RP series

Plug-in remote I/O module

User Manual

Kinco

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Contents

1. Product Overview

1.1. Product introduction

RP series plug-in I/O module modules adopt a structure that combines connection modules, power supplies and I/O modules. The connector connects the scalable I/O modules to the real-time industrial helicopter system. The backplane uses the S-Link interface. The connector module is responsible for the field interface, thus enabling various I/O modules to exchange data with the connector/controller in real time. function.

RP series plug-in I/O modules are rich in variety and have high real-time performance, allowing users to collect high-speed data, optimize system configuration, simplify field wiring, and improve system reliability. Sex etc. provided.

1.2. Product Features

- **Occupies few nodes**

  A node consists of a link connector, 1 to 32 I/O modules, and a termination end cap.

- **Rich function extensions**

  Supports flexible expansion and complete I/O types; it can integrate a variety of digital, analog and temperature modules to meet the needs of different application scenarios.

- **Use it flexibly**

  Various types of plug-in I/O modules can be combined at will.

- **Strong compatibility**

  The coupler communication interface communication complies with standards and supports mainstream PROFINET master stations and EtherCAT master stations. (__ twenty three_)

- **Small size**

  Compact structure and small space occupation.

- **Easy to diagnose**

  The left side is fully designed, the module status is clear at a glance, and detection and maintenance are convenient.

- **Fast**

  The backplane adopts S-Link hiking: the maximum scanning period is 1 ms.

- **Easy to install**

  DIN 35 mm standard stair installation.

  Adopts chip-type terminal blocks for convenient and quick wiring.

1.3. Application method

The coupler module is connected to the controller at the application site, and the I/O module is responsible for connecting to the input and output sensors at the application site. The usual data collection, processing and control process is as follows:

1. The input I/O module collects various signals on site and sends them to the coupler through the internal bus;
2. The controller reads data from the coupler through the fieldbus, processes it, and then writes the output data to the coupler;
3. The coupler then writes the output data to the output I/O module through the internal bus to control the device.

Expandable I/O modules include digital input modules, digital output modules, digital input and output modules, analog input modules, analog output modules, temperature modules, etc.

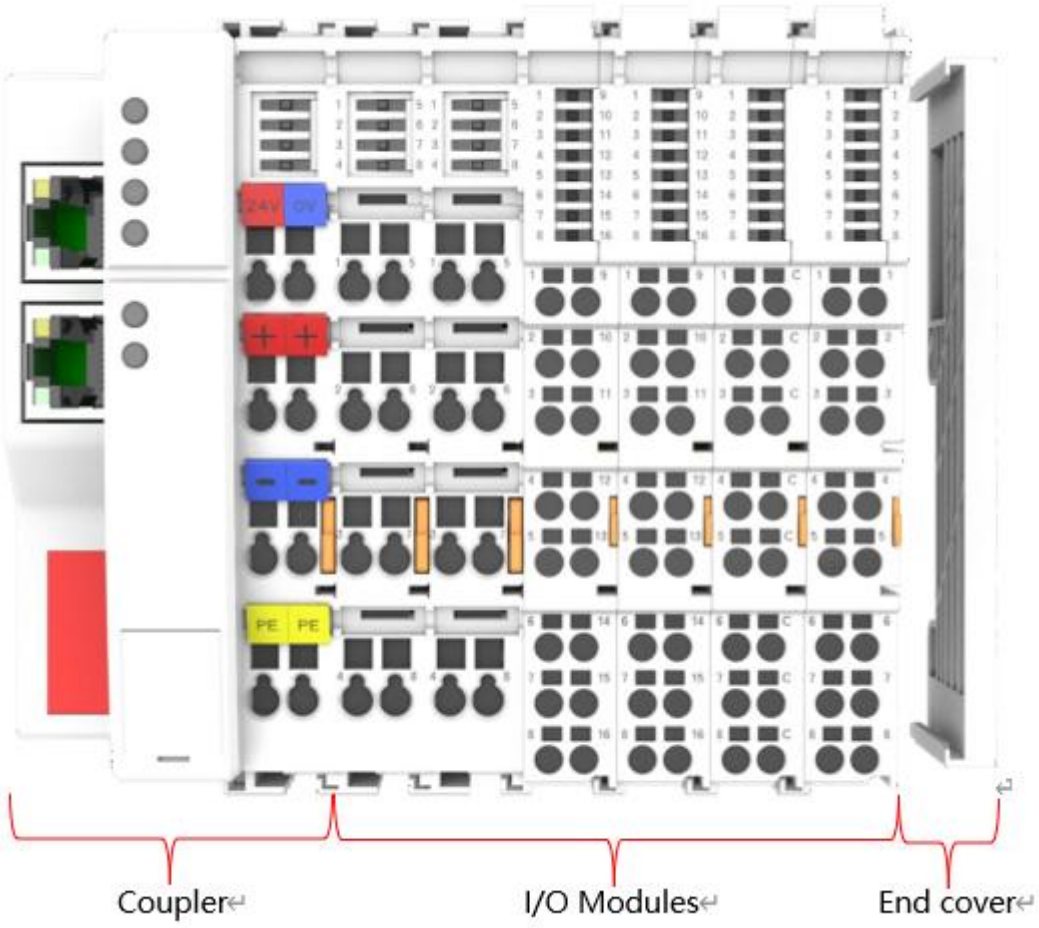
Application method: Application method using a combination of coupler power module, digital quantity, analog quantity, temperature, extended power supply and other modules.

Application configuration: Based on the master station access capability, number of sites, number of I/O points, function types and other requirements, it can adapt to the combination configuration of different types of I/O modules.

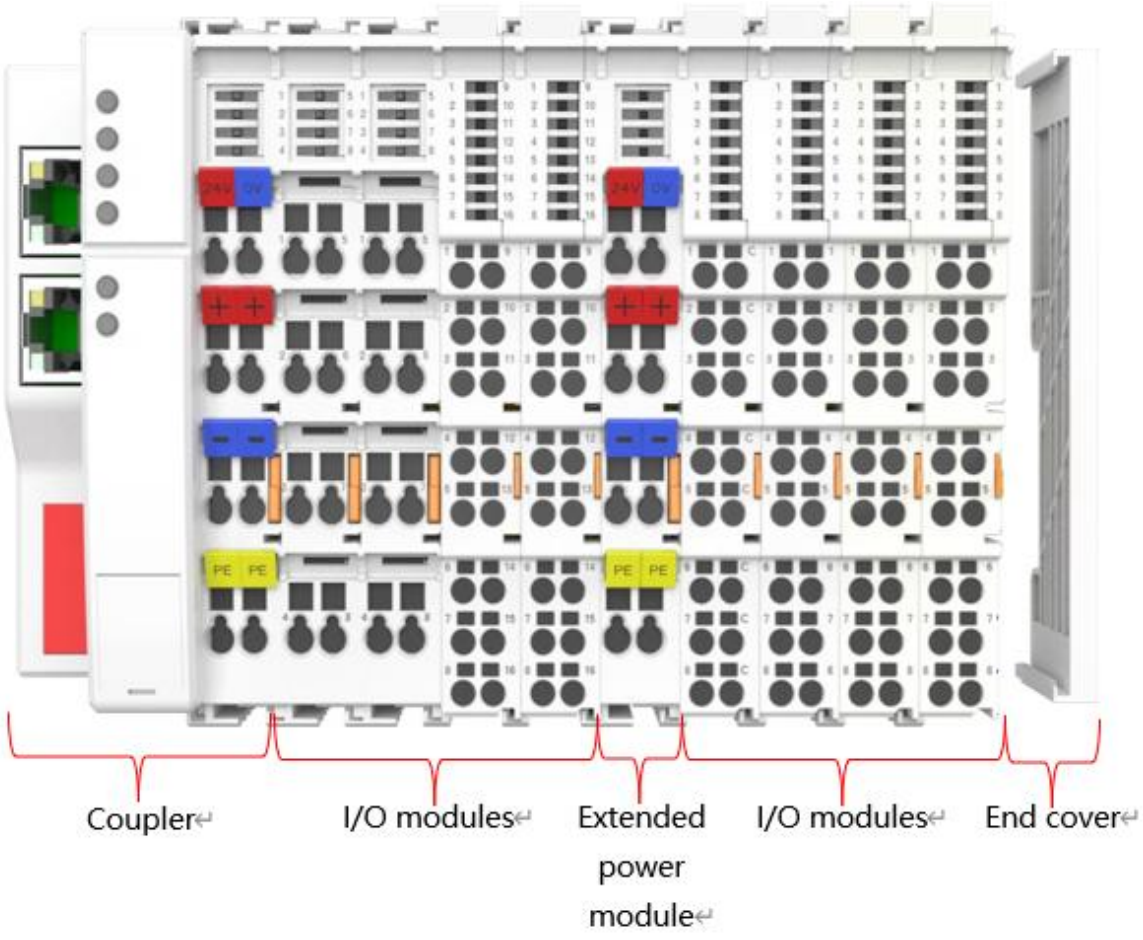
Configuration rules: The modules from left to right are coupler module, power module, I/O module, end cover (must be configured), etc.

The product adopts the application method of coupler, I/O module and end cover combination, with the following two combinations.

- Product combination method one (coupler power supply, I/O module, end cover)



- Product combination method two (coupler power supply, I/O module, extended power supply module, I/O module, end cover)



2. Product type

2.1. module list

Model	Product description	Output current/power consumption
RP00PN	PROFINET connector module	1600 mA
RP00EC	EtherCAT Connector Module	1600 mA
RP0016N	16-channel digital output module, NPN type, 24VDC, 0.5A	40 mA
RP0016P	16-channel digital output module, PNP type, 24VDC, 0.5A	40 mA
RP1600N	16-channel digital input module, NPN type, 24VDC, auxiliary 3ms	30 mA
RP1600P	16-channel digital input module, PNP type, 24VDC, auxiliary 3ms	30 mA
RP0808N	8-channel digital input, 8-channel digital output module, NPN type, 24VDC, 0.5A, auxiliary 3ms	35 mA
RP0808P	8-channel digital input, 8-channel digital module output, PNP type, 24VDC, 0.5A, auxiliary 3ms	35 mA
RP0800N	8-channel digital input module, NPN type, 24VDC, auxiliary 3ms	30 mA
RP0800P	8-channel digital input module, PNP type, 24VDC, auxiliary 3ms	30 mA
RP0008N	8-channel digital output module, NPN type, 24VDC, 0.5A	30 mA
RP0008P	8-channel digital output module, PNP type, 24VDC, 0.5A	30 mA
RP0800V	8-channel analog voltage input module	120 mA
RP0800A	8-channel analog current input module	120 mA
RP0008V	8-channel analog voltage output module	220 mA

RP0008A	8-channel analog current output module	30 mA
RP0400V	4-channel analog voltage input module	110 mA
RP0400A	4-channel analog current input module	110 mA
RP0004V	4-channel analog voltage output module	180 mA
RP0004A	4-channel analog current output module	30 mA
RP01EX	Common extension module	/
RP04RD	4-channel thermal resistance, thermocouple temperature acquisition module	100 mA
PR01PW	Power supply expansion module, providing system side 5V power supply and side 18~30V power supply	2000 mA
RP01CO	Terminal resistor module, end cap, must be connected in current design	/
RP01RS	RS232, RS485, RS422, serial communication module	70 mA
RP01ABZ1	24V single-ended incremental encoder counting module	96 mA
RP01ABZ2	5V incremental encoder counting module	96 mA

2.2. Calculation formula for the number of I/O modules connected to the coupler

When calculating the formula for the number of I/O modules connected to a coupler, you need to consider that the coupler is divided into three data areas, namely data area 1, data area 2 and data area 3. Each data area has a predetermined space capacity.

Each time an I/O module is added, each data area of the coupler consumes corresponding data space. When the space in any data area is completely consumed, the coupler will no longer be able to add more I/O modules.

	Data area 1	Data area 2	Data area 3
Coupler available space	892 bytes	8192 bytes	22528 bytes

Bytes consumed by I/O module data area 1

Data area 1 $_{consumes}$ = 4 + 5 × number of parameters

Bytes consumed by I/O module data area 2

Data area 2 $_{consumption}$ = number of channel names × number of channels + parameter name × number of parameters

Bytes consumed by I/O module data area 3

Data area 3 $_{consumption}$ = 40 × number of channels + 36 × number of parameters

model	Channel name	parameter name	Number of parameters
Digital output	Channel 1(9)	none	0
digital input	Channel 1(9)	Channel Debounce Time(21)	1
Analog output	Channel 1(9)	Range Select Channel1(21)	Number of channels
Analog input	Channel 1(9)	Range Select Channel1(21)	Number of channels
		Filter Channel1(15)	Number of channels

2.2.1. Example

I/O module	Number of channel names	Number of channels	parameter name	Number of parameters	Data area 1 space	Data area 2 space	Data area 3 space
RP1600P	9	16	twenty one	1	-9	-165	-676
Coupler free space remaining					883	8027	21852
RP0016P	9	16	0	0	-4	-144	-640
Coupler free space remaining					879	7883	21212

Number of I/O modules that can be connected to coupler data area 1

Number of I/O modules that can be connected to coupler data area 2

Number of I/O modules that can be connected to coupler data area 3

The number of I/O module connections is the minimum of the three calculations above –> the coupler can connect 17 pairs of RP1600P+RP0016P.

The actual number of I/O modules connected by the coupler needs to consider the remaining power consumption of the coupler and the required power consumption of the I/O modules. For details, see 3.7.3 and below .

3. Module introduction

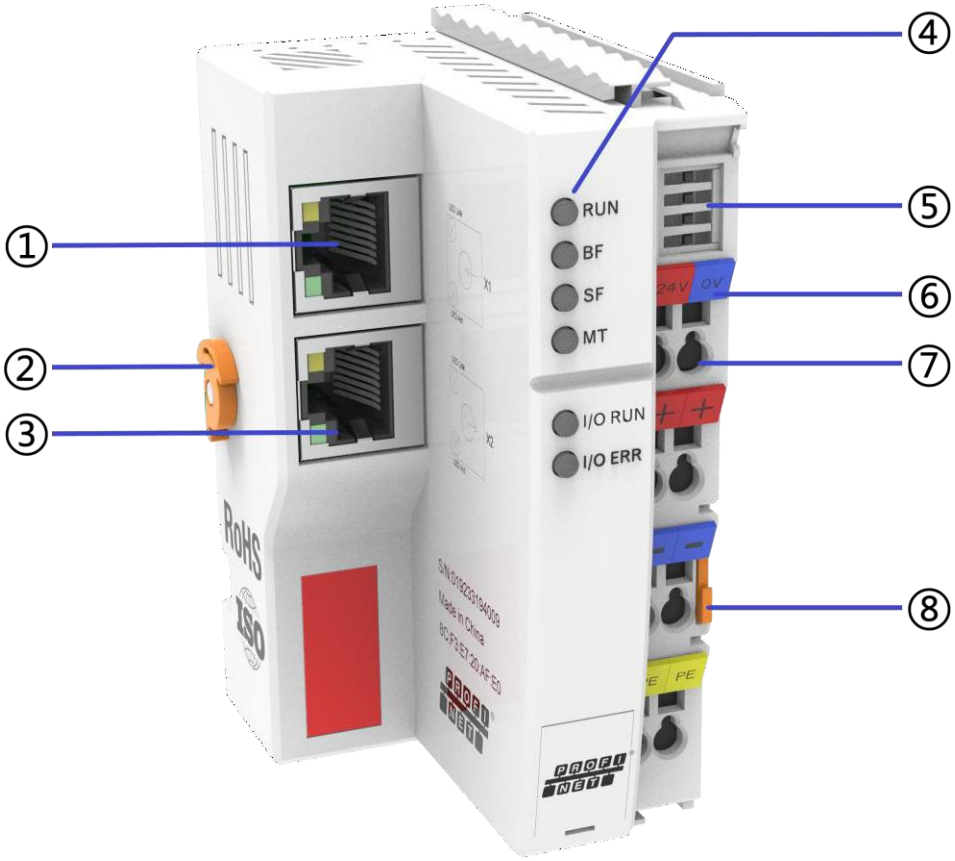
3.1. PROFINET coupler-RP00PN

3.1.1. Technical Parameters

PROFINET interface parameters		
Network protocol		Industrial wall
Number of I/O stations		Controller
Data transmission medium		100Base-TX 2x2 twisted pair copper cable, meeting CAT5 transmission requirements IEEE 802.3
Transmission rate		100Mbps
Transmission distance		≤100 m (station-to-station distance)
Entrance interface		2×RJ45
Power supply parameters		
Power module	Working power supply	24V DC (18V~30V)
	Output voltage	5 VDC
	Output current	2A
Connector module	Working power supply	5 VDC
	Operating current	≤ 400 mA
	Output current	1600mA
General technical parameters		
Specifications and dimensions		100×48×69 mm (see dimensional drawings 4.4.1 Chapter)
Weight		180 grams

Operating temperature	-10℃~+60℃(__ 480_)
Storage temperature	-20℃~+75℃(__ 504_)
Relative humidity	95%, no condensation (__529_)
Protection level	IP20

3.1.2. Panel structure



serial number	name	illustrate
①	bus interface	RJ45
②	Guide rail rotation buckle	Suitable for DIN 35 mm rail mounting
③	bus interface	RJ45
④	Indicator lights and indicator light markings	Indicate module running status
⑤	Power Indicator	Indicates power status
⑥	Power channel marking strip	Indicates channel type

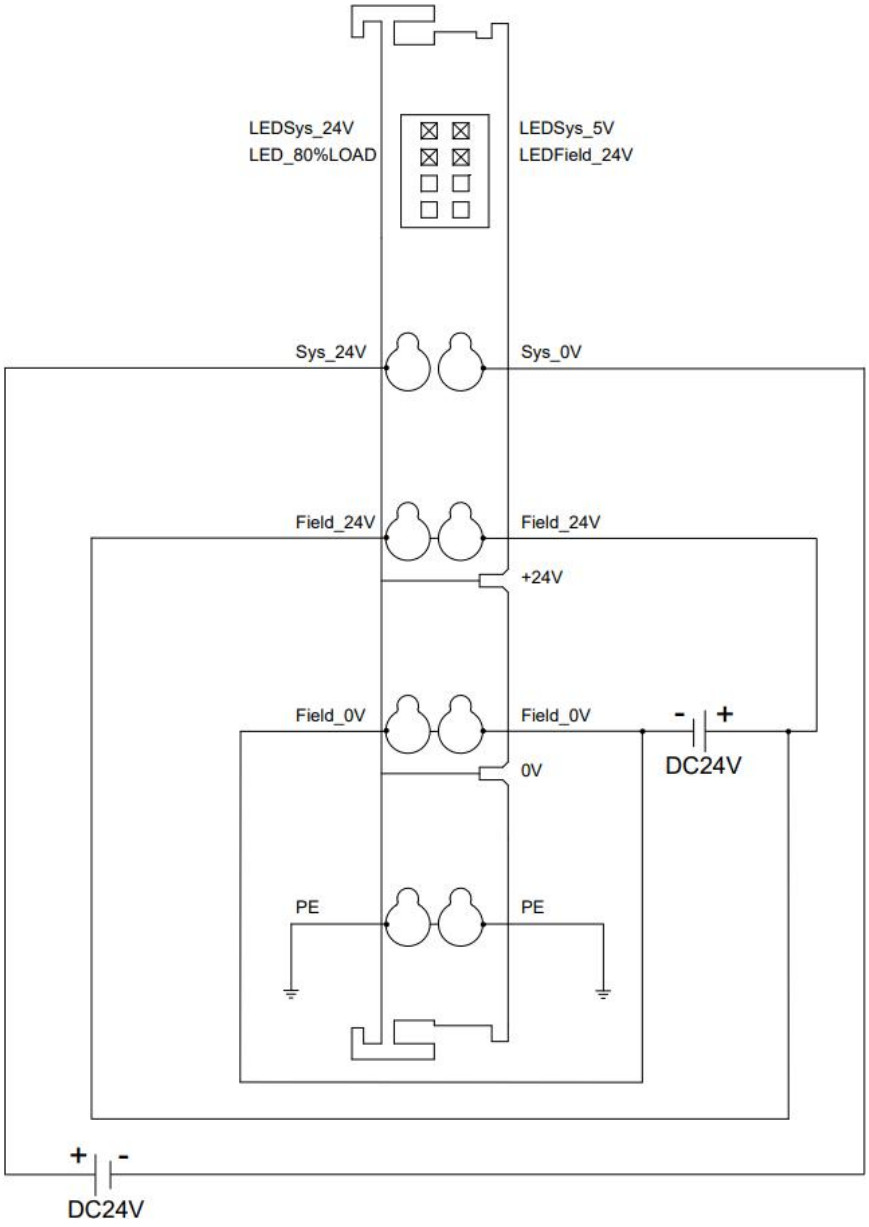
⑦	Power terminal block	8P snap-type terminal block
⑧	Module removal pull-out strip	Remove the pull bar

3.1.3. Indicator function

PROFINET coupler identification and indicator lights				
logo	name	color	state	status description
LEDSys_24V	Input power indicator	green	Always on	Input power access
			go out	Input power is not connected
LEDSys_5V	Output power indicator light	green	Always on	5V output power is normal
			go out	5V output power supply abnormality
LED_80%LOAD	80% load indicator light	red	Always on	5V power supply output current exceeds 1.6A
			go out	The output current of the 5V power supply does not exceed 1.6A
LEDField_24V	Field side power indicator light	green	Always on	On-site power supply access
			go out	On-site power supply is not connected
RUN	Running status indicator light	green	Always on	The system is running normally
			go out	The system is running abnormally or is not powered on
BF	Network alarm indicator light	red	flashing	Network connection abnormality
			go out	Network connection is normal
SF	System alarm indicator light	red	Always on	There is an abnormality in the operation of the module
			go out	The module works without exception
MT	MAINT maintenance	yellow	Always on	PROFINET diagnostic alarms requiring or requiring maintenance

	indicator light			status
			go out	PROFINET diagnostic alarms with no maintenance required or required status
I/O RUN	I/O operation indicator light	green	Always on	The system is interacting with process data
			flashing 1Hz	The I/O module is powered on and ready for data exchange.
			go out	I/O module is not powered on
I/O ERR	I/O error light	red	Always on	S-Link communication establishment failed or the slave station is lost
			go out	Initialization state, not powered on or error-free

3.1.4. Power wiring diagram



*Sys is the system side power supply, and Field is the field side power supply. The system side power supply and the field side power supply need to be isolated.

*On-site power supply 24V is internally conductive, 0V is internally conductive, and PE is internally conductive.

*The system side power supply supports reverse connection protection and output short circuit protection.

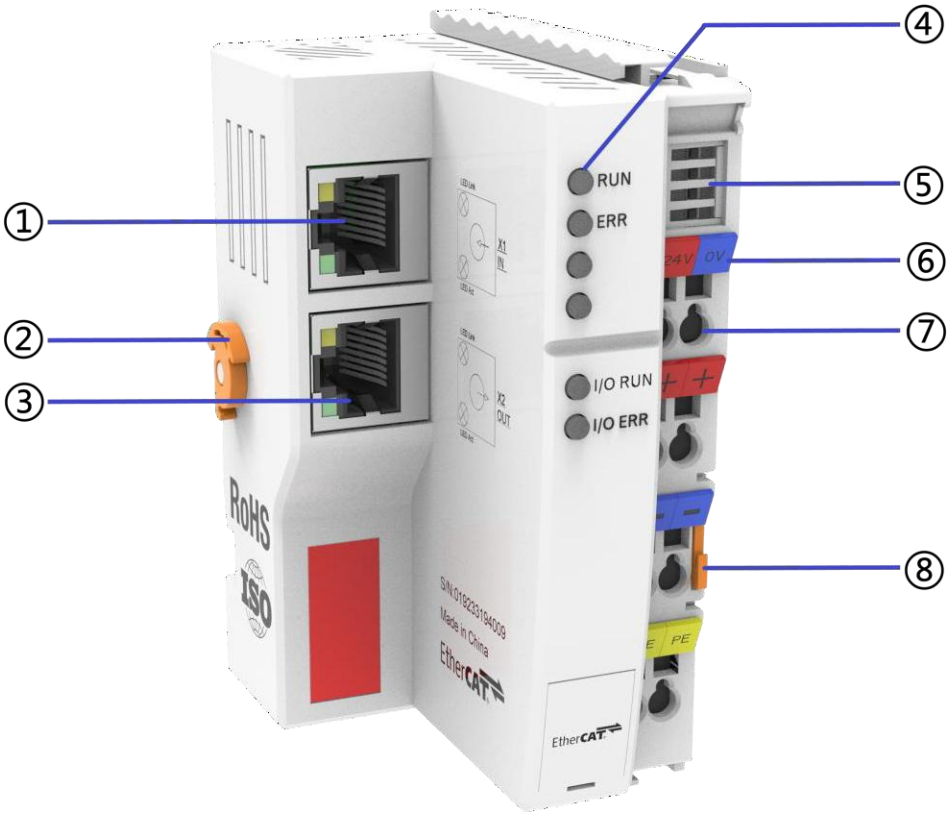
3.2. EtherCAT coupler-RP00EC

3.2.1. Technical Parameters

EtherCAT interface parameters		
bus protocol		EtherCAT(MDP)
Number of I/O stations		According to the main site settings
data transmission medium		Ethernet/EtherCAT CAT5 cable
Transmission rate		100Mbps
Transmission distance		≤100 m (distance between stations)
bus interface		2×RJ45
Power parameters		
Power module	Working power supply	24VDC (18V~30V)
	The output voltage	5 VDC
	Output current	2A
coupler module	Working power supply	5 VDC
	Working current	≤400 mA
	Output current	1600mA
General technical parameters		
Standard sizes		100×48×69 mm (for dimensional drawings, see 4.4.1 Chapter)
weight		185g
Operating temperature		-10℃~+60℃
storage temperature		-20℃~+75℃
Relative humidity		95%, no condensation

Protection level	IP20

3.2.2. Panel structure



serial number	name	illustrate
①	Bus interface IN	RJ45
②	Guide rail rotation buckle	Suitable for DIN 35 mm rail mounting
③	Bus interface OUT	RJ45
④	Indicator lights and indicator light markings	Indicate module running status
⑤	Power Indicator	Indicates power status
⑥	Power channel marking strip	Indicates channel type
⑦	Power terminal block	8P snap-type terminal block

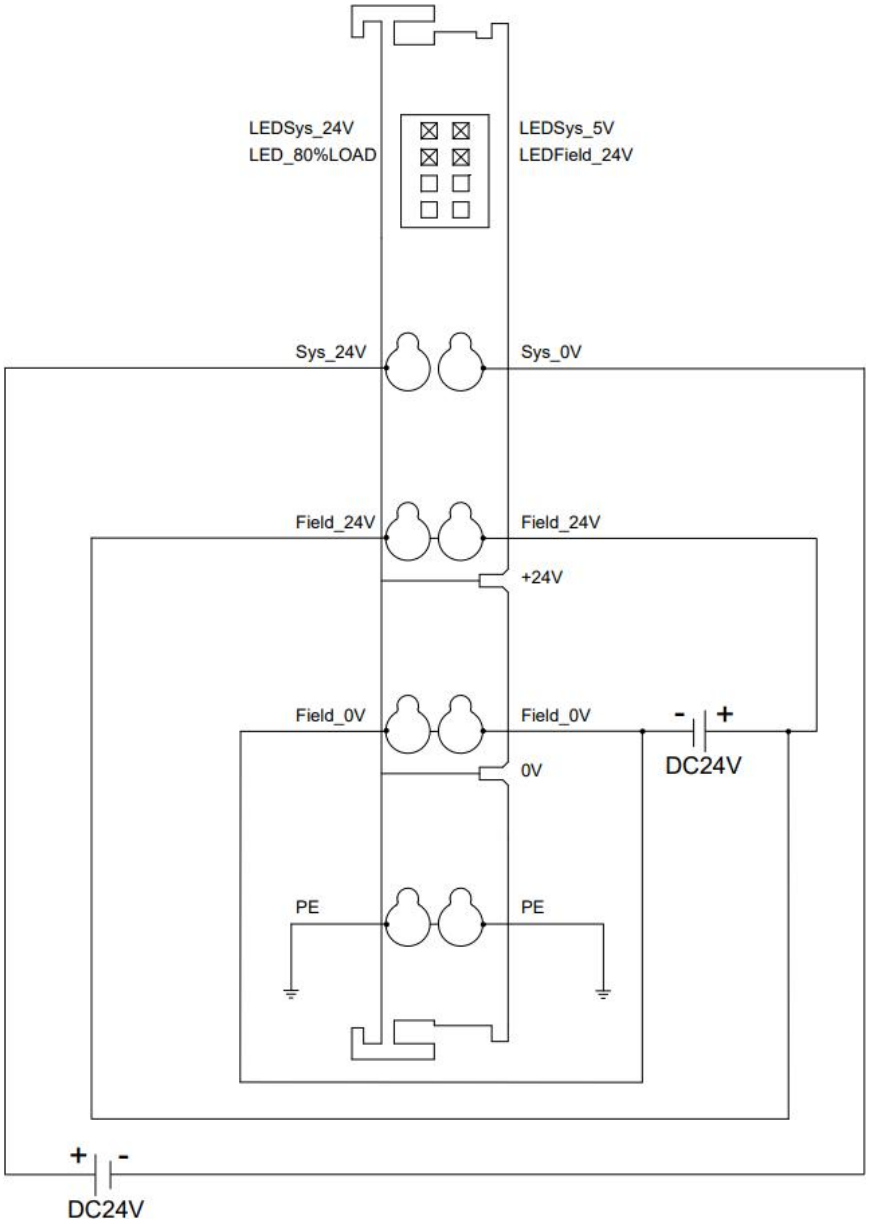
⑧	Module removal pull-out strip	Remove the pull bar

3.2.3. Indicator function

EtherCAT coupler identification and indicator lights				
logo	name	color	state	status description
LEDSys_24V	Input power indicator	green	Always on	Input power access
			go out	Input power is not connected
LEDSys_5V	Output power indicator light	green	Always on	5V output power is normal
			go out	5V output power supply abnormality
LED_80%LOAD	80% load indicator light	red	Always on	5V power supply output current exceeds 1.6A
			go out	The output current of the 5V power supply does not exceed 1.6A
LEDField_24V	Field side power indicator light	green	Always on	On-site power supply access
			go out	On-site power supply is not connected
RUN	Running status indicator light	green	Always on	EtherCAT OP status
			Flashing 5Hz	EtherCAT PreOP status
			Blinking regularly (off for 1s and on for 200ms in a cycle)	EtherCAT SafeOP status
			go out	Initialization state or not powered on, EtherCAT Init state
ERR	Alarm indicator light	red	Always on	An abnormality occurs in the coupler
			go out	Initialization state, not powered on or error-free

I/O RUN	I/O operation indicator light	green	Always on	The system is interacting with process data
			Flashing 1Hz	The I/O module is powered on and ready for data exchange.
			go out	I/O module is not powered on
I/O ERR	I/O error light	red	Always on	S-Link communication establishment failed or the slave station is lost
			go out	Initialization state, not powered on or error-free

3.2.4. Power wiring diagram



*Sys is the system side power supply, and Field is the field side power supply. The system side power supply and the field side power supply need to be isolated.

*On-site power supply 24V is internally conductive, 0V is internally conductive, and PE is internally conductive.

*The system side power supply supports reverse connection protection and output short circuit protection.

3.3. Digital I/O modules

3.3.1. Technical Parameters

digital input	
Rated voltage	24VDC (18V~30V)
signal points	8, 16
signal type	NPN/PNP
"0" signal voltage (PNP)	-3~+3 V
"1" signal voltage (PNP)	15~30V
"0" signal voltage (NPN)	15~30V
"1" signal voltage (NPN)	-3~+3 V
Input filtering	3ms
Input Current	4mA
Isolation method	Optocoupler isolation
Isolation withstand voltage	500VAC
Channel indicator light	Green LED light
Digital output	
Rated voltage	24VDC (18V~30V)
signal points	8, 16
signal type	NPN/PNP
Load type	Resistive load, inductive load
Single channel rated current	NPN type Max: 500 mA PNP type Max: 500 mA

Port protection	Overvoltage and overcurrent protection
Isolation method	Optocoupler isolation
Isolation withstand voltage	500VAC
Channel indicator light	Green LED light
General technical parameters	
Standard sizes	8-channel digital I/O module: 100×14.8×66.8 mm (see 4.4.3 chapter for dimensional drawings)
	16-channel digital I/O module: 100×14.8×68.67 mm (see chapter 4.4.2 for dimension drawings)
weight	50g
Operating temperature	-10℃~+60℃
storage temperature	-20℃~+75℃
Relative humidity	95%, no condensation
Protection level	IP20

3.3.2. Panel structure

3.3.3. Indicator function

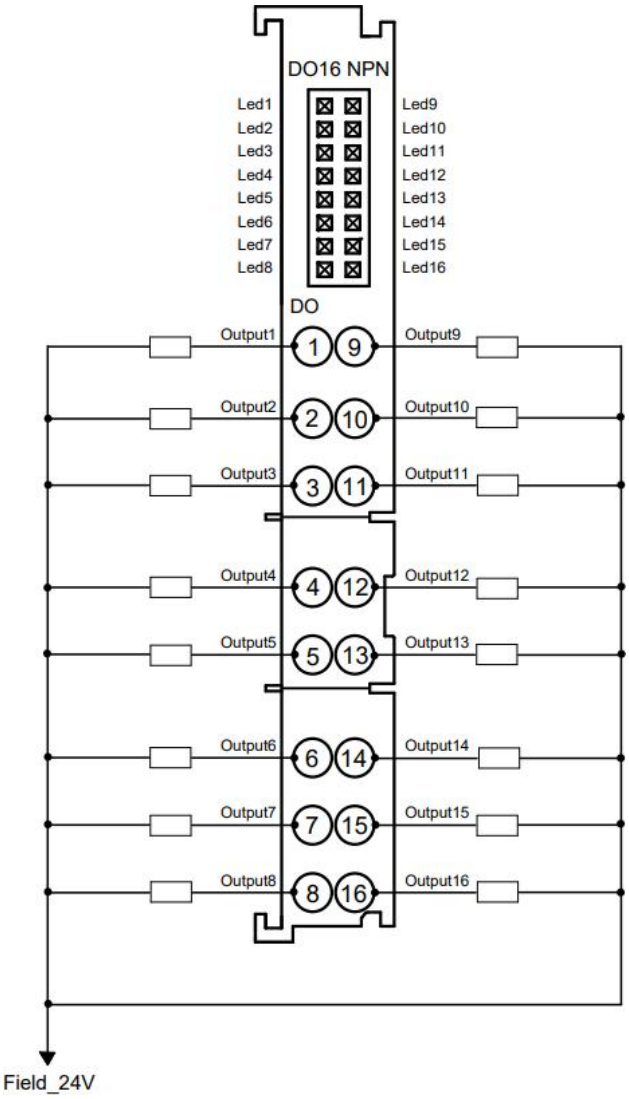
I/O module indicator light description			
logo	color	state	status description
Input channel indicator Led1~Led8	green	Always on	The module channel has signal input
		go out	There is no signal input in the module channel or the signal input is abnormal.
Output channel indicator Led1~Led8	green	Always on	The module channel has signal output
		go out	The module channel has no signal output or the signal output is abnormal.

3.3.4. Wiring diagram

3.3.4.1. 16-channel digital output (NPN)-RP0016N

Wiring diagram

16-channel digital output (NPN)-RP0016N



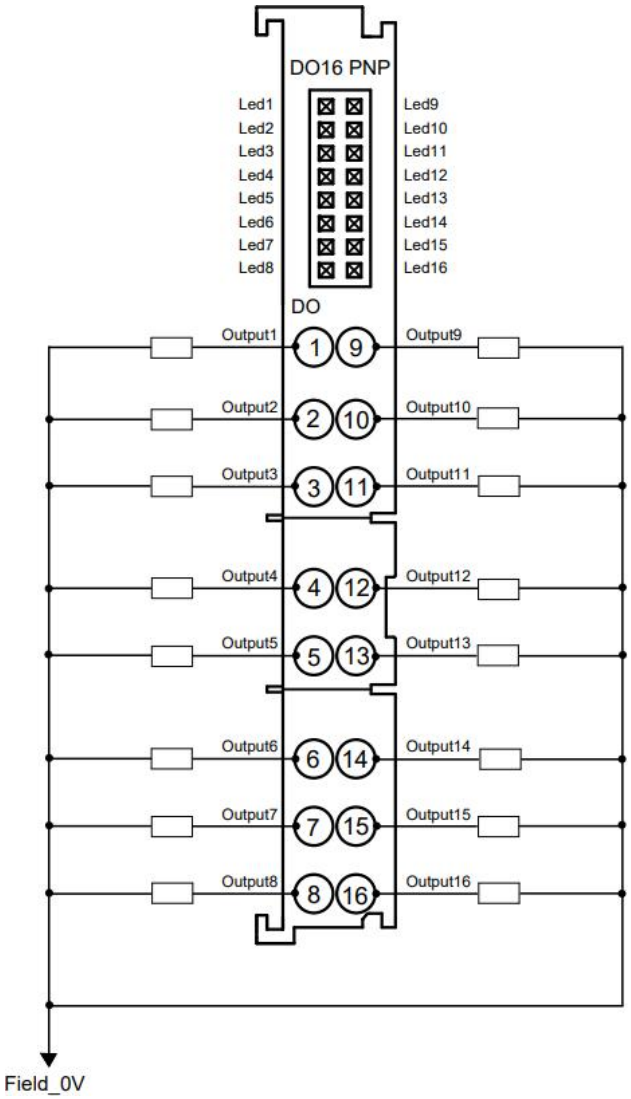
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.2. 16-channel digital output (PNP)-RP0016P

16-channel digital output (PNP)-RP0016P



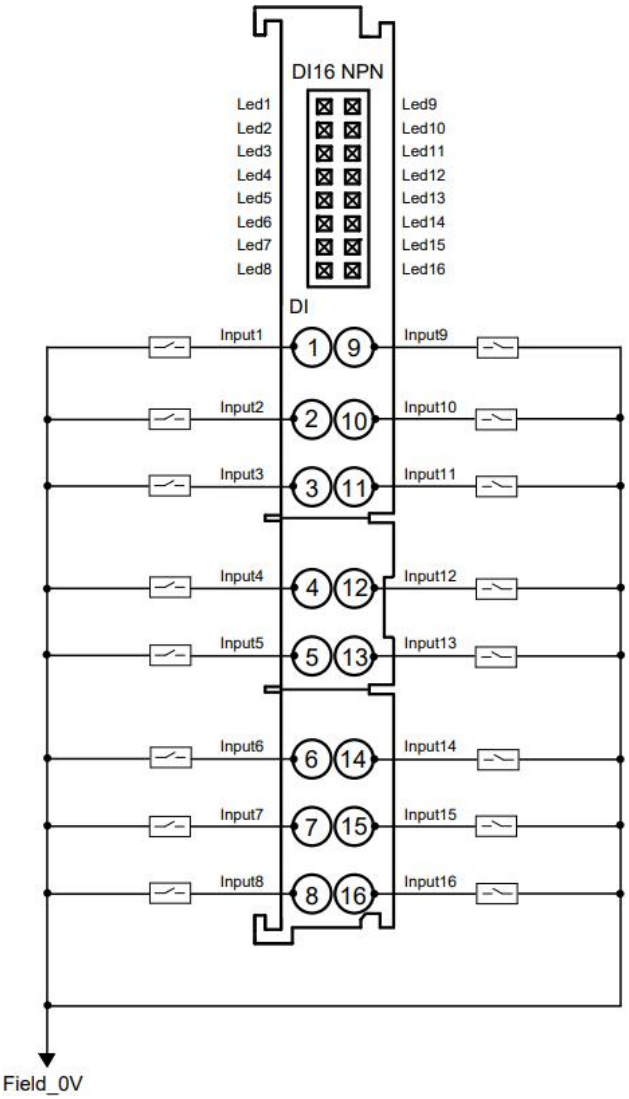
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.3. 16-channel digital input (NPN)-RP1600N

16-channel digital input (NPN)-RP1600N



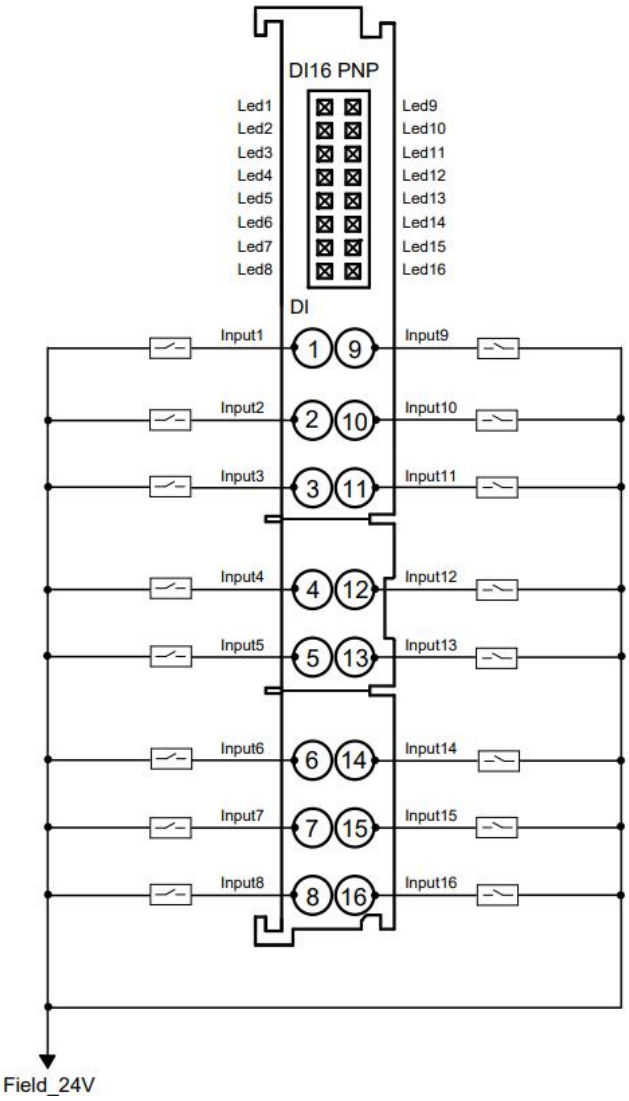
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.4. 16-channel digital input (PNP)-RP1600P

16-channel digital input (PNP)-RP1600P



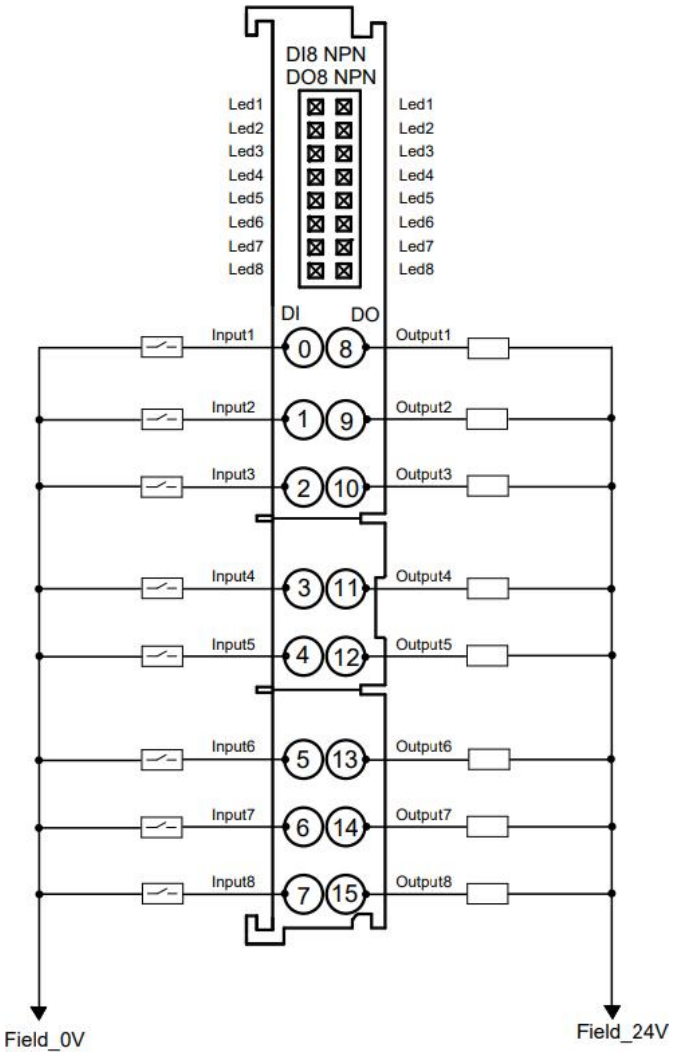
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.5. 8-channel digital input, 8-channel digital output (NPN)-RP0808N

8-channel digital input, 8-channel digital output (NPN)-RP0808N



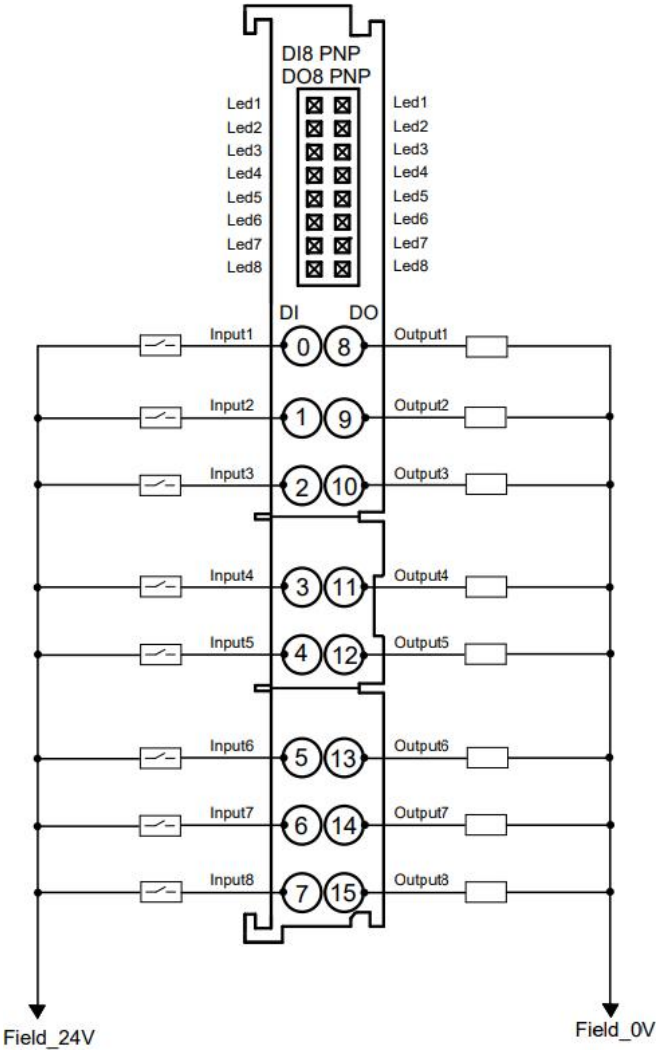
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.6. 8-channel digital input, 8-channel digital output (PNP)-RP0808P

8-channel digital input, 8-channel digital output (PNP)-RP0808P



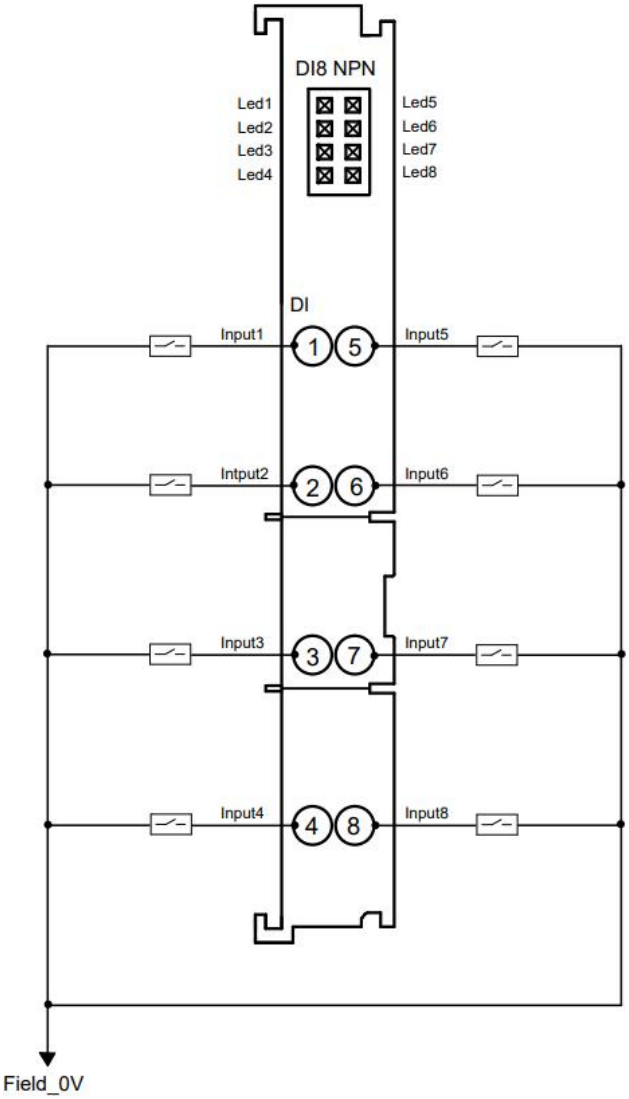
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.7. 8-channel digital input (NPN)-RP0800N

8-channel digital input (NPN)-RP0800N



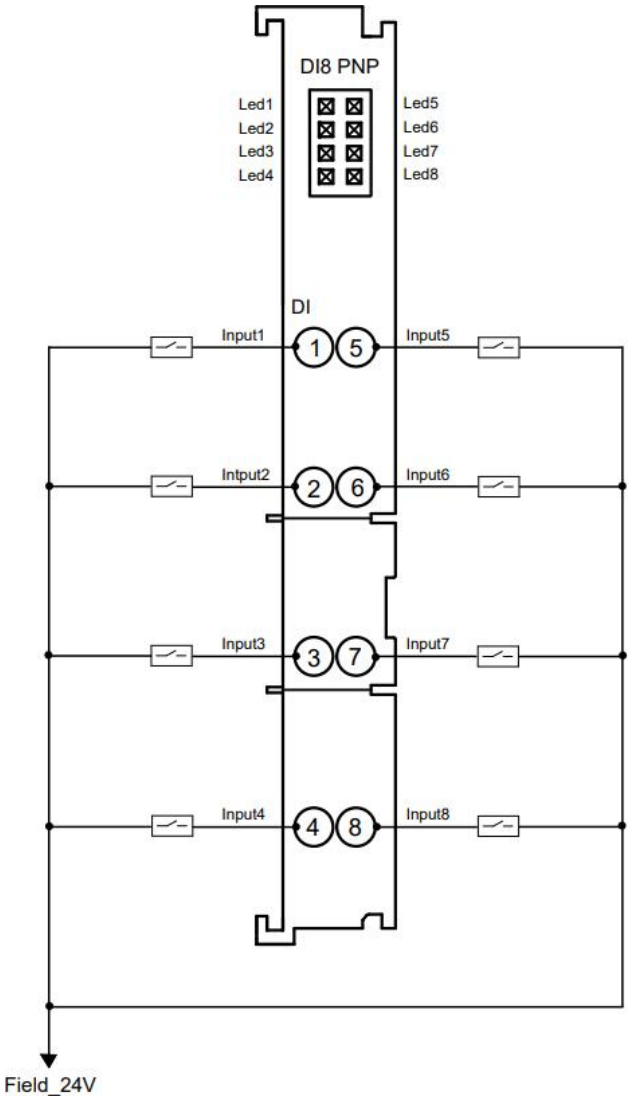
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.8. 8-channel digital input (PNP)-RP0800P

8-channel digital input (PNP)-RP0800P



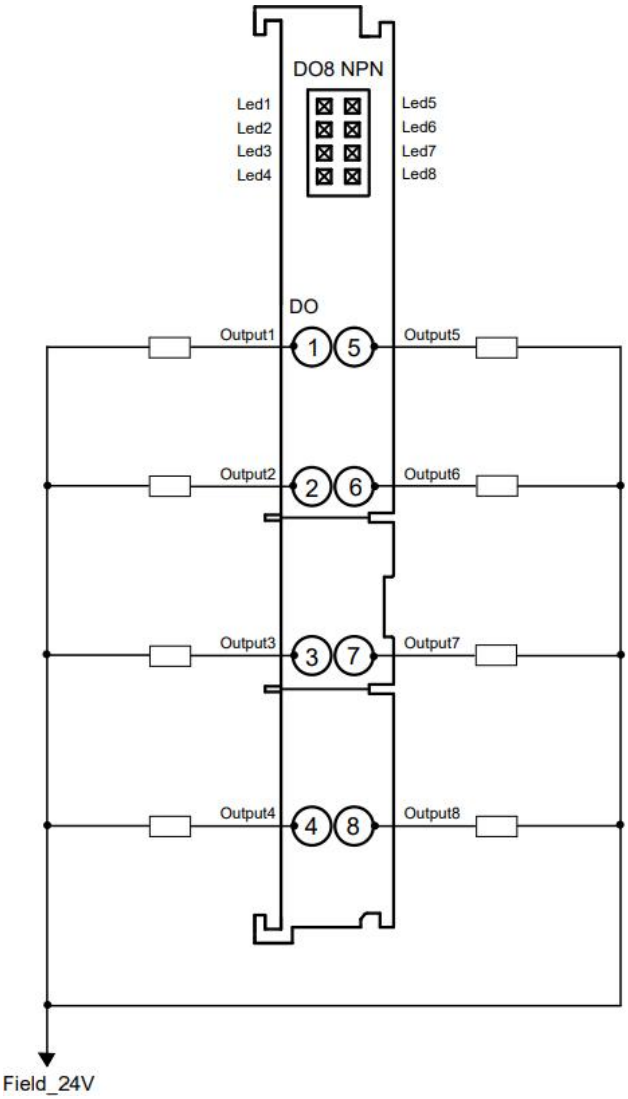
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.9. 8-channel digital output (NPN)-RP0008N

8-channel digital output (NPN)-RP0008N



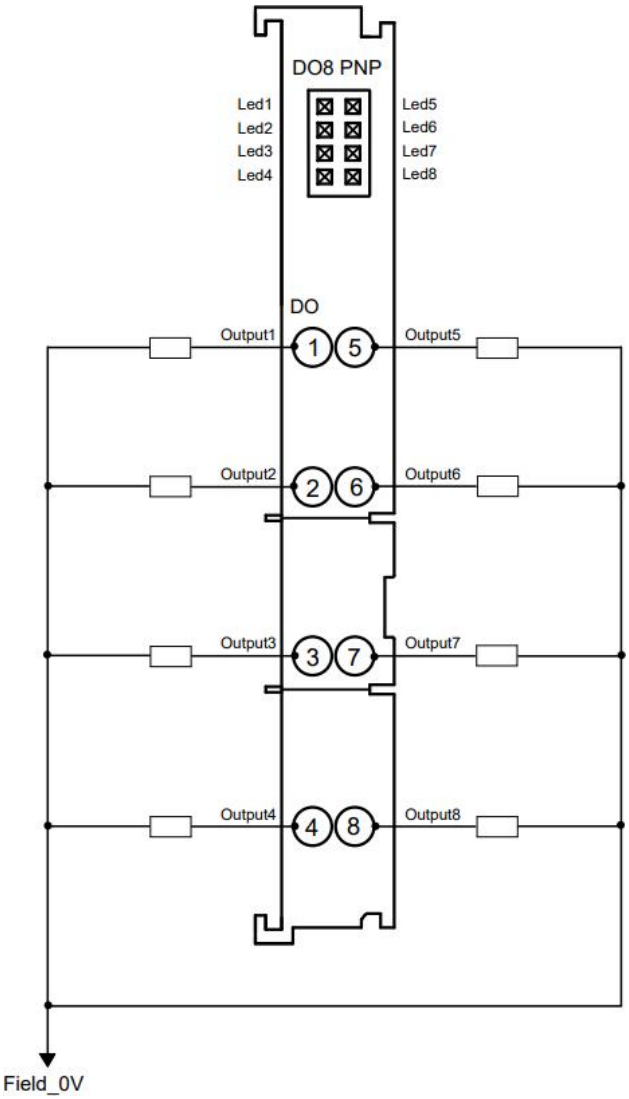
*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.3.4.10. 8-channel digital output (PNP)-RP0008P

8-channel digital output (PNP)-RP0008P



*The load power supply must be the same power supply as the field side power supply of the front-end power module.

*All channel loads must come from the same source, and channels are not isolated.

*Digital I/O modules support output overcurrent protection.

3.4 Analog I/O modules

3.4.1. Technical Parameters

Analog input			
Enter points	4, 8		
Input signal (voltage type)	0~+10 V, -10 V~+10 V (range adjustable)[1]		
Input signal (current type)	0~20 mA, 4~20 mA (range adjustable)		
Input signal type	single ended signal		
resolution	16 bits		
Sampling rate (all channels)	4/8-channel analog voltage and current input module	RP0800V, RP0400V RP0800A, RP0400A	≤1ksps
Accuracy	4/8-channel analog voltage and current input module	RP0800V, RP0400V RP0800A, RP0400A	±0.2%
Input filtering	10 times (filtering times are adjustable)		Smoothing series 1~200
Input impedance (voltage type)	≥2 kΩ		
Input impedance (current type)	100Ω		
Isolation withstand voltage	500VAC		
Channel indicator light	Green LED light		
Analog output			
Output points	4, 8		
Output signal (voltage type)	0~+10 V, -10~+10 V (range adjustable)		
Output signal (current type)	0~20 mA, 4~20 mA (range adjustable)		

resolution	12 bits		
Accuracy	4/8-channel analog voltage and current output module	RP0008V, RP0004V RP0008A, RP0004A	±0.2%
Load impedance (voltage type)	≥2 kΩ		
Load impedance (current type)	≤500Ω		
Isolation withstand voltage	500VAC		
Channel indicator light	Green LED light		
General technical parameters			
Standard sizes	4-channel analog I/O module: 100×14.8×66.8 mm (see 4.4.3 chapter for dimensional drawings)		
	8-channel analog I/O module: 100×14.8×68.67 mm (see chapter 4.4.2 for dimension drawings)		
weight	50g		
Operating temperature	-10℃~+60℃		
storage temperature	-20℃~+75℃		
Relative humidity	95%, no condensation		
Protection level	IP20		

Note [1]: The analog voltage module does not support overflow and overshoot, and the analog current module supports overflow and overshoot.

3.4.1.1. Voltage input/output range selection and code value table

Voltage input/output range selection and code value table

Voltage input/output range selection and code value range				
Range selection	0	1	2	3

Measuring range	-10 V~+10 V	0~+10V	-10 V~+10 V	0~+10V
Code value range	-32768~32767	0~32767	-27648~27648	0~27648
Voltage input calculation formula	D=(65535/20)*U	D=(32767/10)*U	D=(55296/20)*U	D=(27648/10)*U
Voltage output calculation formula	U=(D*20)/65535	U=(D*10)/32767	U=(D*20)/55296	U=(D*10)/27648
Code value correspondence table	See Table 3-1 Voltage code value table .			

Note: D represents code value, U represents voltage.

Table 3-1 Voltage code value table

 **Range Voltage**	0 (default)	1	2	3
	-10 V~+10 V	0~+10V	-10 V~+10 V	0~+10V
	code value	code value	code value	code value
-10	-32768	-	-27648	-
-9	-29491	-	-24883	-
-8	-26214	-	-22118	-
-7	-22937	-	-19354	-
-6	-19661	-	-16589	-
-5	-16384	-	-13824	-
-4	-13107	-	-11059	-
-3	-9830	-	-8294	-
-2	-6554	-	-5530	-
-1	-3277	-	-2765	-
0	0	0	0	0
1	3277	3277	2765	2765

2	6554	6553	5530	5530
3	9830	9830	8294	8294
4	13107	13107	11059	11059
5	16384	16384	13824	13824
6	19661	19660	16589	16589
7	22937	22937	19354	19354
8	26214	26214	22118	22118
9	29491	29490	24883	24883
10	32767	32767	27648	27648
	Code value = (65535/20) *Voltage	Code value = (32767/10) *Voltage	Code value = (55296/20) *Voltage	Code value = (27648/10) *Voltage
	Voltage = (code value * 20) /65535	Voltage = (code value * 10) /32767	Voltage = (code value * 20) /55296	Voltage = (code value * 10) /27648

Note: In the analog voltage input module, when the channel input voltage exceeds 10V, the maximum code value is displayed. Analog voltage output module, when the code value setting exceeds the maximum code value corresponding to the range in the table, all channels will output 10V voltage.

3.4.1.2. Current input/output range selection and code value table

Current input/output range selection and code value table

Current input and output range selection and code value range				
Range selection	0	1	2	3
Measuring range	4~20mA	0~20mA	4~20mA	0~20mA
Code value range	0~65535		0~27648	
Current input calculation formula	D=65535/16*I-16384	D=(65535/20)*I	D=(27648/16)*I-6912	D=(27648/20)*I

Current output calculation formula	I=(D+16384)*16/ 65535	I=(D*20)/65535	I=((D+6912)*16)/ 27648	I=(D*20)/27648
Code value correspondence table	See Table 3-2 Current Code Value Table .			

Note: D represents code value, I represents current.

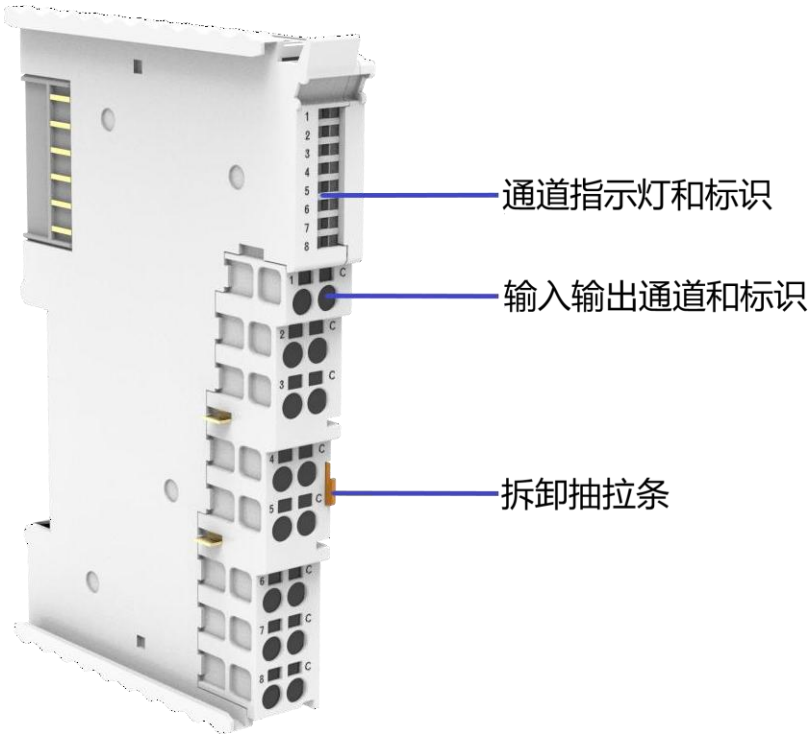
Table 3-2 Current code value table

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

14	40959	45875	17280	19354
15	45055	49151	19008	20736
16	49151	52428	20736	22118
17	53247	55705	22464	23501
18	57343	58982	24192	24883
19	61439	62258	25920	26266
20	65535	65535	27648	27648
twenty one	65535	65535	29376	29030
twenty two			31104	30413
22.81			32511	31538
22.96			32767	31743
twenty three				31795
23.52				32511
23.70				32767
twenty four				
25				
	Code value=65535/16* current-16384	Code value = (65535/20) *Current	Code value = (27648/16) *Current-6912	Code value = (27648/20) *Current

Note: When the input current of range 2 is >22.81 mA, the code value displays 32767; when the specified code value is >32511, the output current is 22.81 mA. In range 3, when the input current is >23.52 mA, the code values all display 32767; when the specified code value is >32511, the output current is 23.52 mA.

3.4.2. Panel structure



3.4.3. Indicator function

I/O module indicator light description			
logo	color	state	status description
Input channel indicator Led1~Led8	green	Always on	The module channel has signal input
		go out	There is no signal input in the module channel or the signal input is abnormal.
Output channel indicator Led1~Led8	green	Always on	The module channel has signal output
		go out	The module channel has no signal output or the signal output is abnormal.

Note: When the input and output values of the analog module are within one thousandth of the range code value, the channel indicator light does not light up. When the maximum code value is 27648, the indicator light does not light up within the code value range of -55.296~55.296;

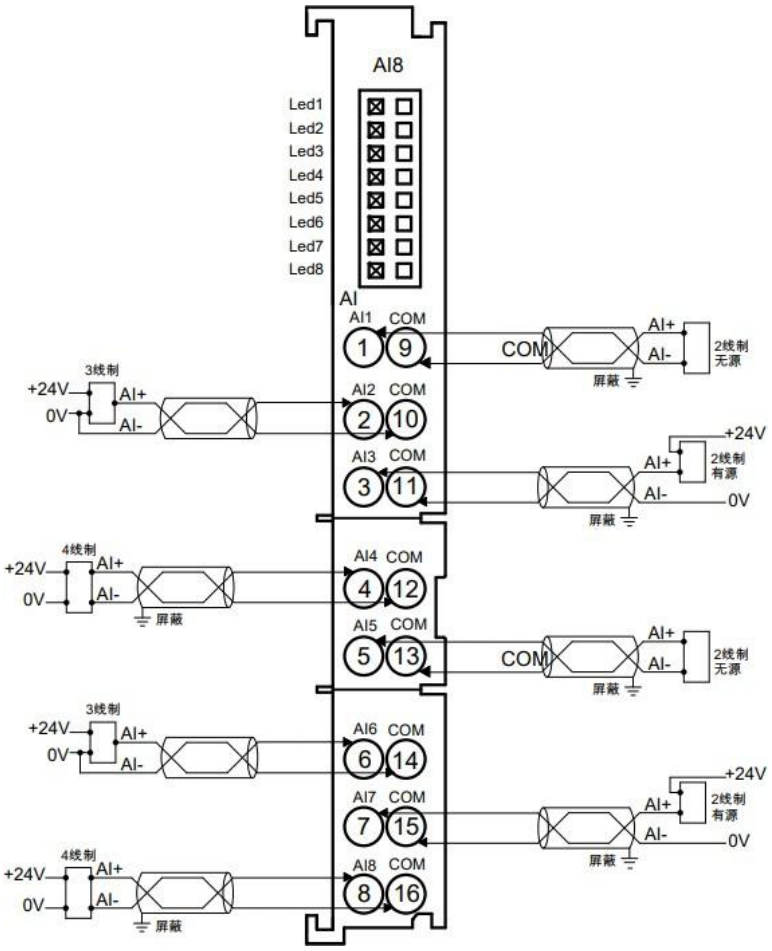
When the maximum code value is 65535, the indicator light does not light up within the code value range of -65.535~65.535; when the maximum code value is 32767, the indicator light does not light up within the code value range of -65.535~65.535.

3.4.4 Wiring diagram

3.4.4.1. 8-channel analog voltage/current input module-RP0800V/RP0800A

Wiring diagram

8-channel analog voltage/current input module-RP0800V/RP0800A



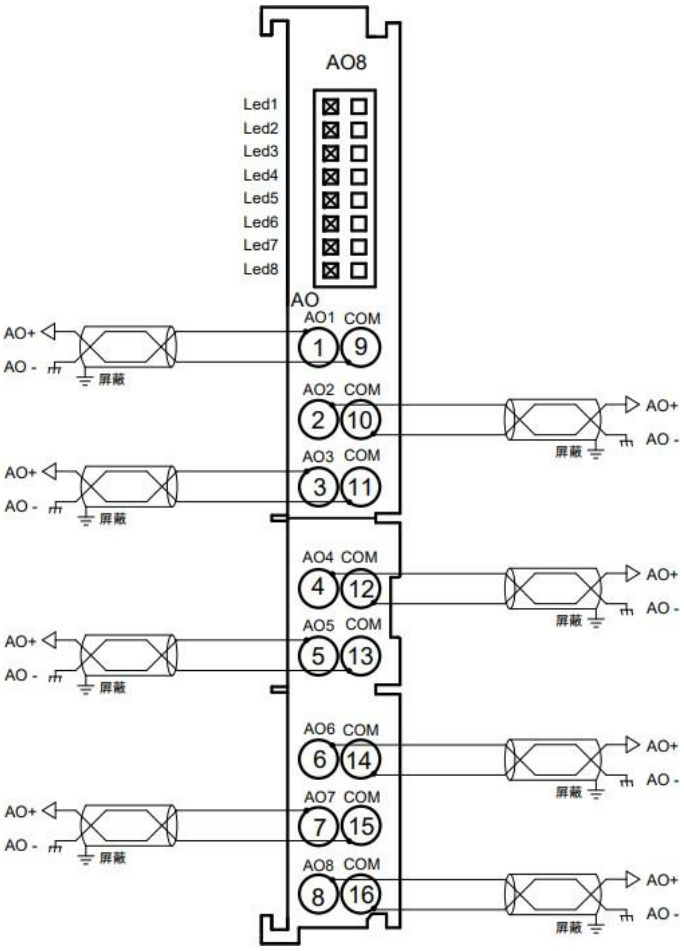
*COM terminal is internally conductive.

*All channel loads must come from the same source, and channels are not isolated.

*Analog I/O modules support input overvoltage protection.

3.4.4.2. 8-channel analog voltage/current output module-RP0008V/RP0008A

8-channel analog voltage/current output module-RP0008V/RP0008A

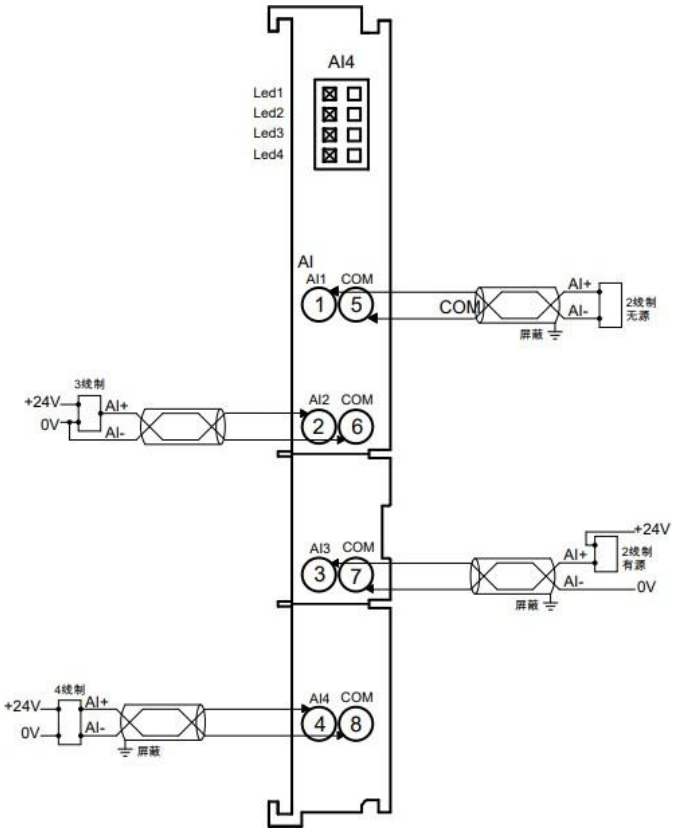


*COM terminal is internally conductive.

*All channel loads must come from the same source, and channels are not isolated.

3.4.4.3. 4-channel analog voltage/current input module-RP0400V/RP0400A

4-channel analog voltage/current input module-RP0400V/RP0400A



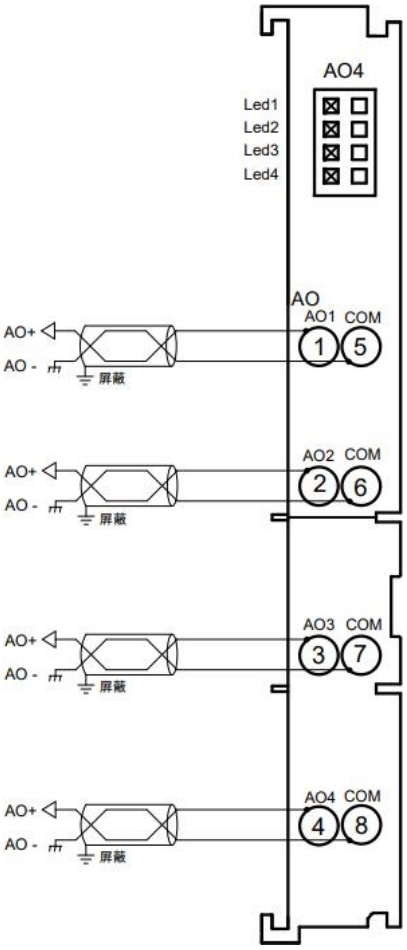
*COM terminal is internally conductive.

*All channel loads must come from the same source, and channels are not isolated.

*Analog I/O modules support input overvoltage protection.

3.4.4.4. 4-channel analog voltage/current output module-RP0004V/RP0004A

4-channel analog voltage/current output module-RP0004V/RP0004A



*COM terminal is internally conductive.

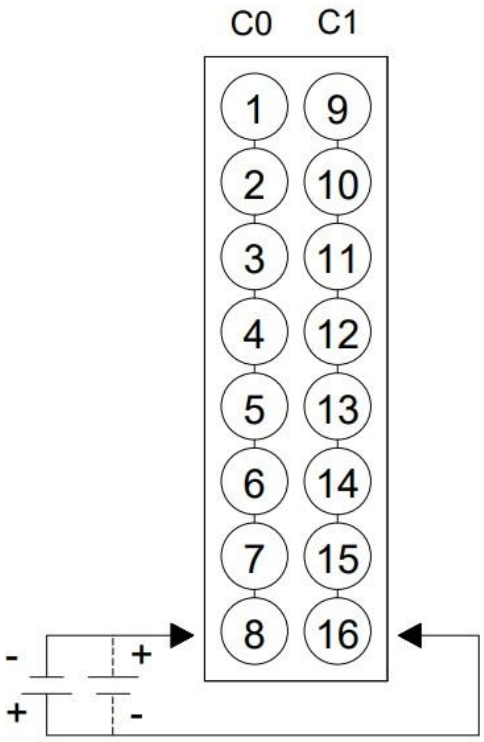
*All channel loads must come from the same source, and channels are not isolated.

3.5. Common module

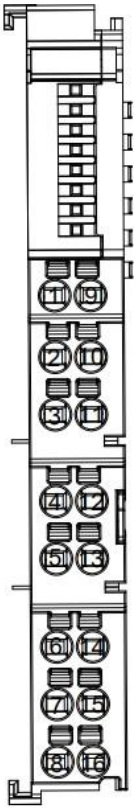
3.5.1. Technical Parameters

Common terminal	
Rated voltage	DC36V & AC36V MAX
Rated current	8A
Number of public terminals	2 sets (8Pin/CH)
General technical parameters	
Standard sizes	100×14.8×68.67 mm (for dimensional drawings, see 4.4.2 Chapter)
weight	45g
Operating temperature	-10℃~+60℃
storage temperature	-20℃~+75℃
Relative humidity	95%, no condensation
Protection level	IP20

3.5.2. Wiring diagram



*C0一列内部导通；C1一列内部导通



3.6. Temperature acquisition module

3.6.1. Technical Parameters

Temperature input			
Number of channels	4		
sensor type	Thermocouple	Thermal resistance	resistance
Connection method	2 wire system	2-wire, 3-wire system	2 wire system
	K: -200~1370℃ J: -200~1200℃ E: -200~1000℃ S: -50~1690℃ B: 50~1800℃	Pt100: −200~850℃ Pt200: −200~600℃ Pt500: −200~600℃ Pt1000: −200~600℃	15Ω~3kΩ
Accuracy	±0.3%	±1℃	±0.1%
Sensitivity	0.1℃		±0.1Ω
resolution	16 bit (int type)		
Conversion time (when the filtering level of all channels is 1)	40ms/4ch	125ms/4ch	
filter	Single channel filtering, configurable (number of levels 1 to 10)		
Channel indicator light	Green LED light		
General technical parameters			
Standard sizes	100×14.8×68.67 mm (for dimensional drawings, see 4.4.2 Chapter)		
weight	50g		
Operating temperature	-10℃~+60℃		

storage temperature	-20℃~+75℃
Relative humidity	95%, no condensation
Protection level	IP20

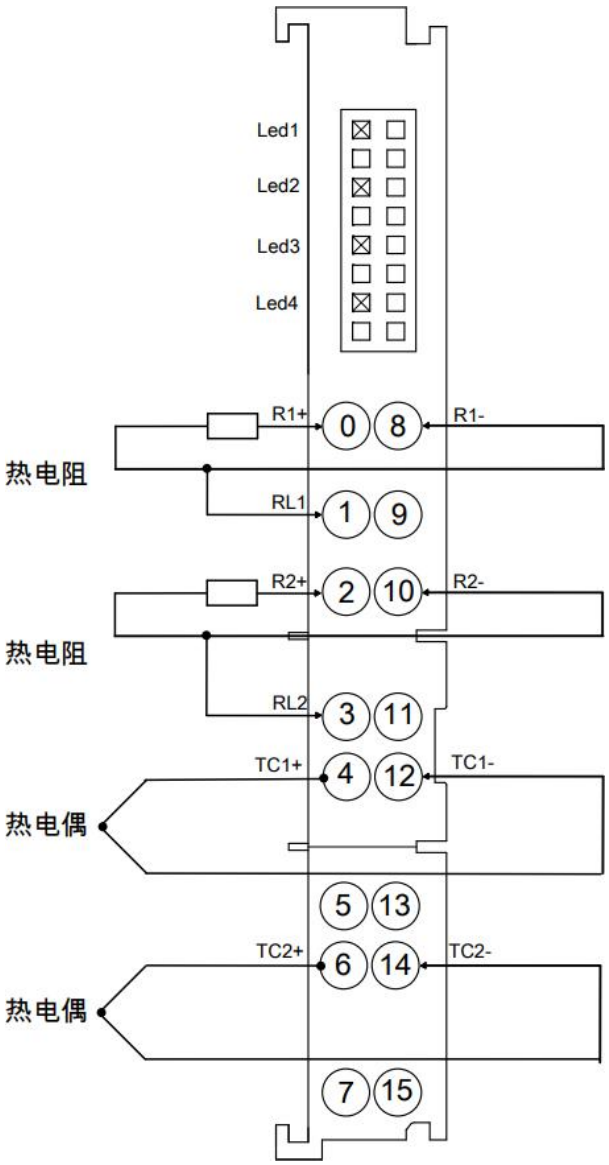
3.6.2. Indicator function

Indicator light function

Module indicator light description			
logo	color	state	status description
Channel indicator light Led1~Led4	green	Always on	The channel is enabled and the sensor is connected normally
		go out	The channel is prohibited or the sensor is not connected properly.

3.6.3. Wiring diagram

Wiring diagram



3.7. Extended power module

The power module is used with products of the same series to provide stable power for the internal circuit of the IO module. The housing is consistent with the 8-channel I/O module.

3.7.1. Technical Parameters

Power parameters	
Working power supply	24VDC (18V~30V)
The output voltage	5 VDC
Output current	2A
General technical parameters	
Standard sizes	100×14.8×66.8 mm (for dimensional drawings, see 4.4.3 Chapter)
weight	55g
Operating temperature	-10℃~+60℃
storage temperature	-20℃~+75℃
Relative humidity	95%, no condensation
Protection level	IP20

3.7.2. Indicator function

Expansion power module indicator light				
logo	name	color	state	status description
LEDSys_24V	Input power indicator	green	Always on	Input power access
			go out	Input power is not connected
LEDSys_5V	Output power indicator light	green	Always on	5V output power is normal
			go out	No output power
LED_80%LOAD	80% load indicator light	red	Always on	5V power supply output current exceeds 1.6A
			go out	The output current of the 5V power supply does not exceed 1.6A
LEDField_24V	Field side power indicator light	green	Always on	On-site power supply access
			go out	On-site power supply is not connected

3.7.3. I/O module power consumption calculation

When combining multiple I/O modules, the power consumption of each I/O module must be fully considered. If the coupler's own power supply cannot meet the needs of the combined I/O modules, an additional expansion power module must be added to ensure stable and reliable power supply for the internal circuits of the I/O modules.

Coupler connection I/O module power consumption calculation

When the "80% load indicator" of the coupler lights up, an expansion power module needs to be added to ensure stable and reliable power supply for the internal circuit of the I/O module.

When adding a new expansion power module, only additional current will be added without being superimposed on the previous residual current.

Calculation of power consumption of extended power module connected to I/O module

When the "80% load indicator" of the expansion power module lights up, an expansion power module needs to be added to ensure stable and reliable power supply for the internal circuit of the I/O module. When adding a new expansion power module, only additional current will be added without being superimposed on the previous residual current.

3.7.3.1 Example

Sorting after module insertion	I/O module	Required power consumption	remaining power consumption
00	RP00EC	0mA	1600mA
01, 02, 03	3*RP0016P	120mA	1480mA
04, 05, 06	3*RP1600P	90mA	1390mA
07	PR01PW	0	2000mA
08	RP0016P	40mA	1960mA
09	PR01PW	0	2000mA
10	RP0016P	40mA	1960mA

Note: When adding a new expansion power module, only additional current will be added and will not be superimposed on the previous residual current.

The actual number of I/O modules connected to the coupler needs to take into account the remaining data space bytes of the coupler. For details, see 2.2 and above .

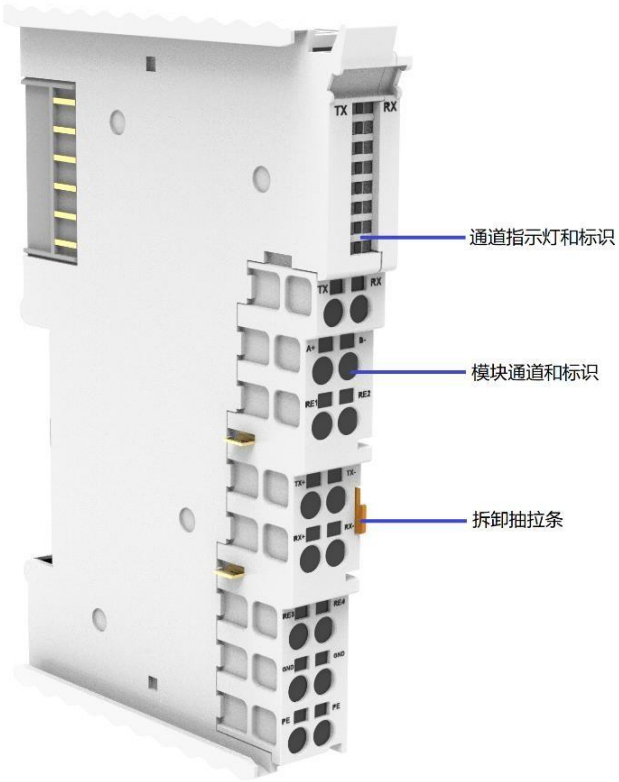
3.8. Serial communication module

The plug-in 1-channel serial communication module adopts S-Link bottom bus and is adapted to the RP series coupler. Through different function blocks, it can realize the three major serial communication functions of Modbus master-slave station, Freeport and transparent transmission. The module occupies a small space. , data interaction processing is simple and can meet the serial communication needs of different application scenarios.

3.8.1. Technical Parameters

Interface parameters	
bus protocol	bus protocol
Process data volume: Downstream	Process data volume: Downstream
Process data volume: Upstream	Process data volume: Upstream
Technical Parameters	
Number of channels	1 channel
Communication mode	MRM/MRS/MAM/MAS/FP/PT
Communication interface type	RS232, RS485, RS422
Protocol	Modbus RTU, Modbus ASCII
baud rate	1200bps~115200bps
power	70mA@5VDC
weight	50g
size	100×14.8×68.67mm
Operating temperature	-10℃~+60℃
storage temperature	-20℃~+75℃
Relative humidity	95%, no condensation
Protection level	IP20

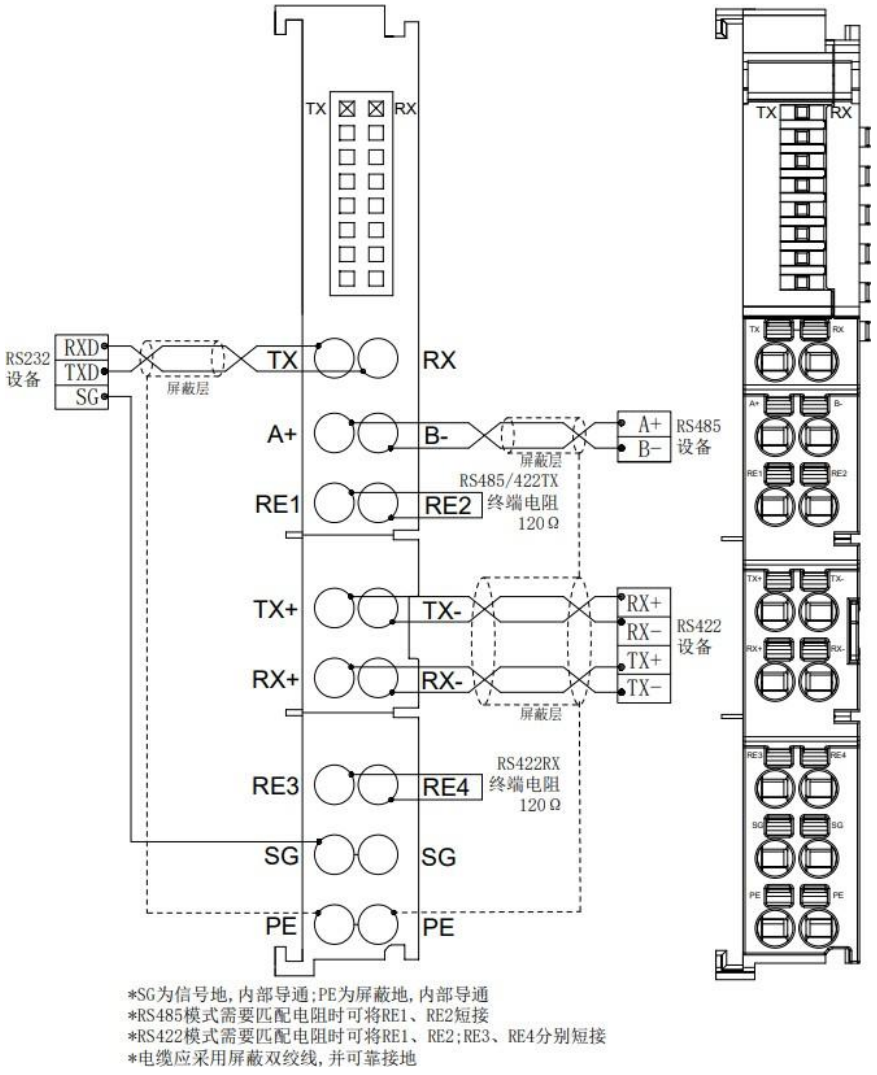
3.8.2. Panel structure



3.8.3. Indicator function

name	logo	color	state	status description
Input channel indicator	RX	green	flashing	The channel has data reception
			go out	No data reception on channel
Output channel indicator	TX	green	flashing	The channel has data to send
			go out	No data is sent on the channel

3.8.4. Wiring diagram



Wiring diagram

name	logo	color	state	status description
Input channel indicator	RX	green	flashing	The channel has data reception
			go out	No data reception on channel
Output channel indicator	TX	green	flashing	The channel has data to send
			go out	No data is sent on the channel

3.9. 24V single-ended incremental encoder counting module

The plug-in encoder counting module can be connected to an external 24V single-ended incremental encoder. The module supports Z phase clearing, comparison output, probe latch and other functions.

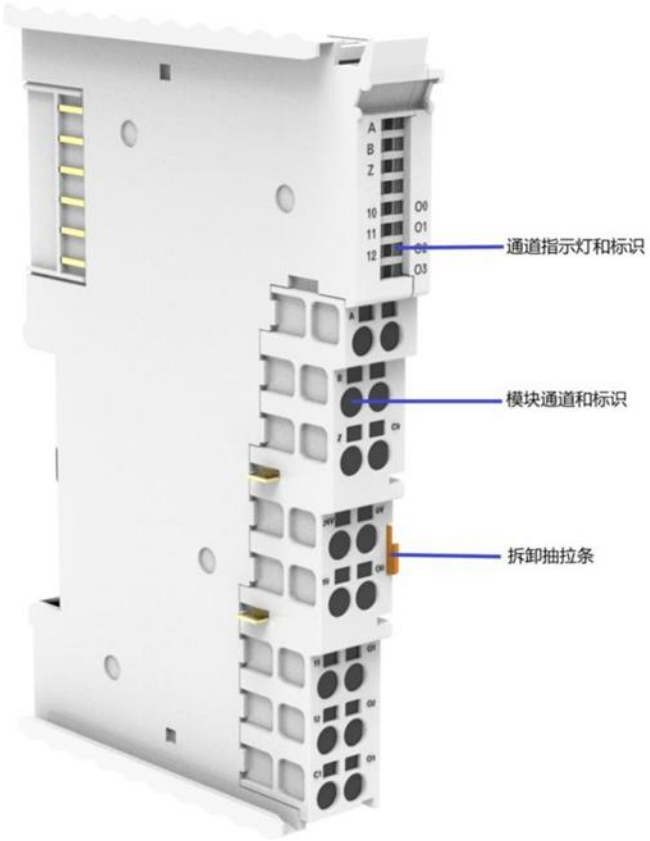
3.9.1. Technical Parameters

Interface parameters	
bus protocol	S-Link
Process data volume: Downstream	10 Bytes
Process data volume: Upstream	18 Bytes
Channel type	Encoder input channel: 1 set of channels (A phase, B phase and Z phase), PNP/NPN
	Probe input channel: 2 channels, PNP/NPN
	Ordinary digital input channels: 1 channel, PNP/NPN
	Comparison output channels: 2 channels, NPN
	Ordinary digital output channels: 2 channels, NPN
refresh rate	1ms
Technical Parameters	
System input power	5VDC
Field side power supply rating (range)	24VDC (18V~36V)
Input channel voltage rating (range)	24VDC (15V~30V)
Encoder pulse input mode	AB quadrature (ABZ), direction pulse (Pul+Dir), double pulse (CW/CCW)

Encoder pulse input frequency	1MHz
Report channel real-time speed	support
Z phase clear	support
Counting magnification setting	4x/2x/1x (default 1x)
ring count	support
Counting range	0~2^32-1 or 0~ring counting resolution×counting magnification-1
Encoder ring count resolution setting[1]	Supported (ring counting resolution setting range is 0~65535)
Count initial value setting	Supported (the initial counting value setting range is 0~2^32-1)
count backwards	support
Encoder input hardware filtering	Support (level 0~15)
Probe function (high-speed hardware latch)	support
Probe input frequency	1MHz
Compare output function	support
Compare output signal response speed	50us
Input and output pin function selection	support
Power-off storage	support
Dimensions	100×14.8×68.67mm
weight	50g
Wiring	Screwless quick plug
Installation method	DIN 35mm rail mounting
Operating temperature	-10℃~+60℃

storage temperature	-20℃~+75℃
Relative humidity	95%, no condensation
Protection level	IP20

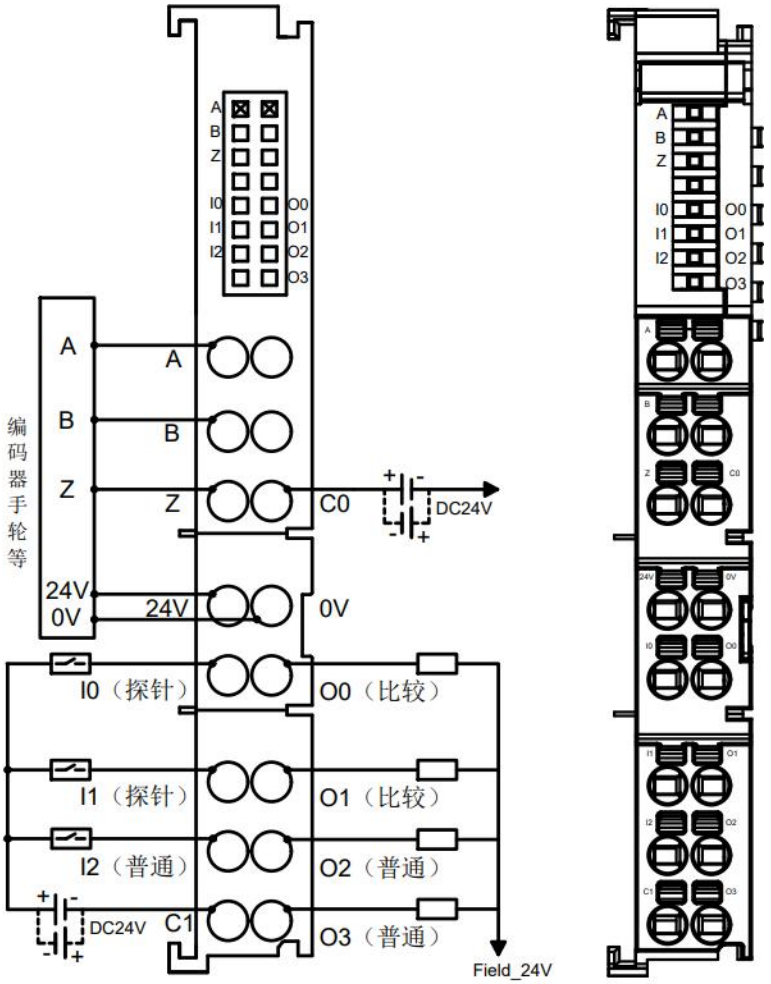
3.9.2. Panel structure



3.9.3. Indicator function

name	logo	color	state	status description
Encoder input AB phase indicator light	A	green	Always on	Encoder is enabled
	B		go out	Encoder is not enabled
Encoder input Z phase indicator light	Z	green	Always on	Encoder Z phase clear function is enabled
			go out	Encoder Z phase clear function is not enabled
Input channel indicator	I0~I2	green	Always on	The channel has signal input
			go out	Channel has no signal input
Output channel indicator	O0~O3	green	Always on	The channel has signal output
			go out	Channel has no signal output

3.9.4. Wiring diagram



*编码器ABZ相NPN/PNP兼容，公共端为C0
*输入点NPN/PNP兼容，公共端为C1
*输出点为NPN

3.10. 5V differential incremental encoder counting module

The plug-in encoder counting module can be connected to an external 5V differential incremental encoder. The module supports Z phase clearing, comparison output, probe latch and other functions.

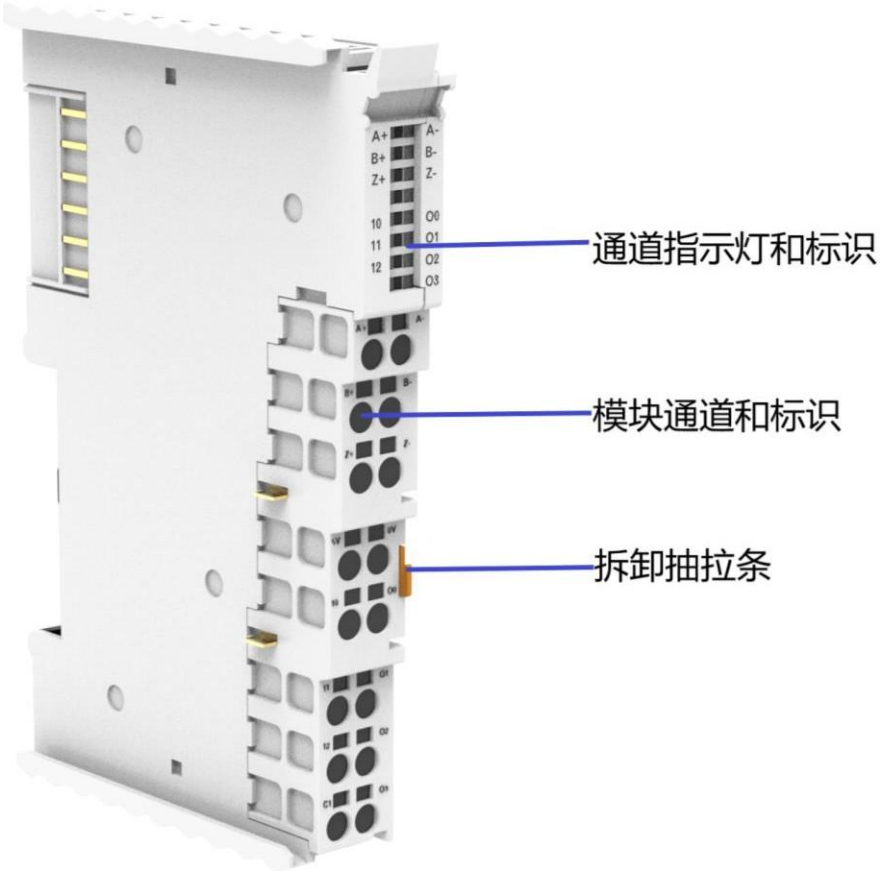
3.10.1. Technical Parameters

Interface parameters	
bus protocol	S-Link
Process data volume: Downstream	10 Bytes
Process data volume: Upstream	18 Bytes
Channel type	Encoder input channel: 1 set of channels (A phase, B phase and Z phase), PNP/NPN
	Probe input channel: 2 channels, PNP/NPN
	Ordinary digital input channels: 1 channel, PNP/NPN
	Comparison output channels: 2 channels, NPN
	Ordinary digital output channels: 2 channels, NPN
refresh rate	1ms
Technical Parameters	
System input power	5VDC
Field side power supply rating (range)	24VDC (18V~36V)
Input channel voltage rating (range)	5VDC (differential)
Encoder pulse input mode	AB quadrature (ABZ), direction pulse (Pul+Dir), double pulse (CW/CCW)
Encoder pulse input frequency	1MHz

Report channel real-time speed	support
Z phase clear	support
Counting magnification setting	4x/2x/1x (default 1x)
ring count	support
Counting range	0~2^32-1 or 0~Ring counting resolution×counting magnification-1
Encoder ring count resolution setting[1]	Supported (ring counting resolution setting range is 0~65535)
Count initial value setting	Supported (the initial counting value setting range is 0~2^32-1)
count backwards	support
Encoder input hardware filtering	Support (level 0~15)
Probe function (high-speed hardware latch)	support
Probe input frequency	1MHz
Compare output function	support
Compare output signal response speed	50us
Input and output pin function selection	support
Power-off storage	support
Dimensions	100×14.8×68.67mm
weight	50g
Wiring	Screwless quick plug
Installation method	DIN 35mm rail mounting
Operating temperature	-10℃~+60℃
storage temperature	-20℃~+75℃

Relative humidity	95%, no condensation
Protection level	IP20

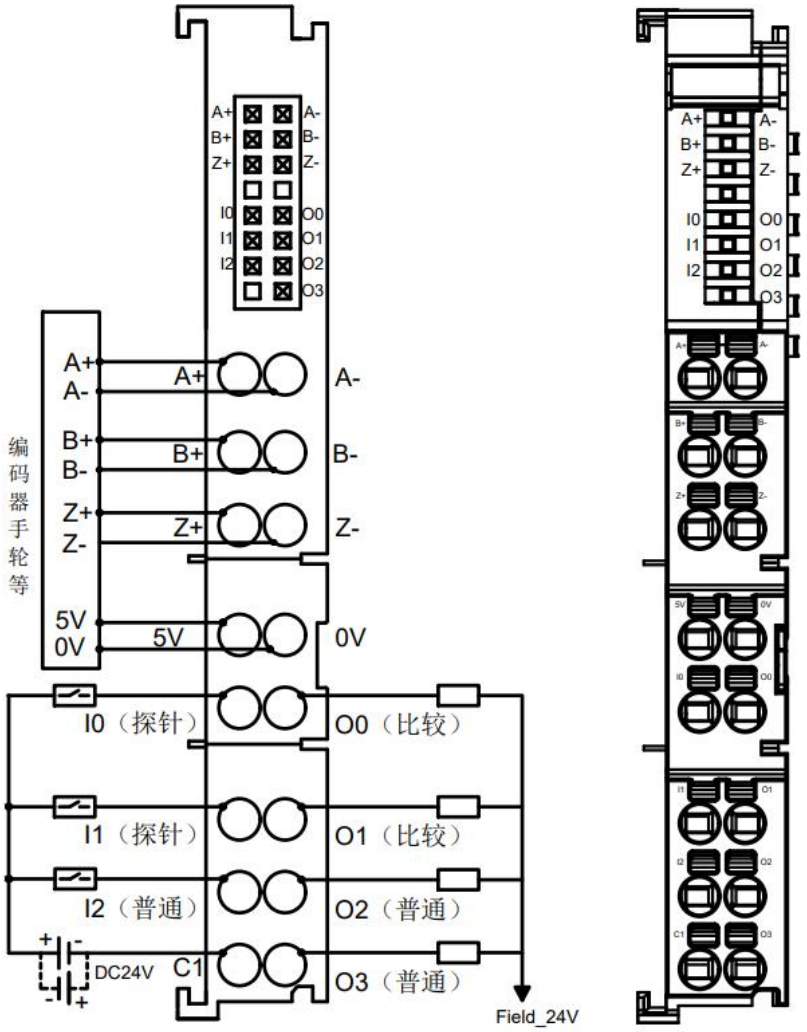
3.10.2. Panel structure



3.10.3. Indicator function

name	logo	color	state	status description
Encoder input AB phase indicator light	A+/A-	green	Always on	Encoder is enabled
	B+/B-		go out	Encoder is not enabled
Encoder input Z phase indicator light	Z+/Z-	green	Always on	Encoder Z phase clear function is enabled
			go out	Encoder Z phase clear function is not enabled
Input channel indicator	I0~I2	green	Always on	The channel has signal input
			go out	Channel has no signal input
Output channel indicator	O0~O3	green	Always on	The channel has signal output
			go out	Channel has no signal output

3.10.4. Wiring diagram



*输入点NPN/PNP兼容，公共端为C1
*输出点为NPN

4. Installation and removal

4.1. Installation guide

Installation\disassembly precautions

- Make sure the cabinet has good ventilation measures (such as installing an exhaust fan in the cabinet).
    - Do not install this device next to or above equipment that may cause overheating.
- Be sure to install the module vertically and maintain air circulation around it (there should be at least 50mm of air circulation space above and below the module).
- After the module is installed, be sure to use the fixing buckle on the left side of the coupler module to secure the module.
- Installation/disassembly must be performed with the power supply turned off.
- Be sure to install it on a fixed rail.

4.2. Installation and disassembly steps

Module installation and removal	
Module installation steps	1. Install the coupler power module on the fixed rail first.
	2. Install the required I/O modules or function modules on the right side of the power module in sequence.
	3. After installing all required modules, install the end caps to complete the module assembly.
	4. Rotate the orange fixing buckle on the left side of the coupler module to secure the module.
Module removal steps	1. When disassembling a module individually, you can directly pull the orange pull-out bar of the module outward.
	2. Continue to pull the orange pull-out bar to disassemble and pull out the module directly.
	3. If you need to replace the module, just insert the new module into the empty space after disassembly.

4.3. Installation diagram

- **Coupler power module and I/O module installation steps**

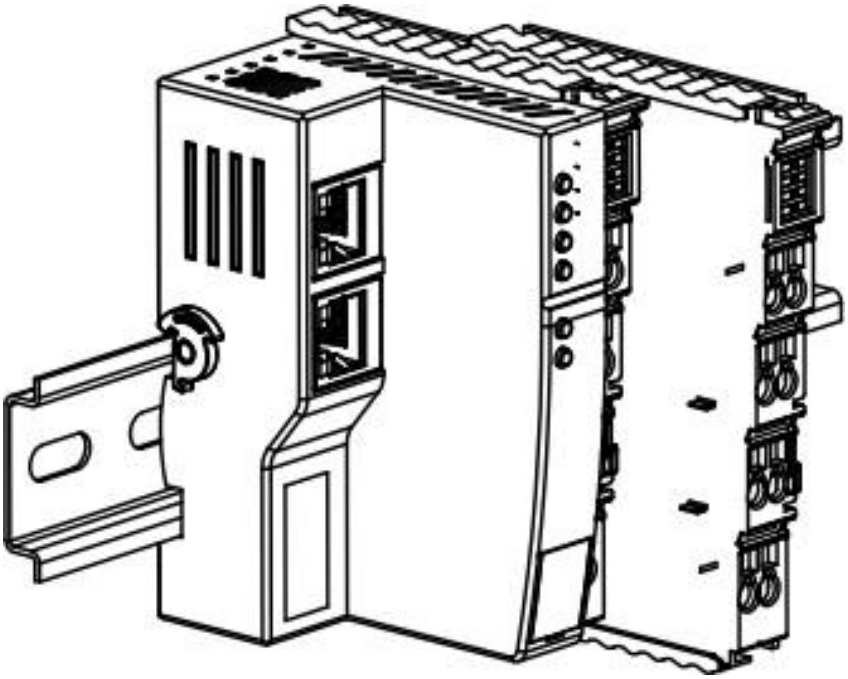
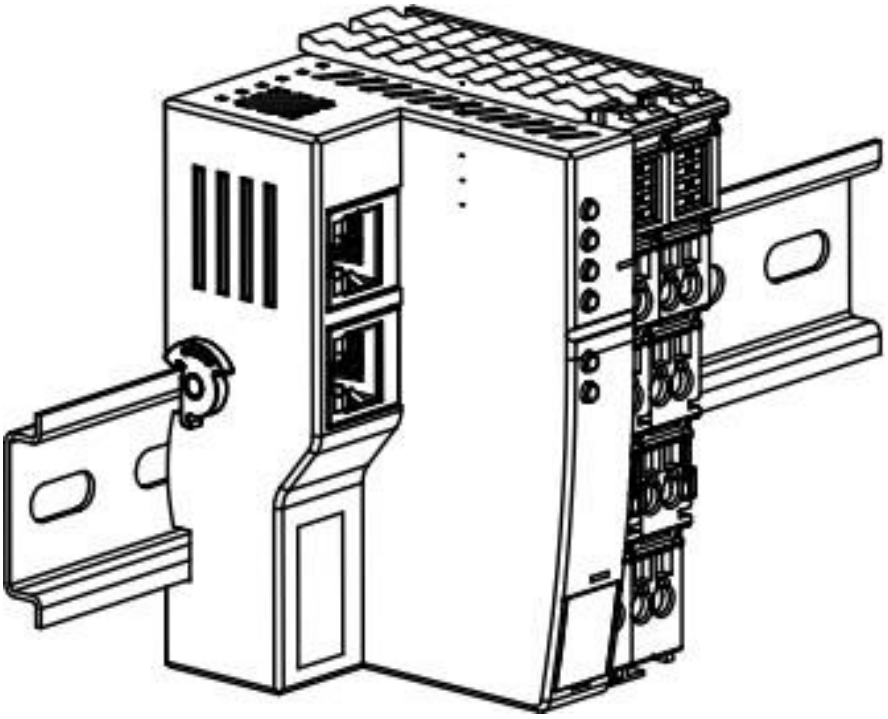


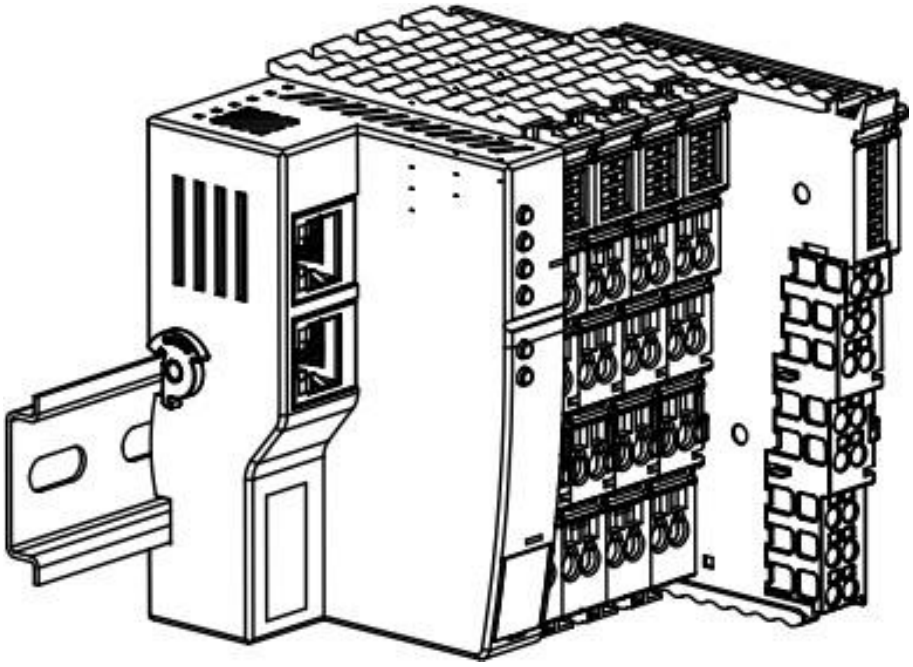
Figure ①

Align the coupler power module vertically with the guide rail slot, push it in place, and install the I/O modules on the right side in sequence, aligning them with the right side of the power module, as shown in ① on the left.



Figure②

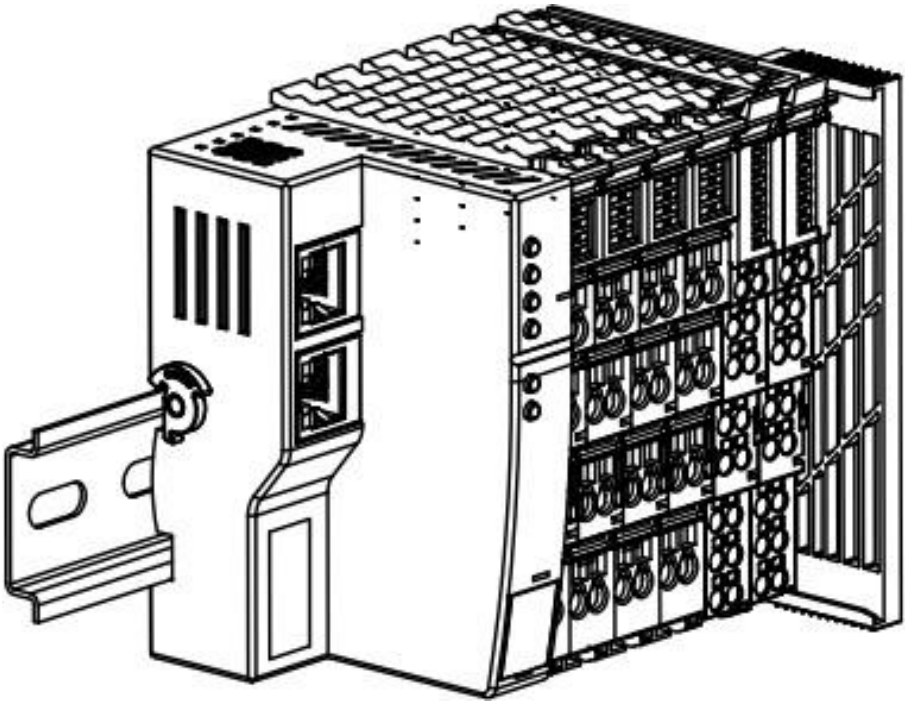
As shown in Figure ②, push the I/O module firmly toward the rail. When you hear a "click" sound, the module is installed in place.



Figure③

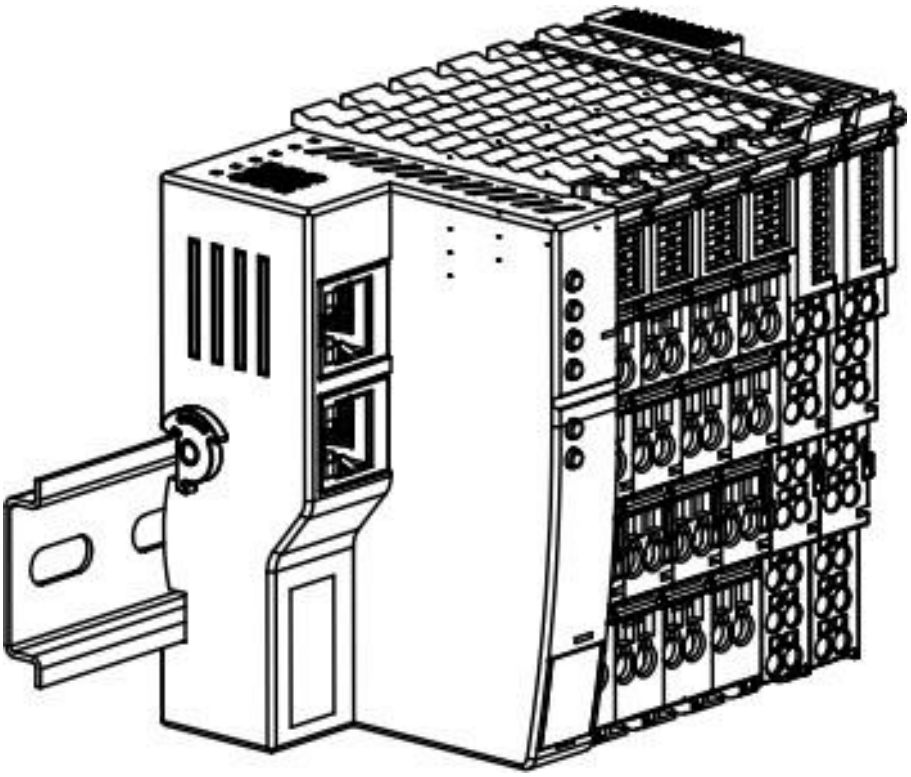
Install the required I/O modules or function modules one by one, align the left card slot of the module with the rightmost side of the installed module, and push it in as shown in Figure ③. When you hear a "click" sound, the module is installed in place.

- **End cover installation steps**



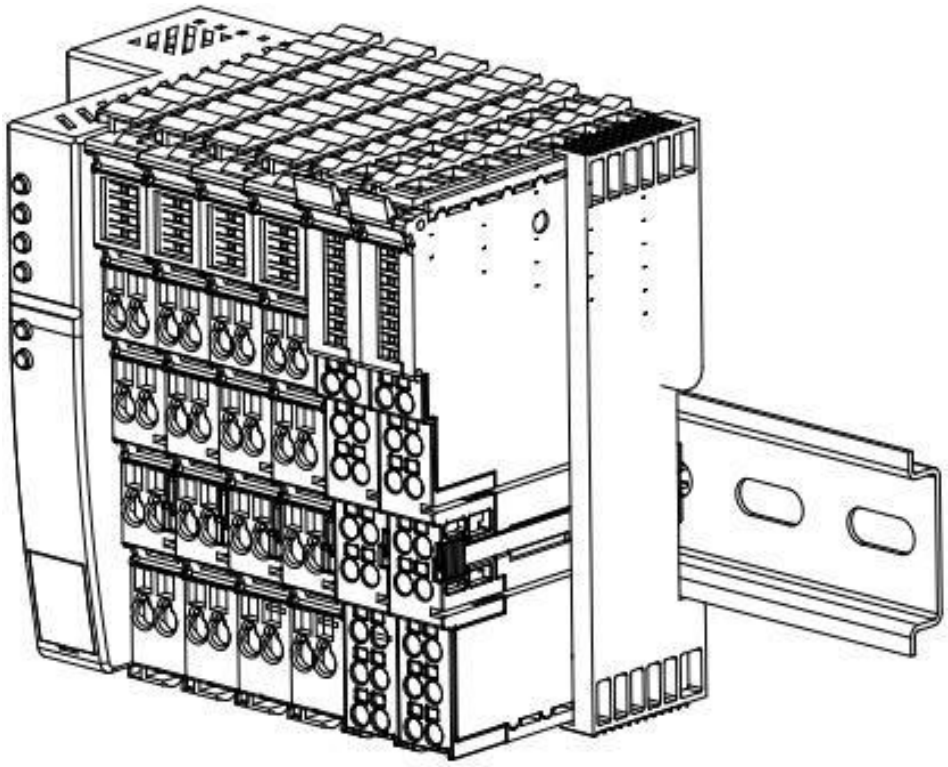
Figure④

Install the end cover on the right side of the last module, aligning the groove side of the end cover with the guide rail, as shown in Figure ④. For the installation method, please refer to the installation method of the I/O module. After the end cover is pushed in place, as shown in Figure ⑤.



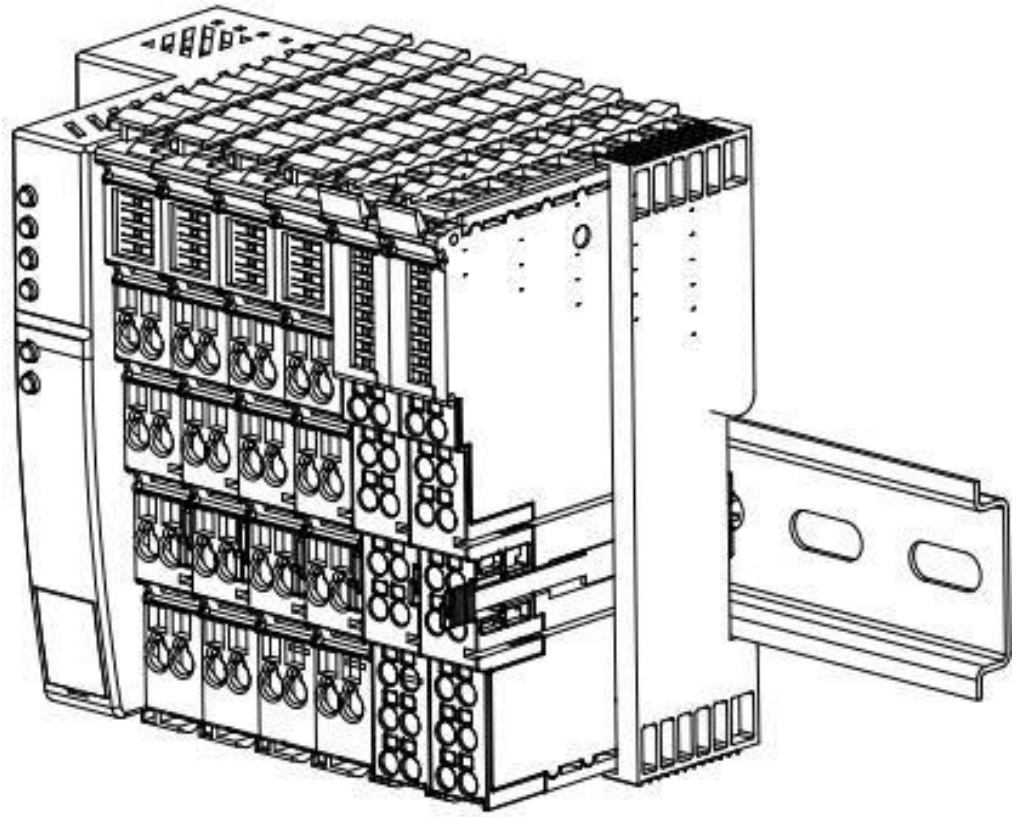
Picture ⑤

- **Disassembly steps**



Figure⑥

You can directly pull out the orange pull-out bar of the module to be removed or replaced, as shown in Figure ⑥.



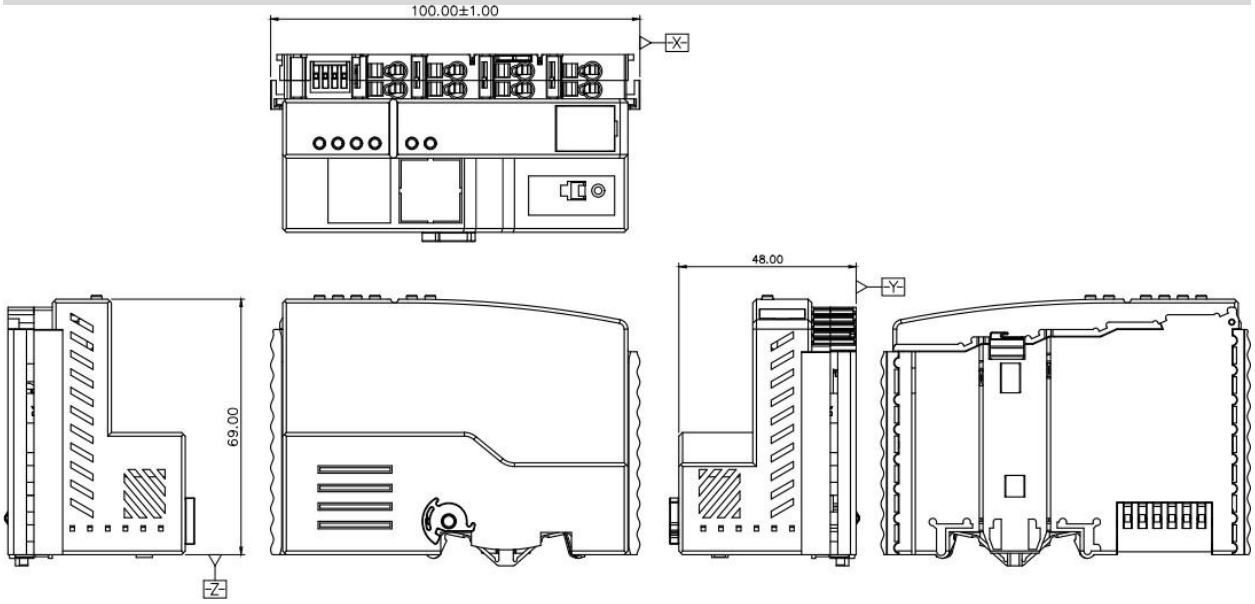
Figure⑦

After the orange pull-out bar is pulled out, continue to pull out, as shown in Figure ⑦, and the module can be pulled out directly.

4.4. Dimensions

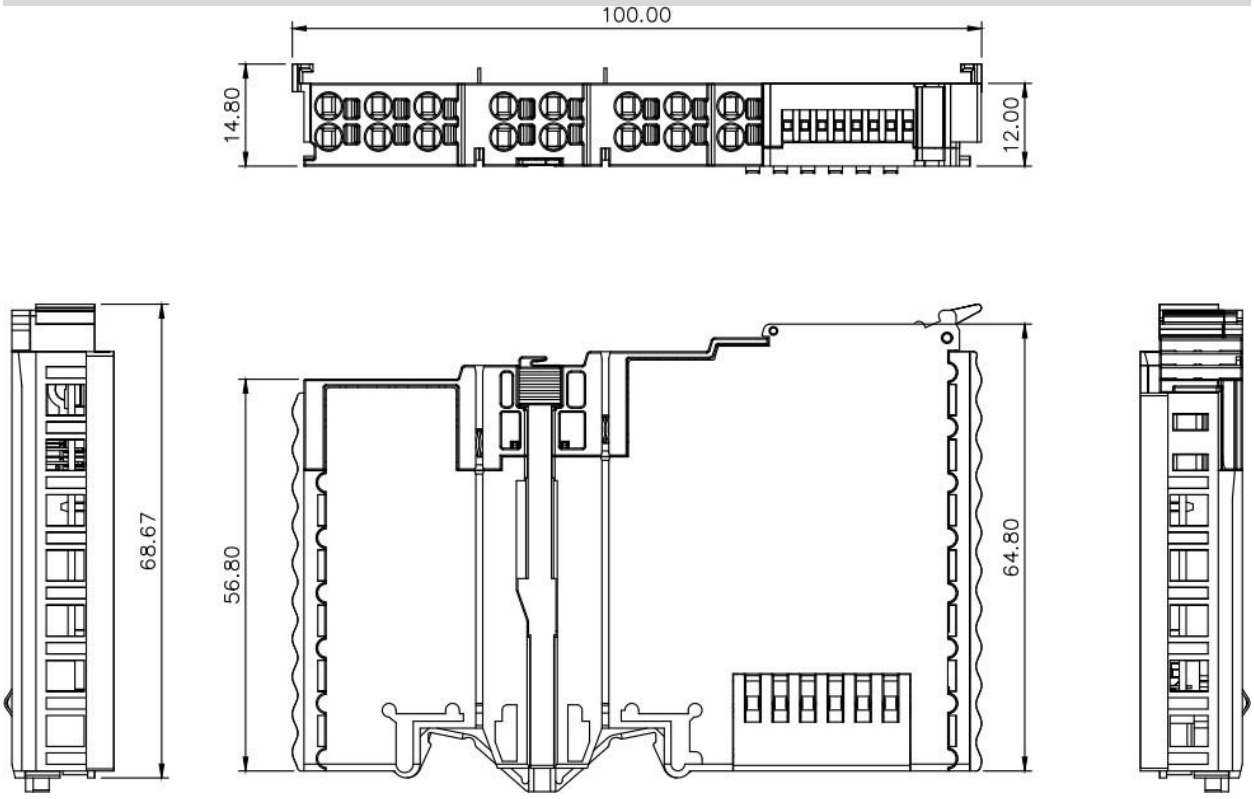
4.4.1. Coupler dimensions

Coupler dimensions (unit: mm)



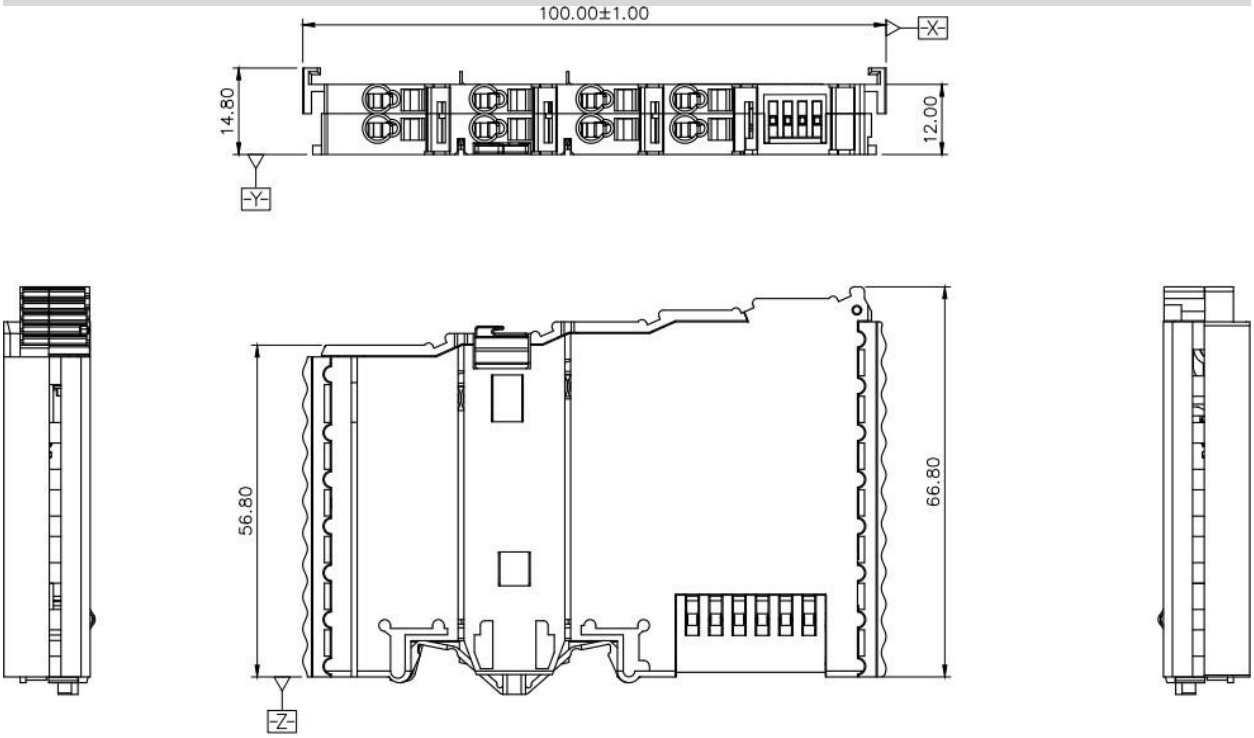
4.4.2. 16 Channel Cage Housing Dimensions

16-channel I/O module, common terminal module, temperature acquisition module outline specifications (unit: mm)



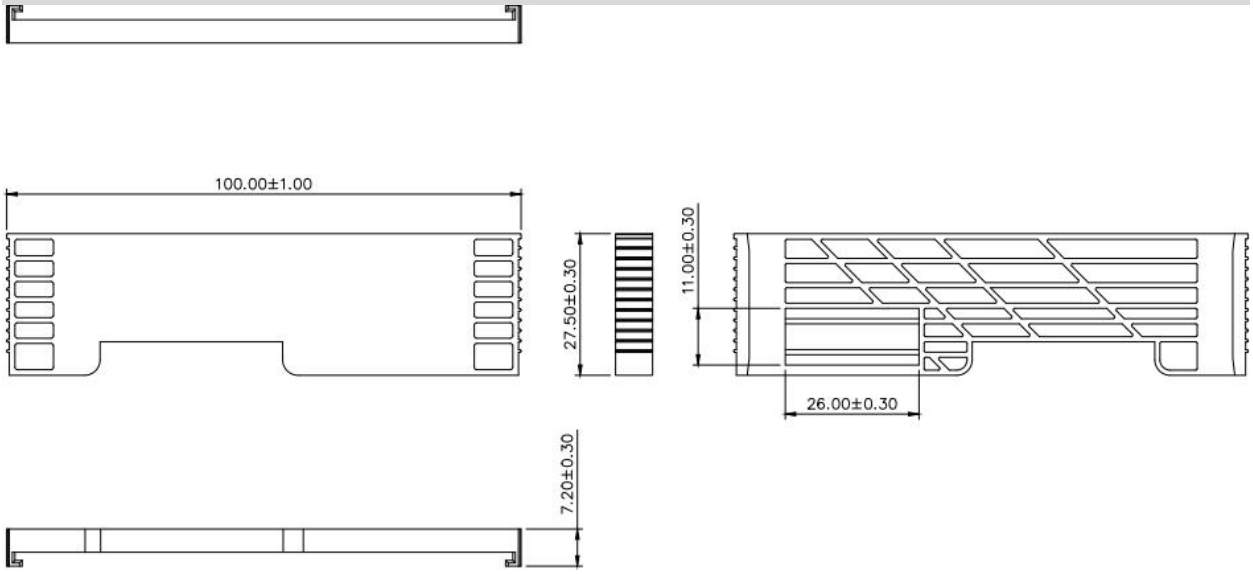
4.4.3. 8-Channel Cage Housing Dimensions

8-channel I/O module, power module and extended power module outline specifications (unit: mm)



4.4.4. Terminal Bezel Module Dimensions

End cover appearance specifications (unit: mm)



Note: They are all installed using DIN 35 mm standard rails. The DIN rail specifications are 35*7.5*1.0 and 35*15*1.0 (unit: mm).

5. wiring

5.1. Terminals

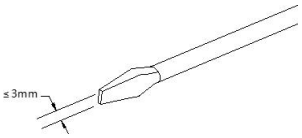
Terminals			
Power module terminals	Number of poles	8P	
	Wire diameter	28~12 AWG 0.2~2.5 mm²	
I/O module terminals	Number of poles	8 channel cage housing	8P
		16 channel cage housing	16P
	Wire diameter	8 channel cage housing	28~12 AWG 0.2~2.5 mm²
		16 channel cage housing	28~16 AWG 0.2~1.5 mm²
bus interface	2×RJ45	Category 5 or above UTP or STP (STP recommended)	

5.2. Wiring Instructions and Requirements

Power wiring precautions

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

Wiring tool requirements



The power terminals and I/O module signal cable terminals adopt a screw-free design, and the cables can be installed and removed using a flat-blade screwdriver (specification: ≤3mm).

Stripping length requirements

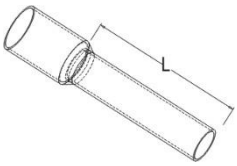
The recommended cable stripping length for power and signal wire terminals is 8~9 mm.

Wiring method

For single-strand hard wires, after peeling off the corresponding length of wire, press down the spring tab and insert the single-strand wire.

Multi-stranded flexible wires, after stripping the wires of corresponding length, can be directly connected or used with corresponding standard cold-pressed terminals (tubular insulated terminals, reference specifications are shown in the table below), press down the spring tab and insert the wire at the same time.

The specifications of power terminals and signal wire terminals are as shown in the following table:

Specification table of tubular insulating terminals		
Specification requirements	model	Wire cross-sectional area mm²
 The length of the tubular insulated terminal L is 8 mm	E0308	0.3
	E0508	0.5
	E7508	0.75
	E1008	1.0
	E1508	1.5
	E2508	2.5

6. use

6.1. Parameter Description

6.1.1. Output signal clear/hold

The clear/hold function is for modules with output channels. This function can configure the output action of the module when communication is disconnected. Clear output: When communication is disconnected, the module output channel automatically clears the output.

Keep output: When communication is disconnected, the module output channel always keeps output.

The EtherCAT coupler keeps the output by default, and the PROFINET coupler clears the output by default.

6.1.2. Digital input filtering

Digital input filtering prevents the program from responding to unexpected rapid changes in the input signal, which may occur due to switch contact jumps or electrical noise. The current default configuration of digital input filtering is 3ms, and the supported setting range is 0~20ms. When configured to 3ms, clutter within 3ms can be filtered out, and channels cannot be configured individually.

An input filter time of 3 ms means that a single signal changes from "0" to "1", or from "1" to "0" for 3 ms before it can be detected, while a single high pulse or low pulse shorter than 3 ms will not be detected.

6.1.3. Analog filter settings

Analog input filter function

The analog input filtering function can average the A/D converted data internally to reduce the impact of fluctuations on the input signal due to noise, etc.

The analog input performs moving average processing with the specified number of A/D conversions.

Filter function configuration

Each channel can be configured independently, configuration range: 1~200, default 10 times.

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

The sampling rate of the 4-channel module is: 2.5KHz/4 channels (400us/4 channels).

6.1.4. Analog range configuration

The analog range setting function is used to set the range of the analog quantity (for details on the range, see 3.4.1 Technical Parameters).

This manual uses TIA Portal V18 as an example to introduce the parameter configuration method of the PROFINET coupler + I/O module combination. For detailed steps, see Chapter 6.2.1 Parameter settings , after modification is completed, power must be turned on again.

This manual uses CODESYS as an example to introduce the parameter configuration method of the EtherCAT coupler + I/O module combination. For specific steps, please refer to the parameter settings in chapter 6.2.1. After the modification is completed, it is recommended to power on again. .

6.1.5. Temperature acquisition module configuration

Sensor type selection

The module supports sensor type configuration function. The same module only supports the same type of sensors, and a single channel cannot be configured.

Note: The default sensor type is PT100.

Filter function

A single channel of the module can filter each measured value through the filtering function, and perform sliding average processing on the first N collected data to reduce the jitter range of the measured values and improve stability and accuracy.

Filtering time = number of module cycles (N) × module cycle time

Module cycle time = conversion time + disconnection detection time

Remarks: ① N configuration range is 1~10.

② Default setting of filter parameters: 1/time.

Channel enable function

The module can determine whether the channel is used through the "enable/disable" parameter settings. If the channel is set to not be used, the channel is disabled and -9999 will not be displayed regardless of whether the sensor is connected or not.

Note: All channels are set to Disable by default at the factory.

The temperature acquisition module is enabled by default after being successfully connected to the XB6-EI0002 and XB6-CB0002 couplers.

Disconnection detection

Thermocouples (TC), resistance thermal sensors (RTD) and resistance sensors all support disconnection detection, and will display -9999 when disconnected.

Temperature/resistance data collection

The upstream data (Input) of the temperature module is the temperature or resistance data collected by each channel. The data of each channel is a 2-byte signed integer. The collected data is 10 times the actual data. Divide the read data by 10 to get the real temperature or resistance value in °C or Ω.

Data compensation function

The downstream data (Output) of the module is a manual compensation function for each channel data, and the data compensation value can be input according to actual needs. After setting the compensation value, the compensated temperature or resistance value will be automatically calculated in the upstream data (Input), that is, the upstream data is the final compensated temperature or resistance data. Divide the read data by 10 to obtain the compensated temperature or resistance value in °C or Ω.

6.2. PROFINET coupler configuration application

6.2.1. Application in TIA Portal V18 software environment

1. Preparation

- **Hardware environment**

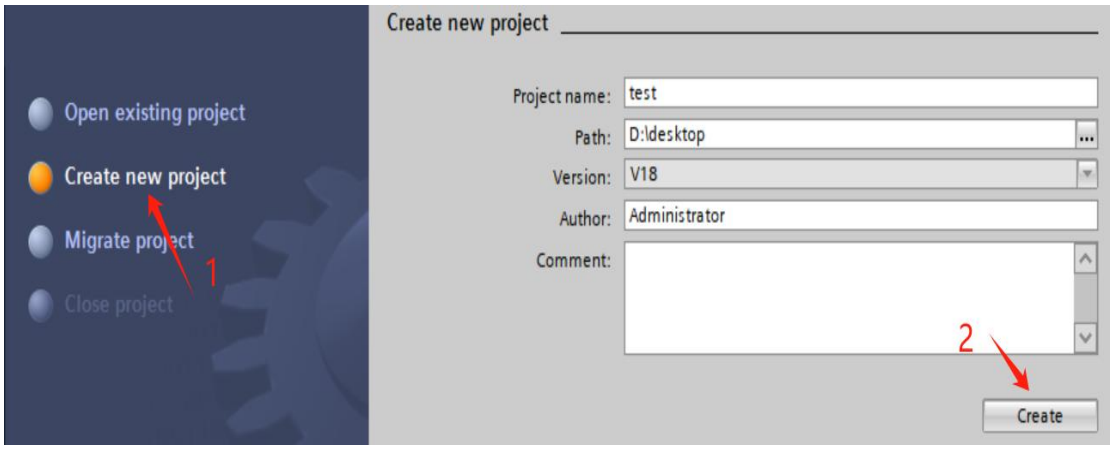
1. Module preparation, this description uses PROFINET coupler RP000PN + 16-channel digital input module RP1600P + 16-channel digital output module RP0016P + 4-channel analog voltage output module RP0004V + 4-channel Analog current input module RP0400A + temperature acquisition module RP04RD topology as an example
2. One computer with TIA Portal V18 software pre-installed
3. PROFINET special shielded cable
4. One Siemens PLC, this description takes Siemens S7-1200 as an example
5. One switching power supply
6. Module mounting guide rails and guide rail fixings
7. Device Configuration File

- **Hardware configuration and wiring**

Please operate in accordance with the requirements of "4 Installation and Disassembly " and "5 Wiring "

2. New construction

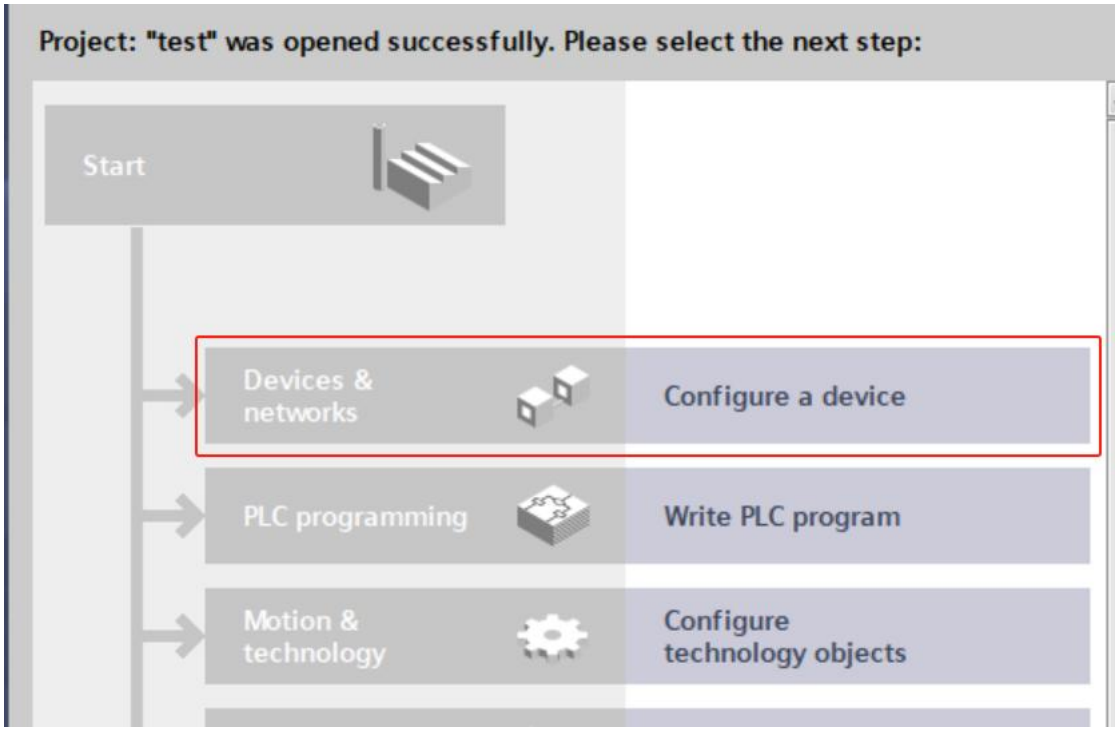
1. Open the TIA Portal V18 software, click "Create New Project", and click "Create" after entering all the information, as shown in the figure below.



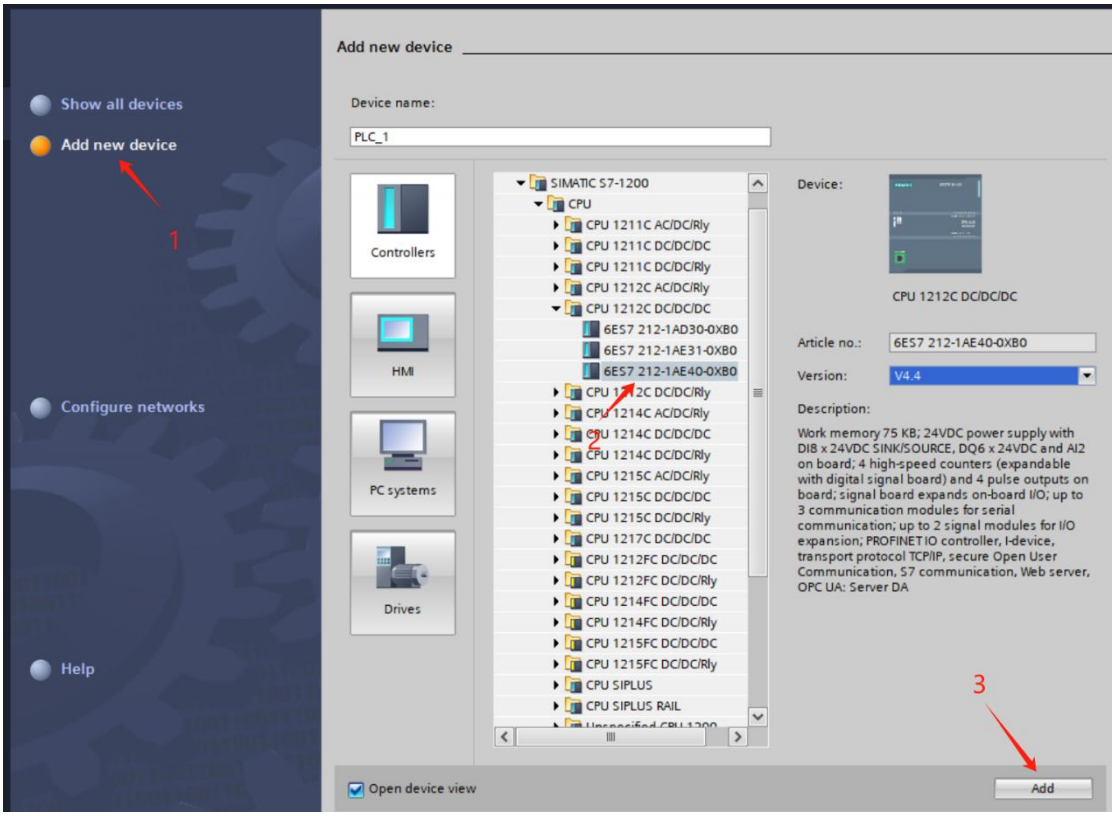
- Project name: Custom, you can keep the default.
- Path: The project keeps the path, which can be kept as default.
- Version: You can keep the default.
- Author: You can keep the default.
- Note: Customized, optional.

3. Add PLC controller

1. Click "Configure Device" as shown in the figure below.

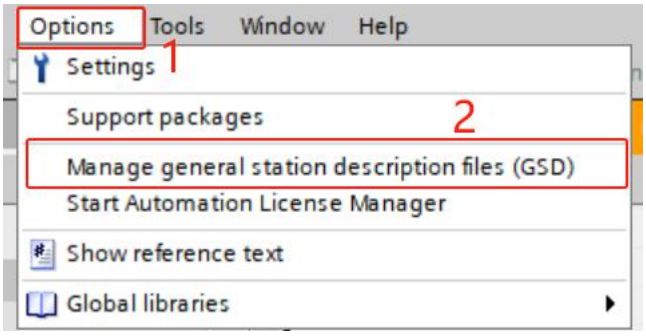


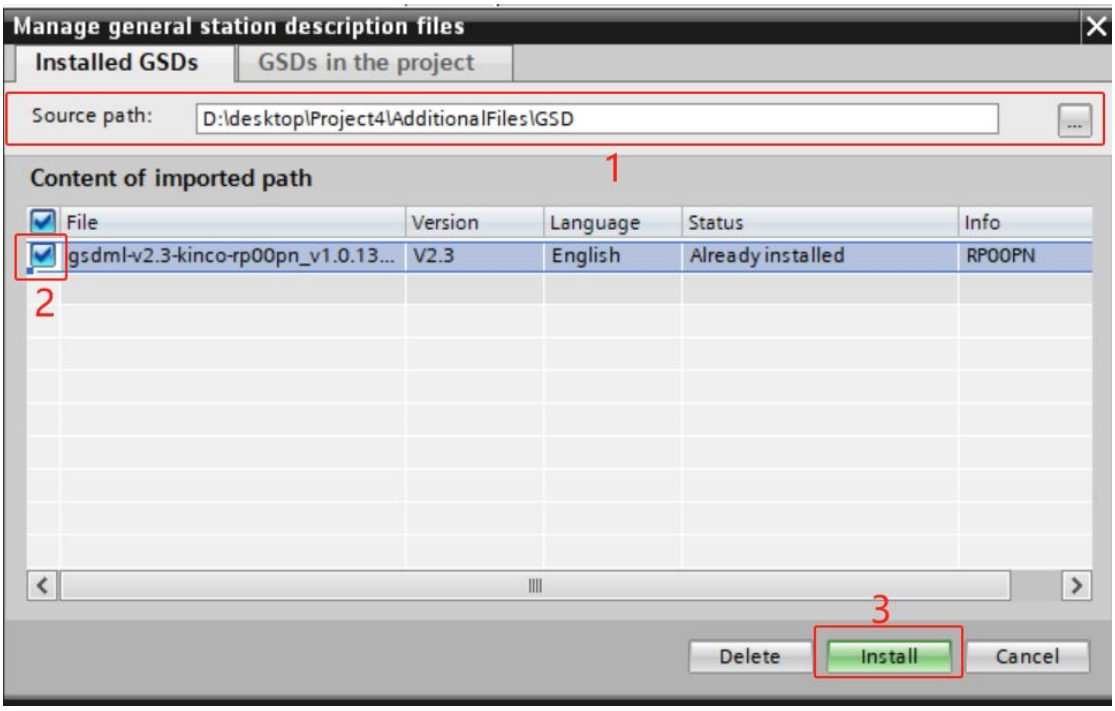
2. Click "Add New Device", select the PLC model currently used, and click "Add", as shown in the figure below. After the addition is completed, you can see that the PLC has been added to the device navigation tree on the left.



4. Add GSD configuration file

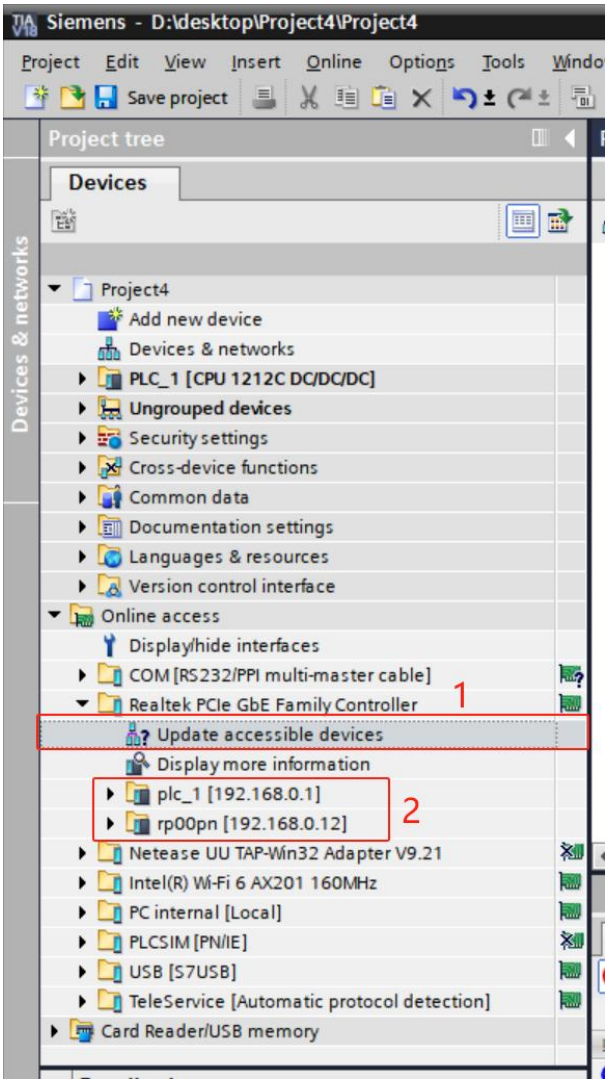
1. In the menu bar, select "Options->Manage Generic Station Description File (GSDML) (D)".
2. Click "Source Path" to select the folder where the GSD file is stored.
3. Check whether the status of the GSD file to be added is "Not Installed". If it is not installed, click the "Install" button. If it is already installed, click "Cancel" to skip the installation step.





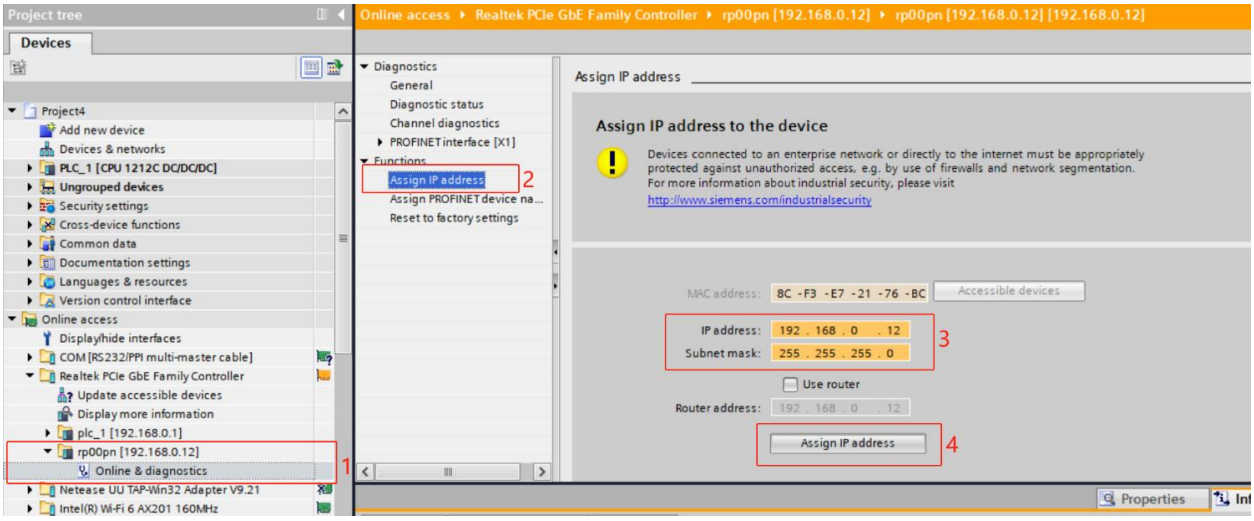
5. Scan for connected devices

1. Click "Online Access -> Update Accessible Devices" in the left navigation tree.
2. After the update is completed, the connected slave devices are displayed, as shown in the figure below.



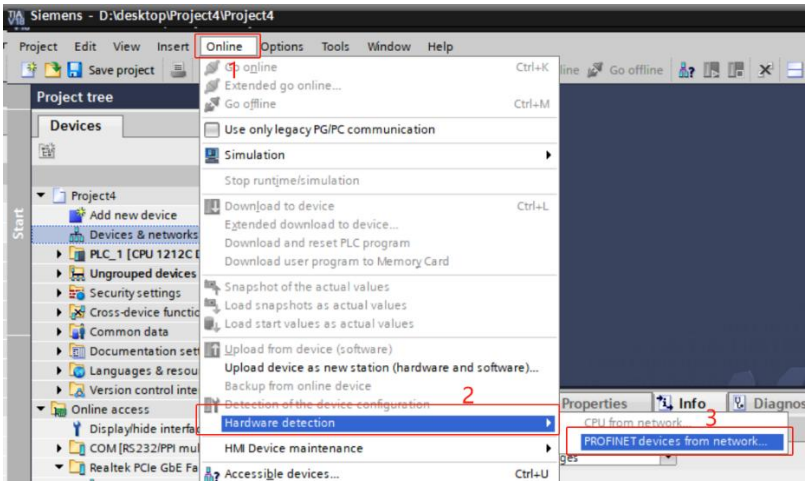
The computer's IP address must be in the same network segment as the PLC. If not, modify the computer's IP address and repeat the above steps.

3. If the coupler's IP address and the PLC are not in the same network segment, you can click "Online and Diagnosis" of the coupler to reassign the IP address, as shown in the figure below.

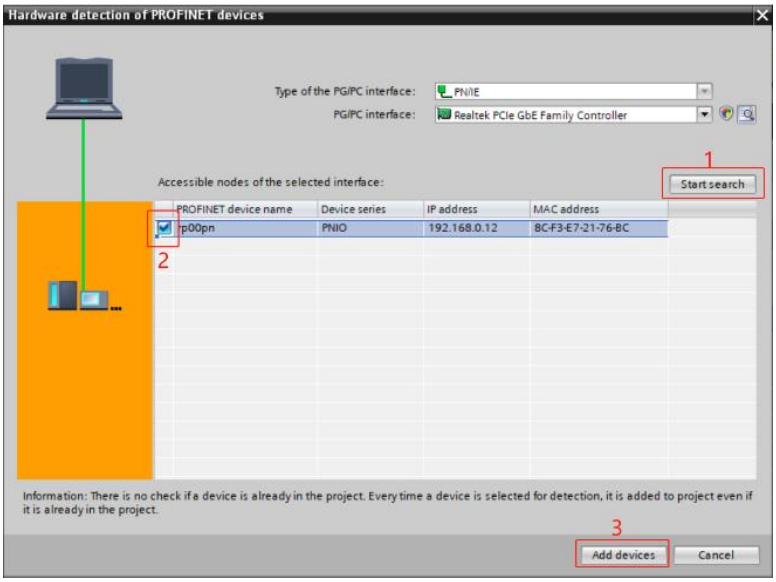


6. Add slave device

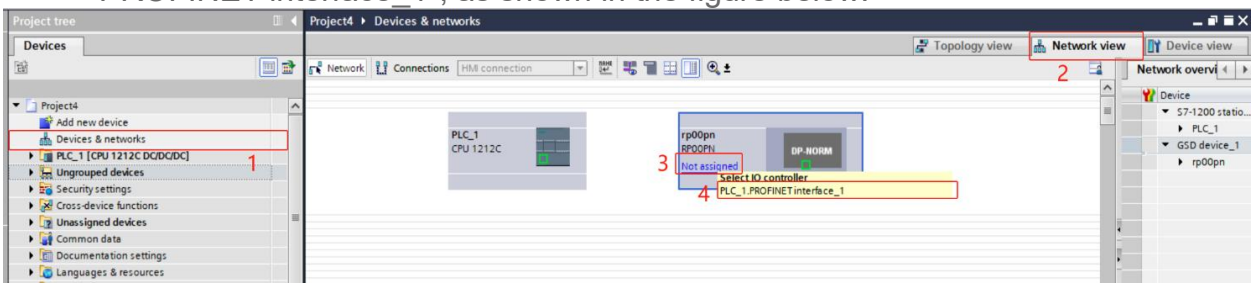
1. In the menu bar, select "Online -> Hardware detection -> PROFINET devices from network".



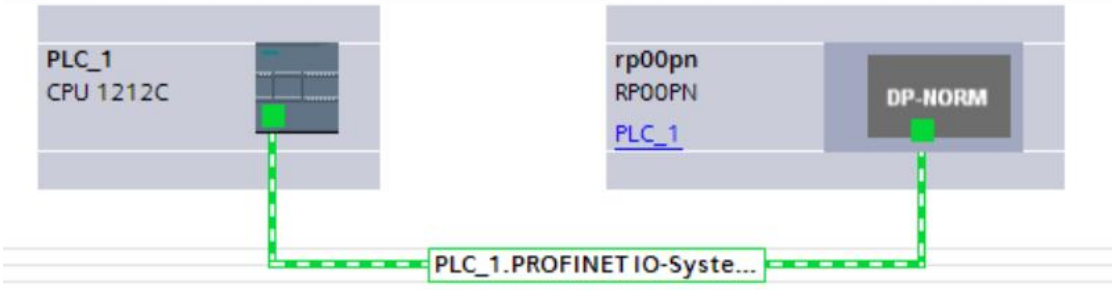
2. Click "Start search", check the scanned devices and add them to the device.



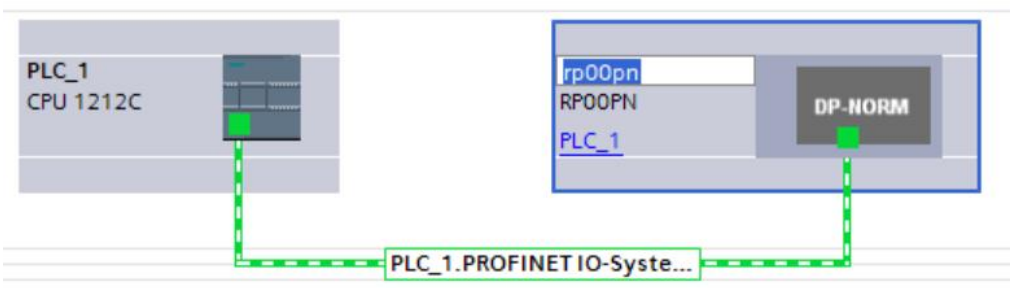
3. Double-click "Device&networks -> Network view", click "Not assigned (blue font)" on the slave device in the network configuration screen, and select "PLC_1. PROFINET interface_1", as shown in the figure below.



4. After the connection is completed, it is as shown in the figure below.

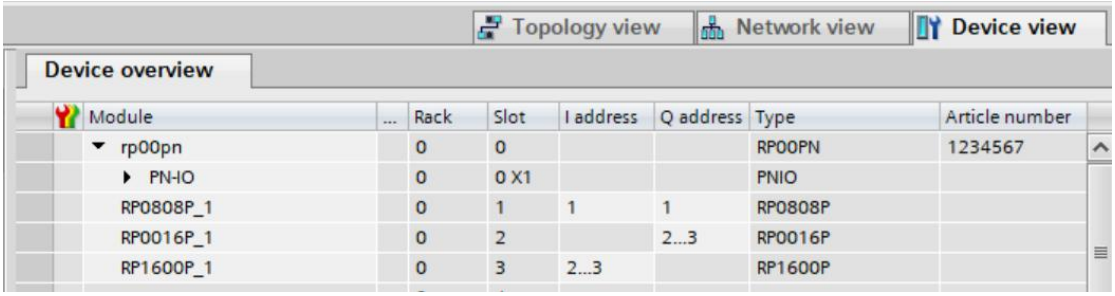


5. Click the device name to rename the device, as shown in the figure below.



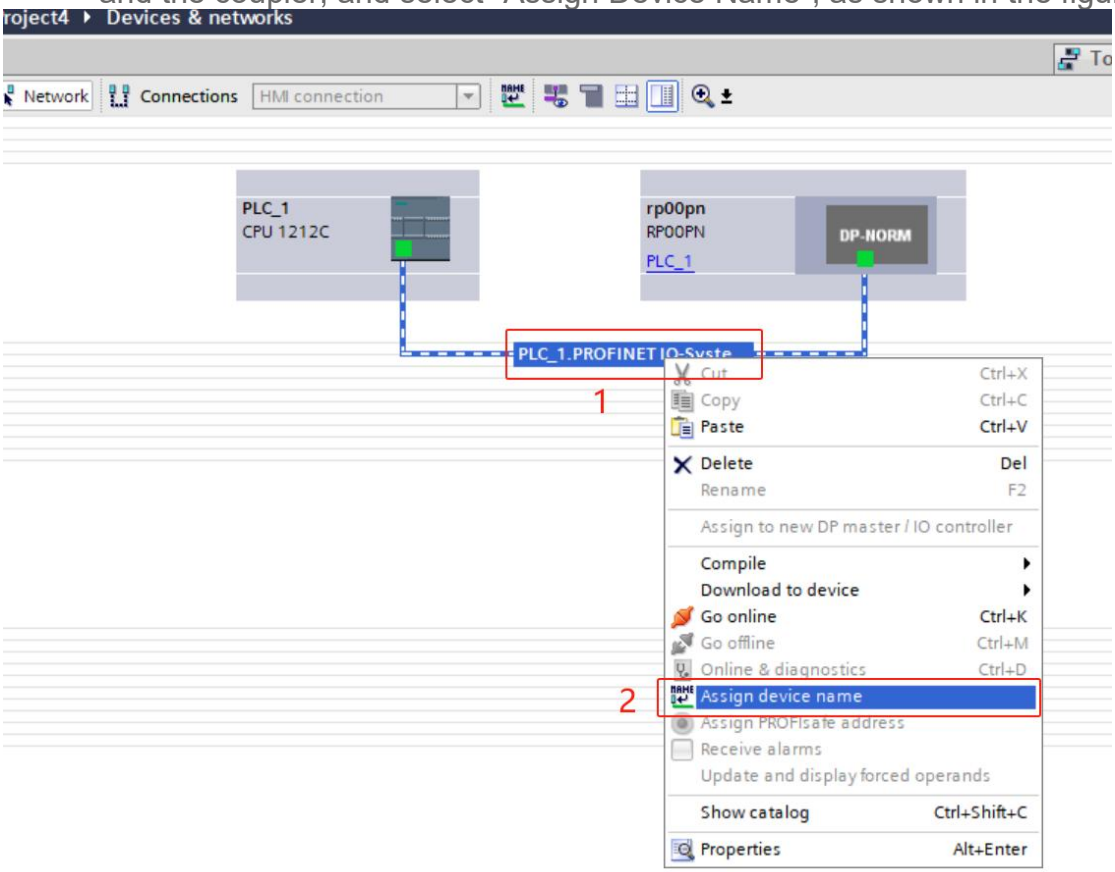
6. Click "Device view" to enter the device overview. The order of the I/O modules is consistent with the actual topology. The system automatically assigns the I/O

address. The I/O address can be changed by yourself, as shown in the figure below.



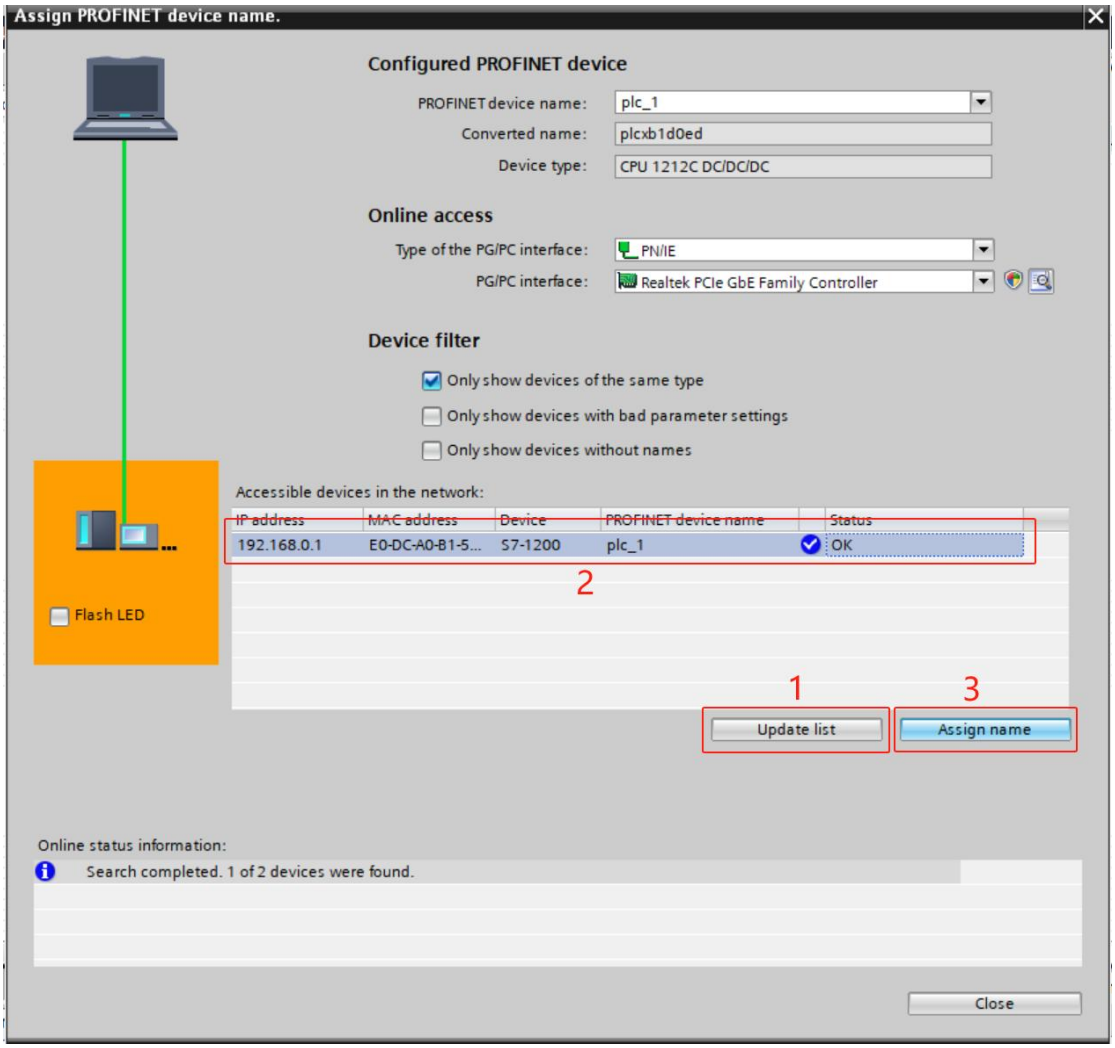
7. Assign device name

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



2. The "Assign PROFINET device name" window pops up. Check whether the MAC address on the module silk screen is the same as the MAC address of the assigned device name.
    - PROFINET device name: The name set in "Assign PROFINET device name".
    - Type of PG/PC interface: PN/IE.
    - PG/PC interface: The actual network adapter used.

3. Select the slave device in turn, click Update List, and click Assign Name. Check whether the status of the node in "Accessible Nodes in the Network" is "OK", as shown in the figure below.

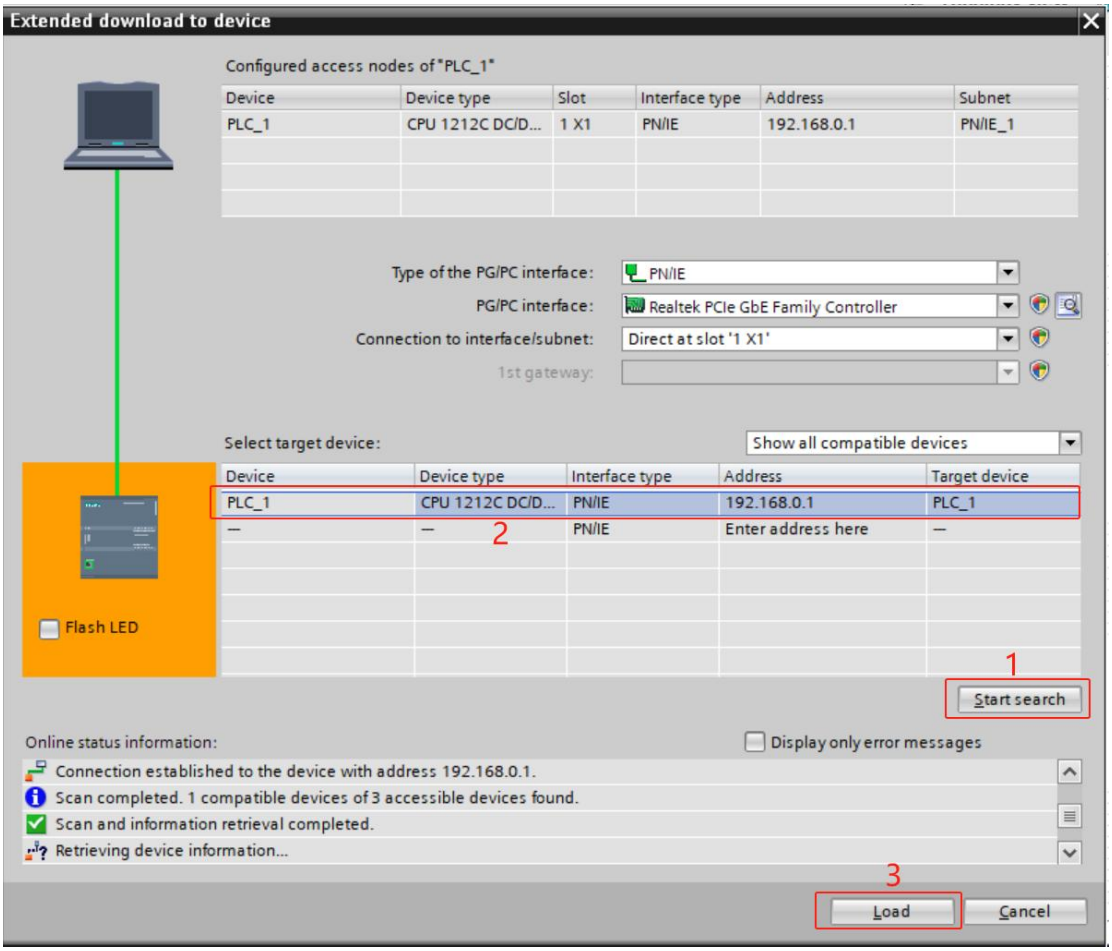


4. Click Close.

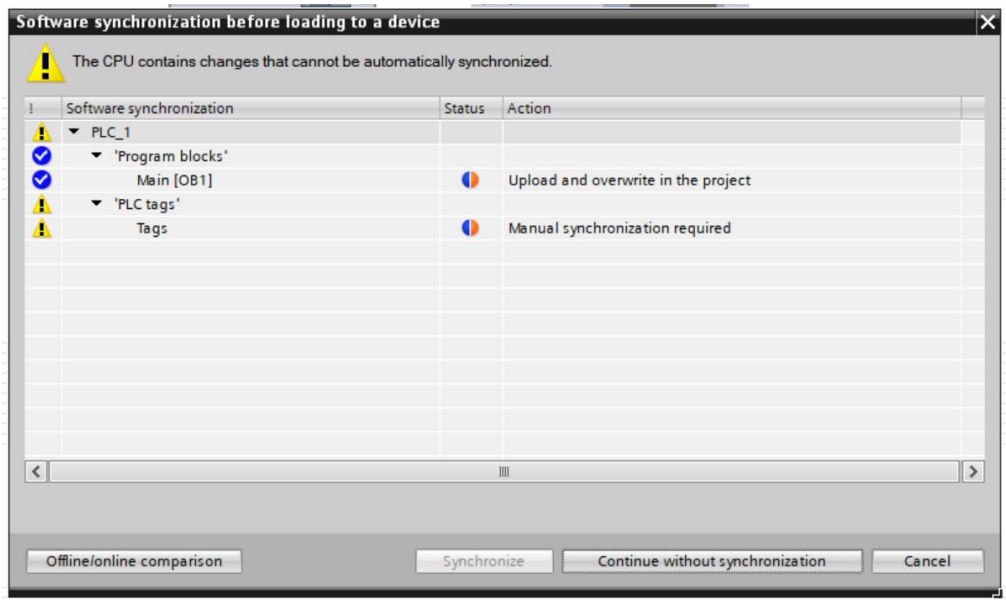
8.2.1.8. 8. Download the configuration structure

8. Download configuration structure

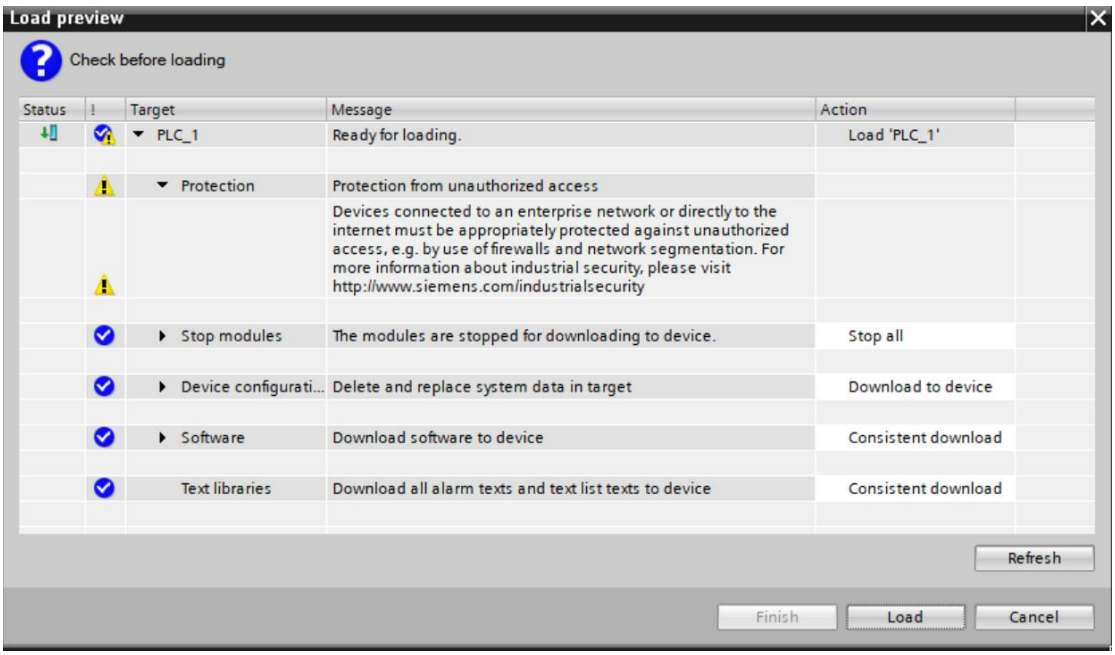
1. In the "Network View", select the PLC.
2. Click the button in the menu bar to download the current configuration to the PLC.
3. In the pop-up "Download extension to device" window, configure the configuration as shown in the figure below, and click "Start Search".
4. Click "Download".



5. Select "Continue without syncing" as shown in the image below.



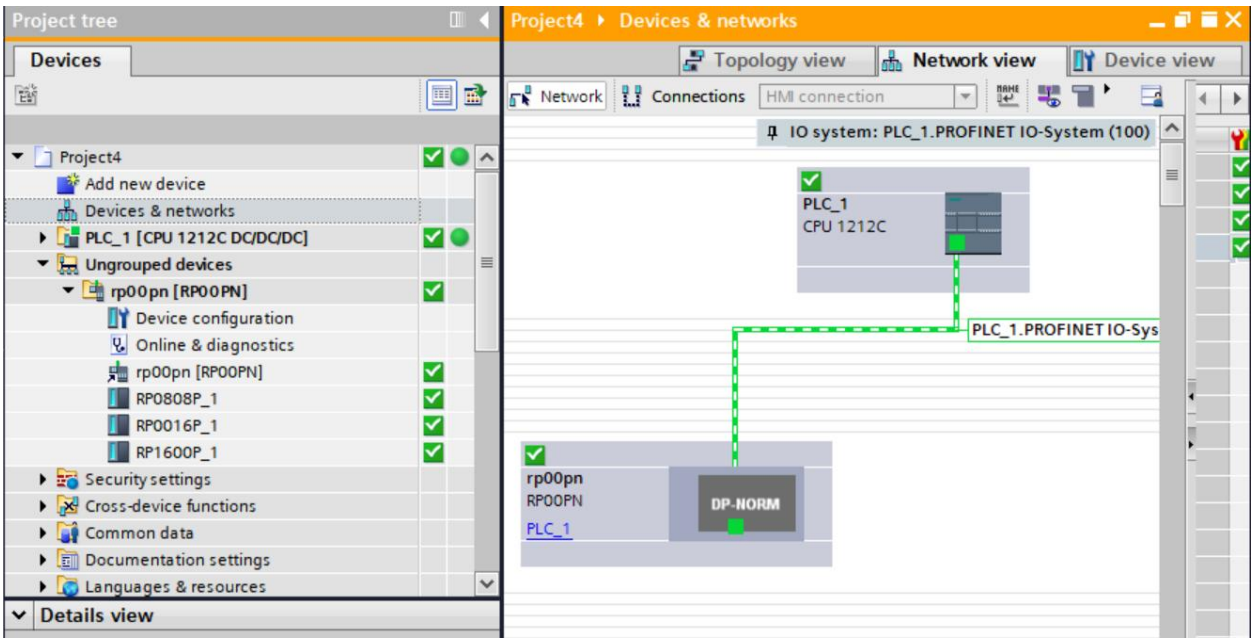
6. Select "Stop All".



7. Click Load.
8. Click "Finish".
9. Power on the device again.

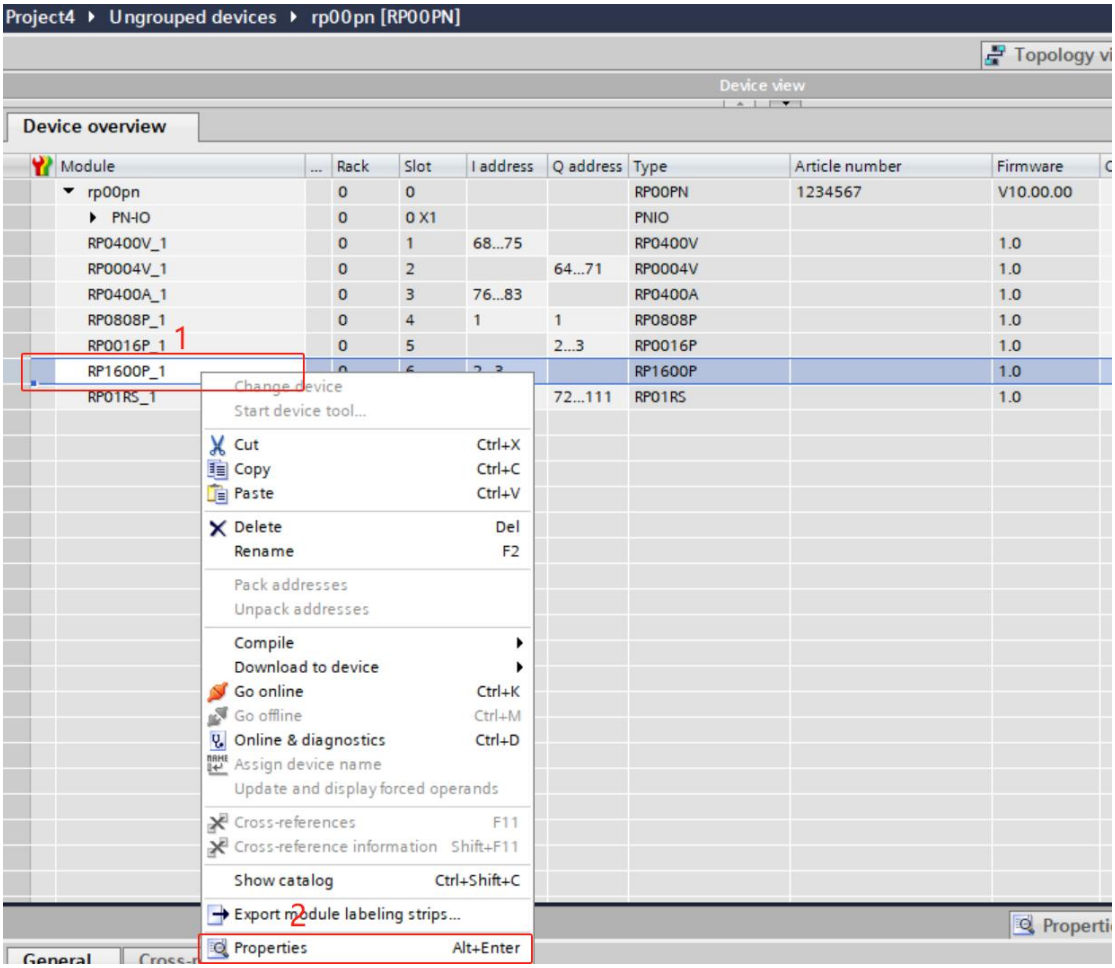
9. Communication connection

1. Click the button, and then click "Go Online". If the icons are all green, the connection is successful, as shown in the figure below.

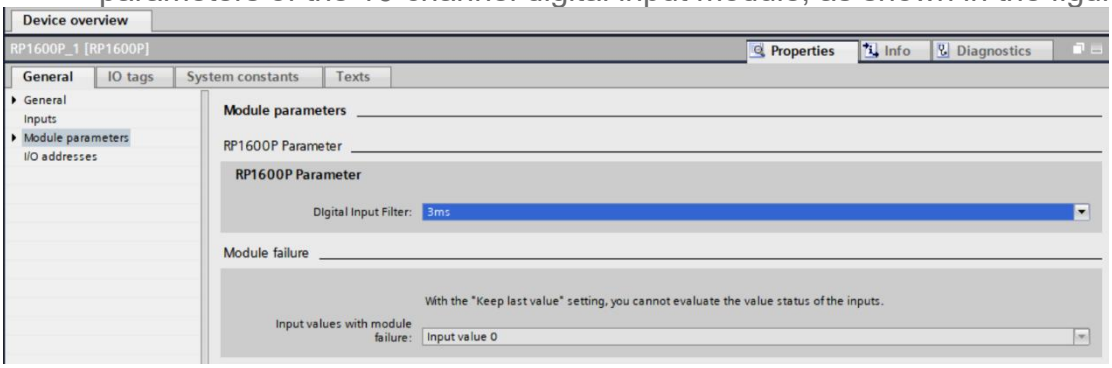


10. Parameter setting

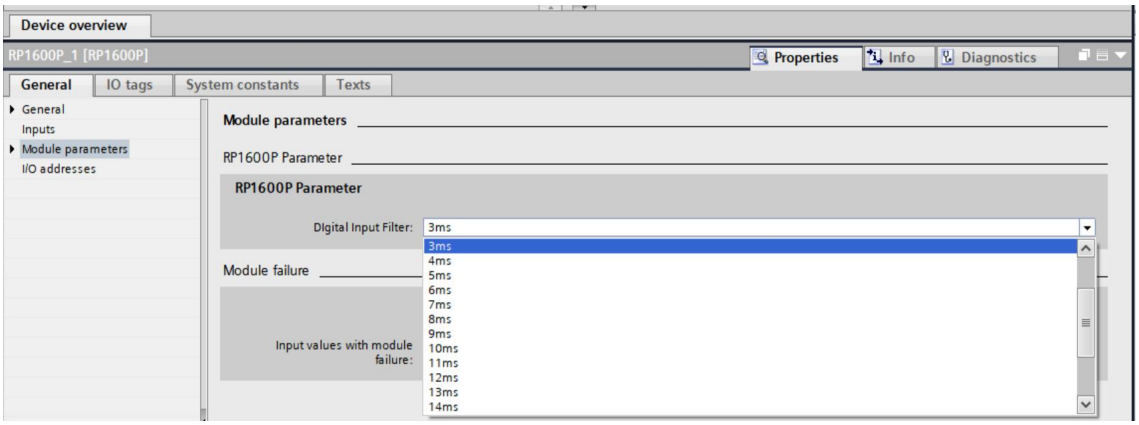
1. Open the "Device View", right-click the module name while offline, and click "Properties", as shown in the figure below.



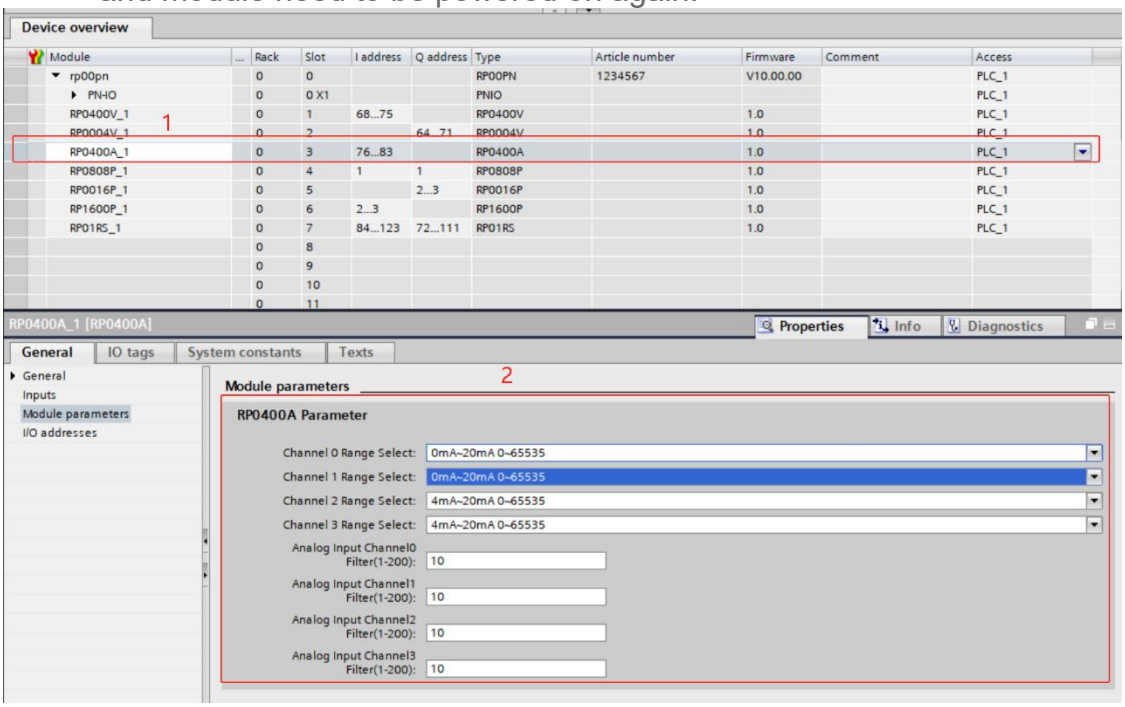
2. On the properties page, click "Module Parameters" to select the digital input filter parameters of the 16-channel digital input module, as shown in the figure below.



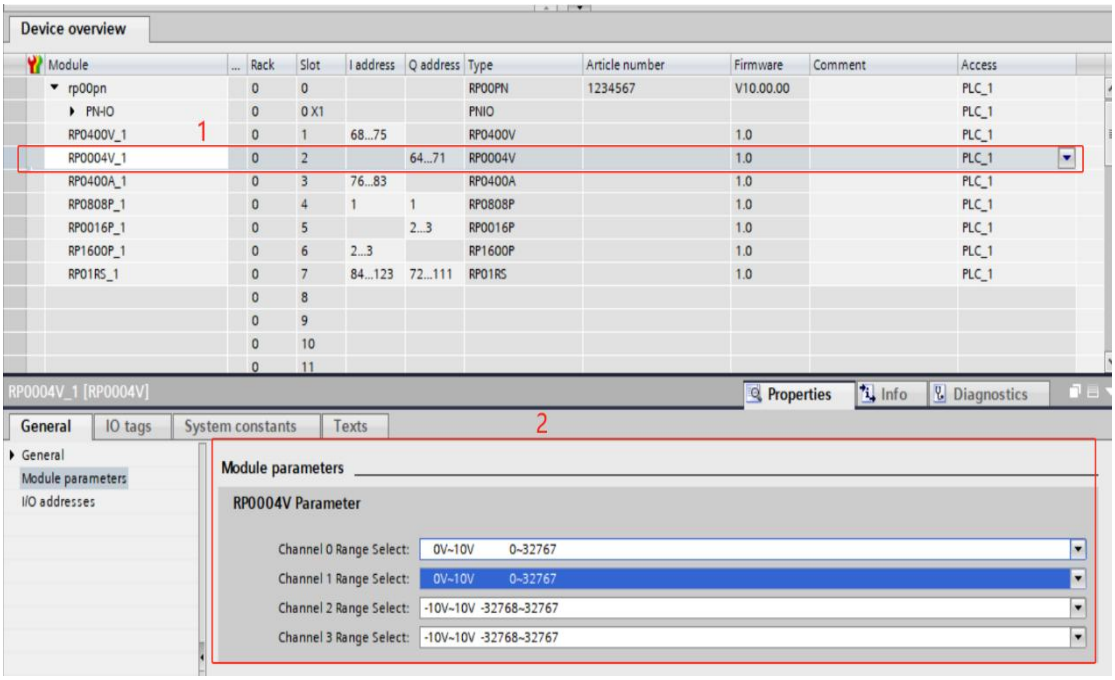
3. Digital input filter parameters can be configured according to actual use needs, as shown in the figure below. After the configuration is completed, re-download the program to the PLC. The PLC and module need to be powered on again.



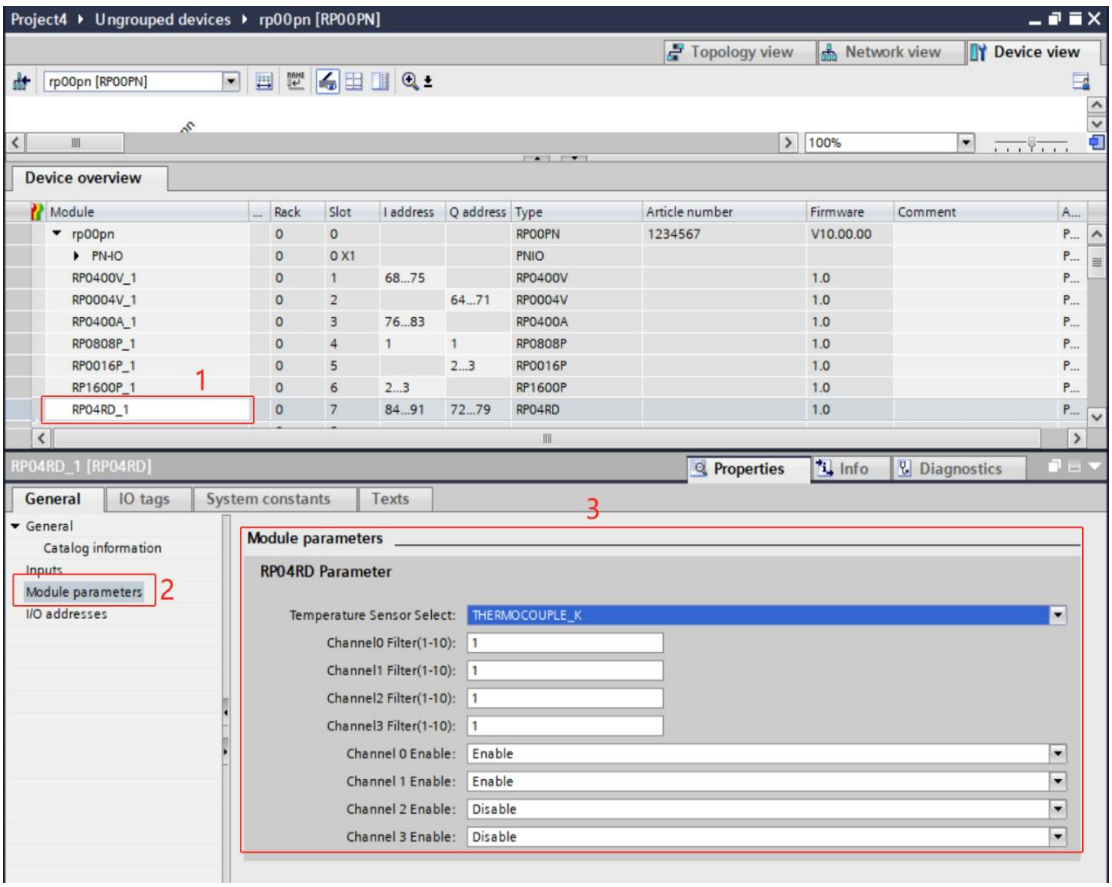
4. The range configuration and analog input filter parameters of the 4-channel analog current input module are as shown in the figure below. After the configuration is completed, re-download the program to the PLC, and the PLC and module need to be powered on again.



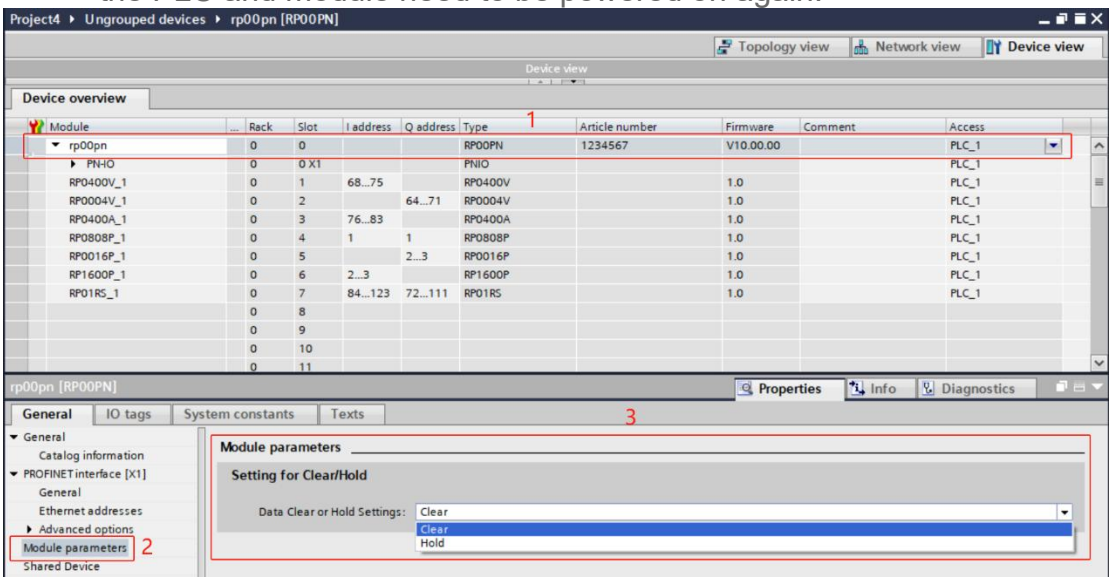
5. The range configuration parameters of the 4-channel analog voltage output module are as shown in the figure below. After the configuration is completed, re-download the program to the PLC, and the PLC and module need to be powered on again.



6. The configuration parameters of the temperature acquisition module are as shown in the figure below. After the configuration is completed, re-download the program to the PLC, and the PLC and module need to be powered on again.

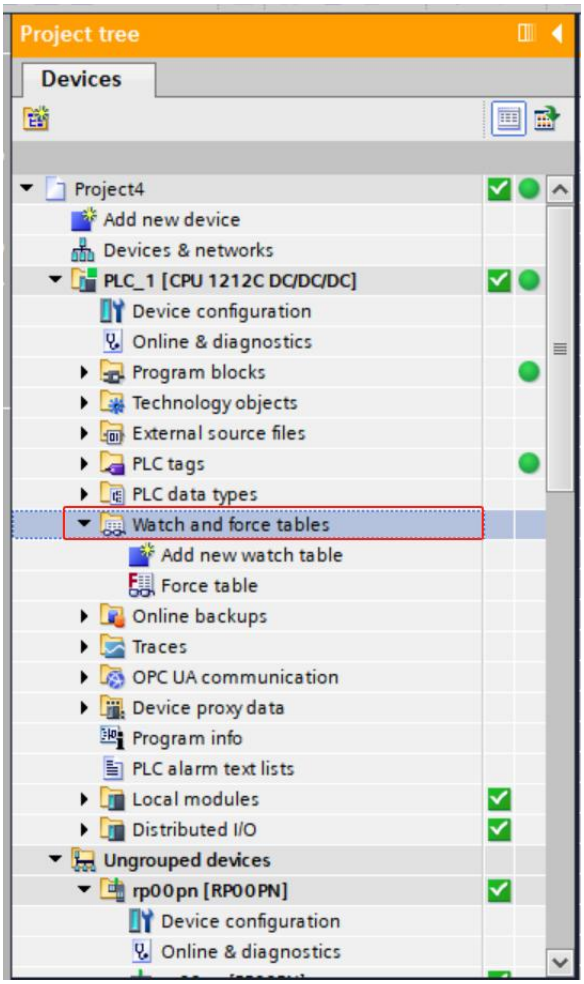


7. Right-click the coupler module in the device view, select "Properties", and you can see the output signal clear/hold parameters, as shown in the figure below. After the configuration is completed, re-download the program to the PLC, and the PLC and module need to be powered on again.

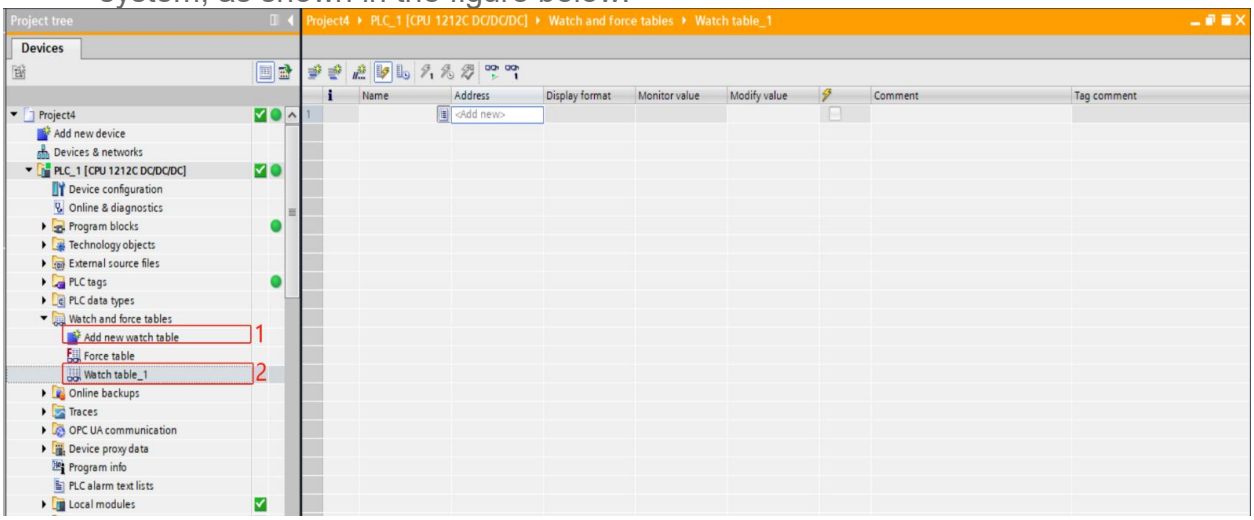


11. Function verification

1. Expand the project navigation on the left and select "Monitoring and Enforcement Table", as shown in the figure below.



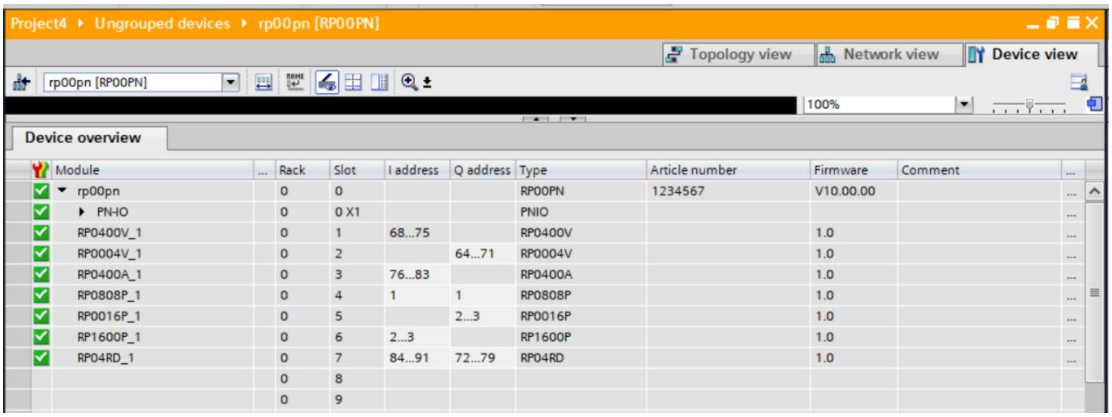
2. Double-click "Add New Monitoring Table" to add a new monitoring table to the system, as shown in the figure below.



3. Open the "Device View" and view the module's channel Q address (channel address of the output signal) and I address (channel address of the input signal) in the device overview.

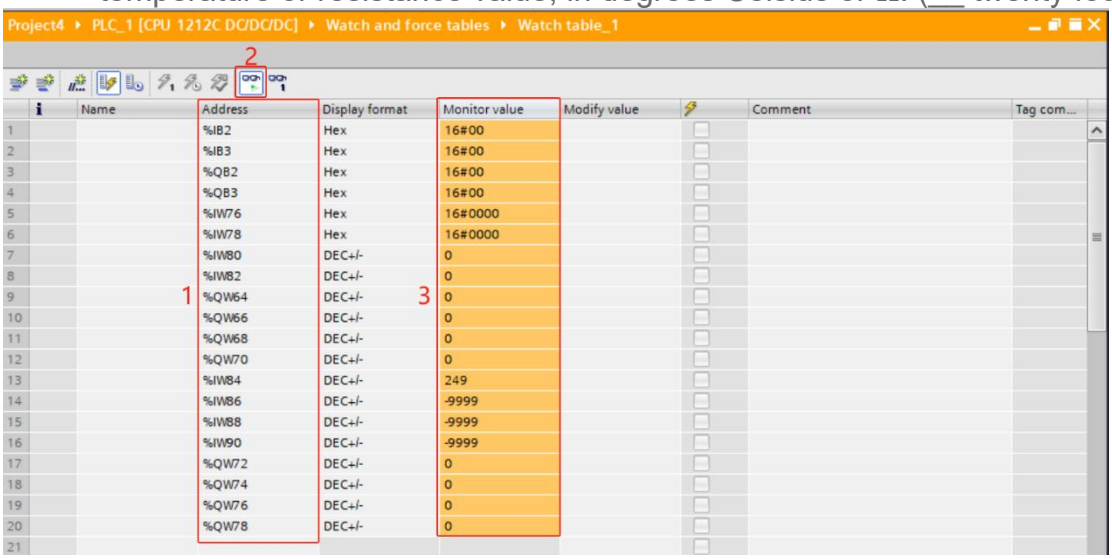
For example, the "I address" of the 16-channel digital input module is 2~3, the "Q address" of the 16-channel digital output module is 2~3, and the "I address" of the 4-channel analog current input module is 76~ 83, the "Q address" of the 4-channel analog voltage output module is

64~71, the "I address" of the temperature acquisition module is 84~91, and the "Q address" is 72~79, as shown in the figure below.



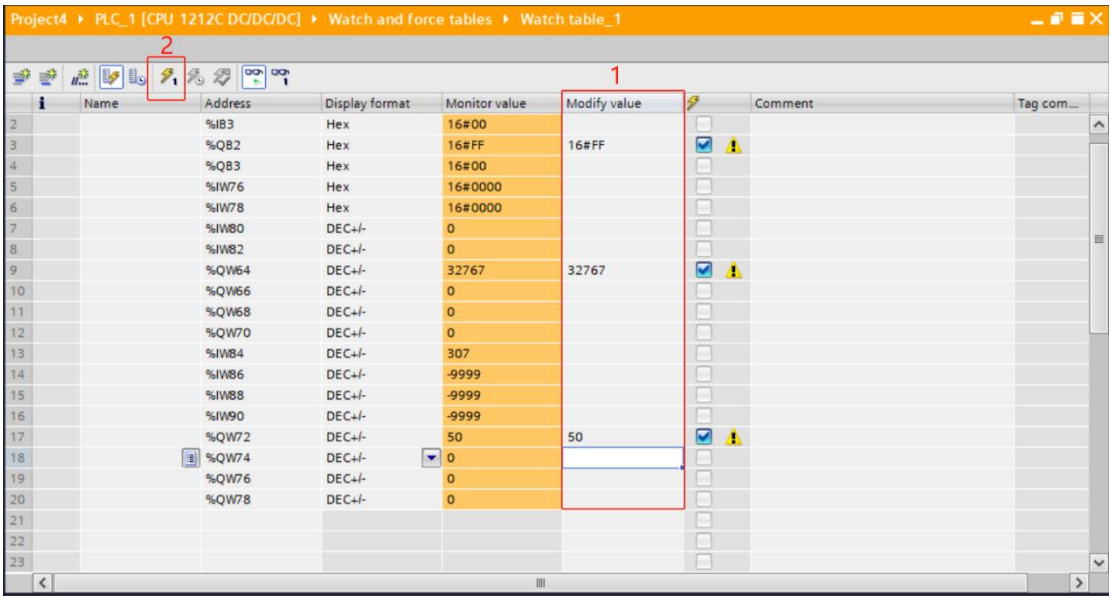
Module	...	Rack	Slot	I address	Q address	Type	Article number	Firmware	Comment	...
rp00pn		0	0			RP00PN	1234567	V10.00.00		
PN-IO		0	0 X1			PNIO				
RP0400V_1		0	1	68...75		RP0400V		1.0		
RP0004V_1		0	2		64...71	RP0004V		1.0		
RP0400A_1		0	3	76...83		RP0400A		1.0		
RP0808P_1		0	4	1	1	RP0808P		1.0		
RP0016P_1		0	5		2...3	RP0016P		1.0		
RP1600P_1		0	6	2...3		RP1600P		1.0		
RP04RD_1		0	7	84...91	72...79	RP04RD		1.0		
		0	8							
		0	9							

4. Fill in the input and output channel address in the address cell of the monitoring table, such as "IB2", "IB3", "QB2", "QB3", "IW76~IW82", QW64~QW70", "IW84~IW90", QW72~QW78", press the "Enter key", after filling in all, click the button to monitor the data, as shown in the figure below. The input and output values of each module can be monitored in the monitoring table. When a certain channel of the digital input module has a valid voltage, the input value can be monitored in IB2 and IB3; The analog voltage input module can be monitored in IW76~IW82 Monitor the input voltage value of each channel; for the corresponding relationship between code value and voltage and current, please refer to [3.4.1 technical parameters], the temperature acquisition module is 10 times the actual temperature in IW84~IW90 . Divide the read data by 10 to get the real temperature or resistance value, in degrees Celsius or Ω. (__ twenty four_)



	Name	Address	Display format	Monitor value	Modify value	Comment	Tag com...
1		%IB2	Hex	16#00			
2		%IB3	Hex	16#00			
3		%QB2	Hex	16#00			
4		%QB3	Hex	16#00			
5		%IW76	Hex	16#0000			
6		%IW78	Hex	16#0000			
7		%IW80	DEC+/-	0			
8		%IW82	DEC+/-	0			
9		%QW64	DEC+/-	0			
10		%QW66	DEC+/-	0			
11		%QW68	DEC+/-	0			
12		%QW70	DEC+/-	0			
13		%IW84	DEC+/-	249			
14		%IW86	DEC+/-	-9999			
15		%IW88	DEC+/-	-9999			
16		%IW90	DEC+/-	-9999			
17		%QW72	DEC+/-	0			
18		%QW74	DEC+/-	0			
19		%QW76	DEC+/-	0			
20		%QW78	DEC+/-	0			
21							

5. Enter "FF" in the "Modified Value" cell of QB2, click the button to write, and see that the corresponding channel indicator light of the digital output module lights up (__ 29_); The analog current output module can force output for each channel in QW64~QW70. In the monitoring meter output control QW72~QW78, set the temperature compensation value to 50, which is 5℃. After setting the compensation value, channel 1 The temperature is 30.7℃, as shown in the figure below.



6.3. EtherCAT coupler configuration application

6.3.1. Application in CODESYS software environment

1. Preparation

- **Hardware environment**

1. **Module preparation, this description uses EtherCAT coupler RP00EC + 8-channel digital input and output module RP0808P + 4-channel analog voltage input module RP0400V + 4-channel analog voltage output module RP0004V + 4-channel analog current input module RP0400A + 4-channel Analog current output module RP0040A + temperature acquisition module RP04RD. The topology is an example of a computer with pre-installed CODESYS software.**
2. **One Kinco PLC (this description takes model AX500 as an example)**
3. **EtherCAT dedicated shielded cable**
4. **One switching power supply**
5. **device profile**

- **Hardware configuration and wiring**

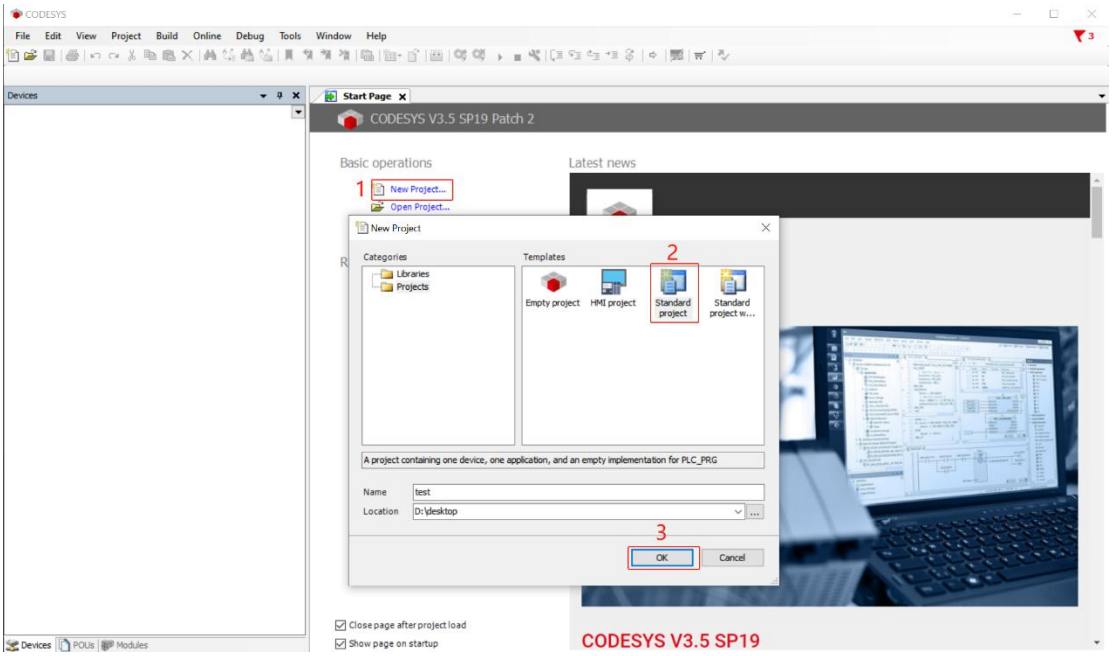
  Please operate in accordance with the requirements of "4 Installation and Disassembly " and "5 Wiring "

- **Computer IP requirements**

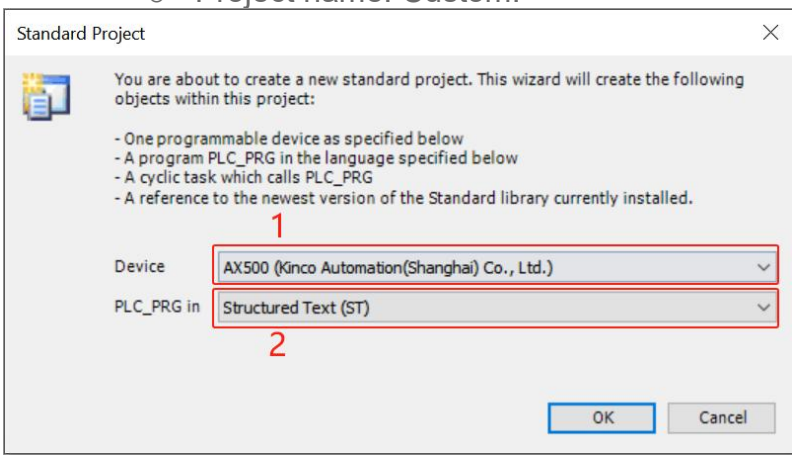
  Set the IP address of the computer and the IP address of the PLC to ensure that they are in the same network segment.

2. New construction

1. Open the CODESYS software, click "New Project", customize the project name, and click "OK".



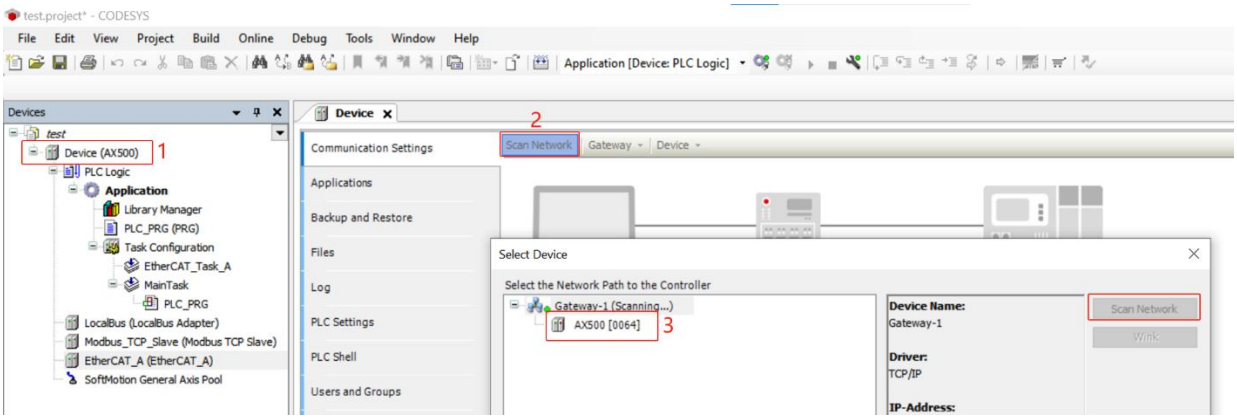
- Project name: Custom.



- Select the device and programming language: "Device" selects the corresponding PLC model, and "PLC_PRG in" selects the programming language.

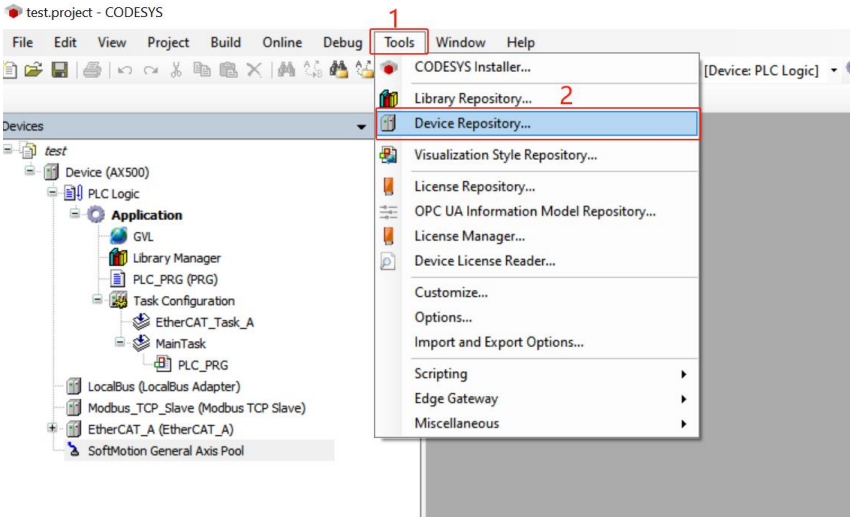
- After entering the project attributes, click "OK" to complete the creation.

3. Click "Device -> Communication Settings" in the left navigation tree, click "Scan Network" and wait until the scan is completed, as shown in the figure below.

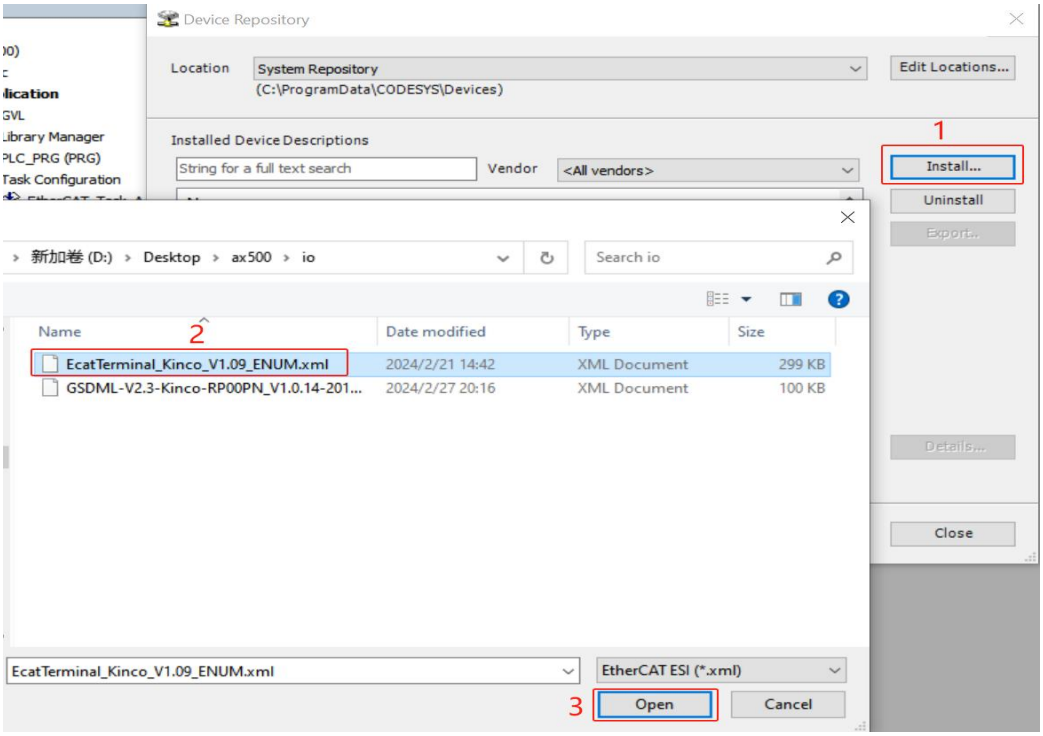


3. Install XML file

1. Click "Tools -> Device Repository" in the menu bar.

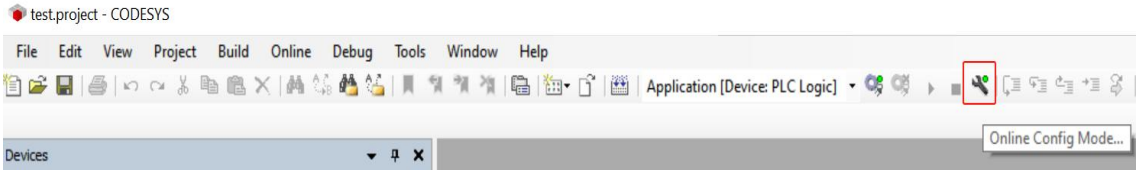


2. Click "Install" in the pop-up "Device Repository" window, select the XML file path of the module, and click "Open" to complete the installation, as shown in the figure below.

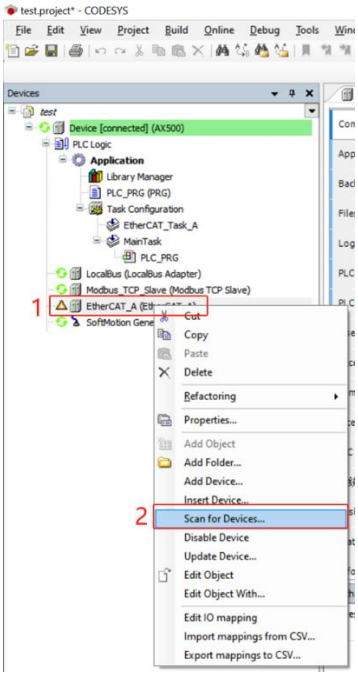


4. Add equipment

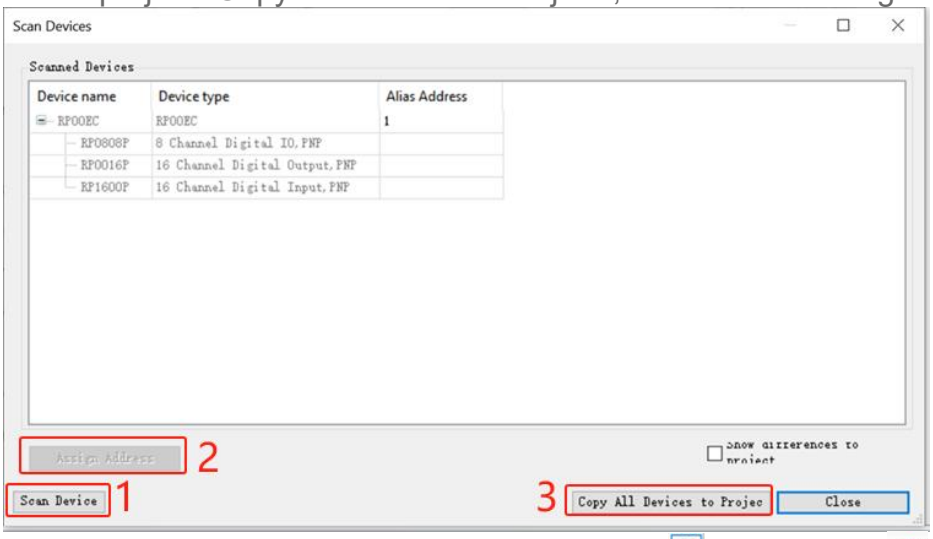
1. Click "Online Config Mode" in the toolbar below the menu bar to enter the online configuration mode, as shown in the figure below.



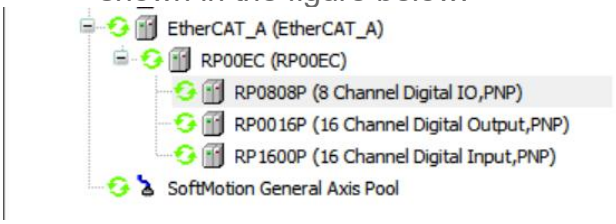
2. Right-click the EtherCAT device module and select "EtheCAT_A -> Scan for Devices" to scan the device, as shown in the figure below.



3. In the "Scanned Devices" window, click "Scan Device" and then assign the address "Assign Address" to the scanned module, and copy all modules to the project "Copy All Devices to Project", as shown in the figure below.



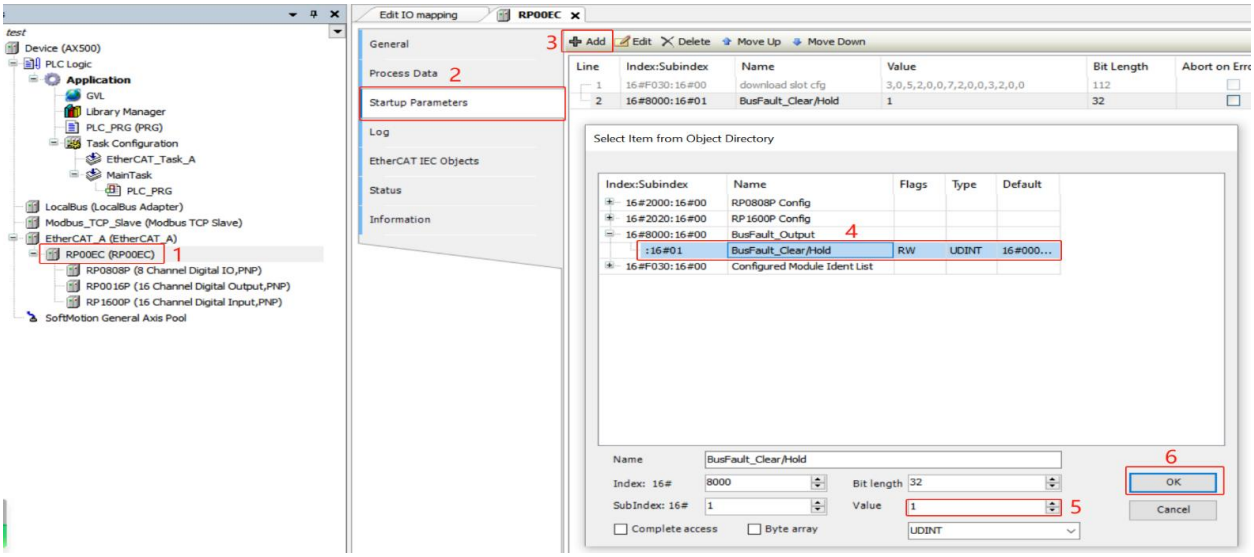
4. Then exit the online configuration mode and re-enter . If there is no abnormal communication, a green arrow will appear in front of the device, as shown in the figure below.



5. Then exit online configuration mode again .

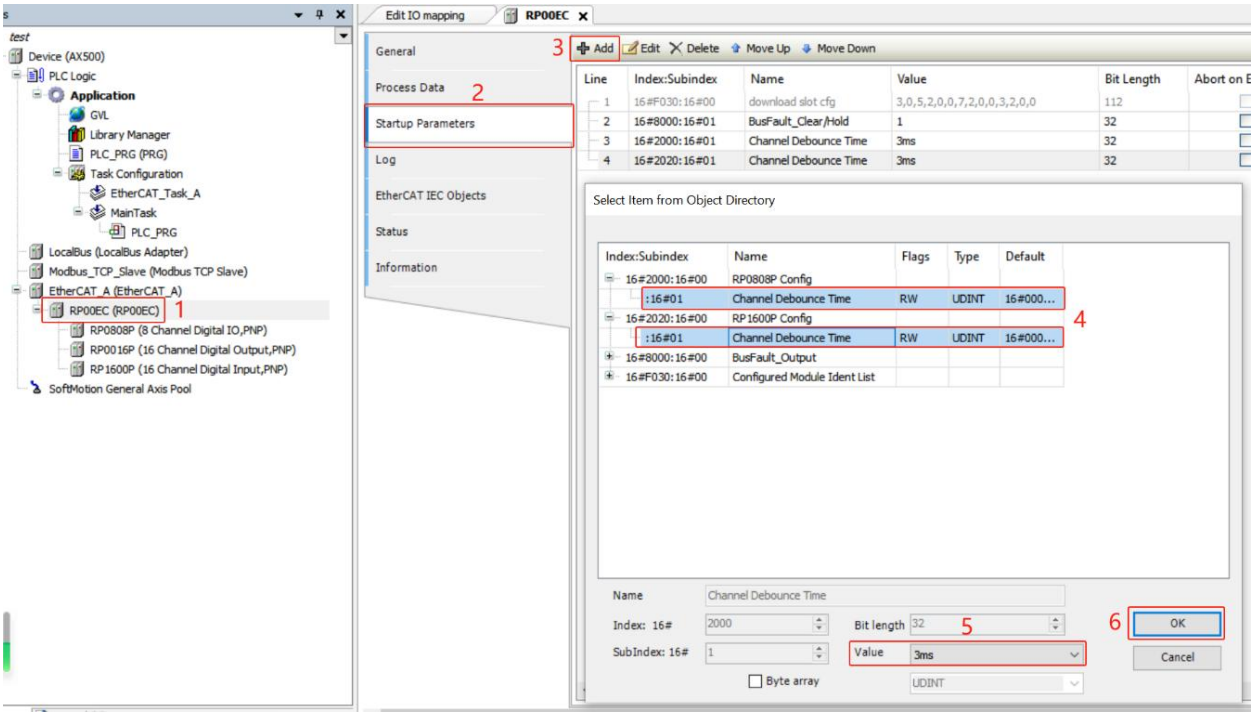
5. EtherCAT coupler module configuration

1. Double-click the coupler module in the left navigation tree to configure startup parameters "RP00EC -> Startup Parameters", add startup parameters in the startup parameters, on the parameter setting page, you can configure the output signal clear/hold function, configure it to "0" The output will be cleared. If set to "1", the output will be maintained. After the configuration is completed, click "OK". After all parameters are configured, the program needs to be downloaded to the PLC again, and the PLC and module need to be powered on again. As shown below.

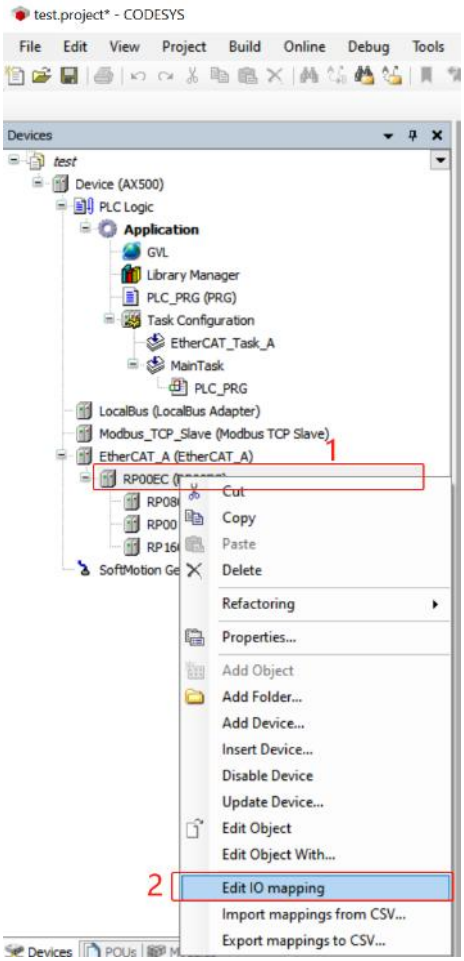


6. Digital IO module configuration and use

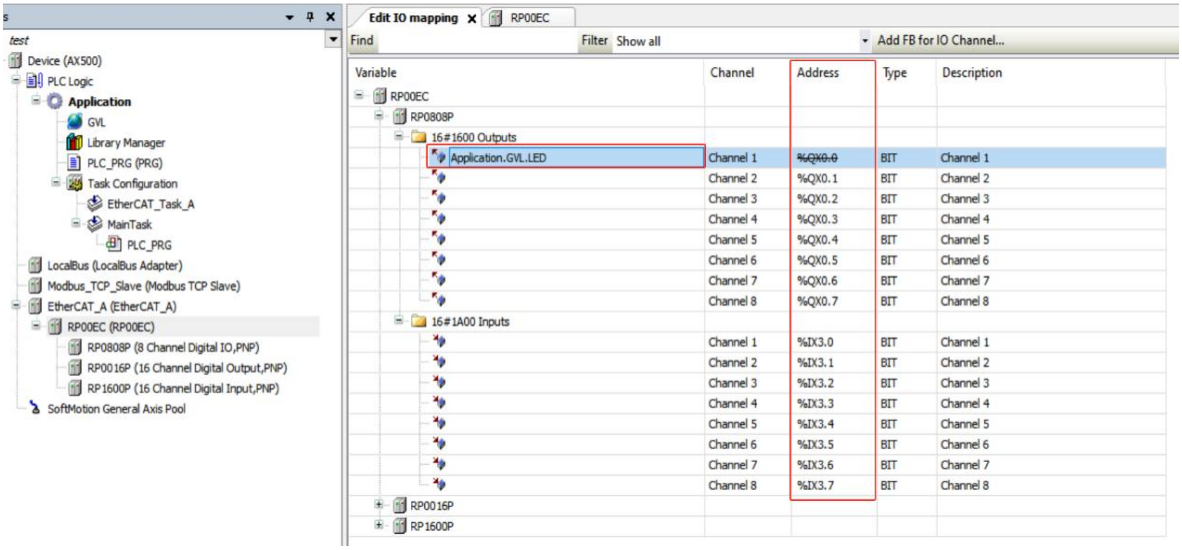
1. Double-click the coupler module in the left navigation tree to configure startup parameters "RP00EC -> Startup Parameters", add startup parameters in the startup parameters, and on the parameter setting page, you can set the input signal filtering time for the digital input module, as shown in the figure below.



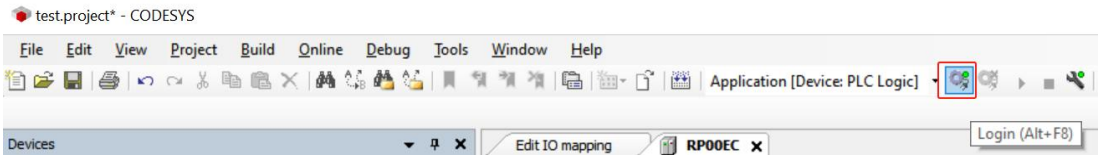
2. Right-click the coupler module in the left navigation tree to modify the IO mapping "RP00EC -> Edit IO mapping", as shown in the figure below.



3. In the window "Edit IO mapping", you can map global variables for IO channels or modify the IO mapping address, as shown in the figure below.



4. Click "Login" in the toolbar below the menu bar to download the program for verification.

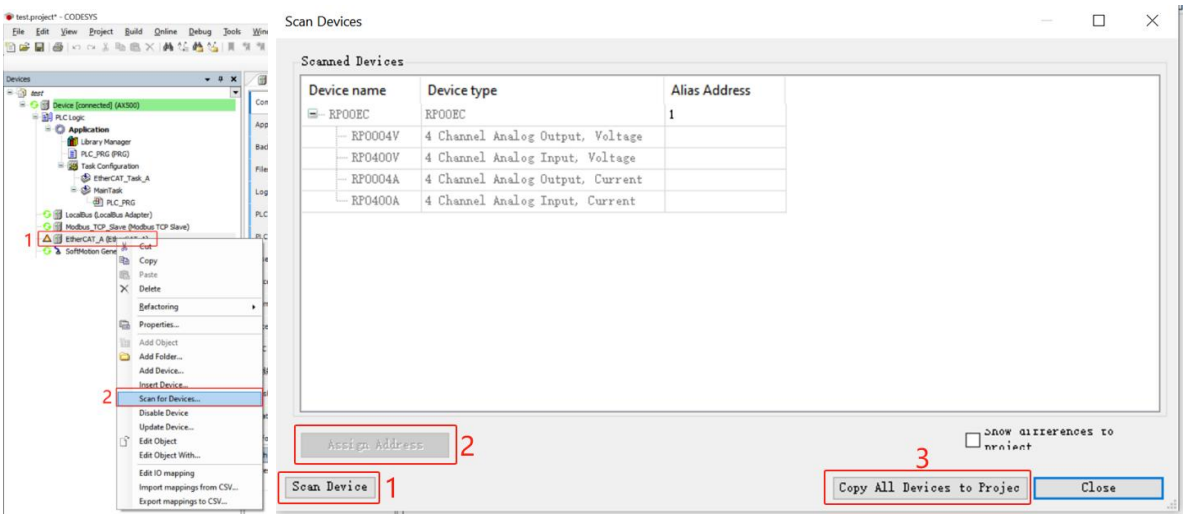


5. When input channel 1 "%IX3.0" is high level, digital output channel 1 "GVL.LED" outputs high level.

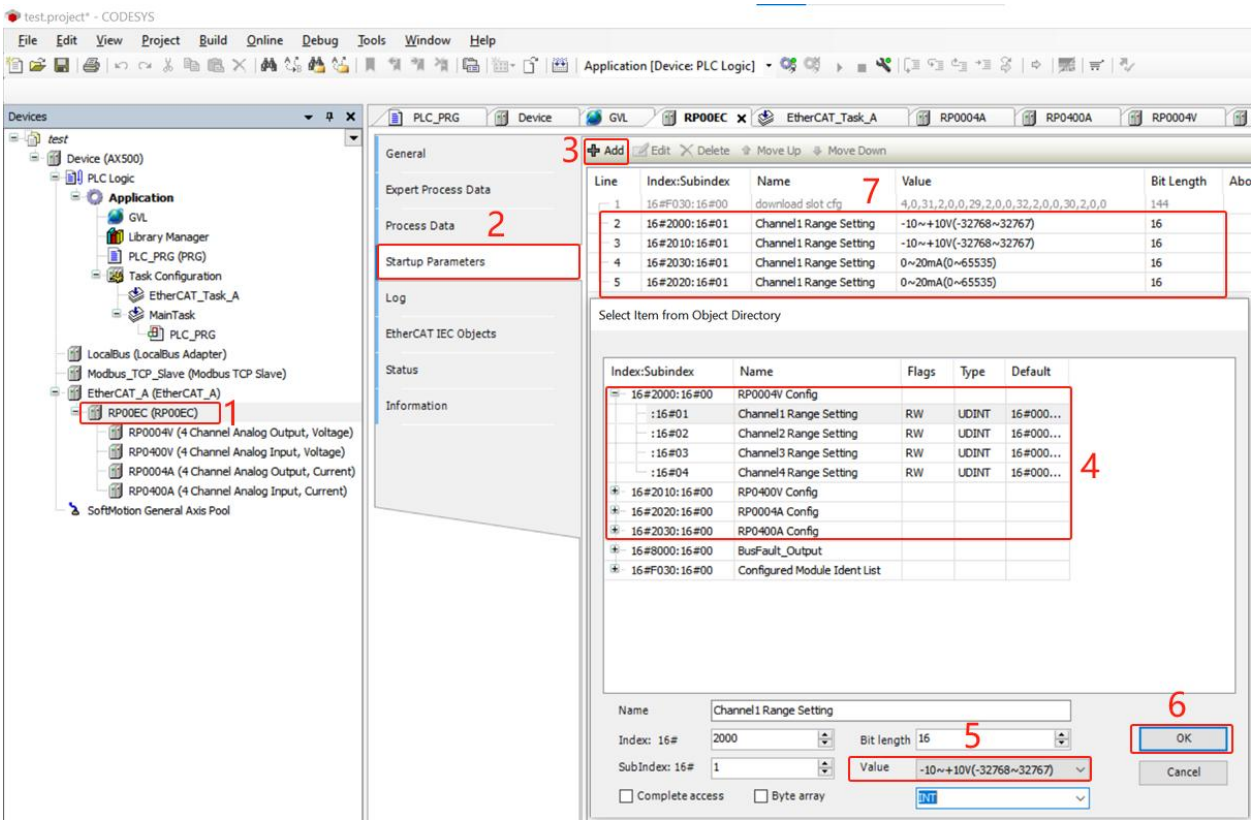
```
IF %IX3.0 TRUE THEN
    gvl.LED TRUE := TRUE;
ELSE
    gvl.LED TRUE := FALSE;
END_IF RETURN
```

7. Analog IO module configuration and use

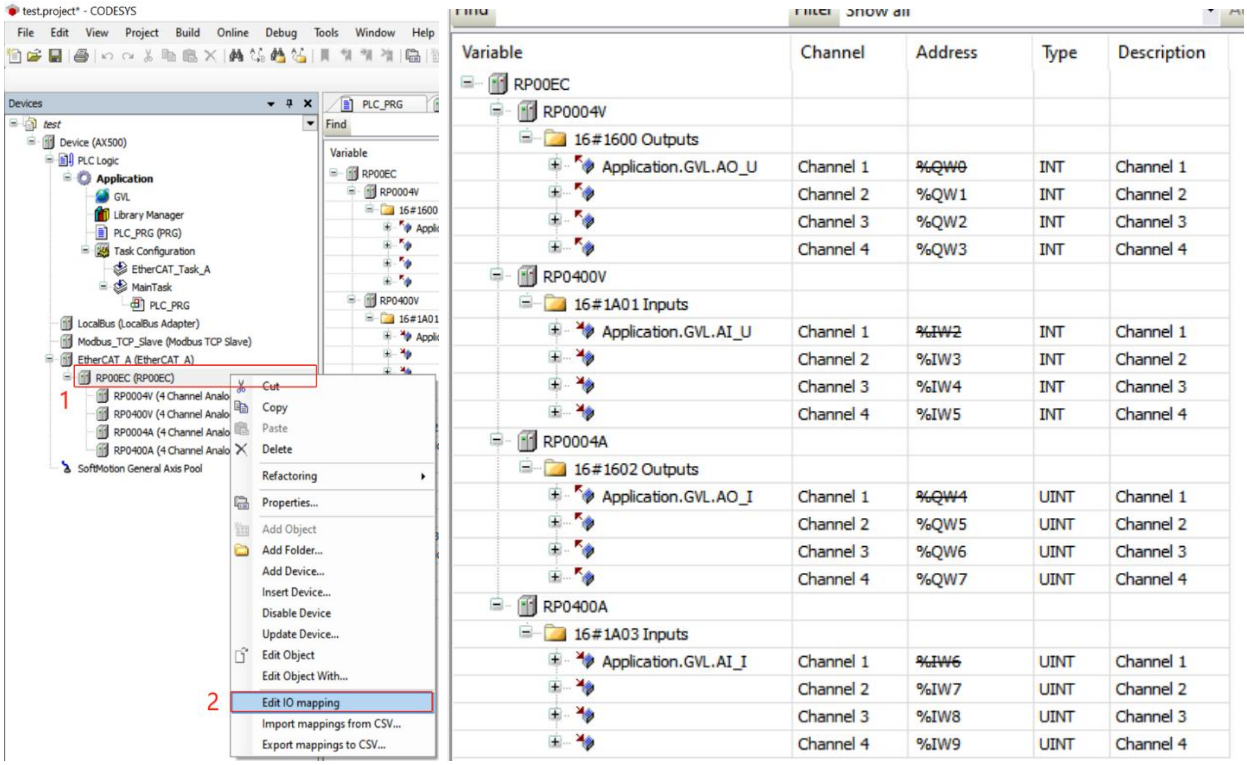
1. Right-click the EtherCAT device module and select "EtheCAT_A -> Scan for Devices" to scan the device, as shown in the figure below. In the "Scanned Devices" window, click "Scan Device" and then assign the address "Assign Address" to the scanned module, and copy all modules to the project "Copy All Devices to Project", as shown in the figure below.



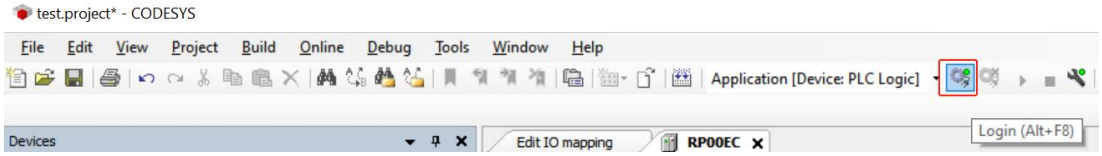
2. Double-click the coupler module in the left navigation tree to configure startup parameters "RP00EC -> Startup Parameters", add startup parameters in the startup parameters, and on the parameter setting page, you can set the channel range for the analog IO module, as shown in the figure below. Click "OK" to complete the configuration.



3. Right-click the coupler module in the left navigation tree to modify the IO mapping "RP00EC -> Edit IO mapping", as shown in the figure below. In the "Edit IO mapping" window, map global variables or modify the IO mapping address for each analog IO channel, as shown in the figure below.



4. Click "Login" in the toolbar below the menu bar to download the program for verification.



5. For details about the corresponding relationship between code value and voltage and current, please refer to 3.4.1Technical parameters (__ 19_) . Modifying the value of variable "value_U" can change the actual voltage of analog voltage output channel 1. The variable "gvl.AI_U" can monitor the code value of analog voltage input channel 1. Through the conversion of the corresponding relationship between code value and voltage, the actual input voltage can be monitored in the variable "gvl.AI_U_value", as shown in the figure below. (__ twenty two_)

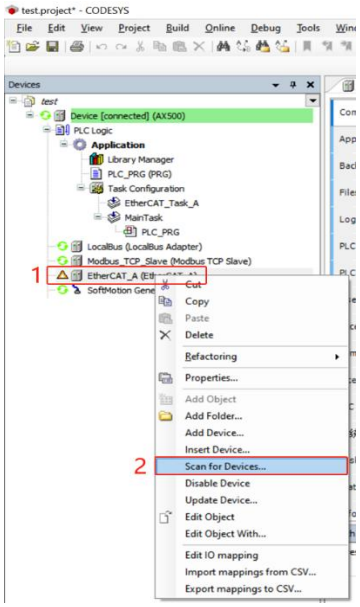
Modifying the value of the variable "value_I" can change the actual voltage of analog current output channel 1. The variable "gvl.AI_I" can monitor the code value of analog voltage input channel 1. By converting the corresponding relationship between code value and voltage, the actual input current can be monitored in the variable "gvl.AI_I_value", as shown in the figure below.

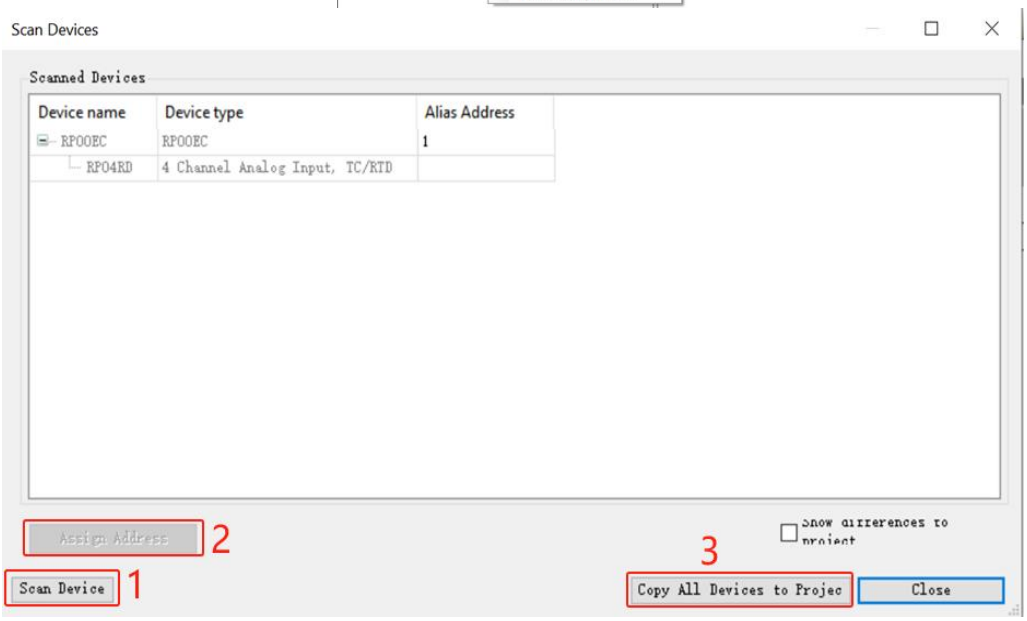
```
// Analog IO - Voltage
//analog output - voltage
gvl.AO_U 21299 := TO_INT(value_U 6.5 * 65535 / 20); // value_U := -10.0V .. 10.0V
//analog input - voltage
gvl.AI_U_value 6.49 := gvl.AI_U 21259 * 20.0 / 65535; // gvl.AI_U_value -> -10.0V .. 10.0V

// Analog IO - current
//analog output - current
gvl.AO_I 14745 := TO_UINT(value_I 4.5 * 65535 / 20); // value_I := 0.0mA .. 20.0mA
//analog input - current
gvl.AI_I_value 4.5 := gvl.AI_I 14747 * 20.0 / 65535; // gvl.AI_I_value -> 0.0mA .. 20.0mA RETURN
```

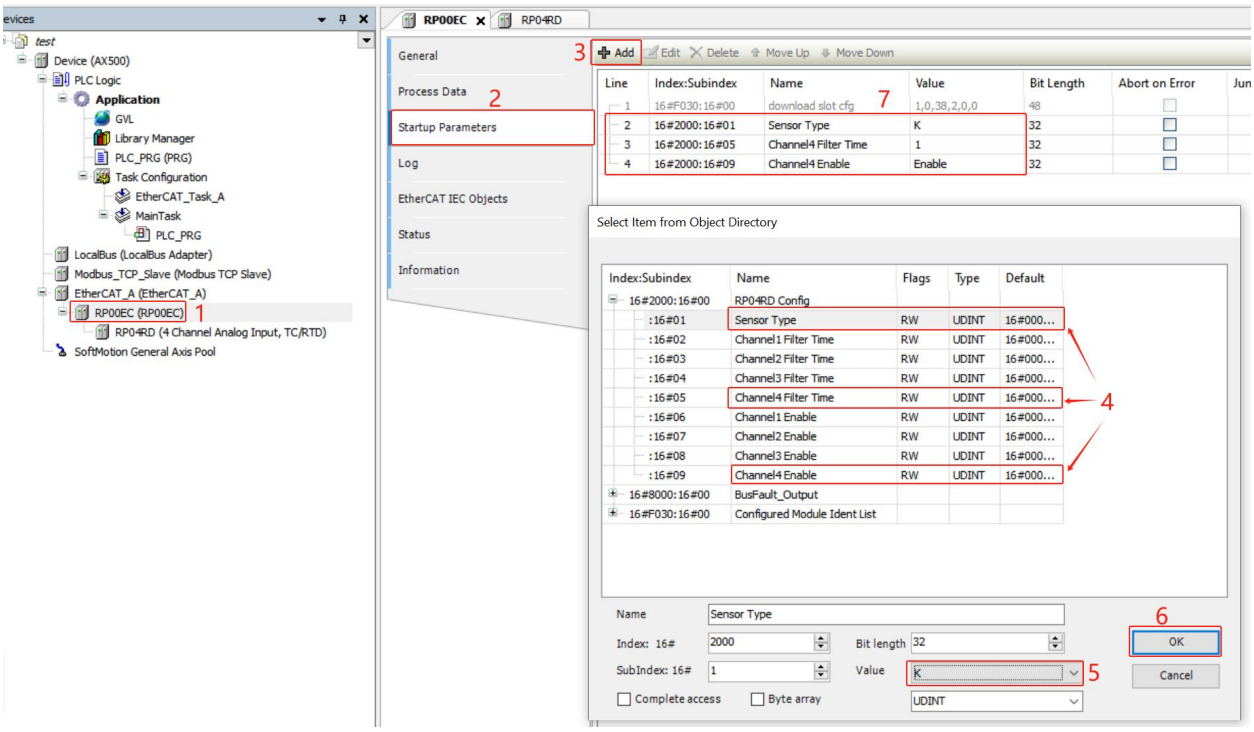
8. Configuration and use of temperature acquisition module

1. Right-click the EtherCAT device module and select "EtheCAT_A -> Scan for Devices" to scan the device, as shown in the figure below. In the "Scanned Devices" window, click "Scan Device" and then assign the address "Assign Address" to the scanned module, and copy all modules to the project "Copy All Devices to Project", as shown in the figure below.

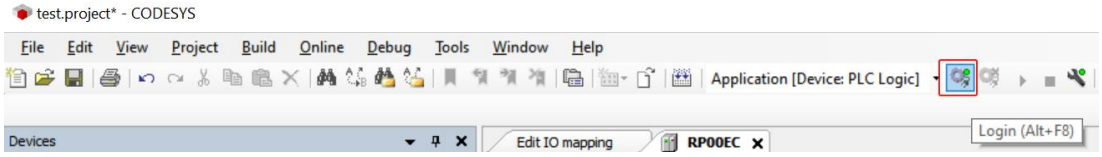




2. Double-click the coupler module in the left navigation tree to configure startup parameters "RP00EC -> Startup Parameters", add startup parameters in the startup parameters, and on the parameter setting page, you can set the sensor type for the temperature acquisition module ((__ 5_)3.6.1 See above), channel filter time, channel enable configuration, as shown in the figure below. Click "OK" to complete the configuration.



3. Click "Login" in the toolbar below the menu bar to download the program for verification.



4. In the navigation tree on the left, double-click "RP04RD -> Module I/O Mapping" of the temperature acquisition module to monitor 10 times the actual temperature of the input channel of the temperature acquisition module. The read data needs to be divided by 10 to obtain the real temperature or resistance value in °C or Ω. The specific operation is shown in the figure below. The actual temperature read on channel 4 of the temperature acquisition module is 29.4°C. In addition, you can also set the temperature compensation value for the channel. After setting the compensation value, the channel temperature is the sum of the actual temperature and the temperature compensation value.