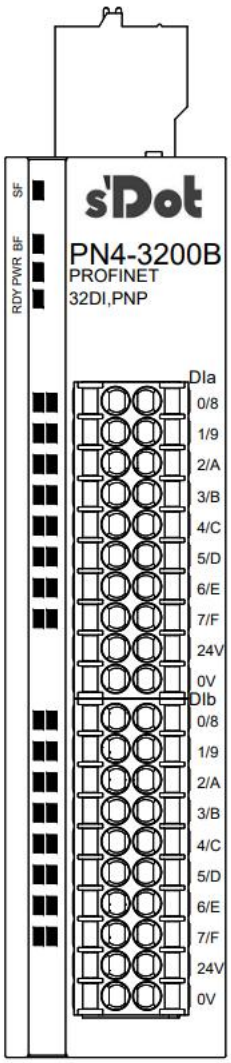
*24V内部导通;0V内部导通



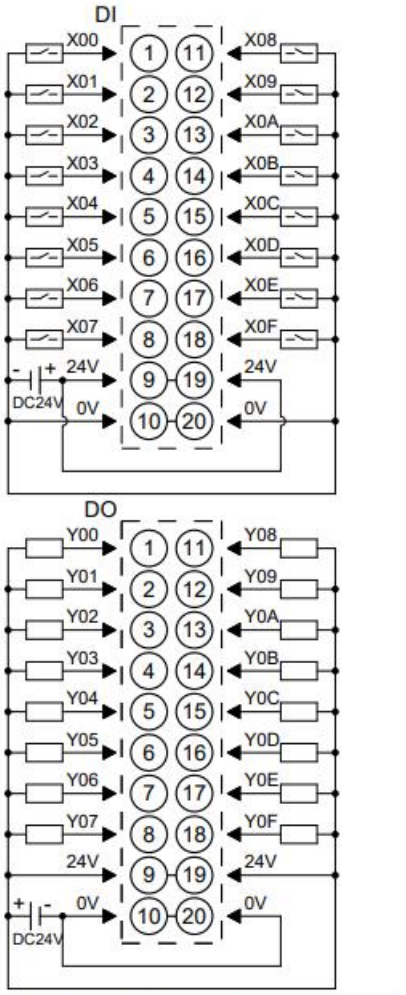
6.3.2 PN4-3200B

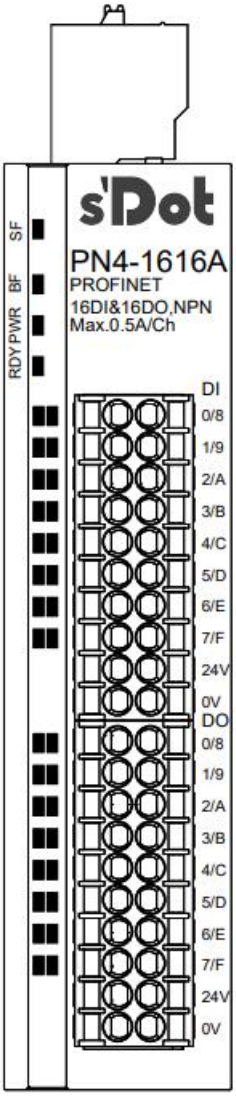


*24V内部导通;0V内部导通

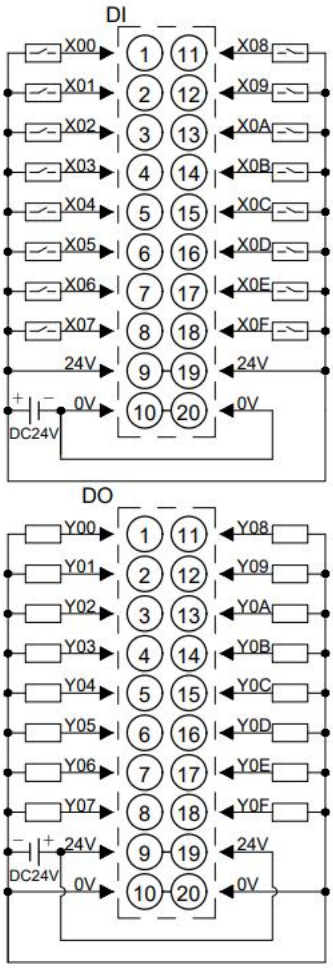


6.3.3 PN4-1616A

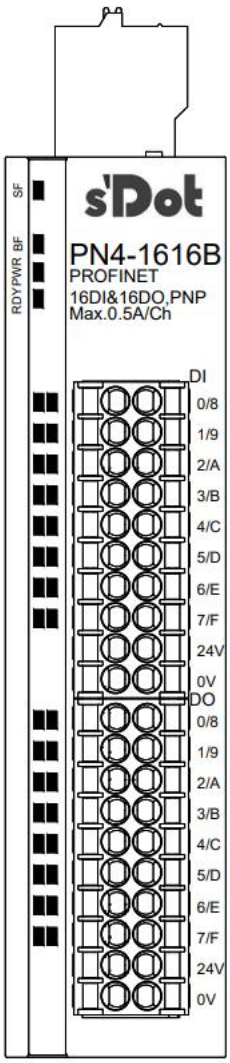




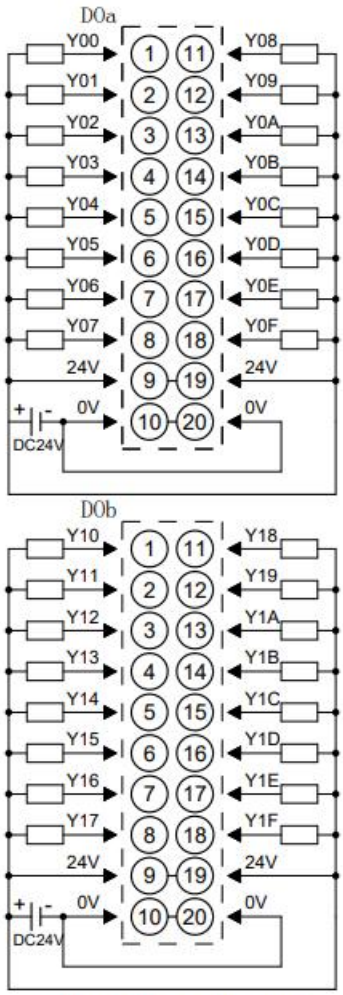
6.3.4 PN4-1616B



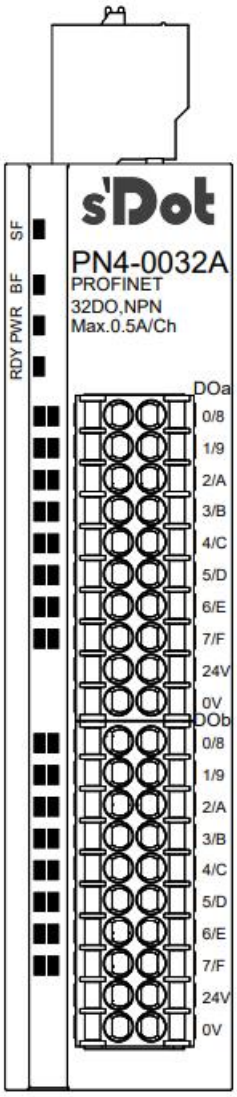
*24V内部导通;0V内部导通；DI与DO之间不互通
*负载公共端电源需与模块使用同一个电源



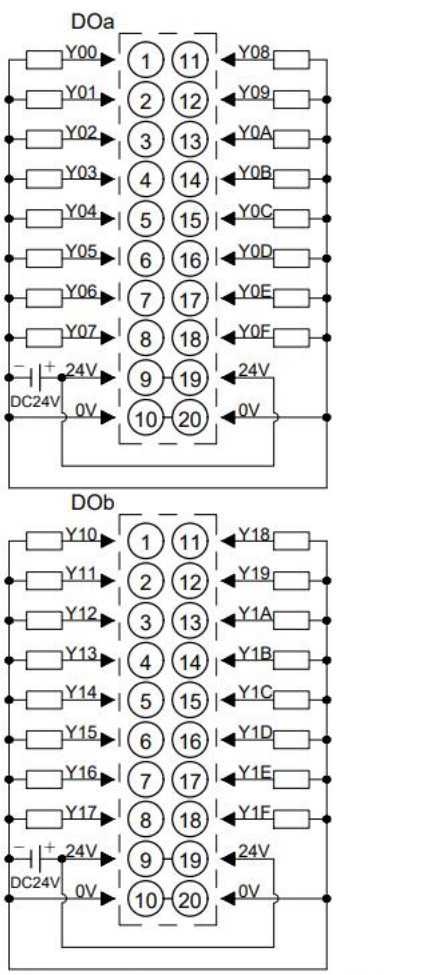
6.3.5 PN4-0032A



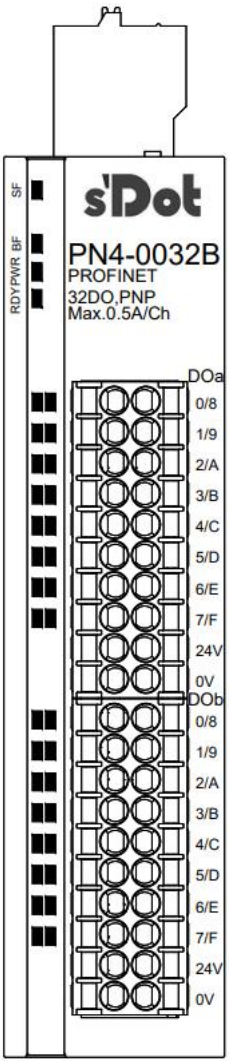
*24V内部导通;0V内部导通;DOa与DOb之间不互通
*负载公共端电源需与模块使用同一个电源



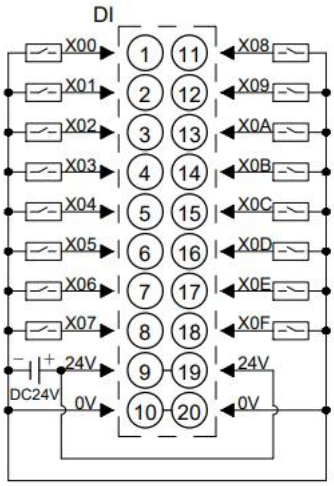
6.3.6 PN4-0032B



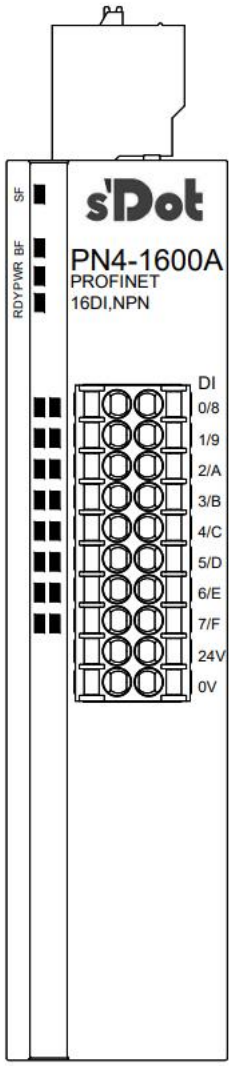
*24V内部导通;0V内部导通;DOa与DOb之间不互通
*负载公共端电源需与模块使用同一个电源



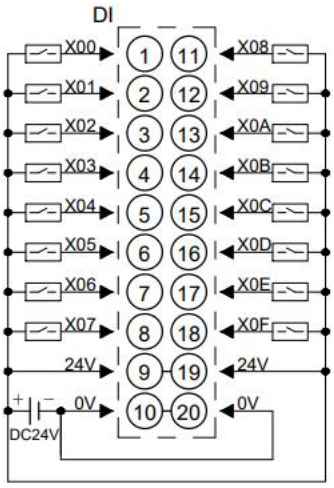
6.3.7 PN4-1600A



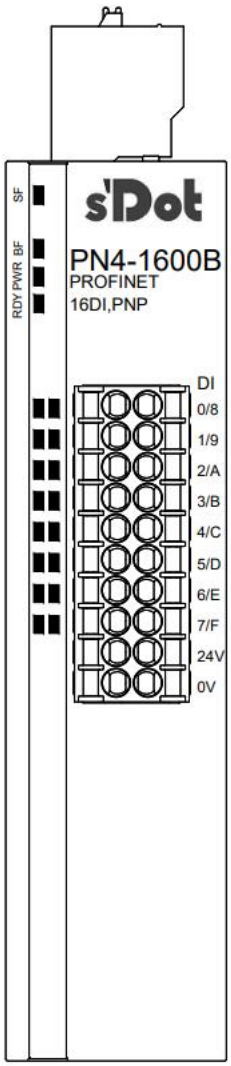
*24V内部导通;0V内部导通



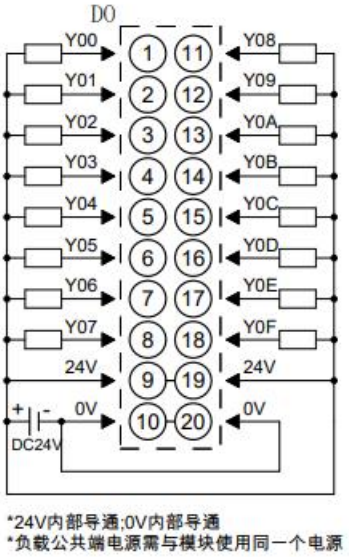
6.3.8 PN4-1600B



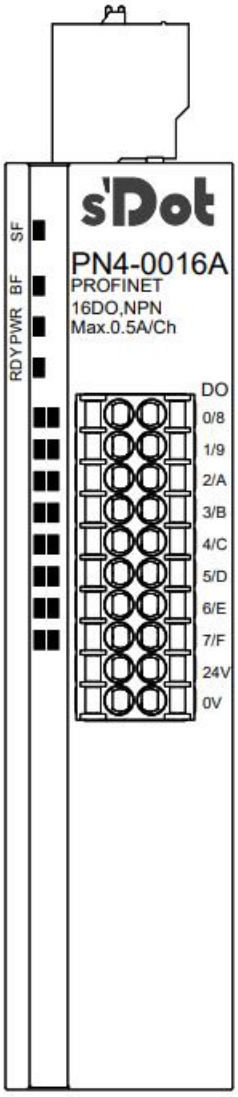
*24V内部导通;0V内部导通



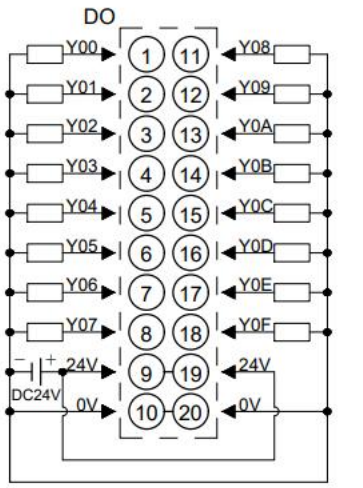
6.3.9 PN4-0016A



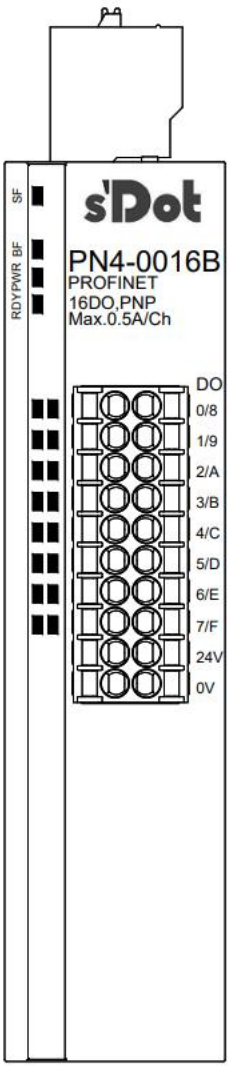
*24V内部导通;0V内部导通
*负载公共端电源需与模块使用同一个电源



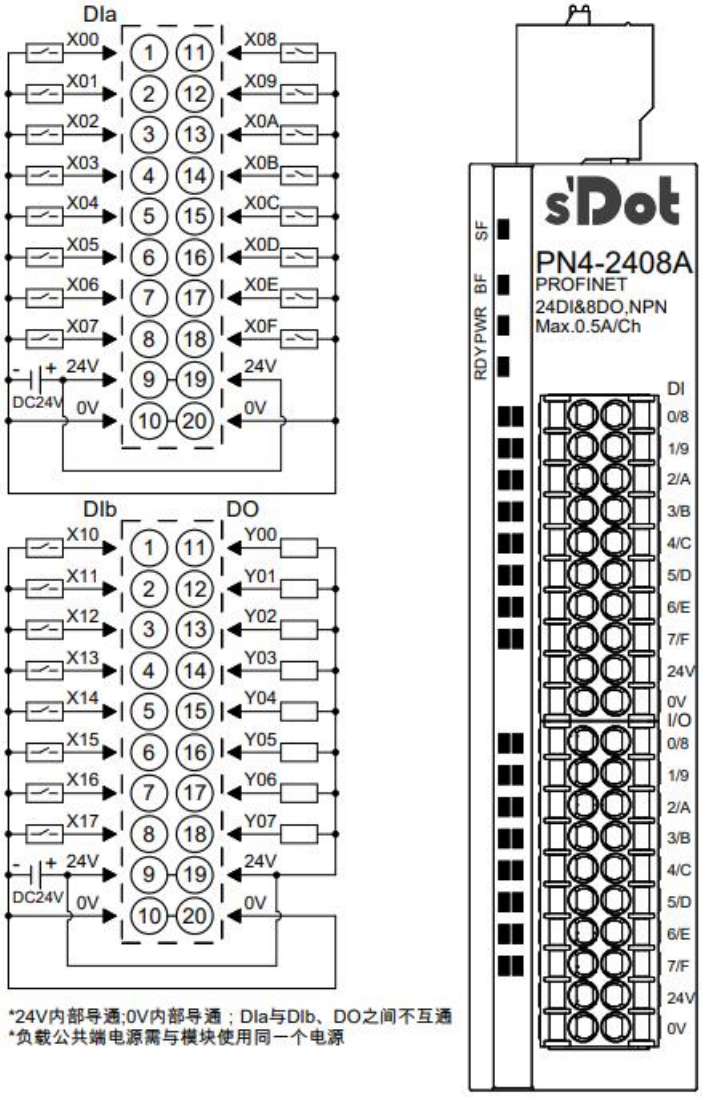
6.3.10 PN4-0016B



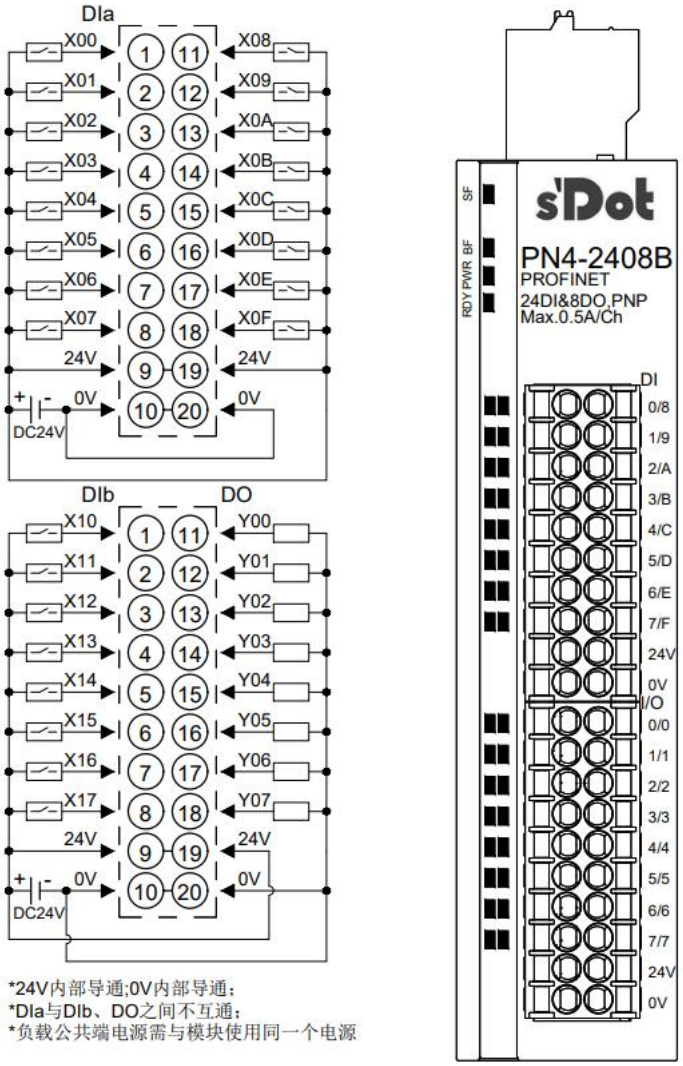
*24V内部导通;0V内部导通
*负载公共端电源需与模块使用同一个电源



6.3.11 PN4-2408A

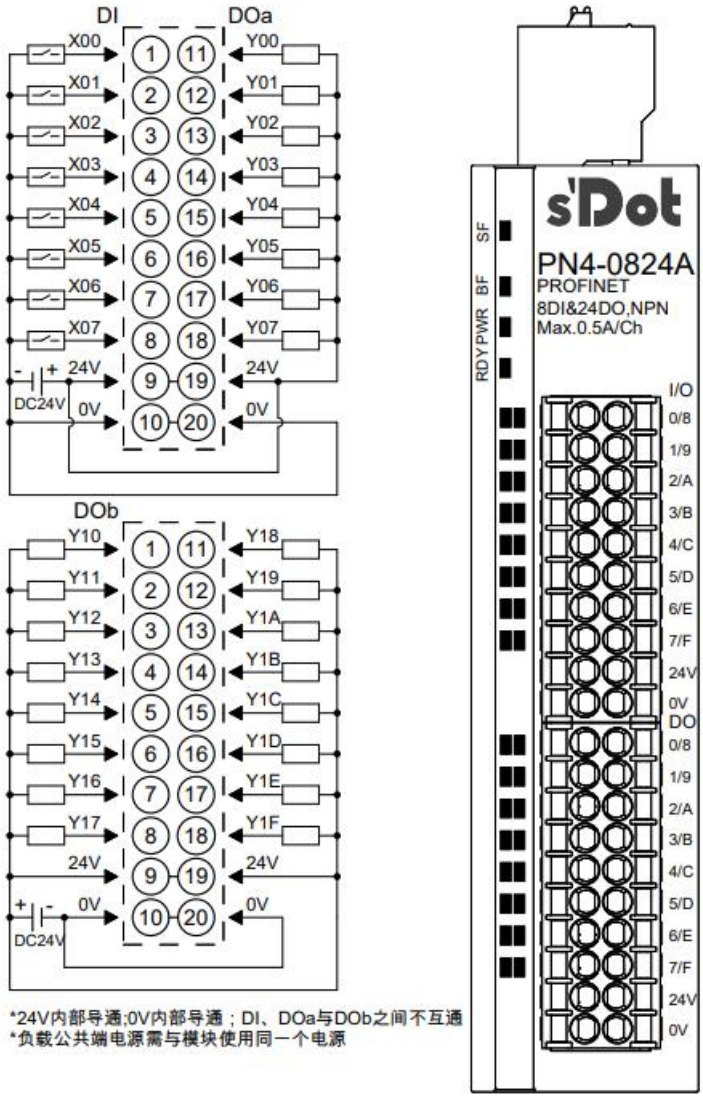


6.3.12 PN4-2408B

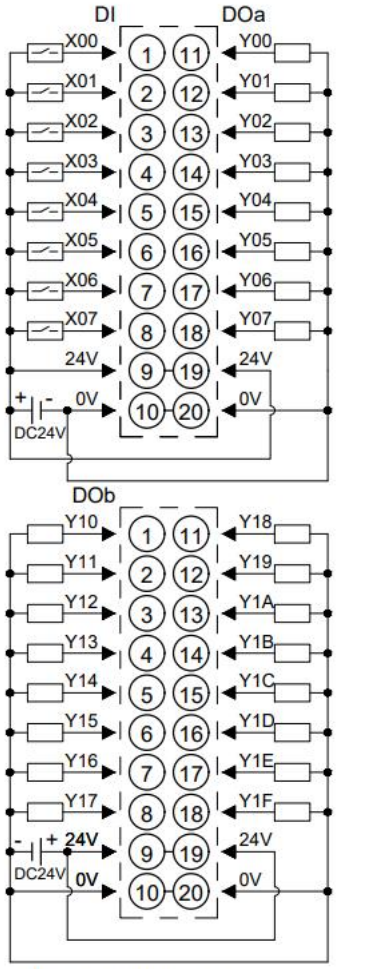


*24V内部导通;0V内部导通；
*DIa与DIb、DO之间不互通；
*负载公共端电源需与模块使用同一个电源

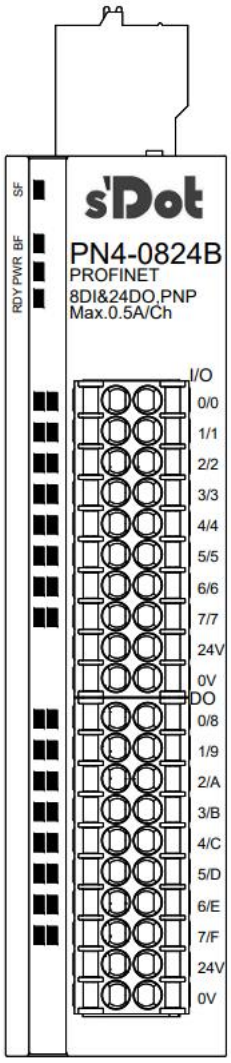
6.3.13 PN4-0824A



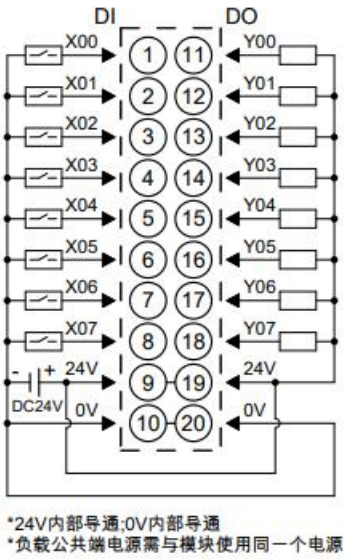
6.3.14 PN4-0824B

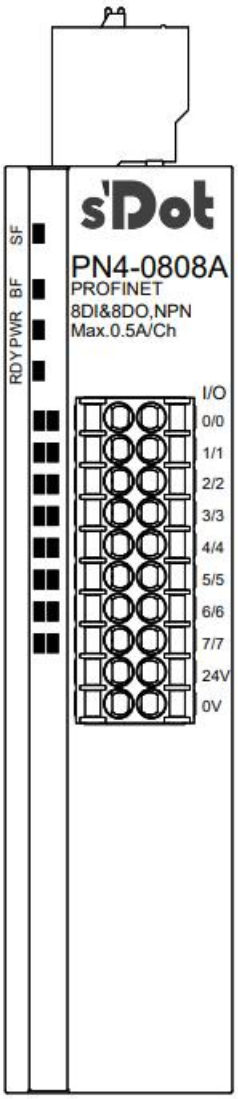


*24V内部导通;0V内部导通；
*DI、DOa与DOb之间不互通；
*负载公共端电源需与模块使用同一个电源

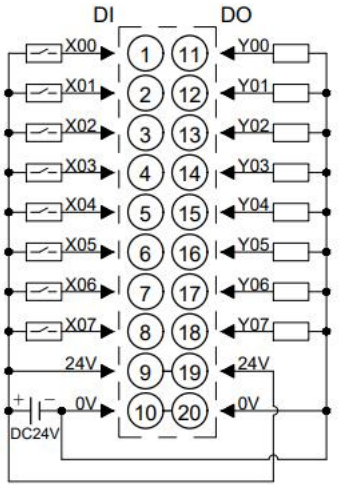


6.3.15 PN4-0808A

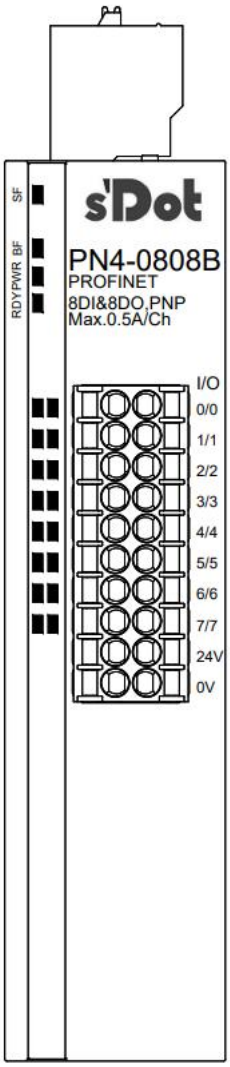




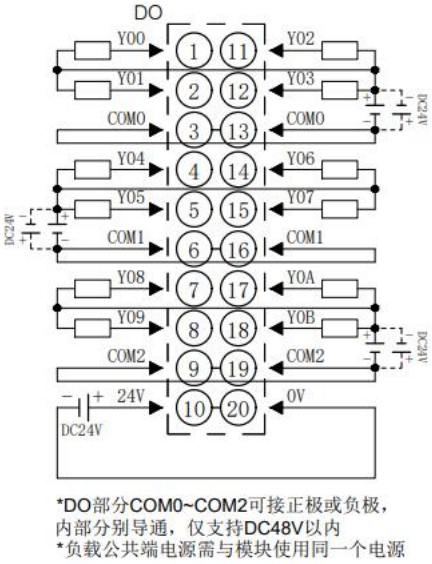
6.3.16 PN4-0808B



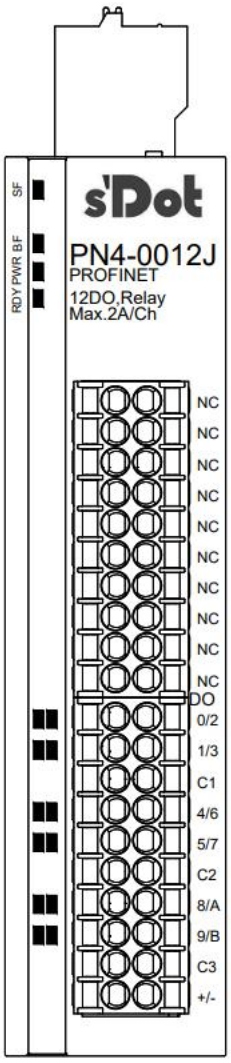
*24V内部导通;0V内部导通
*负载公共端电源需与模块使用同一个电源



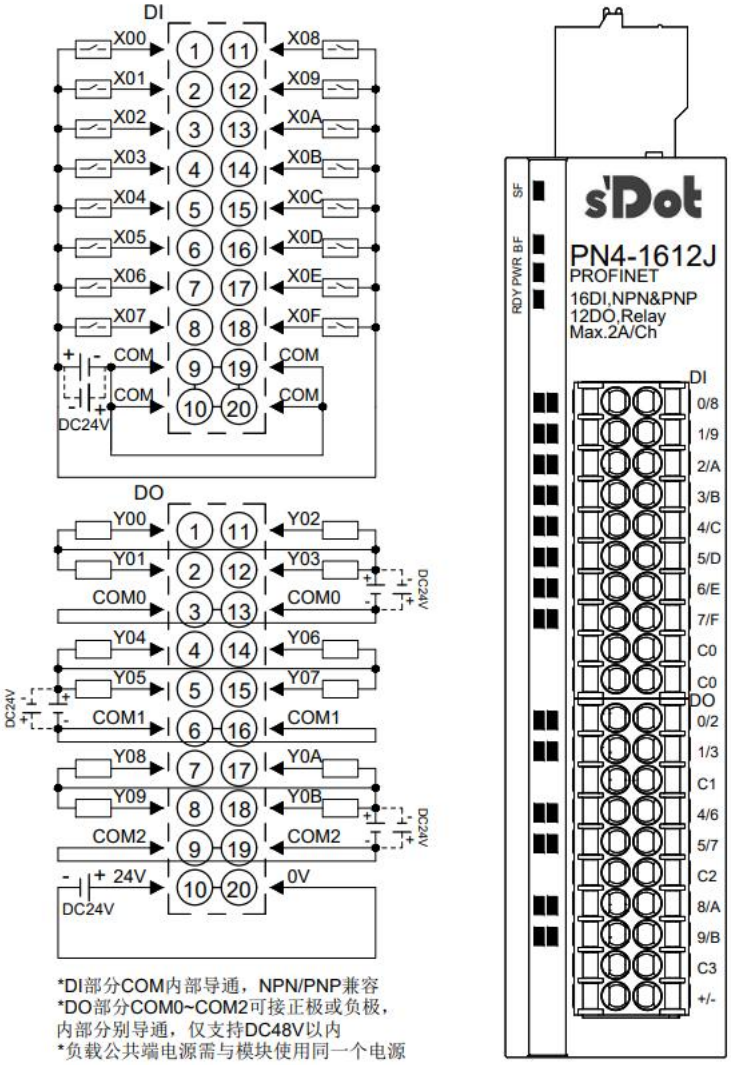
6.3.17 PN4-0012J



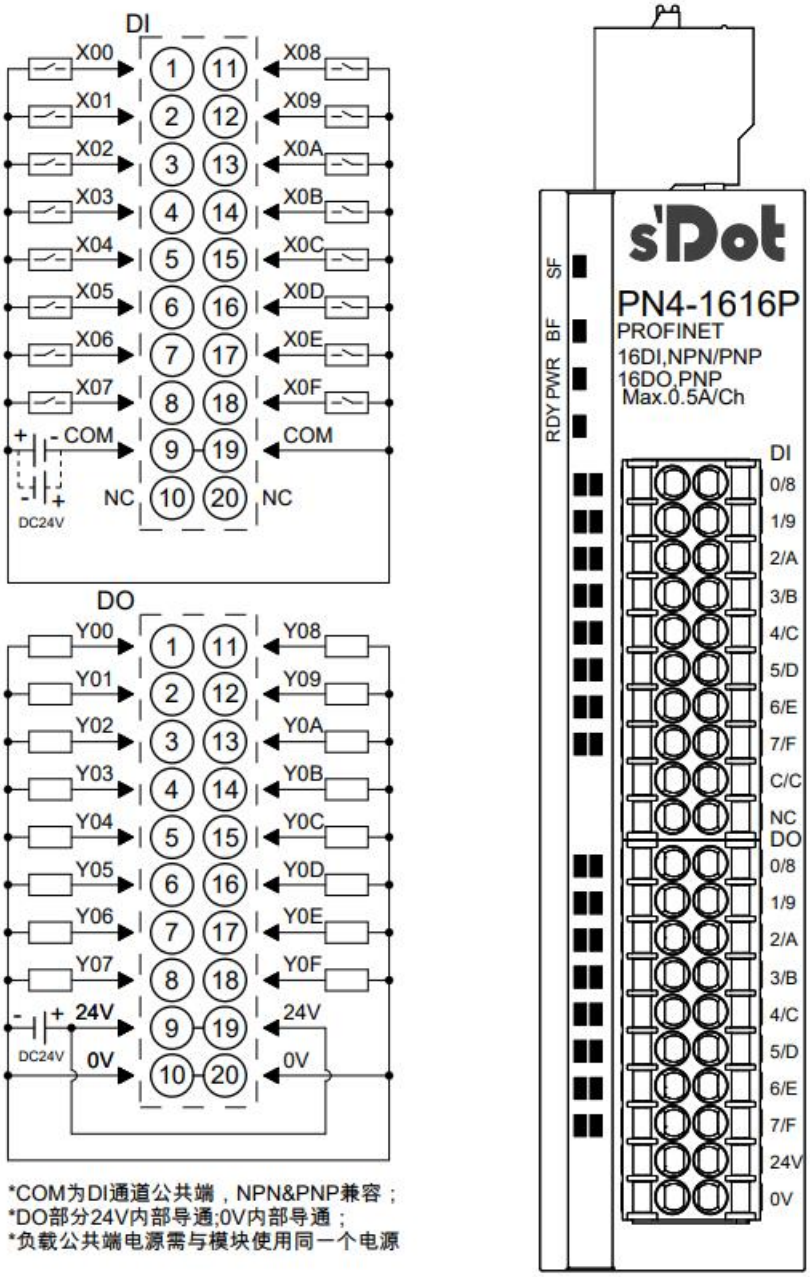
*DO部分COM0~COM2可接正极或负极，
内部分别导通，仅支持DC48V以内
*负载公共端电源需与模块使用同一个电源



6.3.18 PN4-1612J

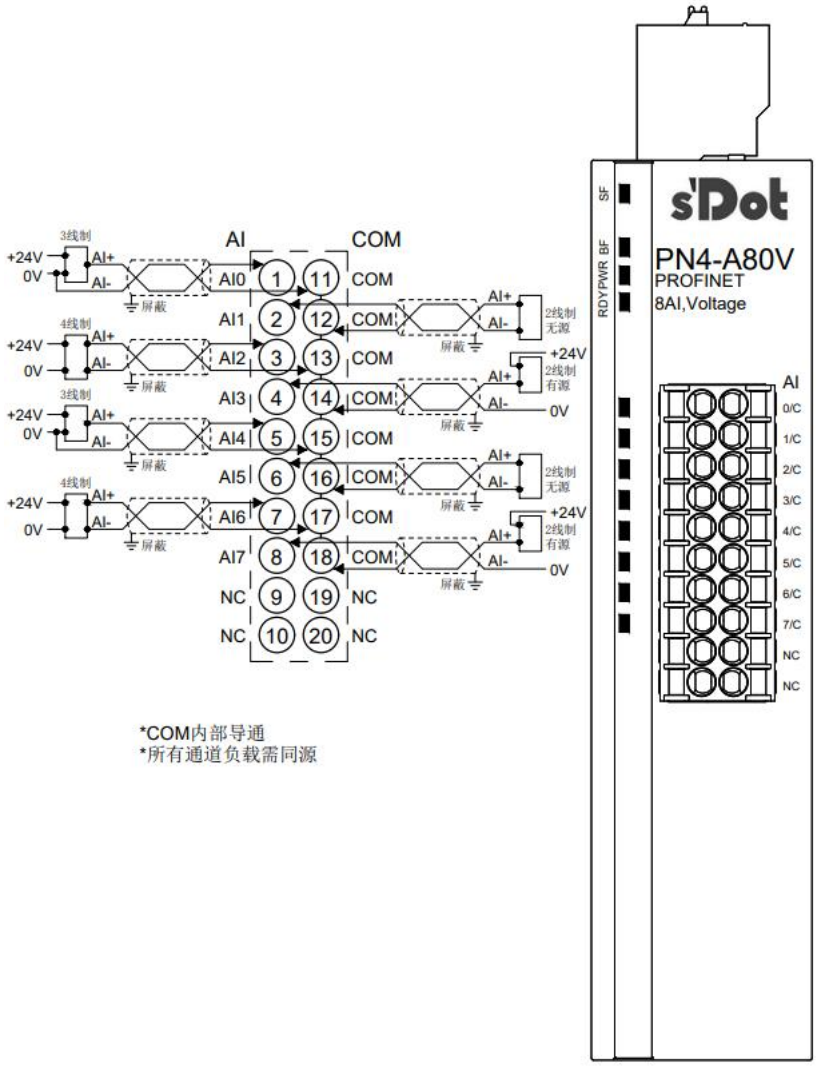


6.3.19 PN4-1616P

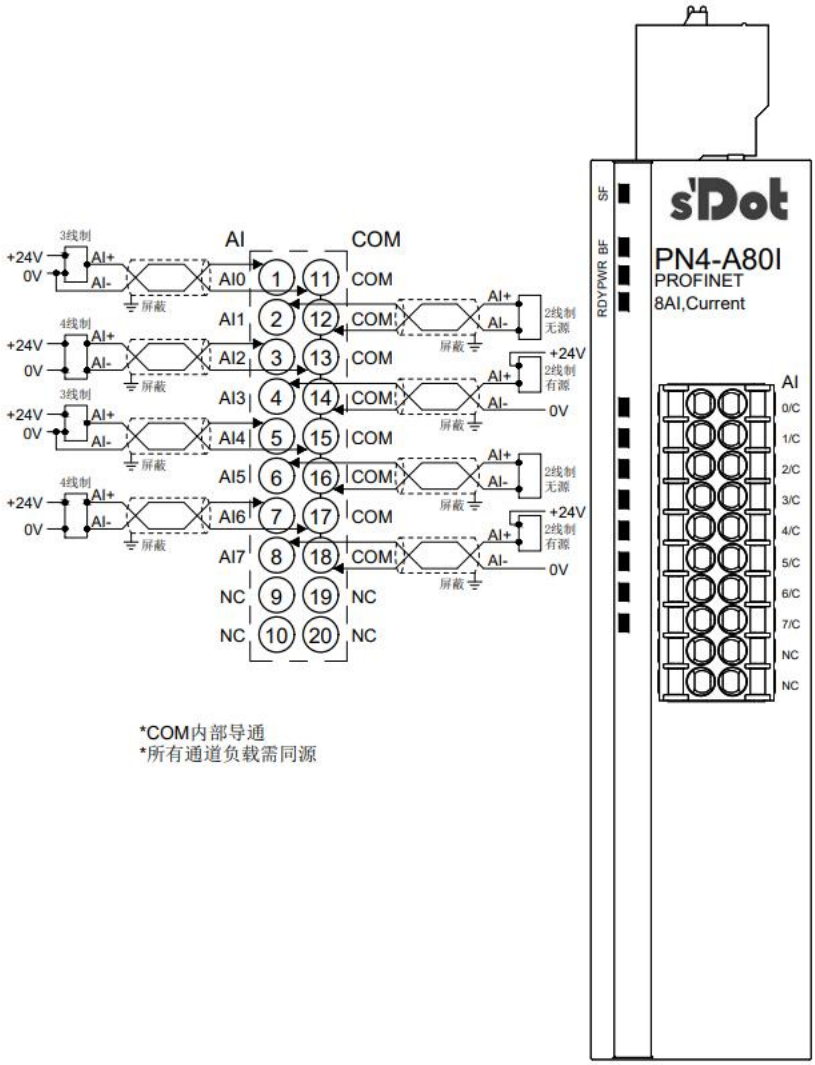


*COM为DI通道公共端，NPN&PNP兼容；
*DO部分24V内部导通;0V内部导通；
*负载公共端电源需与模块使用同一个电源

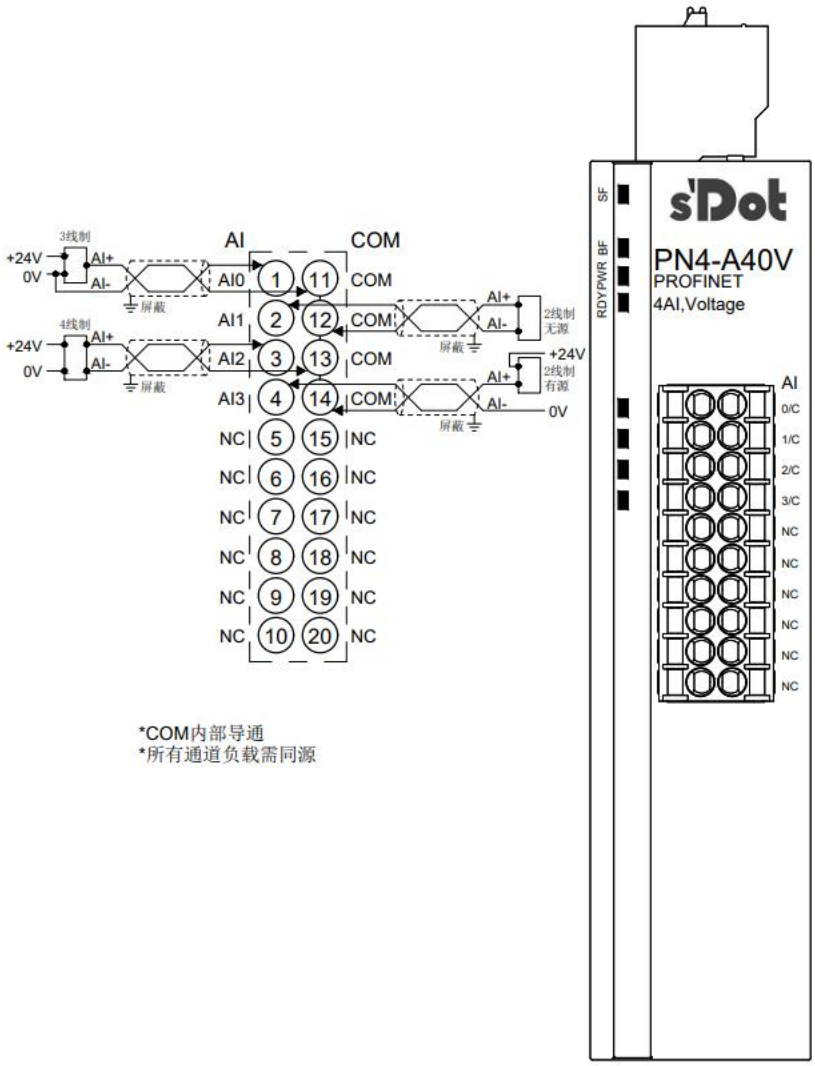
6.3.20 PN4-A80V



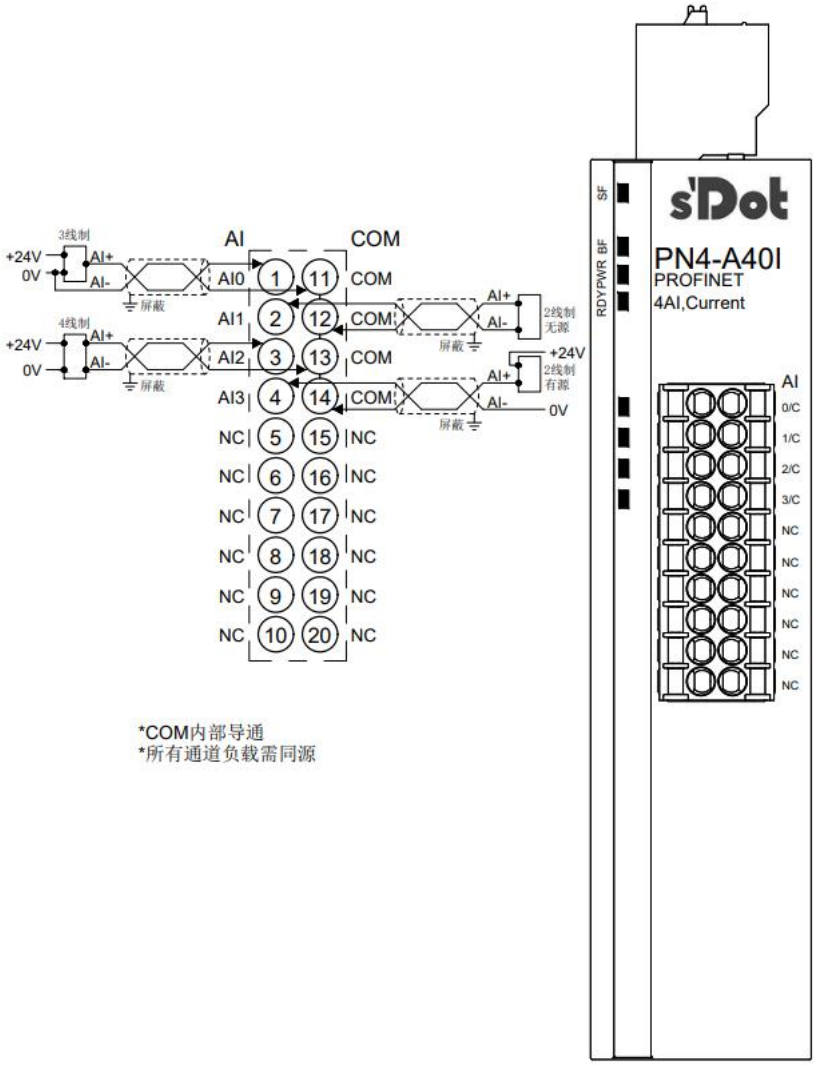
6.3.21 PN4-A80I



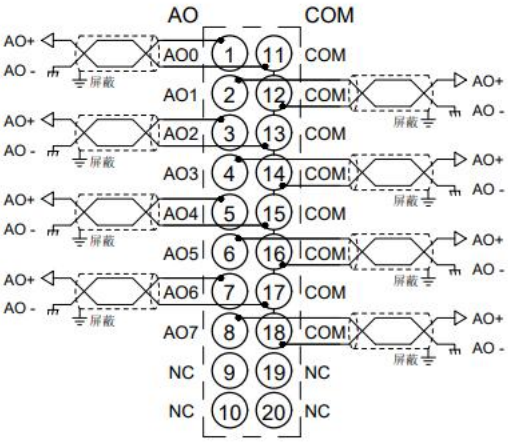
6.3.22 PN4-A40V

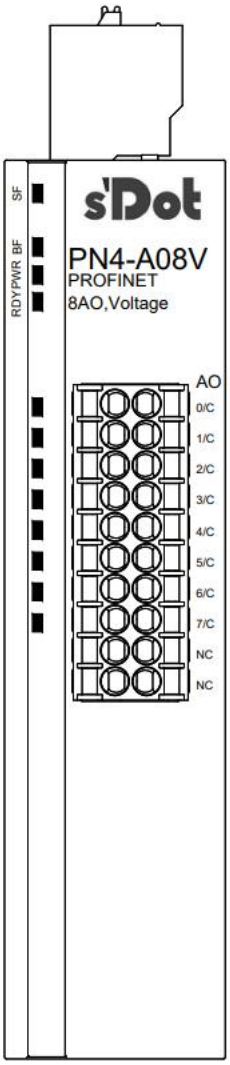


6.3.23 PN4-A40I

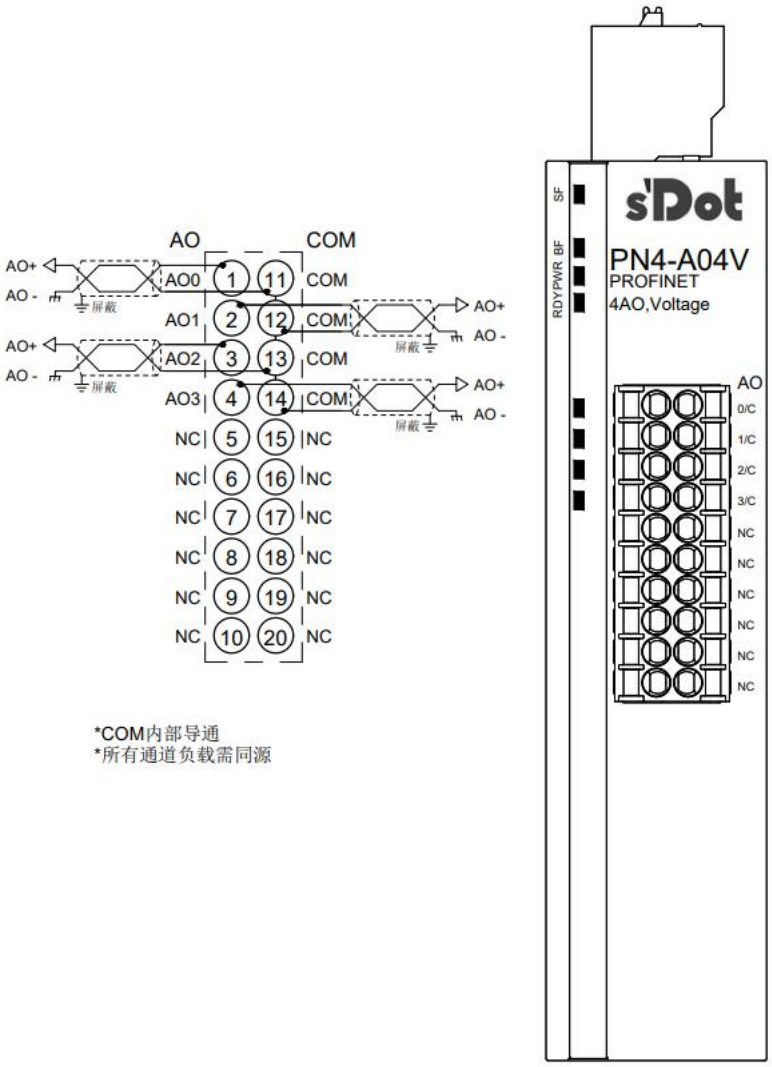


6.3.24 PN4-A08V

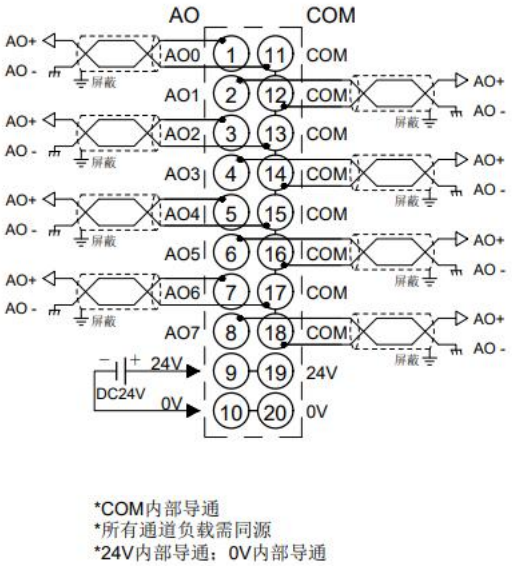




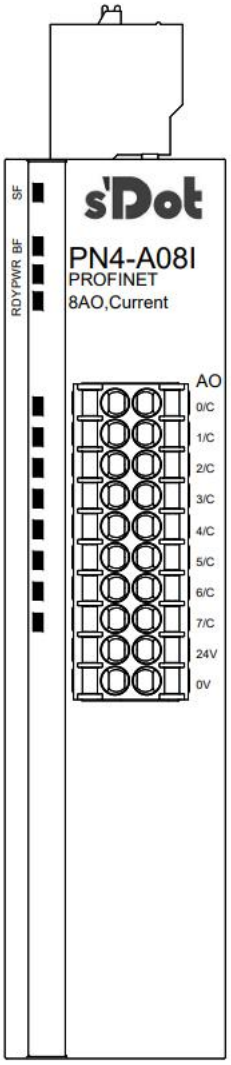
6.3.25 PN4-A04V



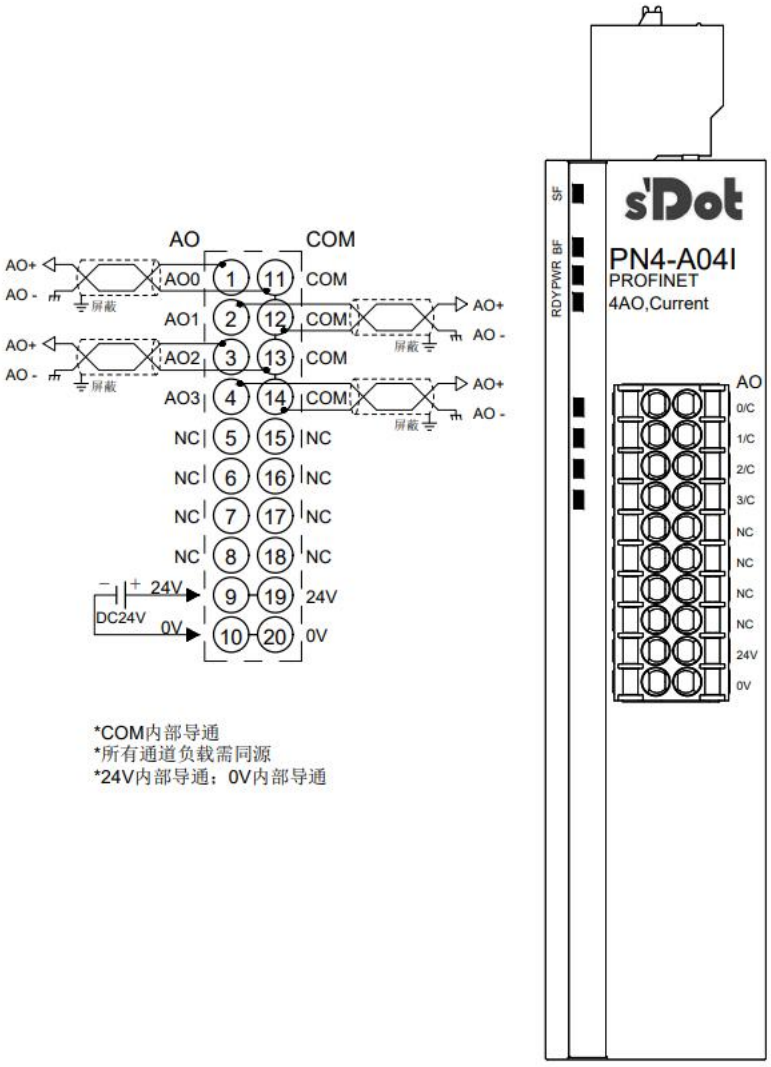
6.3.26 PN4-A08I



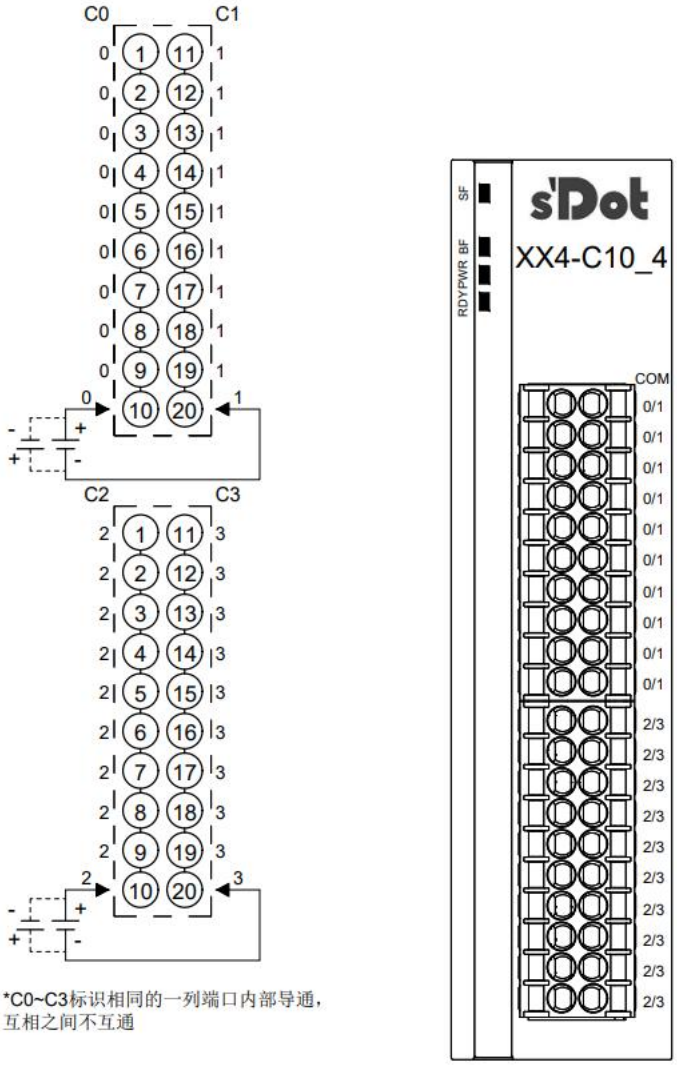
*COM内部导通
*所有通道负载需同源
*24V内部导通；0V内部导通



6.3.27 PN4-A04I



6.4 Wiring diagram of common terminal expansion module



*C0~C3标识相同的一列端口内部导通，互相之间不互通

7 use

7.1 Parameters and function configuration

This manual uses the TIA Portal V17 software platform and a Siemens PLC (model: S7-1200) as an example to introduce module parameters, functions, and configuration methods.

7.1.1 Digital input filtering time

Digital input filtering prevents unexpected rapid changes in the input signal from causing the program to respond, which may be due to switch contact skipping or electrical noise. Digital input filtering is currently fixed at 3ms, filtering out noise within that 3ms range; individual channels cannot be configured.

A 3 ms input filtering time means that a single signal changing from "0" to "1" or from "1" to "0" for 3 ms is required to be detected, while a single high pulse or low pulse shorter than 3 ms will not be detected.

7.1.2 Analog filtering settings function

- **Analog input filtering function**

The analog input filtering function can internally average the data after A/D conversion to reduce the impact of fluctuations in the input signal due to noise and other factors.

The analog input is processed by moving average with a specified number of A/D conversions.

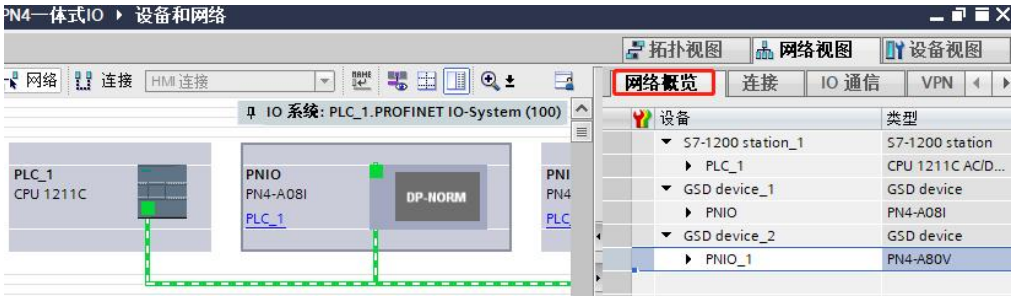
- **Filtering function configuration**

Each channel can be configured individually, with a configuration range of 1~1024ms; the default is 10ms.

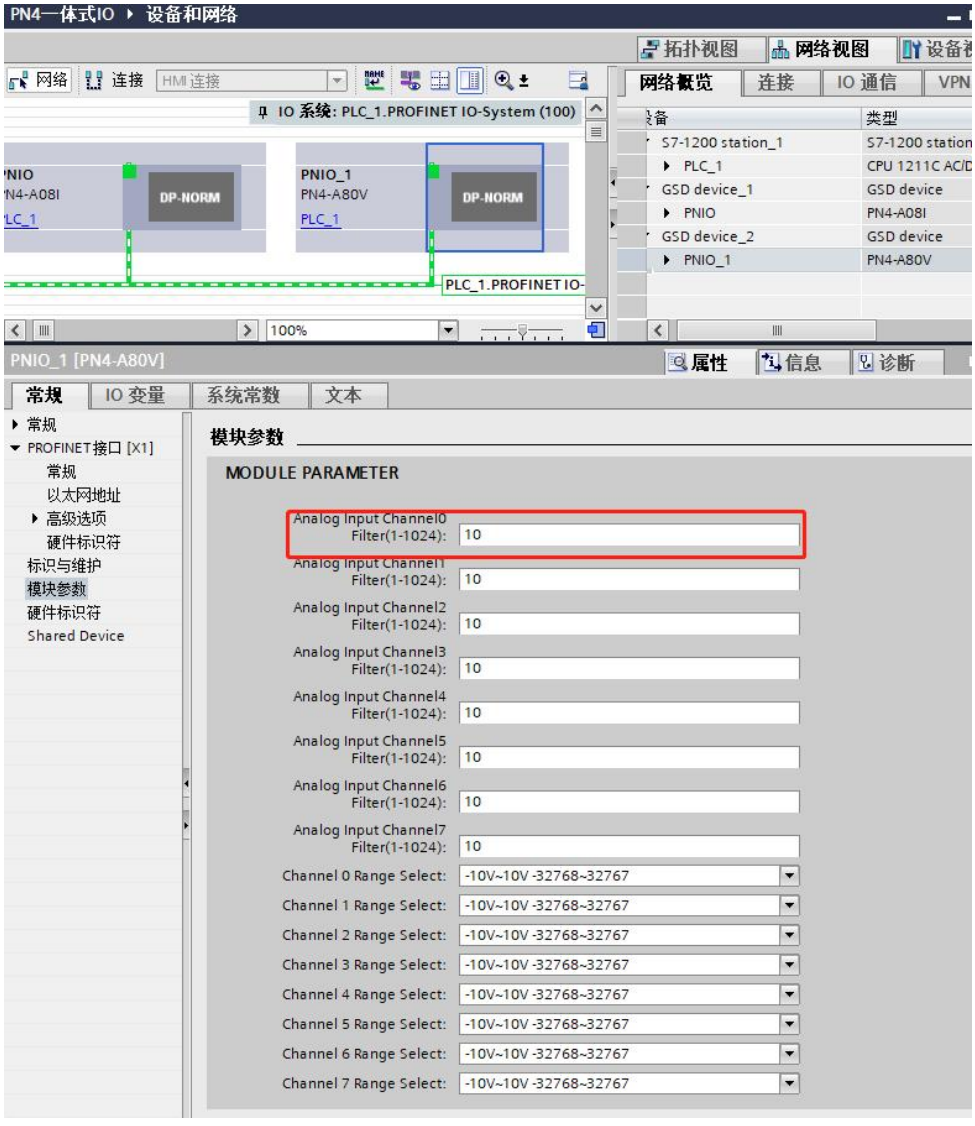
The sampling rate of the 8-channel module is: 1.25kHz/8 channels (800μs/8 channels);

The sampling rate of the 4-channel module is 2.5kHz/4 channels (400μs/4 channels).

A、 In the Devices and Networks interface, click the "Network Overview" menu tab, as shown in the image below.



B、 Select the module with the existing model number, "PN4-A80V" in this example, select the corresponding channel, and set the filter parameters.



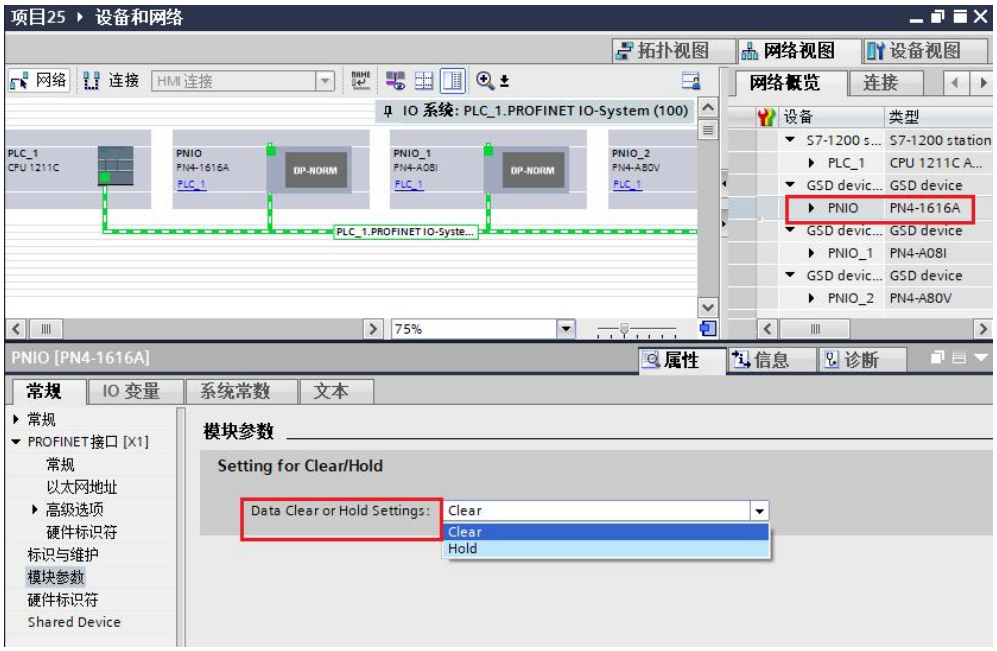
Note: After making the modifications, please power on the module again.

7.1.3 Output clear and hold function

Maintain output: The module's output channel continues to output even when communication is lost.
Clear Output: When communication is lost, the module's output channel clears its output.

- **Output clear and hold function configuration**

A、 In the device view, double-click the "PNIO" icon (PN4-1616A in this example). Under the "General" menu, click "Module Parameters" and modify the value of "Data Clear or Hold Settings".



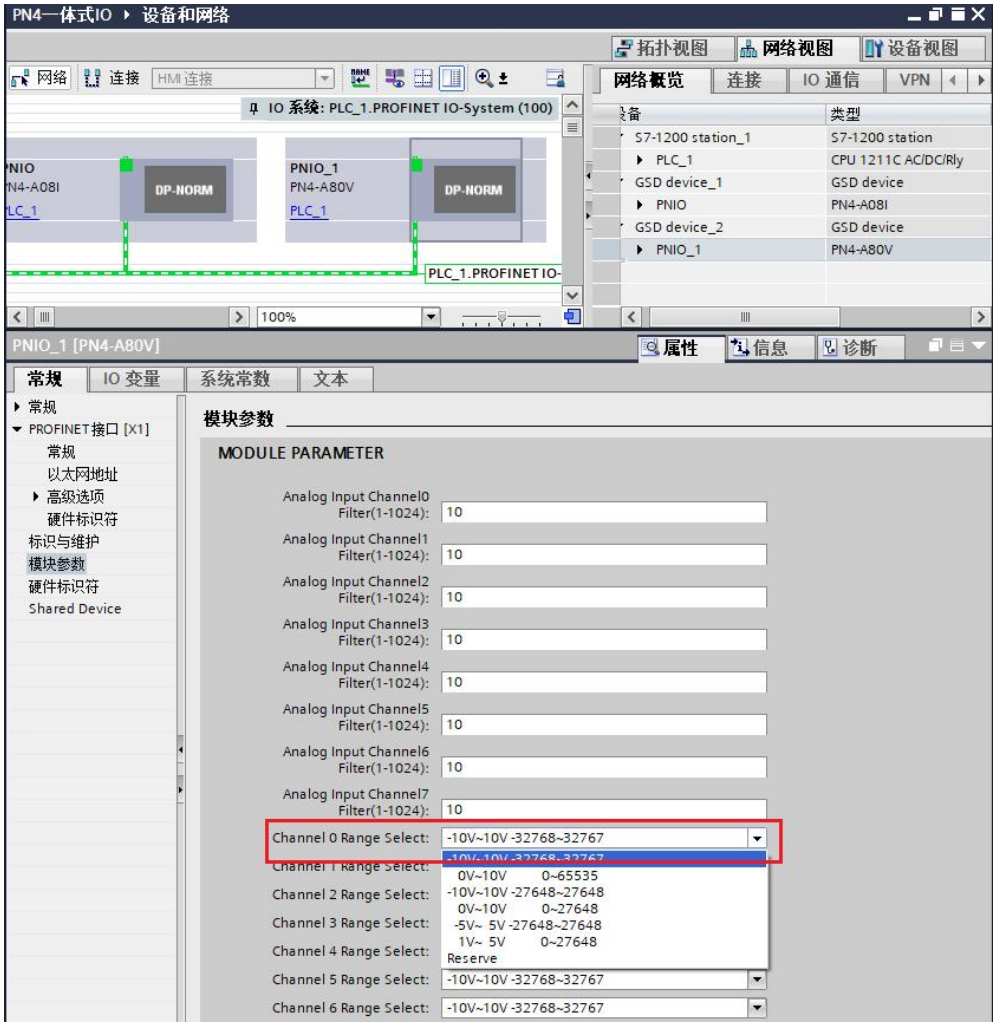
Note: After making the modifications, please power on the module again.

7.1.4 Analog range selection

Analog signals support range selection; see details for specific range options.3.3 Analog Parameters.

- **Analog range selection configuration**

A. On the "Device View" menu tab, select the module with the existing model, "PN4-A80V" in this example, select the corresponding channel, and set the range selection parameters.



Note: After making the modifications, please power on the module again.

7.2 Module configuration instructions

7.2.1 Application in the TIA Portal V17 software environment

1、Preparation

- **Hardware environment**
  - **Module preparation**
    This instruction uses three modules, PN4-1616A, PN4-A80V, and PN4-A80I, as examples.
  - **One computer, pre-installed with TIA Portal V17 software.**
  - **PROFINET dedicated shielded cable (2 pieces)**
  - **This instruction manual uses a Siemens S7-1200 PLC as an example.**
  - **One switching power supply**
  - **Module mounting rails and rail fasteners**
  - **Device configuration file**
    Configuration file retrieval address:https://www.solidotech.com/documents/configfile
- **Hardware configuration and wiring**
  Please follow "5 Installation and Removal, "6. WiringOperation required

2、New construction projects

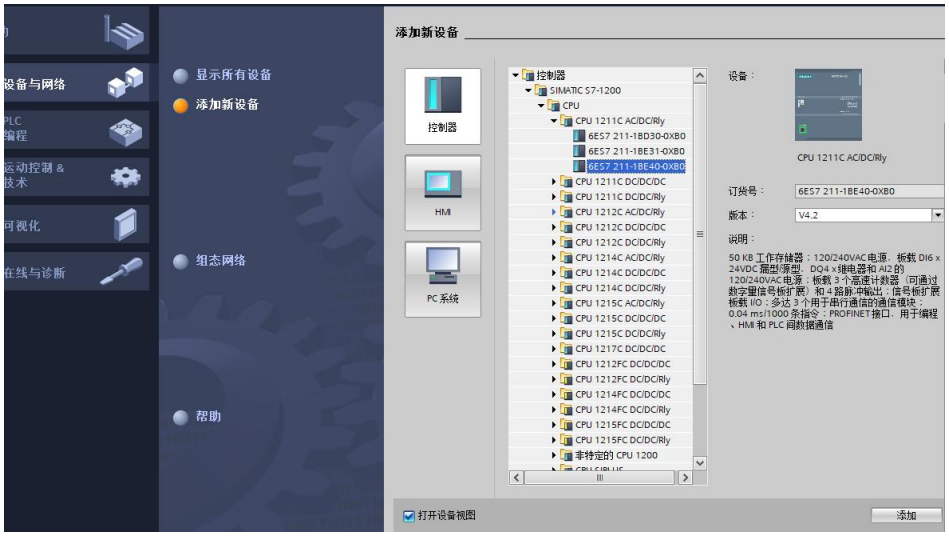
a. Open TIA Portal V17 software and click "Create New Project".

- Project name: Custom, you can keep the default.
- Path: Keep the project path; you can keep the default.
- Version: You can keep the default.
- Author: You can keep the default setting.
- Note: This is customizable and can be left blank.

3、 Add PLC controller

a. Click "Configure Devices", as shown in the figure below.

b. Click "Add New Device", select the PLC model you are currently using, and click "Add", as shown in the image below. After adding, you can see that the PLC has been added to the device navigation tree.



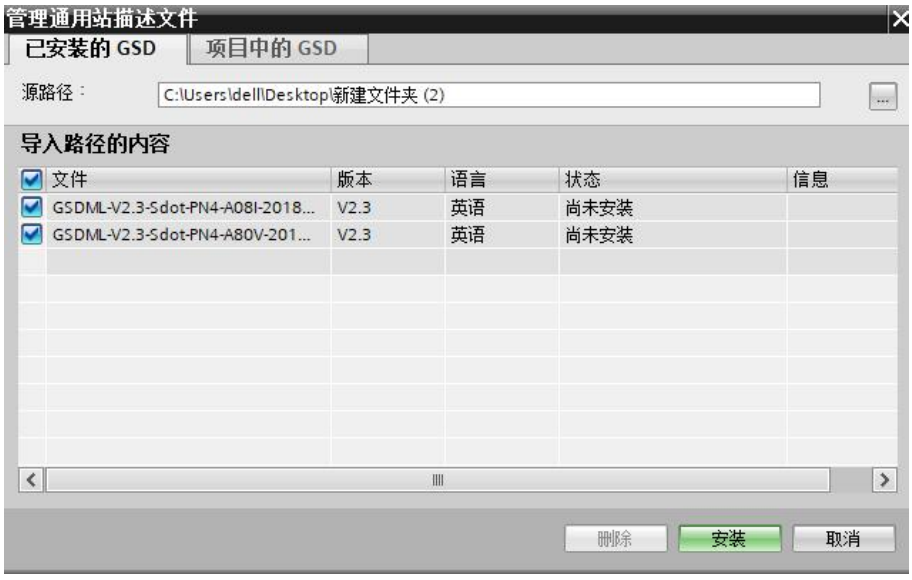
4、Scan connection device

a. Click "Online Access -> Update Accessible Devices" in the left navigation tree. After the update is complete, the connected slave devices will be displayed, as shown in the figure below.

The computer's IP address must be on the same network segment as the PLC. If they are not on the same network segment, change the computer's IP address and repeat the above steps.

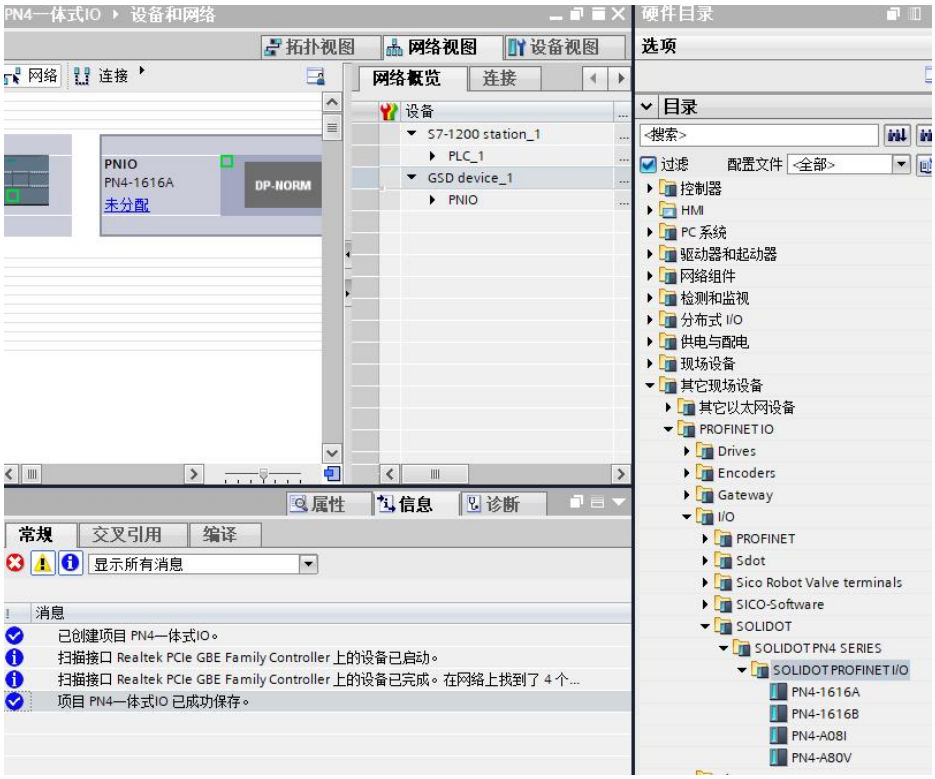
5、Add GSD configuration file

a. In the menu bar, select "Options -> Manage General Station Description Files (GSDML)(D)".
b. Click "Source Path" to select the file.
c. Check if the status of the GSD file to be added is "Not installed". If not installed, click the "Install" button. If already installed, click "Cancel" to skip the installation steps.

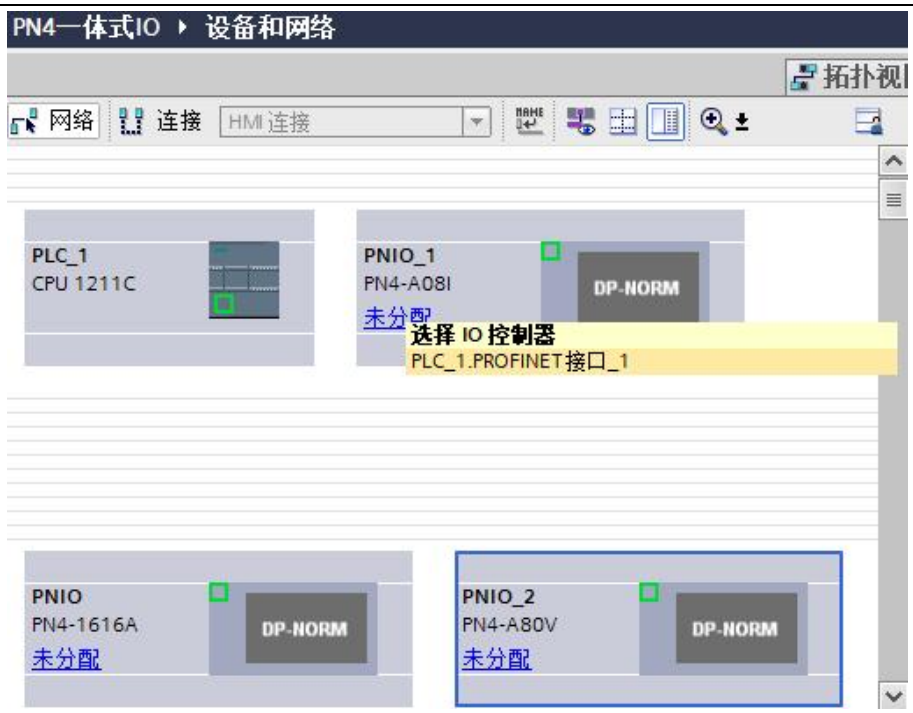


6、Add PN4 integrated I/O module

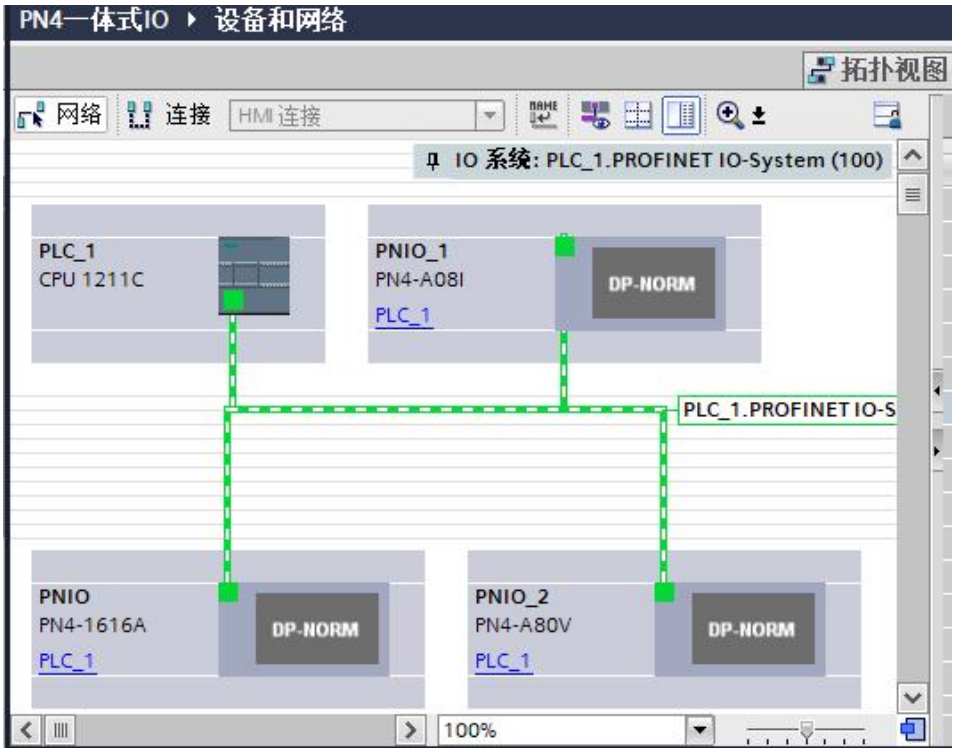
a. Double-click "Devices and Networks" in the left navigation bar, click the vertical button in the "Hardware Catalog" on the right, and select "..."Other field devices -> PROFINET IO -> I/O -> SOLIDOT PROFINET I/O -> PN4-1616A", drag or double-click PN4-1616A to "Network View", as shown in the figure below.



b. Add the "PN-A08I" and "PN4-A80V" modules to the "Network View" in the same way. Click "Unassigned (blue text)" on the slave device and select "PLC_1.PROFINET Interface_1", as shown in the figure below.

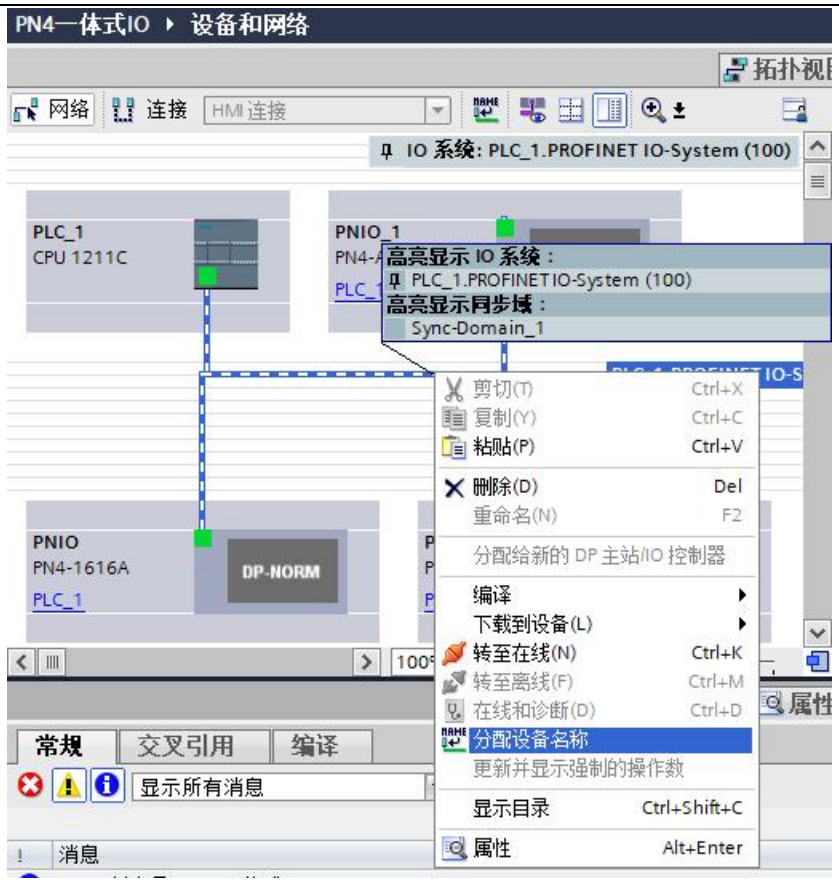


c. After the connection is complete, it will look like the image below.



7、Assign device name

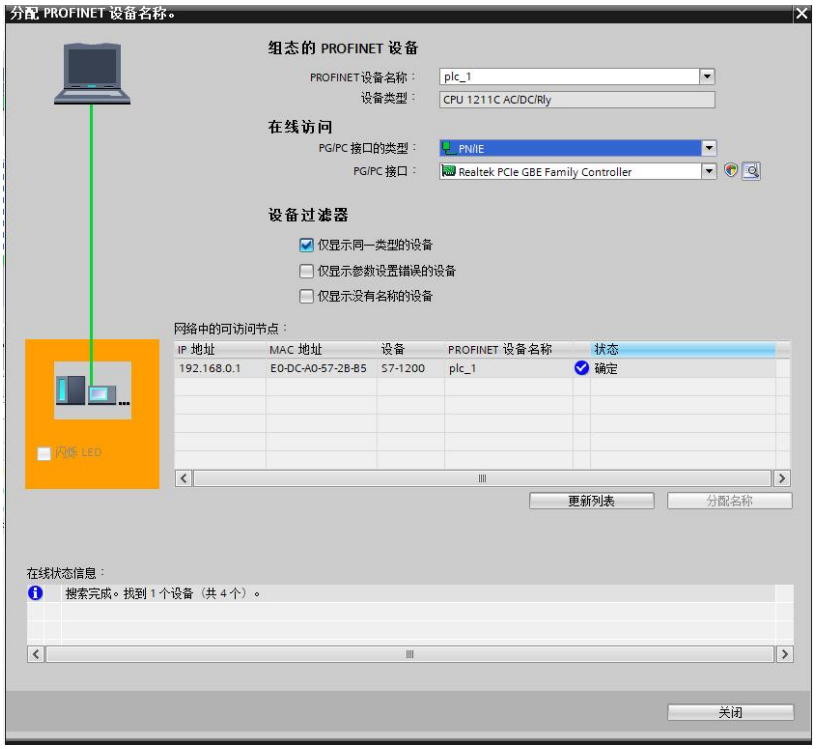
a. Switch to "Network View", right-click the connection cable between the PLC and the coupler, and select "Assign Device Name", as shown in the figure below.



b. When the "Assign PROFINET Device Name" window pops up, check if the MAC address printed on the coupler is the same as the MAC address of the assigned device name.

- PROFINET Device Name: The name set in "Assign IP address and device name to slave station".
- The type of PG/PC interface is PN/IE.
- PG/PC interface: The actual network adapter used.

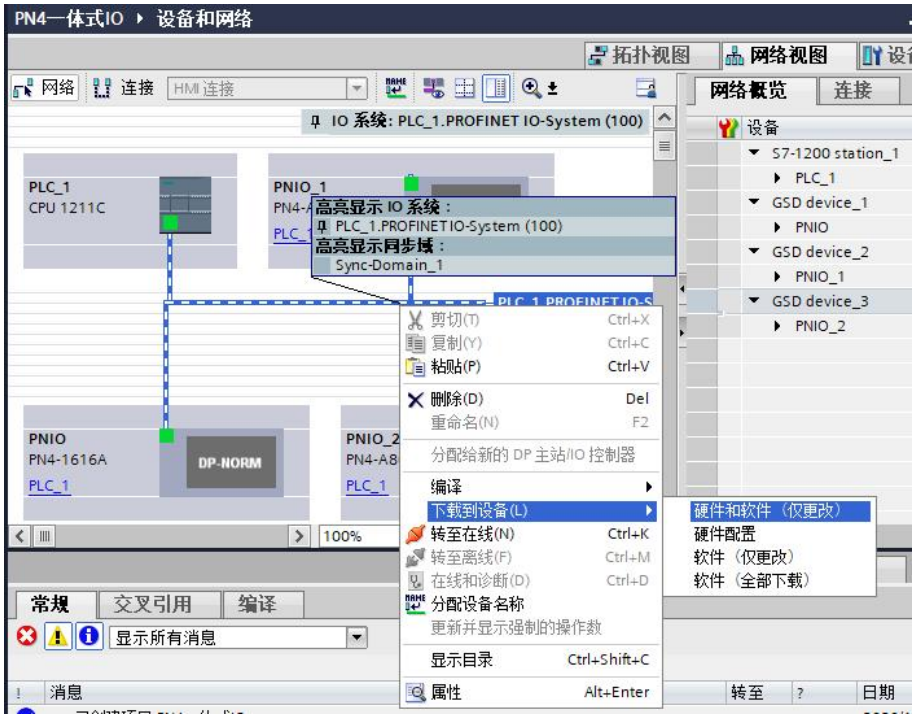
c. Select the slave devices in sequence, click "Update List", and then click "Assign Name". Check whether the status of the node in "Accessible Nodes in the Network" is "OK", as shown in the figure below.



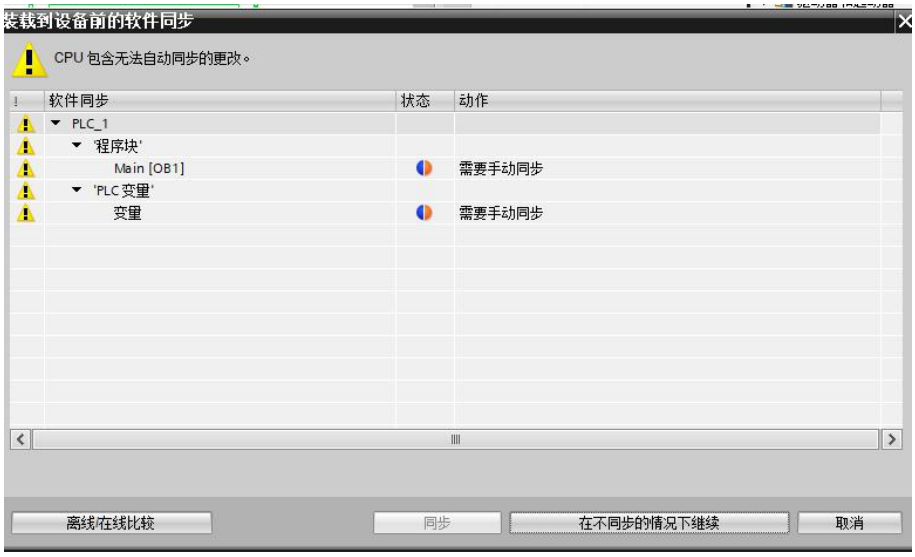
d. Click "Close"

8、Download configuration structure

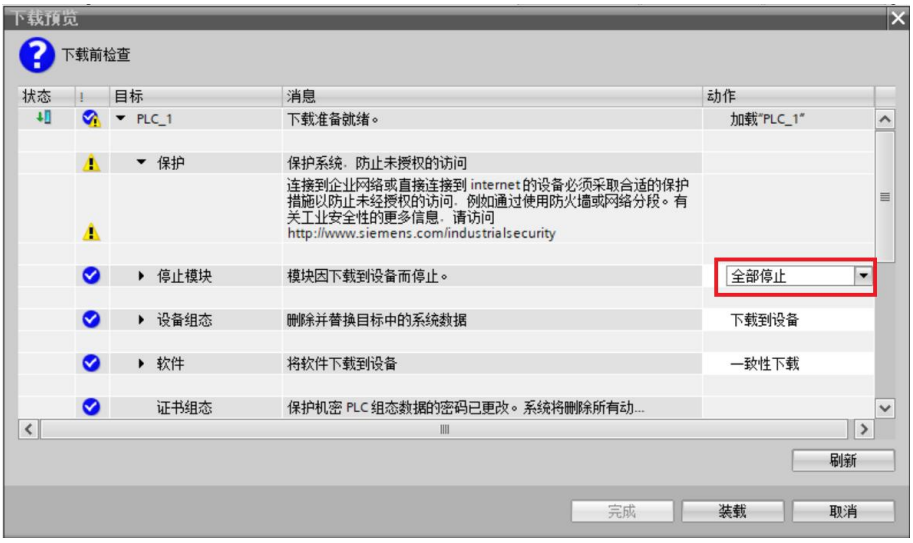
a. Double-click "Device and Network" to return to "Network View". Select PLC and click the "Download to Device" button in the menu bar to download the current configuration to the PLC, as shown in the figure below.



b. Select "Continue without stepping", as shown in the image below.



c. Select "Stop All".



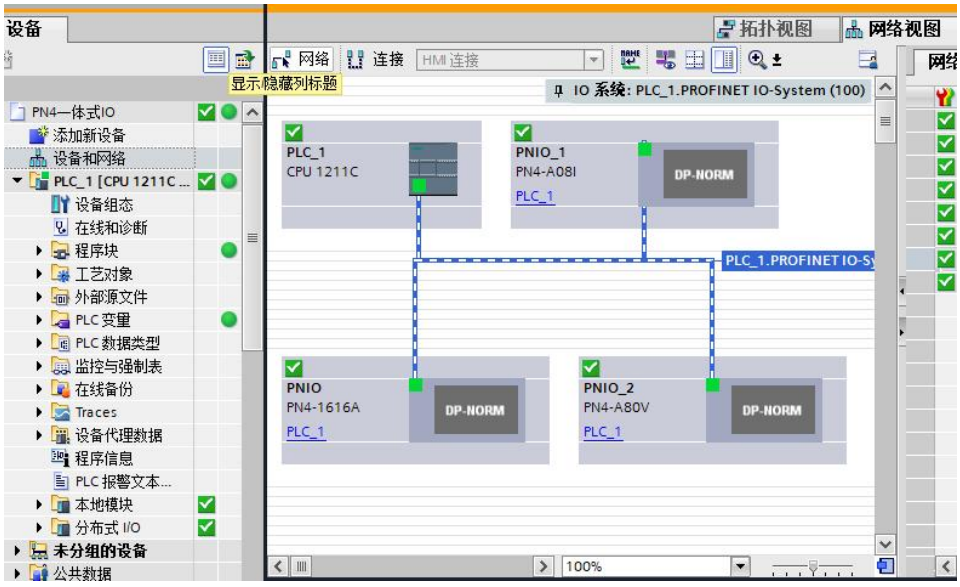
d. Click "Load".

e. Click "Finish".

f. Power on the device again.

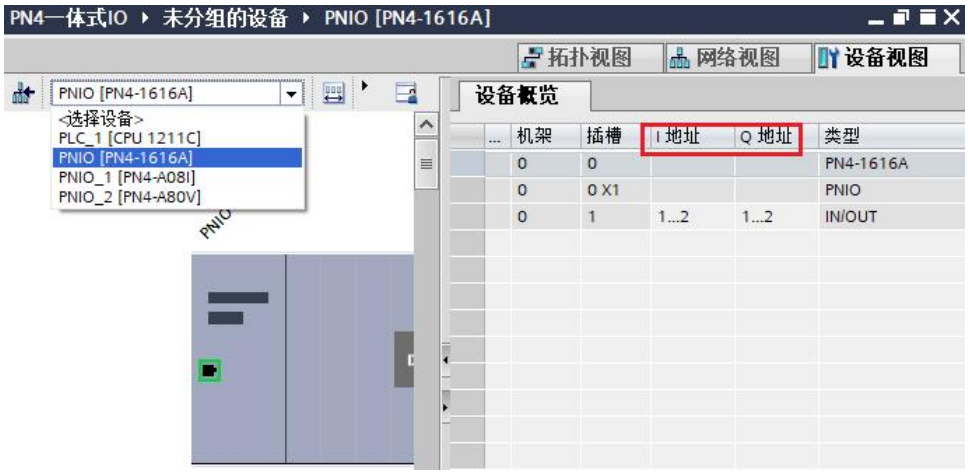
9、Communication connection

a. Select PLC, then click the "Go to Online" button. The connection is successful when all icons are green, as shown in the figure below.

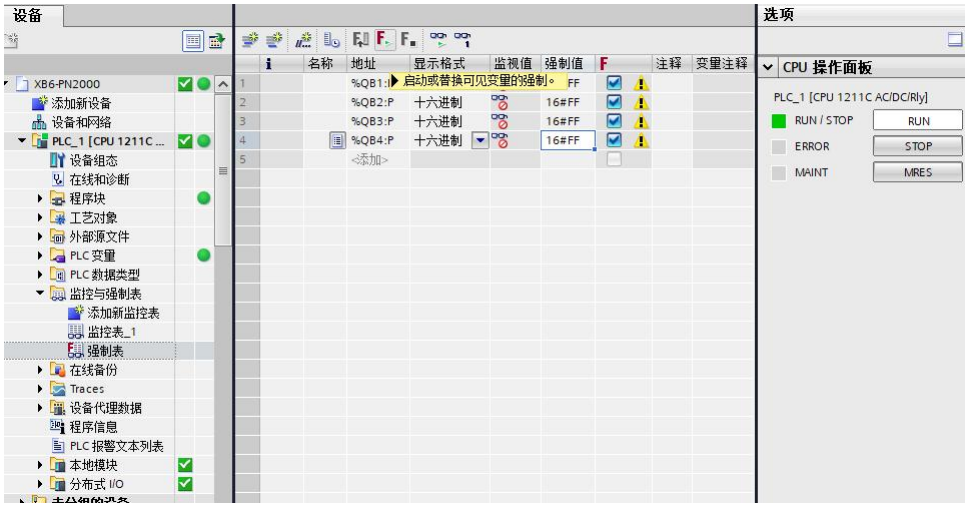


10、 Functional verification

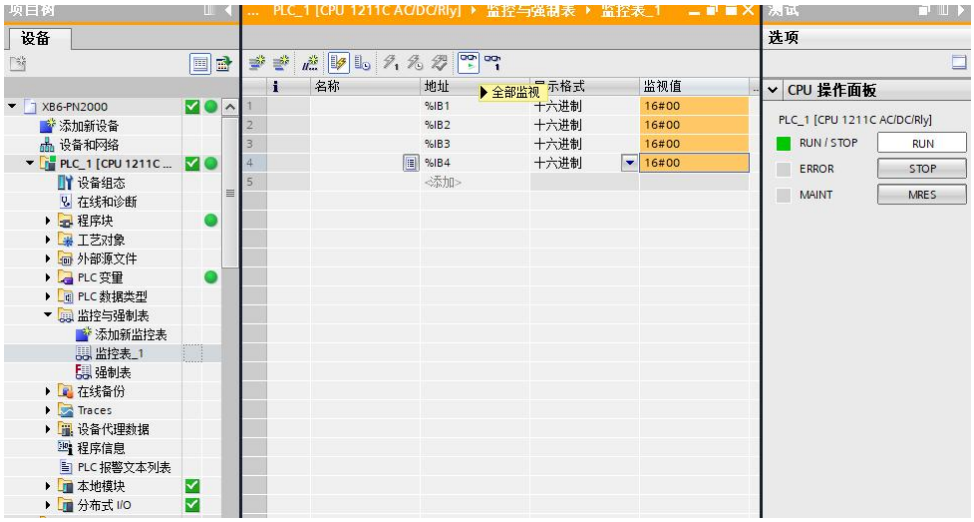
a. Click "Device View". Under the "Device Overview" menu, you can find the addresses assigned to the I/O modules by the system software. You can also modify the addresses as needed, as shown in the figure below.



b. Click "Force Table" and switch the CPU to "RUN" state in the "CPU Operation Panel". Write the output module address in the form of "QB" into the "Address" field, such as "QB1" for address 1. After writing, press the "Enter" key, and "%QB1:P" will be automatically generated in the address 1 field. You can select the display format of the forced value in the "Display Format" field.
This example uses hexadecimal as an example. As shown in the figure below, enter the data FF in the "Forced Value" column (%QB1: The forced value of P is one byte, and its range is 0 to FF. Converting it to binary, it is: 00000000 to 11111111. One byte of data consists of 8 bits of binary data. From right to left, each bit controls one channel. If you want to control channel 2 alone, set the third bit to 1, that is, 00000100 = 0x03). After entering the data, click the "Start or Replace Force of Visible Variables" button to complete the data interaction of the output mode.



c. Click "Add New Monitoring Table", double-click the newly added monitoring table "Monitoring Table_1" (you can change the name), as shown in the figure below. Enter the module address in the form of "IB" into the "Address" field, such as "IB1" for address 1. After writing, press the "Enter" key, and "%IB1" will be automatically generated in the address 1 field. After filling in the addresses that need to be monitored, click the "Monitor All" button to monitor the input data.



Note: When not in use, cancel the forced values in the PLC and stop the PLC from running to avoid loading failures when downloading the configuration after reconfiguration.

7.2.2 Application in the STEP 7-MicroWIN SMART software environment

1、Preparation

- **Hardware environment**
  - **Module preparation**

    This instruction uses three modules, PN4-1616A, PN4-A80V, and PN4-A80I, as examples.
  - **One computer, pre-installed with STEP 7-MicroWIN SMART software.**
  - **This instruction manual uses a Siemens S7-200 SMART PLC as an example.**
  - **PROFINET dedicated shielded cable**
  - **One switching power supply**
  - **Module mounting rails and rail fasteners**
  - **Device configuration file**

    Configuration file retrieval address:https://www.solidotech.com/documents/configfile
- **Hardware configuration and wiring**

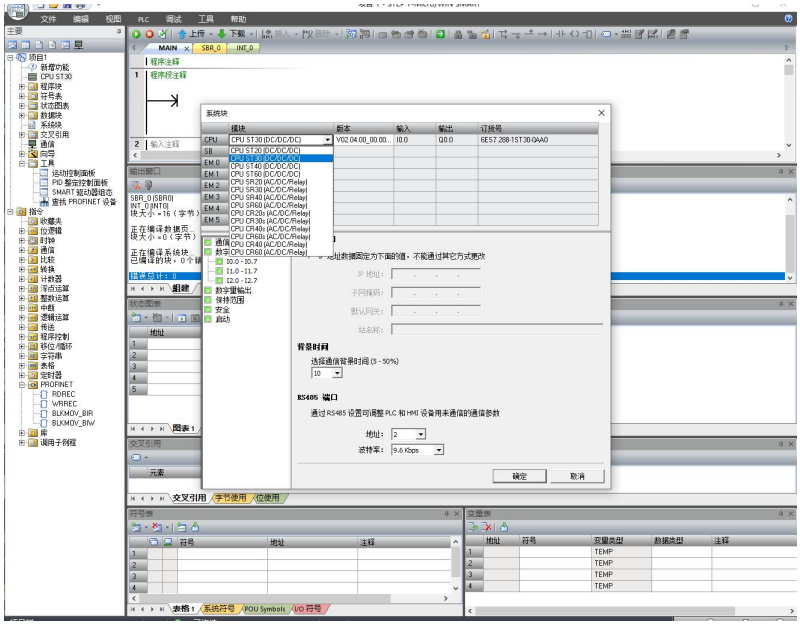
  Please follow "5 Installation and Removal, "6. WiringOperation required

2、Add CPU

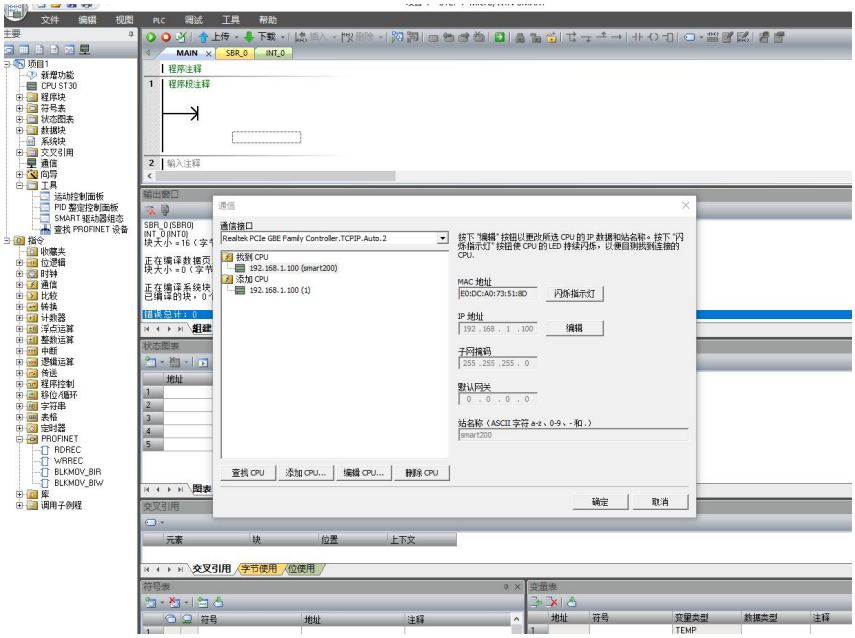
a. Open the STEP 7-MicroWIN SMART software.

b. Double-click the left navigation tree CPU ST30 Press the button to bring up the "System Block" window.

c. Select the CPU model, as shown in the image below.

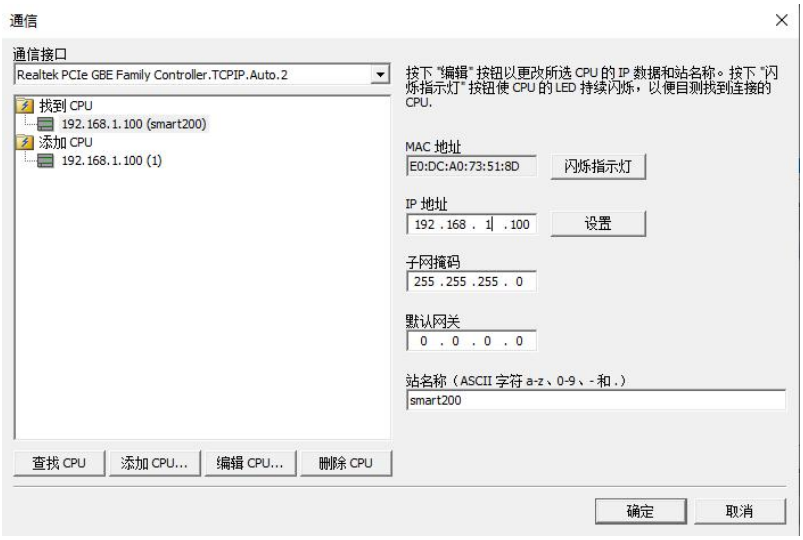


d. Double-click the navigation tree 通信 Press the button to bring up the "Communication" interface.



e. Click 查找 CPU Button.

f. Click the "Settings" button to change the IP address.



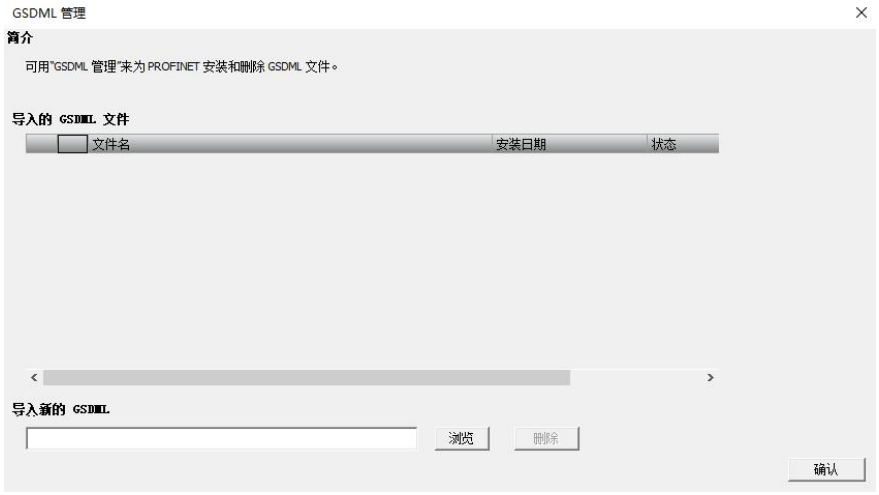
Note: Click the settings button to highlight the IP address bar, where you can modify the IP address and site name. Click the settings button again after making the changes.

3、Managing GSD files

- **Add GSD file**

a. Click “document"(File)Menu function area “GSDML” In someGSDMLmanage"(GSDML Management).

b. ClickGSDMLmanage"(Manage general station description filesClick in the dialog box “Browse"(Browse() button.



c. Select what to importGSDMLFiles can be imported.GSDMLdocument.

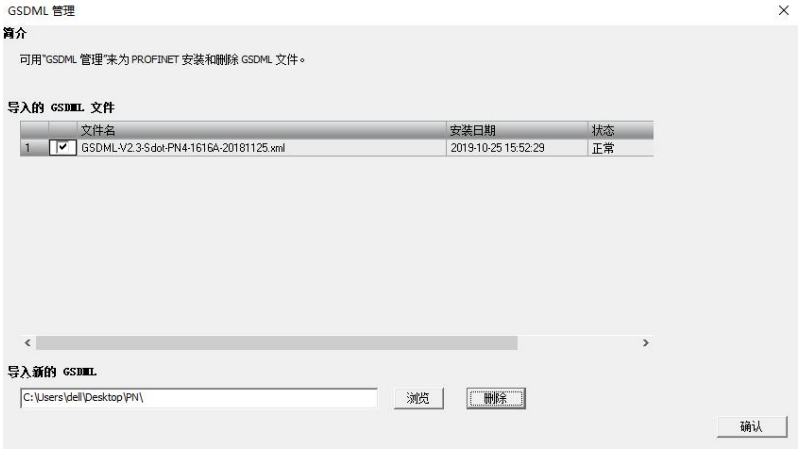
d. Click "Confirm" to complete G.SDMLImport files.

- **Delete GSD files**

a. "document"(FileMenu function area “GSDML” In someGSDMLmanage"(GSDML Management).

b. “GSDMLmanage"(Manage general station description filesSelect the item to delete in the dialog box.GSDMLdocument.

c. Click “delete"(Delete() button. Multiple can be deleted.GSDMLdocument.



d. Click “confirm"Click the button to close the dialog box.

e. DeletedGSDMLThe file will be from “ImportedGSDMLdocument"(Imported GSDML filesRemove from the field.

4、Device Naming

allPROFINETAll equipment must have an equipment name and IPAddress. Use STEP 7 - Micro/WIN SMARTTo define the device name. (Through...)PROFINET DCPThe (Discovery and Configuration Protocol) assigns a device name to the device.PROFINETEquipment andPCThey are located in the same subnet.

a. Click “tool"(ToolsMenu function area “tool(Tools) area “SearchPROFINETequipment"(Find ROFINET Devices() button.

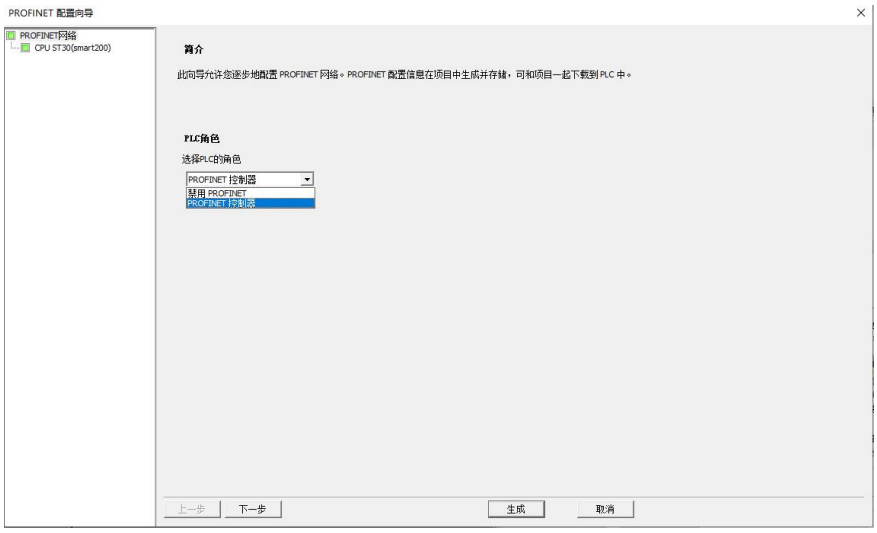
b. Click “Find the device"(Find DevicesA button is provided to display all available Ethernet connections on the local network.PROFINETequipment.

c. Click “edit"(EditClick the button to change the device name.

5、 Configure PROFINET network

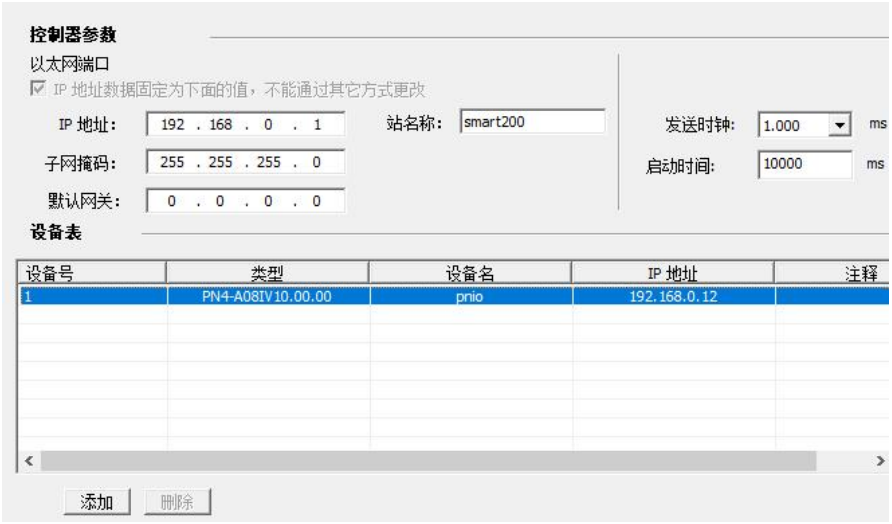
a. Click "Tools"–> PROFINET"Open PROFINETConfiguration wizard.

b. PLCCharacter selectionPROFINETcontroller"(PROFINET controller).



c. Click "Next".

d. Configure the controller parameters as shown in the figure below.



e. Add P in the same way.N4-1616A,PN4-A08IWait IOModule.

Note: The device name must match the module name, and the IP address must be set to be on the same network segment as the PLC.

f. Click "Next", then click the "Generate" button.

6、Download program

a. Click the "Download" button, and a dialog box will pop up as shown in the image below.

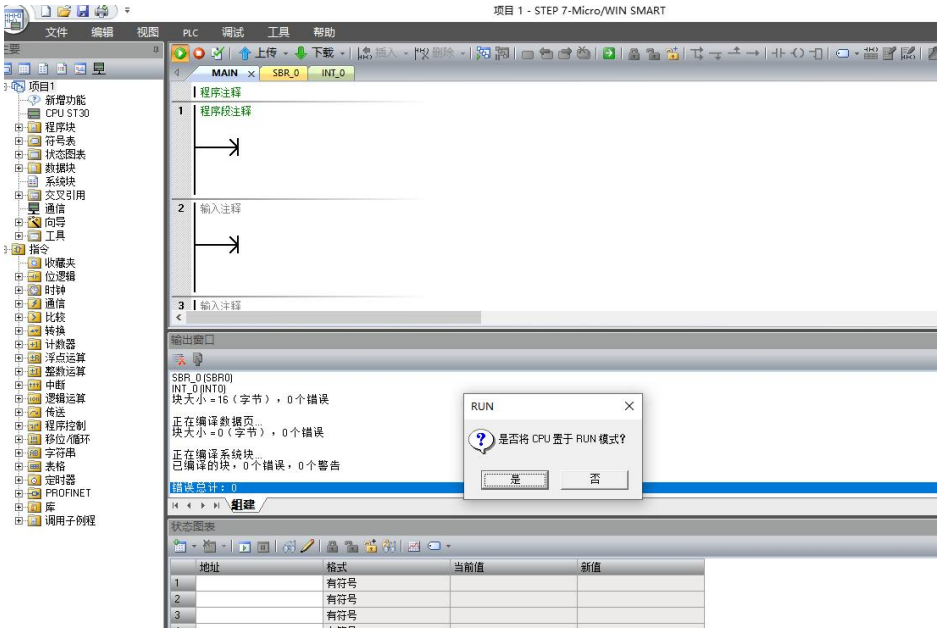
b. Click "Download".

c. Download complete. Close the chat menu.

Note: After downloading, power on the module again.

7、Test data

a. Click the "RUN" button to put the CPU into RUN mode, as shown in the figure below.



b. Click "OK".

c. Double-click "Status Icon -> Chart 1" in the navigation tree to display the status icon.

d. By entering the corresponding channel address and data format, you can force and monitor the I/O module here, as shown in the figure below.

8 FAQ

8.1 The device cannot be found in the software.

1. Verify that the GSDML configuration file is installed correctly.
2. Verify that the GSDML configuration file version is accurate.

8.2 The device cannot enter online mode.

1. Confirm that the project setup is correct.
2. Confirm that the device power supply is normal.
3. Check if the PROFINET communication cable is working properly.
4. Should a device name be assigned to the PLC device after it is connected?
5. Is the PLC model number correct?

8.3 Unable to load when downloaded to device

1. Confirm that the PLC is not in forced mode.
2. Confirm that the CPU is in a stopped state.