



PROFINET

PN4 Series Integrated I/O

User Manual



Nanjing Solidot Electronic Technology Co., Ltd.

Copyright © 2023 Nanjing Solidot Electronic Technology Co., Ltd. All rights reserved.

Without written permission of our company, no organization or individual may extract, copy or transmit part or all of this document.

Trademark notice



and other Solidot trademarks are all trademarks of Nanjing Solidot Electronic Technology Co., Ltd.

All other trademarks or registered trademarks referred to in this document belong to their respective owners.

Note

The products, services or features you purchase shall be subject to the commercial contracts and terms of Solidot. All or part of the products, services or features given in this document may not be within the scope of your purchase or use. Unless otherwise agreed in the contracts, Solidot does not make any express or implied statement or warranty for the content of this document.

Due to product version upgrading or other reasons, the content of this document is subject to changes from time to time. Unless otherwise agreed, this document shall be only used as reference. None of the statements, information and suggestions in this document shall constitute any express or implied warranty.

Nanjing Solidot Electronic Technology Co., Ltd.

Address: 11F, Ang Ying Building, No.91 Shengli Road, Jiangning District, Nanjing, Jiangsu Province, China

Postal code: 210000

Telephone: 4007788929

Website: <http://www.solidotech.com/en>

Table of Contents

1 Product Features.....	1
2 Designation Rule	2
2.1 List of common products.....	2
2.2 Designation rules.....	4
3 Product Parameters.....	5
3.1 General parameters.....	5
3.2 Digital parameters	6
3.3 Analog parameters.....	7
3.3.1 Technical parameters.....	7
3.3.2 Voltage I/O range selection and code value table	8
3.3.3 Current I/O range selection and code value table	12
4 Panel	15
5 Installation and Disassembly.....	17
5.1 Dimensions.....	18
5.2 Installation and disassembly.....	19
6 Wiring	21
6.1 Wiring terminal.....	21
6.2 Wiring instructions and requirements.....	21
6.3 Wiring diagrams	24
PN4-3200A	24
PN4-3200B	24
PN4-1616A	25
PN4-1616B	25
PN4-0032A	26
PN4-0032B	26
PN4-1600A	27
PN4-1600B	27
PN4-0016A	28
PN4-0016B	28
PN4-2408A	29

PN4-2408B	29
PN4-0824A	30
PN4-0824B	30
PN4-0808A	31
PN4-0808B	31
PN4-A80V/PN4-A80I.....	32
PN4-A40V/PN4-A40I.....	32
PN4-A08V	33
PN4-A04V	33
PN4-A08I.....	34
PN4-A04I.....	34
PN4-1612J.....	35
PN4-0012J.....	35
6.4 Common terminal expansion module wiring diagrams	36
7 Operation.....	38
7.1 Parameters and functional configuration.....	38
7.1.1 Digital input filtering time	38
7.1.2 Analog filtering parameter configuration function	38
7.1.3 Output clearing/holding function.....	40
7.1.4 Analog range selection	41
7.2 Module configuration description	42
7.2.1 Application in TIA Portal V14 software environment.....	42
7.2.2 Application in STEP 7-MicroWIN SMART software environment	52
8 FAQ	60
8.1 The device cannot be found in the software	60
8.2 The device cannot enter the online state	60
8.3 Unable to load when downloading to the device	60

1 Product Features

PN4 series integrated I/O modules equipped with PROFINET protocol, feature small footprint, fast speed, quick wiring, pluggable terminals, and simple configuration. They provide users with a range of options for high-speed data collection, optimal system configuration, simple on-site wiring, and improved system reliability.



- Small footprint
Compact structure and small footprint, only measuring 102 mm × 72 mm × 25 mm
- High speed
100 GB industrial Ethernet
- Diversified product lines
A rich variety of I/O modules including digital, analog, temperature, and other modules that can be integrated to meet demand of different application scenarios.
- Easy diagnosis
An innovative channel indicator design is adopted. As the indicators are placed close to the channels, channel status is displayed intuitively and clearly, facilitating detection and main
- Easy configuration
The modules are easy to configure, and support all mainstream PROFINET master stations
- Easy installation
Installation on standard DIN 35 mm rails
Elastic terminal blocks are used for convenient and fast wiring

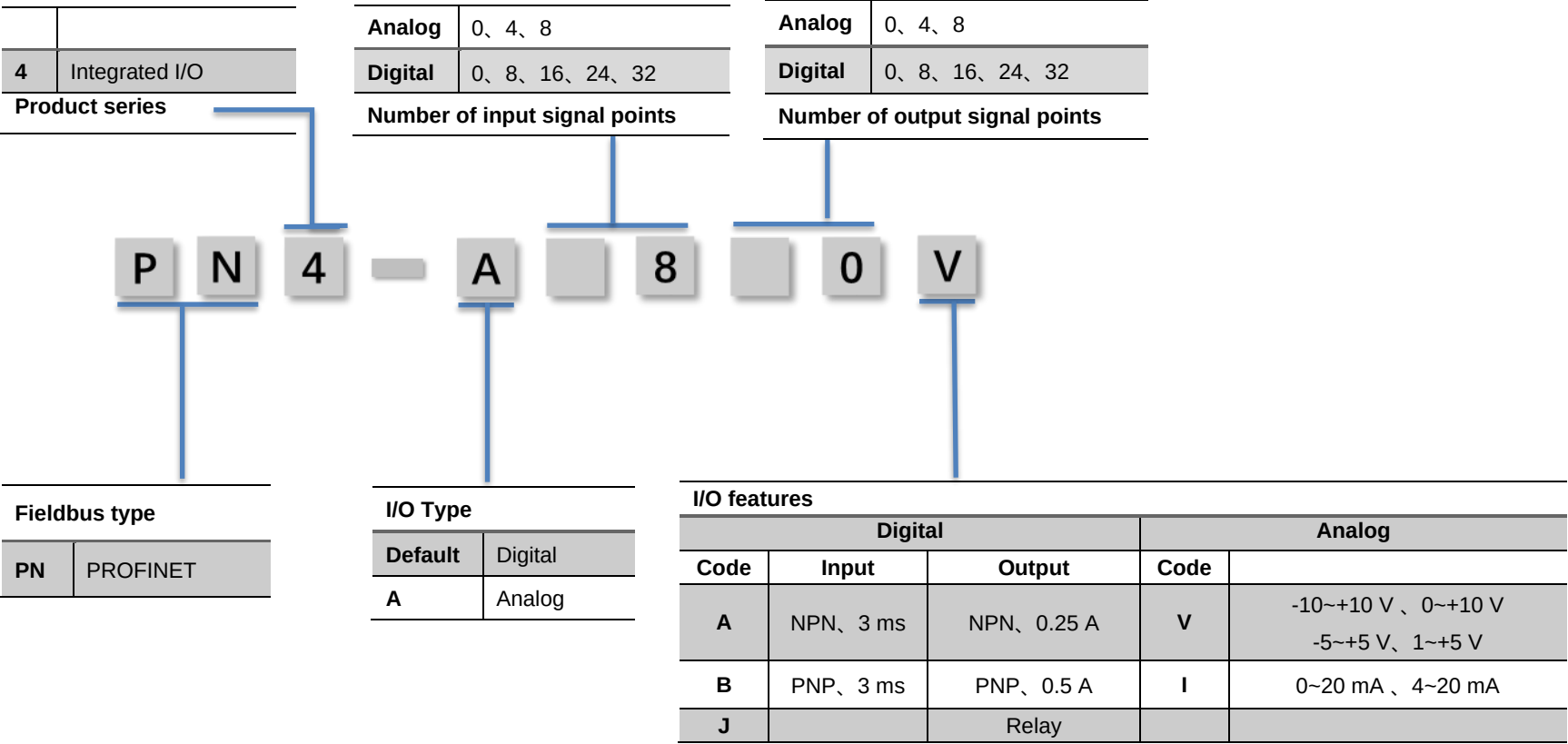
2 Designation Rule

2.1 List of common products

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 I/O module, NPN type
PN4-1616B	16-channel digital I/O 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 I/O module, NPN type
PN4-0808B	8-channel digital I/O 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 (NPN/PNP type), 12-channel relay output module

Model	Product description	
PN4-A80V	8-channel analog input module	Optional ranges: -10~+10 V 、 0~+10 V -5~+5 V、 1~+5 V
PN4-A40V	4-channel analog input module	
PN4-A08V	8-channel analog output module	
PN4-A04V	4-channel analog output module	
PN4-A80I	8-channel analog input module	Optional ranges: 0~20 mA 、 4~20 mA
PN4-A40I	4-channel analog input module	
PN4-A08I	8-channel analog output module	
PN4-A04I	4-channel analog output module	
PN4-C10_4	Common terminal extended module	

2.2 Designation rules



3 Product Parameters

3.1 General parameters

Interface parameters	
Bus protocol	PROFINET IO
Number of I/O stations	Depending on master station configuration
Data Transfer medium	Ethernet/EtherCAT CAT5 cable
Transfer distance	≤100 m (distance between stations)
Transfer rate	100 Mbps
Bus interface	2×RJ45
Technical parameters	
Configuration method	Via master station
Power supply	18~36V DC
Electrical isolation	500 V
Weight	About 130 g
Dimensions	102 mm×72 mm×25 mm
Working temperature	-10~+60℃
Storage temperature	-20~+75℃
Relative humidity	95%, non-condensing
Protection degree	IP20

3.2 Digital parameters

Type		
Input	Nominal voltage	24 VDC (±25%)
	Number of inputs	8、16、24、32
	Signal type	NPN/ PNP
	“0” signal voltage (PNP)	-3~+3 V
	“1” signal voltage (PNP)	15~30 V
	“0” signal voltage (NPN)	15~30 V
	“1” signal voltage (NPN)	-3~+3 V
	Input filter	3 ms
	Input current	4 mA
	Isolation method	Optically-coupled isolation
	Electrical isolation	500 V
	Channel indicator	Green LED
Transistor output	Nominal voltage	24 VDC (±25%)
	Number of outputs	8、16、24、32
	Signal type	NPN/PNP
	Load type	Ohmic, inductive load
	Single-channel rated current	NPN type Max: 250 mA PNP type Max: 500 mA
	Port protection	Overvoltage and overcurrent protection
	Isolation method	Optically-coupled isolation
	Electrical isolation	500 V
	Channel indicator	Green LED
Relay output	Nominal voltage	24 VDC (±25%)
	Number of outputs	12
	Isolation method	Optically-coupled, relay
	Rated load	Single port: 4 A Common port: 8 A Whole module: 16 A
	Common terminal wiring method	4 points/1 common terminal
	Channel indicator	Green LED

3.3 Analog parameters

3.3.1 Technical parameters

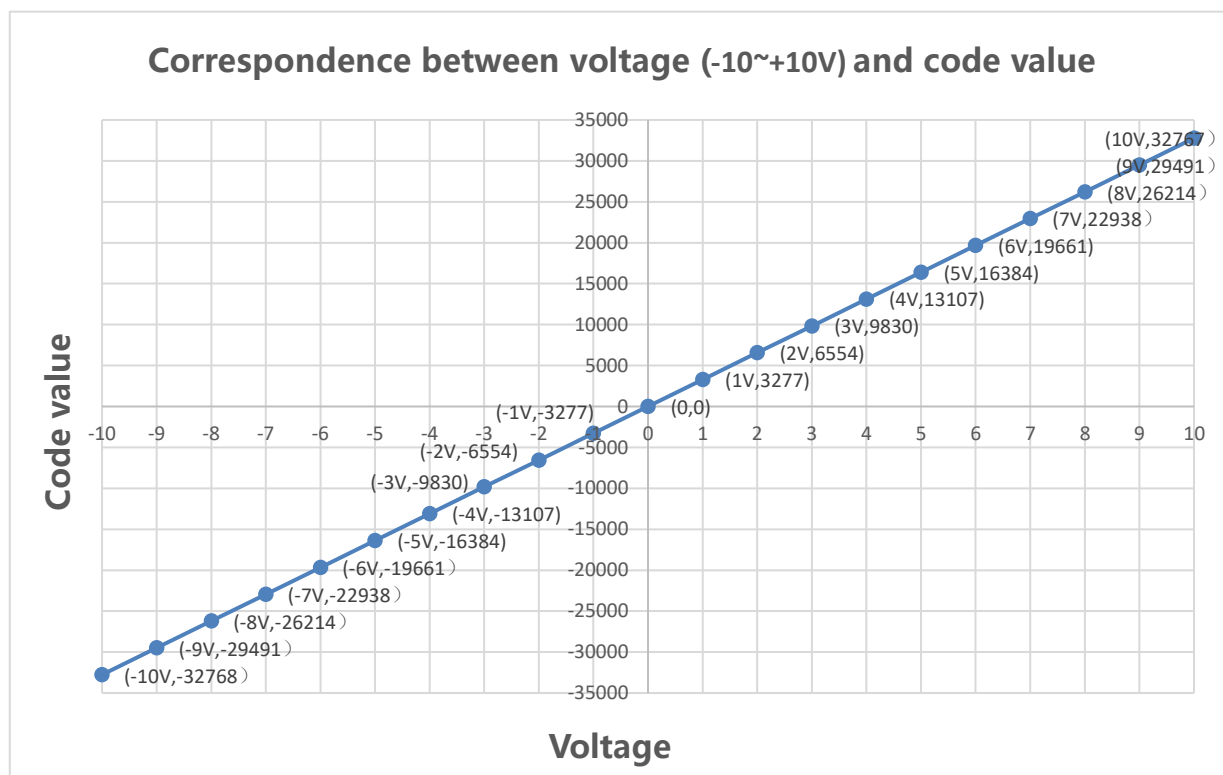
Type		
Input	Number of inputs	4、8
	Input signal (voltage type)	0: -10~+10 V (-32768~32767) 1: 0~+10 V (0~65535) 2: -10~+10 V (-27648~27648) 3: 0~+10 V (0~27648) 4: -5~+5 V (-27648~27648) 5: 1~+5 V (0~27648)
	input signal (current type)	0: 4~20 mA (0~65535) 1: 0~20 mA (0~65535) 2: 4~20 mA (0~27648) 3: 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
	Electrical isolation	500 V
	Channel indicator	Green LED
Output	Number of outputs	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~+5 V (-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
	Electrical isolation	500 V
	Channel indicator	Green LED

3.3.2 Voltage I/O range selection and code value table

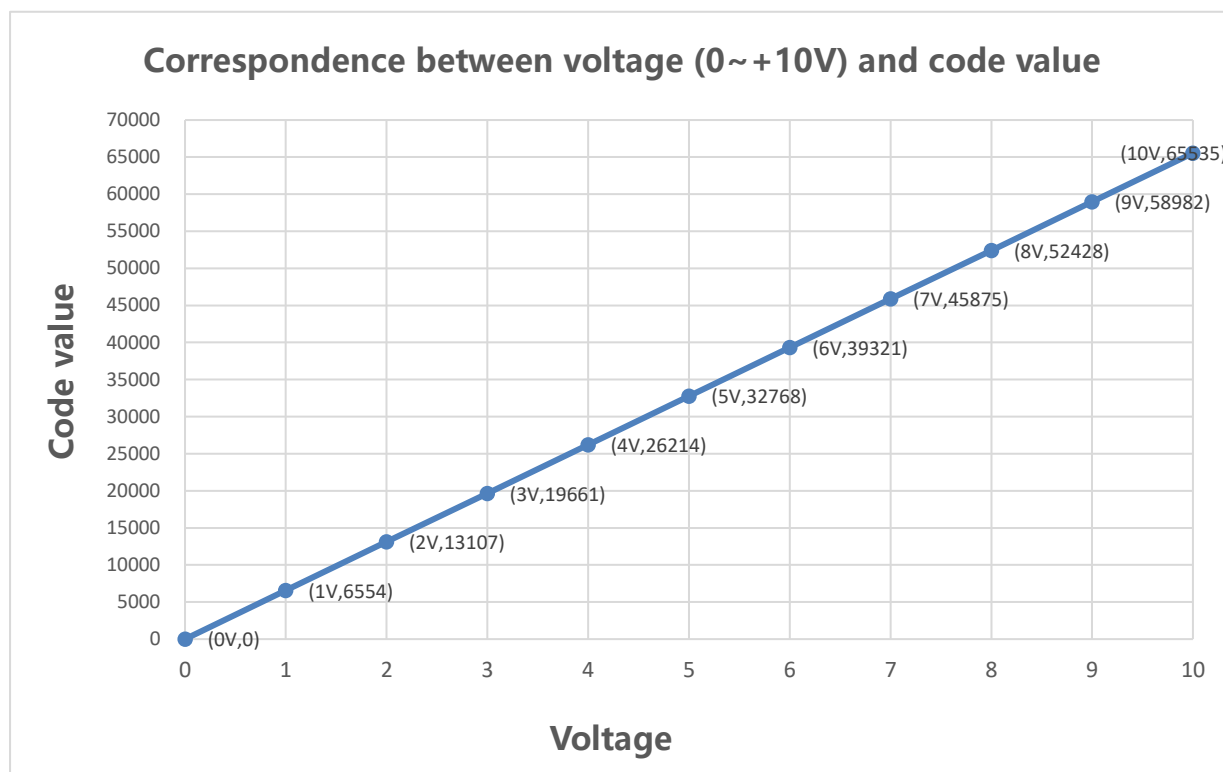
Voltage I/O range selection and cold value range 1			
Range selection	0	1	2
Range	-10 ~+10 V	0~+10 V	-10 ~+10 V
Code value range	-32768~32767	0~65535	-27648~27648
Voltage input formula	$D=(65535/20)*U$	$D=(65535/10)*U$	$D=(55296/20)*U$
Voltage output formula	$U=(D*20)/65535$	$U=(D*10)/65535$	$U=(D*10)/55296$
Code value table	Table①	Table②	Table③

Note: D: code value; U: voltage

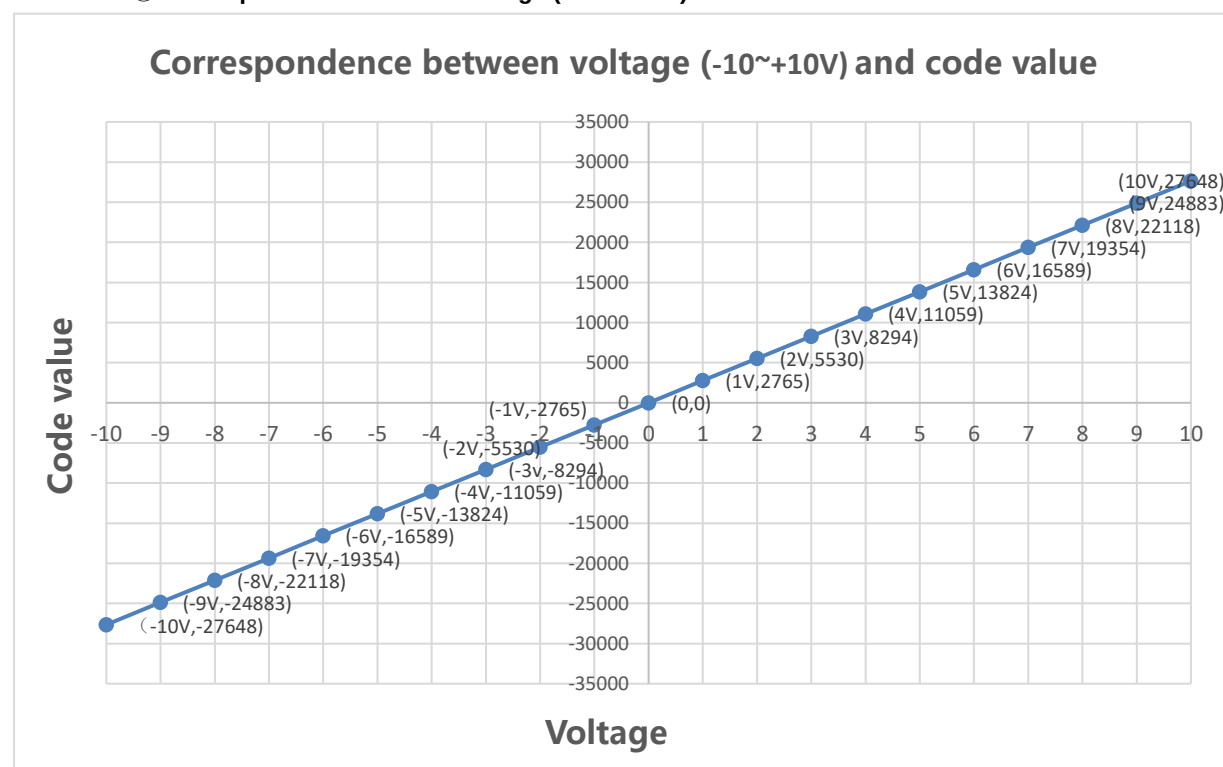
● Table ① Correspondence between voltage (-10 ~+10 V) and code value



● **Table ② Correspondence between voltage (0 ~+10 V) and code value**

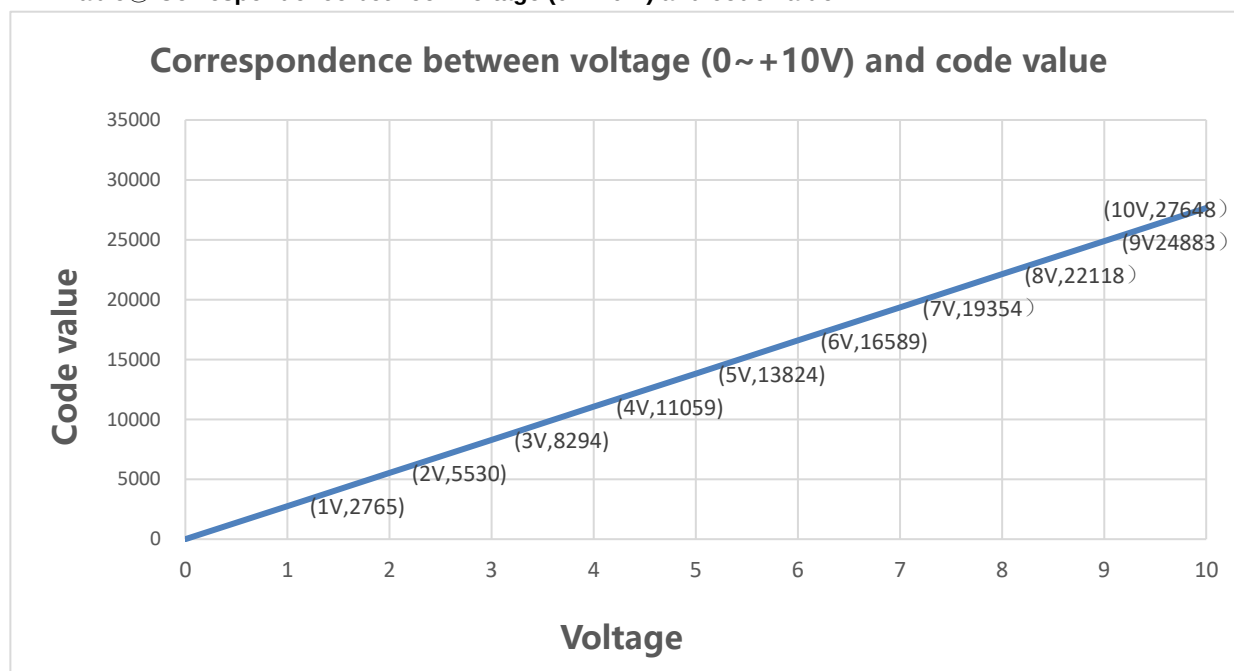


● **Table③ Correspondence between voltage (-10 ~+10 V) and code value**

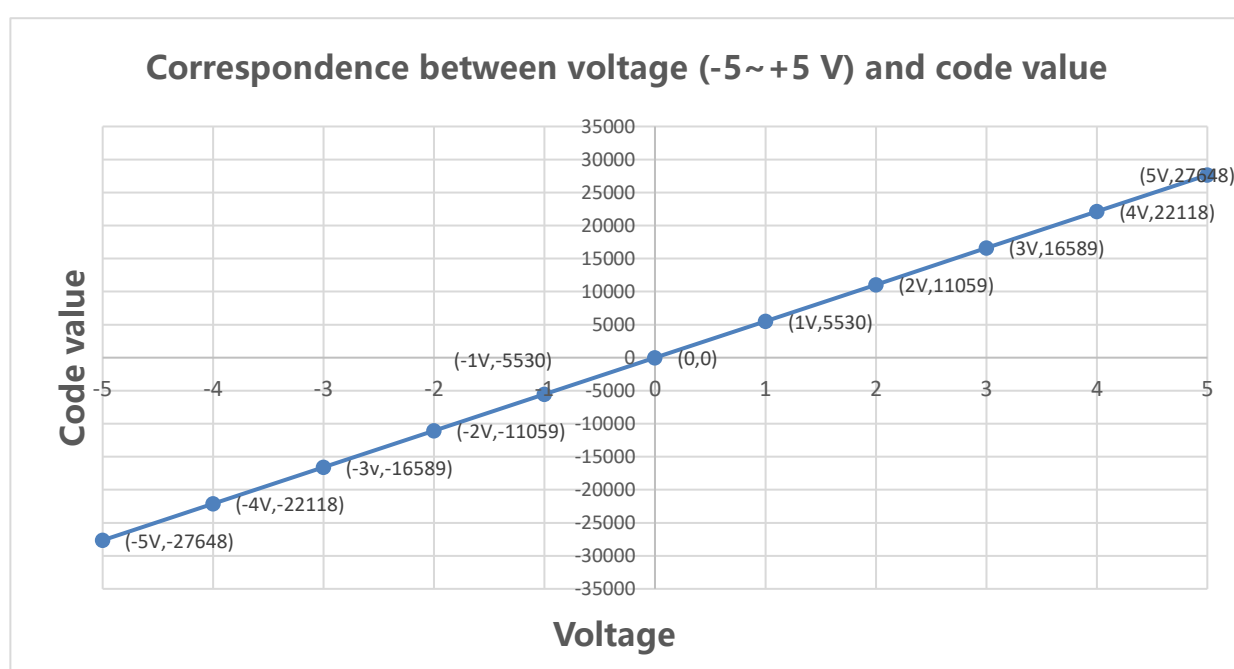


Voltage I/O range selection and cold value range 2			
Range selection	3	4	5
Range	0~+10 V	-5~+5 V	1 ~+5 V
Code value range	0~27648	-27648~27648	0~27648
Voltage input formula	$D=(27648/10)*U$	$D=(55296/10)*U$	$D=(27648/4)*U-6912$
Voltage output formula	$U=(D*10)/27648$	$U=(D*10)/55296$	$U=(D+6912)*4/27648$
Code value table	Table④	Table⑤	Table⑥

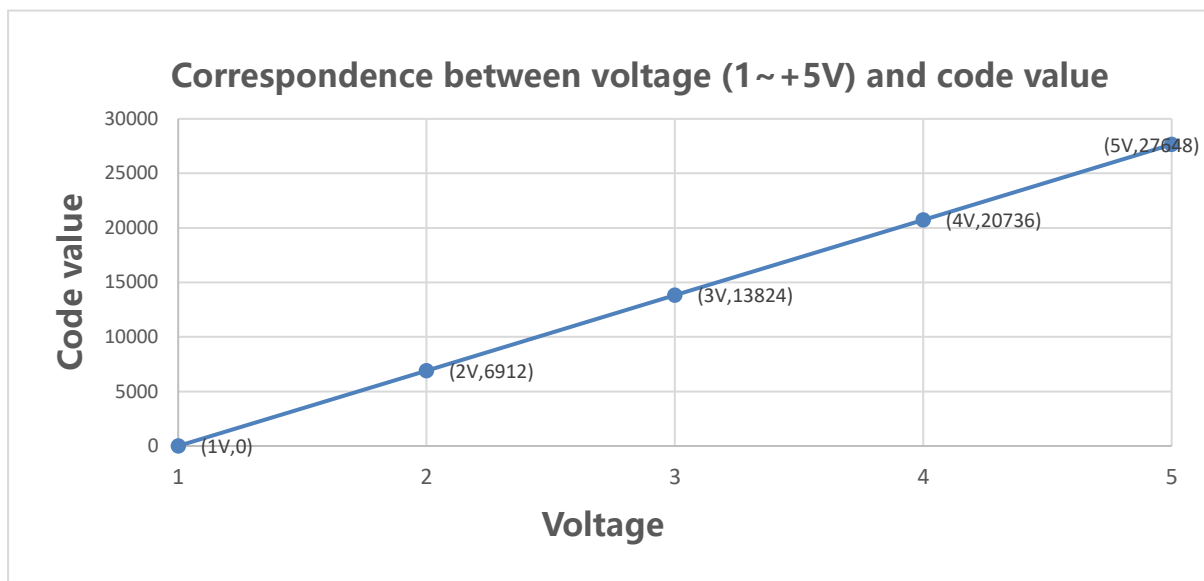
● **Table④ Correspondence between voltage (0~+10 V) and code value**



● **Table⑤ Correspondence between voltage (-5~+5 V) and code value**



● **Table⑥ Correspondence between voltage (1~+5 V) and code value**

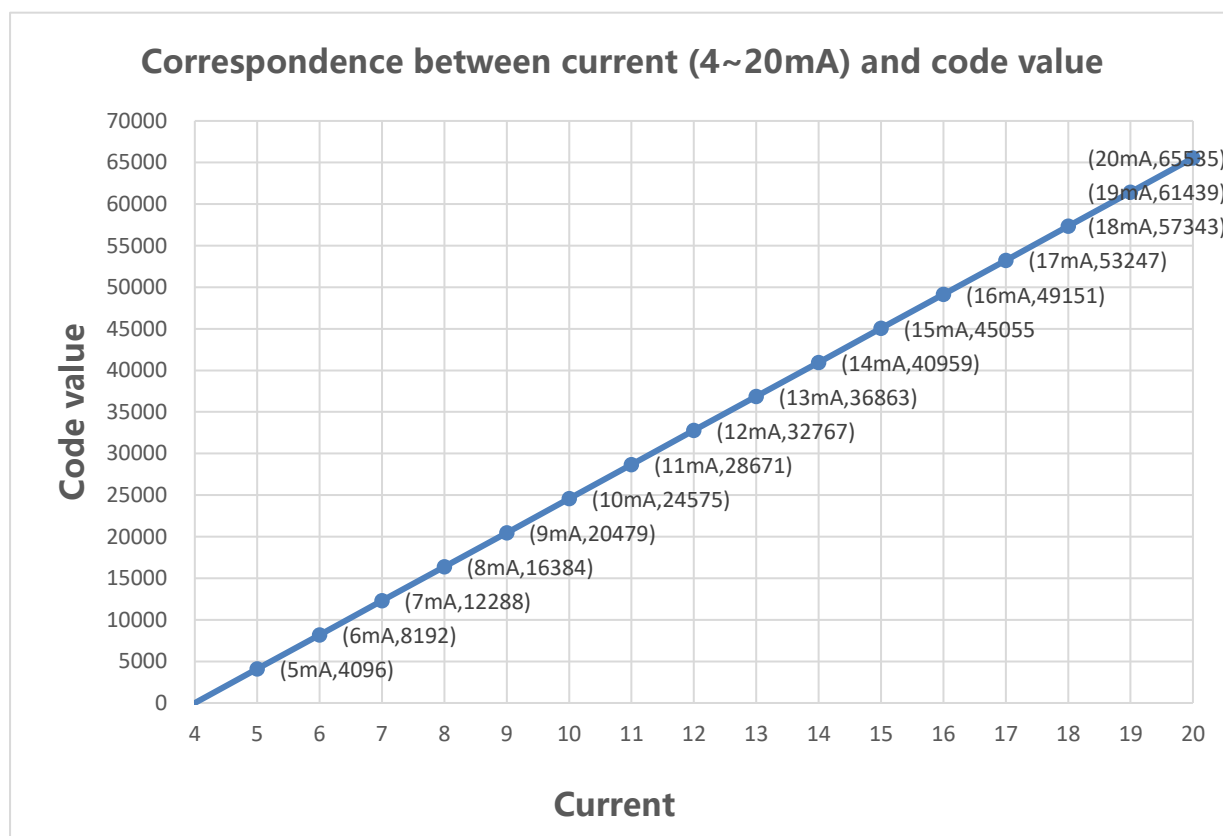


3.3.3 Current I/O range selection and code value table

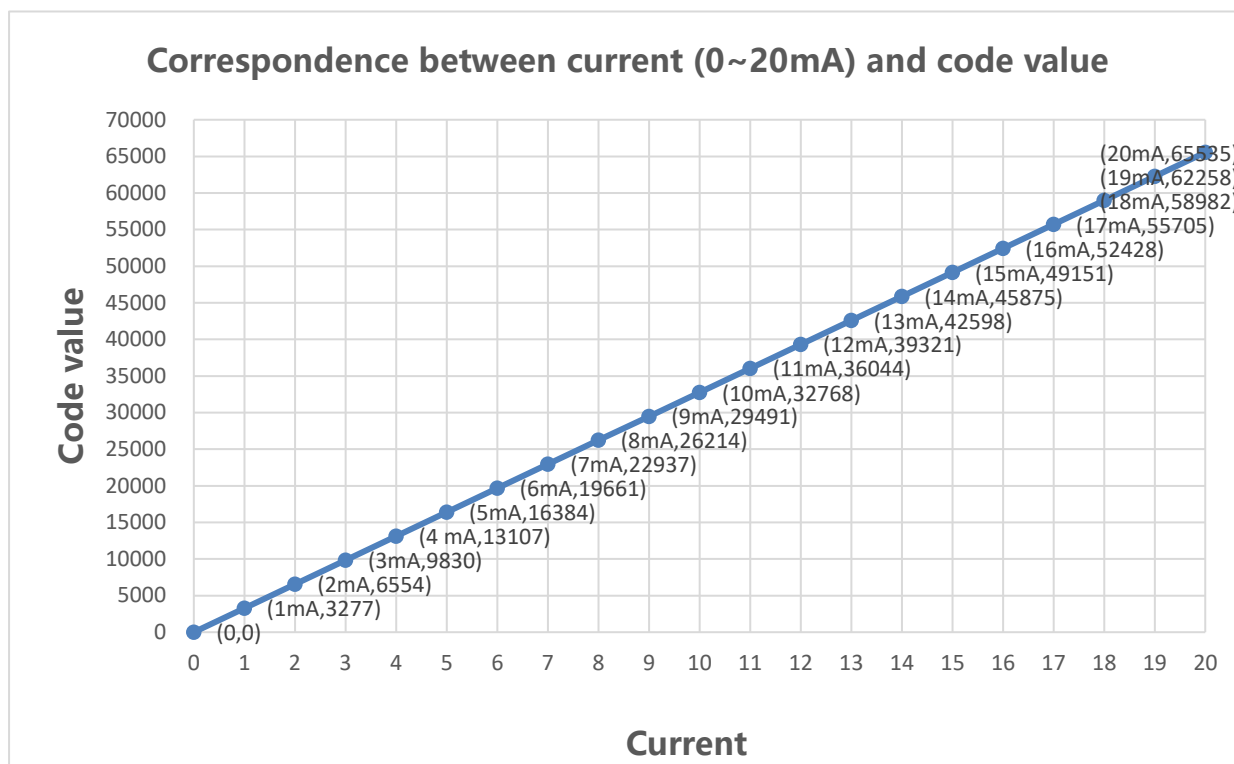
Current I/O range selection and code value range				
Range selection	0	1	3	4
Range	4~20 mA	0~20 mA	4~20 mA	0~20 mA
Code value range	0~65535	0~65535	0~27648	0~27648
Current input formula	$D=(65535/16)*I-16384$	$D=(65535/20)*I$	$D=(27648/16)*I-6912$	$D=(27648/20)*I$
Current output formula	$I=(D+16384)*16/65535$	$I=(D*20)/65535$	$I=(D+6912)*16/27648$	$I=(D*20)/27648$
Code value table	Table⑦	Table⑧	Table⑨	Table⑩

Note: D: Code value; I: current

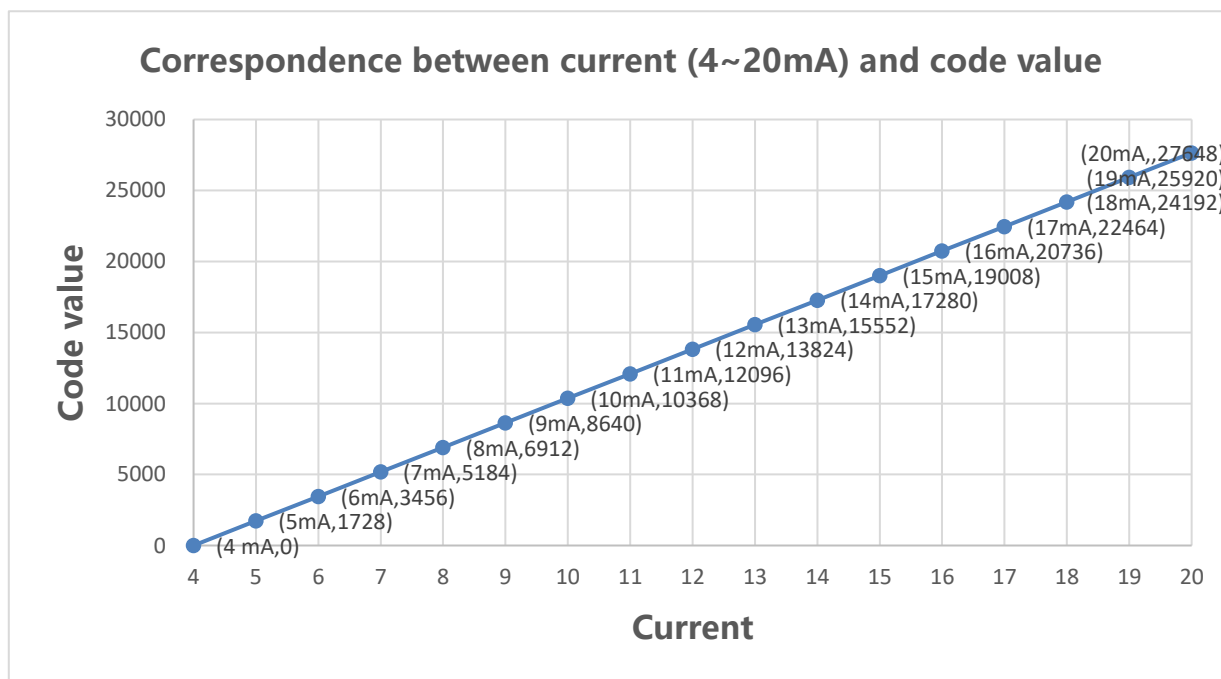
- Table⑦ Correspondence between current (4~20 mA) and code value



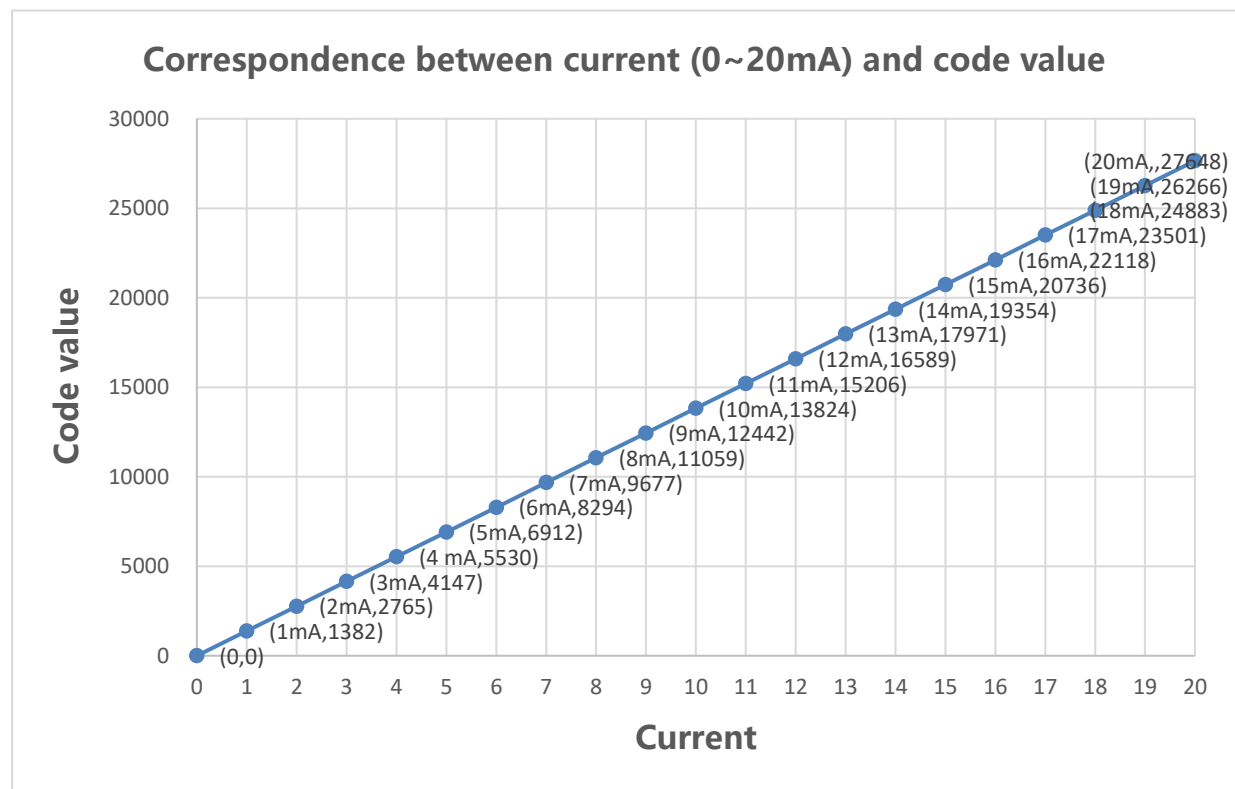
● **Table⑧ Correspondence between current (0~20 mA) and code value**



● **Table⑨ Correspondence between current (4~20 mA) and code value**



● **Table⑩ Correspondence between current (0~20 mA) and code value**



4 Panel

Name of different module parts and functional description



Number	Name	Description
①	Power interface	3P terminal
②	Bus interface	2×RJ45
③	System ID	SF
④	Fieldbus communication ID	BF
⑤	Power ID	PWR

⑥	Operation ID	RDY
⑦	Guide rail slot	Fixed modules
⑧	Product Tags	Tagging module model, type, MAC address and other information
⑨	Channel indicator	Signal status of corresponding channel
⑩	Network port indicator	Link and data transmission status
⑪	System indicator	SF、BF、PWR、RDY indicator
⑫	Type ID	Module model and bus type identification
⑬	Signal ID	Signal type identification
⑭	Channel ID	Position identification of corresponding channel
⑮	Channel interface	20P terminal

Indicator description

PWR	Green	ON	Normal status of working power supply
		OFF	Unpowered or abnormal power supply
RDY	Green	ON	Normal status of system operation
		OFF	Abnormal status of system operation
SF	Red	OFF	Normal status of Modules Operation
		Flashing	1Hz: Analog module double machine communication abnormal
		ON	Abnormal status of Modules Operation
BF	Red	OFF	Normal network connection
		Flashing	Abnormal network connection
Network Port 1	Green	ON	Network connection established
		OFF	Absent or abnormal network connection
	Yellow	Flashing	Connection established with data interaction
		OFF	Absent or abnormal network connection
Network Port 2	Green	ON	Network connection established
		OFF	Absent or abnormal network connection
	Yellow	Flashing	Connection established with data interaction
		OFF	Absent or abnormal network connection
Input Indication	Green	ON	Presence of signal input in module channel
		OFF	Absence of signal input in module channel or abnormal signal input
Output Indication	Green	ON	Presence of signal output in module channel
		OFF	Absence of signal output in module channel or abnormal signal output

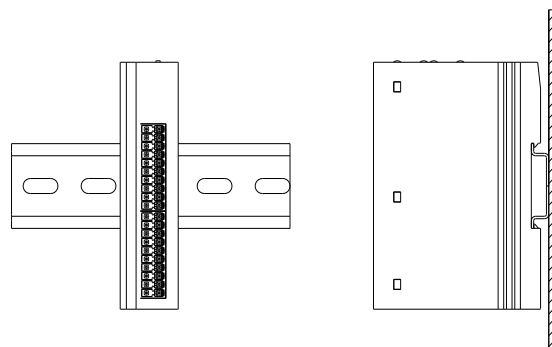
5 Installation and Disassembly

Installation/disassembly precautions

- Ensure that the cabinet is well ventilated (e.g., equipped with a fan).
- Do not install this equipment near or above any equipment that may cause overheating.
- Make sure to install modules vertically and maintain adequate clearance between the modules and nearby devices.
- Installation/disassembly operation may only be carried out after the power supply is cut off.

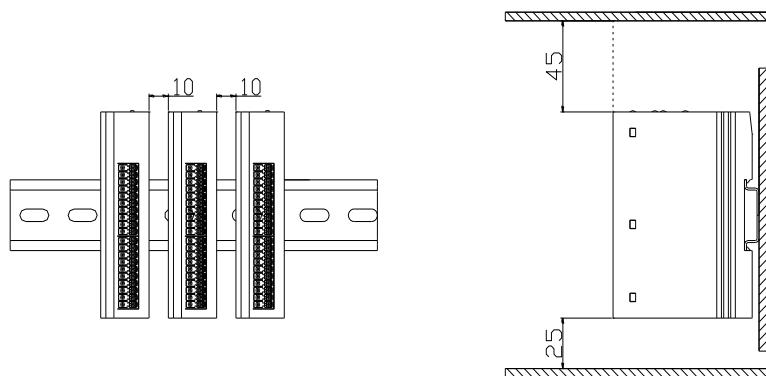
Installation direction

- In order to maintain normal heat dissipation of the modules, make sure to install them vertically to ensure smooth airflow inside them.



Minimum clearance

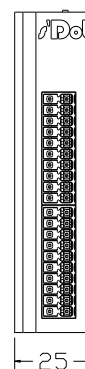
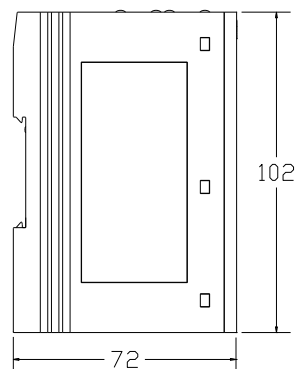
The protection degree of the modules is IP20, and they need to be installed inside boxes or cabinets. During installation, please follow the minimum distances (unit: mm) shown in the following figures between modules and those between modules and heating devices, other devices, or wiring slots.



5.1 Dimensions

Dimensions

Installation method

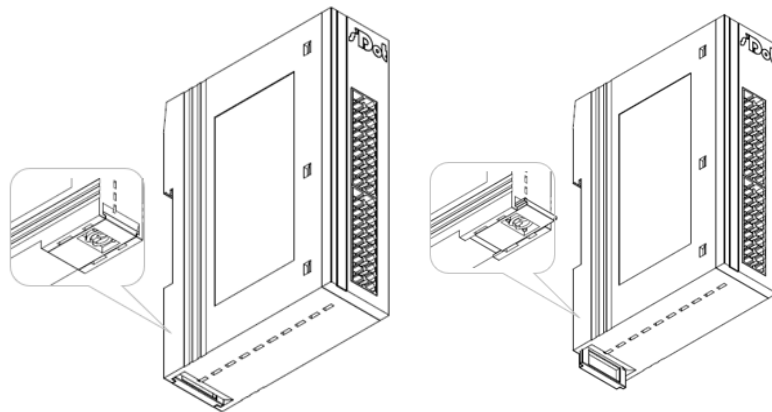


Snap-fitting installation on a standard DIN 35 mm guide rail

***Note: Standard DIN guide rails are 35*7.5*1.0 and 35*15*1.0 in size.**

5.2 Installation and disassembly

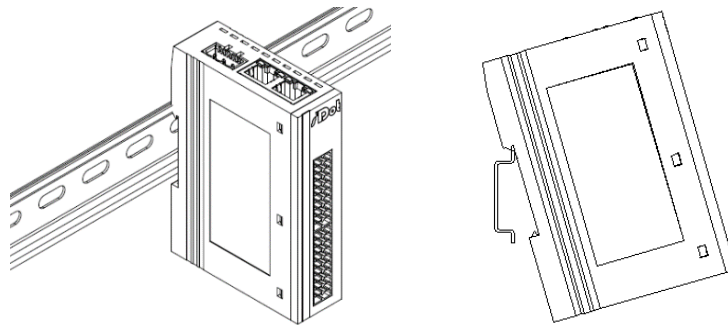
Installation



①

②

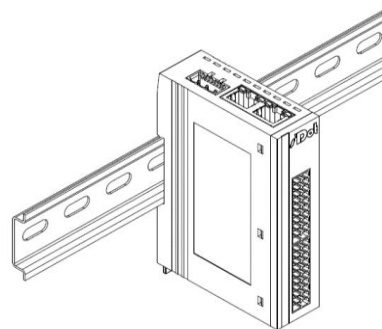
Push the fastener at the bottom of the module outward as shown in Figure ① until it reaches the position shown in Figure ② and a sound is heard.



③

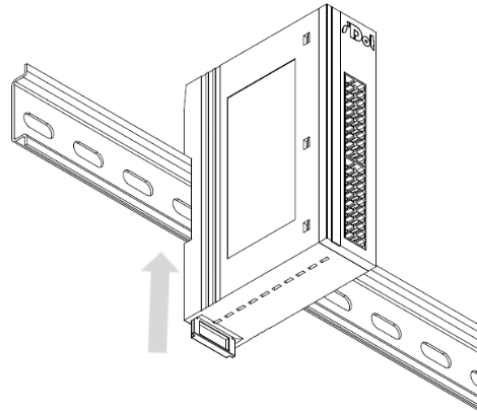
④

Align the upper edge of the module fastener with the upper edge of the guide rail, and place the module into the guide rail, as shown in Figures ③ and ④.



⑤

The module is placed as shown in Figure ⑤.

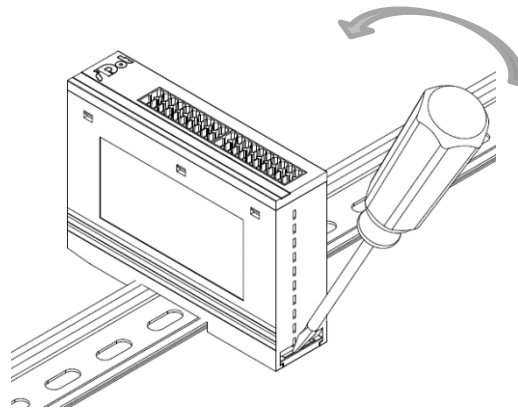


⑥

Push the fastener towards the guide rail until a sound is heard. The module installation is now completed, as shown in Figure ⑥.

Disassembly

With a flat head screwdriver



⑦

Insert the flat head screwdriver into the fastener and apply force towards the module (until a sound is heard) as shown in Figure ⑦.

Disassemble the module in the reverse order of installation steps.

6 Wiring

6.1 Wiring terminal

Wiring terminal		
Signal wire terminal	Number of poles	20 P
	Wire gauge	28 ~16 AWG 0.2~1.5 mm ²
Power terminal	Number of poles	3 P
	Wire gauge	26~12 AWG 0.5~2.5 mm ²
Bus interface	2×RJ45	Ethernet/EtherCAT CAT5 cable

6.2 Wiring instructions and requirements



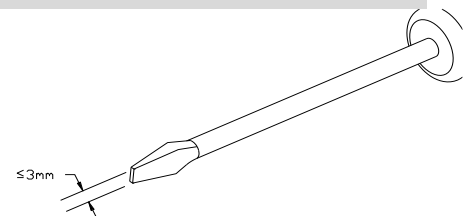
Power wiring precautions

- The power supply on the module system side and that on the field side should be wired separately. Mixing should be avoided.
- PE should be grounded reliably.

● Tool and wiring requirements

Wiring tool requirement

As the terminals are based on a screw-free design, cable installation and removal can be realized with a slotted screwdriver (size: ≤ 3 mm).



Stripping length requirement

Recommended stripping length: 10 mm



Wiring method

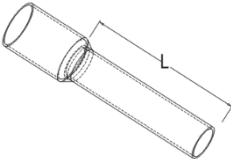
For a single-strand hard wire, after stripping a required length, press the button while inserting the wire into the terminal.



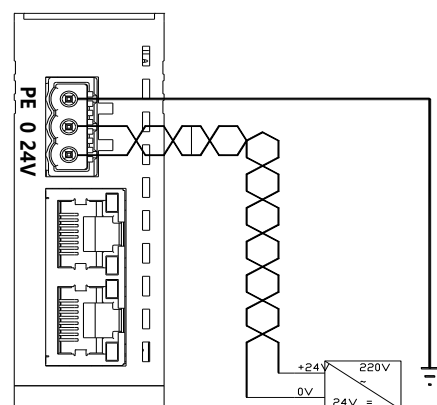
For a multi-strand flexible wire, after stripping a required length, use a compatible cold-pressed terminal (tubular insulated terminal, as shown in the table below). Press the button while inserting the wire.



Specification of tubular insulated terminal

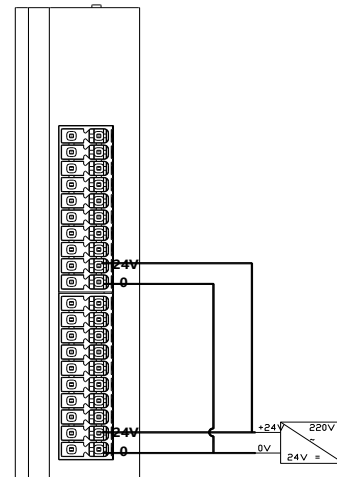
Specification	Model	Cable section area (mm ²)
 Length of tubular insulated terminal L ≥ 10 mm	E0510	0.5
	E7510	0.75
	E7512	
	E1010	1.0
	E1012	
	E1510	1.5
	E1518	

3P terminal of power module

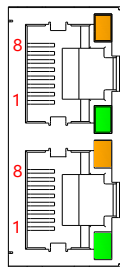


Twisted pair cable is recommended for power supply.

20P terminal on the field side



- **Signal terminal wiring requirement**
 - Press the signal cable into the wiring terminal by referring to the I/O module wiring diagram and wiring method.
- **Bus wiring requirement**
 - Standard RJ45 network interface and standard RJ45 connector are adopted.

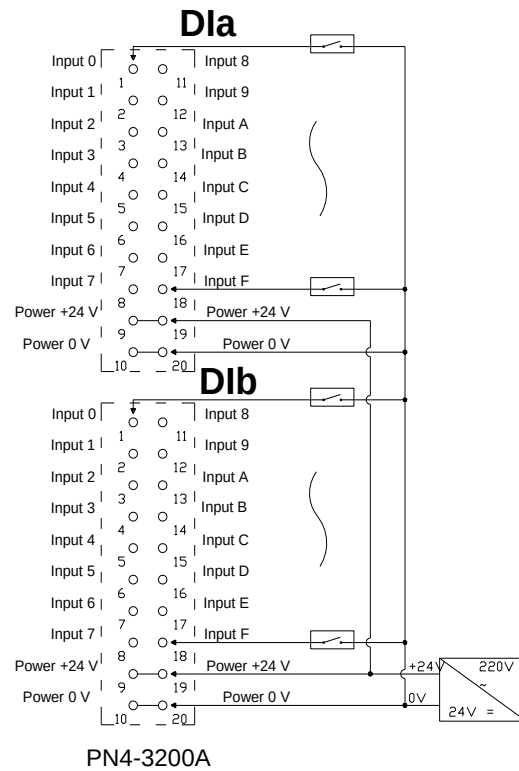


Pin	Signal
1	TD+
2	TD-
3	RD+
4	—
5	—
6	RD-
7	—
8	—

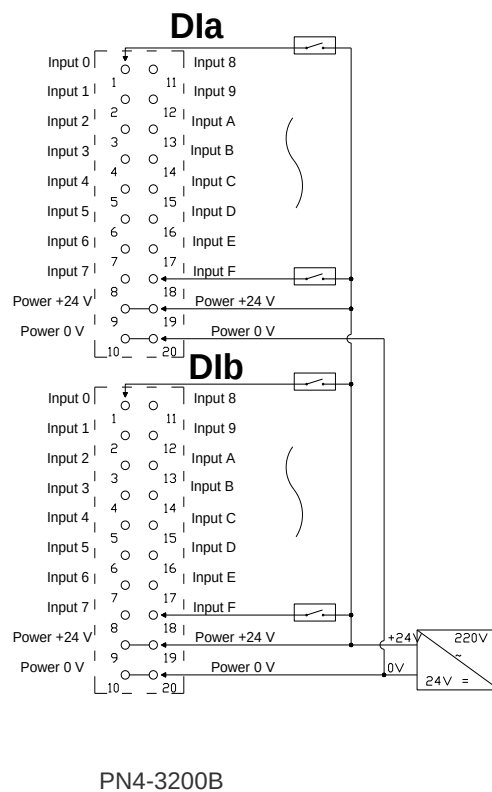
- Category 5 or higher-level double-shielded (braided wire + aluminum foil) STP cable is recommended as communication cable.
- The cable between any two devices should not exceed 100 m.

6.3 Wiring diagrams

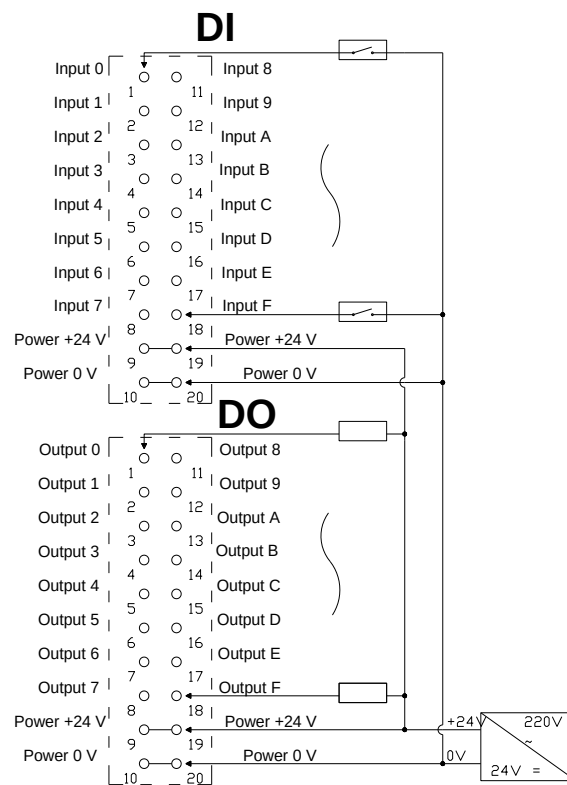
PN4-3200A



PN4-3200B

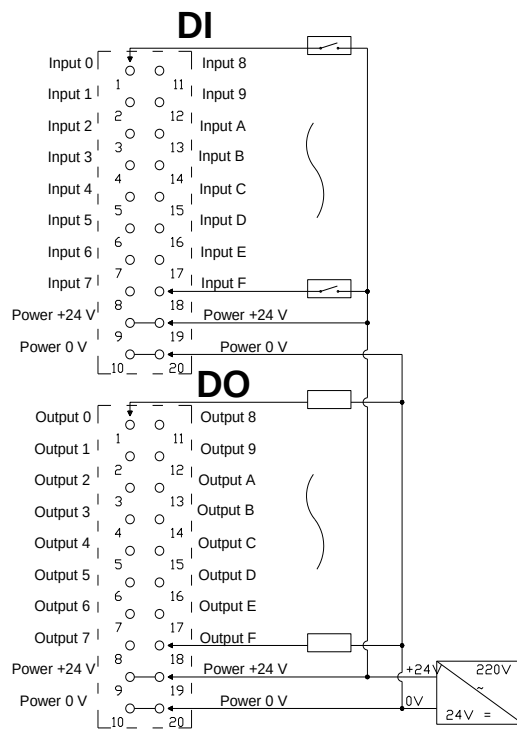


PN4-1616A



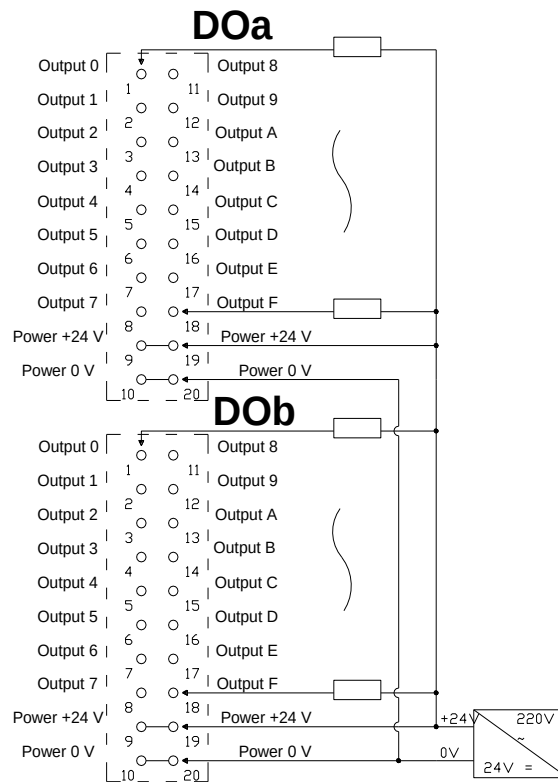
PN4-1616A

PN4-1616B



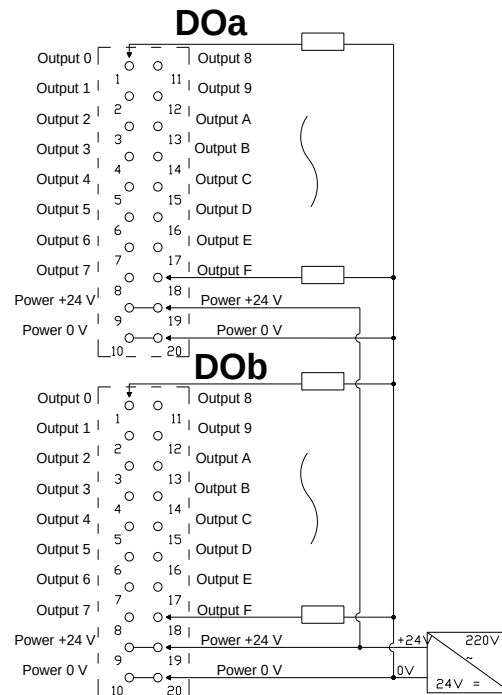
PN4-1616B

PN4-0032A



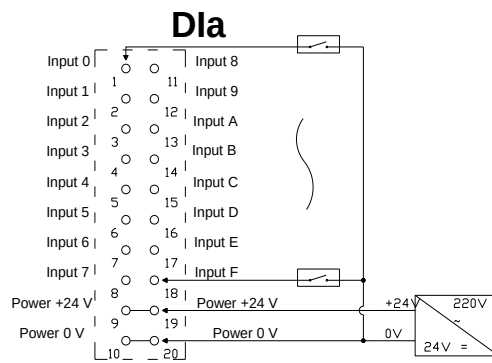
PN4-0032A

PN4-0032B



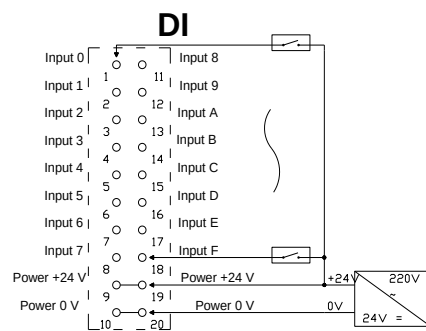
PN4-0032B

PN4-1600A



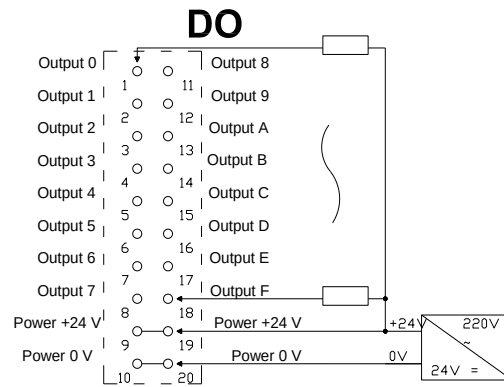
PN4-1600A

PN4-1600B



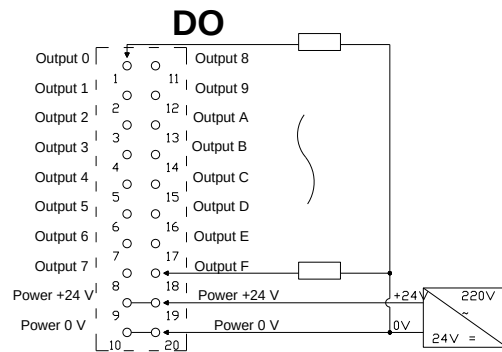
PN4-1600B

PN4-0016A



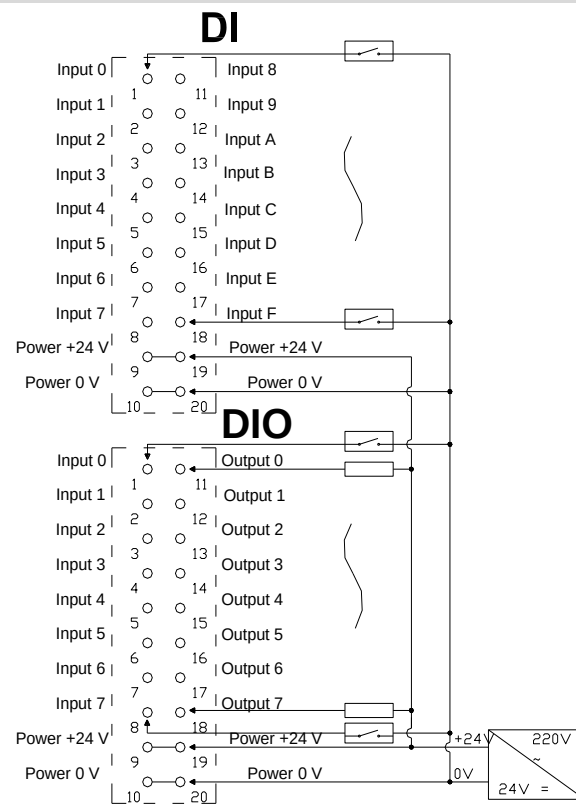
PN4-0016A

PN4-0016B



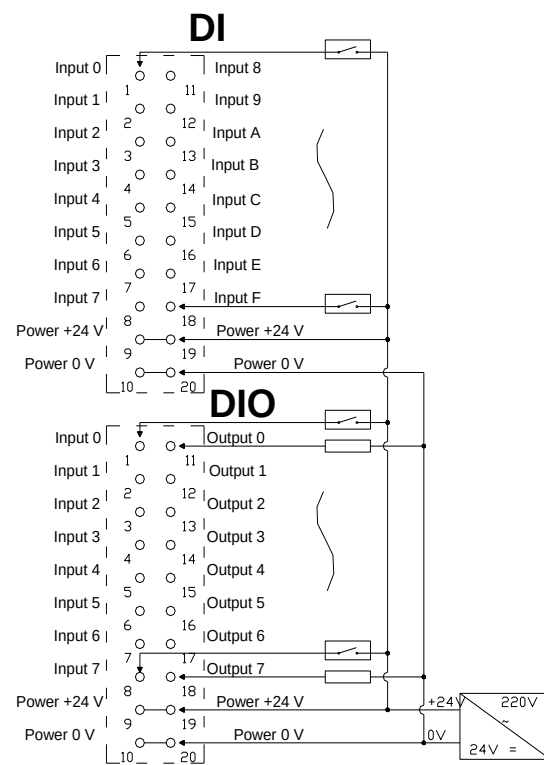
PN4-0016B

PN4-2408A



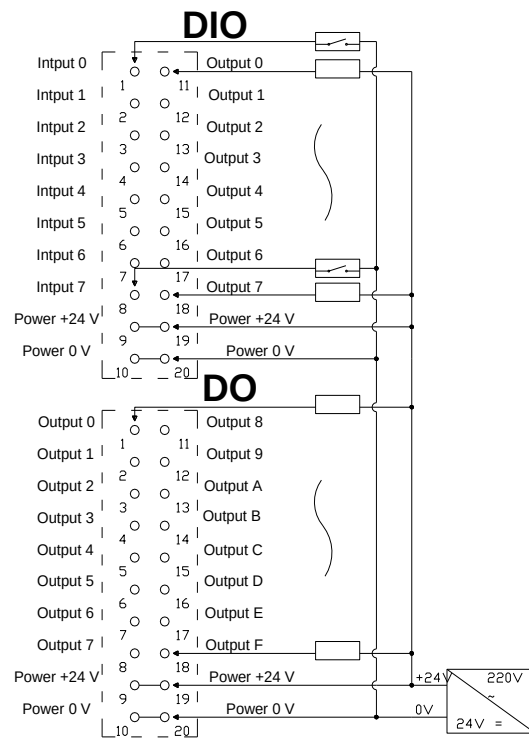
PN4-2408A

PN4-2408B



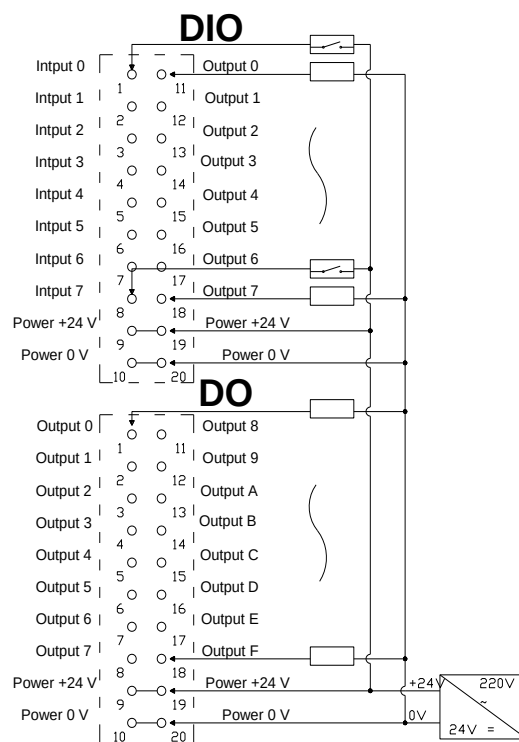
PN4-2408B

PN4-0824A



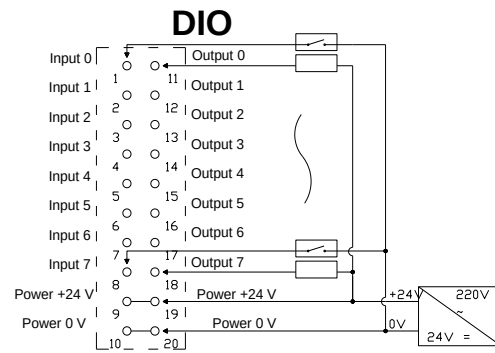
PN4-0824A

PN4-0824B



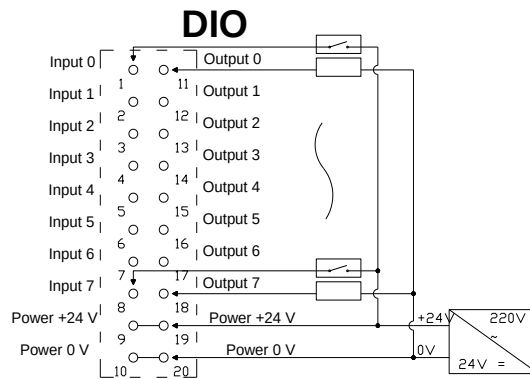
PN4-0824B

PN4-0808A



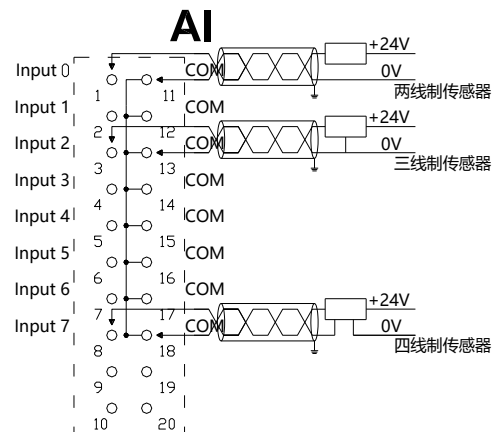
PN4-0808A

PN4-0808B



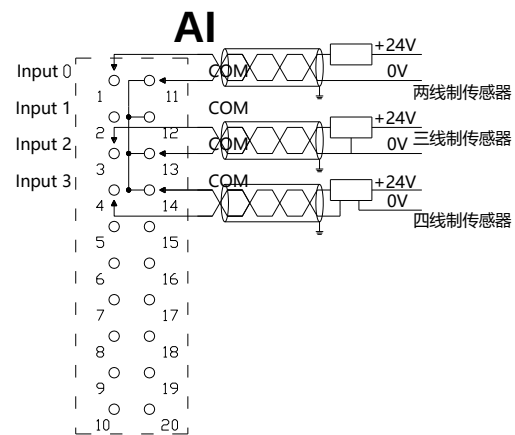
PN4-0808B

PN4-A80V/PN4-A80I



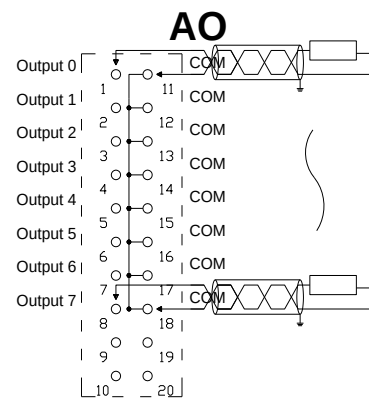
PN4-A80V/PN4-A80I

PN4-A40V/PN4-A40I



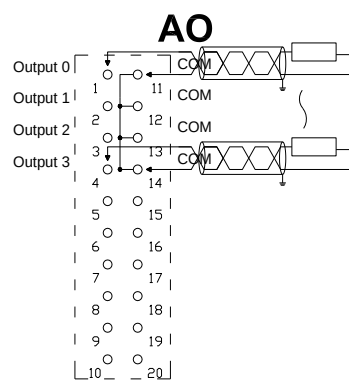
PN4-A40V/PN4-A40I

PN4-A08V



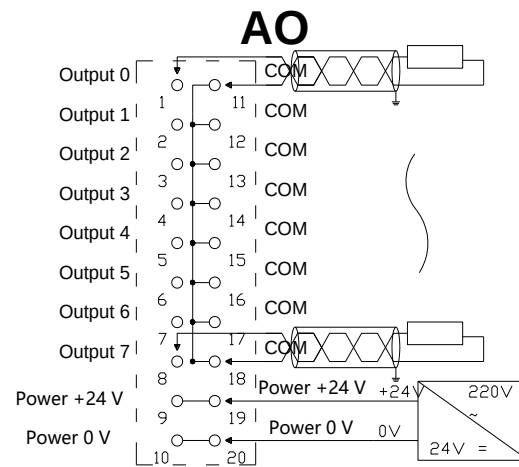
PN4-A08V

PN4-A04V



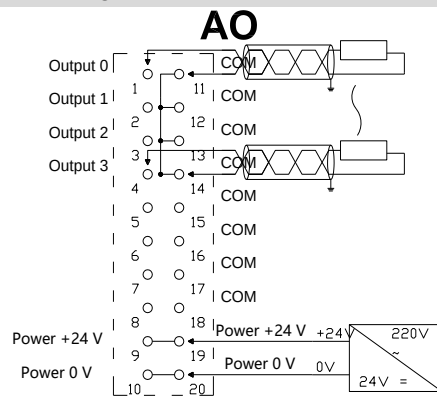
PN4-A04V

PN4-A08I



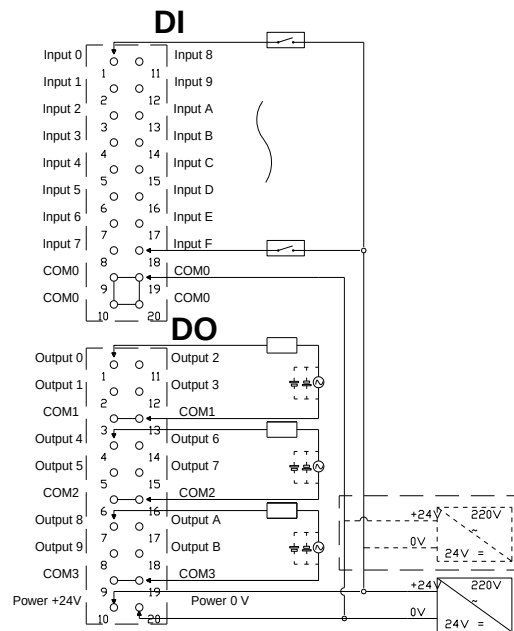
PN4-A08I

PN4-A04I



PN4-A04I

PN4-1612J

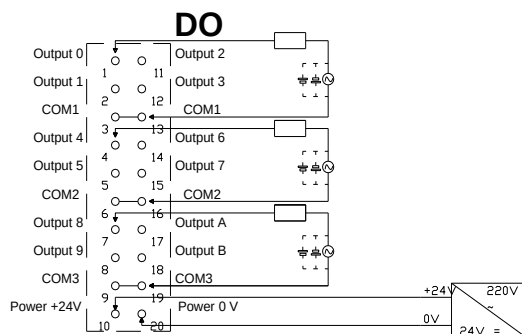


Notes:

1. The input port supports two types of inputs: NPN and PNP, and COM0 is a common port.
2. Outputs 0~3 correspond to the common port com1. Outputs 4~7 correspond to the common port com2. Outputs 8~B correspond to the common port com3.

PN4-1612J

PN4-0012J



Notes:

- Outputs 0~3 correspond to the common port com1.
Outputs 4~7 correspond to the common port com2.
Outputs 8~B correspond to the common port com3.

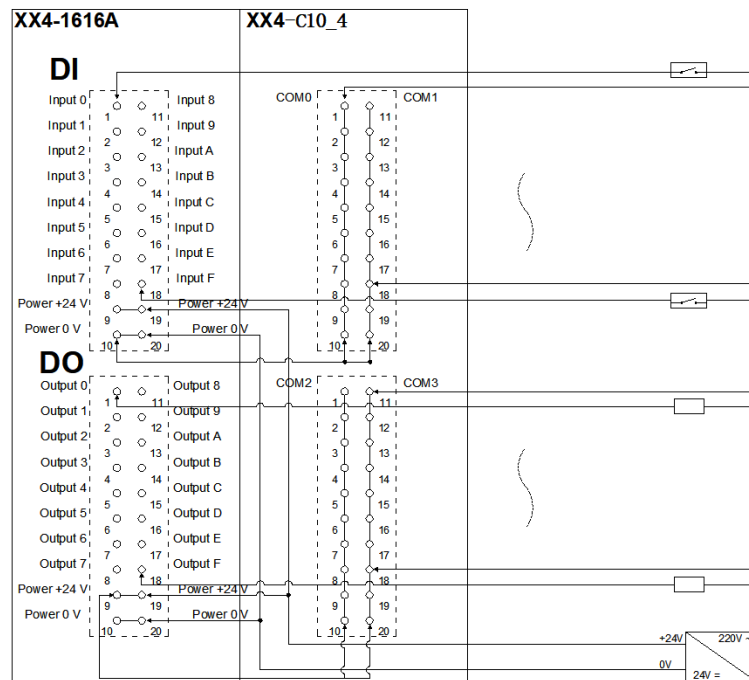
PN4-0012J

6.4 Common terminal expansion module wiring diagrams

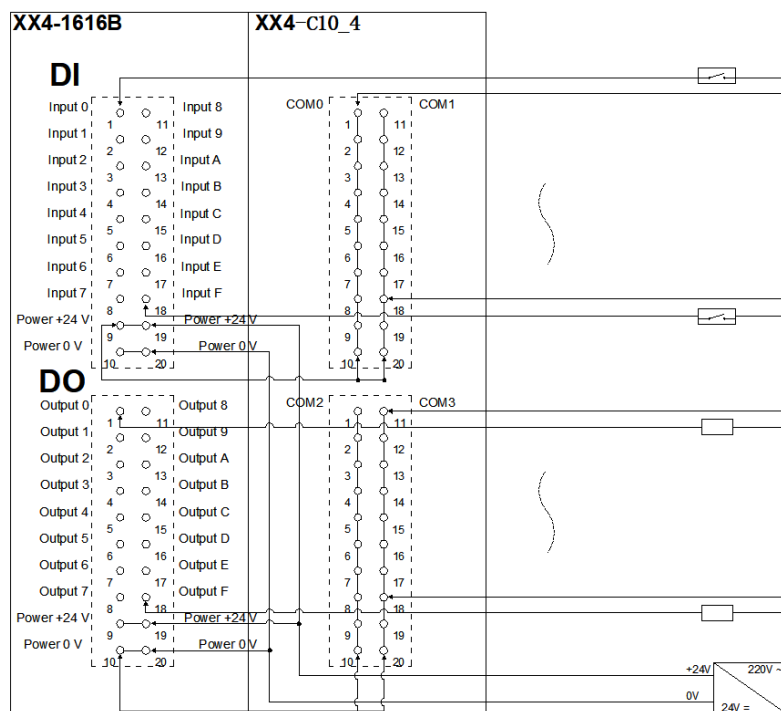
For our PN4 series IO modules, the power supply and common terminals on the field side of the modules can be expanded to facilitate sensor wiring and realize simpler wiring.

The wiring method of two-wire and three-wire sensors is described in this section, taking the two modules of PN4-1616A and PN4-1616B as examples.

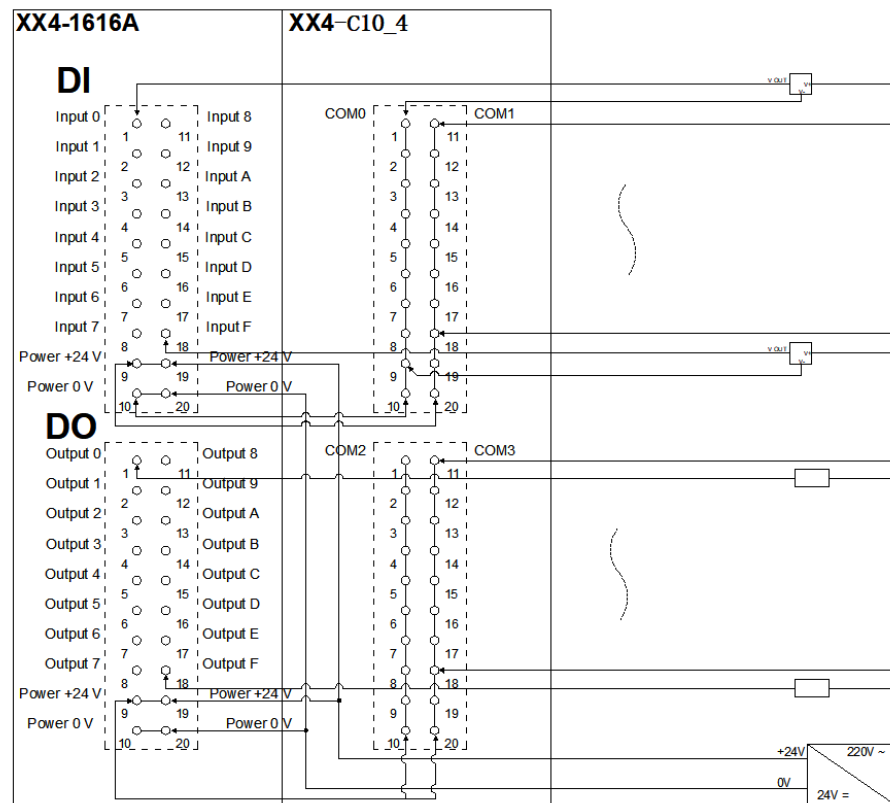
Wiring method of two-wire sensor (NPN type)



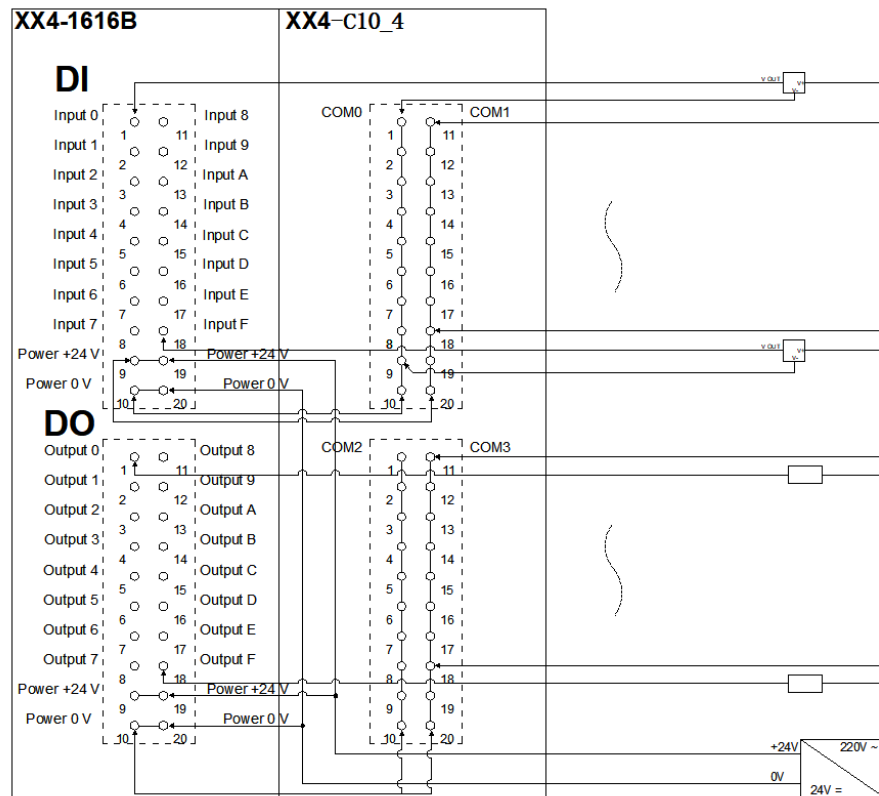
Wiring method of two-wire sensor (PNP type)



Wiring method of three-wire sensor (NPN type)



Wiring method of three-wire sensor (NPN type)



7 Operation

7.1 Parameters and functional configuration

In this manual, TIA Portal V14 software platform and Siemens PLC (model S7-1200) are taken as an example to introduce module parameters, functions, and configuration methods.



○ After the configuration is complete, please re-power the module

7.1.1 Digital input filtering time

Digital input filtering can prevent unexpected rapid changes in program response input signals. Such changes may result from jumping of switch contact or electrical noise. The duration of digital input filtering is currently fixed at 3 ms, and all clutters within 3 ms can be filtered out. Separate channel configuration is not allowed.

The 3 ms input filtering time means that a single signal changing from 0 to 1 or from 1 to 0 can only be detected after 3 ms has lapsed following such change, while a single high pulse or low pulse shorter than 3 ms will not be detected.

7.1.2 Analog filtering parameter configuration function

● Analog input filtering function

The analog input filtering function can average the data internally after A/D conversion to reduce the fluctuation effect on input signals due to noise.

Analog inputs are subject to moving average processing based on the specified A/D conversion times.

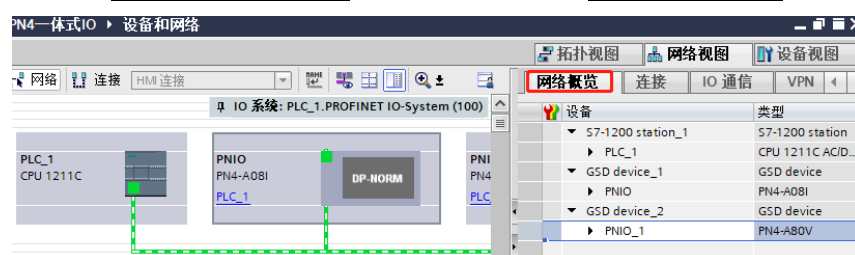
● Filtering function configuration

Each channel can be configured separately. Configuration range: 1~1024, default: 10.

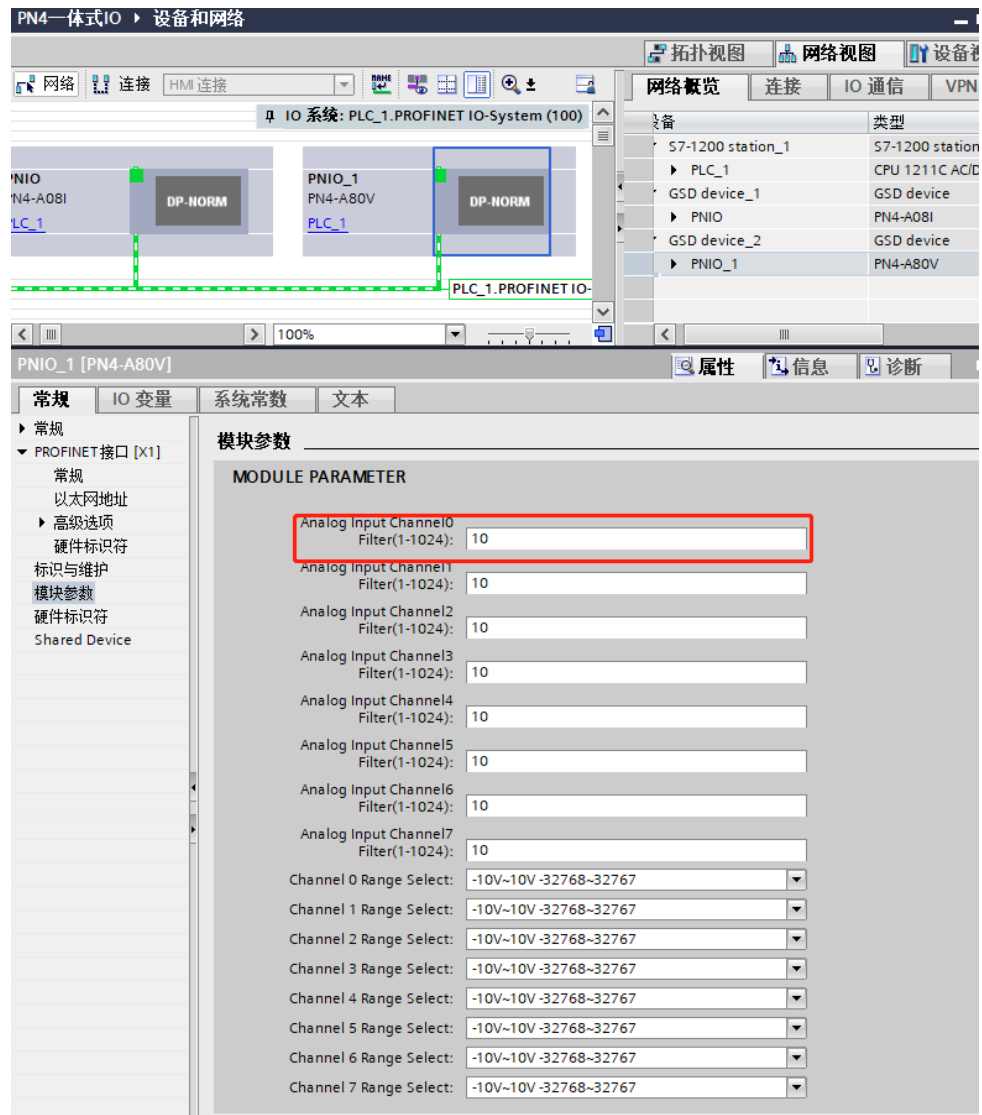
Sampling rate of 8-channel module: 1.25 KHZ/8-channel (800 us/8-channel);

Sampling rate of 4-channel module: 2.5 KHZ/4-channel (400 us/4-channel).

A. Under the Devices and Networks interface, click on the Network Overview menu folder



B. Select the existing model of the module, in this case, "PN4-A80V", select the corresponding channel, and set the filter parameters.



* Please re-power the module after the modification is completed

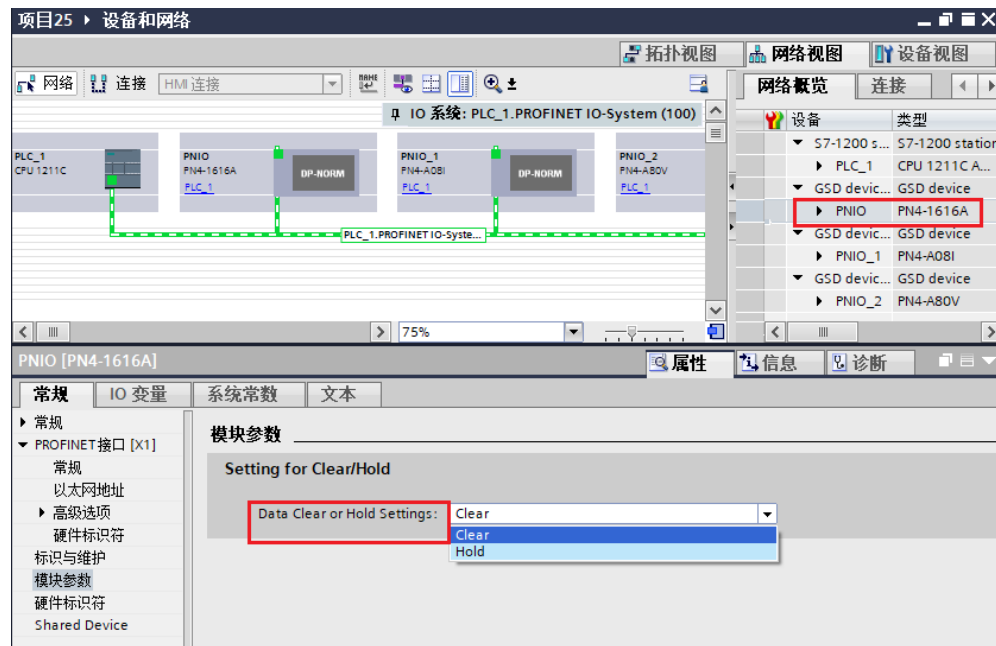
7.1.3 Output clearing/holding function

Output clearing: When the communication is disconnected, the module output channel will clear its output automatically.

Output holding: When the communication is disconnected, the module output channel will maintain its output.

- **Output clearing/holding function configuration**

Under the Devices and Networks interface, double click on the “PNIO” icon (in this case, “PN4-1616A”). Under the General menu folder, click on Module Parameters and change the value of Data Clear or Hold Settings.

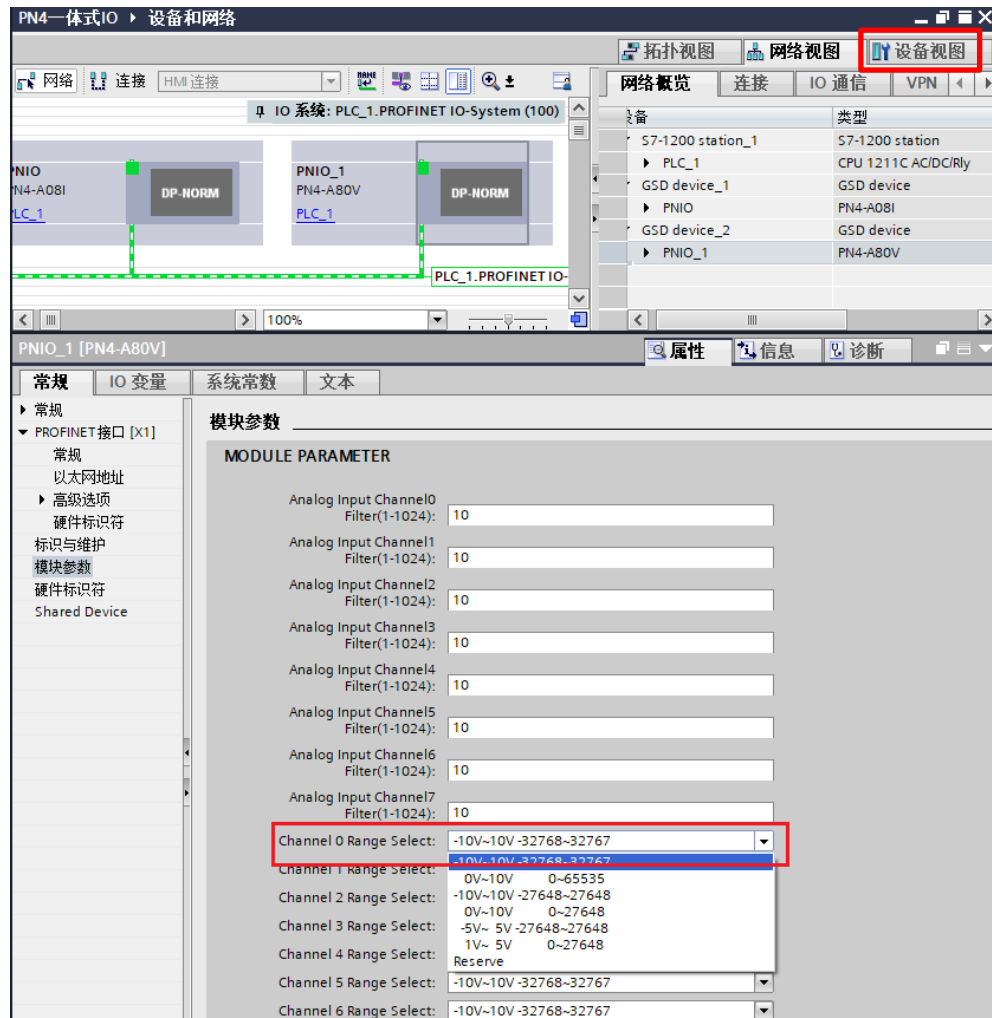


*** Please re-power the module after the modification is completed**

7.1.4 Analog range selection

The analog modules support range selection function, please refer to "3.3 Analog Parameters" for the specific ranges.

In the Device View menu, select the module of the existing model, in this case "PN4-A80V", select the corresponding channel, and set the range selection parameters. .



7.2 Module configuration description

7.2.1 Application in TIA Portal V14 software environment

1. Preparation

- **Hardware environment**

- **Module model**

Type	Model	Number
IO Modules	PN4-1616A	1
	PN4-A80V	1
	PN4-A08I	1

- **A computer installed with TIA Portal V14 software**
- **Two dedicated PROFINET shielded cables**
- **Siemens PLC S7-1200**
- **A switching power supply**
- **Module installation guide rail and fasteners**
- **Device configuration files**

Website of configuration files: <https://www.solidotech.com/documents/configfile>

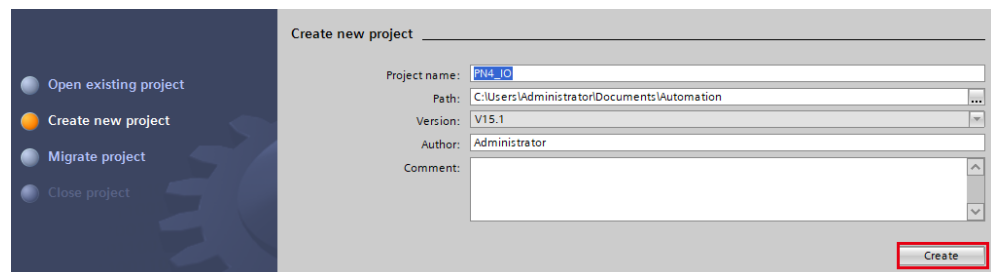
- **Hardware configuration and wiring**

Please operate according to “5 Installation and Disassembly” and “6 Wiring”.

2. TIA Portal V14 configuration

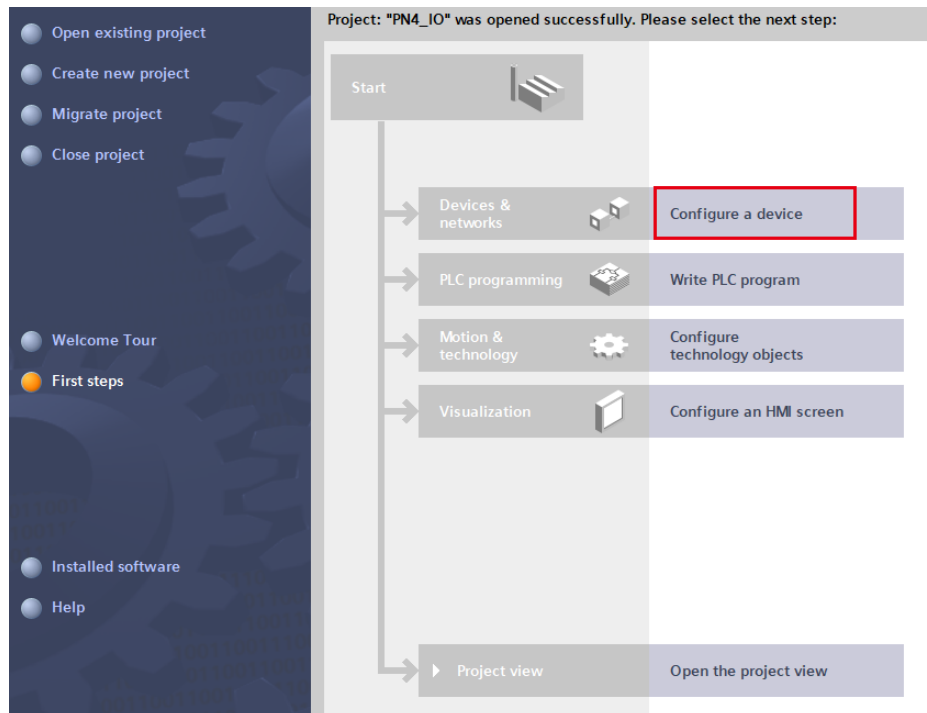
- **Project Creation**

Click "Create New Project", fill in the "Project Name", select "Path", click "Create" to complete the project creation ;

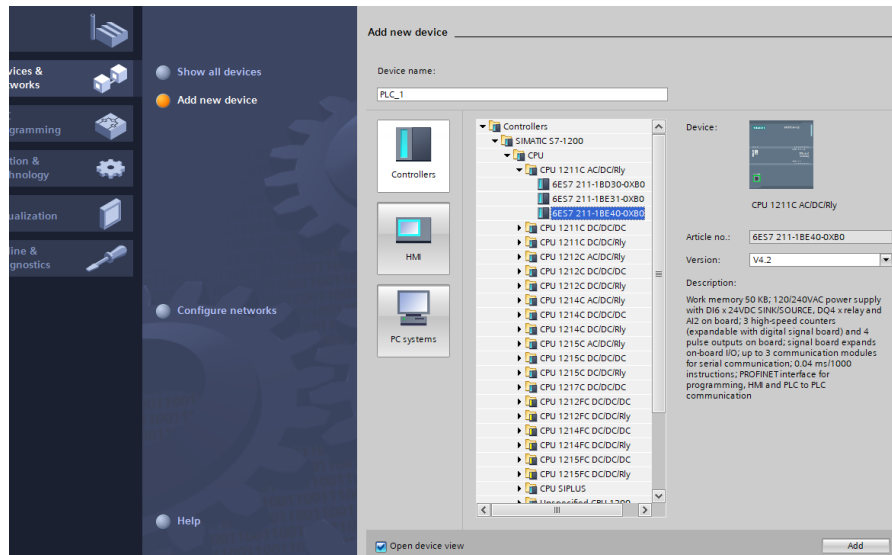


● Adding a PLC

Choose "First steps", "Devices & networks", then "Configure a device"

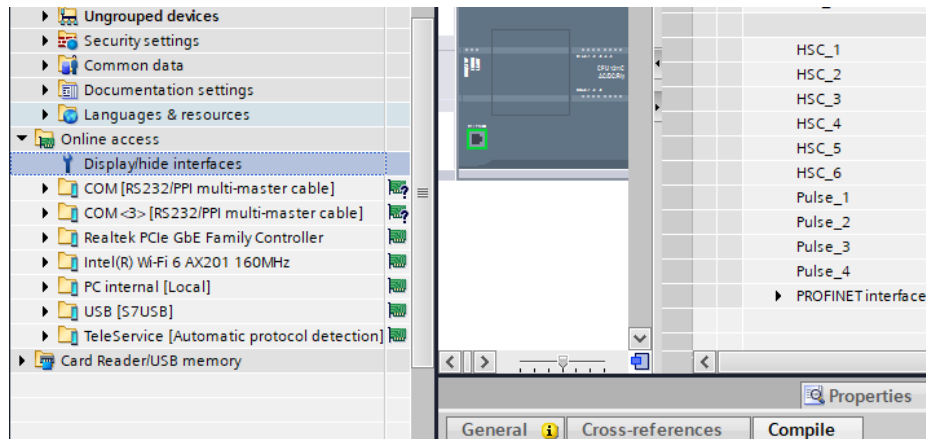


In "Devices and networks", click "Add new device", select "Controllers", select the PLC model you are currently using, and click "Add".



● Scan devices

In "Online Access", double-click the network adapter, double-click "Update accessible devices". After the update complete, the device slave connected to the network cable will be automatically added. (Generally, the first device is the PLC controller, PLC and the IP address of the computer must be in the same network segment, if not, close the project, modify the IP address of the computer, and repeat the above steps)

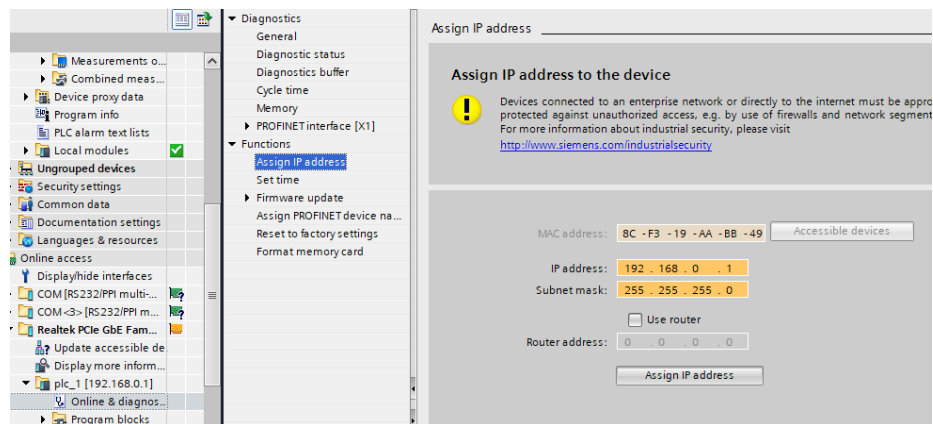


● Assign IP address and device name to the slave module

Double-click "Online and diagnostics" under the slave device, and under the "Functions" menu, you can assign the IP address and device name of the current slave module.

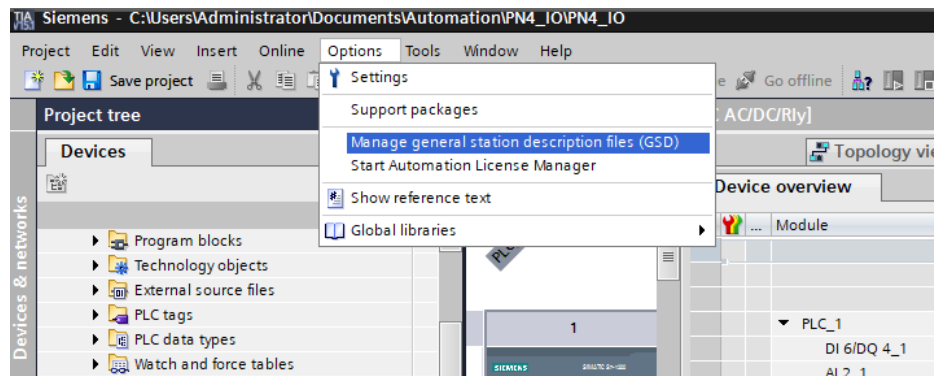
Fill in "Subnet Mask" first, then "IP Address", and click "Assign IP Address".

Click "Assign PROFINET device name", fill in "PROFINET device name", click "Assign name"



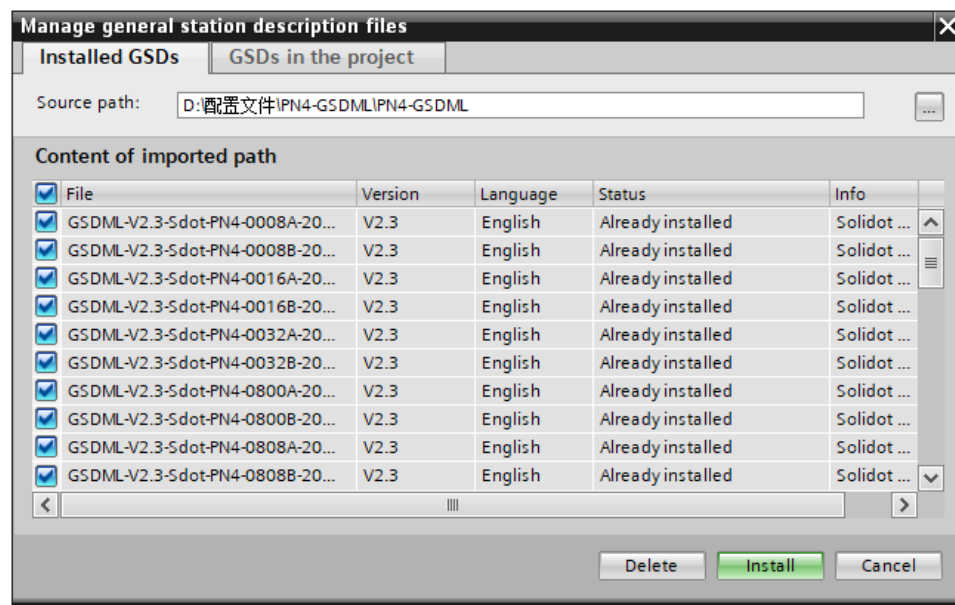
● Add GSD configuration files

In the menu bar, click "Options" and select "Manage general station description files (GSD)"

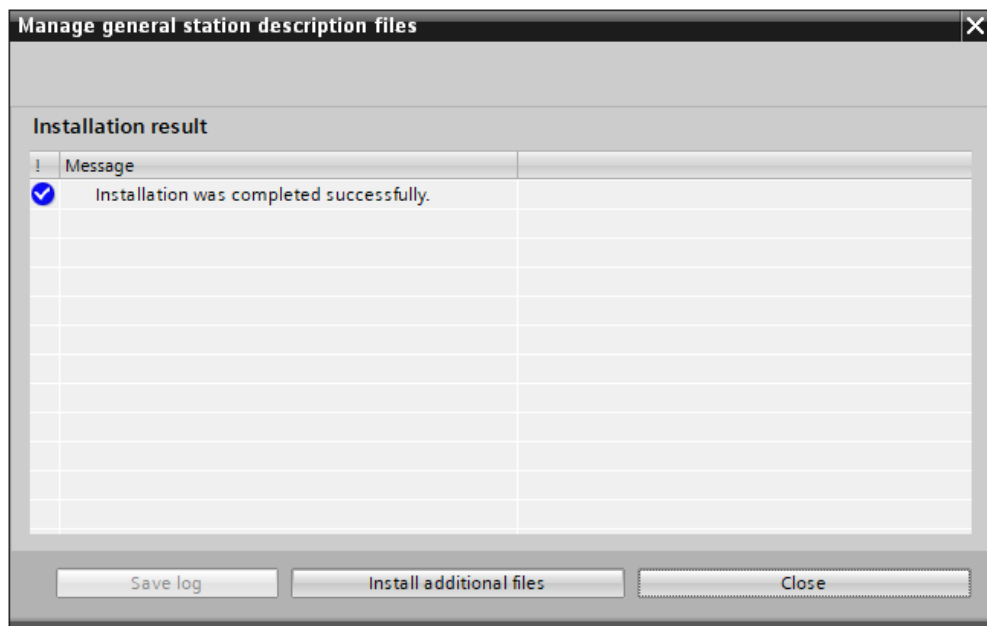


Click "Source path" to find the target folder where the GSD file is stored, select the file and click "OK";

Check the status of the GSD file to be added, whether it is "not yet installed", if it is not yet installed, check the box in front of the GSD file and click "Install"; if it is already installed, you can click "Cancel" to skip the installation step and continue to the next operation;

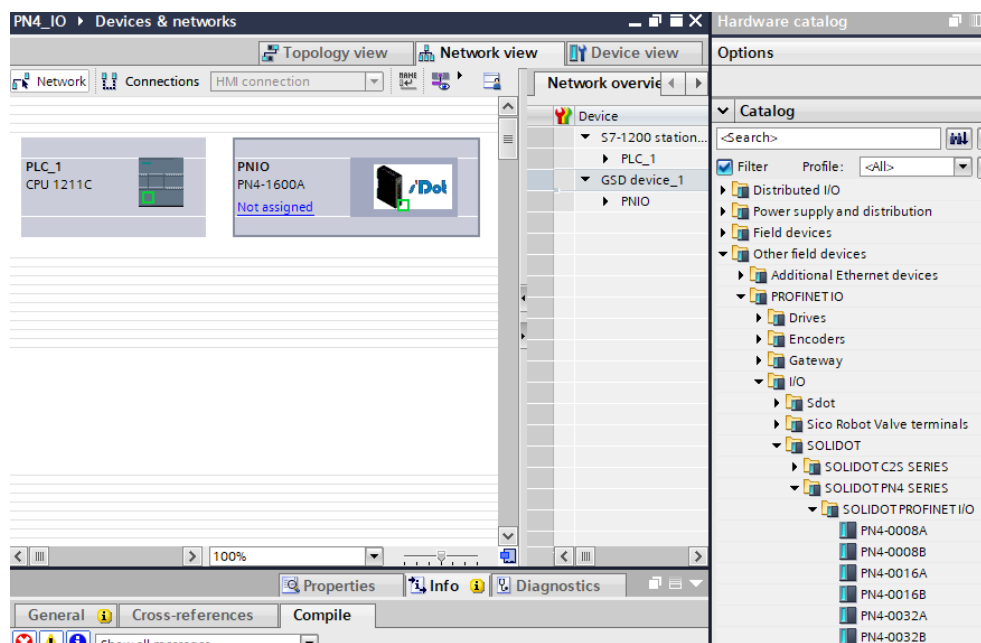


Click "Close"

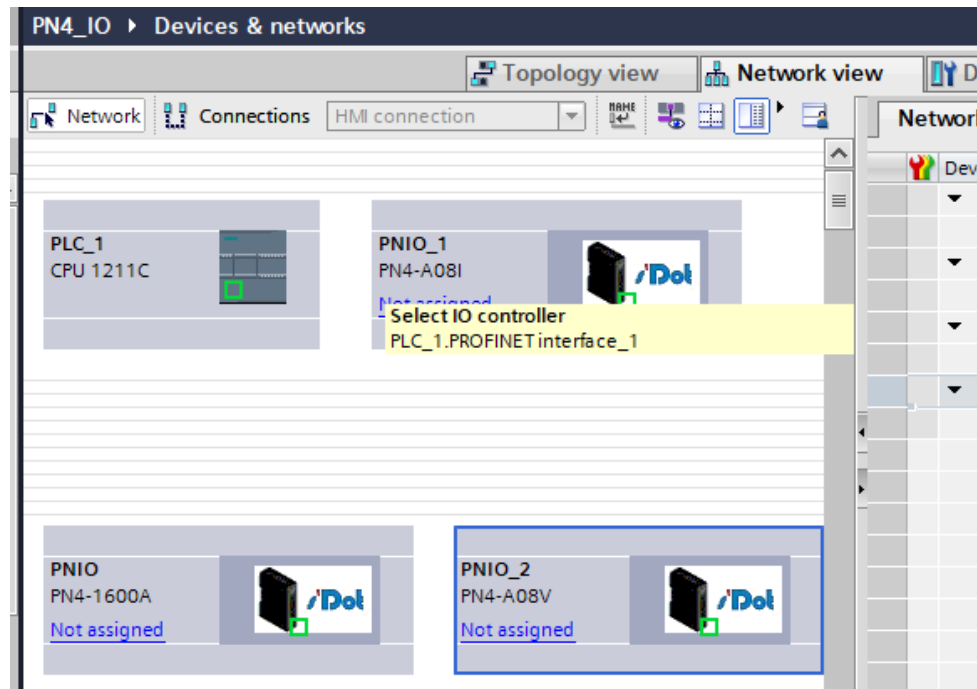


● Add PN4 IO Module

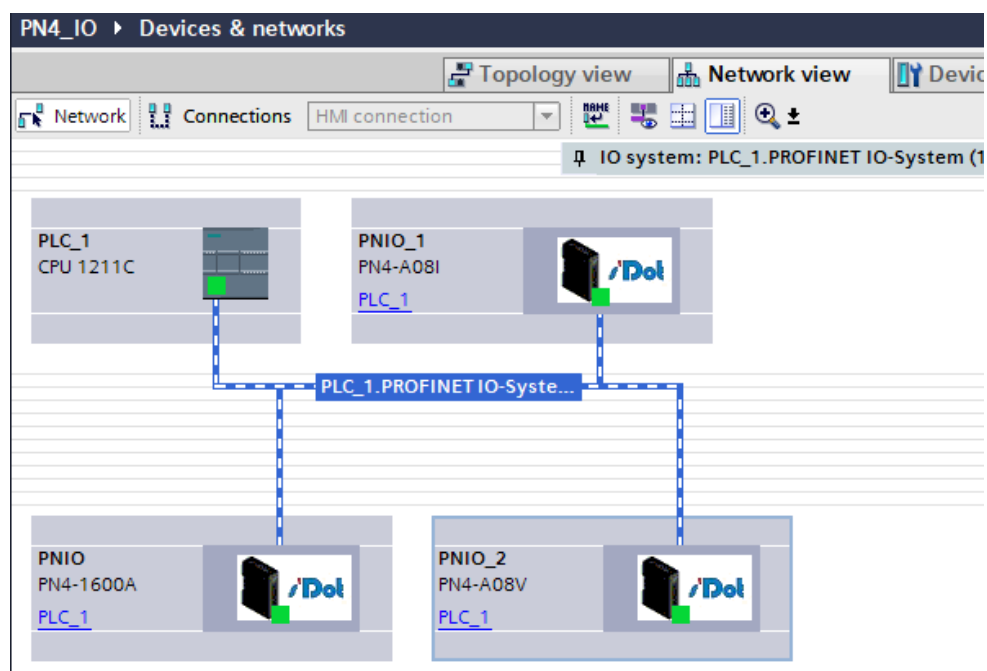
Double click on "Devices and networks", under the right directory of "Network View", look for the installed GSD file's product model and path, as shown (Other field devices->PROFINET IO->I/O->SOLIDOTPROFINET I/O->PN4-1616A), drag or double click PN4-1616A to "Network View";



In the "Network view", click on "Not assigned (blue font)" on the slave device and select "PLC_1.PROFINET interface 1";

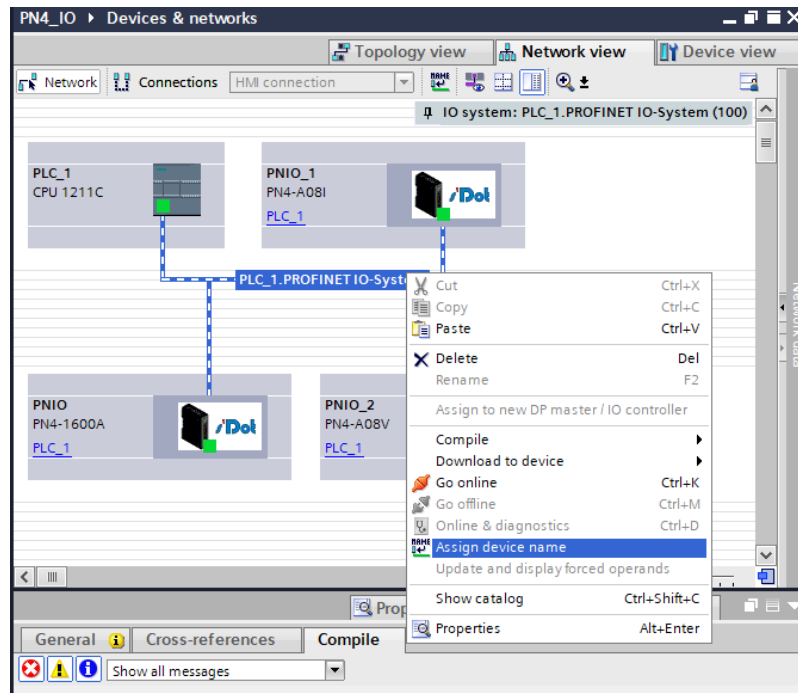


After the connection is completed, the following figure shows:

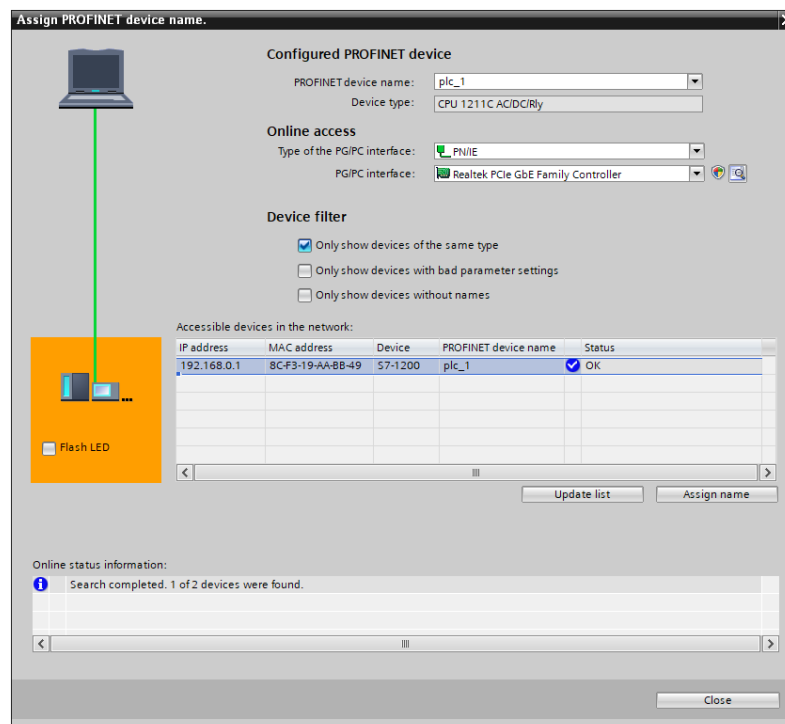


- **Assign device name in the configuration**

Right-click on the connection line between PLC and PNIO and select "Assign device name".

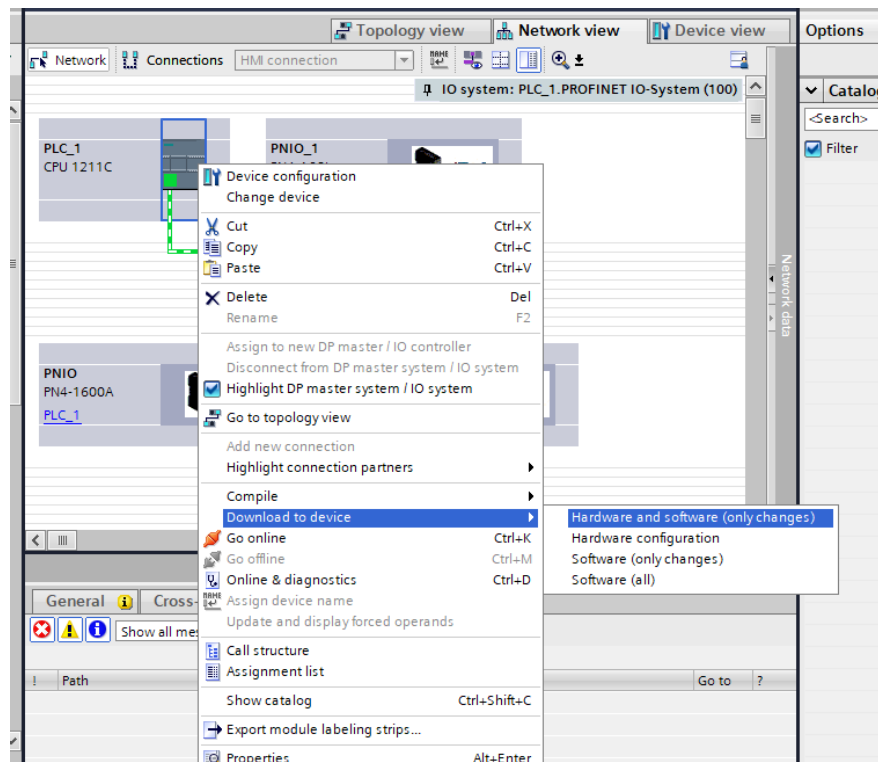


Click the drop-down menu after "PROFINET Device Name", select the name of the previously assigned device, and choose "PN/IE" for "Type of the PG/PC interface". "PG/PC interface" select your own network device; click "Update list" and wait for the "Online status information" to show "Search completed". When "XX devices were found", check whether the status in "Accessible devices in the network" is "OK", if not, select the device, click "Assign Name" below to finish assigning the device name, and click "Close" to close the page;



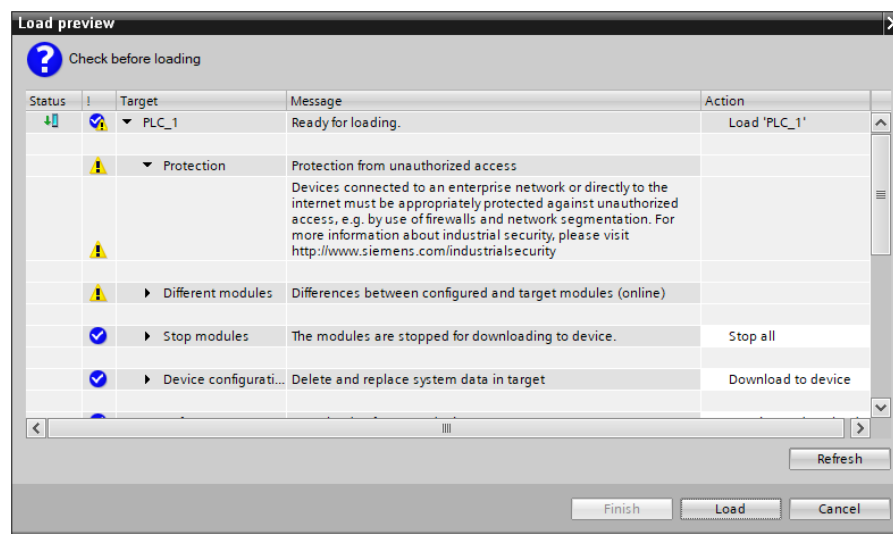
● Download the configuration structure

Double click "Devices and networks", go back to "Network view", select PLC and click "Download to device" button in the menu bar to download the current configuration to the PLC;

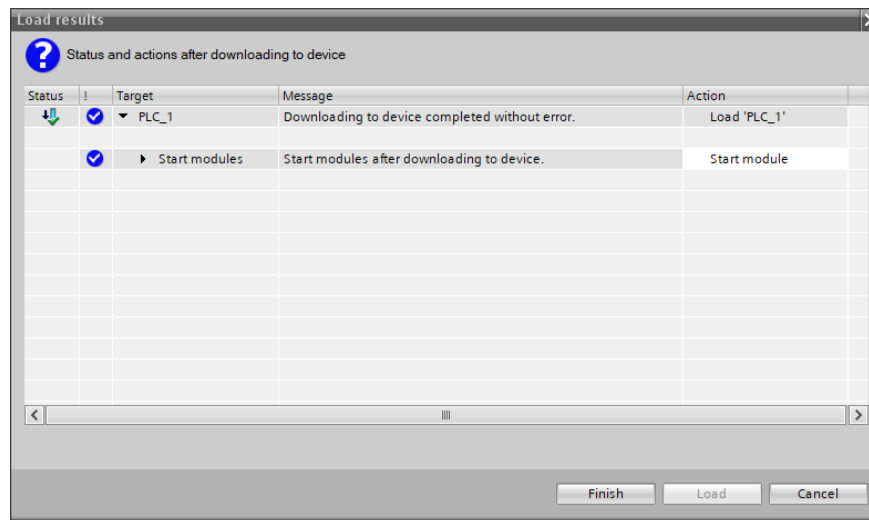


Click "Continue without synchronization";

Click "load";



Click "Finish" to complete the download operation ;

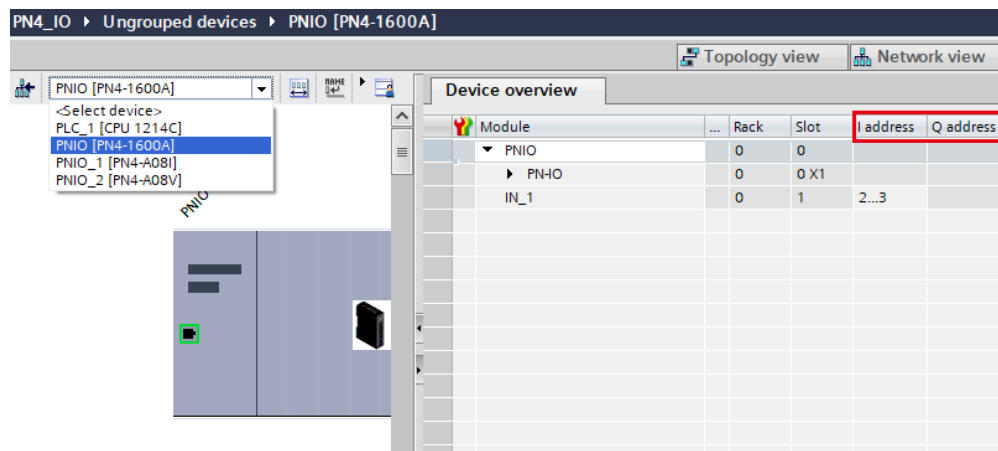


● Communication connection

Select PLC, click "Go to online" in the menu bar, as shown below, all for Green for successful connection ;

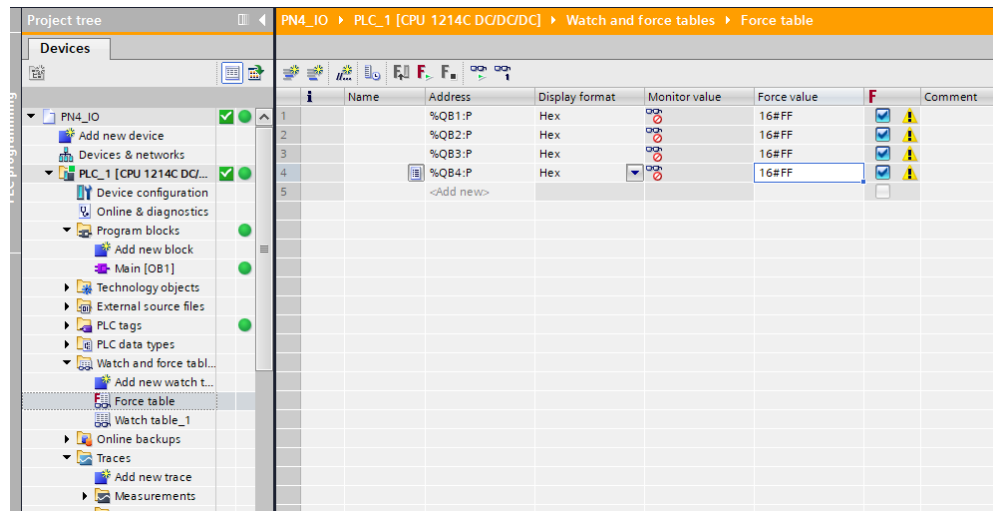
● IO Mapping Addresses

Click on "Device view", and under the "Device overview" menu folder, you can find the addresses assigned to the IO modules by the system software, or you can modify the addresses as required.

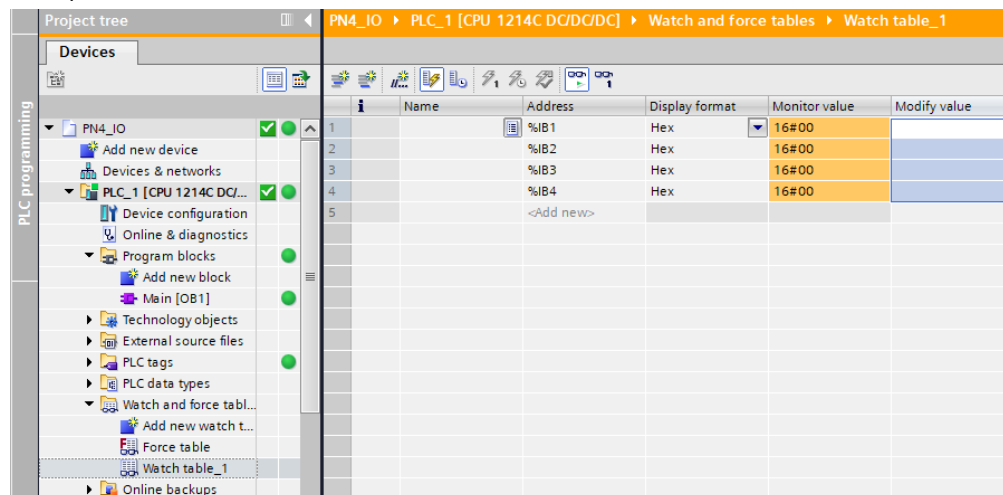


● IO Verification

Click on "Force table" and switch the CPU to "RUN" in the "CPU operation panel". Add "QB" in the "Address" of the output module (e.g., address 1 is "QB1"), click "Enter" after typing. Then, address 1 column will automatically generate "%QB1:P". "Display format" column can choose the display format of the monitor value, in this case hexadecimal was taken as an example, in the "Monitor value" column to fill in the data FF (%QB1: P's monitor value is a byte, it ranges from 0 to FF, it will be converted into binary, which ranges from 0000000000 to 11111111, a byte of data consists of 8 bits of binary data, from right to left, each binary control a channel. If you want to control channel 2 alone, change the third position to be 1, which is 00000100 = 0x03). After filling in the data, click the "Start or replace the visible variable mandatory" button to complete the output mode of data interaction ;



Double-click "Add new block", double-click the newly added Monitoring Table "Monitoring Table_1" (you can change the name). Add "IB" in the "Address" of the input module (e.g., address 1 is "IB1"), click "Enter" after typing. Then the address 1 column will automatically generate "%IB1", after the address to be monitored is filled in, click the "Monitor All" button, you can monitor the input data;



Note: Cancel the monitor values in the PLC and stop the PLC when not in use to avoid the problem of unsuccessful loading when downloading the configuration next re-configuration..

7.2.2 Application in STEP 7-MicroWIN SMART software environment

1. Preparation

- **Hardware environment**

- **Module Model and Type**

Type	Model	Quantity
IO Modules	PN4-1616A	1
	PN4-A80V	1
	PN4-A08I	1

- **A computer installed with STEP 7-MicroWIN SMART software**
- **OMRON PLC Model: S7-200 SMART**
- **Dedicated PROFINET shielded cable**
- **A switching power supply**
- **Module installation guide rail and fastener**
- **Device configuration files**

Website of configuration files: <https://www.solidotech.com/documents/configfile>

- **Install device configuration file**

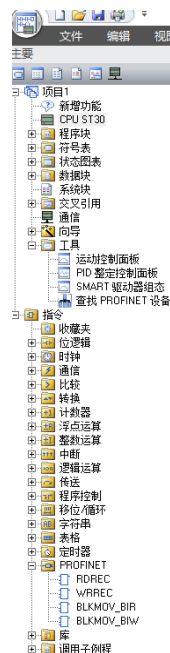
Please operate according to “5 Installation and Disassembly” and “6 Wiring”.

2. Computer IP requirements

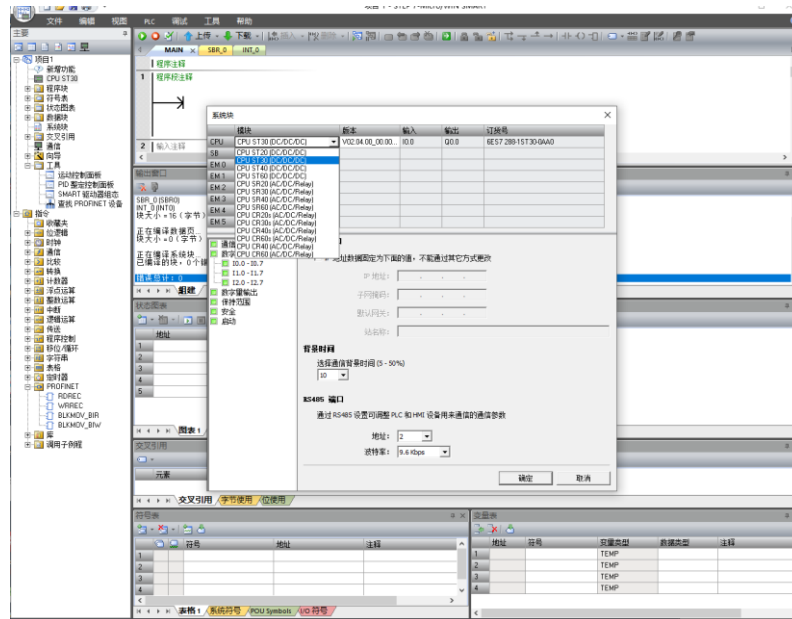
- **Make sure the IP address of the computer and the PLC to are in the same network segment.**

3. PLC Settings

- **Set the CPU model**



- 1、Double click the directory “ CPU ST30” as the left figure
- 2、Select the CPU model, in this case: SIMATIC S7-200 SMART\CPU ST30 as the below figure.

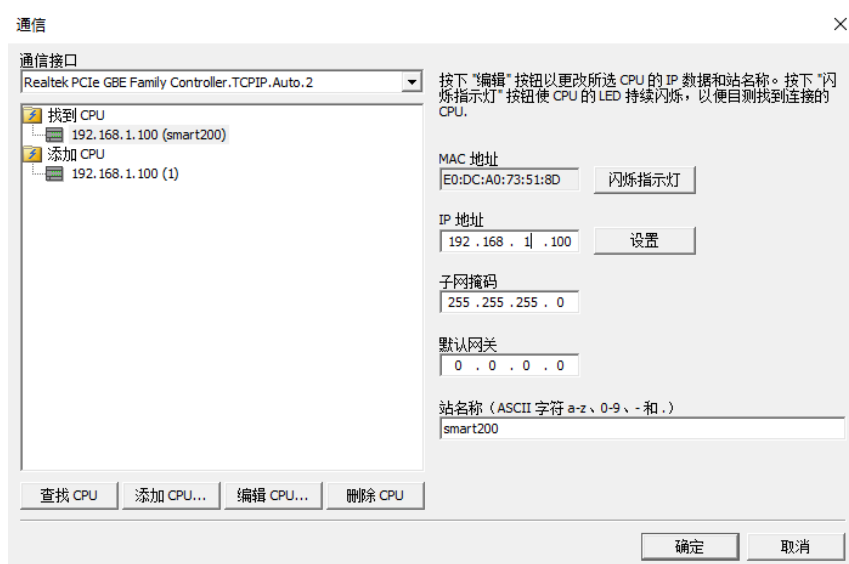
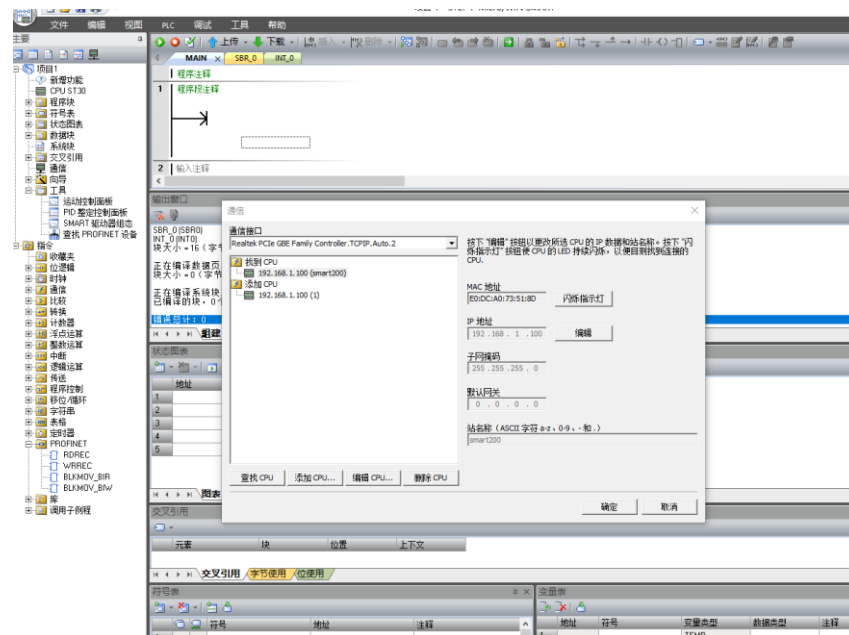


Find, add, and delete CPUs



- 1、 Double click the directory “通信” as the left figure.
- 2、 Find CPU on the communication panel, the below figure.

- Assign CPU IP address



Click the Set button, the IP address bar will become lighted, you can modify the IP and station name, click the Set button again after the modification is completed.

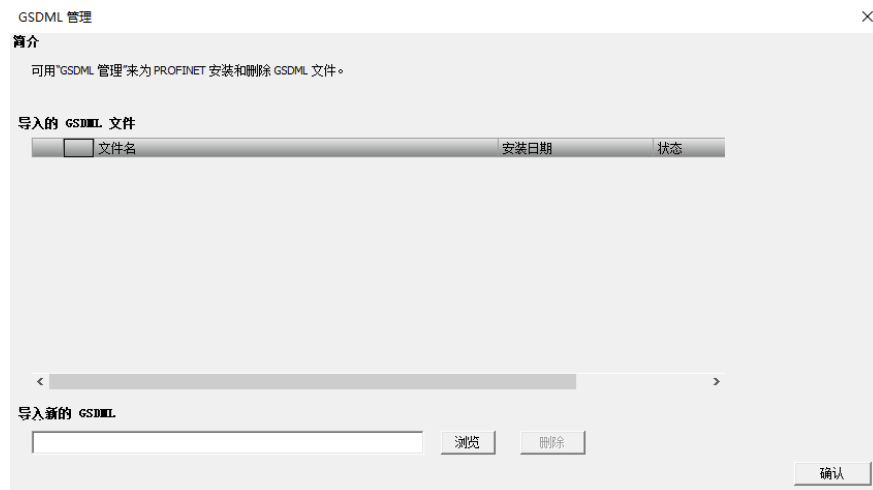
4. Manage GSD files

- Manage GSD files

a) Click "GSDML Management" in the "GSDML" section of the "File" menu



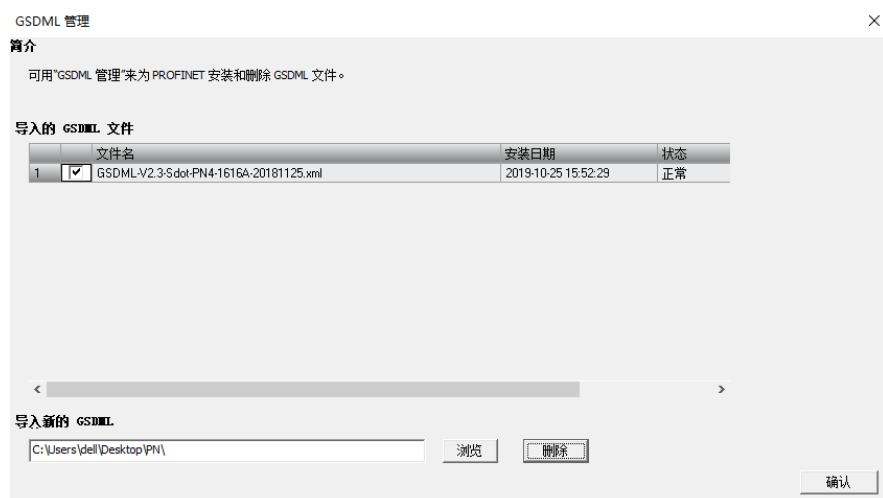
b) Click the "Browse" button in the "Manage general station description files" dialog box



- c) Navigate to the folder where the GSDML file is saved.
- d) Select the GSDML file to be imported. (You can also import multiple GSDML files.)
Click the "Confirm" button to complete the GSDML file import

● **Delete GSD files**

- a) Click "GSDML Management" in the "GSDML" section of the "File" menu.
- b) Select the GSDML file to be deleted in the "Manage general station description files" dialog box.
- c) Select the check box for the GSDML file and click the "Delete" button. You can also delete multiple GSDML files.



- d) Confirm the deletion of the GSDML file in the Reminder window.
- e) OK button to close the dialog box. The deleted GSDML files will be removed from the Imported GSDML files field.

5. Device Naming

All PROFINET devices must have a device name and IP address. Use STEP 7-Micro/WIN SMART to define the device name. Assign device names to devices via PROFINET DCP (Discovery and Configuration Protocol).

PROFINET devices and PCs are located in the same subnet

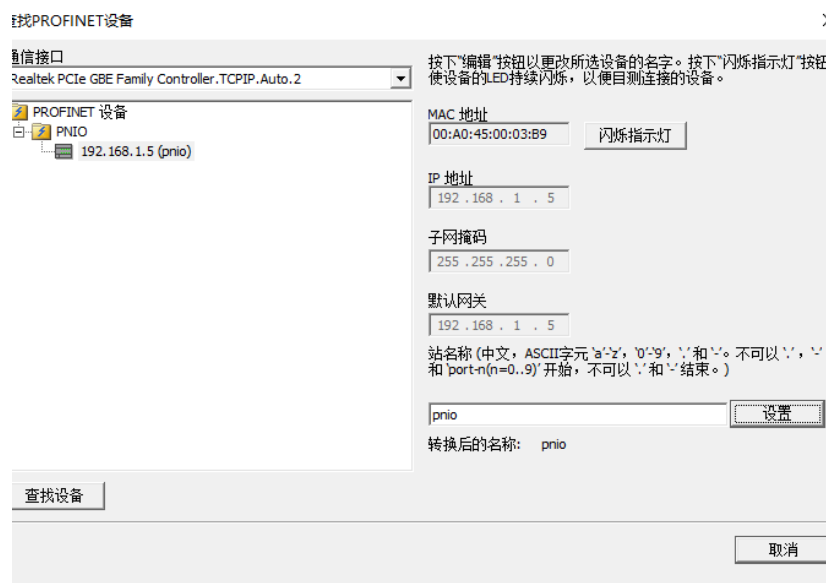
- Click the "Find ROFINET Devices" button in the "Tools" area of the "Tools" menu.



- Click on the "Find Devices" button to display all available PROFINET devices on the local Ethernet

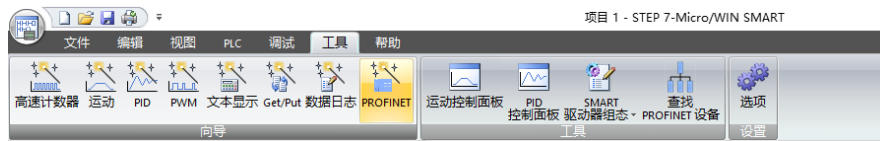


- Click the "Edit" button to change the device name

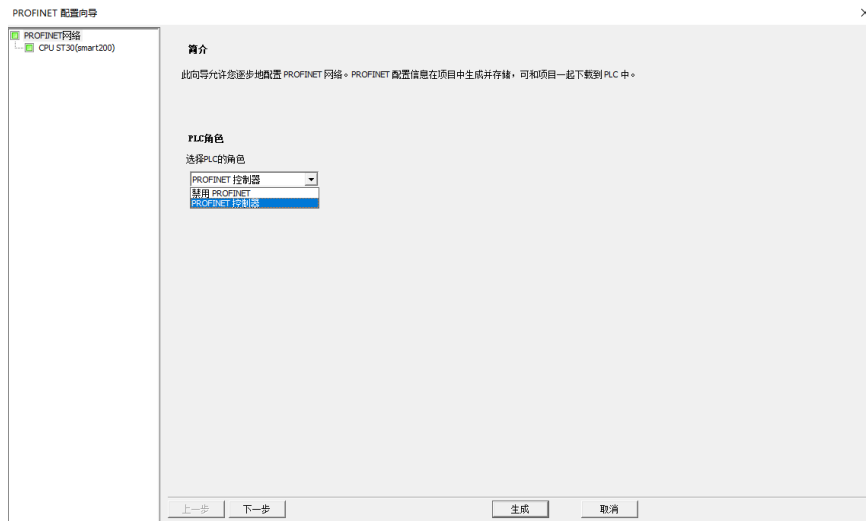


6. PROFINET Networks Configurations

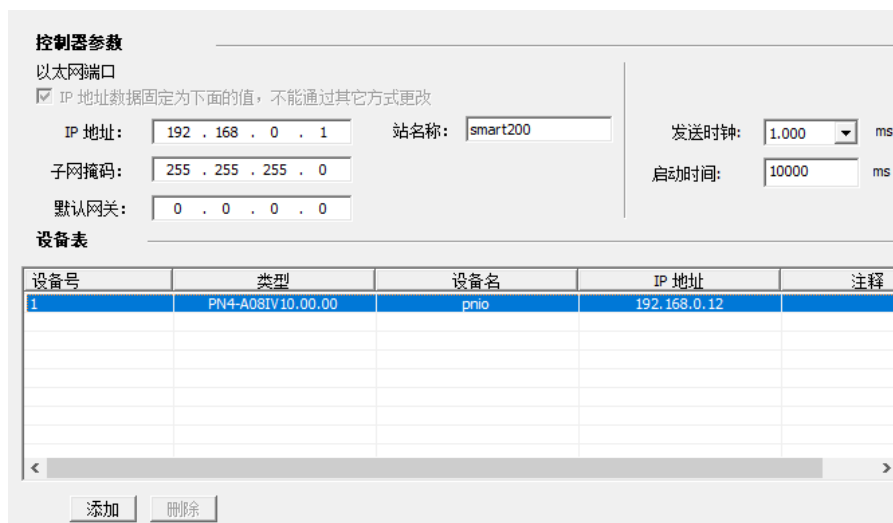
- Open the PROFINET configuration guide.



- Select the PLC role as "PROFINET controller"



- Set controller (CPU) address
- Add the IO module, change the device name and configure the IP address.



Similarly, add IO modules such as PN4-1616A/PN4-A08I.

Note: The device name should be the same as the module name, IP address should be set in the same network segment with PLC.

Click Next and click Generate button.

7. Download the program



Click the Download button



Click Download

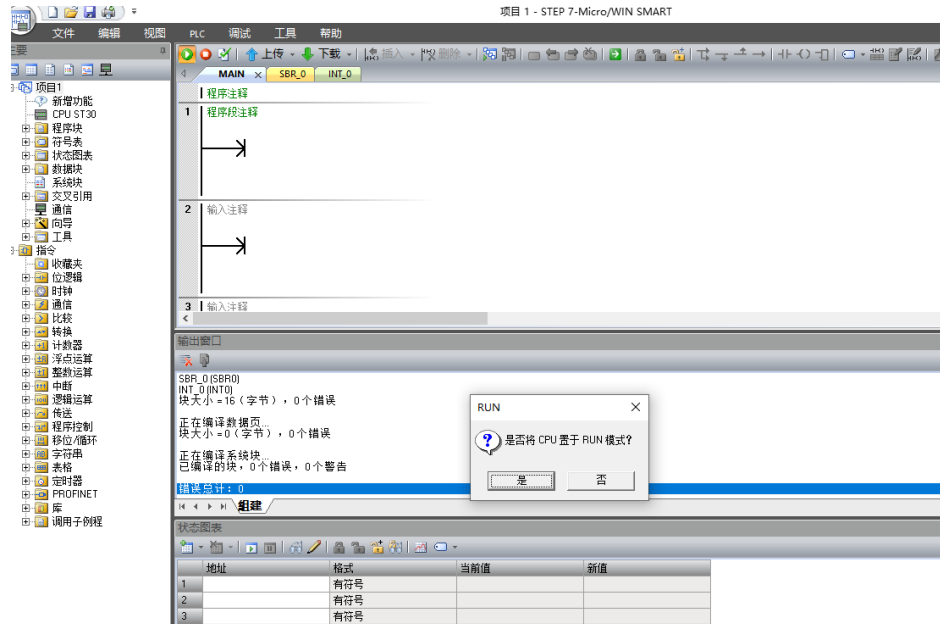


The download is complete and the dialogue menu is closed.

Notes: After the download is complete, re-power the module to process

8. Test Data

- Set the PLC to RUN mode



- Monitor data and force output



- Double click the directory “图表 1” as the left figure
- Enter the corresponding channel address and data format, you can force and input monitoring of IO module here



8 FAQ

8.1 The device cannot be found in the software

1. Check the GSDML configuration file is correctly installed or not
2. Check the GSDML configuration file version is accurate or not

8.2 The device cannot enter the online state

1. Check the project is set up correctly or not
2. Make sure the power supply of the device is normal
3. Make sure the PROFINET communication line is normal
4. Whether the device name is assigned to the PLC device line after the connection
5. Whether the PLC model is correct

8.3 Unable to load when downloading to the device

1. Make sure the PLC is not in the forced state
2. Make sure the CPU is stopped.