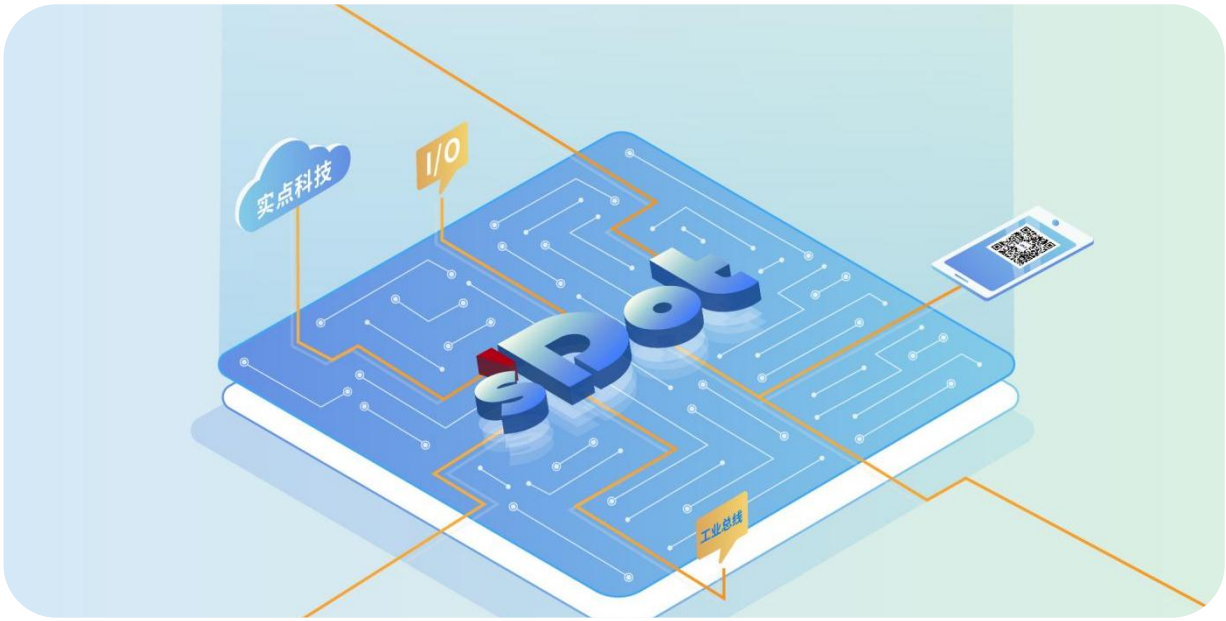


PROFINET

PN5R Series Integrated I/O

User Manual

Nanjing Solidot Electronic Technology Co., Ltd.

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Nanjing Solidot Electronic Technology Co., Ltd.
Address: Building 40, No. 9-1, Yinlong Road, Jiangning District, Nanjing City, Jiangsu Province
Postal code: 211106
Telephone: 4007788929
Website:http://www.solidotech.com

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1 Product Overview

1.1 Product Introduction

The PN5R series integrated I/O modules adopt the PROFINET industrial Ethernet bus interface and are PROFINET slave devices with standard I/O architecture. They are compatible with PROFINET networks from multiple manufacturers, providing users with a variety of options for high-speed data acquisition, optimized system configuration, simplified field wiring, and improved system reliability.

1.2 Product Features

- **Configurable input/output functions**

  The module can be configured with DI/DO via DIP switches, or it can automatically adapt to the DI/DO function according to the wiring method.

- **Small size**

  It has a compact structure and occupies little space.

- **Fast**

  Based on a high-performance communication chip and parallel interface, it is faster.

- **Easy to diagnose**

  The innovative channel indicator 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 all major mainstream master sites.

- **Easy to install**

  Mounted on DIN 35 mm standard rails.

  It adopts spring-loaded terminal blocks, making wiring convenient and quick.

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2 Naming Rules

2.1 Naming Rules

PN 5 R _ - 16 16 A +

(1) (2)(3)(4) (5) (6) (7) (8)

Serial number	Meaning	Value description		
(1)	Bus protocol	PN: Abbreviation for PROFINET protocol		
(2)	Product Series	5: Horizontal integrated IO		
(3)	Bus interface type	R: RJ45	M: M8 interface	
(4)	Terminal type	Default: Spring-loaded terminal	E: E-CON plug-in terminal	
(5)	Number of input channels	Number of digital : 00, 16, 32		
(6)	Number of output channels	Number of digital : 00, 16, 32		
(7)	Output channel type	A: NPN	B: PNP	Default: No output channel
(8)	Is the output channel configurable?	Default: Channels are not configurable	+: Configurable input/output	

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2.2 Model List

Model	Product Description
PN5R-3200	PROFINET integrated I/O, PN5 series, 32-channel digital NPN & PNP compatible input module, RJ45 communication interface, spring-loaded terminals.
PN5R-1616A	PROFINET integrated I/O, PN5 series, 16-channel digital NPN & PNP compatible input, 16-channel digital NPN output module, RJ45 communication interface, spring-loaded terminals.
PN5R-1616B	PROFINET integrated I/O, PN5 series, 16-channel digital NPN & PNP compatible input, 16-channel digital PNP output module, RJ45 communication interface, spring-loaded terminals.
PN5R-1616A+	PROFINET integrated I/O, PN5 series, 16-channel digital NPN input, 16-channel digital NPN input & output compatible module, RJ45 communication interface, spring-loaded terminals.
PN5R-1616B+	PROFINET integrated I/O, PN5 series, 16-channel digital PNP input, 16-channel digital PNP input & output compatible module, RJ45 communication interface, spring-loaded terminals.
PN5R-0032A	PROFINET integrated I/O, PN5 series, 32-channel digital NPN output module, RJ45 communication interface, spring-loaded terminals.
PN5R-0032B	PROFINET integrated I/O, PN5 series, 32-channel digital PNP output module, RJ45 communication interface, spring-loaded terminals.

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3 Product Parameters

3.1 General parameters

Interface parameters	
Bus protocol	PROFINET
Number of stations	It depends on the number of slave stations supported by the main station.
Data transmission medium	Ethernet CAT5 cable
Transmission rate	100Mbps
Minimum loop time [1]	1ms
Transmission distance	≤100m (distance between stations)
Bus interface	2×RJ45

Note [1]: Cycle time (scan cycle) between PLC and module.

Technical parameters		
Specifications and dimensions		182×57.3×34mm
Weight		210g
Usage Environment	Operating temperature	-20℃~+60℃
	Storage temperature	-40℃~+80℃
	Relative humidity	95%, no condensation
	Altitude	≤2000m
	Vibration resistance	IEC 60068-2-6sinusoidal vibration 5Hz~8.4Hz,3.5mm,8.4Hz~150Hz,1g X/Y/ZTriaxial10One cycle/Axial (1)00min)
	Impact resistance	IEC 60068-2-27Mechanical shock 150m/s2,11ms, ±X/Y/ZSix directions 3Second-rate/Direction, Together18Second-rate
	Protection level	IP20
	Overvoltage category	I

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	Pollution level	Level 2
Module error self-recovery		Support
Disconnection check		Support
diagnosis		Support
Alarm		Support
Firmware upgrade		Support
Short circuit protection		Supports (automatic recovery mechanism)
Reverse connection protection		Supports (automatic recovery mechanism)
Reverse connection protection		Support
Surge protection		Support

3.2 Digital input module parameters

Digital input	
Product Model	PN5R-3200
Input power supply rated voltage	24VDC (20.4V~28.8V)
Input power supply rated current	≤50mA
Field-side input voltage range	24VDC (20.4V~28.8V)
Maximum current carrying capacity on site	8A/group
Input rated voltage	24VDC (20.4V~28.8V)
Typical input current	4mA/ch (24VDC)
Number of input signal points	32
Input signal type	NPN/PNP compatible
Input signal form	direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form
OFF voltage/OFF current	-3V to +5V / below 0.9mA
ON voltage/ON current	15V~30V/2.1mA or above
reaction time	150us
Input filtering	No filtering, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms
Maximum input frequency	150Hz (Filtering time: 3ms)
Input impedance	6.6kΩ~7.6kΩ
Isolation methods	Digital signal isolator
Isolation and withstand voltage	500VAC
Rated current consumption	50mA
Power consumption	1.2W
Numeric input type	Type1/Type3
Channel indicators	Green LED lights

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3.3 Digital Input/Output Module Parameters

Digital input		
Product Model	PN5R-1616A	PN5R-1616B
Input power supply rated voltage	24VDC (20.4V~28.8V)	
Input power supply rated current	≤50mA	
Field-side input voltage range	24VDC (20.4V~28.8V)	
Maximum current carrying capacity on site	8A/group	
Input rated voltage	24VDC (20.4V~28.8V)	
Typical input current	4mA/ch (24VDC)	
Number of input signal points	16	16
Input signal type	NPN/PNP compatible	
Input signal form	direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form	
OFF voltage/OFF current	-3V to +5V / less than 0.9mA	
ON voltage/ON current	15V~30V/2.1mA or above	
Reaction time	150us	
Input filtering	No filtering, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms	
Maximum input frequency	150Hz (Filtering time: 3ms)	
Input impedance	6.6kΩ~7.6kΩ	
Isolation methods	Digital signal isolator	
Isolation and withstand voltage	500VAC	
Rated current consumption	50mA	
Power consumption	1.2W	
Numeric input type	Type1/Type3	
Channel indicators	Green LED lights	
Digital output		
Number of output signal points	16	16
Output signal type	NPN	PNP

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Output voltage drop	<1V	
Output load type	Resistive load, inductive load, lamp load	
Channel output current	Max: 0.5A/single channel (see details)Figure 1), 6A/16 channels	
Leakage current	<10uA	
reaction time	<150us	<250us
Output channel protection	Short circuit protection (automatic recovery mechanism)	
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection	
Isolation methods	Digital signal isolator	
Isolation and withstand voltage	500VAC	
Channel indicators	Green LED lights	

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Digital input		
Product Model	PN5R-1616A+	PN5R-1616B+
Input power supply rated voltage	24VDC (20.4V~28.8V)	
Input power supply rated current	≤50mA	
Field-side input voltage range	24VDC (20.4V~28.8V)	
Maximum current carrying capacity on site	8A/group	
Input rated voltage	24VDC (20.4V~28.8V)	
Typical input current	4mA/ch (24VDC)	
Number of input signal points	16	16
Input signal type	NPN	PNP
Input signal form	direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form	
OFF voltage/OFF current	-3V to +5V / below 0.9mA	
ON voltage/ON current	15V~30V/2.1mA or above	
Reaction time	150us	
Input filtering	No filtering, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms	
Maximum input frequency	150Hz (Filtering time: 3ms)	
Input impedance	6.6kΩ~7.6kΩ	
Isolation methods	Digital signal isolator	
Isolation and withstand voltage	500VAC	
Rated current consumption	50mA	
Power consumption	1.2W	
Numeric input type	Type1/Type3	
Channel indicators	Green LED lights	
Digital input/output compatibility		
Number of output signal points	16	16
Output signal type	NPN	PNP
Configurable inputs and outputs	yes	

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Output voltage drop	<1V	
Output load type	Resistive load, inductive load, lamp load	
Channel output current	Max: 0.5A/single channel (see details)Figure 1), 6A/16 channels	
Leakage current	<10uA	
reaction time	<150us	<250us
Output channel protection	Short circuit protection (automatic recovery mechanism)	
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection	
Isolation methods	Digital signal isolator	
Isolation and withstand voltage	500VAC	
Channel indicators	Green LED lights	

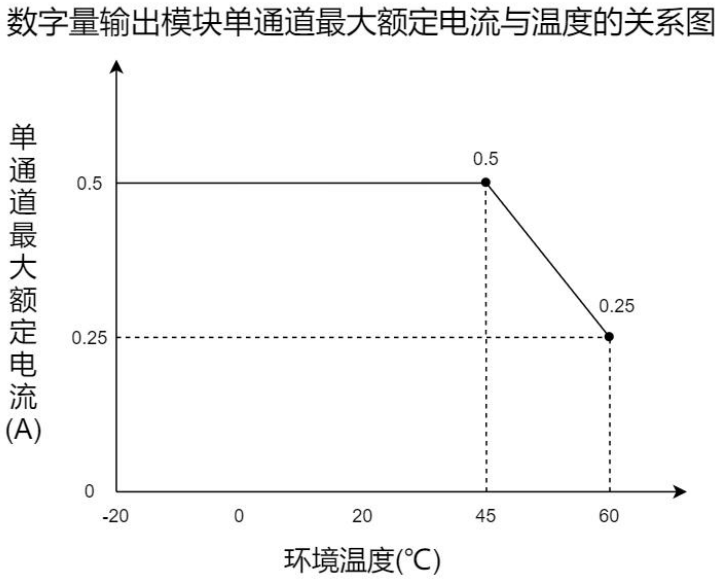
3.4 Digital output module parameters

Digital output		
Product Model	PN5R-0032A	PN5R-0032B
Input power supply rated voltage	24VDC (20.4V~28.8V)	
Input power supply rated current	≤50mA	≤50mA
Field-side input voltage range	24VDC (20.4V~28.8V)	
Maximum current carrying capacity on site	8A/group	
Number of output signal points	32	32
Output signal type	NPN	PNP
Output voltage drop	<1V	
Output load type	Resistive load, inductive load, lamp load	
Channel output current	Max: 0.5A/single channel (see details)Figure 1), 12A/32 channels	
Leakage current	<10uA	
Reaction time	<150us	<250us
Output channel protection	Short circuit protection (automatic recovery mechanism)	
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection	
Isolation methods	Digital signal isolator	

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Isolation and withstand voltage	500VAC	
Rated current consumption	50mA	50mA
Power consumption	1.2W	1.2W
Channel indicators	Green LED lights	

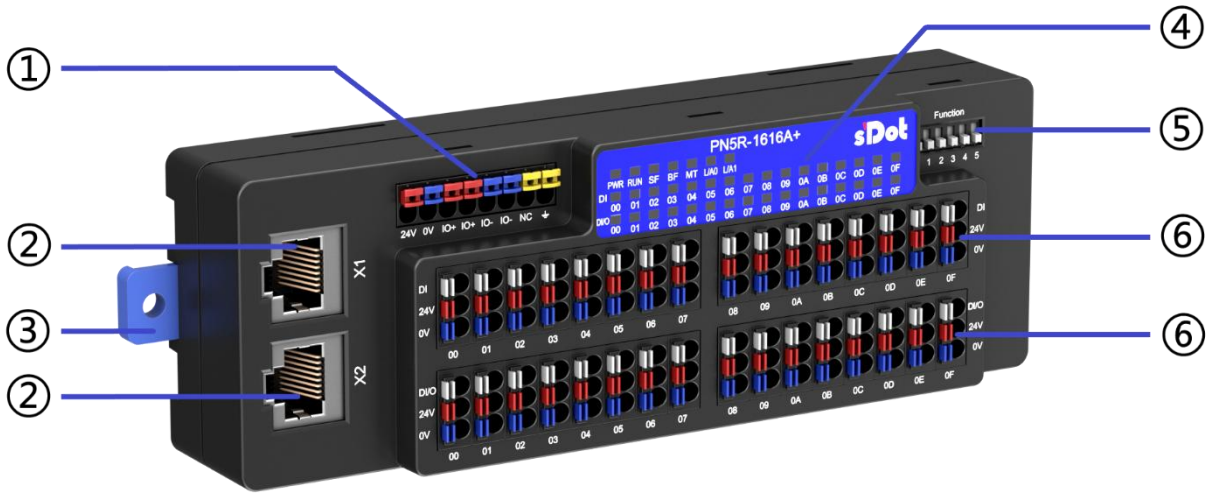
Figure 1:



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4 Panel

4.1 Panel structure



Serial number	Name	Illustrate
①	Power terminal	8P spring-loaded terminal block
②	Bus interface	2×RJ45, PROFINET bus interface
③	Modular wall mounting ear holes	For modular wall mounting
④	System indicators and channel indicators	Indicator module power status, operating status, and channel status
⑤	binary DIP switch	Configure module alarm version, configure DI/DO
⑥	Input/output channels	Terminal blocks

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4.2 indicator function

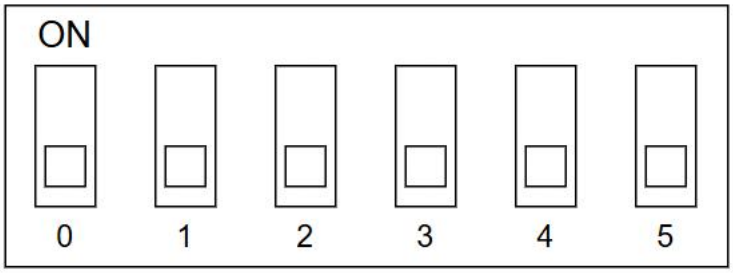
Digital I/O module indicator definitions				
Logo	**Name**	**Color**	**State**	**Status Description**
PWR	Power indicator	Green	ON	The module power supply is working normally.
			Extinguish	Module not powered or power supply abnormal
RUN	Operating status indicator	Green	ON	Equipment starts normally
			Flashing	Main controller startup failed
			Extinguish	The device cannot start.
SF	System error indicator	Red	ON	There is a PROFINET alarm message.
			Extinguish	No PROFINET alarm information
BF	Bus fault indicator	Red	ON	No network connection
			Flashing	No PROFINET connection established with the controller
			Extinguish	Establish PROFINET connection with controller
MT	Maintenance indicator	Yellow	ON	Maintenance required, alarms generated.
			Extinguish	No maintenance required, no alarms
L/A0	Network Port X1 Status Indicator	Green	ON	Establish network connection
			Flashing	Connection established and data exchanged
			Extinguish	No network connection established or abnormal
L/A1	X2 network port status indicator	Green	ON	Establish network connection
			Flashing	Connection established and data exchanged
			Extinguish	No network connection established or abnormal
00~0F/ 10~1F	Input channel indicator	Green	ON	The module channel has a signal input.
			Extinguish	The module channel has no signal input or the signal input is abnormal.
00~0F/ 10~1F	Output channel indicator	Green	ON	The module channel has signal output.
			Extinguish	The module channel has no signal output or the signal output is abnormal.

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4.3 DIP switch

DIP switch instructions

The binary DIP switch is shown in the figure below:



Setting the binary DIP switch from 0 to 0 indicates that the module is the normal version, while setting it to 1 indicates that the module is the Alarm version. Alarm version modules can be viewed in the uplink data for alarm codes.

When binary DIP switch 1 is set to 0, it indicates that the channel can be configured with DI/DO, which is determined by the DIP switch (see the table below for details). When it is set to 1, it indicates that the channel can be configured with DI/DO, which is adaptive by the module wiring.

DI/DO DIP switch setting table available(This takes effect when binary DIP switch 1 is set to 0)	
2. DIP switch settings (binary)	0: Channels 00~03 are output DO
	1: Channels 00~03 are input DI
3. DIP switch settings (binary)	0: Channels 04~07 are output DO
	1: Channels 04~07 are input DI
4. DIP switch settings (binary)	0: Channels 08~0B are output DO
	1: Channels 08~0B are input DI
5. DIP switch settings (binary)	0: Channels 0C~0F are output DO
	1: Channels 0C~0F are input DI

Remark:

1、 **If you need to switch between the normal version/Alarm version and DI/DO during communication, you must power on the entire module after the new settings are completed for the new settings to take effect.**

2、 **For modules PN5R-1616A+/PN5R-1616B+, binary DIP switches 1-5 are active. For other digital modules, binary DIP switches 1-5 are inactive.**

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5 Installation and removal

5.1 Installation Guide

Installation/Removal Precautions

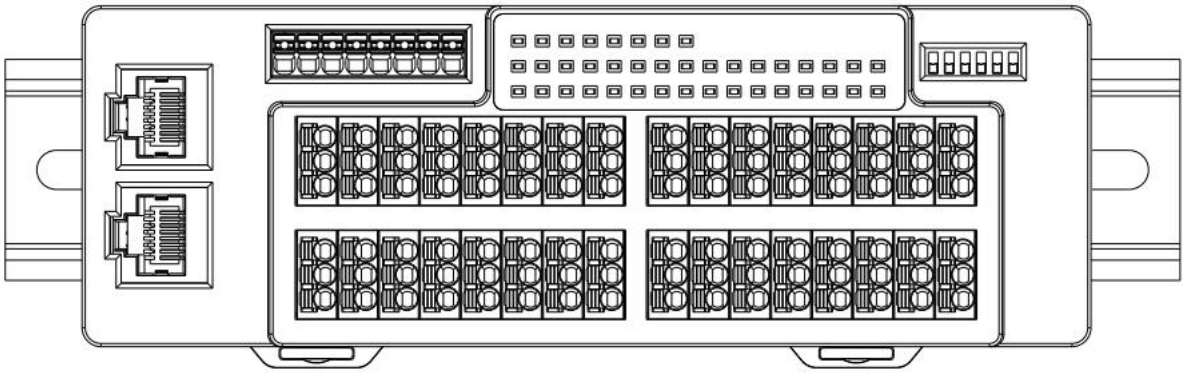
- **The module has an IP20 protection rating and must be installed in a cabinet for indoor use.**
- **Ensure that the server rack has good ventilation (such as installing exhaust fans in the server rack).**
- **Do not install this device next to or above equipment that may cause overheating.**
- **Make sure to install the module vertically on the fixed rail/other fixed position, and ensure that there is air circulation around it (there should be at least 50mm of air circulation space above and below the module).**
- **Installation/removal must be performed with the power off.**

⚠ Warning

- If the device is not used in accordance with the product user manual, the protection it provides may be compromised.

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Ensure the module is installed vertically on the fixed guide rail/other fixed position.



5.2 Installation and disassembly steps

5.2.1 Rail snap-on installation

Module installation and removal	
Module installation steps	1. Push the clips at the bottom of the back of the module outwards until you hear a "click" sound.
	2. Install the I/O module on the fixed guide rail, align the upper edge of the module slot with the upper edge of the guide rail, and place the module into the guide rail.
	3. Press the lower edge of the module slot against the lower edge of the guide rail, push the buckle upwards until you hear a click, and the module installation is complete.
Module disassembly steps	1. Insert a flathead screwdriver into the clip and apply force towards the module until you hear a click.
	2. Remove the module from the guide rail.

5.2.2 Wall-mounted fixed installation

Module installation and removal	
Module installation steps	1. Confirm the installation location.
	2. Push the mounting ears on the left and right sides of the back of the module outward until you hear a "click" sound.
	3. Use a template and a spirit level to determine the hole positions and mark the drilling points.
	4. Align the drilled holes with the mounting holes on the back of the module, and use screws to fix it to the wall through the ear holes, ensuring that the module is stable

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	and does not wobble.
	5. Connect power, signal, and communication cables to avoid pulling or stretching them during installation.
Module disassembly steps	1. Use a screwdriver to loosen the screws securing the module.
	2. Gently remove the module.

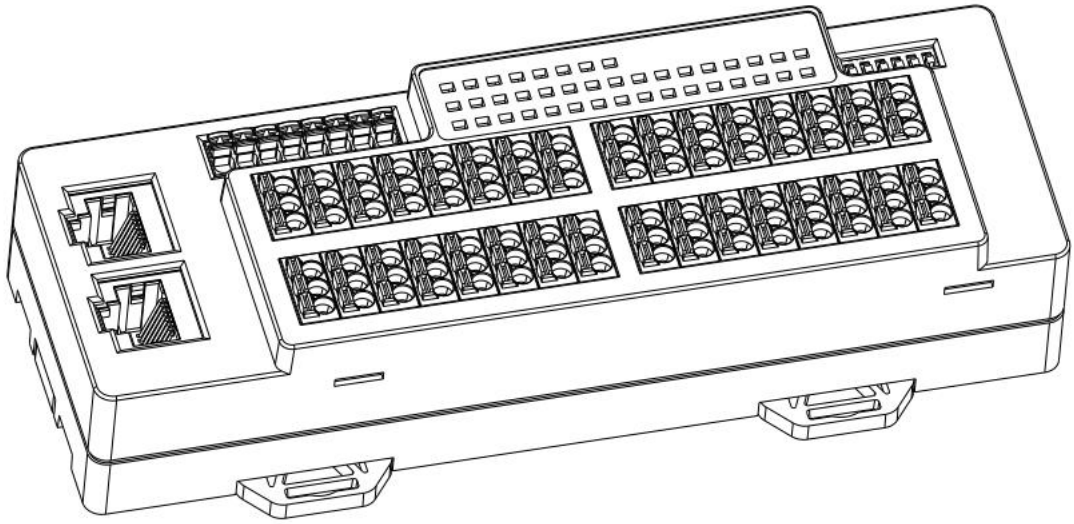
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5.3 Installation and disassembly diagram

5.3.1 Rail snap-on installation

I/O module installation

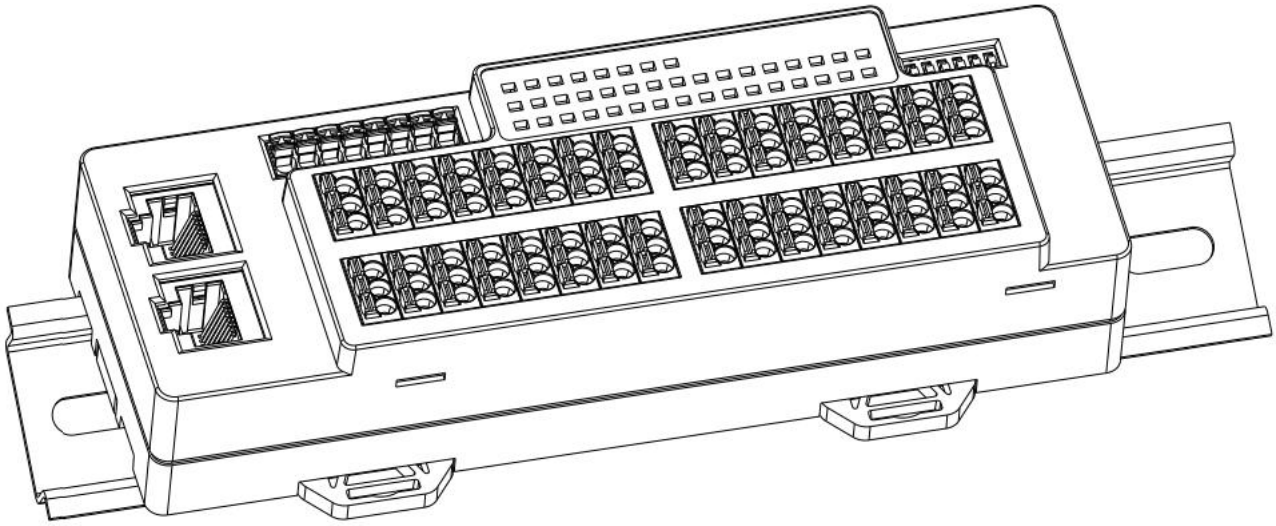
- Push the latch at the bottom of the back of the module outwards until you hear a "click" sound, as shown in Figure ① below.



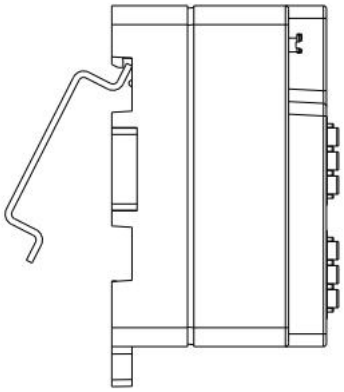
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- Install the module on the fixed guide rail, align the upper edge of the module slot with the upper edge of the guide rail, and place the module into the guide rail, as shown in Figures ② and ③ below.



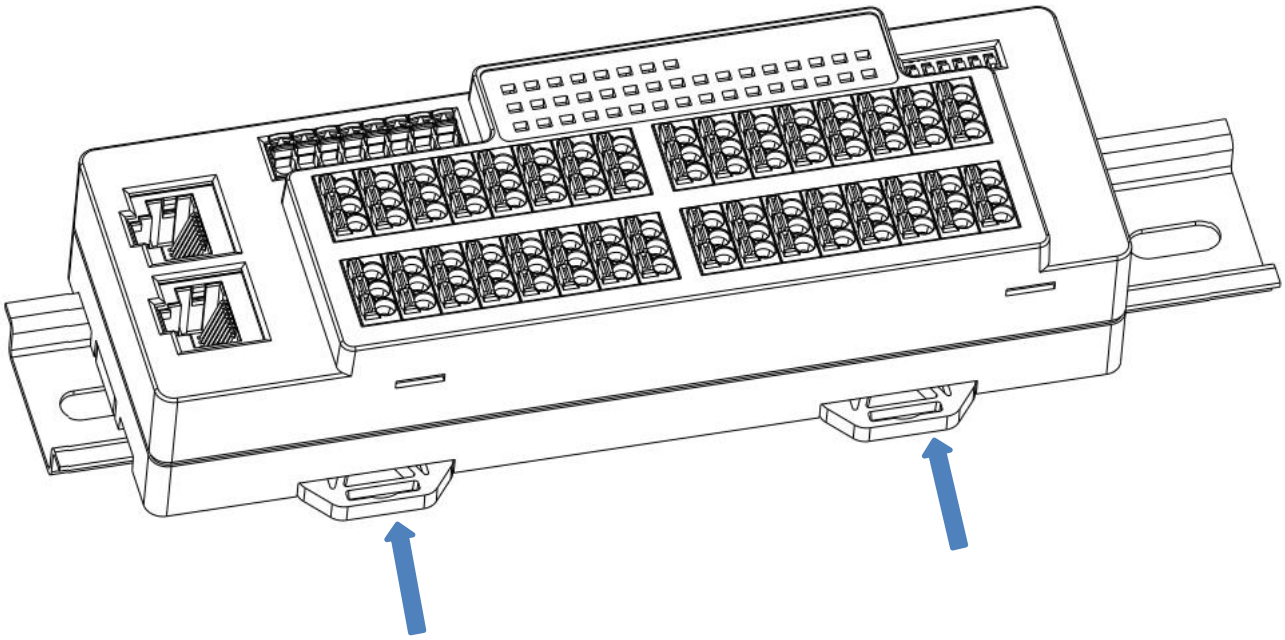
②



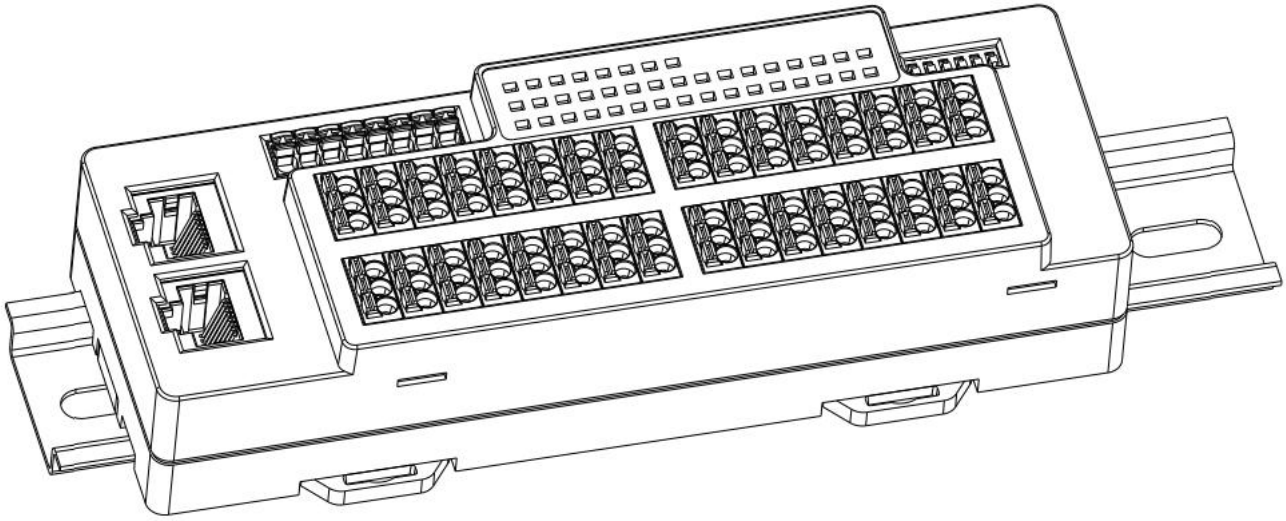
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- Place the lower edge of the module slot against the lower edge of the guide rail, and push the buckle upwards until you hear a click. This completes the module installation, as shown in Figures ④ and ⑤ below.



④

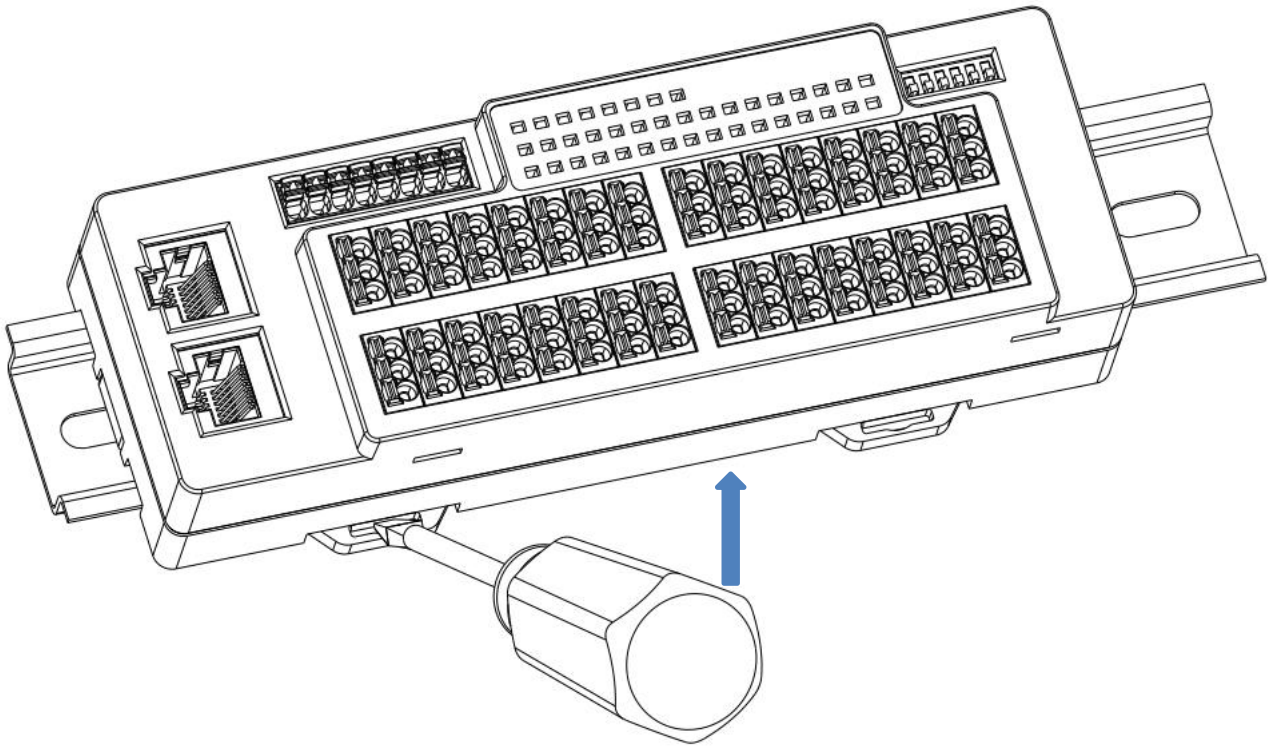


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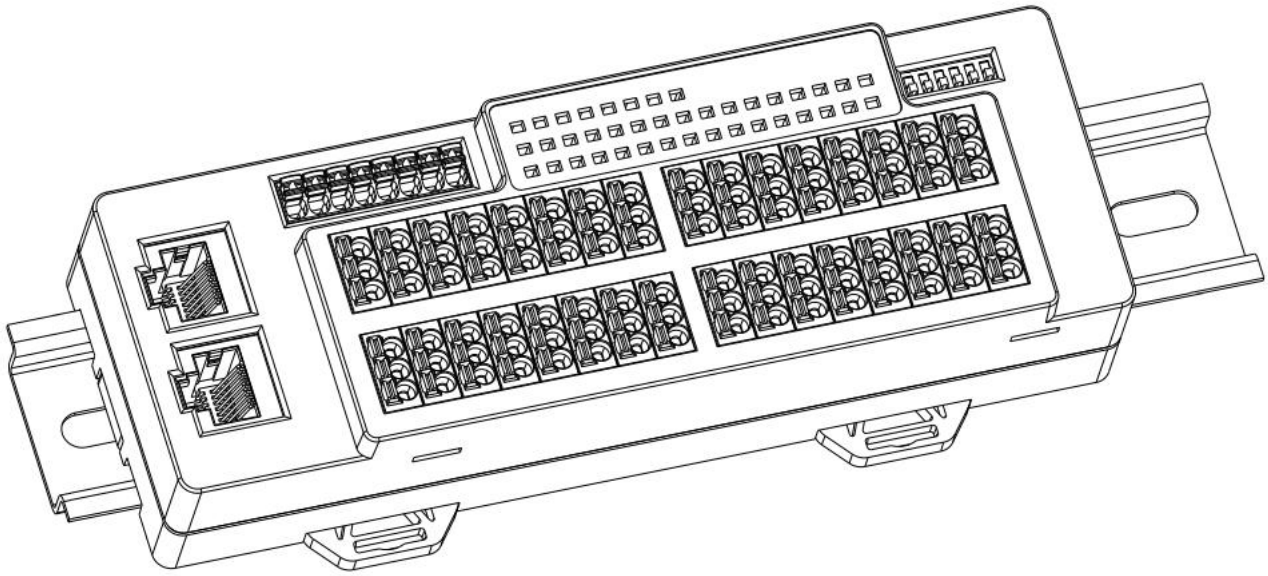
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I/O module disassembly

- Insert a flathead screwdriver into the clip and apply force towards the module until you hear a click, as shown in Figures 6 and 7 below. At this point, you can...Remove the module from the guide rail.



⑥

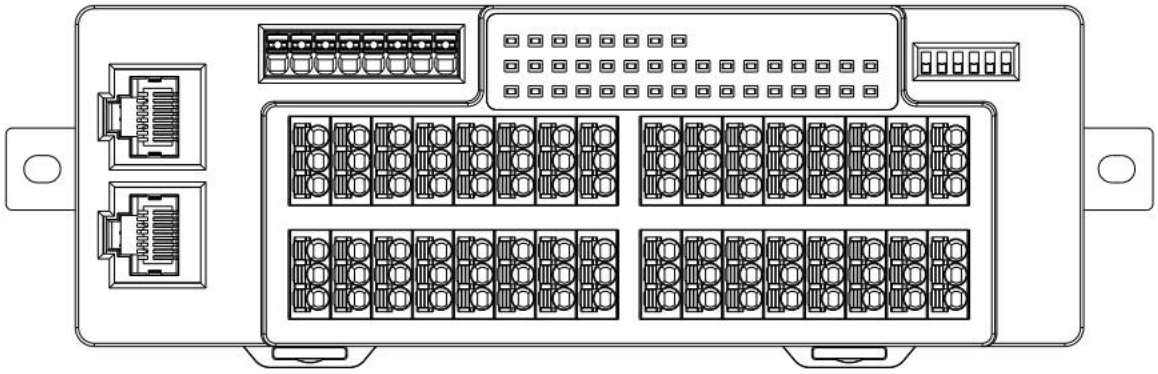


⑦

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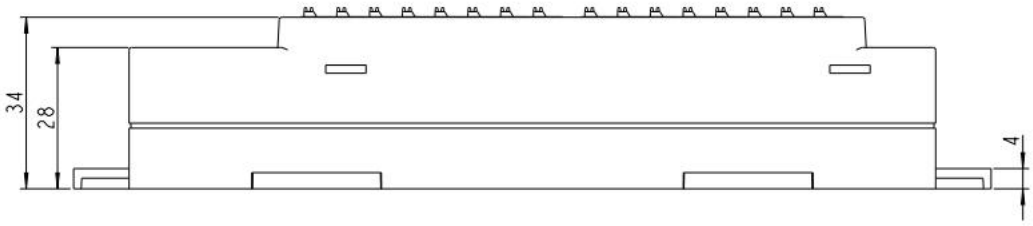
5.3.2 Wall-mounted fixed installation

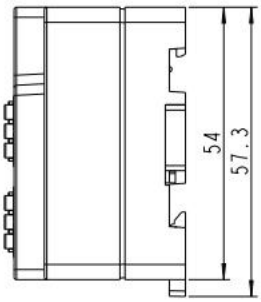
The mounting holes on the left and right sides of the back of the module are shown in the figure below. Please refer to this image.5.2.2 Wall-mounted fixed installationInstall it.

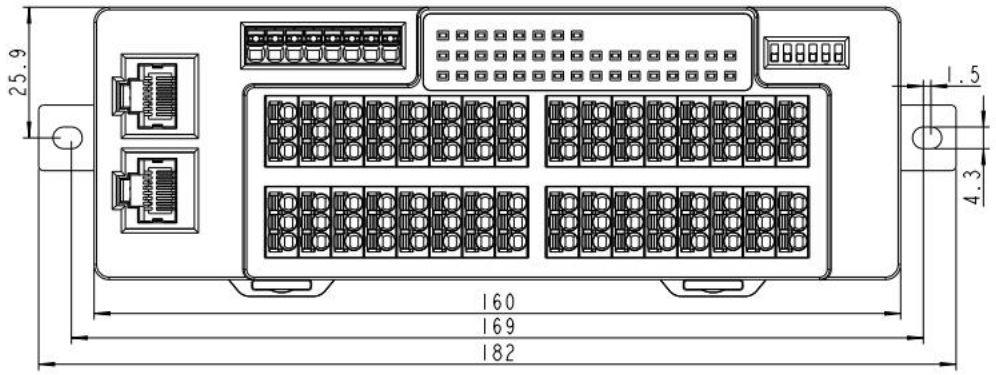


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5.4 Dimensions







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6 Wiring

6.1 Terminal blocks

Warning

Terminal blocks		
Power terminals	Rated voltage	300V
	Rated current	7A
	Pole number	8P
	Wire diameter	28~18 AWG 0.2~0.75 mm²
I/O signal line terminals (i.e., input/output terminals)	Rated voltage	300V
	Rated current	8A
	Pole number	32×3P
	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

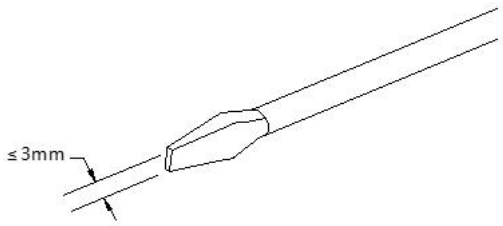
Power connection precautions

- 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.

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Wiring tool requirements

The power terminals and signal terminals feature a screwless design, allowing for cable installation and removal using a flathead screwdriver (size: ≤3mm).



Stripping length requirements

The recommended cable stripping length for power terminals is 8~10 mm.



The recommended cable stripping length for signal line terminals is 9~10 mm.



Wiring method

For a single-strand rigid wire, after stripping the wire to the corresponding length, press the button and insert the single-strand wire directly into the corresponding end hole.

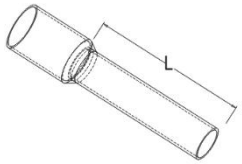


After stripping the wire to the corresponding length, the multi-strand flexible wire can be directly connected or used with the corresponding standard cold-pressed terminals (tubular insulated terminals, see the table below for reference specifications). Pressing down the button will insert the insulated terminal directly into the corresponding end hole.



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The specifications for power supply terminals and signal line terminals are shown in the table below:

Specifications of tubular insulated ends		
Specifications	Model	conductor cross-sectional area (mm²)
 Tubular insulated terminals L The length is 8~10mm	E0308	0.3
	E0508	0.5
	E7508	0.75
	E1008	1.0
	E1508	1.5
	E0310	0.3
	E0510	0.5
	E7510	0.75
	E1010	1.0
	E1510	1.5

Warning

- Only copper wires can be used for wiring.

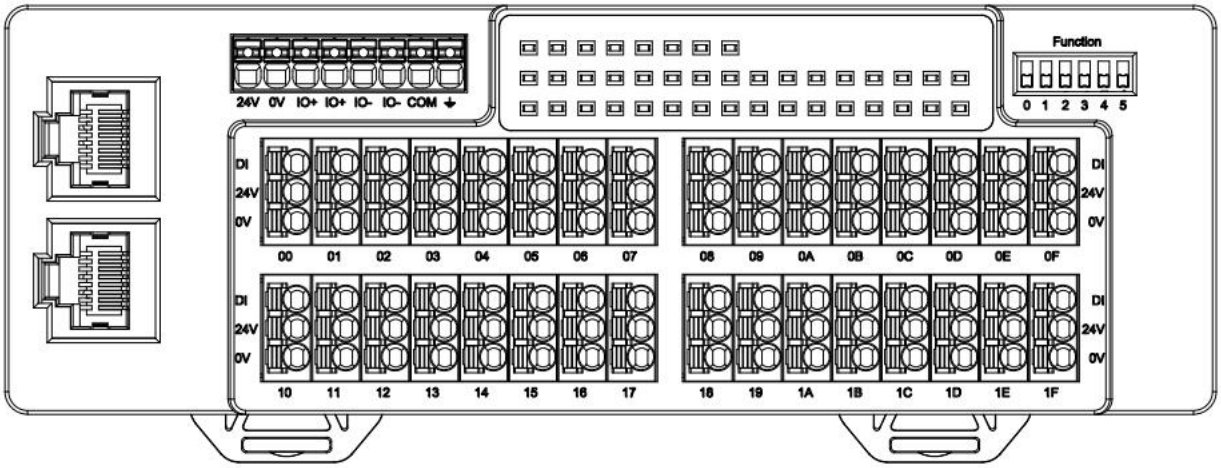
Warning

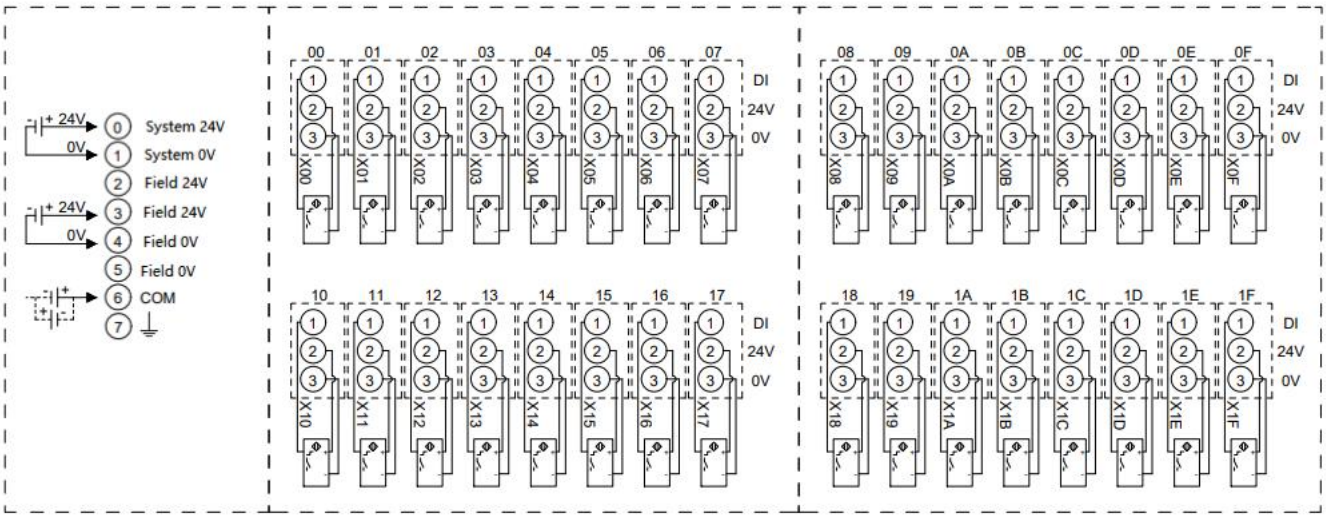
- Cable temperature: 80℃.

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6.3 Wiring diagram

6.3.1 PN5R-3200



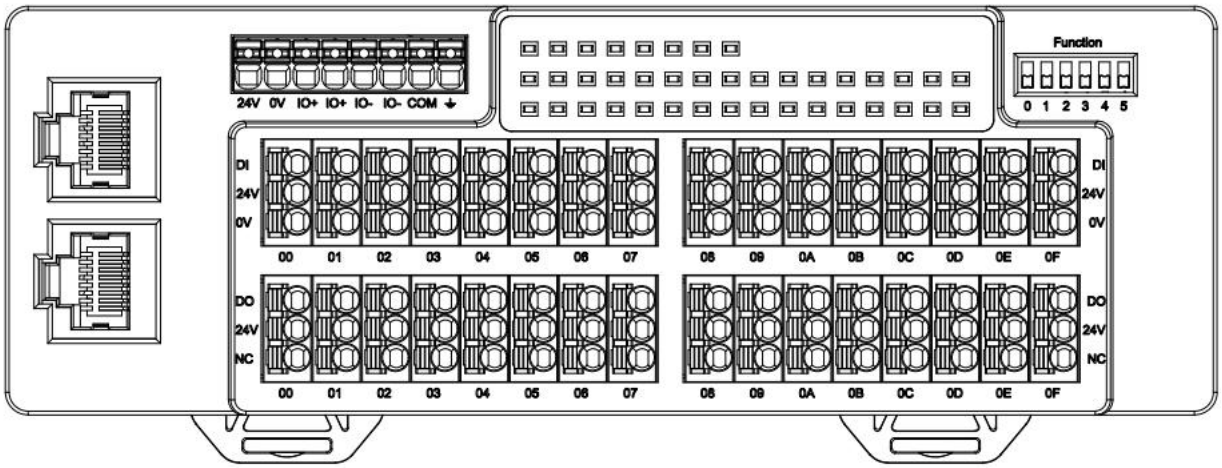


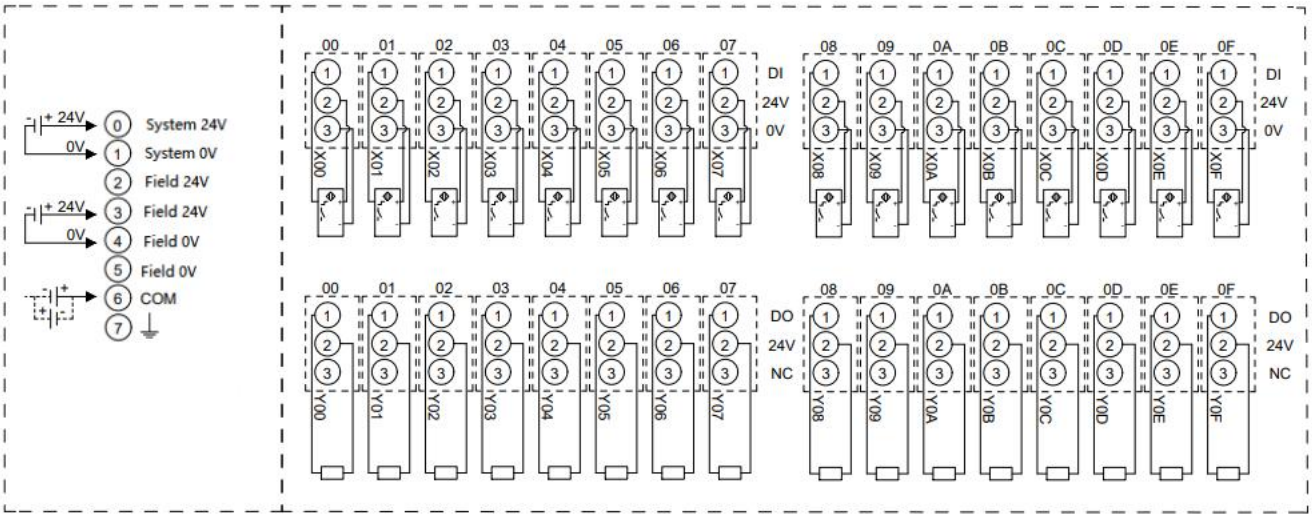
*24V internal conduction at the site; 0V internal conduction at the site.

*COM is the common terminal for DI, compatible with NPN/PNP.

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6.3.2 PN5R-1616A





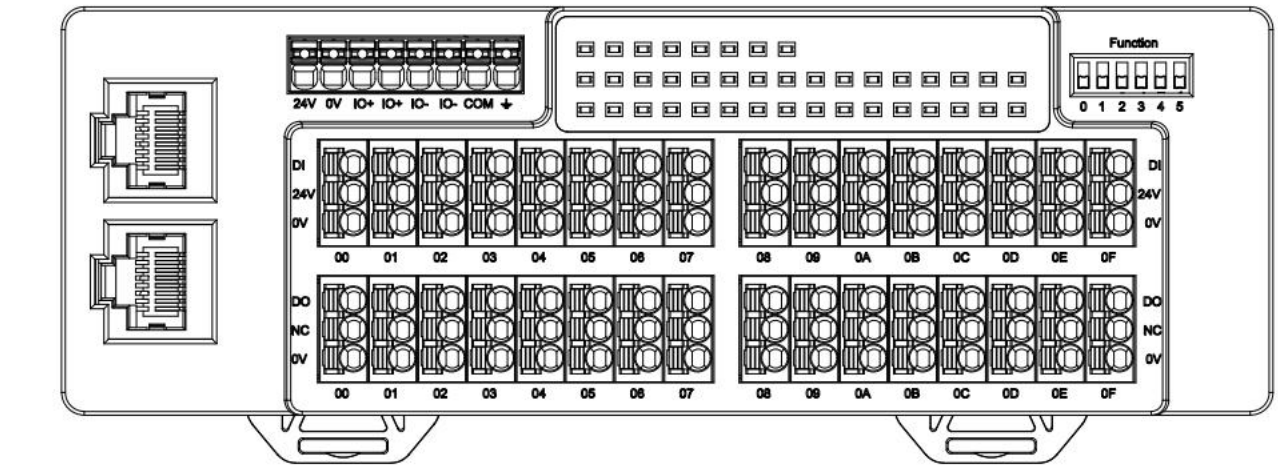
*24V internal conduction at the site; 0V internal conduction at the site.

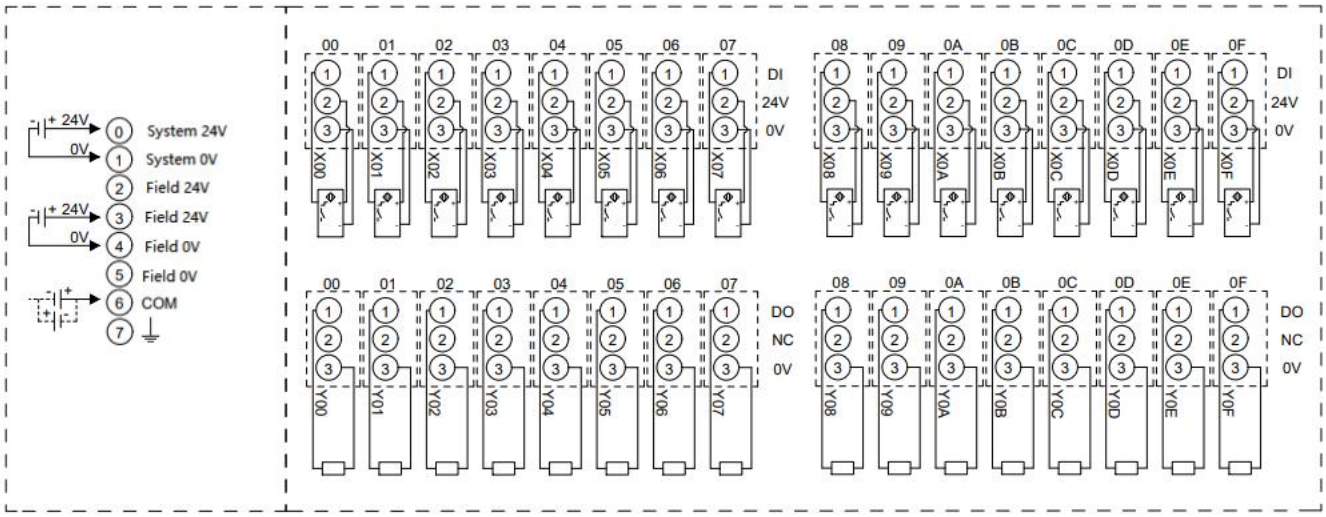
*COM is the common terminal for DI, compatible with NPN/PNP.

*NC internal conduction

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6.3.3 PN5R-1616B





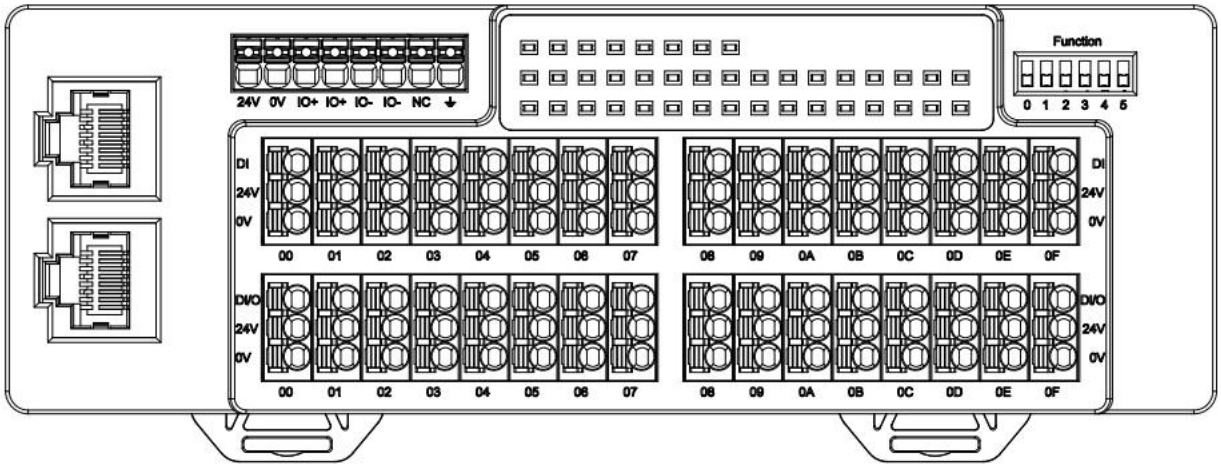
*24V internal conduction at the site; 0V internal conduction at the site.

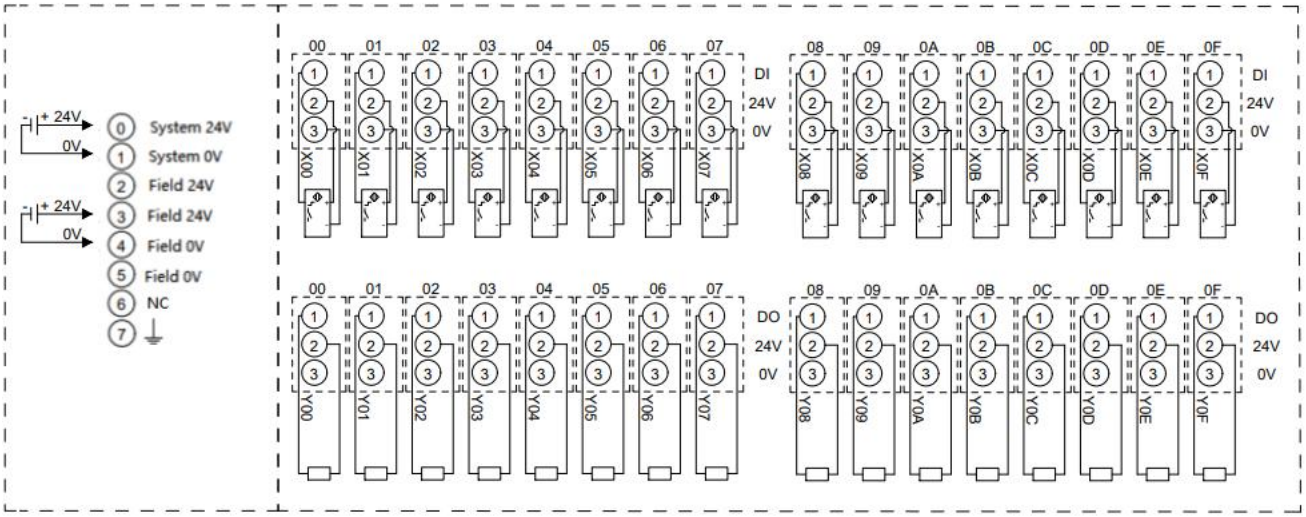
*COM is the common terminal for DI, compatible with NPN/PNP.

*NC internal conduction

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6.3.4 PN5R-1616A+



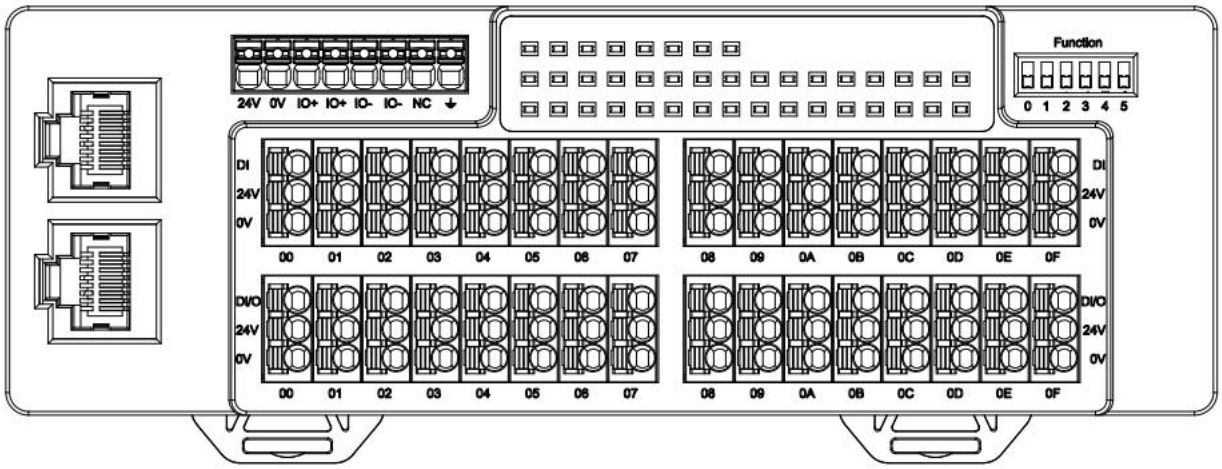


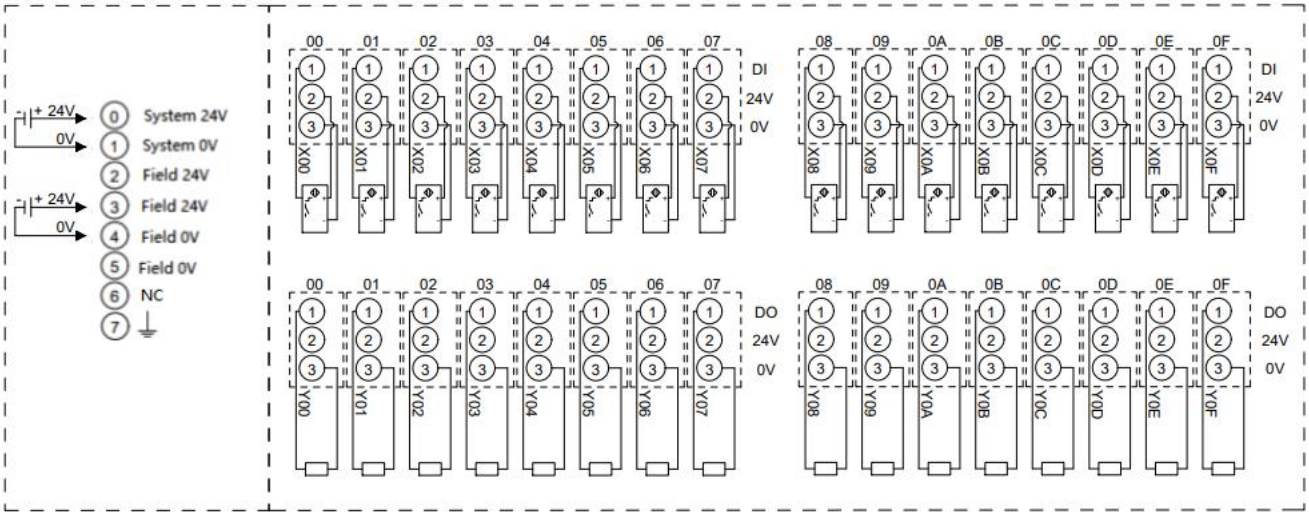
*24V internal conduction at the site; 0V internal conduction at the site.

*The DI port can only use NPN input.

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6.3.5 PN5R-1616B+



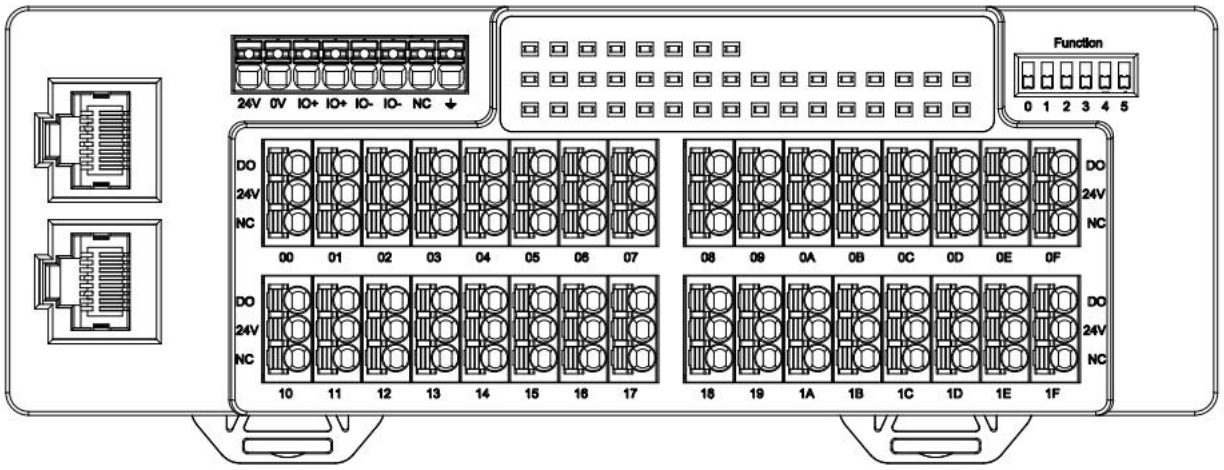


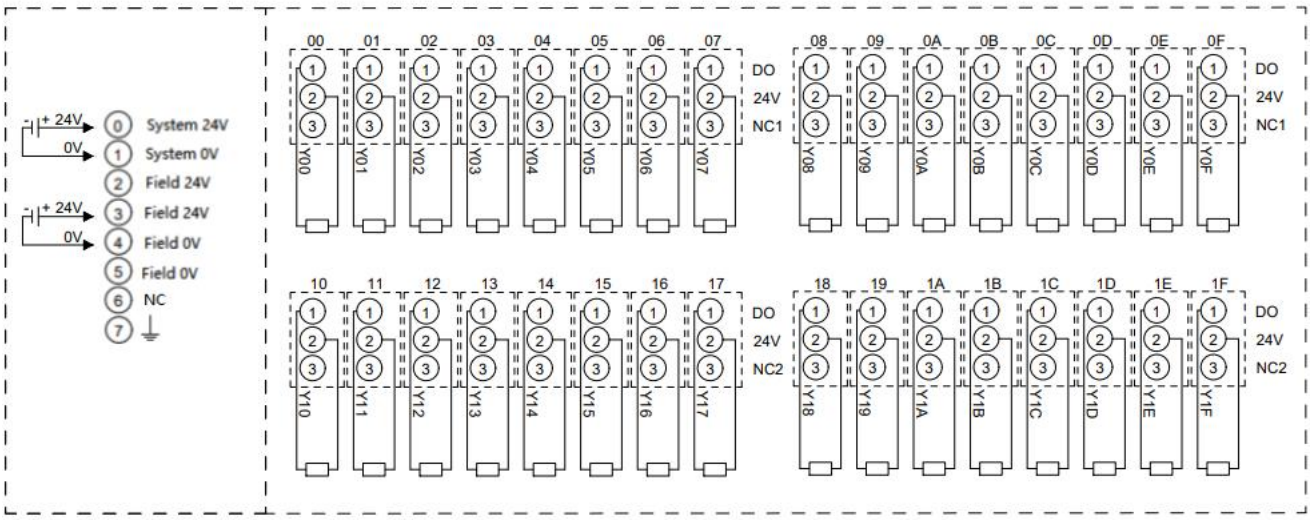
*24V internal conduction at the site; 0V internal conduction at the site.

*DI ports can only use PNP inputs.

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6.3.6 PN5R-0032A





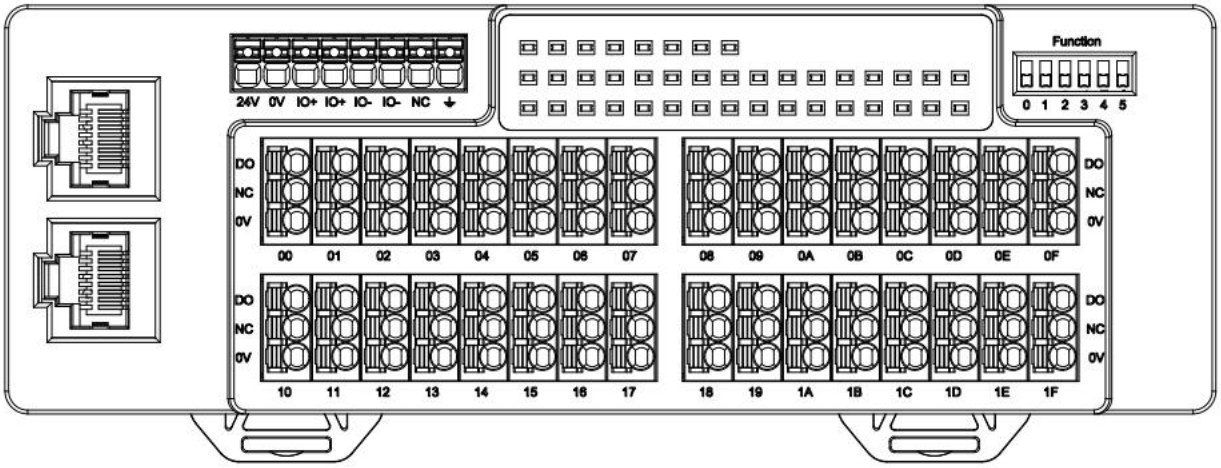
*24V internal conduction at the site; 0V internal conduction at the site.

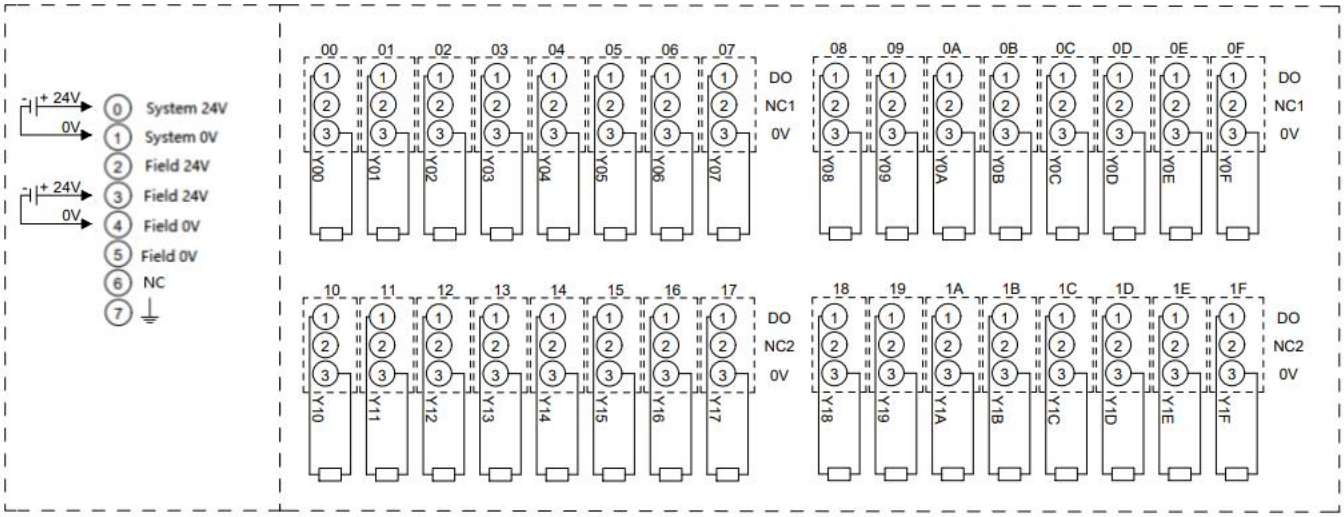
*NC1 is internally conductive; NC2 is internally conductive.

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6.3.7 PN5R-0032B





*24V internal conduction at the site; 0V internal conduction at the site.

*NC1 is internally conductive; NC2 is internally conductive.

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7 Use

7.1 Parameter Description

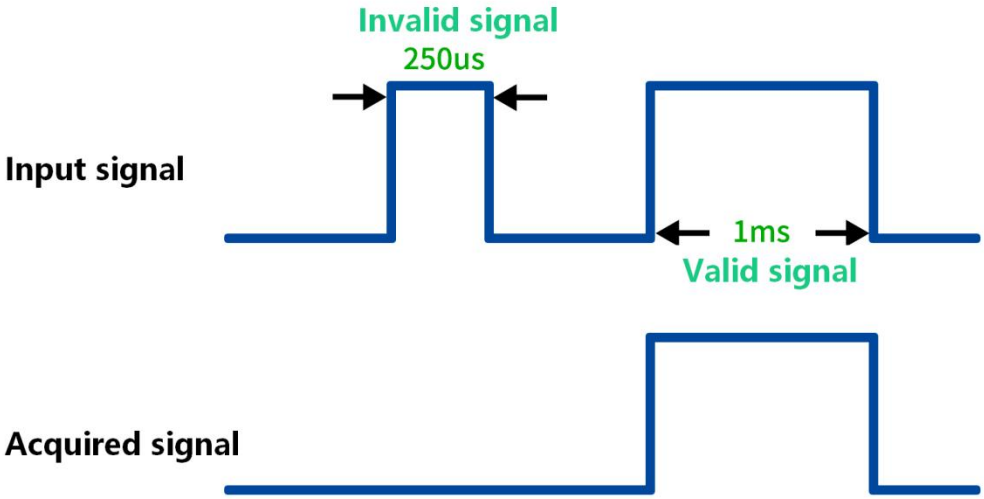
7.1.1 Digital input filtering

Digital input filtering prevents unexpected rapid changes in input signals from causing switch contact skipping or electrical noise. Digital input filtering supports single-module settings; each module can be configured independently, but individual channels cannot.

The default setting for the digital input Filter Time is 3ms, with supported settings of no filtering, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, and 20ms. When configured to 3ms, noise within 3ms can be filtered out. A 3ms input filter time means that a single signal transitioning from "0" to "1" or from "1" to "0" must take 3ms to be detected; single high or low pulses shorter than 3ms will not be detected.

Function Description: When the input filter is configured to 1ms, noise within 1ms can be filtered out. As shown in the figure below, a signal input of 250us will be considered an invalid signal; single high or low pulses shorter than 1ms will not be detected; signals of 1ms and longer can be acquired.

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7.1.2 Clear/hold digital output signal

The Clear/Hold function is for modules with output channels. This function configures the output mode of the output channels when the module is not in an OP state (stopped from operation or with the module's network cable disconnected). This parameter supports the following output states:

Clear output: When communication is disconnected, the module output channel will automatically clear the output, i.e., output 0.

Output valid value: When communication is disconnected, the module output channel continues to output a valid value, that is, output 1.

Retain the previous output value: When communication is disconnected, the module output channel retains the previous output value.

The digital clear and retain function supports both module-wide settings (template mode) and single-channel settings (single-channel mode). Any channel can be configured using either single-channel mode or template mode, with single-channel mode having higher priority than template mode. Specific configuration methods are shown in the table below; the default is module-wide clear output.

Clear and hold parameters of digital output module

Parameter name	Parameter meaning	Parameter values	Parameter value meaning	default value
TemplateMode	Template mode	1	PresetLow clears the output, i.e., outputs 0.	1
		2	PresetHigh outputs a valid value, i.e., 1.	
		3	KeepMode retains the previous output value.	
Channel x	Single-channel mode settings	0	TemplateValue is the template mode value, meaning single-channel mode is not enabled.	0
		1	PresetLow clears the output, i.e., outputs 0.	
		2	PresetHigh outputs a valid value, i.e., 1.	
		3	KeepMode retains the previous output value.	

7.1.3 Protocol alarm switch

The Protocol Alarm Switch is enabled by default. Setting it to disabled disables protocol-related alarm functions. See below for protocol alarm codes.7.2.2 Protocol Alarm Codes.

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7.2 Alarm code information

7.2.1 Process data alarm codes

When the digital module is set to the Alarm version, the alarm code is reported in the module's uplink data, as detailed in the table below.

Error code	Meaning
0x0000	No fault
0x0001	Load-side voltage not connected
0x0002	DO output error
0x0010	Parameter setting error
0x0020	When the DI channel is adaptively set to 1, there is a possibility of an erroneous setting of the corresponding DO control address to 1.

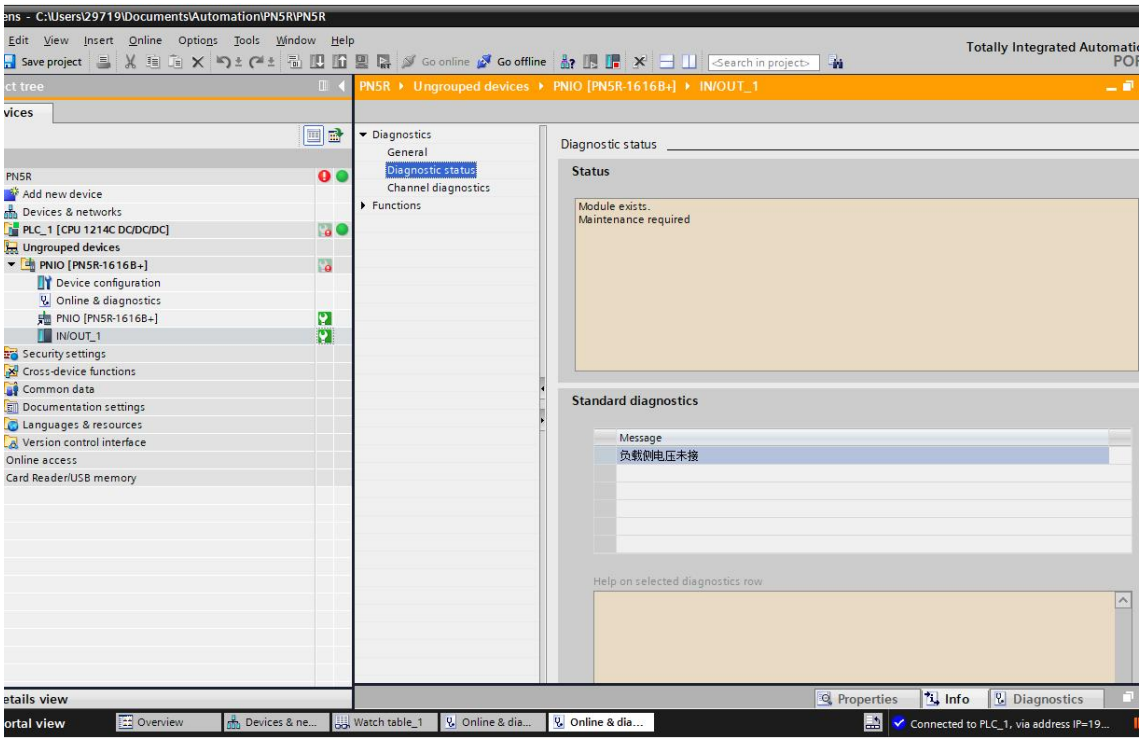
7.2.2 Protocol alarm codes

Type	Alarm codes	Alarm content
On-site voltage alarm	0x00C5	Load-side voltage not connected
Digital output alarm	0x1040	DO output error
	0x1041	Parameter setting error
	0x1042	When the DI channel is adaptively set to 1, there is a possibility of an erroneous setting of the corresponding DO control address to 1.

7.2.3 Viewing Protocol Alarm Codes

Taking TIA Portal V17 software as an example, when a device malfunctions during project operation, clicking the wrench icon to the right of the device name at the bottom of the project tree will display detailed diagnostic status and alarm information, as shown in the figure below. The prompt indicates that the power is disconnected, and you can check whether the power supply on the field side is connected.

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7.3 Module configuration instructions

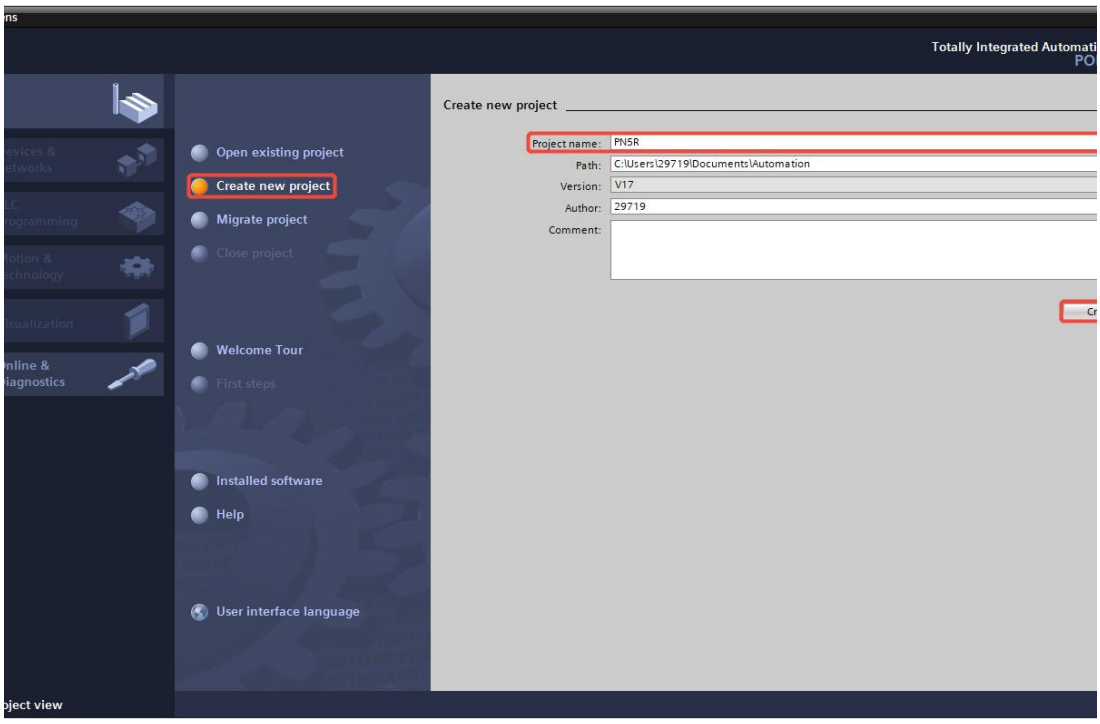
7.3.1 Application in the TIA Portal V17 software environment

1、Preparation

- **Hardware environment**
  - **Module preparation: This manual uses PN5R-1616B+-Alarm as an example.**
  - **One computer, pre-installed with TIA Portal V17 software.**
  - **One Siemens PLC; this instruction manual uses a Siemens S7-1200 CPU 1214C DC/DC/DC as an example.**
  - **Special shielded cable**
  - **One switching power supply**
  - **Device configuration file**
    Configuration file retrieval address:
    https://www.solidotech.com/cn/resources/configuration-files
- **Hardware configuration and wiring**
  Please follow the instructions.5 Installation and Removal"and"6. Wiring"Required Operation"

2、New construction projects

a. Open the TIA Portal V17 software, click "Create New Project", enter all the information and click the "Create" button, as shown in the figure below.



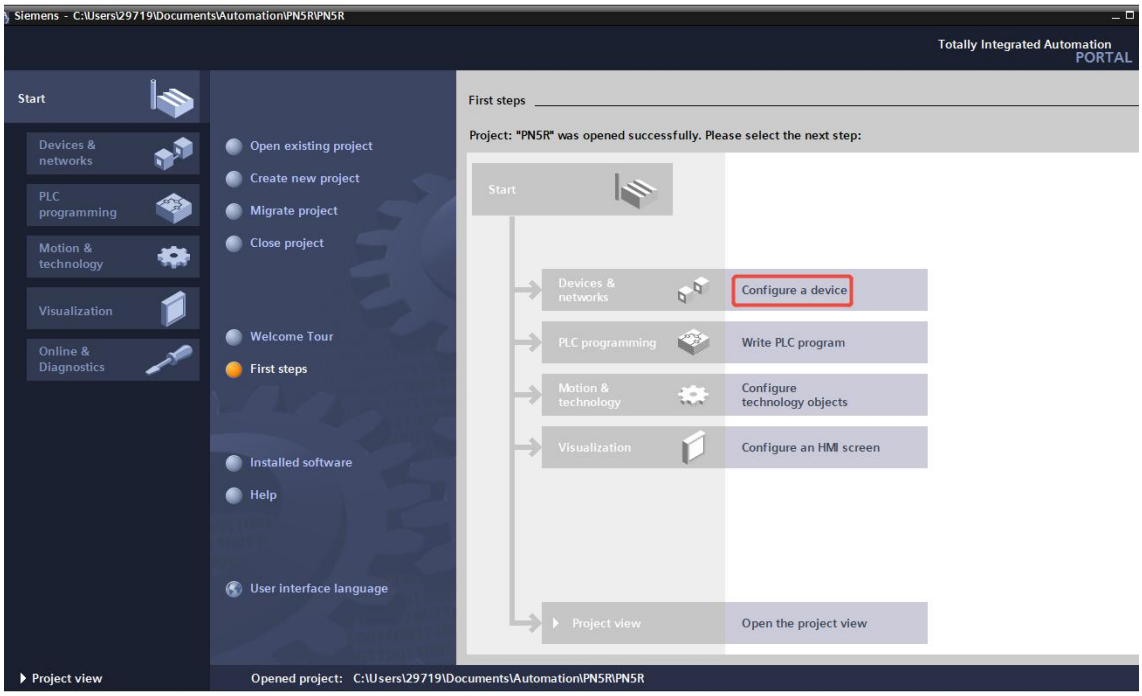
- Project name: Custom, you can keep the default.
- Path: The path where the project is saved. You can keep the default path.
- Version: You can keep the default.

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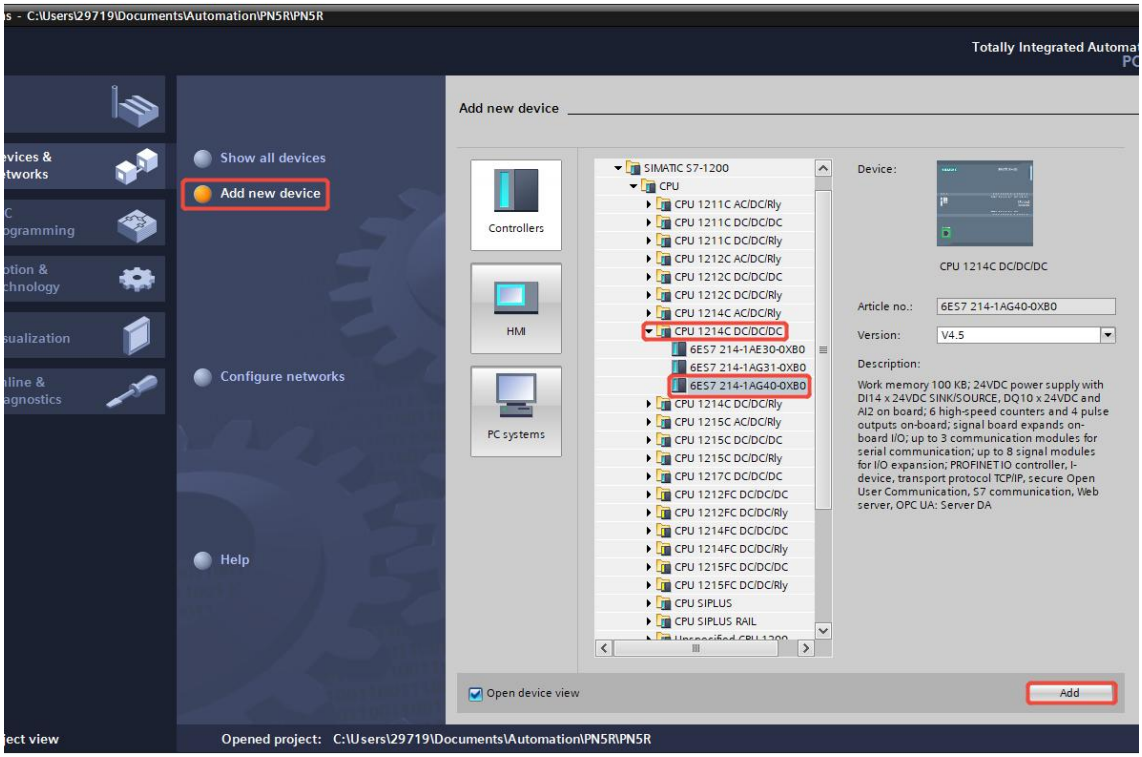
- Author: You can keep the default setting.
- Note: This is customizable and can be left blank.

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.

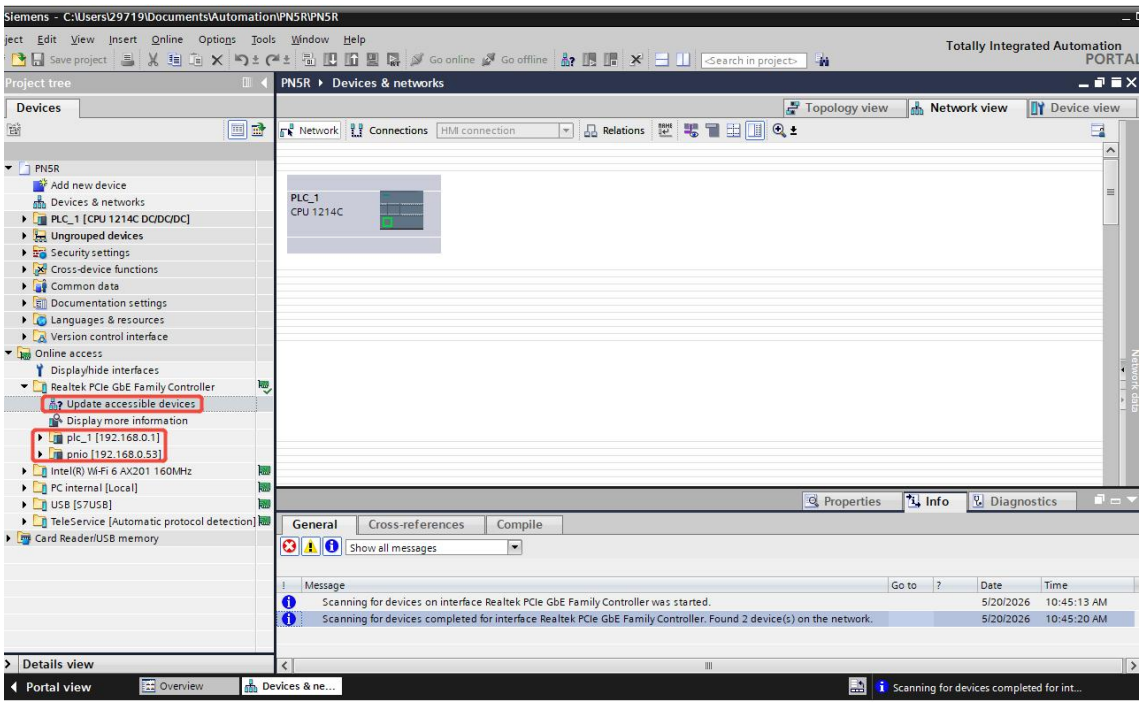


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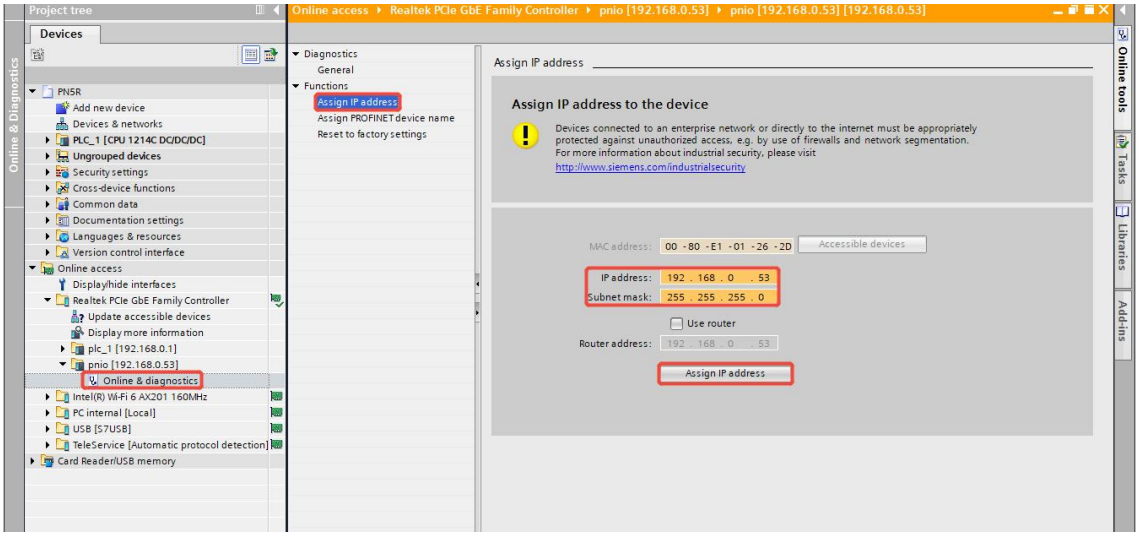
4、Scan connection device

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

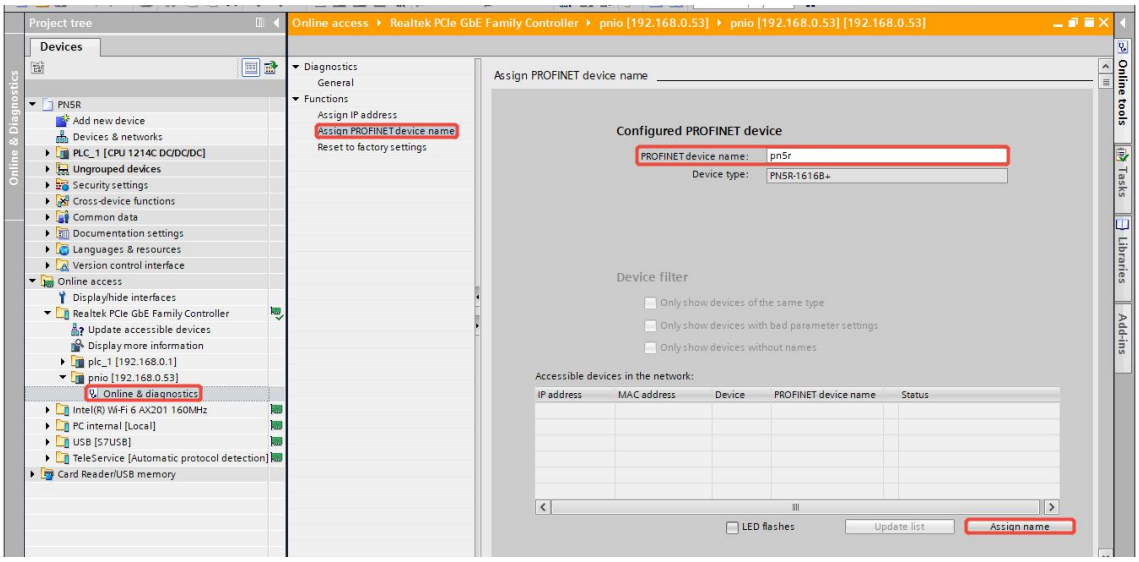
b. Double-click "Online and Diagnostics" under the slave device in the left navigation tree. Under the "Functions" menu, you can assign the IP address and device name to the current slave device. Click "Assign IP Address," first fill in the "Subnet Mask," then fill in the "IP Address," and click "Assign IP Address" at the bottom, as shown in the figure below.



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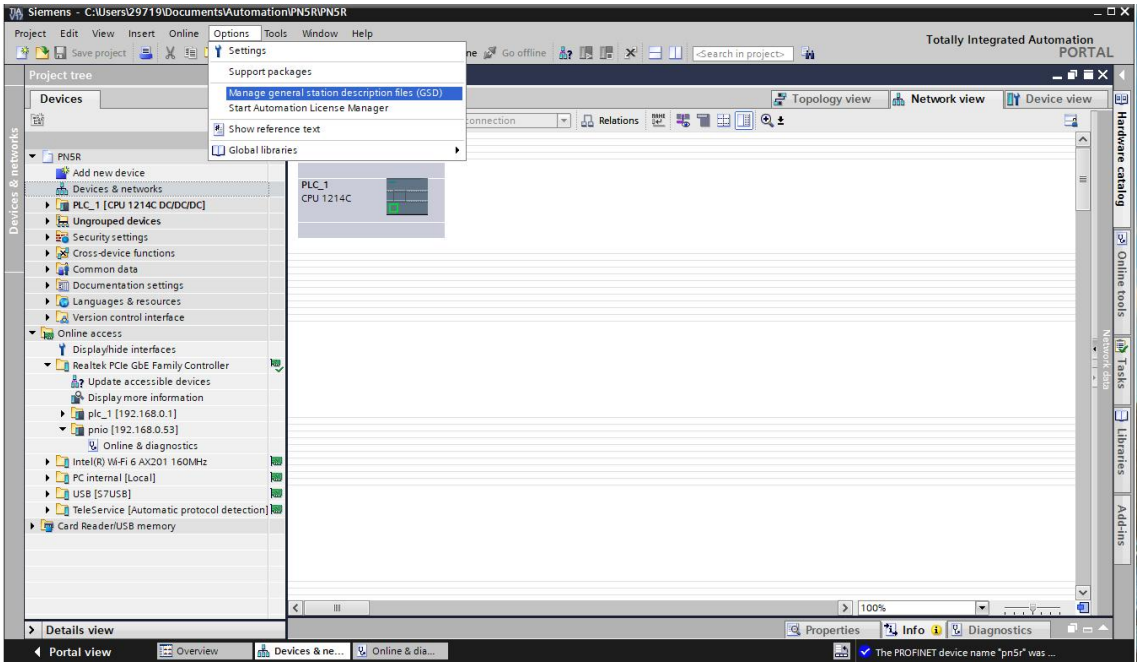
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c. Click "Assign PROFINET Device Name", enter the "Device Name", and click "Assign Name", as shown in the figure below.



5、Add GSD configuration file

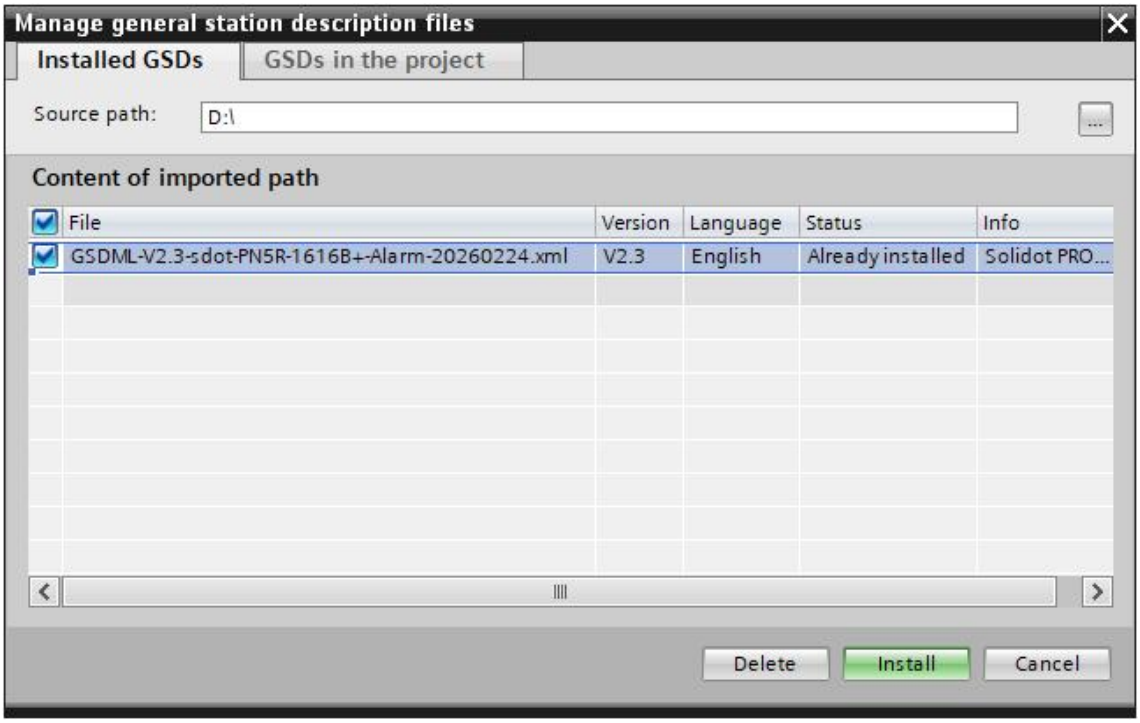
a. In the menu bar, select "Options -> Manage Generic Station Description Files (GSDML)(D)".As shown in the figure below.



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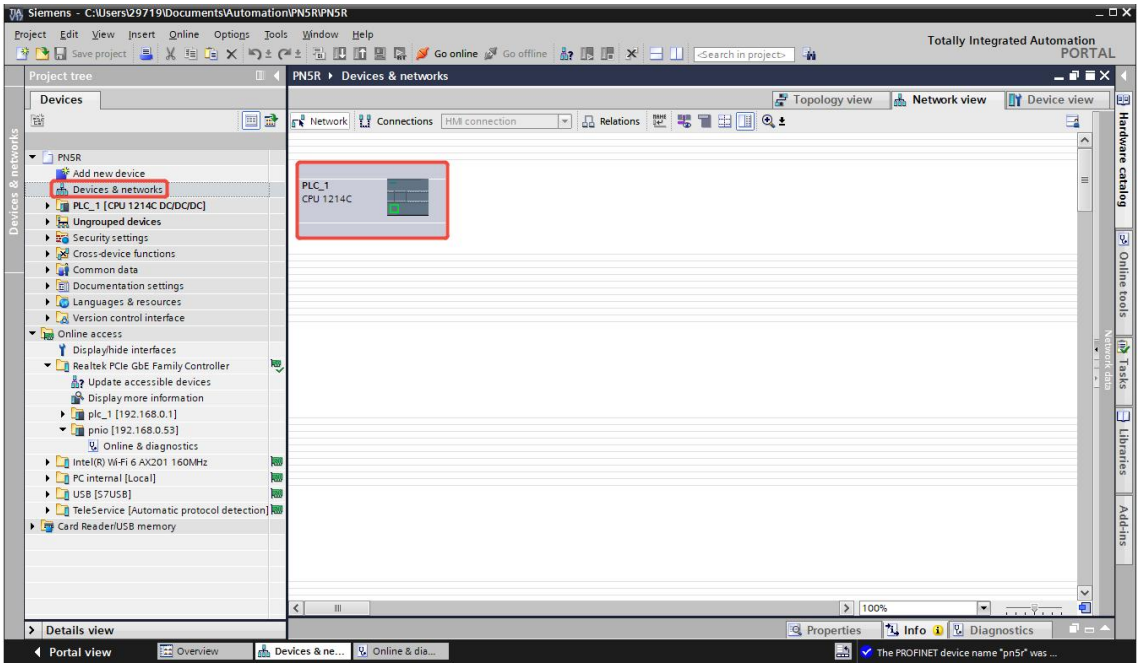
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b. Click "Source Path" to select the folder, and check if the status of the GSD file to be added is "Not Installed". If not, click the "Install" button; if already installed, click "Cancel" to skip the installation steps.As shown in the figure below.



6、Hardware detection and device addition

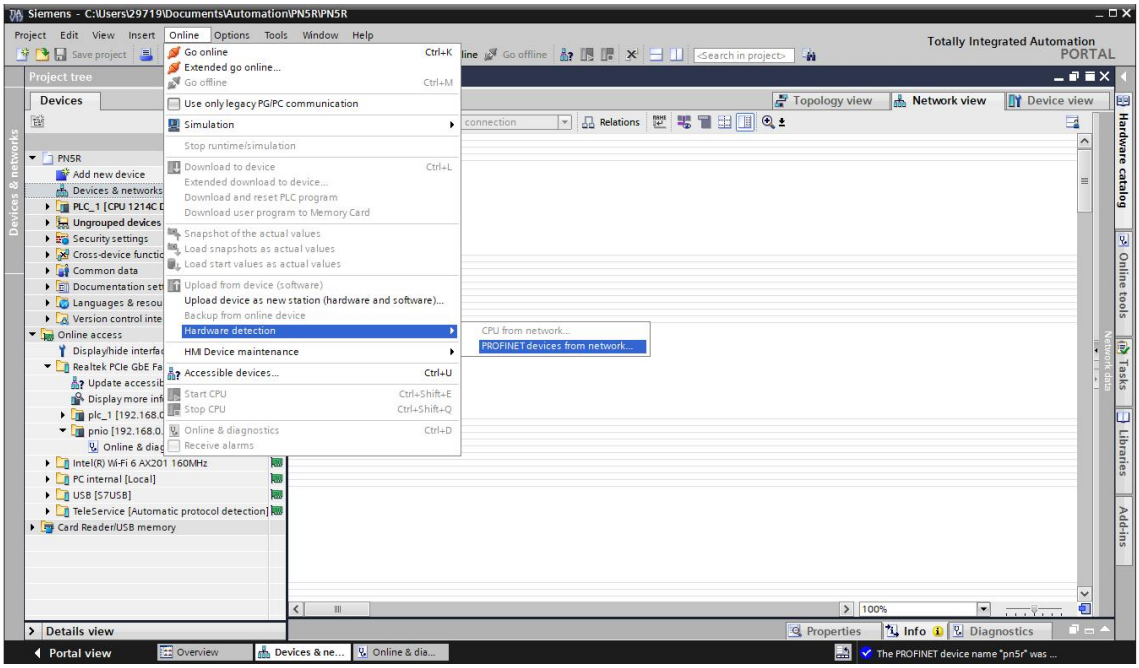
a. Double-click "Device and Network" in the left navigation tree, and select PLC in the network view, as shown in the figure below.



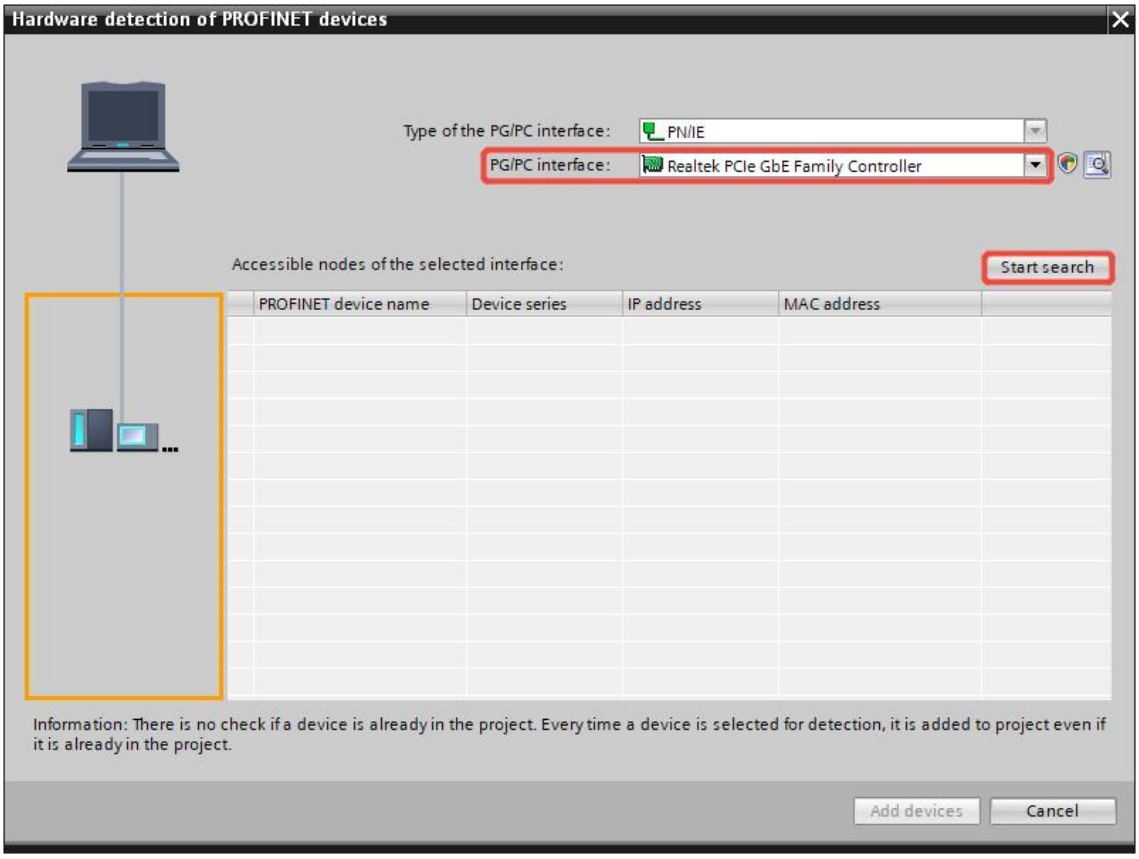
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b. In the menu bar, select "Online -> Hardware Detection -> PROFINET Devices in Network", as shown in the figure below.



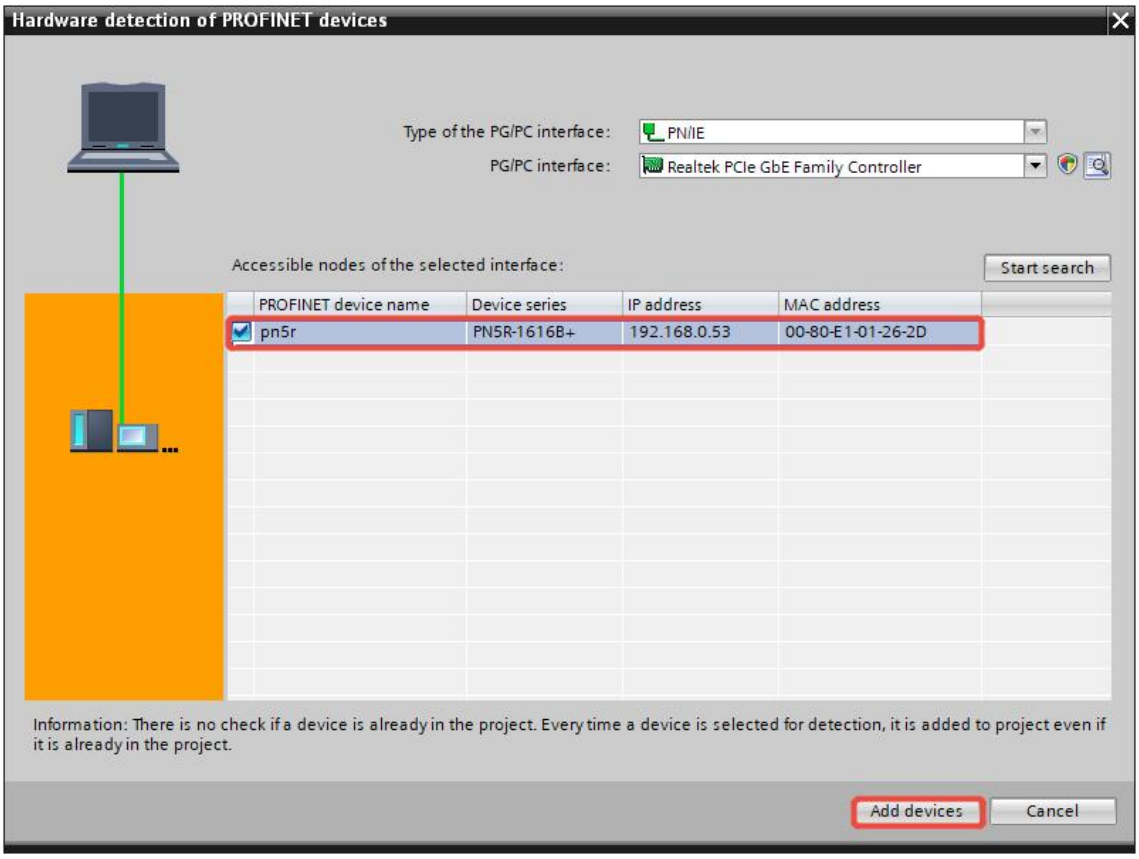
c. A hardware detection window will pop up. Select the correct PG/PC interface and click "Start Search", as shown in the figure below.



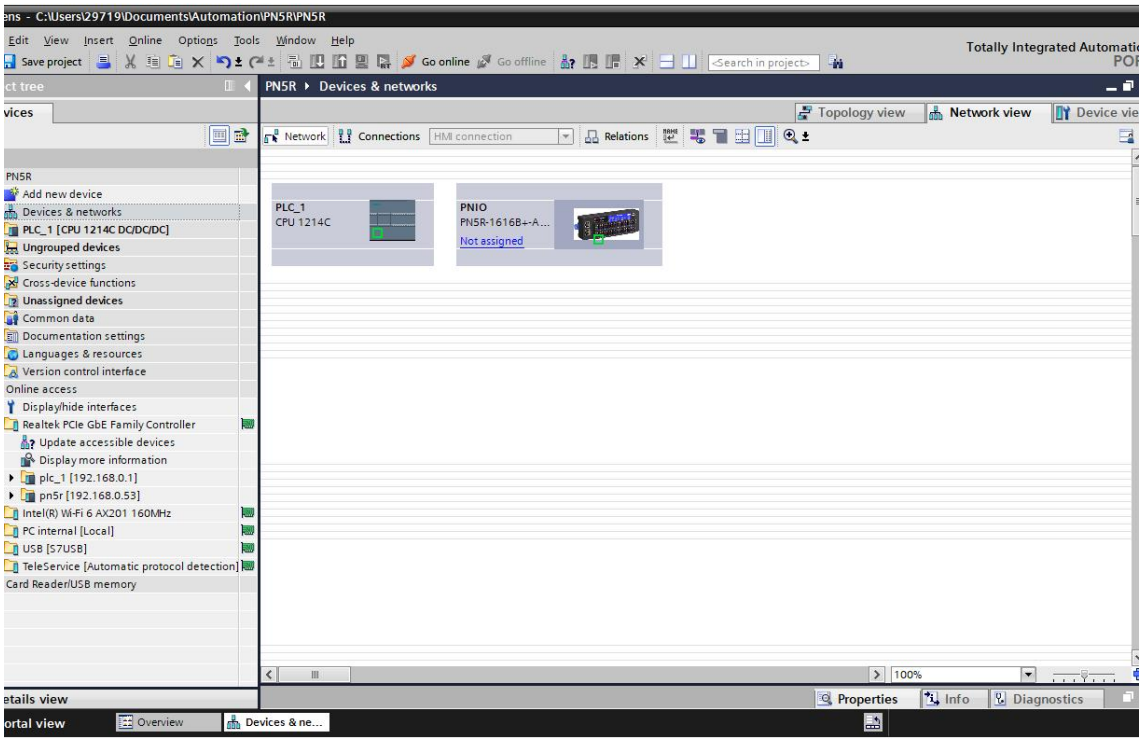
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d. To check the I/O modules in the network, select the I/O modules and click "Add Device", as shown in the figure below.



e. After the I/O module is successfully added, it can be seen in the network view, as shown in the figure below.



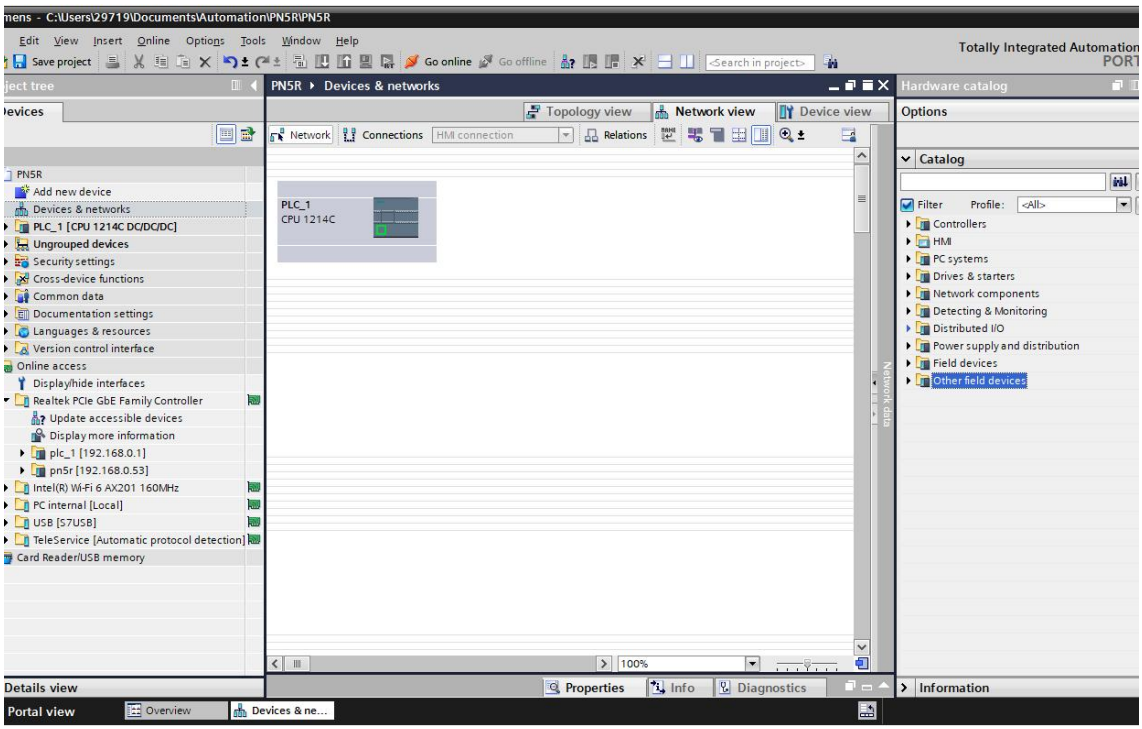
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7、Manually add slave devices

Besides adding devices through hardware detection, you can also add them manually, as detailed below.

a. Double-click "Devices and Networks" in the left navigation bar.

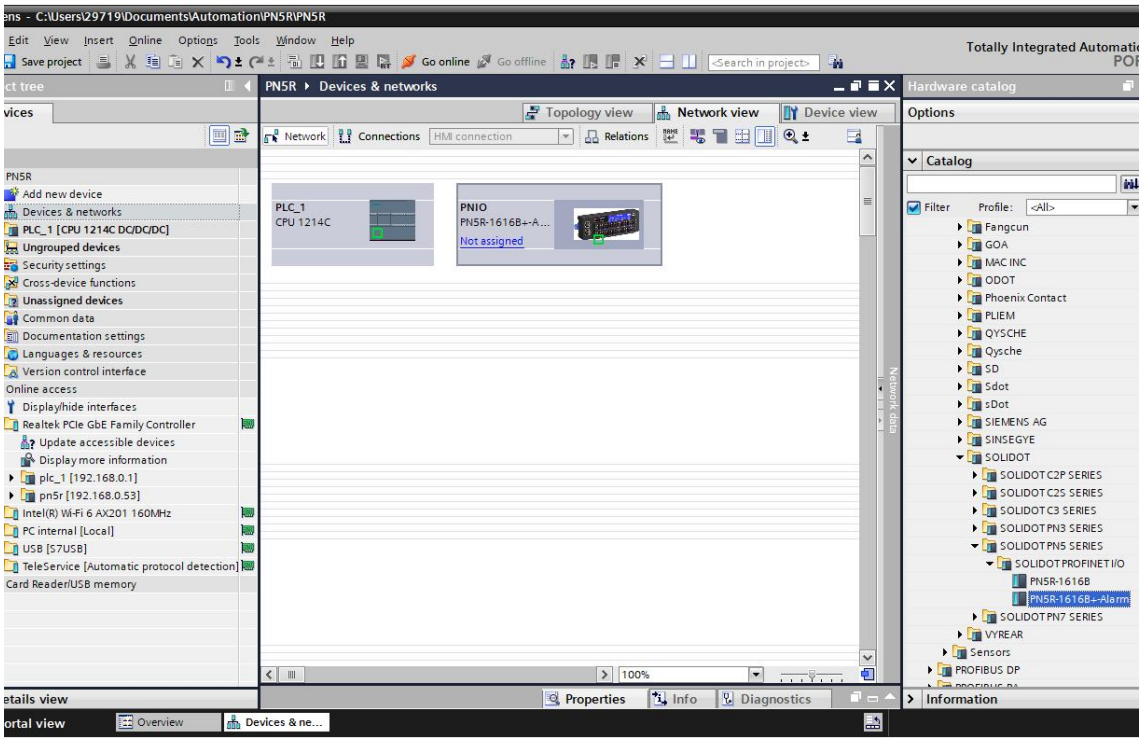
b. Click the vertical "Hardware Catalog" button on the right, and the catalog will be displayed as shown in the image below.



c. Select "Other field devices -> PROFINET IO -> I/O -> SOLIDOT -> SOLIDOT PN5 SERIES -> SOLIDOT PROFINET I/O", and drag or double-click PN5R-1616B+-Alarm to "Network View", as shown in the figure below.

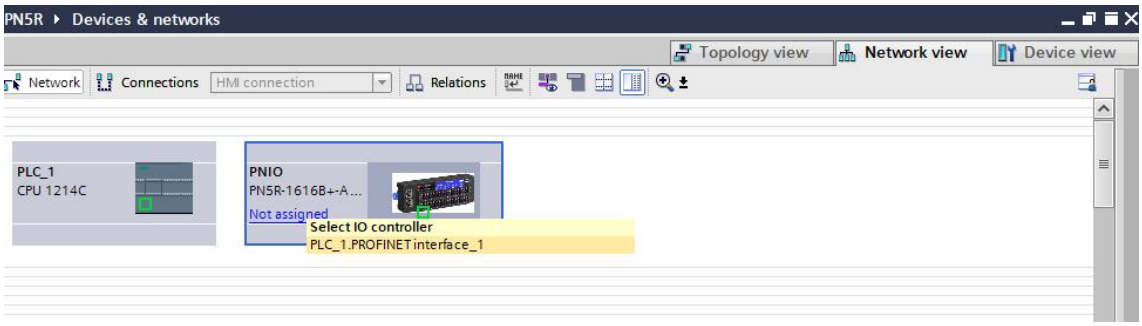
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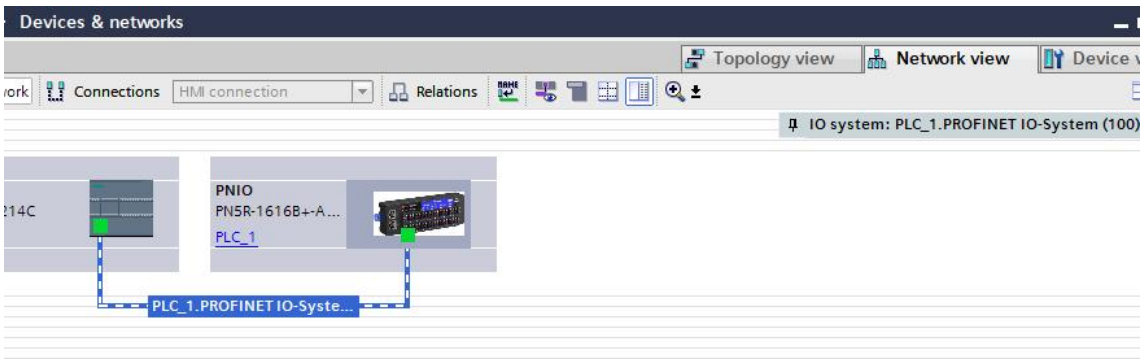


8、Connect controller

a. Switch to network view, click "Unassigned (blue text)" on the I/O module (i.e., slave device), and select "PLC_1.PROFINET Interface_1", as shown in the figure below.



b. Once the connection is complete, it will look like the image below.

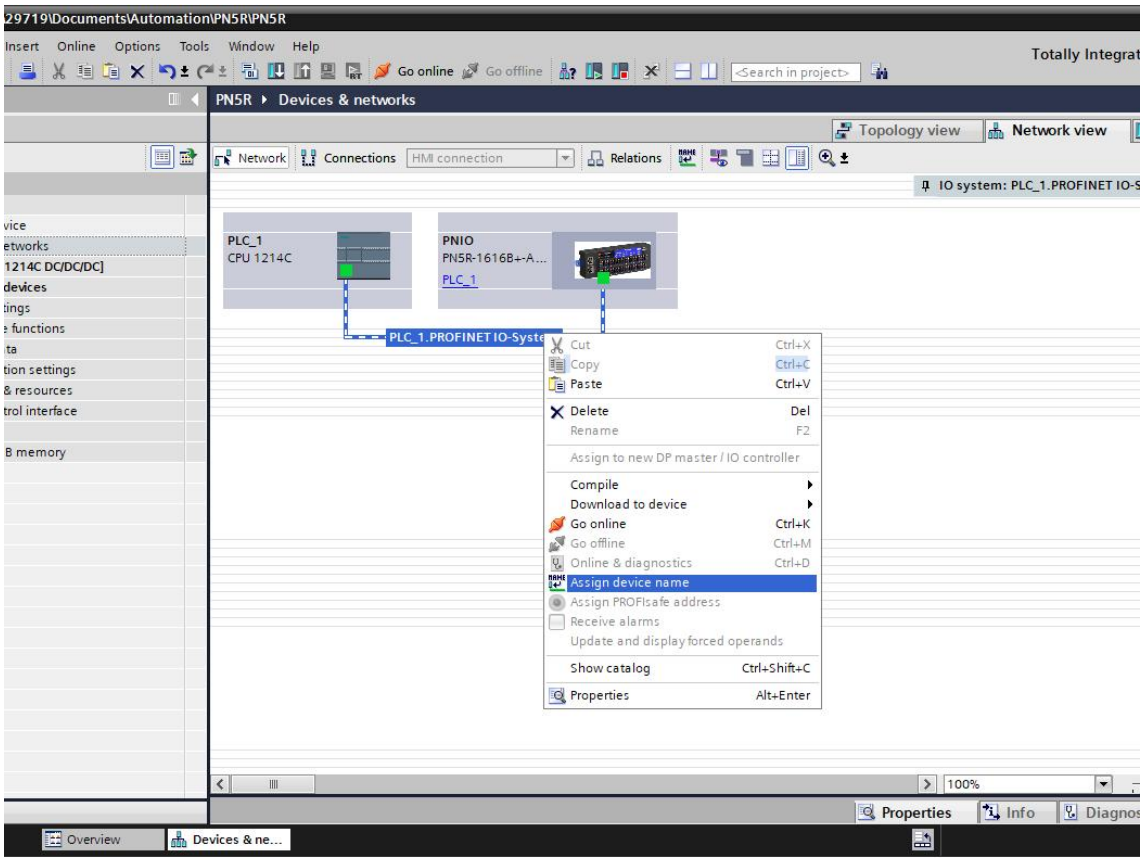


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9、Assign device name

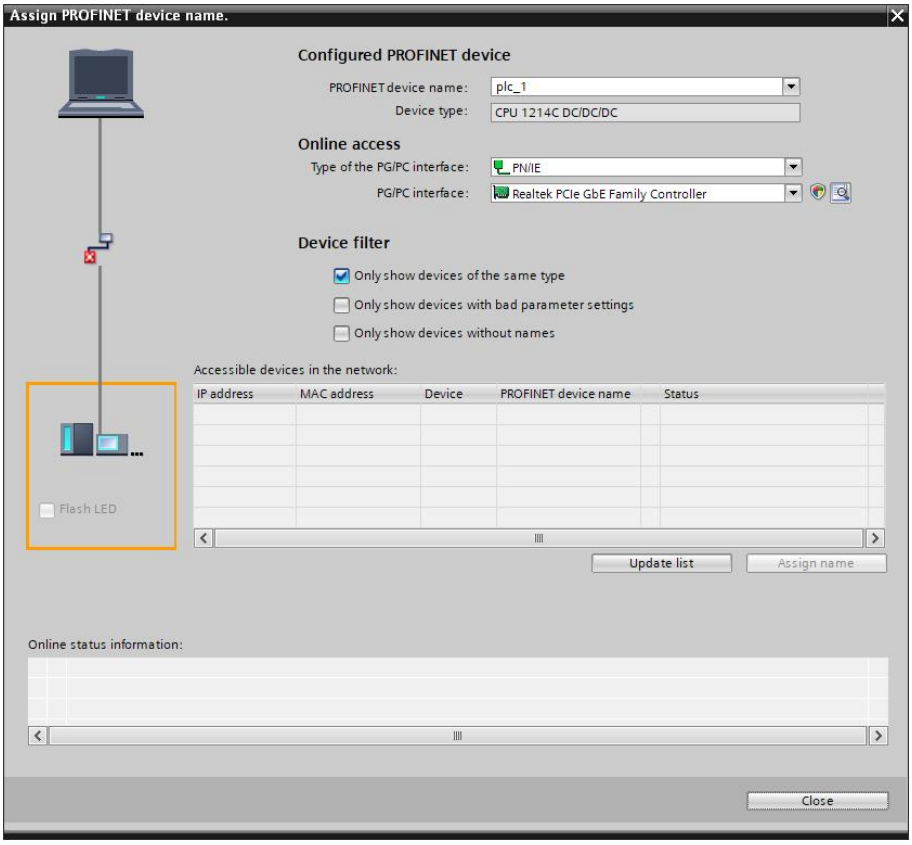
a. In the network view, right-click the connection cable between the PLC and the I/O module, and select "Assign Device Name", as shown in the figure below.



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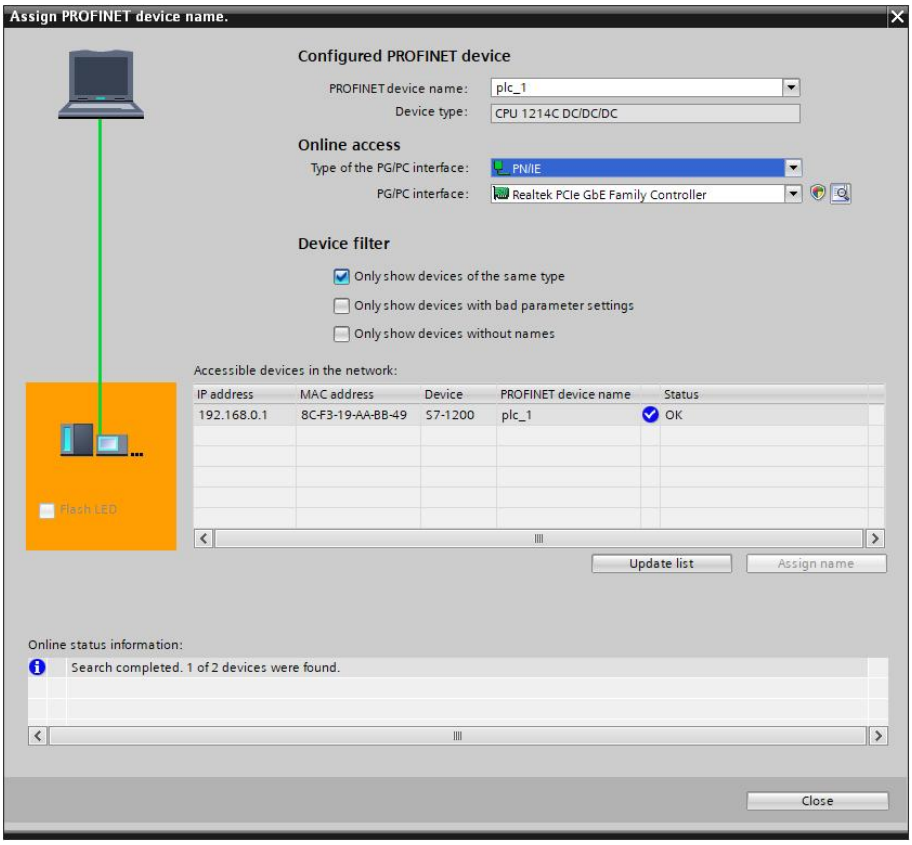
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b. A "Assign PROFINET Device Name" window will pop up, as shown in the figure below.



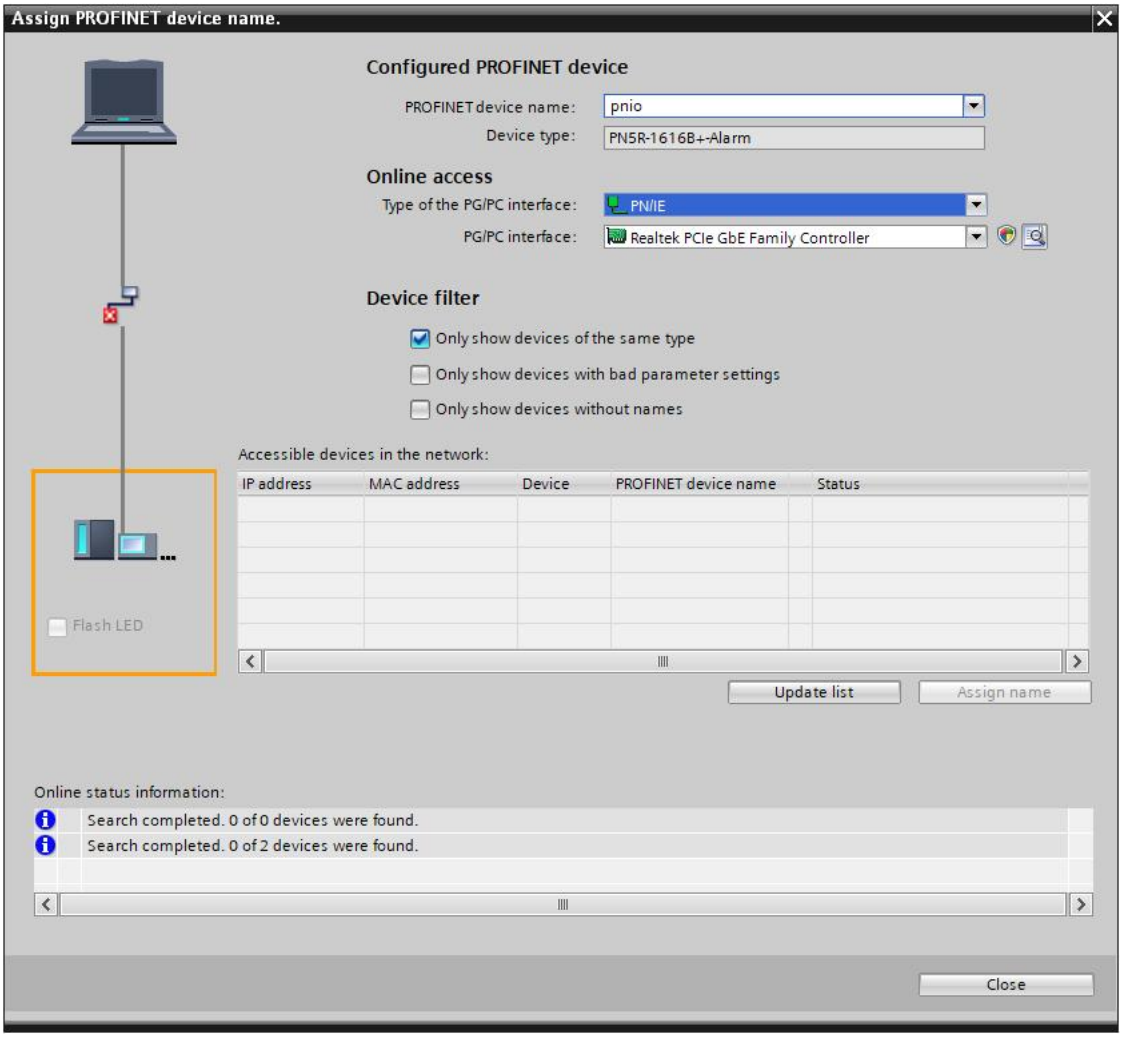
c. Select PLC as the device name, click "Update List", and the update will be completed as shown in the figure below.

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d. Check if the node's status is "OK" in "Accessible Nodes in the Network". If not, select the device and click "Assign Name".

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e. Select I/O module as the device name, click "Update List", and assign a name using the same method after updating, as shown in the figure below.

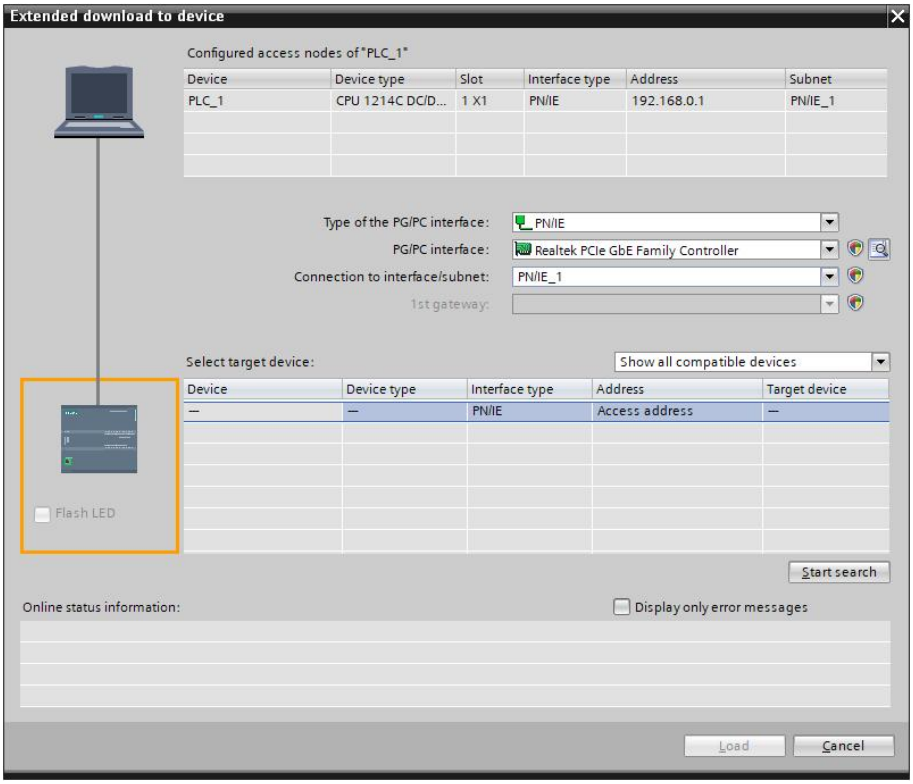
f. Check if the MAC address on the module's silkscreen matches the MAC address of the assigned device name. Click "Close".

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10、 Download configuration structure

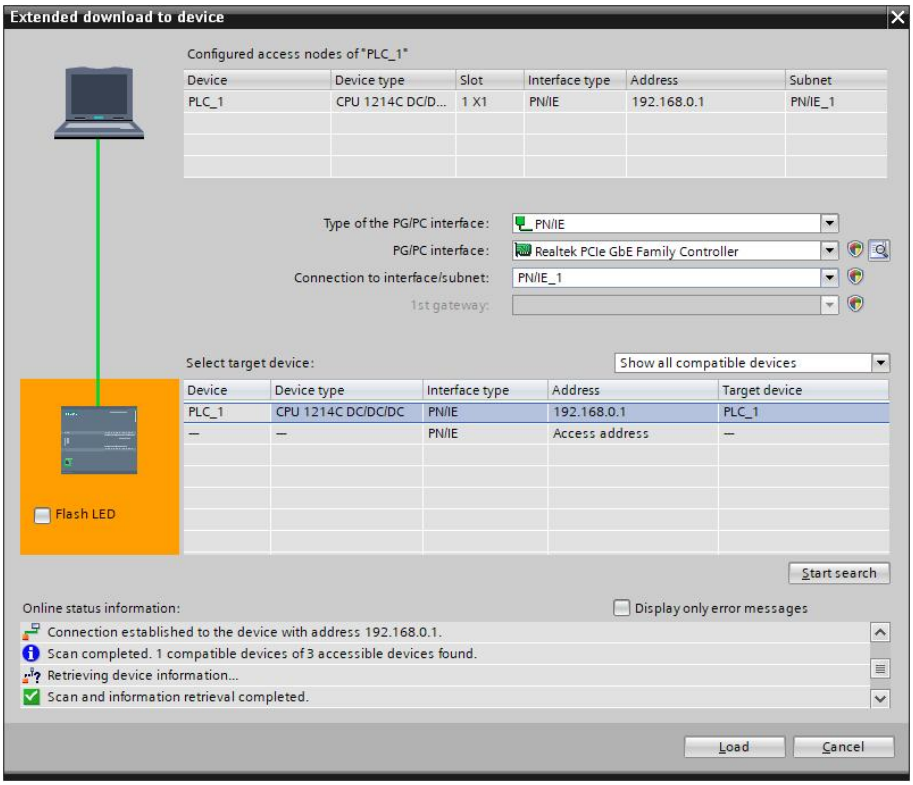
a. In the network view, select the PLC. First, click the Compile button in the menu bar, then click the Download button to download the current configuration to the PLC.

b. In the pop-up "Download extension to device" interface, configure as shown in the image below.

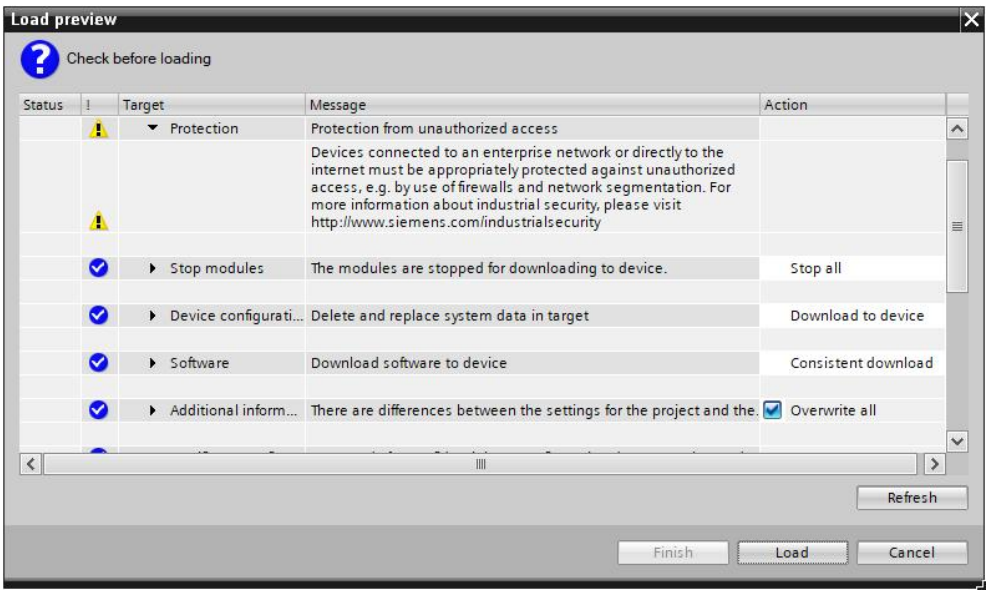


c. Click the "Start Search" button, as shown in the image below.

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d. Click "Download" to bring up the download preview window, as shown in the image below.



e. Click "Load".

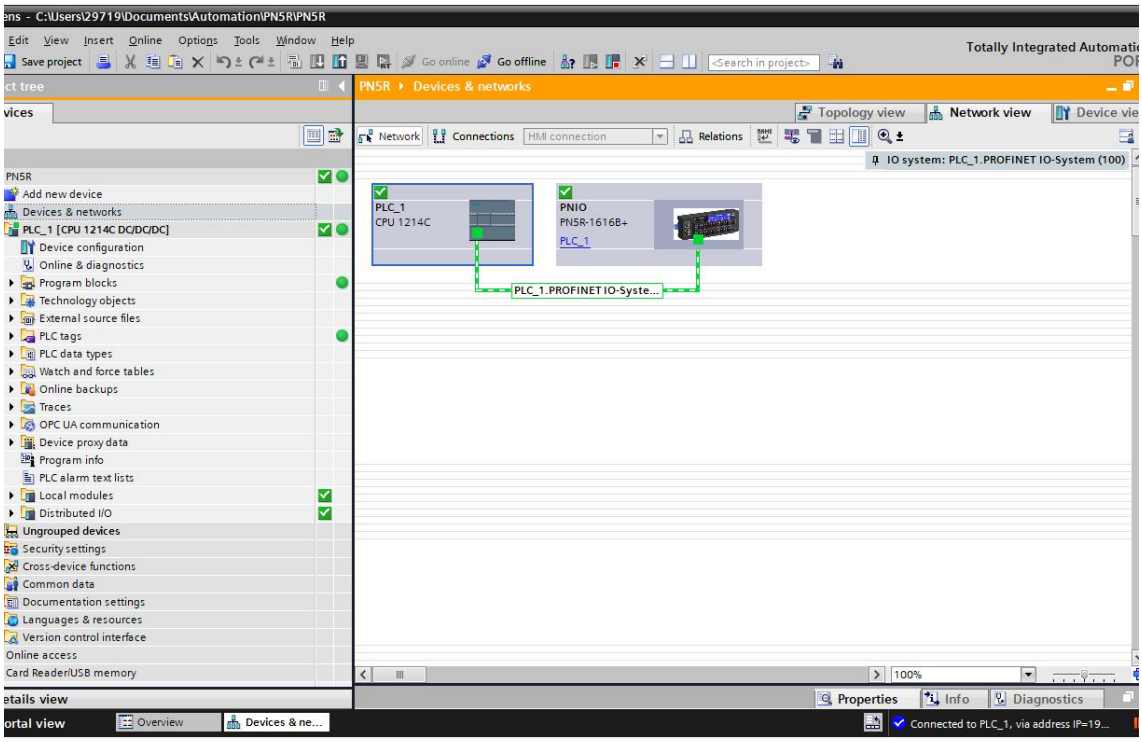
f. Click "Finish".

g. Power on the device again.

11、 Communication connection

a. Click the "Start CPU" button in the menu bar, then click the "Go to Online" button. If both icons are green, the connection is successful, as shown in the image below.

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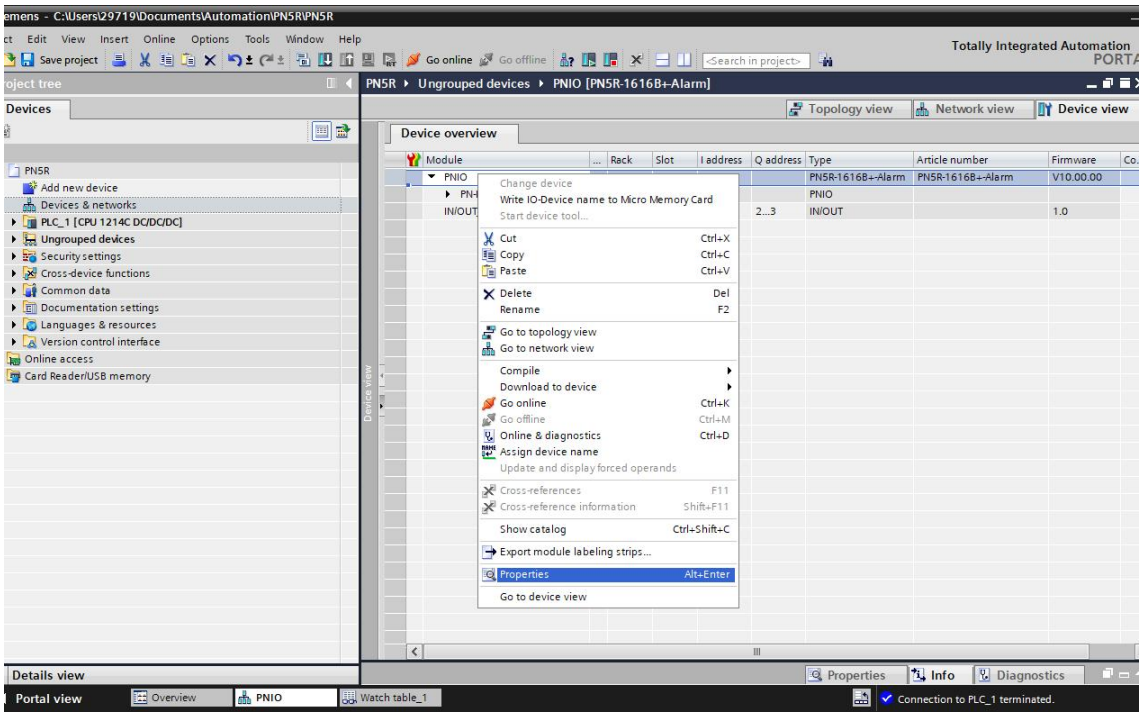


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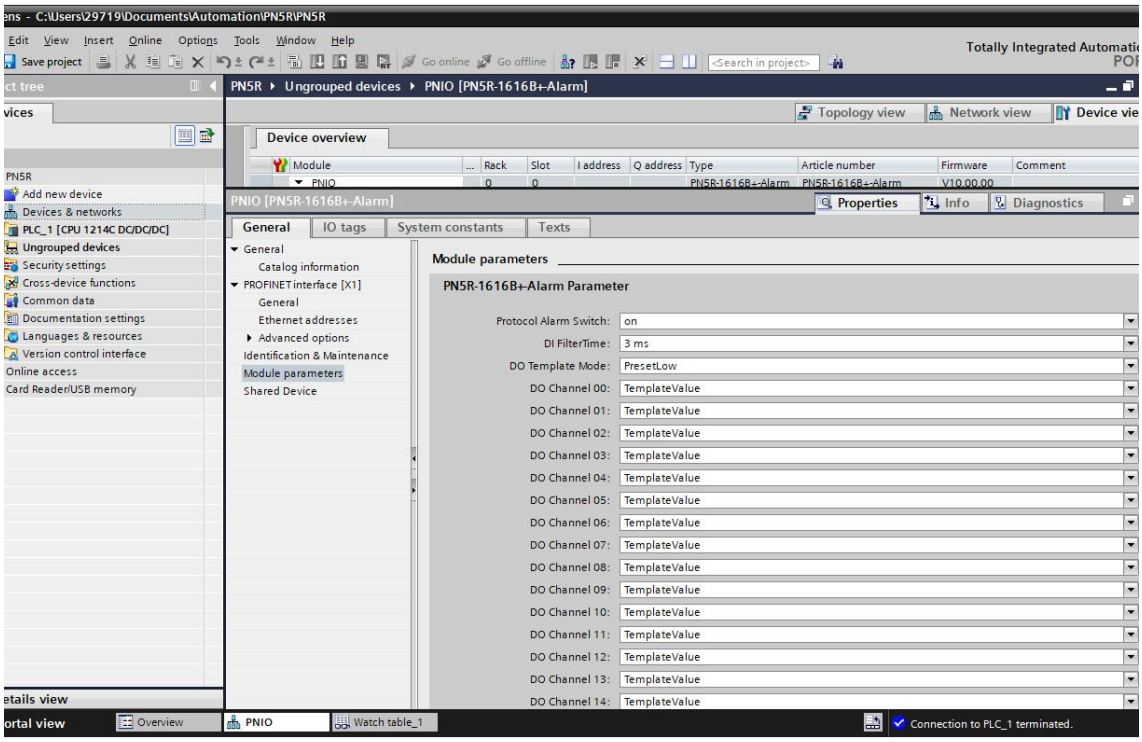
12、 Parameter settings

a. In offline mode, open "Network View", select the module, switch to Device View, right-click the PN5R-1616B+-Alarm module, and click the "Properties" button to view and set various parameters of the module, as shown in the figure below.



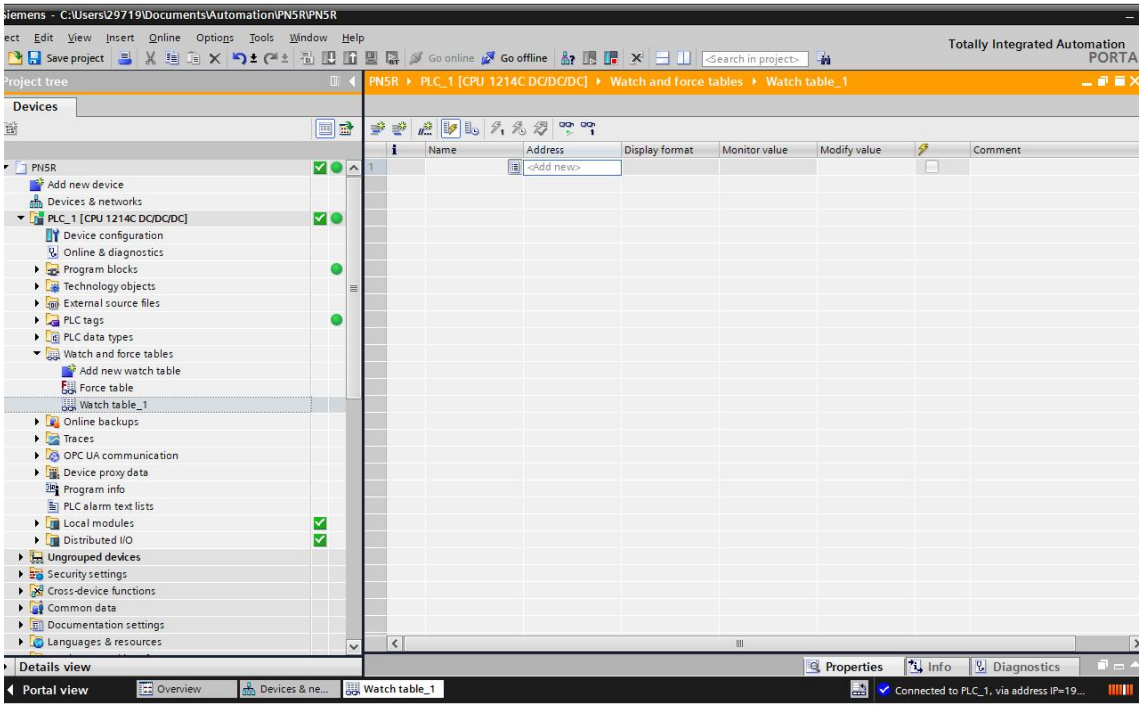
b. On the module properties page, click "Module Parameters," as shown in the image below. The parameters can be configured according to actual usage needs. After configuration, re-download the program to the PLC, and then power on both the PLC and the module.

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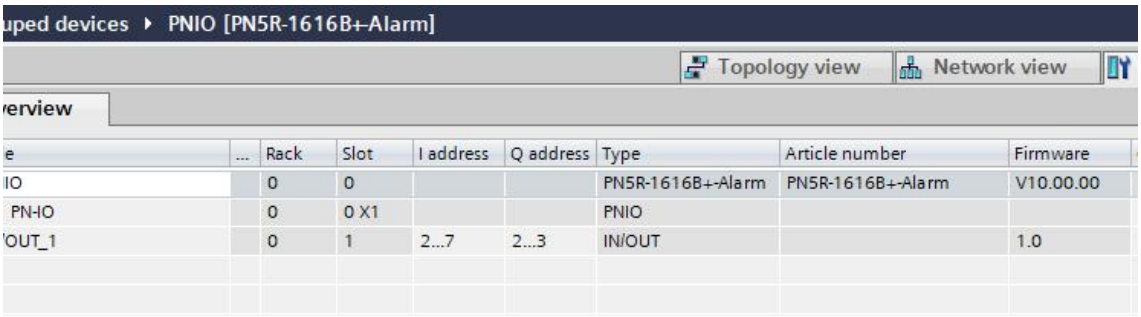
13、 Functional verification

a. Expand the project navigation on the left and select "Monitoring & Enforcement Tables".Double-click "Add New Monitoring Table" to add a new monitoring table, as shown in the figure below.

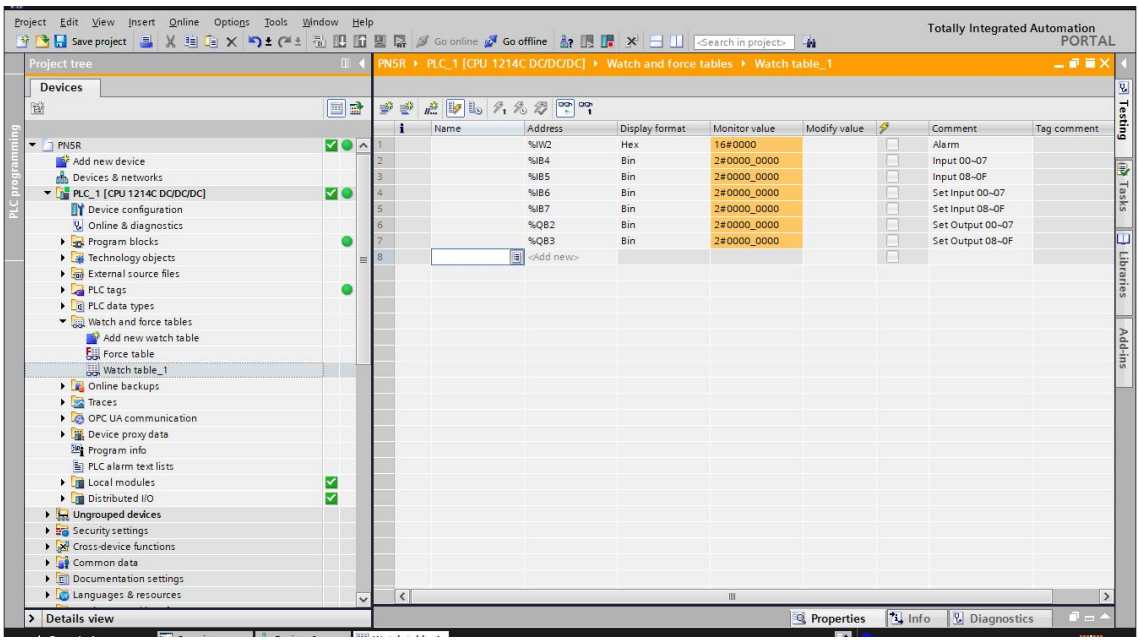


b. Open "Device View" and view the channel I address (address of input signal) and Q address (address of output signal) of each module in the device overview.
For example, the "I address" of the PN5R-1616B+-Alarm module is 2 to 7, and the "Q address" is 2 to 3, as shown in the figure below.

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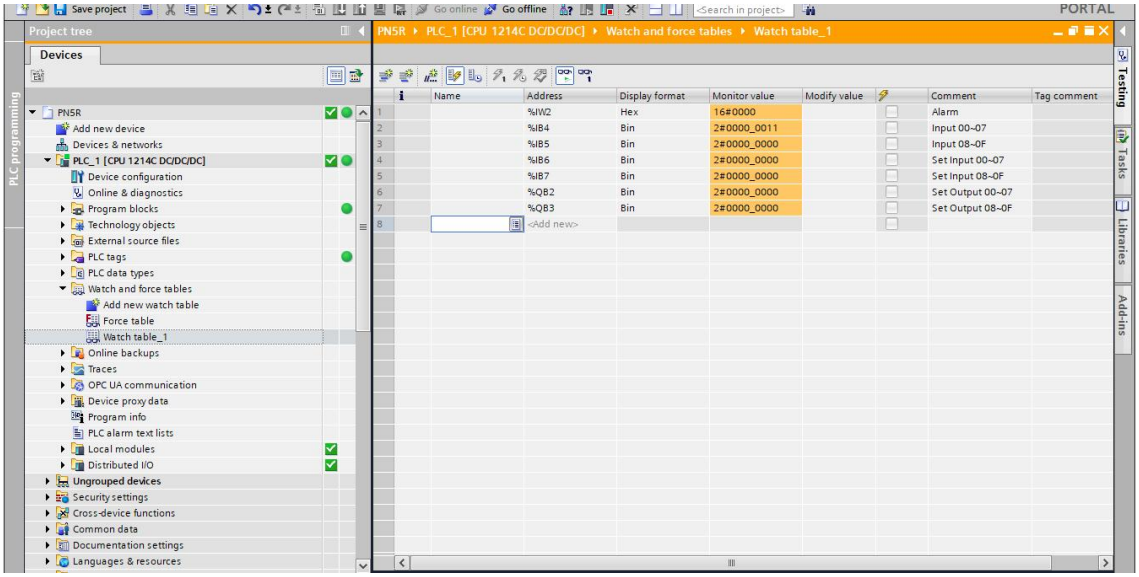


c. In the address cells of the monitoring table, enter the input and output addresses, such as "IW2" to "IB7", "QB2" to "QB3", and press "Enter". After completing all the entries, click [the command/button].  The button allows you to monitor the data, as shown in the image below.



d. Taking input channels 0 and 1 as an example, when there is a valid voltage input to input channels 0 and 1 of the PN5R-1616B+-Alarm module, it can be observed in the monitoring value cell of the monitoring table, as shown in the figure below.

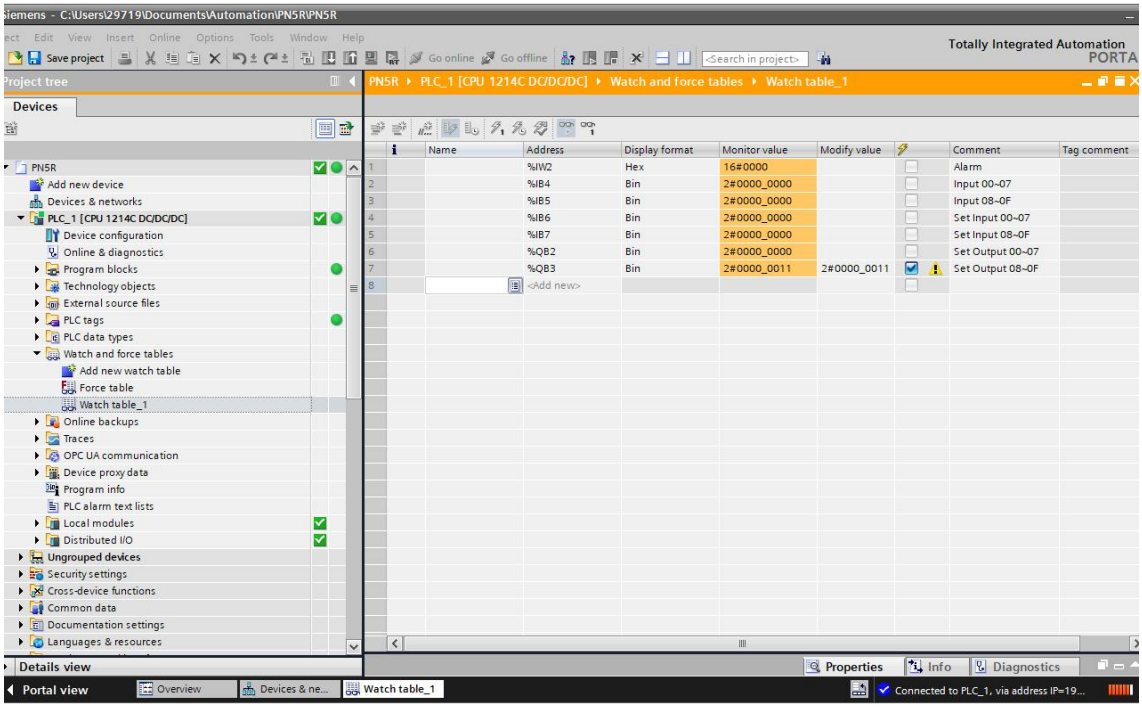
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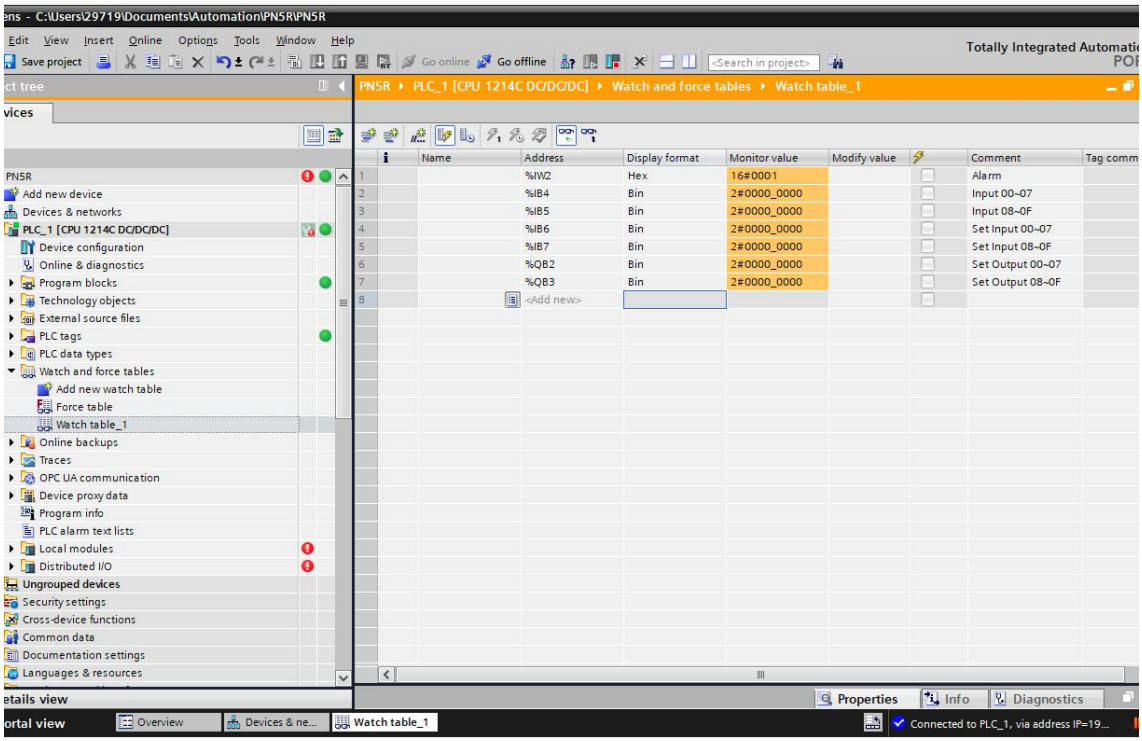
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e. Configurable channels 8 to F can be configured as output modes. Output channels can be forced to output by modifying the monitored values. For example, configurable channels 8 and 9 can be configured as valid outputs, as shown in the figure below.



f. If an error occurs where the field power supply is not connected, the alarm code can be viewed in the uplink data, as shown in the figure below.



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