SRR Series Plug-in I/O
User Manual

Table of Contents

1 Product Overview

1.1 Product Description

The SRR series plug-in I/O modules adopt a structure combining couplers and I/O modules. The coupler connects expandable I/O modules to real-time industrial Ethernet systems. S-Link bus is adopted for backplane. The coupler module is responsible for fieldbus communication, enabling real-time data exchange between various I/O modules and the coupler/controller.

The SRR series plug-in I/O modules feature diverse product types and high real-time performance, ensuring high-speed data acquisition, optimized system configuration, simplified field wiring, and improved system reliability for users.

1.2 Product Features

- **Low node occupancy**
  A node consists of one bus coupler, 1-32 SRR series I/O modules, and one terminal cover plate.
- **Rich functional expansion options**
  A full range of I/O types to support flexible expansion; Various digital modules, analog modules, and temperature modules can be integrated to meet different application requirements.
- **Flexible configuration**
  Multiple types of plug-in I/O modules can be freely combined.
- **Strong compatibility**
  The coupler communication interface complies with communication standards, supporting mainstream EtherCAT master and PROFINET master.
- **Compact size**
  Compact structure with small space occupation
- **Easy diagnosis**
  It is equipped with comprehensive indicators for clear visibility of module status, facilitating detection and maintenance.
- **High speed**
  The S-Link bus is adopted for the backplane, with a minimum scan cycle of 200us and a typical value of 1ms.
- **Easy assembly**
  Fastening to the standard DIN 35 mm rail.
  Equipped with spring-loaded terminals for convenient and quick wiring.

2 Module List

2.1 Module List

Model	Product Description	
SRR8200	EtherCAT bus Coupler modules	
SRR8300	PROFINET bus Coupler modules	
SRR1032	32 Channel Digital Input Module, Input NPN/PNP Compatible, Default 3ms Input Filter	
SRR1016	16 Channel Digital Input Module, Input NPN/PNP Compatible, Default 3ms Input Filter	
SRR1008	8 Channel Digital Input Module, Input NPN/PNP Compatible, Default 3ms Input Filter	
SRR1332	16 Channel Digital Input Module 16 Channel Digital Output Module Input NPN/PNP Compatible, Default 3ms Input Filter, Output NPN Type	
SRR1432	16 Channel Digital Input Module 16 Channel Digital Output Module Input NPN/PNP Compatible, Default 3ms Input Filter, Output PNP Type	
SRR1316	8 Channel Digital Input Module 8 Channel Digital Output Module Input NPN/PNP Compatible, Default 3ms Input Filter, Output NPN Type	
SRR1416	8 Channel Digital Input Module 8 Channel Digital Output Module Input NPN/PNP Compatible, Default 3ms Input Filter, Output PNP Type	
SRR2132	32 Channel Digital Output Module, Output NPN Type	
SRR2232	32 Channel Digital Output Module, Output PNP Type	
SRR2116	16 Channel Digital Output Module, Output NPN Type	
SRR2216	16 Channel Digital Output Module, Output PNP Type	
SRR2108	8 Channel Digital Output Module, Output NPN Type	
SRR2208	8 Channel Digital Output Module, Output PNP Type	
SRR3258	8 Channel Analog Voltage Input Module	Differential signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
SRR3218	8 Channel Analog Voltage Input Module	Single-ended signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
SRR3214	4 Channel Analog Voltage Input Module	Single-ended signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
SRR3268	8 Channel Analog Current Input Module	Differential signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA, -20mA~+20mA
SRR3238	8 Channel Analog Current Input Module	Single-ended signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA
SRR3234	4 Channel Analog Current Input Module	Single-ended signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA
SRR4018	8 Channel Analog Voltage Output Module	Single-ended signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
SRR4014	4 Channel Analog Voltage Output Module	Single-ended signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
SRR4038	8 Channel Analog Current Output Module	Single-ended signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA
SRR4034	4 Channel Analog Current Output Module	Single-ended signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA
SRR3294	4 Channel Temperature Acquisition Module	
SRR6001	1 Channel Serial Port Module	
SRR5001	1 Channel Incremental Encoder Module	
SRR5031	1 Channel Differential Incremental Encoder Module	
SRR5041	1 Channel SSI Absolute Encoder Module	
SRR9001	Expansion Power Module	
SRR9010	Terminal Cover Plate	

3 Module Introduction

3.1 EtherCAT Coupler

3.1.1 Indicator Function

Definition of EtherCAT coupler indicators				
Label	**Name**	**Color**	**Status**	**Status Description**
PWR	Power indicator	Green	Steadily lit	Module power supply normal
			Off	Module not powered or power supply abnormal
OVR	Overload indicator	Red	Off	No overload
			Steadily lit	Load reaches above 90% (±5%)
RUN	EtherCAT operation status indicator	Green	Steadily lit	EtherCAT OP status
			Flashing at 2.5Hz	EtherCAT PreOP status
			Single flash (steadily lit for 200ms and then turning off for 1s, repeating this flashing cycle)	EtherCAT SafeOP status
			Flashing at 10Hz	BootStrap status
			Off	EtherCAT Init status
ERR	EtherCAT fault indicator	Red	Double flash[1]	EtherCAT watchdog timeout
			Single flash (steadily lit for 200ms and then turning off for 1s, repeating this flashing cycle)	Module local error
			Flashing at 2.5Hz	General configuration error
			Off	EtherCAT communication normal
IOR	IO communication indicator	Green	Steadily lit	I/O process data established
			Flashing at 1Hz	No business data interaction
			Flashing at 10Hz	Coupler firmware upgrade
IOE	IO fault indicator	Red	Steadily lit	Communication abnormal
			Flashing at 1Hz	I/O module alarm/ I/O module fault exists
			Off	Communication normal

Note [1]: Double flash refers to steadily lit for 200ms and turning off for 200ms, then steadily lit for 200ms and turning off for 1000ms, repeating this flashing cycle.

Definition of network status indicators				
Label	**Name**	**Color**	**Status**	**Status Description**
OUT	Network status indicator OUT	Orange	Flashing	Connection established with data exchange
			Off	No data exchange or abnormal status
		Green	Steadily lit	Network connection established
			Off	No network connection established or abnormal
IN	Network status indicator IN	Orange	Flashing	Connection established with data exchange
			Off	No data exchange or abnormal status
		Green	Steadily lit	Network connection established
			Off	No network connection established or abnormal

3.1.2 Product Parameters

3.1.2.1 Interface Parameters

EtherCAT interface parameters	
Bus protocol	EtherCAT
Number of slave stations	Determined by the number of slave stations supported by the master station
Data transmission medium	Ethernet/EtherCAT CAT5 cable
Transmission rate	100Mbps
Minimum cycle time[1]	250us
Transmission distance	≤100m (station-to-station distance)
Bus interface	2×RJ45
Maximum number of modules in series	32
Input and output process data volume	1024Bytes[2]

Note [1]: Cycle time (scan cycle) between PLC and coupler.
Note [2]: The total length of uplink and downlink data shall not exceed 1024 Bytes.

3.1.2.2 Power Supply Parameters

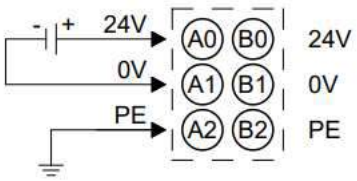
Power Supply Parameters	
Input voltage	SELV Input 24VDC（18V~36V）
Input current	Max：600mA（24VDC）
Backplane supply current	Max：2A
Backplane supply voltage	5VDC

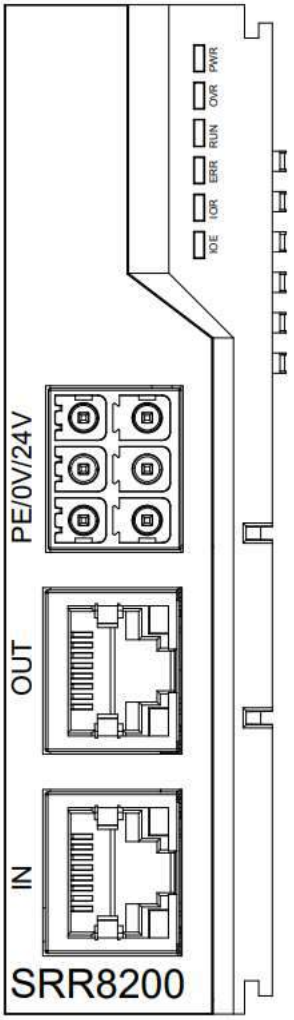
3.1.2.3 General Parameters

General Technical Parameters		
Specifications and dimensions		100◊27.82◊80mm
Weight		95g
Operating environment	Operating temperature	-20℃~+60℃
	Storage temperature	-40℃~+80℃
	Relative humidity	95%, no condensation
	Altitude	≤2000m
	Protection rating	IP20
	Overvoltage category	I
	Pollution level	Level 2
Module fault auto-recovery		Support
Access PDO via SDO		Support
Diagnosis		Support
Alarm		Support
Firmware upgrade		Support
Short circuit protection		Support (Auto-recovery mechanism)
Reverse connection protection		Support (Auto-recovery mechanism)
Surge protection		Support

3.1.3 Power Wiring Diagram

Use a 24VDC power module, follow the wiring method, connect the power supply according to the circuit diagram shown below, and ensure reliable PE grounding (twisted pair cables are recommended for power lines).

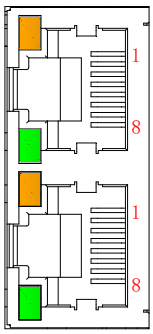




*24V internal conduction, 0V internal conduction

3.1.4 Bus Wiring

Use standard RJ45 network interfaces and standard crystal connectors, with pin assignments as shown in the table below.



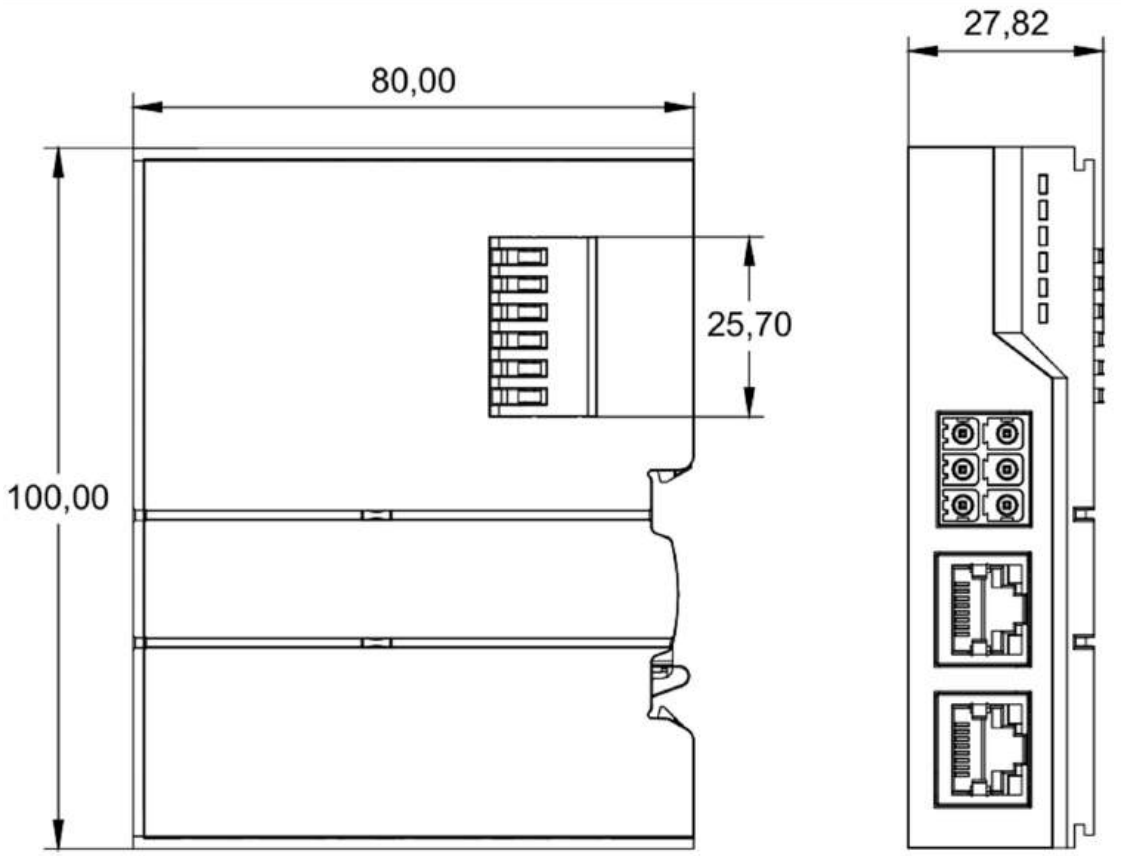
Pin number	Signal
1	TD+
2	TD-
3	RD+
4	I
5	I
6	RD-
7	I
8	I

Note

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

3.1.5 Dimensional Diagram

Dimensions of the coupler (unit: mm)



3.2 PROFINET Coupler

3.2.1 Indicator Function

Definition of PROFINET coupler indicators				
Label	**Name**	**Color**	**Status**	**Status Description**
PWR	Power indicator	Green	Steadily lit	Module power supply normal
			Off	Module not powered or power supply abnormal
OVR	Overload indicator	Red	Off	No overload
			Steadily lit	Load reaches above 90% (±5%)
RUN	Run status indicator	Green	Steadily lit	System running normally
			Off	Operation abnormal
BF	Bus fault indicator	Red	Flashing	PROFINET bus parameters not set or abnormal
			Off	PROFINET bus parameters normal
IOR	IO communication indicator	Green	Steadily lit	I/O process data established
			Flashing at 1Hz	No business data interaction
			Flashing at 10Hz	Coupler firmware upgrade
IOE	IO fault indicator	Red	Steadily lit	Communication abnormal
			Flashing at 1Hz	I/O module alarm/ I/O module fault exists
			Off	Communication normal

Definition of network status indicators				
Label	**Name**	**Color**	**Status**	**Status Description**
X1	Network status indicator	Orange	Flashing	Connection established with data exchange
			Off	No data exchange or abnormal status
		Green	Steadily lit	Network connection established
			Off	No network connection established or abnormal
X2	Network status indicator	Orange	Flashing	Connection established with data exchange
			Off	No data exchange or abnormal status
		Green	Steadily lit	Network connection established
			Off	No network connection established or abnormal

3.2.2 Product Parameters

PROFINET interface parameters	
Bus protocol	PROFINET
Number of slave stations	Determined by the number of slave stations supported by the master station
Data transmission medium	Ethernet CAT5 cable
Transmission rate	100Mbps
Minimum cycle time[1]	1ms
Transmission distance	≤100m (station-to-station distance)
Bus interface	2×RJ45
Maximum number of modules in series	32
Input and output process data volume	1024Bytes[2]

Note [1]: Cycle time (scan cycle) between PLC and coupler.
Note [2]: The total length of uplink and downlink data shall not exceed 1024 Bytes.

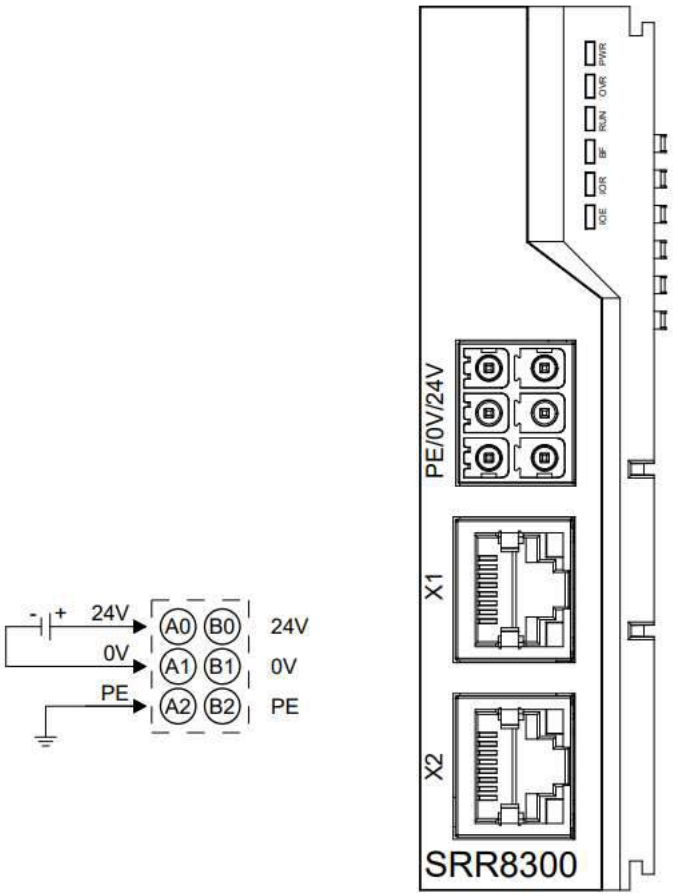
Power Supply Parameters	
Input voltage	SELV Input 24VDC（18V~36V）
Input current	Max：600mA（24VDC）
Backplane supply current	Max：2A
Backplane supply voltage	5VDC

General Technical Parameters		
Specifications and dimensions		100◊27.82◊80 mm
Weight		105g
Operating environment	Operating temperature	-20℃~+60℃

	Storage temperature	-40℃~+80℃
	Relative humidity	95%, no condensation
	Altitude	≤2000m
	Protection rating	IP20
	Overvoltage category	I
	Pollution level	Level 2
PROFINET IO RT		Support
Fault auto-recovery		Support
Hardware detection function		Support
Diagnosis		Support
Alarm		Support
MRP		Support
Firmware upgrade		Support
Short circuit protection		Support (Auto-recovery mechanism)
Reverse connection protection		Support (Auto-recovery mechanism)
Surge protection		Support

3.2.3 Power Wiring Diagram

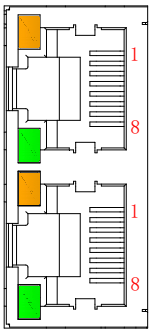
Use a 24VDC power module, follow the wiring method, connect the power supply according to the circuit diagram shown below, and ensure reliable PE grounding (twisted pair cables are recommended for power lines).



*24V internal conduction; 0V internal conduction

3.2.4 Bus Wiring

Use standard RJ45 network interfaces and standard crystal connectors, with pin assignments as shown in the table below.



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

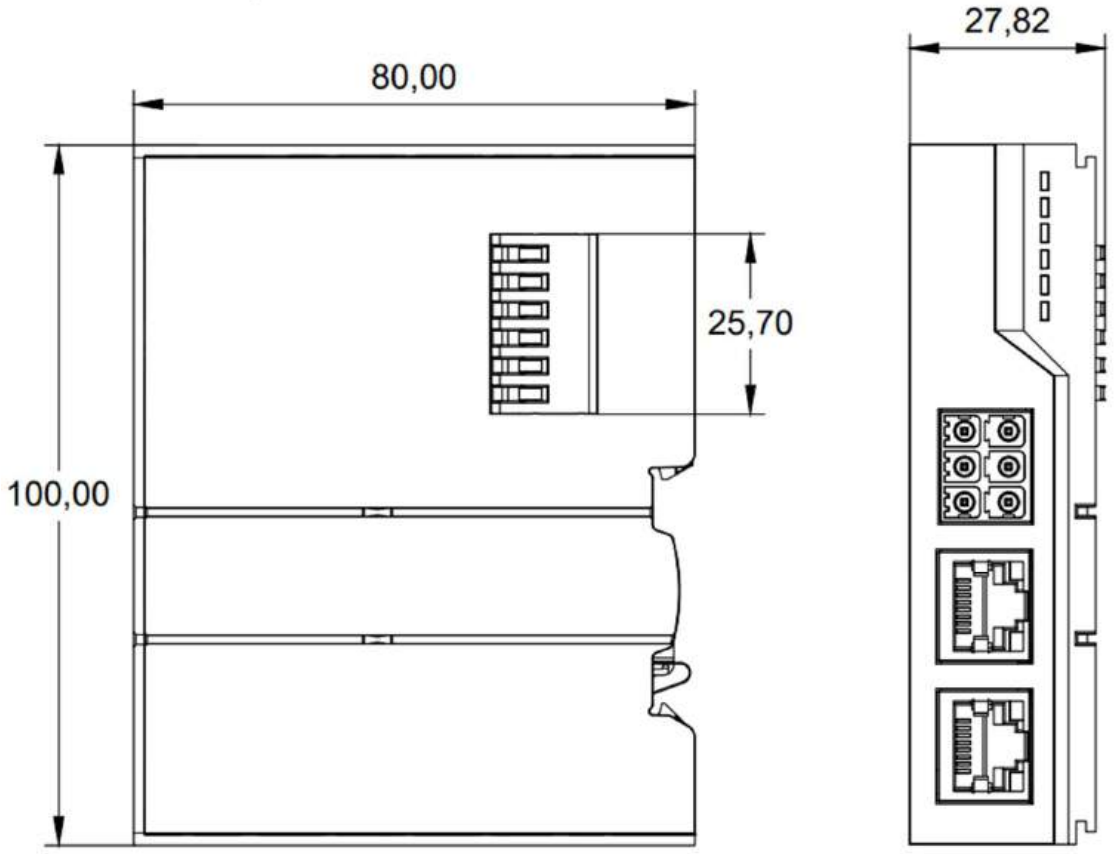
Note

- It is recommended to use Category 5 or higher-grade double-shielded (braided mesh + aluminum foil) STP cables as communication cables.

The length of cables between devices must not exceed 100 m

3.2.5 Dimensional Diagram

Dimensions of the coupler (unit: mm)



3.3 Digital I/O Module

3.3.1 Indicator Function

Definition of digital I/O module indicators				
Label	**Name**	**Color**	**Status**	**Status Description**
PWR	Power indicator	Green	Steadily lit	Power supply normal
			Off	Product unpowered on or power supply abnormal
RUN	Run status indicator	Green	Steadily lit	System running normally
			Flashing at 1Hz	No service data interaction, waiting to establish service data connection
			Flashing at 10Hz	Firmware upgrade
			Off	System not in operation
0~7	Input channel indicator	Green	Steadily lit	Signal input detected on the module channel
			Off	No signal input or abnormal signal input detected on the module channel
0~7	Output channel indicator	Green	Steadily lit	Signal output detected on the module channel
			Off	No signal output or abnormal signal output detected on the module channel

3.3.2 Technical Parameters

3.3.2.1 Digital Input Module Parameters

Digital input			
Product model	SRR1032	SRR1016	SRR1008
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）		
Rated current of bus input power supply	≤80mA	≤50mA	≤50mA
Rated input voltage	24VDC（20.4V~28.8V）		
Typical input current	5mA/ch（24VDC）		
Number of input signal points	32	16	8
Input signal type	NPN/PNP compatible		
Input signal form	Direct voltage input form Sink input: NPN open collector input Source input: PNP open collector input		
OFF voltage/OFF current	-3V~+5V/below 0.9mA		
ON voltage/ON current	11V~30V/above 2.1mA		
Response time	<50us		
Input filter	No filter, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms		
Maximum input frequency	150Hz (filter time: 3ms)		
Input impedance	5.4KΩ		
Isolation method	Optocoupler isolation		
Isolation withstand voltage	500VAC		
Rated current consumption	80mA	50mA	50mA
Power consumption	0.4W	0.25W	0.25W
Digital input type	Type1/Type3		
Channel indicator	Green LED		

3.3.2.2 Digital I/O Module Parameters

Digital input				
Product model	SRR1332	SRR1432	SRR1316	SRR1416
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）			
Rated current of bus input power supply	≤60mA	≤70mA	≤40mA	≤45mA
Rated input voltage	24VDC（20.4V~28.8V）			
Typical input current	5mA/ch（24VDC）			
Number of input signal points	16		8	
Input signal type	NPN/PNP compatible			
Input signal form	Direct voltage input form Sink input: NPN open collector input Source input: PNP open collector input			
OFF voltage/OFF current	-3V~+5V/below 0.9mA			
ON voltage/ON current	11V~30V/above 2.1mA			
Response time	<50us			
Input filter	No filter, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms			
Maximum input frequency	150Hz (filter time: 3ms)			
Input impedance	5.4KΩ			
Isolation method	Optocoupler isolation			
Isolation withstand voltage	500VAC			
Rated current consumption	60mA	70mA	40mA	45mA
Power consumption	0.3W	0.35W	0.2W	0.225W
Digital input type	Type1/Type3			
Channel indicator	Green LED			
Digital output				
Number of output signal points	16		8	
Output signal type	NPN	PNP	NPN	PNP
Field-side input voltage range	24VDC（20.4V~28.8V）			
Output voltage drop	＜1V			
Output load type	Resistive load, inductive load, and lamp load			
Rated current per channel	Max：0.5A			
Leakage current	<10uA			
Response time	<150us			
Output channel protection	Short circuit protection (auto-recovery mechanism)			
Module protection	Reverse connection protection (auto-recovery mechanism), and field-side surge protection			
Isolation method	Optocoupler isolation			
Isolation withstand voltage	500VAC			
Channel indicator	Green LED			

3.3.2.3 Digital Output Module Parameters

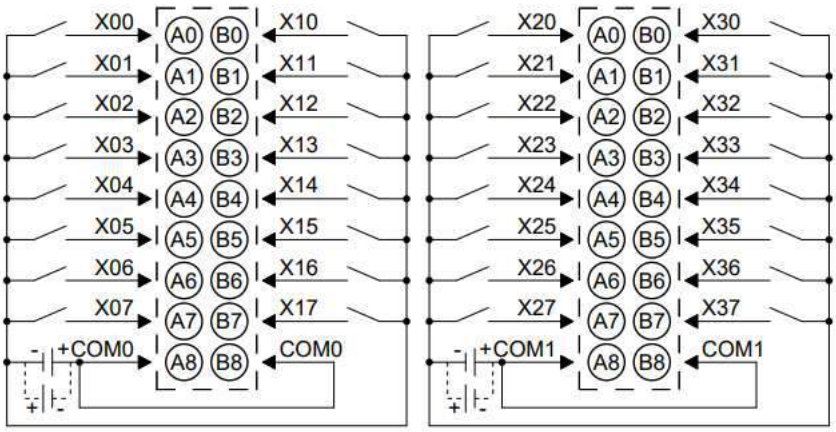
Digital output						
Product model	SRR2132	SRR2232	SRR2116	SRR2216	SRR2108	SRR2208
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）					
Rated current of bus input power supply	≤70mA	≤90mA	≤75mA	≤55mA	≤50mA	≤55mA
Field-side input voltage range	24VDC（20.4V~28.8V）					
Number of output signal points	32	32	16	16	8	8
Output signal type	NPN	PNP	NPN	PNP	NPN	PNP
Output voltage drop	＜1V					
Output load type	Resistive load, inductive load, and lamp load					
Rated current per channel	Max：0.5A					
Leakage current	<10uA					
Response time	<150us					
Output channel protection	Short circuit protection (auto-recovery mechanism)					
Module protection	Reverse connection protection (auto-recovery mechanism), and field-side surge protection					
Isolation method	Optocoupler isolation					
Isolation withstand voltage	500VAC					
Rated current consumption	70mA	90mA	75mA	55mA	50mA	55mA
Power consumption	0.35W	0.45W	0.375W	0.275W	0.25W	0.275W
Channel indicator	Green LED					

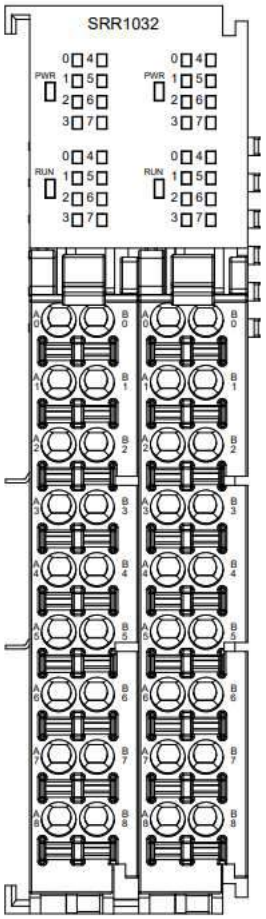
3.3.2.4 General Technical Parameters

General Technical Parameters	
Specifications and dimensions	8/16 Channels: 100◊16.11◊80mm
	32 Channels: 100◊26.7◊80mm
Weight	8/16 channels: 70g
	32 channels: 130g
Operating temperature	-20℃~+60℃
Storage temperature	-40℃~+80℃
Relative humidity	95%, no condensation
Altitude	≤2000m
Pollution level	Level 2
Protection rating	IP20

3.3.3 Wiring Diagram

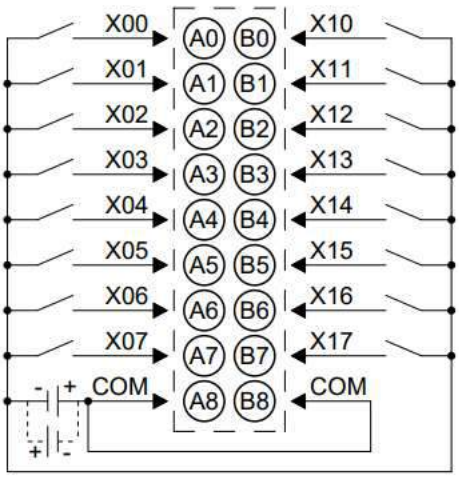
3.3.3.1 SRR1032

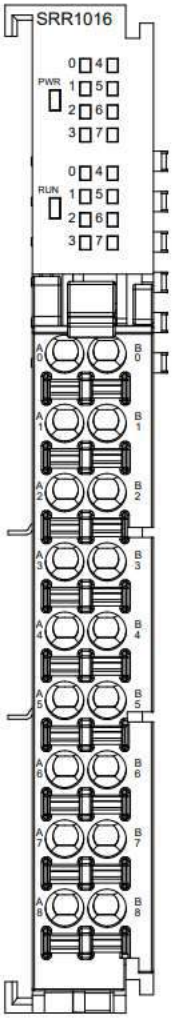




*COM0 internal conduction, NPN/PNP compatible
*COM1 internal conduction, NPN/PNP compatible

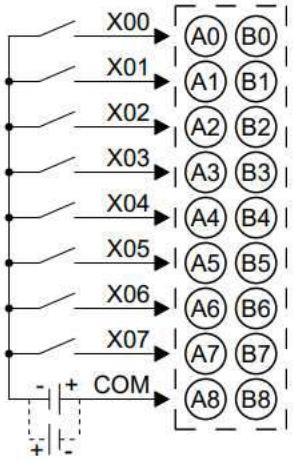
3.3.3.2 SRR1016

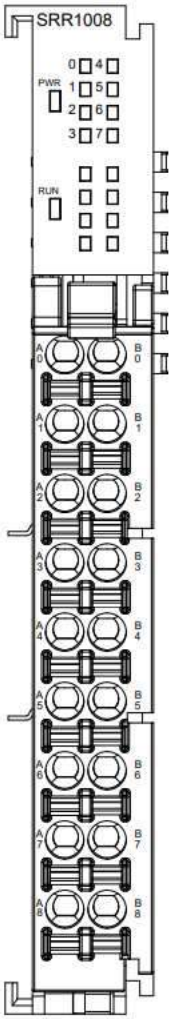




*COM internal conduction, NPN/PNP compatible

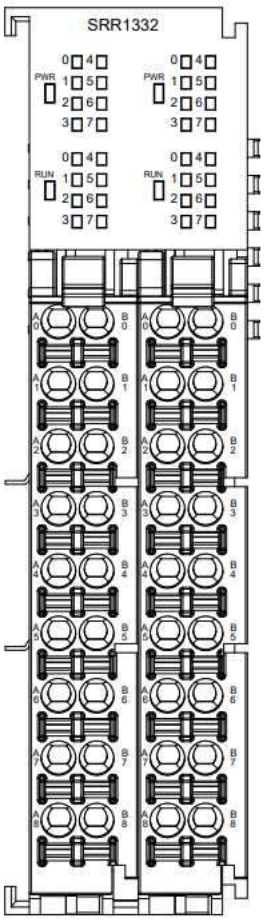
3.3.3.3 SRR1008

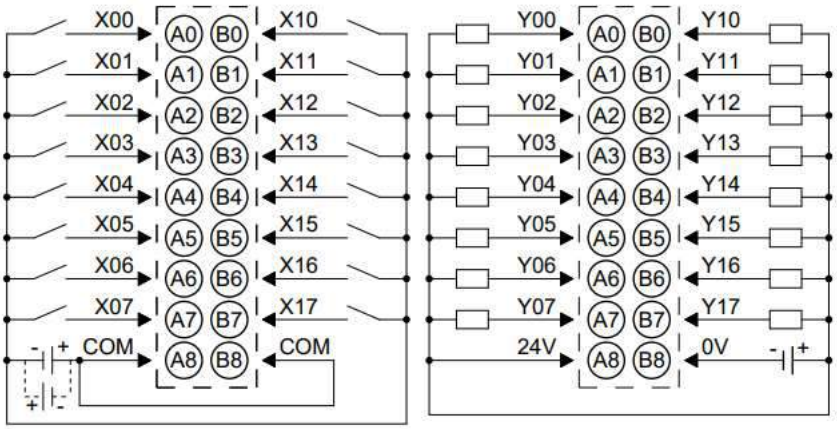




*NPN/PNP compatible

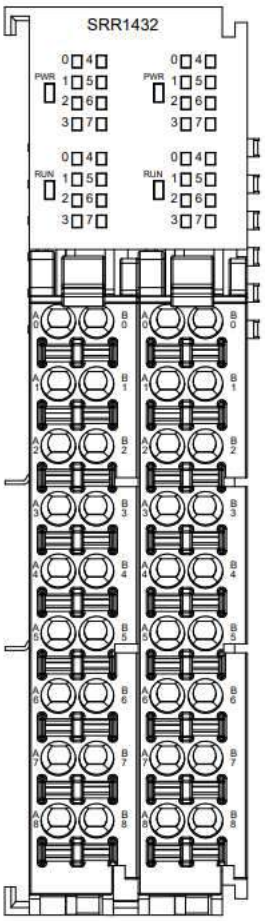
3.3.3.4 SRR1332

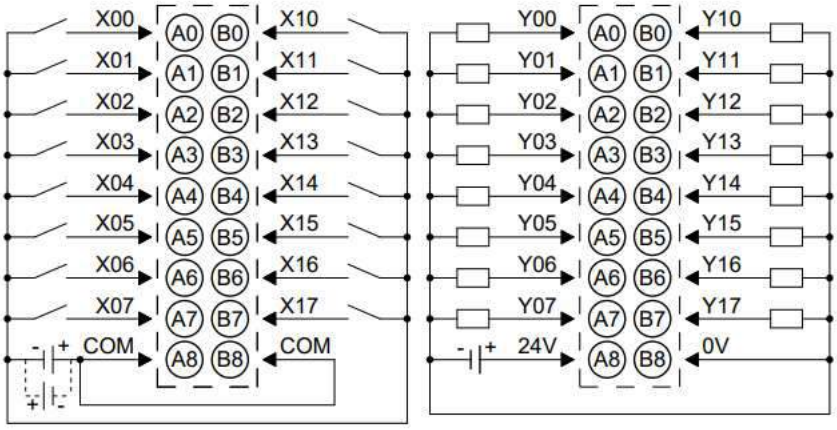




*COM internal conduction, NPN/PNP compatible

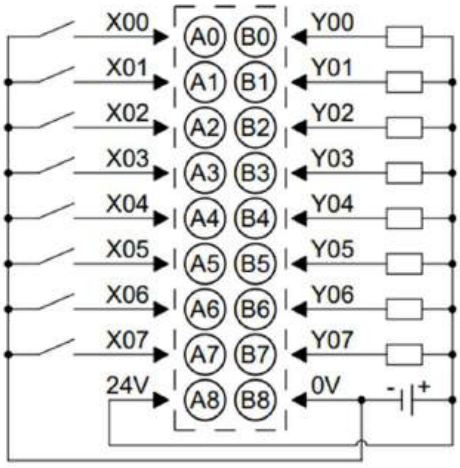
3.3.3.5 SRR1432

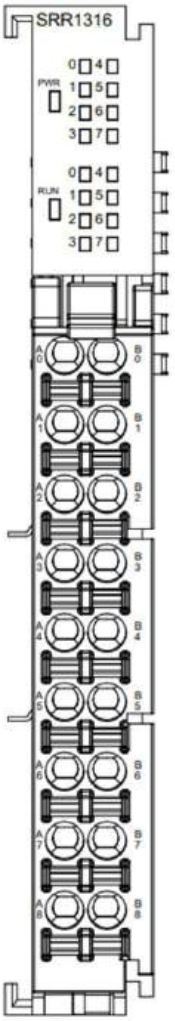




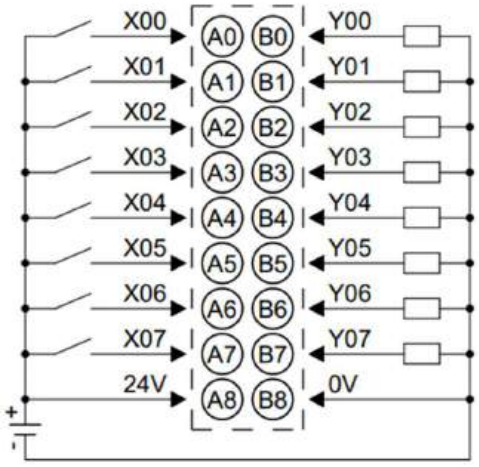
*COM internal conduction, NPN/PNP compatible

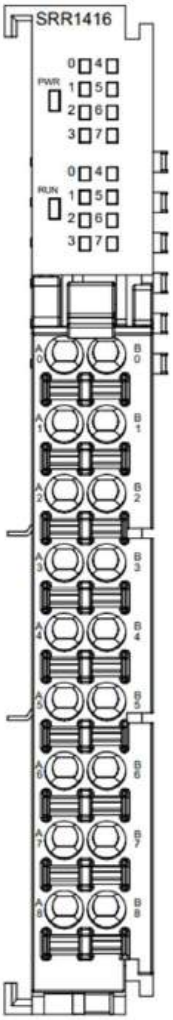
3.3.3.6 SRR1316



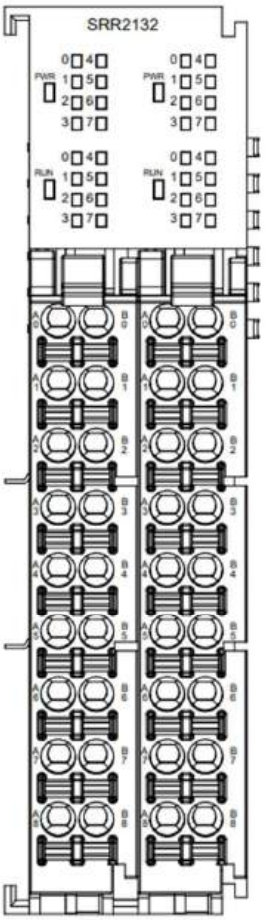


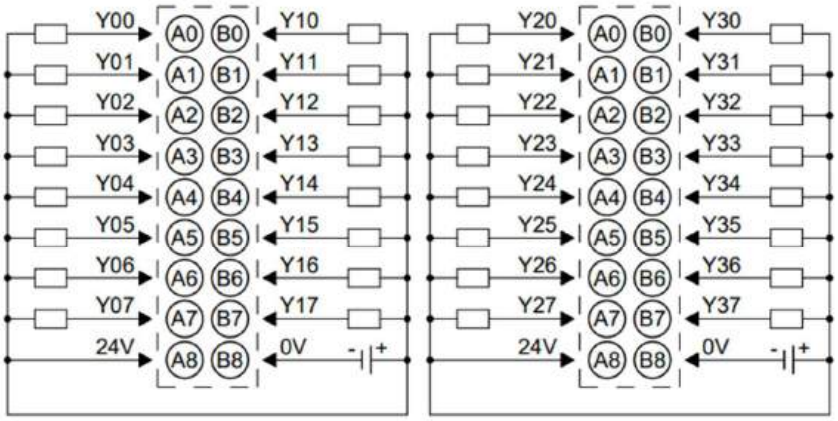
3.3.3.7 SRR1416



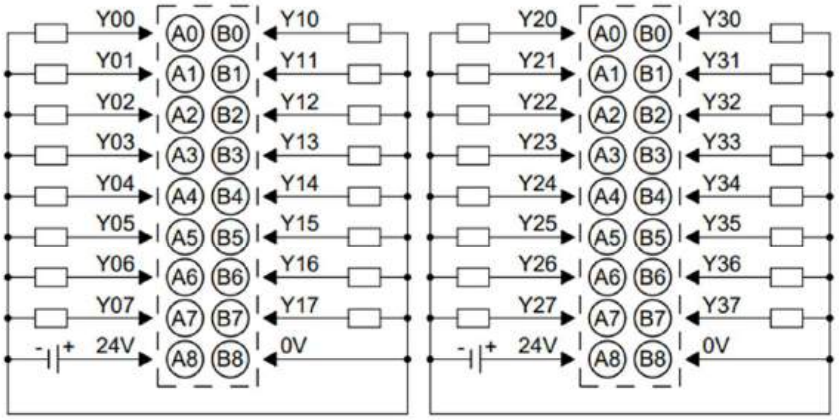


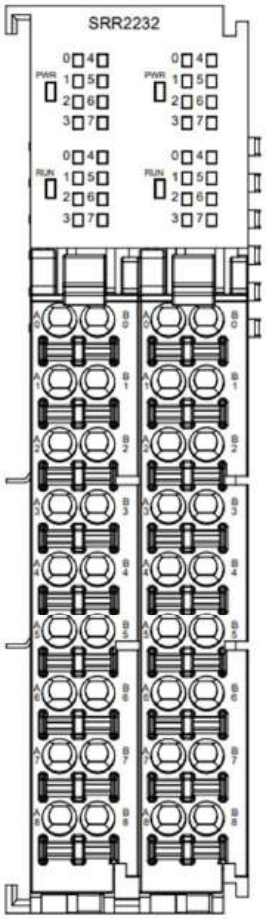
3.3.3.8 SRR2132



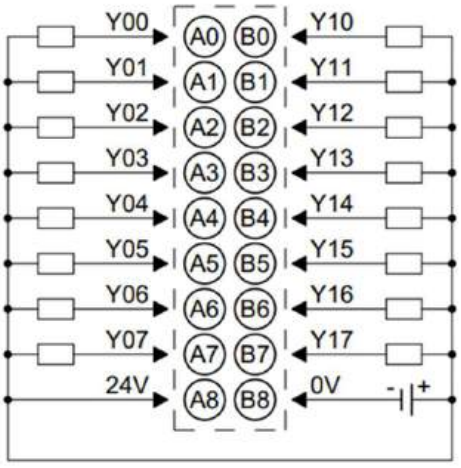


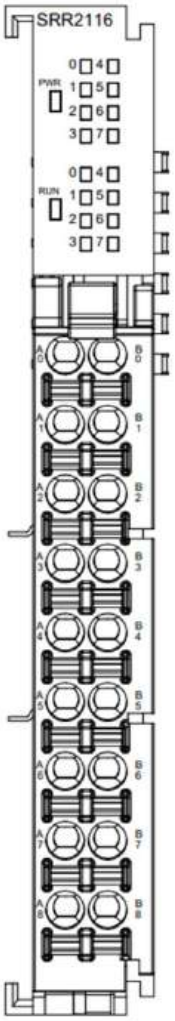
3.3.3.9 SRR2232



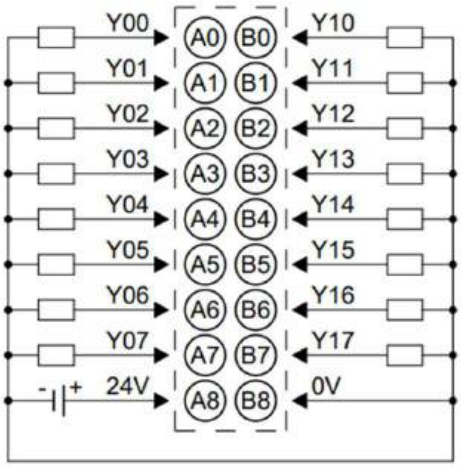


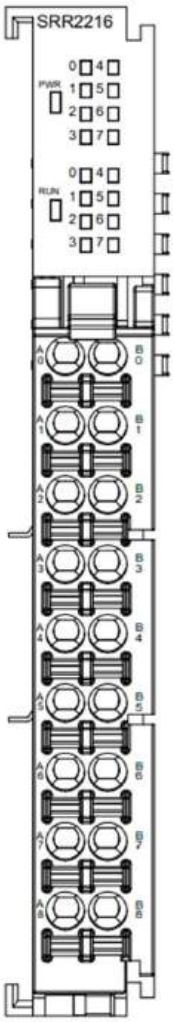
3.3.3.10 SRR2116



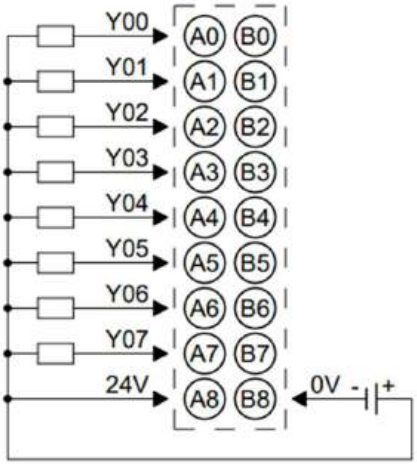


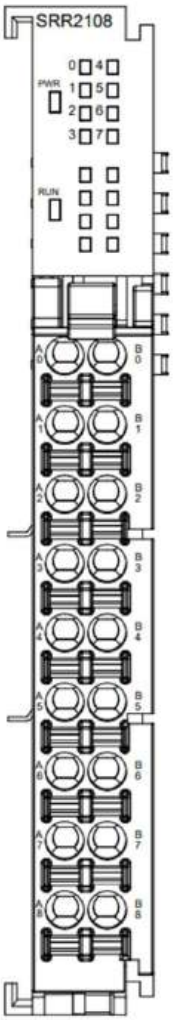
3.3.3.11 SRR2216



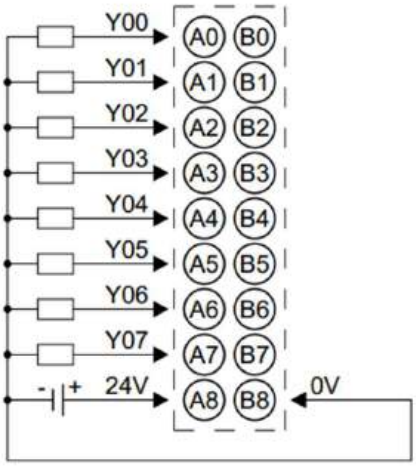


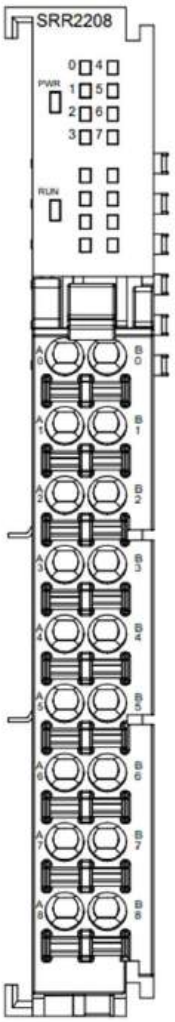
3.3.3.12 SRR2108





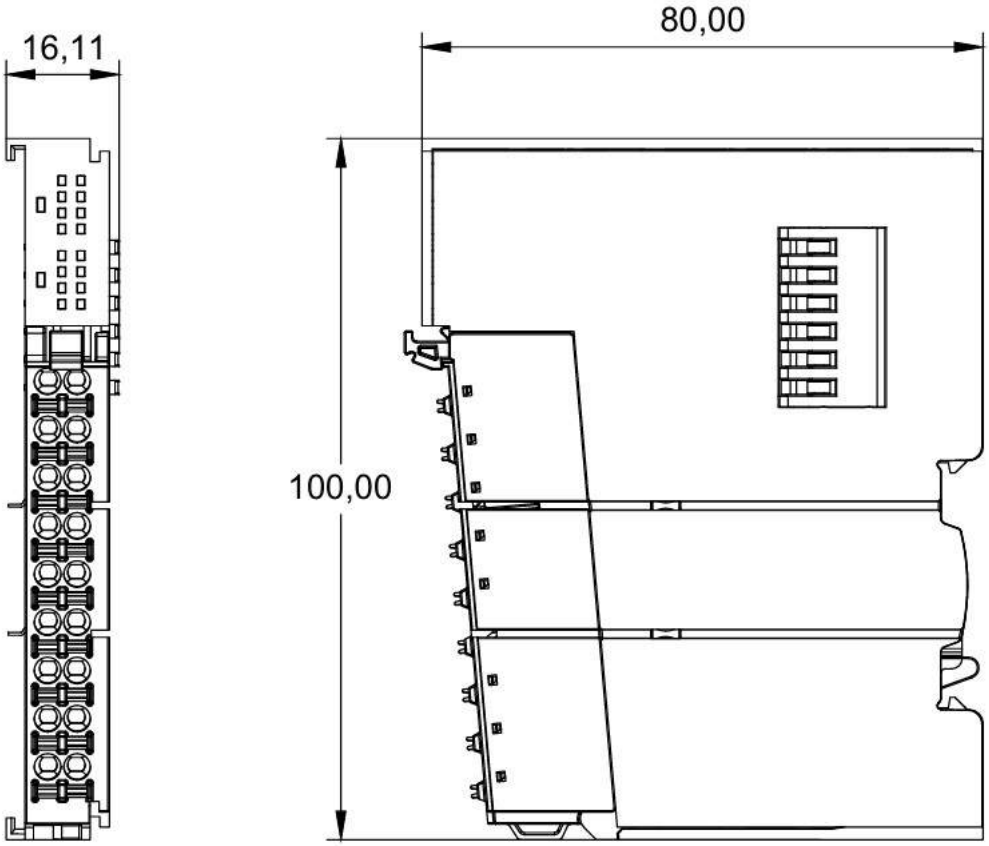
3.3.3.13 SRR2208



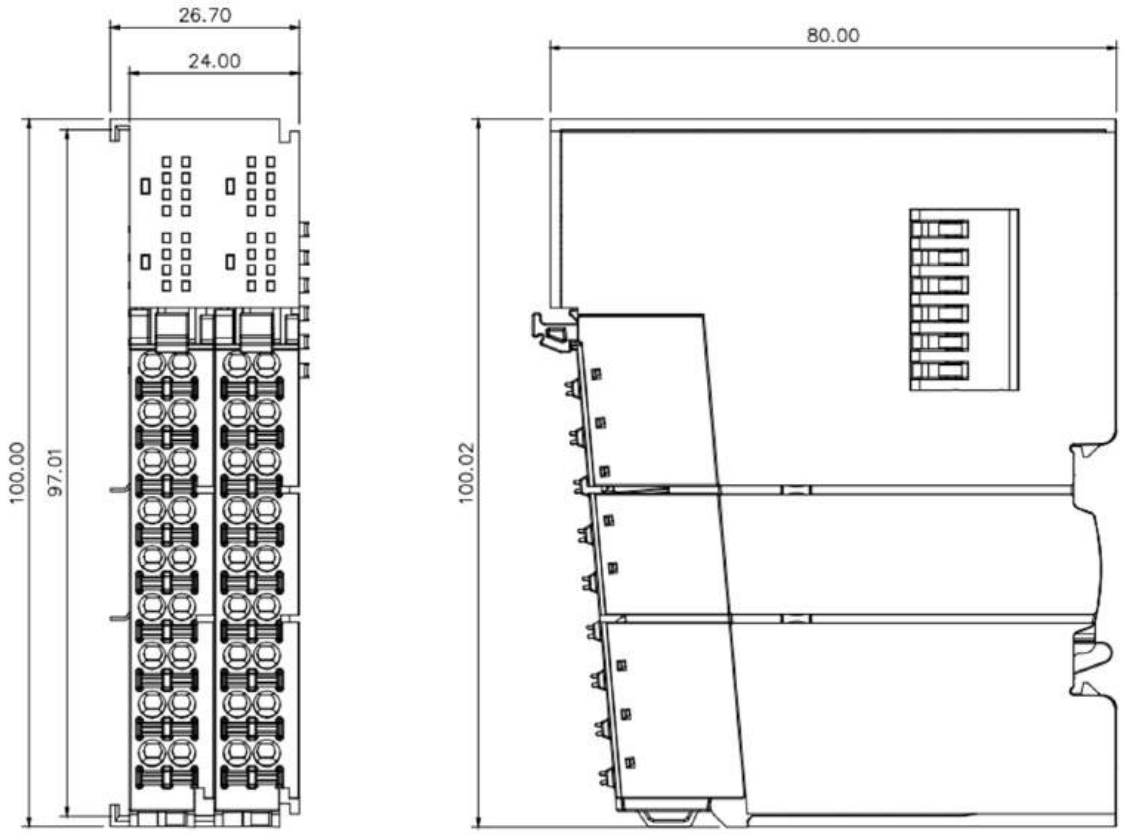


3.3.4 Dimensional Diagram

Dimensions of 8/16 channel digital I/O module (unit: mm)



Dimensions of 32 channel digital I/O module (unit: mm)



3.4 Analog I/O Module

3.4.1 Indicator Function

Definition of analog I/O module indicators				
Label	**Name**	**Color**	**Status**	**Status Description**
PWR	Power indicator	Green	Steadily lit	Power supply normal
			Off	Product unpowered on or power supply abnormal
RUN	Run status indicator	Green	Steadily lit	System running normally
			Flashing at 1Hz	No service data interaction, waiting to establish service data connection
			Flashing at 10Hz	Firmware upgrade
			Off	System not in operation
0~7	Input channel indicator	Green	Steadily lit	Signal input detected on the module channel
			Off	No signal input or abnormal signal input detected on the module channel
0~7	Output channel indicator	Green	Steadily lit	Signal output detected on the module channel
			Off	No signal output or abnormal signal output detected on the module channel

3.4.2 Technical Parameters

3.4.2.1 Analog Input Module Parameters

Analog input		
Product model	SRR3258	SRR3268
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）	
Rated current of bus input power supply	≤200mA	
Number of input points	8	8
Input type	Voltage type	Current type
Input signal	Disable、-10V~+10V、0V~10V、-5V to +5V, 0V to 5V, 1V to 5V (adjustable range, default: -10V to +10V)	Disable、4mA~20mA、0mA~20mA、-20mA~+20mA (adjustable range, default: 0mA to 20mA)
Input signal type	Differential signal	
Channel response time	550us / ch 850us / 8ch	
Resolution	16bits	
Sampling rate (all channels)	≤1ksps	
Accuracy	±0.1% at 25°C, ±0.3% over full temperature range	
Input filter	Support	
Smoothing level	1~200	
Input impedance (voltage type)	≥1MΩ	-
Input impedance (current type)	-	≤250Ω
Common-mode voltage range	12VAC	-
Maximum permissible channel voltage (voltage type)	30V	-
Maximum permissible channel current (current type)	-	30mA
The system shall not be affected	When the ±15V power supply is damaged or short-circuited, the system +5V power supply shall not be affected	
Potential isolation	No isolation is provided between channels; isolation is provided between channels and backplane bus, and between channels and power supply voltage	
Input overload protection	Support clamp protection	Support current limiting protection
Input protection	±30V	±30mA
Isolation withstand voltage	500VDC	
Rated current consumption	200mA	
Power consumption	1W	
Channel indicator	Green LED	

Analog input		
Product model	SRR3218	SRR3238
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）	
Rated current of bus input power supply	≤30mA	≤30mA
Number of input points	8	8
Input type	Voltage type	Current type
Input signal	Disable、-10V~+10V、0V~10V、-5V to +5V, 0V to 5V, 1V to 5V (adjustable range, default: -10V to +10V)	Disable、4mA~20mA、0mA~20mA (adjustable range, default: 0mA to 20mA)
Input signal type	Single-ended signal	
Channel response time	560us / ch 770us / 8ch	
Resolution	16bits	
Sampling rate (all channels)	≤1ksps	
Accuracy	±0.1% at 25°C, ±0.3% over full temperature range	
Input filter	Support	
Smoothing level	1~200	
Input impedance (voltage type)	≥400kΩ	-
Input impedance (current type)	-	≤100Ω
Maximum permissible channel voltage (voltage type)	30V	-
Maximum permissible channel current (current type)	-	30mA
The system shall not be affected	When the ±15V power supply is damaged or short-circuited, the system +5V power supply shall not be affected	
Potential isolation	No isolation is provided between channels; isolation is provided between channels and backplane bus, and between channels and power supply voltage	
Input overload protection	Support clamp protection	Support current limiting protection
Input protection	±30V	±30mA
Isolation withstand voltage	500VDC	
Rated current consumption	30mA	30mA
Power consumption	0.15W	0.15W
Channel indicator	Green LED	

Analog input		
Product model	SRR3214	SRR3234
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）	
Rated current of bus input power supply	≤145mA	≤70mA
Number of input points	4	4
Input type	Voltage type	Current type
Input signal	Disable、-10V~+10V、0V~10V、-5V to +5V, 0V to 5V, 1V to 5V (adjustable range, default: -10V to +10V)	Disable、4mA~20mA、0mA~20mA (adjustable range, default: 0mA to 20mA)
Input signal type	Single-ended signal	
Channel response time	230us / ch 380us / 4ch	230us / ch 300us / 4ch
Resolution	16bits	
Sampling rate (all channels)	≤1ksps	
Accuracy	±0.1% at 25°C, ±0.3% over full temperature range	
Input filter	Support	
Smoothing level	1~200	
Input impedance (voltage type)	≥400kΩ	-
Input impedance (current type)	-	≤100Ω
Maximum permissible channel voltage (voltage type)	30V	-
Maximum permissible channel current (current type)	-	30mA
The system shall not be affected	When the ±15V power supply is damaged or short-circuited, the system +5V power supply shall not be affected	
Potential isolation	No isolation is provided between channels; isolation is provided between channels and backplane bus, and between channels and power supply voltage	
Input overload protection	Support clamp protection	Support current limiting protection
Input protection	±30V	±30mA
Isolation withstand voltage	500VDC	
Rated current consumption	145mA	70mA
Power consumption	0.725W	0.35W
Channel indicator	Green LED	

3.4.2.2 Analog Output Module Parameters

Analog output		
Product model	SRR4018	SRR4038
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）	
Rated current of bus input power supply	≤230mA	≤90mA
Field-side input voltage range	24VDC（20.4V~28.8V）	
Number of output points	8	8
Output type	Voltage type	Current type
Output signal	Disable、-10V~+10V、0V~10V、-5V to +5V, 0V to 5V, 1V to 5V (adjustable range, default: -10V to +10V)	Disable、4mA~20mA、0mA~20mA (adjustable range, default: 0mA to 20mA)
Channel response time	400us / ch 400us / 8ch	
Resolution	16bits	
Accuracy	±0.1% at 25°C, ±0.3% over full temperature range	
Load impedance (voltage type)	≥2kΩ (1kΩ accuracy: ±3‰ at 25°C, ±5‰ over full temperature range)	-
Load impedance (current type)	-	≤500Ω
The system shall not be affected	When the ±15V power supply is damaged or short-circuited, the system +5V power supply shall not be affected	
Output protection	Overload protection, open-circuit protection, and short-circuit protection (all with auto-recovery mechanism)	
Potential isolation	No isolation is provided between channels; isolation is provided between channels and backplane bus, and between channels and power supply voltage	
Isolation withstand voltage	500VDC	
Rated current consumption	230mA	90mA
Power consumption	1.15W	0.45W
Optional function of clear/hold under non-OP state	Support	
Channel indicator	Green LED	

Analog output		
Product model	SRR4014	SRR4034
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）	
Rated current of bus input power supply	≤30mA	
Field-side input voltage range	24VDC（20.4V~28.8V）	
Number of output points	4	4
Output type	Voltage type	Current type
Output signal	Disable、-10V~+10V、0V~10V、-5V to +5V, 0V to 5V, 1V to 5V (adjustable range, default: -10V to +10V)	Disable、4mA~20mA、0mA~20mA (adjustable range, default: 0mA to 20mA)
Channel response time	200us / ch 200us / 4ch	
Resolution	16bits	
Accuracy	±0.1% at 25°C, ±0.3% over full temperature range	
Load impedance (voltage type)	≥2kΩ (1kΩ accuracy: ±3‰ at 25°C, ±5‰ over full temperature range)	-
Load impedance (current type)	-	≤500Ω
The system shall not be affected	When the ±15V power supply is damaged or short-circuited, the system +5V power supply shall not be affected	
Output protection	Overload protection, open-circuit protection, and short-circuit protection (all with auto-recovery mechanism)	
Potential isolation	No isolation is provided between channels; isolation is provided between channels and backplane bus, and between channels and power supply voltage	
Isolation withstand voltage	500VDC	
Rated current consumption	30mA	
Power consumption	0.15W	
Optional function of clear/hold under non-OP state	Support	
Channel indicator	Green LED	

3.4.2.3 General Technical Parameters

General Technical Parameters	
Specifications and dimensions	4 channels: 100◊16.11◊80mm
	8 channels: 100◊26.7◊80mm
Weight	4 channels: 70g
	8 channels: 130g
Operating temperature	-20°C~+60°C
Storage temperature	-40°C~+80°C
Relative humidity	95%, no condensation
Altitude	≤2000m
Pollution level	Level 2
Protection rating	IP20

3.4.3 Analog Voltage Parameters

3.4.3.1 Voltage Input Range Selection Table

Voltage input range selection and code value range					
Range selection	Measurement range	Code value range	Voltage input calculation formula	Voltage output calculation formula	Code Value Correspondence Table
0	Disable, indicating that the channel is not enabled				
1 (default)	-10V~+10V	-32768~32767	D=(65535/20)*U	U=(D*20)/65535	See 3.3.4.3 Voltage Input Code Value Table
2	0V~10V	0~32767	D=(32767/10)*U	U=(D*10)/32767	
3	-10V~+10V	-27648~27648	D=(55296/20)*U	U=(D*20)/55296	
4	0V~10V	0~27648	D=(27648/10)*U	U=(D*10)/27648	
5	-5V~+5V	-27648~27648	D=(55296/10)*U	U=(D*10)/55296	
6	0V~5V	0~27648	D=(27648/5)*U	U=(D*5)/27648	
7	1V~5V	0~27648	D=(27648/4)*U-6912	U=(D+6912)*4/27648	

Note: D represents the code value, and U represents the voltage. The default range of the analog voltage input module is 1: -10V~+10V (-32768~32767).

3.4.3.2 Voltage Output Range Selection Table

Voltage output range selection and code value range					
Range selection	Measurement range	Code value range	Voltage input calculation formula	Voltage output calculation formula	Code Value Correspondence Table
0	Disable, indicating that the channel is not enabled				
1 (default)	-10V~+10V	-32768~32767	D=(65535/20)*U	U=(D*20)/65535	See 3.3.4.4 Voltage Output Code Value Table
2	0V~10V	0~32767	D=(32767/10)*U	U=(D*10)/32767	
3	-10V~+10V	-27648~27648	D=(55296/20)*U	U=(D*20)/55296	
4	0V~10V	0~27648	D=(27648/10)*U	U=(D*10)/27648	
5	-5V~+5V	-27648~27648	D=(55296/10)*U	U=(D*10)/55296	
6	0V~5V	0~27648	D=(27648/5)*U	U=(D*5)/27648	
7	1V~5V	0~27648	D=(27648/4)*U-6912	U=(D+6912)*4/27648	

Note: D represents the code value, and U represents the voltage. The default range of the analog voltage output module is 1: -10V~+10V (-32768~32767).

3.4.3.3 Voltage Input Code Value Table

Measurement range / Voltage	-10V~+10V -32768~32767 Code value	0V~10V 0~32767 Code value	-10V~+10V -27648~27648 Code value	0V~10V 0~27648 Code value
-10.13	-	-	-27980	-
-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	-
-0.13	-426	-384	-359	-332
-0.06	-197	-197	-166	-156
0	0	0	0	0
1	3277	3277	2765	2765
2	6554	6554	5530	5530
3	9830	9830	8294	8294
4	13107	13107	11059	11059
5	16384	16384	13824	13824
6	19661	19661	16589	16589
7	22937	22937	19354	19354
8	26214	26214	22118	22118
9	29491	29491	24883	24883
10	32767	32767	27648	27648
10.12	-	-	27980	27980
Code value formula	Code value = (65535/20) *Voltage	Code value = (32767/10) *Voltage	Code value = (55296/20) *Voltage	Code value = (27648/10) *Voltage
Voltage formula	Voltage = (Code value*20) /65535	Voltage = (Code value*10) /32767	Voltage = (Code value*20) /55296	Voltage = (Code value*10) /27648

Note: ① When the voltage input module range is selected as -10V~+10V (-32768~32767), the module supports the **overflow/underflow** functions. That is, when the channel input voltage is greater than 10V, the maximum code value 32767 will be displayed; When the channel input voltage is less than -10V, the minimum code value -32768 will be displayed.

② When the voltage input module range is selected as 0V~10V (0~32767), the **underflow/overshoot, overflow/underflow, and underflow alarm** functions will be supported. Overshoot means when the channel input range exceeds the measurement range and enters overshoot, the normal calculated code values will be displayed within -0.13V~+10V. Overflow/underflow means when the channel input voltage exceeds 10V, the maximum code value 32767 will be displayed. When the channel input voltage is less than -0.13V, the minimum overshoot code value -384 will be displayed, and an alarm will be given at the same time .

③ When the voltage input module range is selected as -10V~+10V (-27648~27648), the **overshoot, overflow/underflow, and overflow/underflow alarm** functions will be supported. Overshoot means when the channel input range exceeds the measurement range and enters overshoot, the normal calculated code values will be displayed within -10.13V~+10.12V. Overflow/underflow means when the channel input voltage exceeds 10.12V, the maximum overshoot code value 27980 will be displayed, and an alarm will be given at the same time. When the channel input voltage is less than -10.13V, the minimum overshoot code value -27980 will be displayed, and an alarm will be given at the same time.

④ When the voltage input module range is selected as 0V~10V (0~27648), the **overshoot, overflow/underflow, and overflow/underflow alarm** functions will be supported. Overshoot means when the channel input range exceeds the measurement range and enters overshoot, the normal calculated code values will be displayed within -0.13V~+10.12V. Overflow/underflow means when the channel input voltage exceeds 10.12V, the maximum overshoot code value 27980 will be displayed, and an alarm will be given at the same time. When the channel input voltage is less than -0.13V, the minimum overshoot code value - 332 will be displayed, and an alarm will be given at the same time.

Measurement range / Voltage	-5V~+5V -27648~27648 Code value	0V~5V 0~27648 Code value	1V~5V 0~27648 Code value
-5.07	-27980	-	-

-5	-27648	-	-
-4	-22118	-	-
-3	-16588	-	-
-2	-11060	-	-
-1	-5530	-	-
-0.07	-332	-332	-
0	0	0	-
0.94	5198	5198	-345
1	5530	5530	0
2	11060	11060	6912
3	16588	16588	13824
4	22118	22118	20736
5	27648	27648	27648
5.06	27980	27980	27933
Code value formula	Code value =(55296/10)* Voltage	Code value =(27648/5)* Voltage	Code value =(27648/4)* Voltage -6912
Voltage formula	Voltage =(Code value *10)/55296	Voltage =(Code value *5)/27648	Voltage =(Code value +6912)*4/27648

Note: ① When the voltage input module range is selected as -5V~+5V (-27648~27648), the **overshoot, overflow/underflow, and overflow/underflow alarm** functions will be supported. Overshoot means when the channel input range exceeds the measurement range, the normal calculated code values will be displayed within -5.07V~+5.06V. Overflow/underflow means when the channel input voltage exceeds 5.06V, the maximum overshoot code value 27980 will be displayed, and an alarm will be given at the same time; When the channel input voltage is less than -5.07V, the minimum overshoot code value -27980 will be displayed, and an alarm will be given at the same time.

②When the voltage input module range is selected as 0V~5V (0~27648), the **overshoot, overflow/underflow, and overflow/underflow alarm** functions will be supported. Overshoot means when the channel input range exceeds the measurement range, the normal calculated code values will be displayed within -0.07V~+5.06V. Overflow/underflow means when the channel input voltage exceeds 5.06V, the maximum overshoot code value 27980 will be displayed, and an alarm will be given at the same time; When the input voltage of the input channel is less than -0.07V, the minimum overshoot code value - 332 will be displayed, and an alarm will be given at the same time.

③When the voltage input module range is selected as 1V~5V (0~27648), the **overshoot, overflow/underflow, and overflow/underflow alarm** functions will be supported. Overshoot means when the channel input range exceeds the measurement range, the normal calculated code values will be displayed within 0.94V~5.06V. Overflow/underflow means when the channel input voltage exceeds 5.06V, the maximum overshoot code value 27933 will be displayed, and an alarm will be given at the same time. When the channel input voltage is less than 0.94V, the minimum overshoot code value - 345 will be displayed, and an alarm will be given at the same time.

3.4.3.4 Voltage Output Code Value Table

Measurement range / Voltage	-10V~+10V -32768~32767 Code value	0V~10V 0~32767 Code value	-10V~+10V -27648~27648 Code value	0V~10V 0~27648 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	6554	5530	5530
3	9830	9830	8294	8294
4	13107	13107	11059	11059
5	16384	16384	13824	13824
6	19661	19661	16589	16589
7	22937	22937	19354	19354
8	26214	26214	22118	22118
9	29491	29491	24883	24883
10	32767	32767	27648	27648
Code value formula	Code value = (65535/20) *Voltage	Code value = (32767/10) *Voltage	Code value = (55296/20) *Voltage	Code value = (27648/10) *Voltage
Voltage formula	Voltage = (Code value*20) /65535	Voltage = (Code value*10) /32767	Voltage = (Code value*20) /55296	Voltage = (Code value*10) /27648

Note: ① The voltage output module supports the **overflow/underflow** functions. That's, , when the voltage output module range is selected as -10V~+10V or 0V~10V and the code value is set to be greater than the maximum code value corresponding to the measurement range, each channel will output 10V;

When the voltage output module range is selected as -10V to +10V and the code value is set below the minimum code value corresponding to the measurement range, each channel will output -10V.

When the voltage output module range is selected as 0V to 10V and the code value is set below the minimum code value corresponding to the measurement range, each channel will output 0V.

Measurement range / Voltage	-5V~+5V	0V~5V	1V~5V
	-27648~27648	0~27648	0~27648
	Code value	Code value	Code value
-5	-27648	-	-
-4	-22118	-	-
-3	-16588	-	-
-2	-11060	-	-
-1	-5530	-	-
0	0	0	-
1	5530	5530	0
2	11060	11060	6912
3	16588	16588	13824
4	22118	22118	20736
5	27648	27648	27648
Code value formula	Code value =(55296/10)* Voltage	Code value =(27648/5)* Voltage	Code value =(27648/4)* Voltage -6912
Voltage formula	Voltage =(Code value *10)/55296	Voltage =(Code value *5)/27648	Voltage =(Code value +6912)*4/27648

Note: ① The voltage output module supports the overflow/underflow functions. That's,, when the voltage output module range is selected as -5V~+5V/0V~5V/1V~5V and the code value is set to be greater than the maximum code value corresponding to the measurement range, each channel will output 5V;

When the voltage output module range is selected as -5V to +5V and the code value is set below the minimum code value corresponding to the measurement range, each channel will output -5V.

When the voltage output module range is selected as 0V to 5V and the code value is set below the minimum code value corresponding to the measurement range, each channel will output 0V.

When the voltage output module range is selected as 1V to 5V and the code value is set below the minimum code value corresponding to the measurement range, each channel will output 1V.

3.4.4 Analog Current Parameters

3.4.4.1 Current Input Range Selection Table

Current input range selection and code value range					
Range selection	Measurement range	Code value range	Current input calculation formula	Current output calculation formula	Code Value Correspondence Table
0	Disable, indicating that the channel is not enabled				
1	4mA~20mA	0~65535	D=(65535/16)*I-16384	I=(D+16384)*16/65535	See 3.3.5.3 Current Input Code Value Table
2 (Default)	0mA~20mA	0~65535	D=(65535/20)*I	I=(D*20)/65535	
3	4mA~20mA	0~27648	D=(27648/16)*I-6912	I=((D+6912)*16)/27648	
4	0mA~20mA	0~27648	D=(27648/20)*I	I=(D*20)/27648	
5	-20mA~+20mA	0~65535	D=(65535/40)*(I+20)	I=(D*40)/65535-20	

Note: “D” represents code value, and “I” represents current. The default range of the analog current input module is 2: 0mA~20mA (0~65535).

Range 5: -20mA~+20mA (0~65535) is exclusive to the current input differential signal module.

3.4.4.2 Current Output Range Selection Table

Current output range selection and code value range					
Range selection	Measurement range	Code value range	Current input calculation formula	Current output calculation formula	Code Value Correspondence Table
0	Disable, indicating that the channel is not enabled				
1	4mA~20mA	0~65535	D=(65535/16*I)-16384	I=(D+16384)*16/65535	See 3.3.5.4 Current Output Code Value Table
2 (Default)	0mA~20mA	0~65535	D=(65535/20)*I	I=(D*20)/65535	
3	4mA~20mA	0~27648	D=(27648/16)*I-6912	I=((D+6912)*16)/27648	
4	0mA~20mA	0~27648	D=(27648/20)*I	I=(D*20)/27648	

Note: “D” represents the code value, and “I” represents the current. The default range of the analog current output module is 2: 0mA~20mA (0~65535).

3.4.4.3 Current Input Code Value Table

Measurement range / Current	4mA~20mA	0mA~20mA	4mA~20mA	0mA~20mA	-20mA~+20mA
	0~65535	0~65535	0~27648	0~27648	0~65535
	Code value	Code value	Code value	Code value	Code value
-20	-	-	-	-	0
-15	-	-	-	-	8192
-10	-	-	-	-	16384
-9	-	-	-	-	18022
-8	-	-	-	-	19661
-7	-	-	-	-	21299
-6	-	-	-	-	22937
-5	-	-	-	-	24576
-4	-	-	-	-	26214
-3	-	-	-	-	27852
-2	-	-	-	-	29491
-1	-	-	-	-	31129
0	-	0	-	0	32768
1	-	3277	-	1382	34406
2	-	6554	-	2765	36044
3	-	9830	-	4147	37683
4	0	13107	0	5530	39321
5	4096	16384	1728	6912	40959
6	8192	19661	3456	8294	42598
7	12288	22937	5184	9677	44236
8	16384	26214	6912	11059	45875
9	20479	29491	8640	12442	47513
10	24575	32768	10368	13824	49151
11	28671	36044	12096	15206	50790
12	32767	39321	13824	16589	52428
13	36863	42598	15552	17971	54066
14	40959	45875	17280	19354	55705
15	45055	49151	19008	20736	57343
16	49151	52428	20736	22118	58982
17	53247	55705	22464	23501	60620
18	57343	58982	24192	24883	62258
19	61439	62258	25920	26266	63897
20	65535	65535	27648	27648	65535
20.19	-	-	28034	27917	-
20.24	-	-	28085	27986	-
Code value formula	Code value = 65535/16 * current - 16384	Code value = (65535/20) * current	Code value = (27648/16) * current - 6912	Code value = (27648/20) * current	Code value = (65535/40) * (current + 20)

Note: **Range 5: -20mA~+20mA (0~65535) is exclusive to the current input differential signal module.**

①When the current input module range is selected as 4mA~20mA (0~65535), the **overflow/underflow and overflow alarm** functions will be supported. That is, when the channel input current is greater than 20.03mA, the maximum code value 65535 will be displayed and an alarm will be given at the same time; When the channel input current is less than 4mA, the minimum code value 0 will be displayed.

② When the current input module range is selected as 0mA~20mA (0~65535), the **overflow/underflow and overflow alarm** functions will be supported. That is, when the channel input current is greater than 20.03mA, the maximum code value 65535 will be displayed and an alarm will be given at the same time; When the channel input current is less than 0mA, the minimum code value 0 will be displayed.

③ When the current input module range is selected as 4mA~20mA (0~27648), the **overflow/overshoot, overflow/underflow, and overflow alarm** functions will be supported. Overshoot means when the channel input range exceeds the measurement range and enters overshoot, the normal calculated code values will be displayed within 4mA~20.24mA. Overflow means when the channel input current exceeds 20.24mA, the maximum overshoot code value 28085 will be displayed, and an alarm will be given at the same time. Underflow means when the channel input current is less than 4mA, the minimum overshoot code value 0 will be displayed.

④ When the current input module range is selected as 0mA~20mA (0~27648), the **overflow/overshoot, overflow/underflow, and overflow alarm** functions will be supported. Overshoot means when the channel input range exceeds the measurement range, the normal calculated code values will be displayed within 0mA~20.24mA. Overflow means when the channel input current exceeds 20.24mA, the maximum overshoot code value 27986 will be displayed, and an alarm will be given at the same time. Underflow means when the channel input current is less than 0mA, the minimum overshoot code value 0 will be displayed.

⑤ When the current input module range is selected as -20mA~+20mA (0~65535), the **overflow/underflow and overflow alarm** functions will be supported. That is, when the channel input current is greater than 20mA, the maximum code value 65535 will be displayed and an alarm will be given at the same time; When the input channel input is less than -20mA, the minimum code value 0 will be displayed.

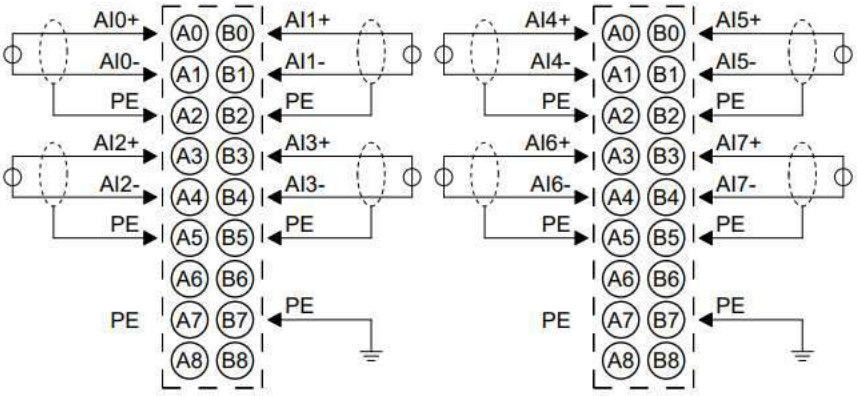
3.4.4.4 Current Output Code Value Table

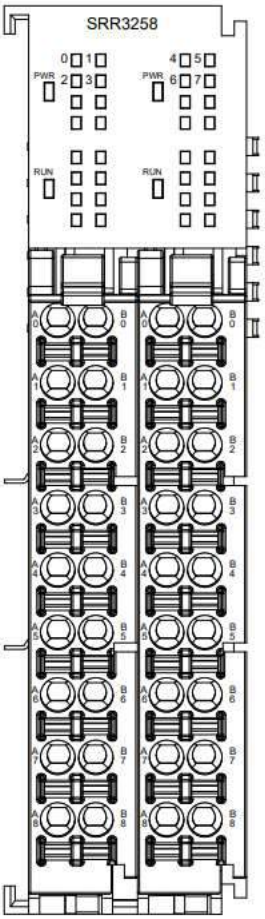
Measurement range / Current	4mA~20mA	0mA~20mA	4mA~20mA	0mA~20mA
	0~65535	0~65535	0~27648	0~27648
	Code value	Code value	Code value	Code value
0	-	0	-	0
1	-	3277	-	1382
2	-	6554	-	2765
3	-	9830	-	4147
4	0	13107	0	5530
5	4096	16384	1728	6912
6	8192	19661	3456	8294
7	12288	22937	5184	9677
8	16384	26214	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
22.81	-	-	32511	31538
23.52	-	-	-	32511
Code value formula	Code value = 65535/16 * current - 16384	Code value = (65535/20) * current	Code value = (27648/16) * current - 6912	Code value = (27648/20) * current

Note: ① When the current output module range is selected as 4mA~20mA (0~27648) and 0mA~20mA (0~27648), the **overflow/overshoot, overflow and overflow alarm** functions will be supported. That's, when the current output module range is selected as 4mA~20mA (0~27648) and the code value is set above 32511, all channels will output 22.81mA with an alarm triggered. When the current output module range is selected as 0mA~20mA (0~27648) and the code value is set above 32511, all channels will output 23.52mA and an alarm will be given at the same time.

3.4.5 Wiring Diagram

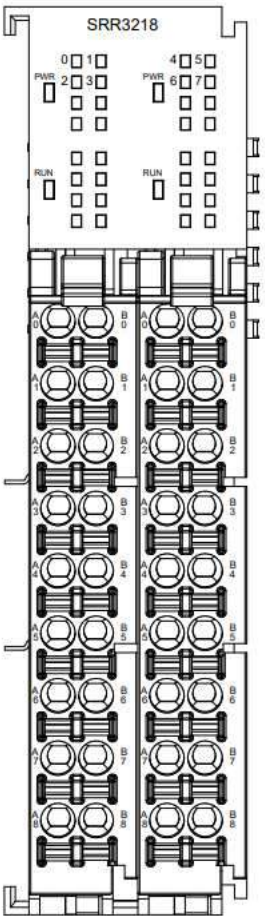
3.4.5.1 SRR3258

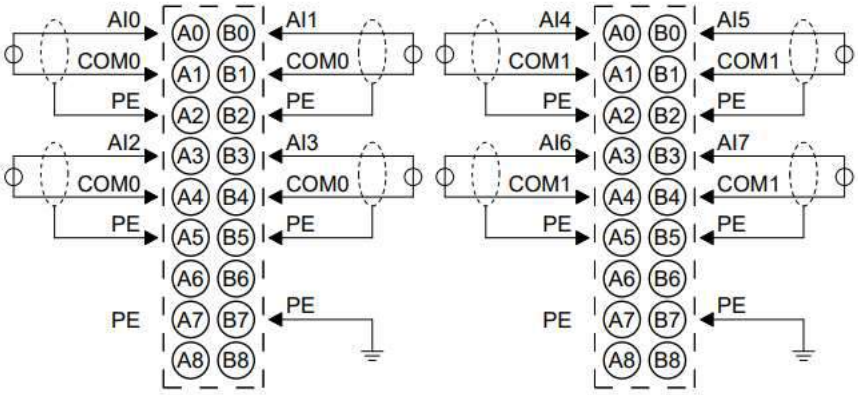




*PE internal conduction

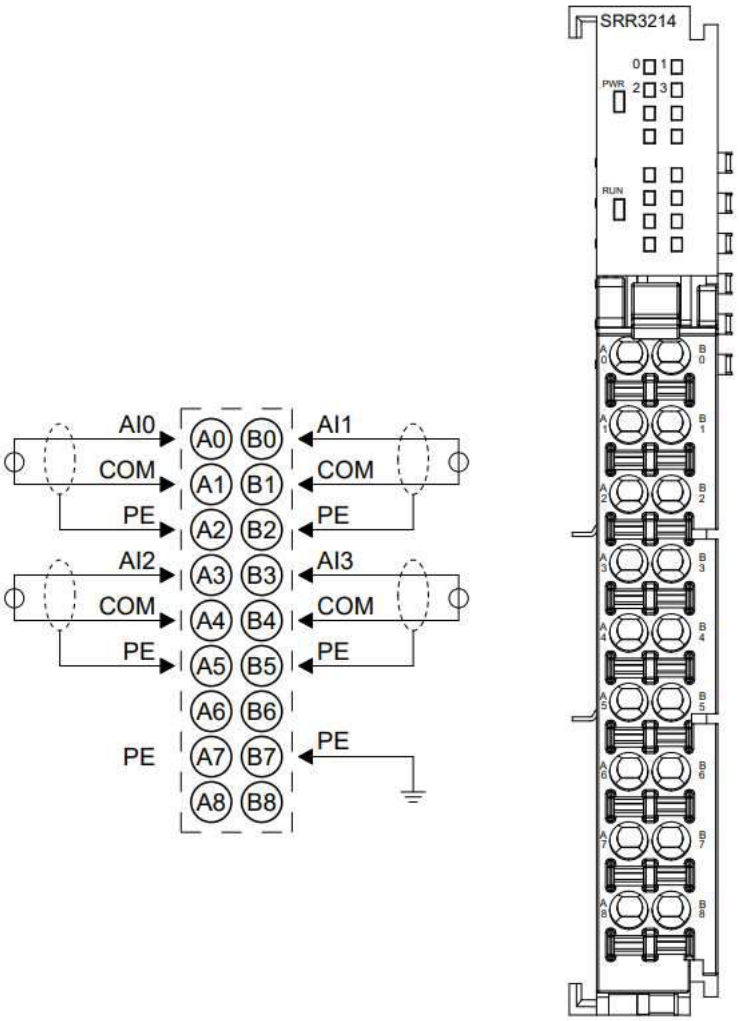
3.4.5.2 SRR3218





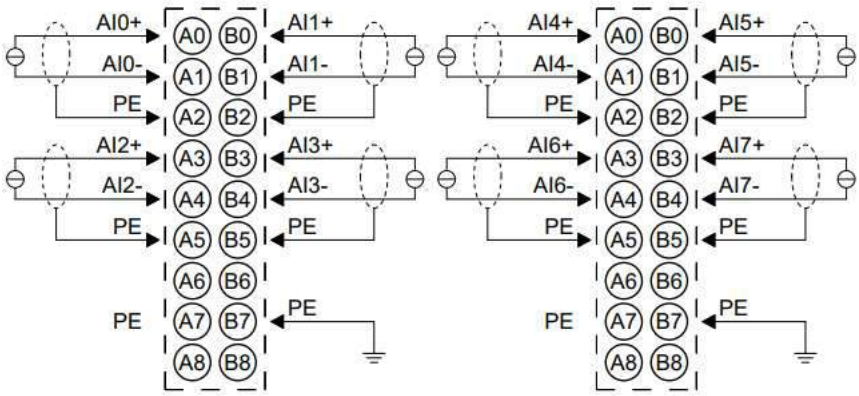
*COM0 internal conduction COM1 internal conduction
*PE internal conduction

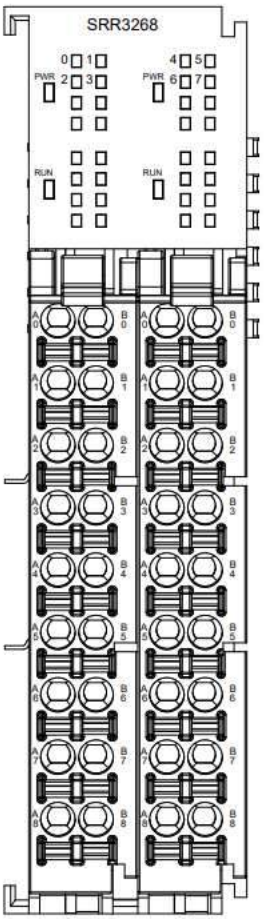
3.4.5.3 SRR3214



*COM internal conduction; PE internal conduction

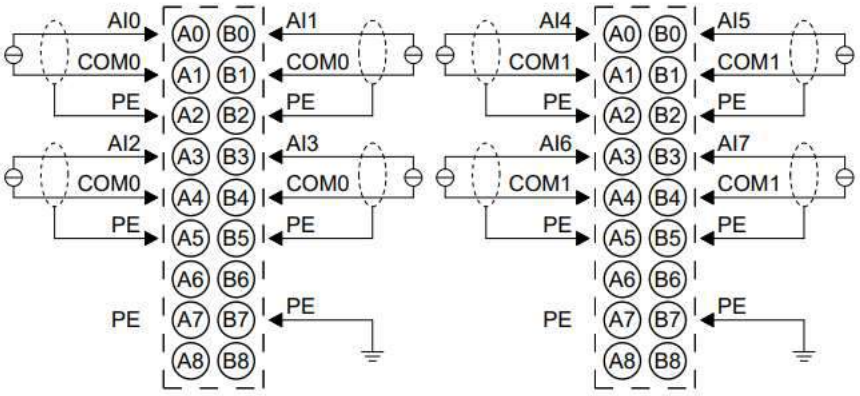
3.4.5.4 SRR3268

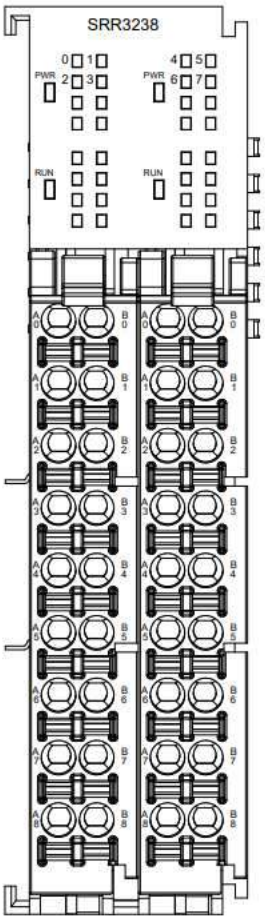




*PE internal conduction

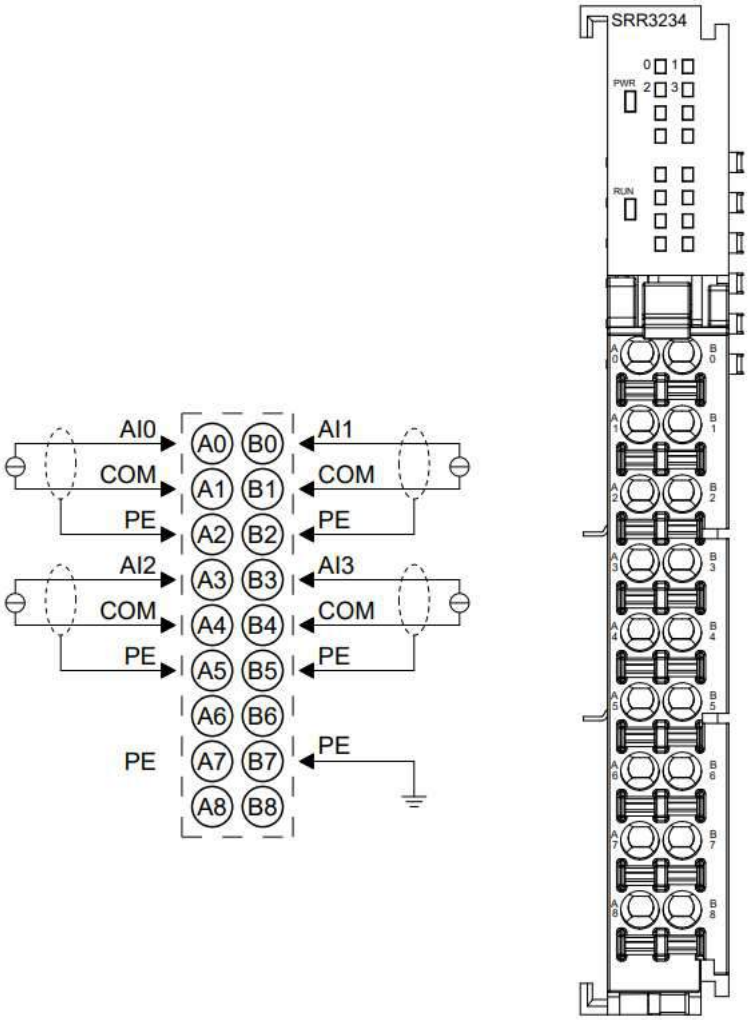
3.4.5.5 SRR3238





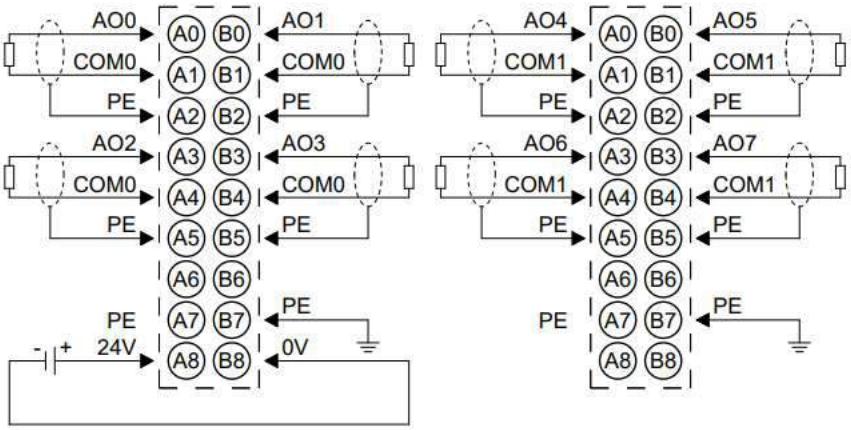
*COM0 internal conduction COM1 internal conduction
*PE internal conduction

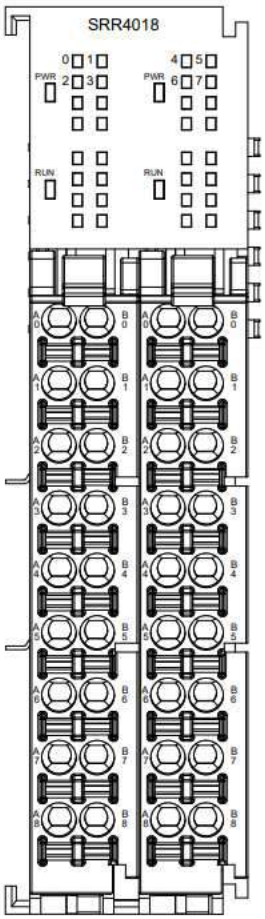
3.4.5.6 SRR3234



*COM internal conduction; PE internal conduction

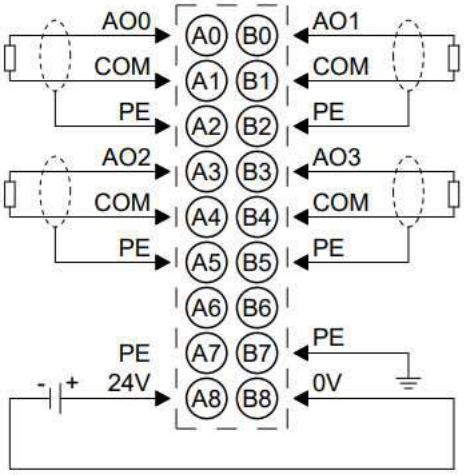
3.4.5.7 SRR4018

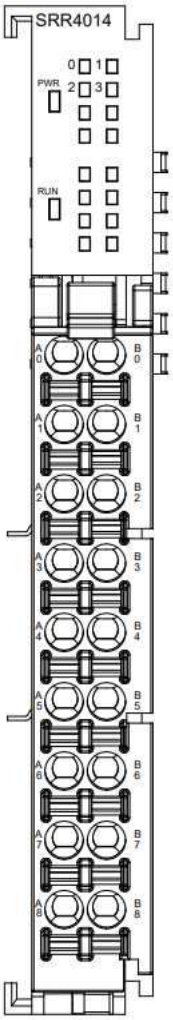




*COM0 internal conduction, COM1 internal conduction
*PE internal conduction

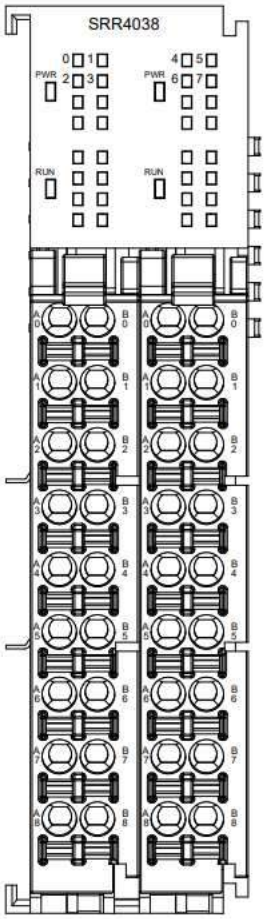
3.4.5.8 SRR4014

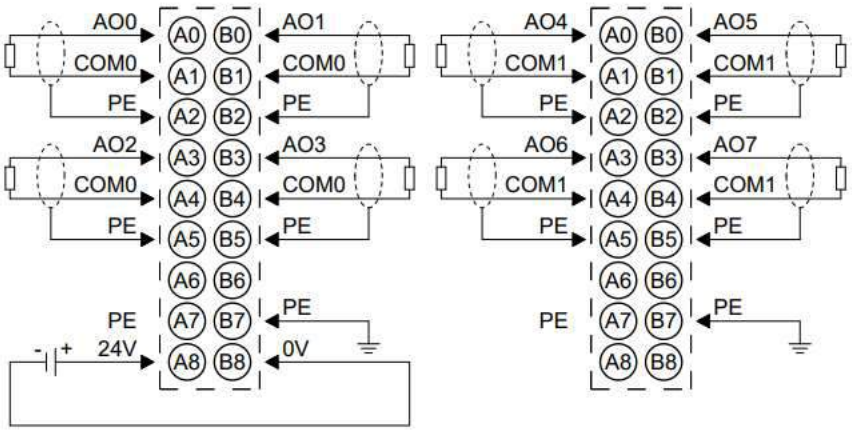




* COM internal conduction, PE internal conduction

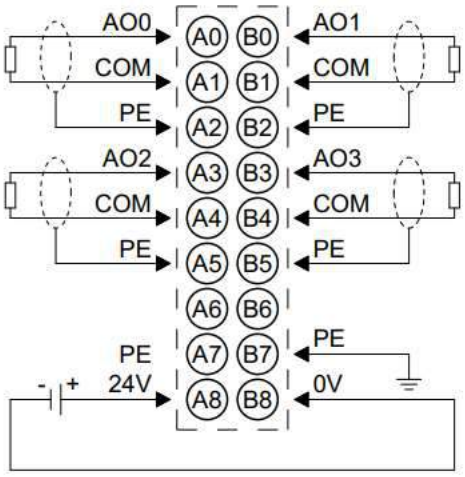
3.4.5.9 SRR4038

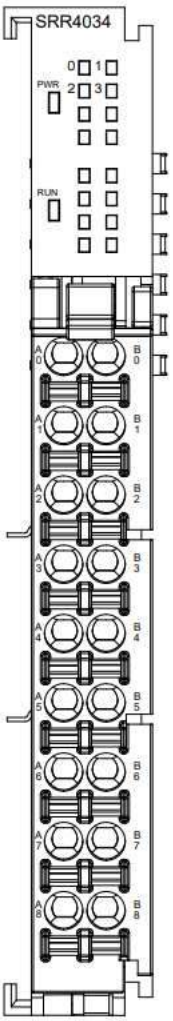




*COM0 internal conduction, COM1 internal conduction
*PE internal conduction

3.4.5.10 SRR4034

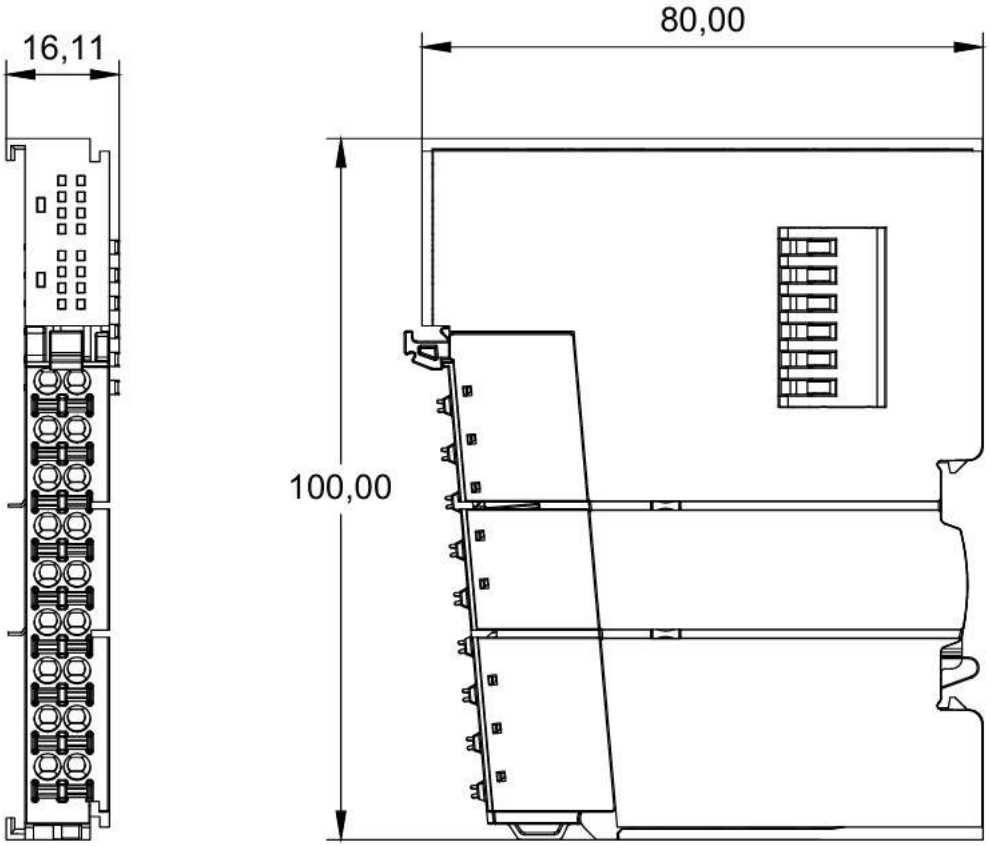




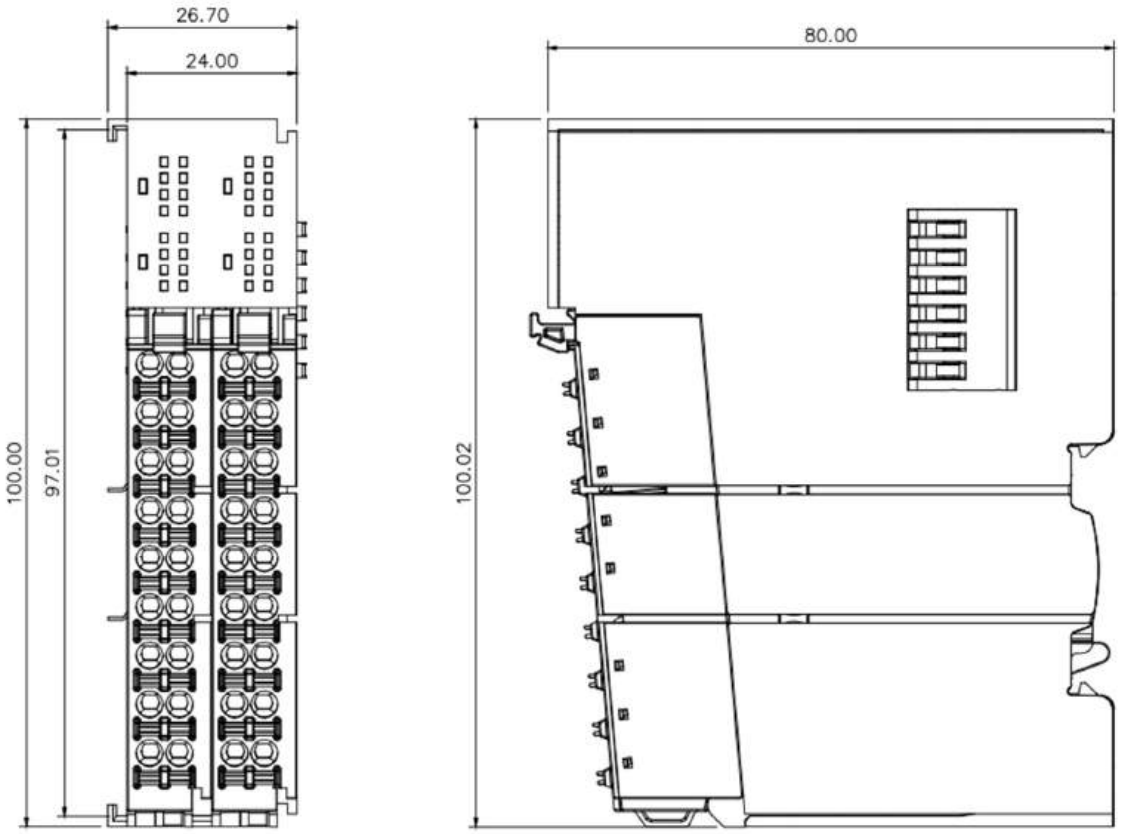
*COM internal conduction; PE internal conduction

3.4.6 Dimensional Diagram

Dimensions of 4 channel analog I/O module (unit: mm)



Dimensions of 8 channel analog I/O module (unit: mm)



3.5 Temperature module

3.5.1 Indicator Function

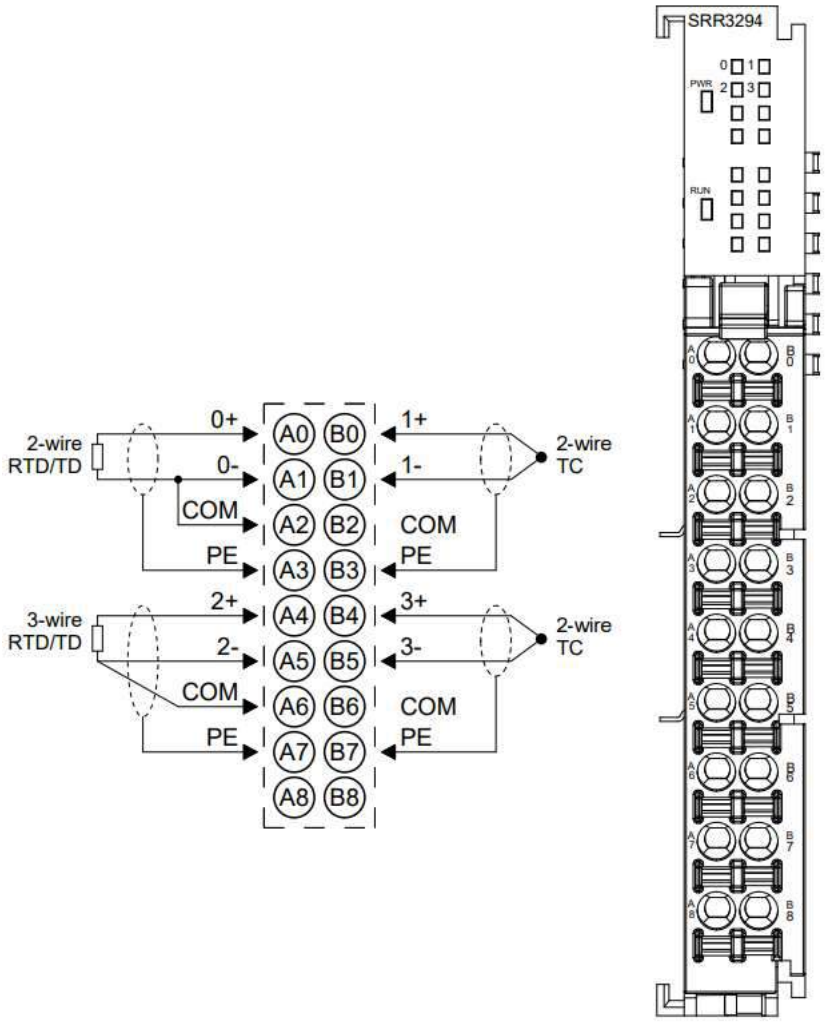
Definition of temperature acquisition module indicators				
Label	**Name**	**Color**	**Status**	**Status Description**
PWR	Power indicator	Green	Steadily lit	Power supply normal
			Off	Product unpowered on or power supply abnormal
RUN	Run status indicator	Green	Steadily lit	System running normally
			Flashing at 1Hz	No service data interaction, waiting to establish service data connection
			Flashing at 10Hz	Firmware upgrade
			Off	System not in operation
0~3	Channel indicator	Green	Steadily lit	Channel enabled and sensor properly connected
			Off	Channel disabled or sensor not properly connected

3.5.2 Technical Parameters

Interface Parameters			
Product model	SRR3294		
Bus protocol	S-Link		
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）		
Rated current consumption	75mA		
Power consumption	0.375W		
Transmission rate	6 Mbps		
Station type	Slave		
Power supply	5VDC, powered via S-Link bus		
General Parameters			
Specifications and dimensions	100◊16.11◊80mm		
Weight	70g		
Operating temperature	-20℃~+60℃		
Storage temperature	-40℃~+80℃		
Relative humidity	95%, no condensation		
Altitude	≤2000m		
Pollution level	Level 2		
Protection rating	IP20		
Technical Parameters			
Number of channels	4		
Sensor type	Thermocouple	Resistance thermometer	Resistance
Connection method	2-wire system	2-wire and 3-wire systems	2-wire system
Sensor code and range	B： 50~1800℃ C: (reserved)[1] E：-200~1000℃ J：-200~1200℃ K：-200~1370℃ L: (reserved) N: (reserved) R: (reserved) S：-50~1690℃ T: (reserved) U: (reserved)	Pt100：−200~850℃ Pt200：−200~850℃ Pt500：−200~850℃ Pt1000：−200~850℃ Ni120: (reserved) Ni100：-60~250℃ Ni1000：-60~250℃ Ni200: (reserved) Ni500: (reserved)	15Ω~3kΩ 15Ω~150Ω (reserved) 15Ω~300Ω (reserved) 15Ω~600Ω (reserved)
Accuracy	±0.3% @25℃ (F.S.) ±0.5% @-20~60℃ (F.S.)	±0.1% @25℃ (F.S.) ±0.3% @-20~60℃ (F.S.)	±0.1% @25℃ (F.S.) ±0.3% @-20~60℃ (F.S.)
Sensitivity	0.1℃		±0.1Ω
Resolution	16-bit (integer type)		
Channel conversion time	20ms/ch 110ms/4ch	80ms/ch 330ms/4ch	
Filter	Single-channel filter, configurable (levels 0-10)		

Disconnection detection	Support
Disconnection detection time	2ms
Misconnection of overvoltage protection	±30V
Noise suppression	50Hz, 60Hz, 10Hz, and noise-free suppression
Excitation current	<2mA
Input impedance	≥10KΩ
Isolation method	Digital isolation
Isolation withstand voltage	500VDC
Channel indicator	Green LED

3.5.3 Wiring Diagram

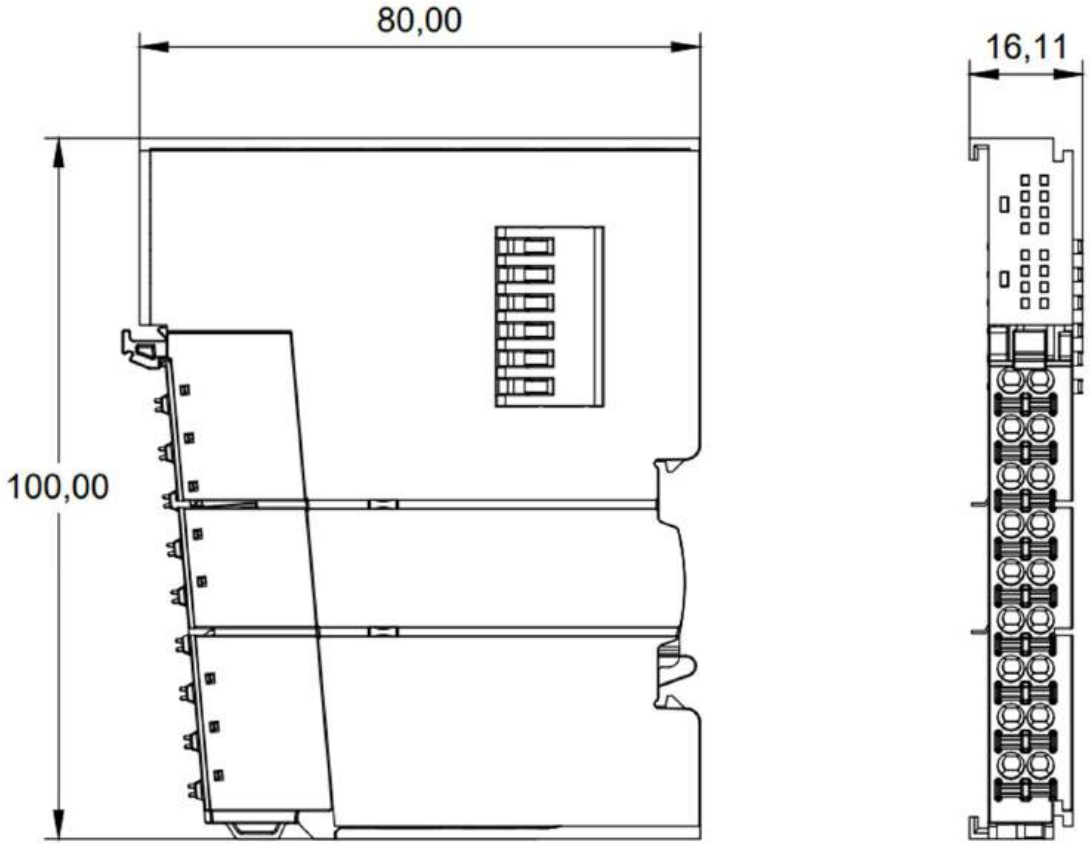


*COM internal conduction; PE internal conduction

Terminal identification	Terminal definition	Description	Terminal identification	Terminal definition	Description
A0	0+	CH0 Temperature Input	B0	1+	CH1 Temperature Input
A1	0-		B1	1-	
A2	COM		B2	COM	
A3	PE		B3	PE	
A4	2+	CH2 Temperature Input	B4	3+	CH3 Temperature Input
A5	2-		B5	3-	
A6	COM		B6	COM	
A7	PE		B7	PE	
A8	NC	Empty terminal	B8	NC	Empty terminal

3.5.4 Dimensional Diagram

Dimensions (unit: mm)



3.6 Serial port module

3.6.1 Indicator Function

Name	Label	Color	Status	Status Description
Power indicator	PWR	Green	Steadily lit	Power supply normal
			Off	Product unpowered on or power supply abnormal
Communication indicator	RUN	Green	Steadily lit	System running normally
			Flashing at 1Hz	No service data interaction, waiting to establish service data connection
			Flashing at 10Hz	Firmware upgrade
			Off	System not in operation
Input channel indicator	RX	Green	Flashing	Data reception detected on the channel
			Off	No data reception detected on the channel
Output channel indicator	TX	Green	Flashing	Data sending detected on the channel
			Off	No data sending detected on the channel

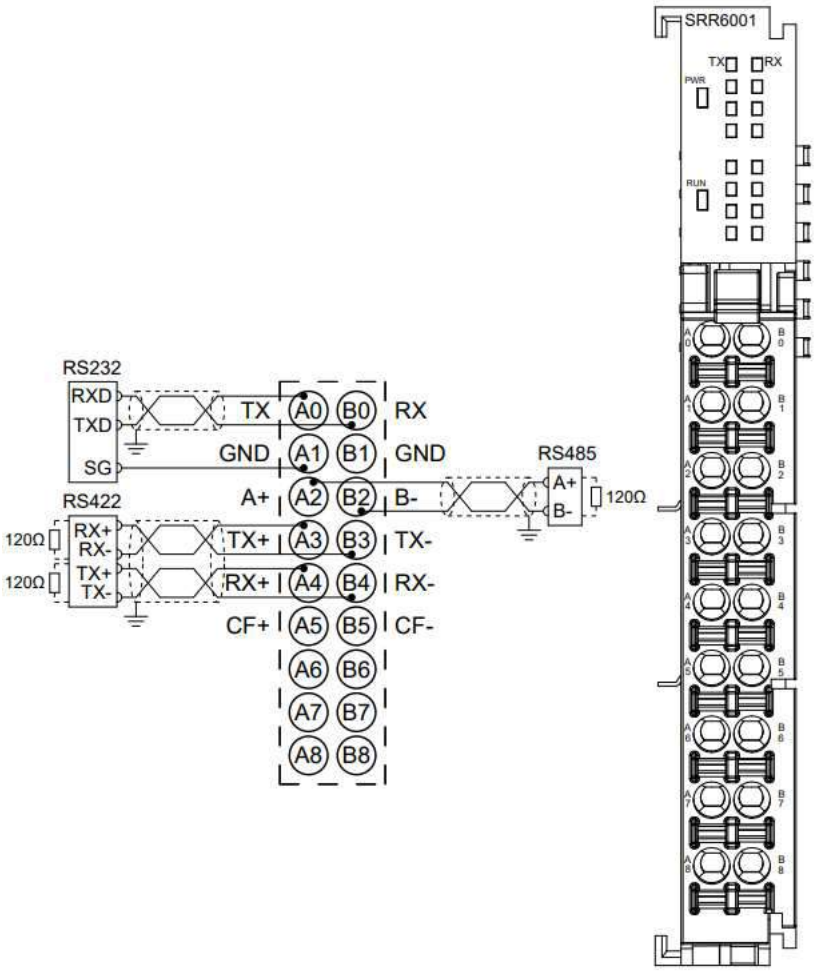
3.6.2 Technical Parameters

Interface Parameters	
Product model	SRR6001
Bus protocol	S-Link
Rated voltage of bus input power supply	5VDC（4.5V~5.5V）

Rated current consumption	170mA
Power consumption	0.85W
Technical Parameters	
Number of channels	1 Channel
Communication interface type[1]	RS232、RS485、RS422
Communication protocol	Modbus RTU、Modbus ASCII、Freeport
Baud rate	1200bps~115200bps
Weight	70g
Dimensions	100×16.11×80mm
Wiring method	Screwless quick-connect terminal
Assembly method	Fastening to DIN 35mm rail
Operating temperature	-20℃~+60℃
Storage temperature	-40℃~+80℃
Relative humidity	95%, no condensation
Protection rating	IP20

Note [1]: Only one interface among RS232, RS485, and RS422 can be used simultaneously.

3.6.3 Wiring Diagram



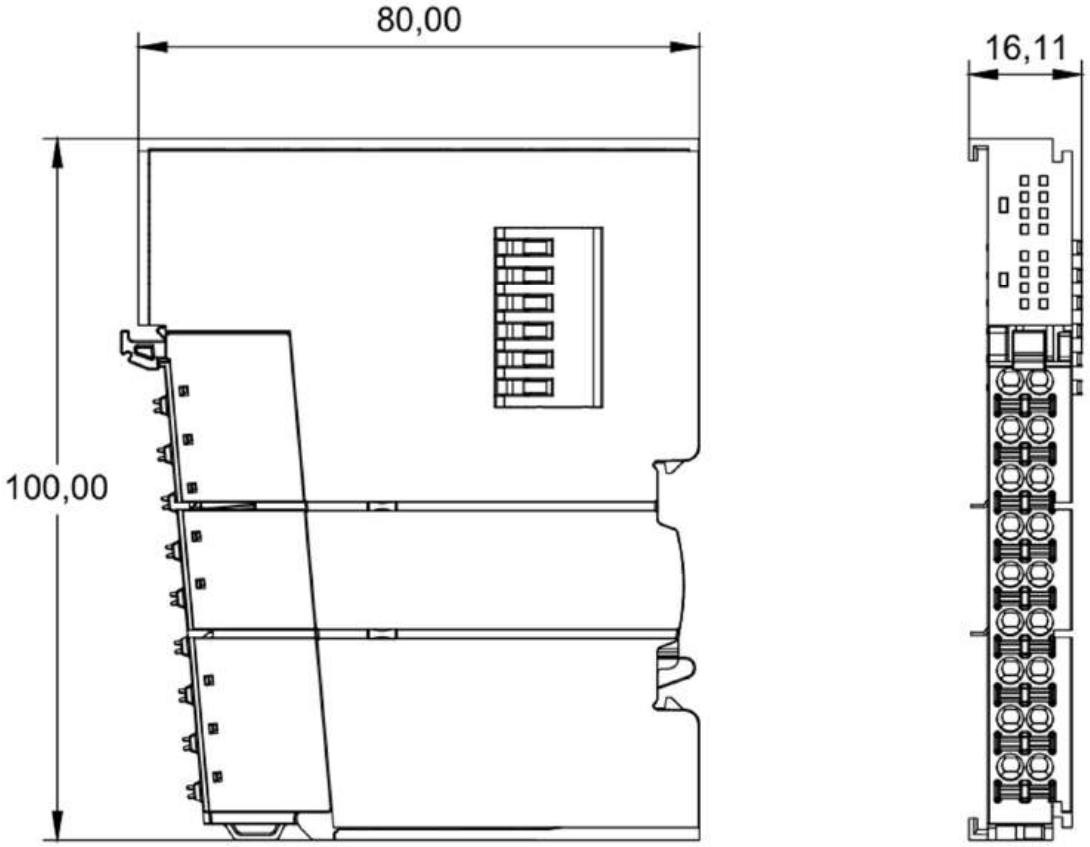
*GND is the RS232 signal ground, internally conductive
*Cables shall be shielded twisted pair and be reliably grounded
*CF+/CF- are reserved debugging interfaces for the module, currently not in use

Terminal identification	Terminal definition	Description	Terminal identification	Terminal definition	Description
A0	TX	RS232 sending end	B0	RX	RS232 receiving end

A1	GND	RS232 signal ground	B1	GND	RS232 signal ground
A2	A+	RS485 sending+	B2	B-	RS485 sending-
A3	TX+	RS422 sending+	B3	TX-	RS422 sending-
A4	RX+	RS422 receiving+	B4	RX-	RS422 receiving -
A5	CF+	Reservation	B5	CF-	Reservation
A6	NC	Empty terminal	B6	NC	Empty terminal
A7	NC	Empty terminal	B7	NC	Empty terminal
A8	NC	Empty terminal	B8	NC	Empty terminal

3.6.4 Dimensional Diagram

Dimensions (unit: mm)



3.7 Incremental Encoder Module

3.7.1 Indicator Function

Name	Label	Color	Status	Status Description
Power indicator	PWR	Green	Steadily lit	Power supply normal
			Off	Product unpowered on or power supply abnormal
System run indicator	RUN	Green	Steadily lit	System running normally
			Flashing at 1Hz	No service data interaction, waiting to establish service data connection
			Flashing at 10Hz	Firmware upgrade
			Off	System not in operation
Encoder input A/B phase indicator	A	Green	Steadily lit	Encoder enabled
	B		Off	Encoder disabled
Encoder input Z-phase indicator	Z	Green	Steadily lit	Encoder Z-phase reset enabled
			Off	Encoder Z-phase reset disabled

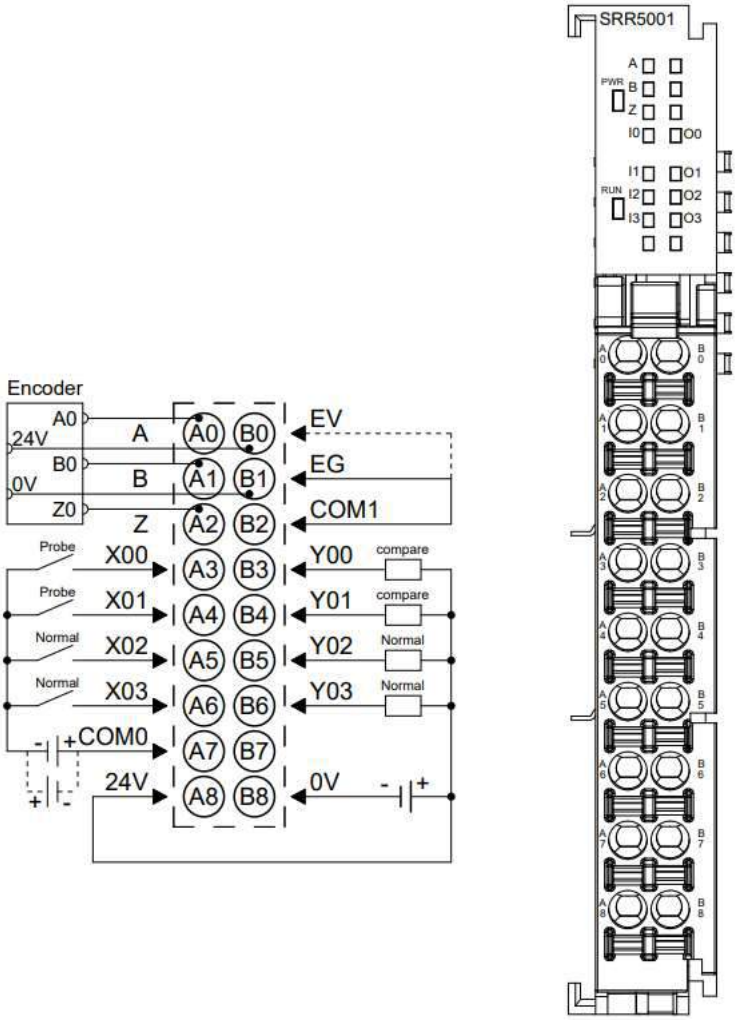
Input channel indicator	I0~I3	Green	Steadily lit	Signal input detected on the channel
			Off	No signal input detected on the channel
Output channel indicator	O0~O3	Green	Steadily lit	Signal output detected on the channel
			Off	No signal output detected on the channel

3.7.2 Technical Parameters

Interface Parameters	
Product model	SRR5001
Bus protocol	S-Link
Process data volume: Downlink	10Bytes
Process data volume: Uplink	18Bytes
Channel type	Encoder input channel: 1 channel (Phase A, Phase B, and Phase Z), PNP/NPN
	Probe input channel: 2 channel (1 encoder with 2 probe functions), PNP/NPN
	General digital input channel: 2 channel (1 encoder with 2 general digital inputs), PNP/NPN
	Comparison output channel: 2 channel (1 encoder with 2 comparison outputs), NPN
	General digital output channels: 2 channel (1 encoder with 2 general digital outputs), NPN
Refresh rate	1ms
Technical Parameters	
System input power supply	5VDC（4.5V~5.5V）
Rated current consumption	85mA
Power consumption	0.425W
Field-side power supply rating (range)	24VDC（20.4V~28.8V）
Input channel voltage rating (range)	24VDC（20.4V~28.8V）
Encoder pulse input mode	AB quadrature (ABZ), Pulse + Direction (Pul+Dir), Dual pulse (CW/CCW)
Encoder pulse input frequency	1MHz
Report channel real-time speed	Support
Z-phase reset	Support
Count multiple setting	4x/2x/1x (default 1x)
Ring count	Support
Count range	0~2^32-1 or 0~ring count resolution × count multiple -1
Encoder ring count resolution setting[1]	Support (ring count resolution setting range: 1~65535)
Count initial value setting	Support (the setting range of the count initial value is 0~2^32-1)
Reverse count	Support
Encoder input hardware filter	Support (levels 0-15)
Probe function (high-speed hardware latching)	Support
Probe input frequency	1MHz
Comparison output function	Support
Comparison output signal response speed	＜10us
Input/output pin function selection	Support
Power-off storage	Support
Dimensions	100×16.11×80mm
Weight	70g
Wiring method	Screwless quick-connect terminal
Assembly method	Fastening to standard 35mm DIN rail
Operating temperature	-20℃~+60℃
Storage temperature	-40℃~+80℃
Relative humidity	95%, no condensation
Protection rating	IP20

Note [1]: The ring count resolution here is only used to set the ring count range of the encoder, which is different from the physical resolution of the encoder itself.

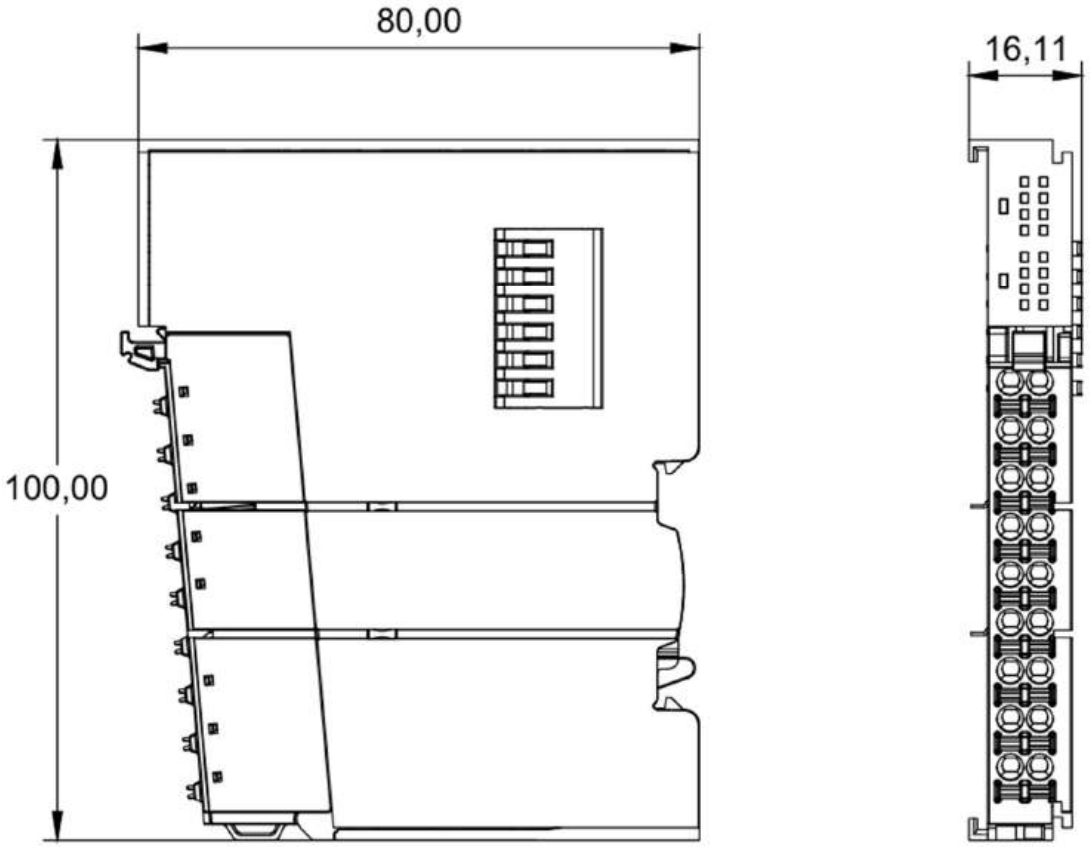
3.7.3 Wiring Diagram



*COM0 is the DI common terminal, NPN/PNP.
*COM1 is the encoder common terminal, NPN/PNP.

3.7.4 Dimensional Diagram

Dimensions (unit: mm)



3.8 Differential incremental encoder module

3.8.1 Indicator Function

Name	Label	Color	Status	Status Description
Power indicator	PWR	Green	Steadily lit	Power supply normal
			Off	Product unpowered on or power supply abnormal
System run indicator	RUN	Green	Steadily lit	System running normally
			Flashing at 1Hz	No service data interaction, waiting to establish service data connection
			Flashing at 10Hz	Firmware upgrade
			Off	System not in operation
Encoder input A/B phase indicator	A+/A-	Green	Steadily lit	Encoder enabled
	B+/B-		Off	Encoder disabled
Encoder input Z-phase indicator	Z+/Z-	Green	Steadily lit	Encoder Z-phase reset enabled
			Off	Encoder Z-phase reset disabled
Input channel indicator	I0~ I2	Green	Steadily lit	Signal input detected on the channel
			Off	No signal input detected on the channel
Output channel indicator	O0~O3	Green	Steadily lit	Signal output detected on the channel
			Off	No signal output detected on the channel

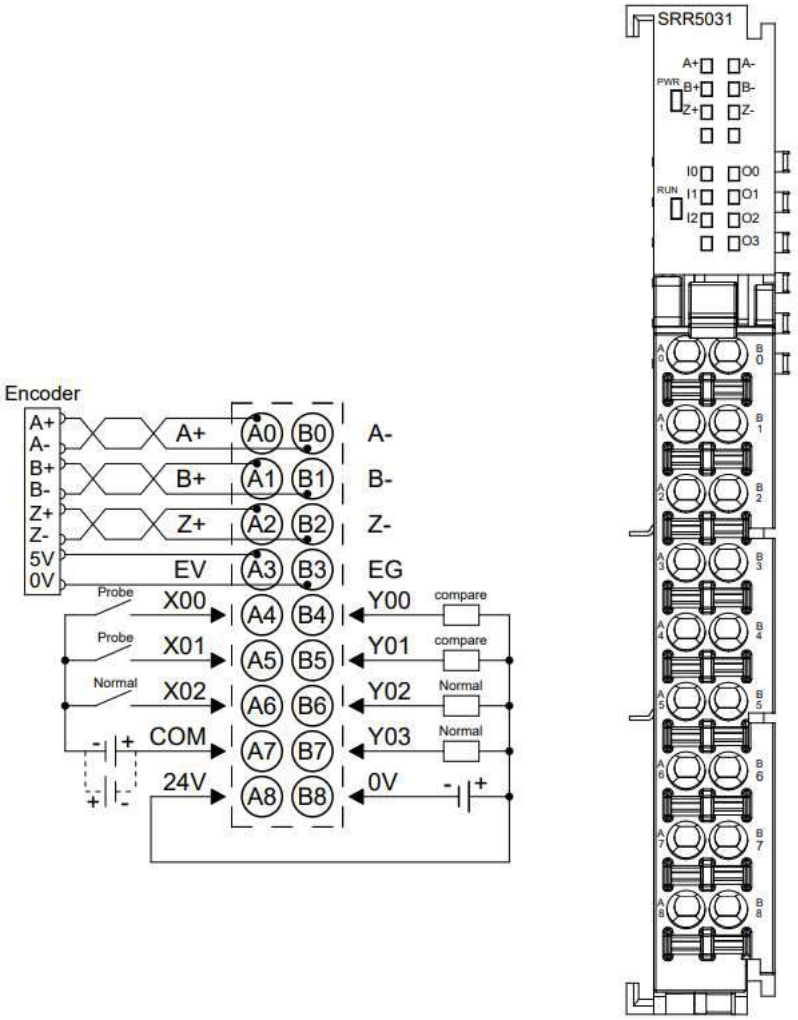
3.8.2 Technical Parameters

Interface Parameters	
Product model	SRR5031
Bus protocol	S-Link
Process data volume: Downlink	10Bytes
Process data volume: Uplink	17Bytes
Channel type	Encoder input channels: 1 channel (Phase A, Phase B, and Phase Z), 5V differential

	Probe input channel: 2 channel (1 encoder with 2 probe functions), PNP/NPN
	General digital input channel: 1 channel (1 encoder channel paired with 1 general digital input), PNP/NPN
	Comparison output channel: 2 channel (1 encoder with 2 comparison outputs), NPN
	General digital output channels: 2 channel (1 encoder with 2 general digital outputs), NPN
Refresh rate	1ms
Technical Parameters	
System input power supply	5VDC（4.5V~5.5V）
Rated current consumption	65mA
Power consumption	0.325W
Field-side power supply rating (range)	24VDC（20.4V~28.8V）
Input channel voltage rating (range)	24VDC（20.4V~28.8V）
Encoder pulse input mode	AB quadrature (ABZ), Pulse + Direction (Pul+Dir), Dual pulse (CW/CCW)
Encoder pulse input frequency	Maximum 1MHz
Report channel real-time speed	Support
Z-phase reset	Support
Count multiple setting	4x/2x/1x (default 1x)
Ring count	Support
Count range	0~2^32-1 or 0~ring count resolution × count multiple -1
Encoder ring count resolution setting[1]	Support (ring count resolution setting range: 1~65535)
Count initial value setting	Support (the setting range of the count initial value is 0~2^32-1)
Reverse count	Support
Encoder input hardware filter	Support (levels 0-15)
Probe function (high-speed hardware latching)	Support
Probe input frequency	1MHz
Comparison output function	Support
Comparison output signal response speed	＜10us
Input/output pin function selection	Support
Power-off storage	Support
Dimensions	100×16.11×80mm
Weight	70g
Wiring method	Screwless quick-connect terminal
Assembly method	Fastening to standard 35mm DIN rail
Operating temperature	-20℃~+60℃
Storage temperature	-40℃~+80℃
Relative humidity	95%, no condensation
Protection rating	IP20

Note [1]: The ring count resolution here is only used to set the ring count range of the encoder, which is different from the physical resolution of the encoder itself.

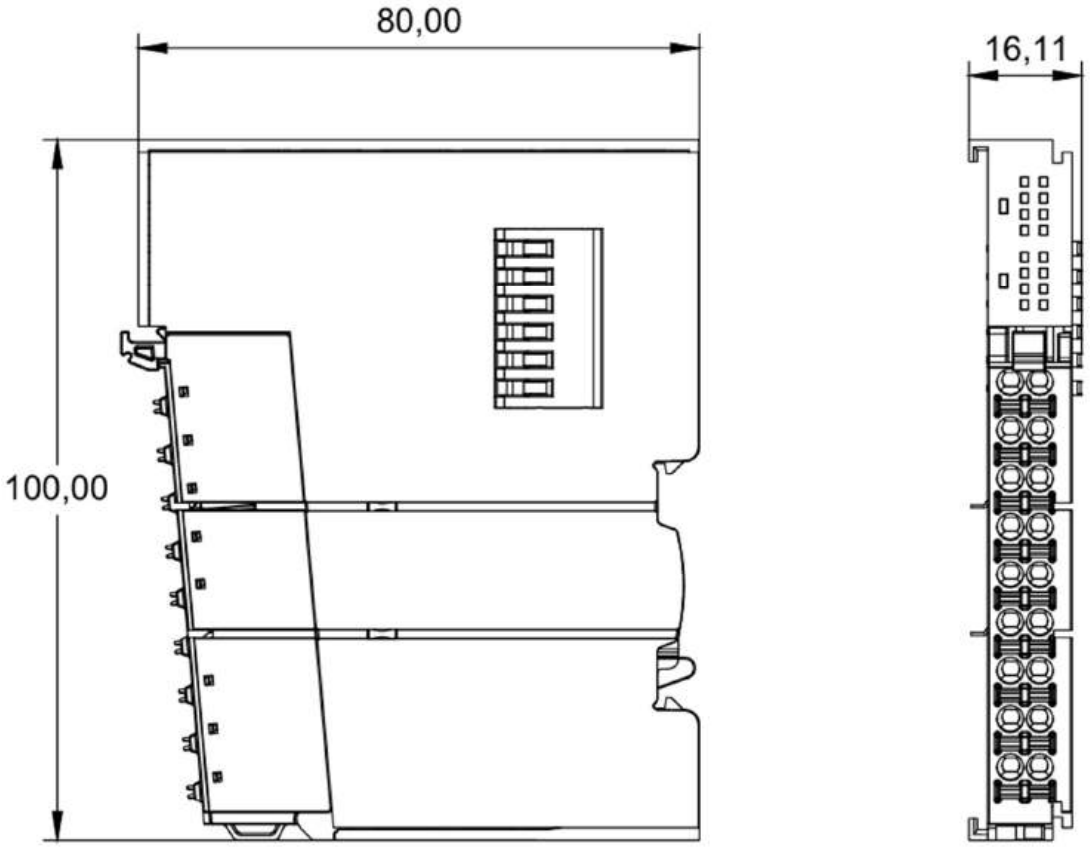
3.8.3 Wiring Diagram



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

3.8.4 Dimensional Diagram

Dimensions (unit: mm)



3.9 Absolute encoder module

3.9.1 Indicator Function

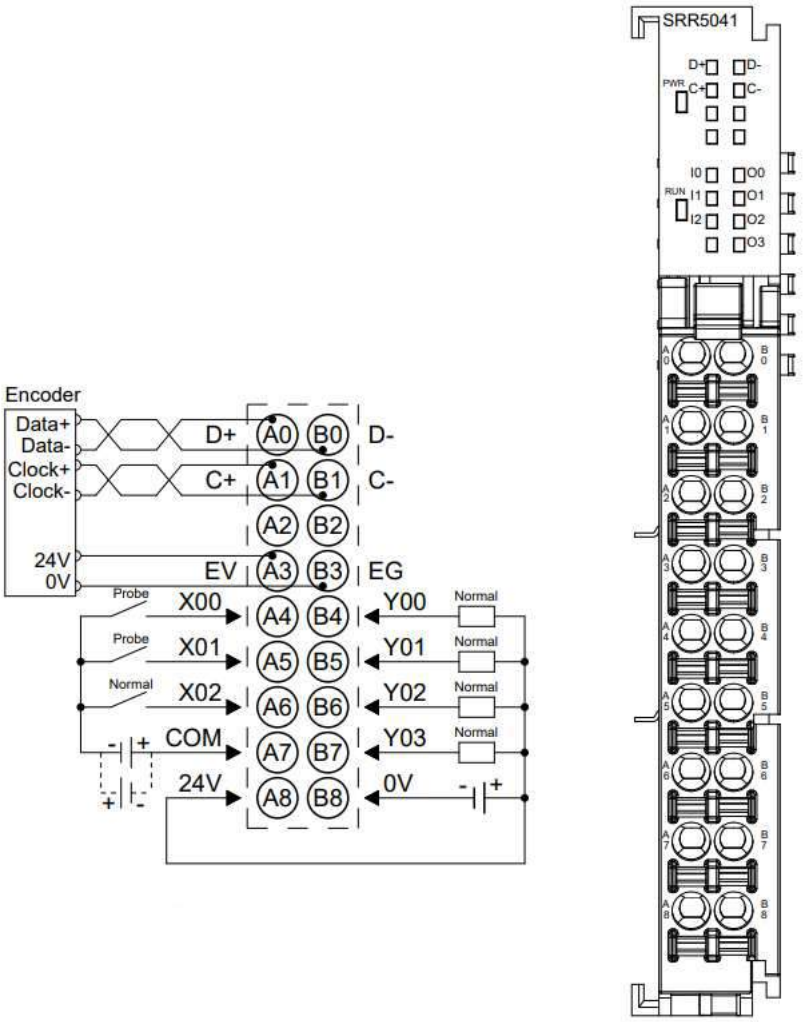
Name	Label	Color	Status	Status Description
Power indicator	PWR	Green	Steadily lit	Power supply normal
			Off	Product unpowered on or power supply abnormal
System run indicator	RUN	Green	Steadily lit	System running normally
			Flashing at 1Hz	No service data interaction, waiting to establish service data connection
			Flashing at 10Hz	Firmware upgrade
			Off	System not in operation
Data line channel indicator	D+/D-	Green	Steadily lit	Signal input detected on the channel
			Off	No input or abnormal signal input in the channel
Clock line channel indicator	C+/C-	Green	Steadily lit	Signal output detected on the channel
			Off	No output or abnormal signal output from channel
Input channel indicator	I0~I2	Green	Steadily lit	Signal input detected on the channel
			Off	No input or abnormal signal input in the channel
Output channel indicator	O0~O3	Green	Steadily lit	Signal output detected on the channel
			Off	No output or abnormal signal output from channel

3.9.2 Technical Parameters

Interface Parameters	
Product model	SRR5041
Bus protocol	S-Link
Process data volume: Downlink	1Byte
Process data volume: Uplink	13Bytes
Channel type	Encoder input channel: 1 set of SSI absolute encoder channel
	Probe input channel: 2 channel (1 encoder with 2 probe functions), PNP/NPN
	General digital input channel: 1 channel (1 encoder channel paired with 1 general digital input), PNP/NPN
	General digital output channels: 4 channel (1 encoder with 4 general digital outputs), NPN
Refresh rate	1ms
Technical Parameters	
System input power supply	5VDC（4.5V~5.5V）
Rated current consumption	85mA
Power consumption	0.425W
Field-side power supply rating (range)	24VDC（20.4V~28.8V）
Input channel voltage rating (range)	24VDC（20.4V~28.8V）
Encoder input	1 Channel
Encoder signal type	Differential signal, 5V
Data frame length	10~40 bits
Position value format	Support Gray code or binary
Position value LSB/MSB	Configurable
SSI encoder clock frequency	≤2.0MHz
Read interval	Configurable
Probe function (high-speed hardware latching)	Support
Dimensions	100×16.11×80mm
Weight	70g
Wiring method	Screwless quick-connect terminal
Assembly method	Fastening to standard 35mm DIN rail
Operating temperature	-20℃~+60℃
Storage temperature	-40℃~+80℃
Relative humidity	95%, no condensation
Protection rating	IP20

Digital input	
Rated Voltage	24VDC（20.4V~28.8V）
Number of signal points	3
Signal type	NPN/PNP
OFF voltage/OFF current	-3V~+5V/below 0.9mA
ON voltage/ON current	11V~30V/above 2.1mA
Input current	4mA
Isolation method	Optocoupler isolation
Isolation withstand voltage	500VAC
Channel indicator	Green LED
Digital output	
Rated Voltage	24VDC（20.4V~28.8V）
Number of signal points	4
Signal type	NPN
Load type	Resistive load and inductive load
Rated current per channel	Max：500mA
Port protection	Overcurrent protection
Isolation method	Optocoupler isolation
Isolation withstand voltage	500VAC
Channel indicator	Green LED

3.9.3 Wiring Diagram

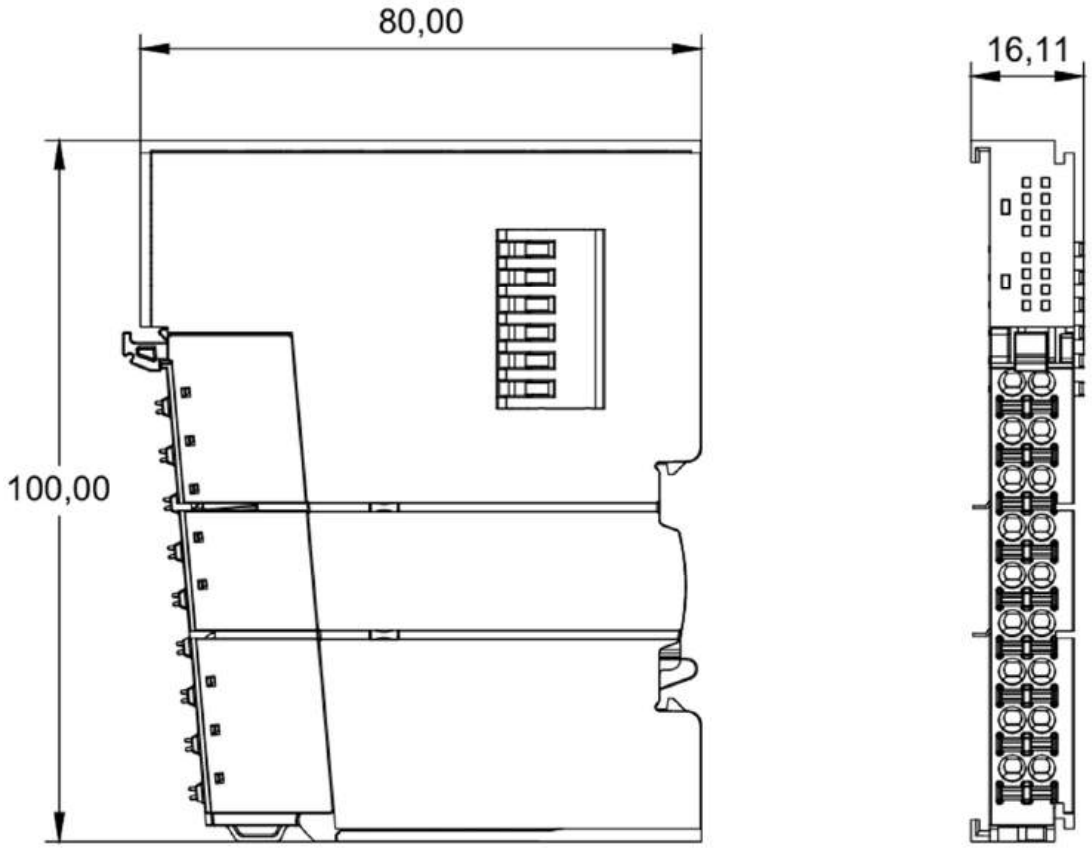


*COM is the common terminal for DI, NPN/PNP.

Encoder					
Terminal identification	**Terminal definition**	**Description**	**Terminal identification**	**Terminal definition**	**Description**
A0	D+	Encoder data signal input +	B0	D-	Encoder data signal input -
A1	C+	Encoder clock signal output+	B1	C-	Encoder clock signal output-
A2	NC	Empty terminal	B2	NC	Empty terminal
A3	EV	24V encoder power supply	B3	EG	0V encoder power supply
A4	X00	DI channel 0 (probe function)	B4	Y00	DO channel 0
A5	X01	DI channel 1 (probe function)	B5	Y01	DO channel 1
A6	X02	DI channel 2	B6	Y02	DO channel 2
A7	COM	Input COM	B7	Y03	DO channel 3
A8	24V	Field-side power supply 24V	B8	0V	Field-side power supply 0V

3.9.4 Dimensional Diagram

Dimensions (unit: mm)



3.10 Expansion Power Module

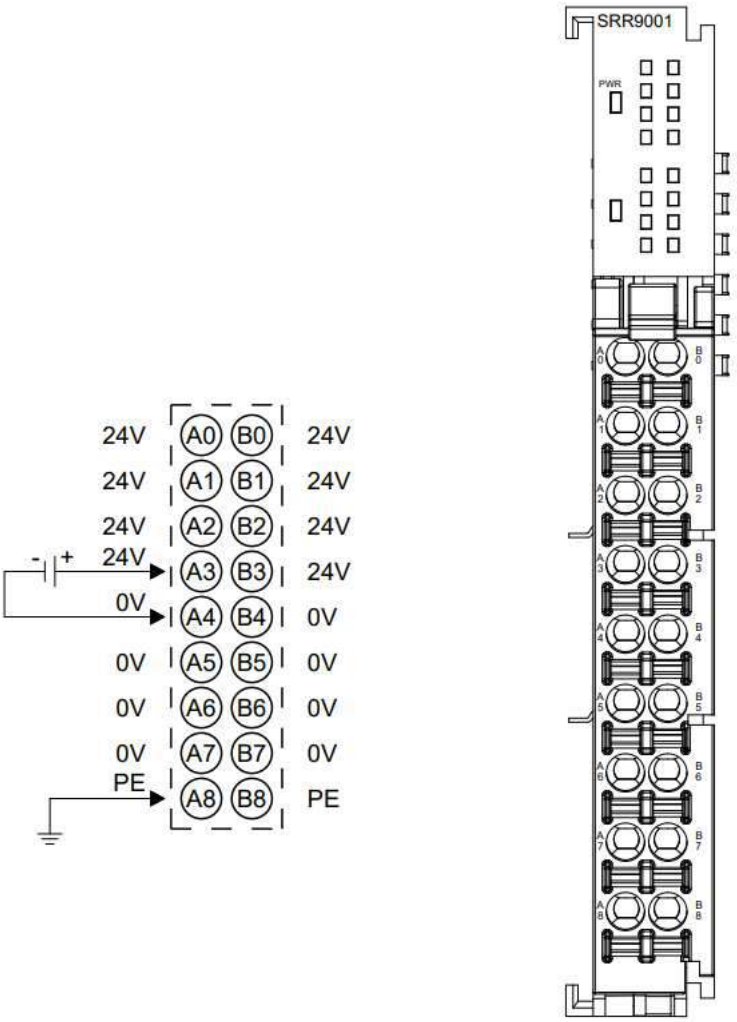
3.10.1 Indicator Function

Definition of expansion power module indicators				
Label	**Name**	**Color**	**Status**	**Status Description**
PWR	Power indicator	Green	Steadily lit	Module power supply normal
			Off	Module not powered or power supply abnormal

3.10.2 Technical Parameters

Power Supply Parameters	
Input voltage	SELV Input 24VDC（18V~36V）
Input current	500mA（24VDC）
Output Voltage	5VDC
Output current	2A
General Technical Parameters	
Specifications and dimensions	100◊16.11◊80mm
Weight	70g
Operating temperature	-20℃~+60℃
Storage temperature	-40℃~+80℃
Relative humidity	95%, no condensation
Altitude	≤2000m
Pollution level	Level 2
Short circuit protection	Support (Auto-recovery mechanism)
Reverse connection protection	Support (Auto-recovery mechanism)
Surge protection	Support
Protection rating	IP20

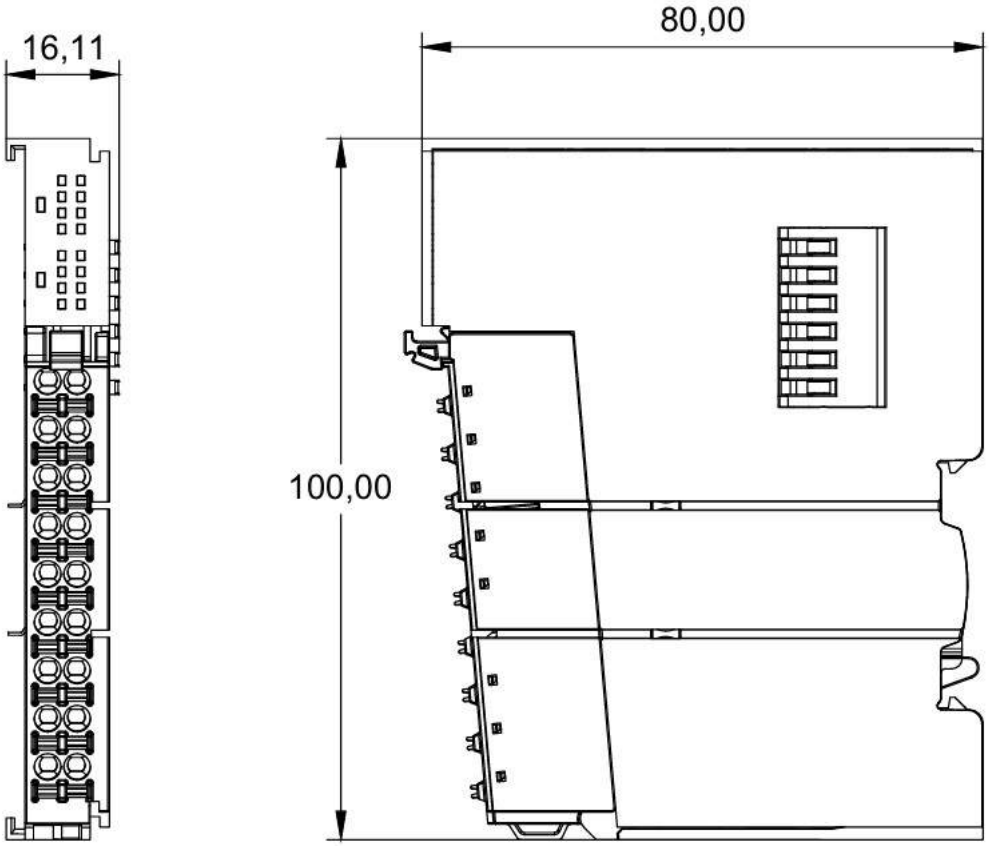
3.10.3 Wiring Diagram



*24V internal conduction, 0V internal conduction

3.10.4 Dimensional Diagram

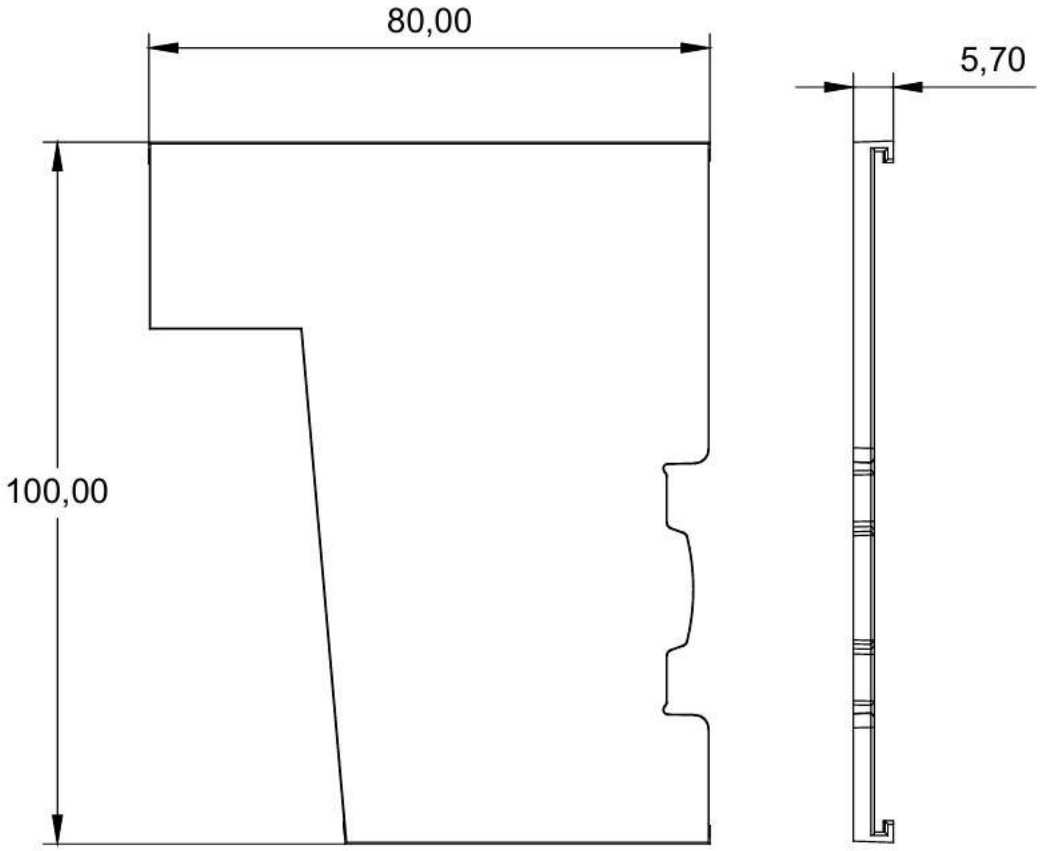
Dimensions of expansion power supply (unit: mm)



3.11 Terminal Cover Plate

3.11.1 Dimensional Diagram

Dimensions of terminal cover plate (unit: mm)



Note: All fastened to the standard DIN 35 mm rail, and DIN rail specifications are 35*7.5*1.0, 35*15*1.0 (unit: mm).

4 Assembly and Disassembly

4.1 Assembly Guide

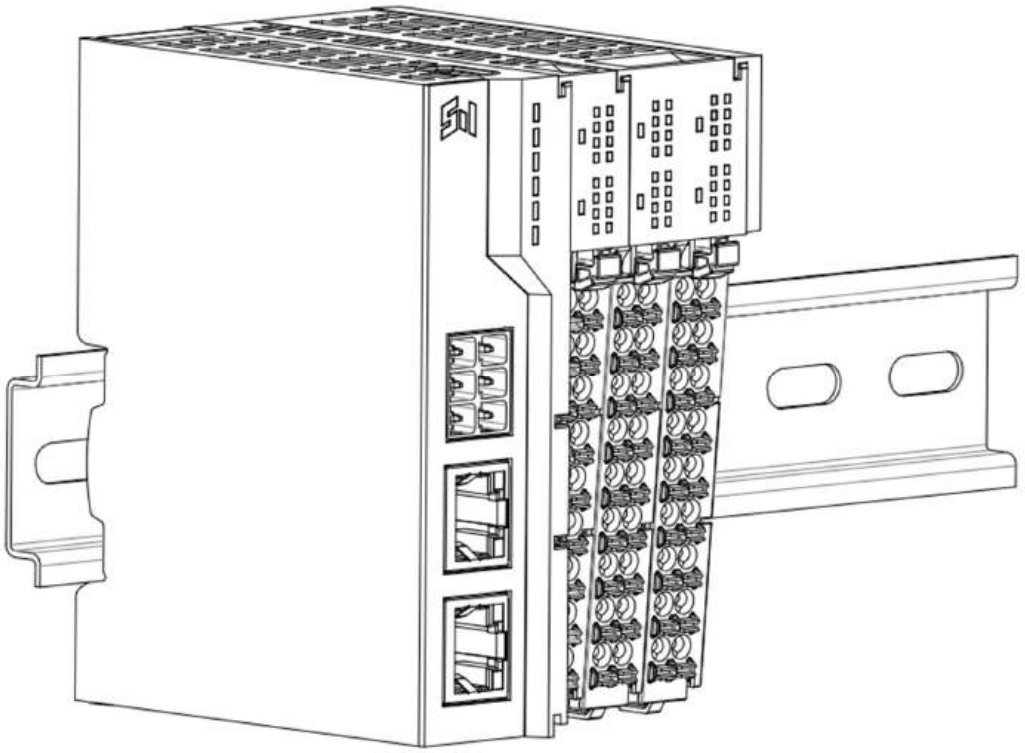
Precautions for assembly/disassembly

- **The module has an IP20 protection rating and must be assembled in a cabinet for indoor use.**
- **Ensure the cabinet has equipped with proper ventilation measures (e.g., exhaust fans assembled on a cabinet).**
- **Do not assemble this device adjacent to or above any equipment that may cause overheating.**
- **Fasten the module vertically to the fixed rail with adequate airflow (maintain at least 50mm clearance above and below the module).**
- **Assembly/disassembly must be performed with the power supply disconnected.**
- **After module assembly, it is recommended to connect and route wires in a top-to-bottom manner.**


Warning

- If the product is not used according to the product user manual, the protection provided by the equipment may be damaged.

Ensure the module is vertically fastened to the fixed rail



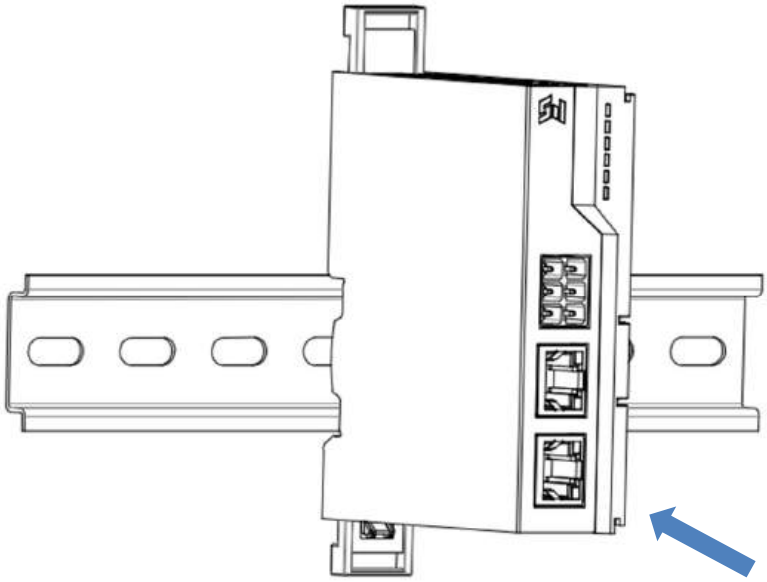
4.2 Assembly and Disassembly Steps

Module assembly and disassembly	
Module assembly steps	1. First assemble the coupler module on the fixed rail.
	2. Sequentially assemble the required I/O modules or functional modules to the right of the coupler module.
	3. After assembly of all required modules, mount the terminal cover plate to complete the module assembly.
Module disassembly steps	1. Pry the module latch open with a flathead screwdriver.
	2. Remove the disassembled module.

4.3 Assembly and Disassembly Diagram

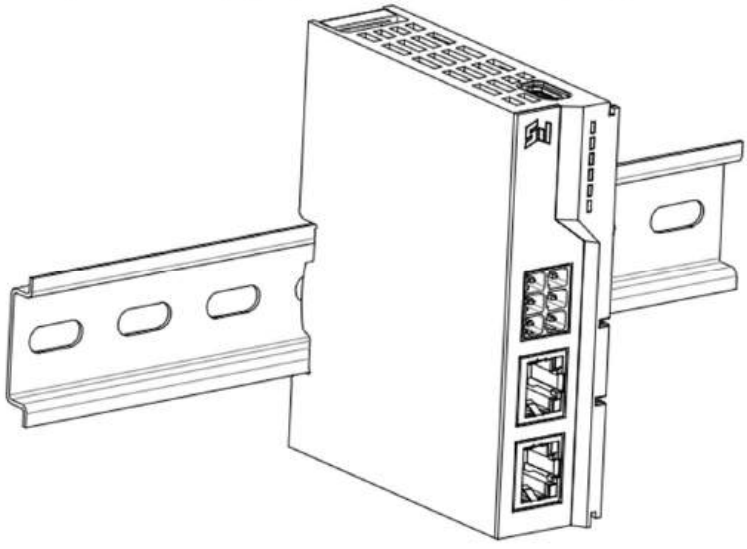
Assembly of the coupler module

- Push the upper and lower clips of the coupler module outward, and then vertically align the module with the guide rail slot, as shown in Figure ①.



①

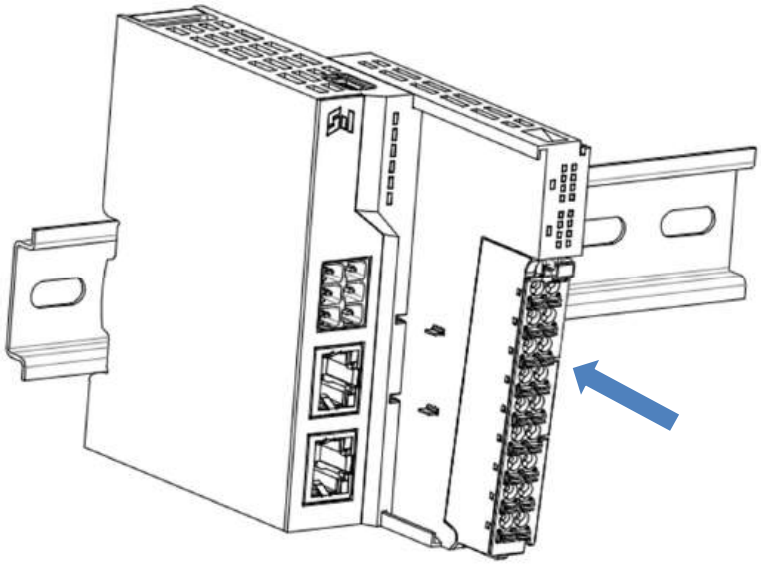
- Push the upper and lower clips inward and then firmly press the coupler module toward the guide rail until a “click” sound is heard, indicating the module is properly assembled, as shown in Figure ②.



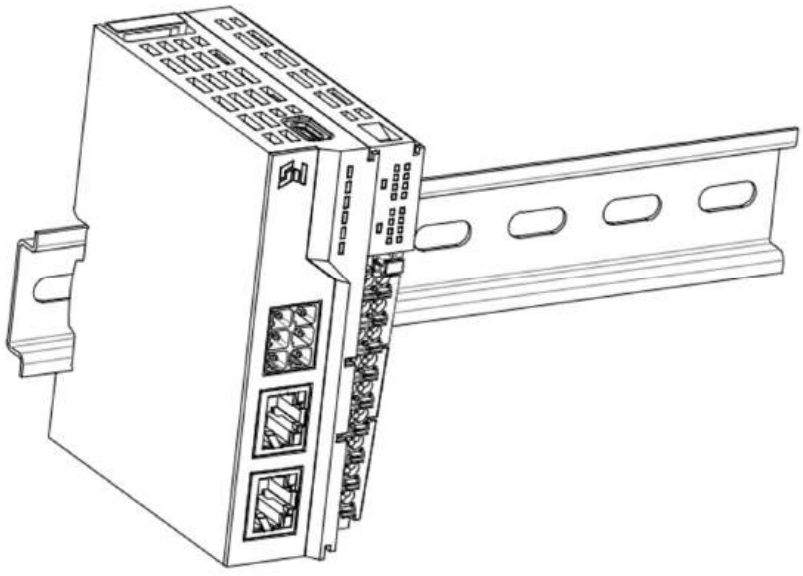
②

I/O module assembly

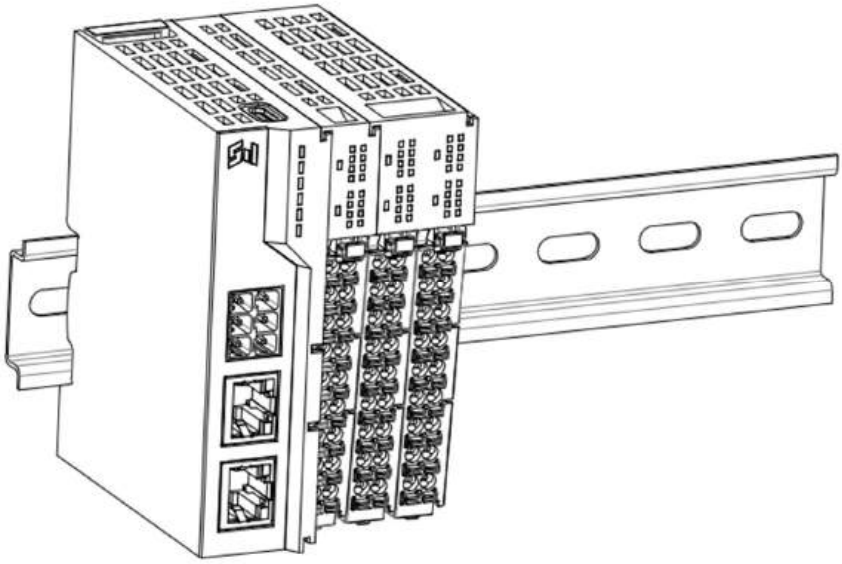
- Following the same assembly steps as the coupler module, sequentially assemble the required I/O modules or functional modules by pushing them in, as shown in Figures ③, ④, and ⑤ until a “click” sound is heard, indicating the module is proper assembled.



③



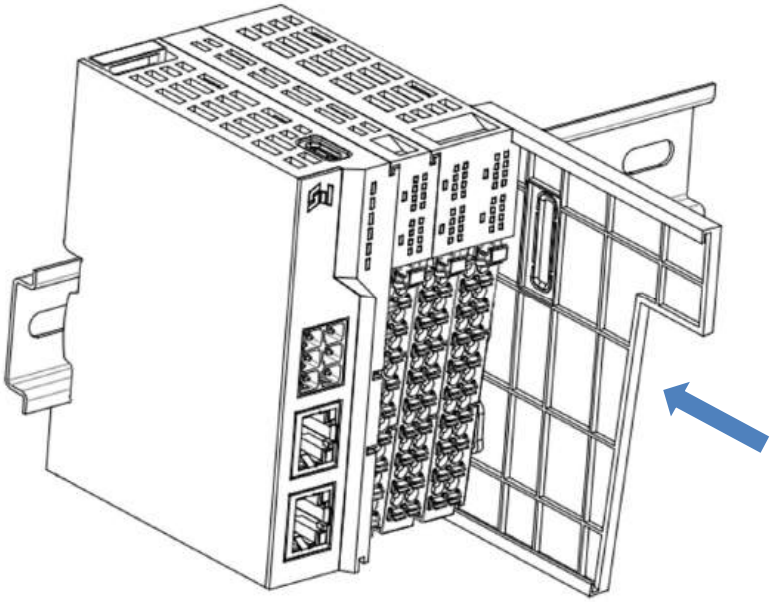
④



⑤

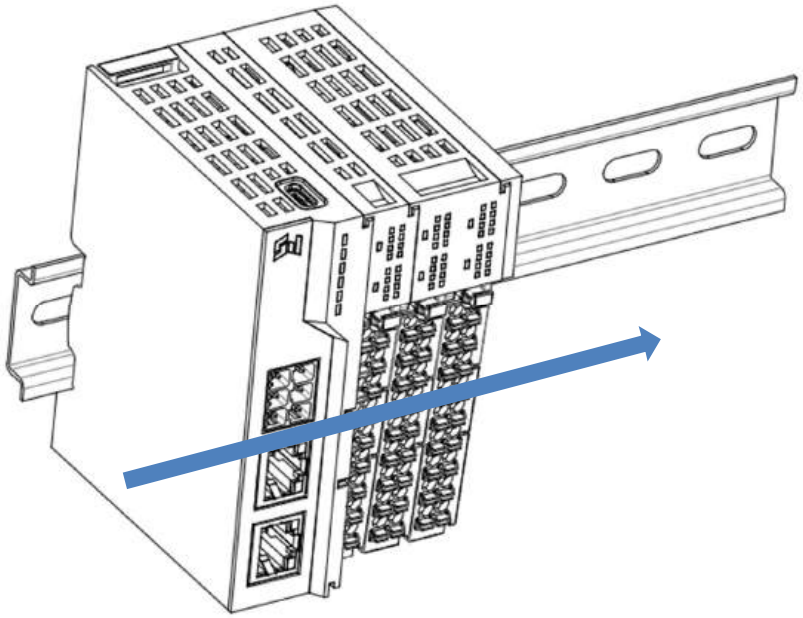
Terminal cover plate assembly

- Assemble the terminal cover plate on the right side of the last module, and align the groove side of the terminal cover plate with the guide rail. Referring to the assembly method of the I/O module, push the terminal cover plate inward until it is in place, as shown in Figure ⑥.



⑥

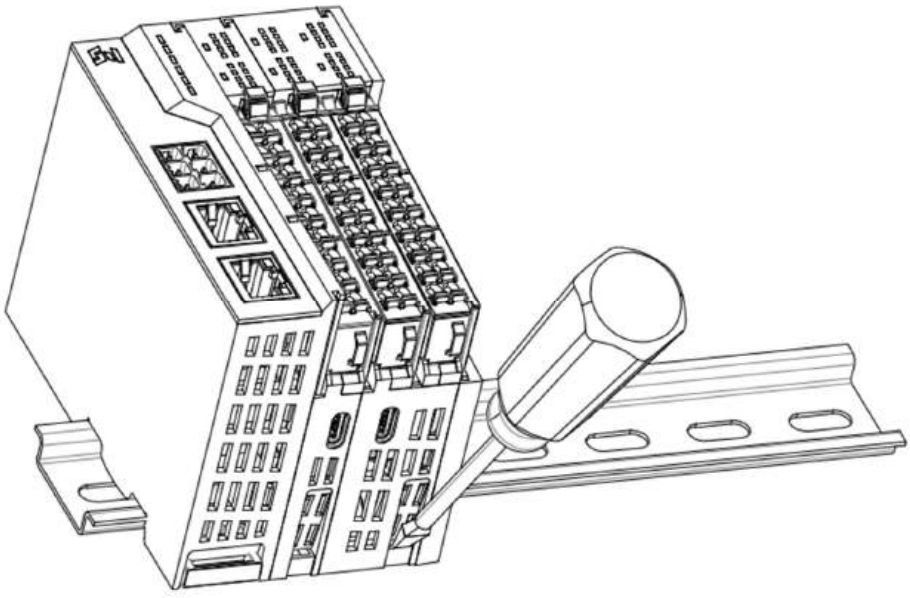
- After assembling the terminal cover plate, check if the entire module front is flat, ensuring all modules and terminal cover plates are properly assembled and aligned, as shown in Figure ⑦.



⑦

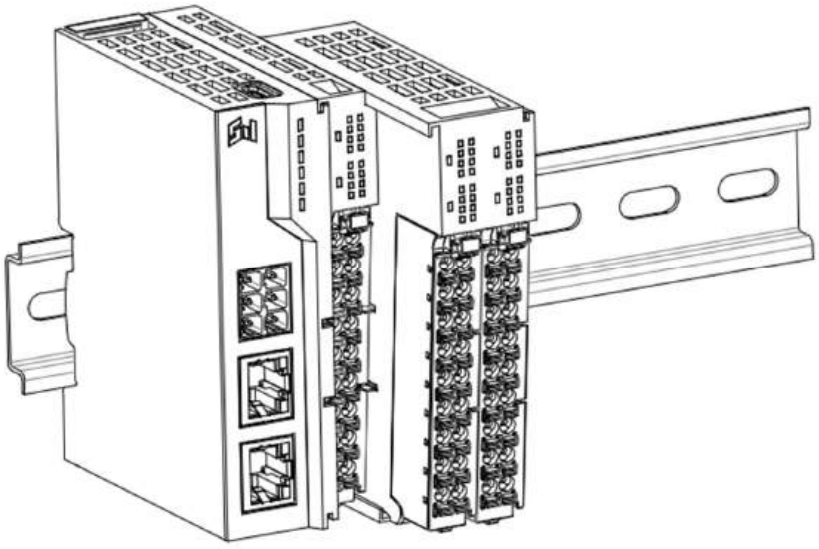
Disassembly

- Insert a flat-head screwdriver into the buckle of the module to be removed, and apply force towards the module (until a click is heard), as shown in Figure ⑧. **Note: There is one buckle under each IO module, and all shall be operated with this method.**



⑧

- Disassemble the module by following the reverse assembly steps, as shown in Figure 9.



⑨

5 Wiring

5.1 Wiring terminal

Wiring terminal		
Power terminal	Rated Voltage	250V
	Rated current	8A
	Number of poles	6P
	Wire diameter	24~16 AWG 0.2~1.5 mm²
Signal line terminal (i.e. input/output terminal)	Rated Voltage	150V
	Rated current	8A
	Number of poles	18P/36P
	Wire diameter	28~16 AWG 0.2~1.5 mm²
Bus interface	2×RJ45	Category 5 or higher UTP or STP (STP recommended)

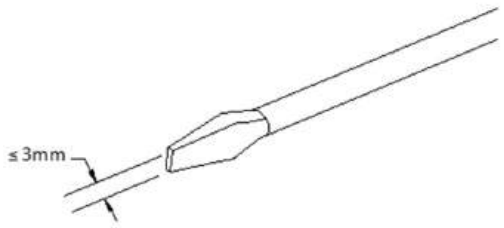
5.2 Wiring Instructions and Requirements

Precautions for power supply wiring

- The system-side power supply and field-side power supply of the module shall be configured separately and must not be mixed.
- PE must be reliably grounded.

Wiring tool requirements

The power terminals and signal line terminals feature a screwless design, allowing cable assembly and disassembly to be performed using a flathead screwdriver (specification: ≤3mm).



Wire stripping length requirement

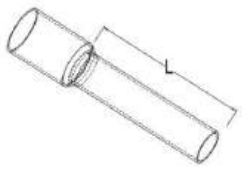
The recommended wire stripping length for power and signal line terminals is 10 mm.

Wiring method

For single-strand solid wires, strip the wire to the required length, then press the button, and insert the bare wire directly into the corresponding terminal port.

For multi-strand flexible wires, strip the wire to the required length, then directly connect or use corresponding standard cold-press terminals (insulated ferrule, with referring to the specifications in the table below). Press the button and insert the insulated terminal directly into the corresponding port.

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

Insulated Ferrule Specifications Table		
Specification requirement	Model	Wire cross-sectional area (mm²)
 The length (L) of the insulated ferrule is 10 mm	E0310	0.3
	E0510	0.5
	E7510	0.75
	E1010	1.0
	E1510	1.5

Warning

- Only copper conductors shall be used for wiring.

Warning

- Cable temperature: 80°C.

6 Usage

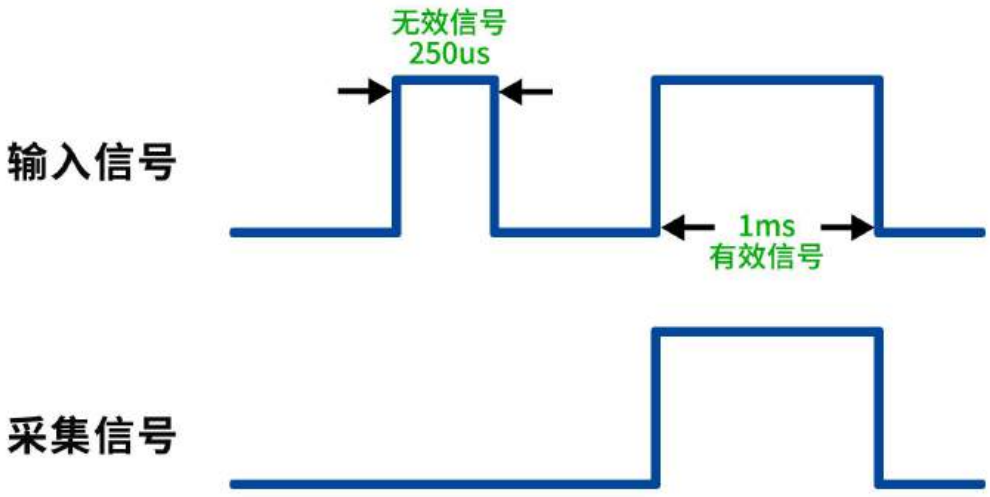
6.1 Analog and digital parameter description

6.1.1 Digital Input Filter

Digital input filter prevents the program from responding to unexpected rapid changes in input signals, which may be caused by switch contact bounce or electrical noise. Digital input filter supports single-module configuration. Each module can be set individually, while each channel cannot be configured separately.

The default FilterTime for digital input filter is currently set to 3ms, with configurable options including no filter, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, and 20ms. When configured to 3ms, it can filter out noise pulses shorter than 3ms. The 3ms input filter time means a single signal transition from "0" to "1" or "1" to "0" can only be detected when it lasts for 3ms, while single high or low pulses shorter than 3ms won't be detected.

Function description: When the input filter is configured to 1ms, it can eliminate noise signals within 1ms. As shown in the figure below, a 250us input signal will be considered invalid. Single high or low pulses shorter than 1ms will not be detected. Signals of 1ms or longer can be captured.



6.1.2 Digital Output Signal Clear/Hold

The clear/hold function applies to modules with output channels. This function is used to configure the output mode of output channels when the module is in non-OP state (stopping operation or disconnection of the coupler network cable). This parameter supports the following output states:

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

Output a valid value: When the communication is disconnected, the module output channel will continuously output a valid value, i.e., output 1.

Maintain the last output value: When the communication is disconnected, the module output channel will maintain the last output value.

The digital clear/hold function supports both overall module settings (template mode) and single-channel settings (single-channel mode). Any channel can be set in single-channel mode or template mode, and the single-channel mode takes precedence over the template mode. The specific configuration method is shown in the table below, and the default setting is to clear the overall output of the module.

Digital output module clear/hold parameters				
Parameter name	Parameter meaning	Parameter value	Parameter value meaning	Default value
TemplateMode	Template mode	1	PresetLow: clear output, i.e. output 0	1
		2	PresetHigh: output a valid value, i.e. output 1	
		3	KeepMode: keep the last output value	
Channel x	Single-channel mode setting	0	TemplateValue: meaning single-channel mode is not enabled	0
		1	PresetLow: clear output, i.e. output 0	
		2	PresetHigh: output a valid value, i.e. output 1	
		3	KeepMode: keep the last output value	

6.1.3 Analog Range Setting

Analog range setting “Range Select” is used to set the analog range. Each channel can be configured separately (see 3.3.4 and 3.3.5 Analog Parameters).

6.1.4 Analog Input Filter

- **Analog input filter function**

The analog input filter function “Filter” can internally average the data after A/D conversion to reduce fluctuations caused by noise in the input signal.

The analog input is processed by moving average based on the specified number of A/D conversion times.

- **Filter function configuration**

Each channel can be configured individually with a range of 1~200, defaulting to 10 times.

6.1.5 Analog Output Signal Clear/Hold

The clear/hold function applies to modules with output channels. This function is used to configure the output mode of output channels when the module is in non-OP state (stopping operation or disconnection of the coupler network cable). This parameter supports the following output states:

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

Hold output: When the communication is disconnected, the module output channel will maintain the output continuously.

Output a preset value: When the communication is disconnected, the module output channel will output the preset value.

The analog clear/hold function supports both overall module settings (template mode) and single-channel settings (single-channel mode). Any channel can be set in single-channel mode or template mode, and the single-channel mode takes precedence over the template mode. The specific configuration method is shown in the table below, and the default setting is to clear the overall output of the module.

Analog output module clear/hold parameters				
Parameter name	Parameter meaning	Parameter value	Parameter value meaning	Default value
TemplateMode	Template mode	0	Clear: clear all channel outputs	0
		1	Hold: maintain all channel outputs	
		2	Preset: preset all channel output values	

TemplateValue Chx	Single-channel clear/hold configuration	0	TemplateValue: meaning single-channel mode is not enabled	0
		1	Clear: clear single-channel output	
		2	Hold: maintain single-channel output	
		3	Preset: preset single-channel output value	
Preset Value Chx	Single-channel preset value	Code value range	Current/voltage value corresponding to the output code value (Corresponding to the range code value table)	0

Note: When the overall setting of the module (template mode) is configured as 2, meaning when the preset values for all channels take effect, the preset value will be based on the preset code value of channel 0 in the single-channel preset values for full-channel output.

6.1.6 Analog Power-off Retention

The analog parameters support the function of saving all configuration parameters when abnormal power failure or communication disconnection occurs. Analog modules all support power-off retention by default.

This manual takes Sysmac Studio as an example to introduce the parameter configuration method of the SRR8200 coupler + I/O module combination. For detailed steps, see "Parameter settings" in Section 6.3.1. After the modification is completed, it is recommended to power on again.

6.2 Temperature module parameter description

6.2.1 Definition of configuration parameters

The module has a total of 16 configuration parameters, with 3 shared configuration parameters across channels: Sensor Type, Filter Type, and Temp Mode; and 4 independently configurable parameters: Cold Compensation, Filter Time, Enable, and Cmp. Taking channel 0 as an example, the configuration parameters are shown in the table below.

Function	Parameter name	Value range	Default value
Sensor type	Sensor Type	0：PT100	0
		1：PT200	
		2：PT500	
		3：PT1000	
		4：Ni120_ID（Reserve）	
		5：THERMOCOUPLE_K	
		6：THERMOCOUPLE_J	
		7：THERMOCOUPLE_T（Reserve）	
		8：THERMOCOUPLE_E	
		9：THERMOCOUPLE_N（Reserve）	
		10：THERMOCOUPLE_S	
		11：THERMOCOUPLE_R（Reserve）	
		12：THERMOCOUPLE_B	
		13：THERMOCOUPLE_C（Reserve）	
		14：THERMOCOUPLE_L（Reserve）	
		15：THERMOCOUPLE_U（Reserve）	
		16：Ni 100	
		17：Ni 1000	
		18：LG-Ni 1000（Reserve）	
		19：Ni 200（Reserve）	

		20：Ni 500（Reserve）	
		21：RESISTANCE_15:150（Reserve）	
		22：RESISTANCE_15:300（Reserve）	
		23：RESISTANCE_15:600（Reserve）	
		24：RESISTANCE_15:3000	
		25：-1：1V（Reserve）	
		26：-250：250mV（Reserve）	
		27：-50：50mV（Reserve）	
		28：-80：80mV（Reserve）	
Filter type	Filter Type	0：Default	0
		50hz	
		60hz	
		10hz	
Cold junction compensation	Cold Compensation	0~65535	0 (Enabled by default)
Temperature unit switching	Temp Mode	Centigrade	0
		Fahrenheit	
		Thermodynamic	
Channel filter time	Filter Time CH00	0~10	0
Channel enable	Enable CH00	Disable	1
		Enable	
Temperature compensation	Cmp CH00	-10000~10000	0

6.2.2 Sensor type

The module supports sensor type configuration function (see 2 Product Parameters for details of sensor types).
The same module only support one type of sensor, and individual channels cannot be configured.
Note: The default sensor type is PT100.

6.2.3 Filter function

The module provides hardware filter configuration options: no filter, 50Hz, 60Hz, and 10Hz.
Each channel can filter measurement values through the channel filter function. It performs a moving average on the previous N sampled data points to reduce measurement jitter and improve stability and accuracy.
Filter time = Number of module cycles (N) × Module cycle time
Module cycle time = Conversion time + Disconnection detection time
Note: N configuration range is 0~10.

6.2.4 Cold junction compensation

The module supports enabling or disabling the thermocouple cold compensation function, which is enabled by all channels by default. It supports single-channel configuration. There are 4 channels occupying a total of 8 bits, with 2 bits allocated to each channel. Setting “00” enables the cold junction compensation for that channel, while setting “01” disables it.

6.2.5 Temperature unit switching

The module supports configuration conversion of temperature measurement units among Celsius (Centigrade), Fahrenheit, and Thermodynamic scale.

6.2.6 Channel enable function

The module can determine whether a channel is used through the “Enable/Disable” parameter setting. If the channel is set to “Disabled”, the channel will be deactivated. No matter whether the sensor is connected or not, it will display -9999.
Note: The default sensor type is Celsius (Centigrade).

6.2.7 Temperature compensation function

The module supports manual cold junction compensation for the data of each channel in both thermocouple and resistance thermometer modes. The compensation value can be input as needed. After setting the compensation value, the compensated temperature will be automatically calculated in the uplink data (Input), meaning the uplink data represents the final compensated temperature. Divide the read data by 10 to obtain the compensated temperature, with unit in °C.

Note: The channel is set to "Enabled" by default.

6.2.8 Process data

Uplink data 8 bytes (2 bytes per channel, channel n ranges from 0 to 3)				
Name	**Meaning**	**Value range**	**Data type**	**Length**
Channel n	Channel n temperature/resistance data acquisition	-32768~32767	Int16	2 bytes

Data description:

- **Temperature/Resistance Data Acquisition Channel [n]**
  The uplink data (Input) of the temperature module consists of temperature or resistance values collected for each channel. Each channel's data is a 2-byte signed integer, and the collected data is 10 times the actual measured value. Divide the read data by 10 to obtain the true temperature or resistance value, with units in ℃ or Ω.

6.3 Serial port module parameter description

6.3.1 Definition of configuration parameters

Parameter name	Description	Value range	Description
Communication Mode	Communication mode	0	NoSelect refers to no selection
		1	Modbus RTU Master refers to the RTU master mode
		2	Modbus RTU Slave refers to the RTU slave mode
		3	Modbus ASCII Master refers to the ASCII master mode
		4	Modbus ASCII Slave refers to the ASCII slave mode
		5	FP_Request refers to the free port request mode
		6	FP_Input_Output refers to the free port input/output mode
		7	FP_Input refers to the free port input mode
		8	FP_Output refers to the free port output mode
		9	SetPDOLength32Bytes
		10	SetPDOLength64Bytes
		11	SetPDOLength128Bytes
		12	SetPDOLength255Bytes
Baud Rate	Serial port baud rate	0	1200 bps
		1	2400 bps
		2	4800 bps
		3	9600 bps
		4	19200 bps
		5	38400 bps
		6	57600 bps
		7	115200 bps
Stop Bit	Stop bits	0	1 Bit
		1	2 Bits
Word Format	Character Format	0	8 Bits
		1	7 Bits
Parity	Parity Bit	0	Parity None
		1	Parity Odd
		2	Parity Even

Control Mode	Control and status mode	0	Disable means control and status are disabled
		1	Level means control and status are enabled - high level triggered
		2	Rising Edge means control and status are enabled - rising edge triggered
Node Output Mode	Node output mode	0	Poll means polling
		1	Change Trigger means change trigger
Communication Error Behavior	Communication error behavior	0	Clear means reset
		1	Hold means maintain
Respond Timeout	Response time	5~3000	Unit: ms, default 50
Poll Delay	Polling delay	5~3000	Unit: ms, default 10
Slave ID	Modbus slave station number	1~247	Valid in the slave mode, default 1
Slave Respond Delay	Slave response delay	0~3000	Unit: ms, default 50
Frame Interval	Frame interval	0	1.5T
		1	3.5T
		2	5T
		3	10T
		4	20T
		5	50T
		6	100T
		7	200T
Node_1_Param_01	Node 1 Parameter 1	0~FFFFFFFF	The default value is 0. See Node Code Parameters for details
Node_1_Param_02	Node 1 Parameter 2	0~FFFFFFFF	The default value is 0. See Node Code Parameters for details
…	…	…	…
Node_16_Param_01	Node 16 Parameter 1	0~FFFFFFFF	The default value is 0. See Node Code Parameters for details
Node_16_Param_02	Node 16 Parameter 2	0~FFFFFFFF	The default value is 0. See Node Code Parameters for details

6.3.2 Node parameter code

Modbus Master Function

In Modbus master mode, parameter 1 (Param_01) consists of a 2-byte start address parameter and a 2-byte node code parameter, while parameter 2 (Param_02) is composed of a 2-bit byte swap parameter and a 1-byte slave station number parameter.

Param_01			
BIT31~BIT16	BIT15~BIT0		
Start Address	Node Code. See Modbus Master Node Code for details		
Param_02			
BIT31~BIT16	BIT15~BIT10	BIT9~BIT8	BIT7~BIT0
Reserve		See Byte Swap ExByte Flag	Slave Station Number

Note: The start address parameter range is 0000~FFFFH, and the slave station number parameter range is 1~247.

Modbus master function node code

SubModule grouping	SubModule	SubModule ID（10#）	SubModule ID（16#）
Modbus Master Read Coils That is, the Modbus master reads coils	Read 8 bits	257	0x0101
	Read 16 bits	258	0x0102
	Read 24 bits	259	0x0103
	Read 32 bits	260	0x0104
	Read 40 bits	261	0x0105
	Read 48 bits	262	0x0106

	Read 56 bits	263	0x0107
	Read 64 bits	264	0x0108
	Read 72 bits	265	0x0109
	Read 80 bits	266	0x010A
	Read 88 bits	267	0x010B
	Read 96 bits	268	0x010C
	Read 104 bits	269	0x010D
	Read 112 bits	270	0x010E
	Read 120 bits	271	0x010F
	Read 128 bits	272	0x0110
Modbus Master Read Discrete That is, the Modbus master reads discrete inputs	Read 8 bits	513	0x0201
	Read 16 bits	514	0x0202
	Read 24 bits	515	0x0203
	Read 32 bits	516	0x0204
	Read 40 bits	517	0x0205
	Read 48 bits	518	0x0206
	Read 56 bits	519	0x0207
	Read 64 bits	520	0x0208
	Read 72 bits	521	0x0209
	Read 80 bits	522	0x020A
	Read 88 bits	523	0x020B
	Read 96 bits	524	0x020C
	Read 104 bits	525	0x020D
	Read 112 bits	526	0x020E
	Read 120 bits	527	0x020F
	Read 128 bits	528	0x0210
Modbus Master Read Hold That is, the Modbus master reads holding registers	Read 1 Reg	769	0x0301
	Read 2 Regs	770	0x0302
	Read 3 Regs	771	0x0303
	Read 4 Regs	772	0x0304
	Read 5 Regs	773	0x0305
	Read 6 Regs	774	0x0306
	Read 7 Regs	775	0x0307
	Read 8 Regs	776	0x0308
	Read 9 Regs	777	0x0309
	Read 10 Regs	778	0x030A
	Read 11 Regs	779	0x030B
	Read 12 Regs	780	0x030C
	Read 13 Regs	781	0x030D
	Read 14 Regs	782	0x030E
	Read 15 Regs	783	0x030F
	Read 16 Regs	784	0x0310
Modbus Master Read Input That is, the Modbus master reads input registers	Read 1 Reg	1025	0x0401
	Read 2 Regs	1026	0x0402
	Read 3 Regs	1027	0x0403
	Read 4 Regs	1028	0x0404
	Read 5 Regs	1029	0x0405
	Read 6 Regs	1030	0x0406
	Read 7 Regs	1031	0x0407
	Read 8 Regs	1032	0x0408
	Read 9 Regs	1033	0x0409
	Read 10 Regs	1034	0x040A
	Read 11 Regs	1035	0x040B
	Read 12 Regs	1036	0x040C
	Read 13 Regs	1037	0x040D
	Read 14 Regs	1038	0x040E
	Read 15 Regs	1039	0x040F
	Read 16 Regs	1040	0x0410
Modbus Master Write Coils That is, the Modbus master writes coils	Write 8 bits	1281	0x0501
	Write 16 bits	1282	0x0502
	Write 24 bits	1283	0x0503
	Write 32 bits	1284	0x0504
	Write 40 bits	1285	0x0505
	Write 48 bits	1286	0x0506

	Write 56 bits	1287	0x0507
	Write 64 bits	1288	0x0508
	Write 72 bits	1289	0x0509
	Write 80 bits	1290	0x050A
	Write 88 bits	1291	0x050B
	Write 96 bits	1292	0x050C
	Write 104 bits	1293	0x050D
	Write 112 bits	1294	0x050E
	Write 120 bits	1295	0x050F
	Write 128 bits	1296	0x0510
	Write Single bit	1535	0x05FF
Modbus Master Write Hold That is, the Modbus master writes holding registers	Write 1 Reg	1537	0x0601
	Write 2 Regs	1538	0x0602
	Write 3 Regs	1539	0x0603
	Write 4 Regs	1540	0x0604
	Write 5 Regs	1541	0x0605
	Write 6 Regs	1542	0x0606
	Write 7 Regs	1543	0x0607
	Write 8 Regs	1544	0x0608
	Write 9 Regs	1545	0x0609
	Write 10 Regs	1546	0x060A
	Write 11 Regs	1547	0x060B
	Write 12 Regs	1548	0x060C
	Write 13 Regs	1549	0x060D
	Write 14 Regs	1550	0x060E
	Write 15 Regs	1551	0x060F
	Write 16 Regs	1552	0x0610
	Write Single Reg	1791	0x06FF

Modbus slave function

In Modbus slave mode, parameter 1 (Param_01) consists of a 2-byte start address parameter and a 2-byte node code parameter, while parameter 2 (Param_02) is composed of a 2-bit byte swap parameter.

Param_01		
BIT31~BIT16	BIT15~BIT0	
Start Address	Node Code: See Modbus Slave Node Code for details	
Param_02		
BIT31~BIT16	BIT15~BIT2	BIT1~BIT0
Reserve		See Byte Swap ExByte Flag

Note: The start address parameter range is 0000~FFFFH

Modbus slave functions node code

SubModule grouping	SubModule	SubModule ID（10#）	SubModule ID（16#）
Modbus Slave Read Coils That is, the Modbus slave reads coils	Read 8 bits	1793	0x0701
	Read 16 bits	1794	0x0702
	Read 24 bits	1795	0x0703
	Read 32 bits	1796	0x0704
	Read 40 bits	1797	0x0705
	Read 48 bits	1798	0x0706
	Read 56 bits	1799	0x0707
	Read 64 bits	1800	0x0708
	Read 72 bits	1801	0x0709
	Read 80 bits	1802	0x070A
	Read 88 bits	1803	0x070B
	Read 96 bits	1804	0x070C
	Read 104 bits	1805	0x070D
	Read 112 bits	1806	0x070E
	Read 120 bits	1807	0x070F

	Read 128 bits	1808	0x0710
Modbus Slave Read Hold That is, the Modbus slave reads holding registers	Read 1 Reg	2049	0x0801
	Read 2 Regs	2050	0x0802
	Read 3 Regs	2051	0x0803
	Read 4 Regs	2052	0x0804
	Read 5 Regs	2053	0x0805
	Read 6 Regs	2054	0x0806
	Read 7 Regs	2055	0x0807
	Read 8 Regs	2056	0x0808
	Read 9 Regs	2057	0x0809
	Read 10 Regs	2058	0x080A
	Read 11 Regs	2059	0x080B
	Read 12 Regs	2060	0x080C
	Read 13 Regs	2061	0x080D
	Read 14 Regs	2062	0x080E
	Read 15 Regs	2063	0x080F
	Read 16 Regs	2064	0x0810
Modbus Slave Write Coils That is, the Modbus slave writes coils	Write 8 bits	2305	0x0901
	Write 16 bits	2306	0x0902
	Write 24 bits	2307	0x0903
	Write 32 bits	2308	0x0904
	Write 40 bits	2309	0x0905
	Write 48 bits	2310	0x0906
	Write 56 bits	2311	0x0907
	Write 64 bits	2312	0x0908
	Write 72 bits	2313	0x0909
	Write 80 bits	2314	0x090A
	Write 88 bits	2315	0x090B
	Write 96 bits	2316	0x090C
	Write 104 bits	2317	0x090D
	Write 112 bits	2318	0x090E
	Write 120 bits	2319	0x090F
	Write 128 bits	2320	0x0910
Modbus Slave Write Discrete That is, the Modbus slave writes discrete input	Write 8 bits	2561	0x0A01
	Write 16 bits	2562	0x0A02
	Write 24 bits	2563	0x0A03
	Write 32 bits	2564	0x0A04
	Write 40 bits	2565	0x0A05
	Write 48 bits	2566	0x0A06
	Write 56 bits	2567	0x0A07
	Write 64 bits	2568	0x0A08
	Write 72 bits	2569	0x0A09
	Write 80 bits	2570	0x0A0A
	Write 88 bits	2571	0x0A0B
	Write 96 bits	2572	0x0A0C
	Write 104 bits	2573	0x0A0D
	Write 112 bits	2574	0x0A0E
	Write 120 bits	2575	0x0A0F
	Write 128 bits	2576	0x0A10
Modbus Slave Write Hold That is, the Modbus slave writes holding register	Write 1 Reg	2817	0x0B01
	Write 2 Regs	2818	0x0B02
	Write 3 Regs	2819	0x0B03
	Write 4 Regs	2820	0x0B04
	Write 5 Regs	2821	0x0B05
	Write 6 Regs	2822	0x0B06
	Write 7 Regs	2823	0x0B07
	Write 8 Regs	2824	0x0B08
	Write 9 Regs	2825	0x0B09
	Write 10 Regs	2826	0x0B0A
	Write 11 Regs	2827	0x0B0B
	Write 12 Regs	2828	0x0B0C
	Write 13 Regs	2829	0x0B0D
	Write 14 Regs	2830	0x0B0E
	Write 15 Regs	2831	0x0B0F

	Write 16 Regs	2832	0x0B10
Modbus Slave Write Input That is, the Modbus slave writes input register	Write 1 Reg	3073	0x0C01
	Write 2 Regs	3074	0x0C02
	Write 3 Regs	3075	0x0C03
	Write 4 Regs	3076	0x0C04
	Write 5 Regs	3077	0x0C05
	Write 6 Regs	3078	0x0C06
	Write 7 Regs	3079	0x0C07
	Write 8 Regs	3080	0x0C08
	Write 9 Regs	3081	0x0C09
	Write 10 Regs	3082	0x0C0A
	Write 11 Regs	3083	0x0C0B
	Write 12 Regs	3084	0x0C0C
	Write 13 Regs	3085	0x0C0D
	Write 14 Regs	3086	0x0C0E
	Write 15 Regs	3087	0x0C0F
	Write 16 Regs	3088	0x0C10

Byte swap

Byte numbering	Function	Length
0	No exchange	2-bit
1	2Bytes Exchange	2-bit
2	4Bytes Register Exchange	2-bit
3	4Bytes Big-Little-Endian Exchange	2-bit

Freeport function

In Freeport mode, parameter 1 (Param_01) consists of a 2-byte node code parameter.

Param_01	
BIT31~BIT16	BIT15~BIT0
Reserve	Node Code: See Freeport Node Code for details
Param_02	
BIT31~BIT0	
Reserve	

Freeport function node code

SubModule grouping	SubModule	SubModule ID（10#）	SubModule ID（16#）
Freeport Input refers to free port input	Input 1 byte	3329	0x0D01
	Input 2 bytes	3330	0x0D02
	Input 4 bytes	3331	0x0D03
	Input 8 bytes	3332	0x0D04
	Input 16 bytes	3333	0x0D05
	Input 32 bytes	3334	0x0D06
	Input 64 bytes	3335	0x0D07
	Input 128 bytes	3336	0x0D08
	Input 160 bytes	3337	0x0D09
	Input 192 bytes	3338	0x0D0A
	Input 224 bytes	3339	0x0D0B
	Input 255 bytes	3340	0x0D0C
Freeport Output refers to free port output	Output 1 byte	3585	0x0E01
	Output 2 bytes	3586	0x0E02
	Output 4 bytes	3587	0x0E03
	Output 8 bytes	3588	0x0E04
	Output 16 bytes	3589	0x0E05
	Output 32 bytes	3590	0x0E06
	Output 64 bytes	3591	0x0E07

	Output 128 bytes	3592	0x0E08
	Output 160 bytes	3593	0x0E09
	Output 192 bytes	3594	0x0E0A
	Output 224 bytes	3595	0x0E0B
	Output 255 bytes	3596	0x0E0C
Freeport Parity refers to free port parity	CRC8	3841	0x0F01
	CRC16	3842	0x0F02
	XOR	3843	0x0F03
	SUM8	3844	0x0F04
	LRC	3845	0x0F05

Control and status node code

When the configuration parameter Control Mode is set to “Disable”, there is no need to configure the control and status node code; When the configuration parameter Control Mode is set to Level or Rising Edge, it is necessary to first configure the node code in Node 1 Parameter 1 (Node_1_Param_01).

The node codes are shown in the following table:

SubModule grouping	SubModule	SubModule ID（10#）	SubModule ID（16#）	Remarks
Control&Status	1 Node	1	0x0001	Configuration in master station mode
	2 Node	2	0x0002	
	3 Node	3	0x0003	
	4 Node	4	0x0004	
	5 Node	5	0x0005	
	6 Node	6	0x0006	
	7 Node	7	0x0007	
	8 Node	8	0x0008	
	9 Node	9	0x0009	
	10 Node	10	0x000A	
	11 Node	11	0x000B	
	12 Node	12	0x000C	
	13 Node	13	0x000D	
	14 Node	14	0x000E	
	15 Node	15	0x000F	
	Freeport Req	32	0x0020	Configuration in free port mode
	Freeport Input_Output	33	0x0021	
	Freeport Input	34	0x0022	
	Freeport Output	35	0x0023	
	Modbus Slave	48	0x0030	Configuration in slave station mode

6.3.3 Process data

Modbus master station process data

Uplink data (32 bytes)			
Byte numbering	**Function**	**Meaning**	**Address range**
1	Status word	Bit0: Idle status	1 byte
		Bit1: busy status, indicating data transmission in progress	
		Bit2: completion status, indicating data transmission finished	
2	Alarm code	See Alarm Code	1 byte
3	Input data	Serial communication module input data	Last 30 bytes
4	Input data		
…	…		

32	Input data		
Downlink data (32 bytes)			
Byte numbering	**Function**	**Meaning**	**Address range**
1	Control word	When the configuration parameter Control Mode is set to Level, send data by setting to 1 When the configuration parameter Control Mode is set to Rising Edge, send data on 0->1	1 byte
2	Output data	Serial communication module output data	Last 31 bytes
3	Output data		
…	…		
32	Output data		

Note: The process data in the above table is configured for 1 node in Level or Rising Edge mode. If two nodes are configured, byte numbers 1 and 2 of the uplink data represent the status bits and alarm codes of node 1, while byte numbers 3 and 4 represent those of node 2, with the remaining bytes being data bits. For downlink data, byte number 1 is the control bit for node 1, byte number 2 is the control bit for node 2, and the remaining bytes are data bits. A maximum of 15 nodes can be configured.

Modbus slave process data

Uplink data (32 bytes)			
Byte numbering	**Function**	**Meaning**	**Address range**
1	Alarm code	See Alarm Code	1 byte
2	Input data	Serial communication module input data	Last 31 bytes
3	Input data		
…	…		
32	Input data		
Downlink data (32 bytes)			
Byte numbering	**Function**	**Meaning**	**Address range**
1	Control word	Bit0: Alarm code clear	1 byte
2	Output data	Serial communication module output data	Last 31 bytes
3	Output data		
…	…		
32	Output data		

Freeport_Request: process data

Uplink data (32 bytes)			
Byte numbering	**Function**	**Meaning**	**Address range**
1	Status word	Bit0: Idle status Bit1: busy status, indicating data transmission in progress Bit2: completion status, indicating data transmission finished	1 byte
2	Alarm code	Bit0: Received data length error Bit1: Check error Bit2: Timeout error	1 byte
3	Received data length	0~255	1 byte
4~5	Received abnormal count	0~65535	2 bytes
6~7	Received data count	0~65535	2 bytes

8	Input data	Serial communication module input data	Last 25 bytes
9	Input data		
…	…		
32	Input data		
Downlink data (32 bytes)			
Byte numbering	**Function**	**Meaning**	**Address range**
1	Control word	Bit0: Enable	1 byte
		Bit1: Clear the status word	
		Bit2: Clear the received data	
2	Sent data length	0~255	1 byte
3	Reset counter	Bit0: Clear received error counter	1 byte
		Bit1: Clear received data counter	
		Bit2: Clear received data length	
4	Clear error code	Bit0: Clear abnormal length	1 byte
		Bit1: Clear check error	
		Bit2: Clear timeout error	
5	Output data	Serial communication module output data	Last 28 bytes
6	Output data		
…	…		
32	Output data		

Freeport_Output process data

Downlink data (32 bytes)			
Byte numbering	**Function**	**Meaning**	**Address range**
1	Control word	Bit0: Enable	1 byte
2	Sent data length	0~255	1 byte
3	Output data	Serial communication module output data	Last 30 bytes
4	Output data		
…	…		
32	Output data		

Freeport_Input Output process data

Uplink data (32 bytes)			
Byte numbering	**Function**	**Meaning**	**Address range**
1	Alarm code	Bit0: Received data length error	1 byte
		Bit1: Check error	
2	Received data length	0~255	1 byte
3~4	Received abnormal count	0~65535	2 bytes
5~6	Received data count	0~65535	2 bytes
7	Input data	Serial communication module input data	Last 26 bytes
8	Input data		
…	…		
32	Input data		
Downlink data (32 bytes)			

Byte numbering	Function	Meaning	Address range
1	Control word	Bit0: Enable	1 byte
		Bit1: Clear the status word	
		Bit2: Clear the received data	
2	Sent data length	0~255	1 byte
3	Reset counter	Bit0: Clear received error counter	1 byte
		Bit1: Clear received data counter	
		Bit2: Clear received data length	
4	Clear error code	Bit0: Clear the received length error	1 byte
		Bit1: Clear check error	
5	Output data	Serial communication module output data	Last 28 bytes
6	Output data		
…	…		
32	Output data		

Modbus alarm code

Fault code	Notes
0x00	No error
0x01	Slave device address error
0x02	Function code error
0x03	CRC check error
0x04	Response byte count error
0x05	Coil register data error
0x06	Holding register data error
0x07	Illegal data address
0x08	Slave device failure
0x09	LRC verification error
0x0C	Data length error
0x0D	Data conversion error
0x0E	ASCII frame error
0x0F	Response timeout

6.4 Incremental Encoder Module & Differential Incremental Encoder

6.4.1 Process data

Uplink Data 18 Bytes				
Name	**Meaning**	**Value range**	**Data type**	**Length**
E0 Input CH0 (Latch)	Encoder probe input signal channel 0	0: No signal input 1: Signal input detected	bool	1 bit
E0 Input CH1 (Latch)	Encoder probe input signal channel 1	0: No signal input 1: Signal input detected	bool	1 bit
E0 Input CH2	Encoder general input signal channel 2	0: No signal input 1: Signal input detected	bool	1 bit
E0 Input CH3	Encoder general input signal channel 3	0: No signal input 1: Signal input detected	bool	1 bit
E0 Latched Flag CH0	Encoder probe input channel 0 latched completion flag	0: 1->0 latch once and toggle once 1: 0->1 latch once and toggle once	bool	1 bit
E0 Latched Flag CH1	Encoder probe input channel 1 latched completion flag	0: 1->0 latch once and toggle once 1: 0->1 latch once and toggle once	bool	1 bit
Reservation			bool	10 bits
E0 Count Value	Encoder count value	0~2^32-1	unsigned32	4 bytes
E0 Latch Value CH0	Latch value of encoder probe input channel 0	0~2^32-1	unsigned32	4 bytes
E0 Latch Value CH1	Latch value of encoder probe input channel 1	0~2^32-1	unsigned32	4 bytes
E0 Speed	Encoder speed	-2^31~2^31-1	signed32	4 bytes

Uplink data description:

- **Encoder probe input signal channel E0 Input CH0/CH1 (Latch)**
  The encoder is equipped with 2 probe input channels, indicating the presence or absence of input signals in the corresponding probe input channels.
  When the probe input channel latch function is not enabled, it can be used as a general digital input channel.

- **Encoder general input signal channel E0 Input CH2/CH3**
  The encoder is equipped with 2 general digital input channels, indicating the presence or absence of input signals in the corresponding DI channels.

- **Encoder probe input channel latched completion flag E0 Latched Flag CH0/CH1**
  The encoder is equipped with 2 probe input channels. After a probe input channel completes a latching operation, the flag bit will toggle from 0->1 or 1->0.
  Example 1: The Encoder probe input channel latched completion flag is 0. After completion of one latching operation, the flag bit changes to 1. After another latching operation, the flag bit changes back to 0.

- **Encoder count value E0 Count Value**
  The encoder count value represents the current count value of the corresponding encoder, with a numerical range of 0 to 2^32-1.

- **Encoder probe input channel latch value E0 Latch Value CH0/CH1**

The encoder is equipped with 2 probe input channels. By inputting signals that meet the set conditions into the probe input channels, the current count value of the corresponding encoder can be quickly latched. Therefore, the range of the latched value is the same as the count value, ranging from 0 to 2^32-1.

◆ **Encoder speed E0 Speed**

The encoder speed represents the pulse speed of the encoder input channel, with a numerical range of -2^31~2^31-1.

Downlink data 10 bytes				
Name	**Meaning**	**Value range**	**Data type**	**Length**
E0 Enable	Encoder count enable	0: Disabled 1: Enable	bool	1-bit bit0
E0 Z Phase Clear Enable	Encoder Z-phase clear enable	0: Disabled 1: Enable	bool	1 bit1
E0 Count Clear	Encoder counter value clear	0: Disabled 1: Enable	bool	1 bit2
E0 Compare Output CH0 Enable	Encoder comparison output channel 0 enable	0: Disabled 1: Enable	bool	1 bit3
E0 Compare Output CH1 Enable	Encoder comparison output channel 1 enable	0: Disabled 1: Enable	bool	1 bit4
E0 Compare Output CH0 Direction	Encoder comparison output channel 0 comparison direction	0: Decrement comparison 1: Incremental comparison	bool	1 bit5
E0 Compare Output CH1 Direction	Encoder comparison output channel 1 comparison direction	0: Decrement comparison 1: Incremental comparison	bool	1 bit6
E0 Compare Output CH0 Mode	Encoder comparison output channel 0 trigger mode	0: Single trigger 1: Repeated trigger	bool	1 bit7
E0 Compare Output CH1 Mode	Encoder comparison output channel 1 trigger mode	0: Single trigger 1: Repeated trigger	bool	1-bit bit0
E0 Output CH0 (Compare)	Encoder output channel 0 (comparison output)	0: high-level output 24V 1: low-level output 0V	bool	1 bit1
E0 Output CH1 (Compare)	Encoder output channel 1 (comparison output)	0: high-level output 24V 1: low-level output 0V	bool	1 bit2
E0 Output CH2	Encoder output channel 2 (general output)	0: high-level output 24V 1: low-level output 0V	bool	1 bit3
E0 Output CH3	Encoder output channel 3 (general output)	0: high-level output 24V 1: low-level output 0V	bool	1 bit4
E0 Latch CH0 Enable	Encoder probe input channel 0 latch enabled	0: Disabled 1: Enable	bool	1 bit5
E0 Latch CH1 Enable	Encoder probe input channel 1 latch enabled	0: Disabled 1: Enable	bool	1 bit6
E0 Compare Value CH0	Encoder compare output channel 0 set value	0~2^32-1	unsigned32	4 bytes
E0 Compare Value CH1	Encoder compare output channel 1 set value	0~2^32-1	unsigned32	4 bytes

Downlink data description:

- **E0 Enable**
  Setting the encoder count enable to 0 will disable it, while setting it to 1 will enable it.

- **E0 Z Phase Clear Enable**
  Setting E0 Z Phase Clear Enable to 0 will disable it, while setting it to 1 will enable it.
  After E0 Z Phase Clear Enable is activated, the current count value is cleared by detecting the encoder Z-phase signal. The encoder generates one Z phase pulse per revolution, and the count value is cleared once accordingly.
  The physical resolution of the encoder refers to the number of pulses output per revolution, where the count multiple multiplied by the physical resolution equals the maximum single-revolution count. With the Z Phase Clear Enable function enabled, the count value is cleared once per revolution when incrementing or decrementing.

- **E0 Count Clear**
  Edge control: when this bit transitions from 0 to 1, the corresponding encoder count value will be cleared. If an encoder count initial value is set, the count value will also be reset to 0.

- **E0 Compare Output CH0/CH1 Enable**
  Setting the E0 Compare Output CH0/CH1 Enable to 0 will disable it, while setting it to 1 will enable it.
  When the comparison output channel function is disabled, it can be used as a general digital output channel.
  Note: Before enabling the comparison output, ensure the comparison output channel is not active. Otherwise, enabling comparison output while active will result in continuous output.
  See 6.2.3 comparison output function.

- **E0 Compare Output CH0/CH1 Direction**
  Setting the E0 Compare Output CH0/CH1 Direction to 0 means decremental comparison, i.e., the count value changes in descending order. Setting it to 1 means incremental comparison, i.e., the count value changes in ascending order.

- **E0 Compare Output CH0/CH1 Mode**
  The E0 Compare Output CH0/CH1 Mode can be set to: 0 (single trigger) or 1 (repeated trigger).
  Single trigger mode: After enabling the comparison output function, a pulse output is triggered once when the count value meets the condition, and then the comparison is stopped. Re-enabling the comparison output function is required for subsequent triggers.
  Repeated trigger means that after the comparison output function is enabled, a pulse output is triggered once when the count value meets the condition. The system immediately starts the next comparison, but no new pulse output will be restarted during the existing comparison pulse duration. After the pulse output triggered by comparison is completed, the pulse output will be triggered again once the comparison condition is met. See 6.2.3 comparison output function.

- **E0 Output CH0/CH1 (Compare)**
  When the comparison output channel function is disabled, it can be used as a general digital output channel. Digital channel output (NPN): Setting to “0” will output 24V high level, while setting to “1” will output 0V low level.
  When the comparison output is active, this pin level will be toggled. Therefore, by first setting this bit and then enabling the comparison output, the corresponding inactive/active level of the comparison output can be configured.

- **E0 Output CH2/CH3 (general output)**
  Digital channel output (NPN): Setting to “0” will output 24V high level, while setting to “1” will output 0V low level.

- **E0 Latch CH0/CH1 Enable**
  When the encoder input latch channel enable flag is set to 1, the latching function will be enabled; when the encoder input latch channel enable flag is set to 0, the latching function will be disabled.

- **E0 Compare Output CH0/CH1 Set Value**
  The encoder comparison output channel set value is consistent with the encoder count range, which is 0~2^32-1. After the comparison output function is enabled, the module will compare whether the current count value matches the set value. When the comparison direction is consistent with the comparison set value, the corresponding comparison output channel will generate an adjustable-time pulse. See 6.2.3 comparison output function.

6.4.2 Definition of configuration parameters

The module configuration consists of 12 parameters in total, as shown in the table below. **Note: Configuration parameters will take effect the next time the encoder is enabled.**

Function	Parameter name	Value range	Default value
Encoder 0 Pulse Mode	Encoder0 Pulse Mode	0: ABZ (AB Quadrature) 1: Pul+Dir (Direction + Pulse) 2: CW/CCW (Dual Pulse)	0
Encoder 0 Filter	Encoder0 Filter Level	Levels 0~15	7
Encoder 0 count multiple	Encoder0 Count Multiple	MUL_1, 2, 4 (only effective in AB quadrature mode)	MUL_1
Encoder 0 count range	Encoder0 Count Range	0：2^32（0~2^32-1） 1：Resolution×Multiple (0~ring count resolution × count multiple -1, only effective in AB quadrature mode)	0
Encoder 0 ring count resolution	Encoder0 Count Resolution	1~65535	1
Encoder 0 count direction	Encoder0 Count Direction	0: Forward 1: Backward	0
Encoder 0 count initial value	Encoder0 Count Initial Value	0~2^32-1	0
Encoder 0 probe mode	Encoder0 Latch Trigger Mode	0：CH0 Single，CH1 Single Channel 0 single, Channel 1 single 1：CH0 Repeat，CH1 Single Channel 0 repeat, Channel 1 single 2：CH0 Single，CH1 Repeat Channel 0 single, Channel 1 repeat 3：CH0 Repeat，CH1 Repeat Channel 0 repeat, Channel 1 repeat	0
Encoder 0 probe trigger edge	Encoder0 Latch Trigger Edge	0：CH0 Raising，CH1 Raising Channel 0 rising edge, Channel 1 rising edge 1：CH0 Falling，CH1 Raising Channel 0 falling edge, Channel 1 rising edge 2：CH0 Raising，CH1 Falling Channel 0 rising edge, Channel 1 falling edge 3：CH0 Falling，CH1 Falling Channel 0 falling edge, Channel 1 falling edge	0
Encoder 0 comparison output channel 0 pulse time	Encoder0 Compare Output CH0 Keep Time	0~65535 (unit: ms)	10
Encoder 0 comparison output channel 1 pulse time	Encoder0 Compare Output CH1 Keep Time	0~65535 (unit: ms)	10
Power-off storage enable	Power Down Storage	0: OFF 1: ON	1

6.4.3 Encoder Counting Function

The encoder counting parameters include 7 parameters: **encoder pulse mode**, **filter**, **count multiple**, **count range**, **ring count resolution**, **count direction** and **count initial value**.

Encoder pulse mode: The input pulse modes supported by encoder count include AB quadrature mode, direction-pulse mode and CW/CCW mode.

Encoder filter: Encoder filter is valid in all three pulse modes. There are 16 levels of filter (0~15). Level 0 means no filter and level 15 means the maximum filter. The default encoder filter parameter is level 7 and can be configured as needed.

Encoder count multiple: Encoder count multiple is only valid in AB quadrature pulse mode.

Encoder count range: The encoder count range can be set to 0~2^32-1 or 0~ring count resolution × count multiple -1. The former is suitable for most cases, and the latter is suitable for situations where the encoder has no Z-phase signal but still needs to be used for single-turn counting.

Encoder ring count resolution: The ring count resolution is used to set the encoder count range, and the setting range is 0~65535.

Note: The ring count resolution here differs from the physical resolution of the encoder itself. When the resolution is set to 0 and the count range is set to 1 (i.e., 0 ~ ring count resolution × count multiple - 1), the ring count function will be invalid.

Encoder count direction: The encoder count direction defaults to 0, which is forward count; When set to 1, the encoder will count in reverse after re-enabled.

Encoder count initial value: The encoder initial count value supports configuration and automatically takes effect after the encoder is re-enabled. The count initial value can be set within the range of 0 ~ 2^32-1. Note: When the power-off storage function is enabled, the count initial value is invalid; each encoder count initial value is 0. When the count initial value exceeds the maximum ring count value, the ring count function will not take effect.

Example 1: When the encoder 0 pulse mode is set to AB quadrature mode, the encoder count range is selected as 0~ring count resolution × count multiple - 1, the ring count resolution is set to 50000, the count multiple is set to 4, the count direction is forward, and the count initial value is 0, the count range will be 0~200000. The module is connected to an encoder with a physical resolution of 1000. After counting starts, the count value increments from 0. The encoder counts 1000×4=4000 per revolution. When reaching 200000, it resets to 0 and continues counting.

6.4.4 Probe function

The probe function parameters include **probe mode** and **probe trigger edge**. The encoder is equipped with 2 probe input channels. By inputting the corresponding signals to these probe input channels, the count value of the corresponding encoder can be latched.

Probe mode: The probe mode parameter can be used to configure each probe function channel of the encoder to single/continuous mode.

When the probe function channel is configured in single mode, after the probe function is enabled, the count value can be latched once when the channel input meets the set condition. When subsequent input meets the set condition, it will not trigger latching again unless the probe function channel is re-enabled.

When the probe function channel is configured in continuous mode, after the probe function is enabled, each time the channel input meets the set conditions, the count value can be latched once, allowing multiple latching of the count value.

Probe trigger edge: The probe trigger edge parameter can be used to configure each probe function channel of the encoder to be rising edge/falling edge trigger. The two probe function channels of the encoder can be individually configured for latch trigger signals, and the latched values can be displayed separately.

The probe input channels are compatible with PNP/NPN signals through the COM terminal. When the COM terminal is connected to 0V, input signals are PNP-type, high-level 24V output signals are valid, and low-level 0V output signals are invalid. When the COM terminal is connected to 24V, the input signal is NPN-type, a low-level 0V output signal is valid and a high-level 24V output signal is invalid.

Rising edge trigger indicates the probe input channel transitions from an invalid signal to a valid signal, while falling edge trigger indicates the transition from a valid signal to an invalid signal.

6.4.5 Comparison output function

The comparison output function is configured by enabling the comparison output channel, setting the comparison output value, the comparison direction, the single/repeated trigger mode, and the comparison output channel pulse time. When the encoder count value reaches the set value and satisfies the comparison direction, the corresponding comparison output channel will output a pulse with adjustable time. The adjustable time is the comparison output pulse time. The pulse output response speed of the comparison output function can reach the 10μs level.

The configuration parameters of the comparison output function include **the encoder comparison output channel pulse time**, and the configurable time range is 0~65535ms.

The encoder is equipped with 2 comparison output channels. The enable status, set value, comparison direction, and single/repeated trigger mode of the comparison output channels can all be configured via downlink data. When the comparison output channel function is disabled, the comparison output channel can be used as a general digital output.

Example 1: When Encoder 0 Comparison Output Channel 1 is used as a general digital output, the output value is set to 0 (NPN type output, the output is 24V at this time), and the channel indicator is off.

Encoder 0 Comparison Output Channel 1 is configured with a set value of 1000, a set comparison direction of increasing comparison, a comparison trigger mode of single trigger, and pulse duration of 5s. When the comparison input channel 1 function is enabled and the count value of Encoder 0 reaches 1000 in ascending order (meeting the comparison direction), the comparison input channel 1will be used as a comparison input channel, and its output state will toggle from the original high-level output to low-level output. The pulse output duration will be 5s, and the channel indicator will remain steadily lit for 5s. After 5 seconds, it returns to high-level output and the channel indicator turns off. When the count value meets the set value and comparison direction again, the comparison output channel remains inactive due to being configured in single trigger mode.

Example 2: When the E0 Comparison Output Channel 1 is used as a general digital output, the output value is set to 1 (NPN output, the output is 0V at this time), and the channel indicator is steadily lit.

E0 Comparison Output Channel 1 is configured with a set value of 1000, a comparison direction of decreasing comparison, a comparison output trigger mode of repeated trigger, and the pulse duration of 5s. When the comparison output channel 1 function is enabled and the count value of E0 reaches 1000 in ascending order (not meeting the comparison direction), the comparison output channel 1 is inactive. When the count value of E0 reaches 1000 in descending order (meeting the comparison direction), the comparison output channel will be used as a comparison output channel, and its output state will toggle from the original low-level output to high-level output. The pulse output duration will be 5s, and the channel indicator will turn off for 5s. After 5s, it returns to low-level output, and the channel indicator remains steadily lit.

When the comparison output trigger mode is set to repeated trigger and the count value meets the comparison output setting and direction again within the 5s pulse output duration, the comparison output channel will not change its pulse output state and will continue to complete the 5s pulse output. When the comparison condition is met again after 5s, the state will flip once more, changing from the original high-level output to low-level output. The pulse duration will be 5 s, and the channel indicator will turn off for 5 s. The comparison output repeated trigger mode follows this pattern accordingly.

6.4.6 Power-off storage function

When the power-off storage enable parameter is activated, the encoder count value can be stored in case of system power failure. Default value 1 means the power-off storage function is enabled; when it is set to 0, the power-off storage function will be disabled.

When the power-off storage function is enabled, the initial encoder count value is invalid; each initial encoder count value is 0.

6.4.7 Usage Example

- **Encoder 0 inputs AB quadrature pulses with 40,000 pulses, and Encoder 0 probe input channel 0 performs latching**
  a. The parameters are configured;
     a) Encoder0 pulse mode is set to AB quadrature pulse mode, i.e., Encoder0 Pulse Mode is set to 0: ABZ;
     b) Encoder0 count multiple is set to 4x, i.e., Encoder0 Count Multiple is set to MUL_4;
     c) Encoder0 count range is set to 0~ring count resolution × count multiple-1, i.e., Encoder0 Count Range is set to 1: Resolution×Multiple;
     d) Encoder0 ring count resolution is set to 20000, i.e., Encoder0 Count Resolution is set to 20000;
     e) Encoder0 count direction is set to forward count, i.e., Encoder0 Count Direction is set to 0: Forward;
     f) Encoder0 count initial value is set to 0, i.e., Encoder0 Count Initial Value is set to 0;
     g) Encoder 0 probe mode is set to Channel 0 Single and Channel 1 Single, i.e., Encoder0 Latch Trigger Mode is set to 0: CH0 Single, CH1 Single;
     h) Encoder 0 probe trigger edge is set to Channel 0 Rising Edge and Channel 1 Rising Edge, i.e., Encoder0 Latch Trigger Edge is set to 0: CH0 Raising, CH1 Raising;
  b. The count function of Encoder 0 is set to "Enable" and the latching of probe input Channel 0 for Encoder 0 is set to "Enable";
     a) The downlink data E0 Enable is set to 1;
     b) The downlink data E0 Latch CH0 Enable is set to 1;
  c. Encoder 0 starts inputting pulses, and the probe input channel 0 of encoder 0 receives a valid signal.

- **Encoder 0 inputs directional pulses with a count of 40,000, and the comparison output channel 0 of encoder 0 performs a comparison output.**
  a. The parameters are configured;
     a) The pulse mode of encoder 0 is set to direction pulse mode, i.e., Encoder0 Pulse Mode is set to 1: Pul+Dir;
     b) The count range of encoder 0 to 0~2^32-1, i.e., Encoder0 Count Range is set to 0: 2^32;
     c) Encoder0 count direction is set to forward count, i.e., Encoder0 Count Direction is set to 0: Forward;
     d) Encoder0 count initial value is set to 0, i.e., Encoder0 Count Initial Value is set to 0;
     e) The pulse duration of Encoder 0 Compare Output Channel 0 is set to 10s, i.e., Encoder0 Compare Output CH0 Keep Time is set to 10000;
  b. Encoder 0 count is set to "Enable", configure the comparison set value, comparison direction, and comparison mode are set and enable for Encoder 0 Compare Output Channel 0;
     a) The downlink data E0 Enable is set to 1;
     b) The downlink data E0 Compare Value CH0 is set to 1000;

c) The downlink data E0 Compare Output CH0 Direction is set to 1 for increment comparison;
d) The downlink data E0 Compare Output CH0 Mode is set to 1 for repeated trigger;
e) Downstream data E0 Compare Output CH0 is set to 1 for enabling;

c. Encoder 0 starts inputting pulses.

6.5 Absolute encoder module

6.5.1 Process data

Uplink data 13 bytes				
Name	**Meaning**	**Value range**	**Data type**	**Length**
E0 Input CH0 (Latch)	Encoder probe input signal channel 0	0: No signal input 1: Signal input detected	bool	1 bit
E0 Input CH1 (Latch)	Encoder probe input signal channel 1	0: No signal input 1: Signal input detected	bool	1 bit
E0 Input CH2	Encoder general input signal channel 2	0: No signal input 1: Signal input detected	bool	1 bit
E0 Latched Flag CH0	Encoder probe input channel 0 latched completion flag	0: 1->0 latch once and toggle once 1: 0->1 latch once and toggle once	bool	1 bit
E0 Latched Flag CH1	Encoder probe input channel 1 latched completion flag	0: 1->0 latch once and toggle once 1: 0->1 latch once and toggle once	bool	1 bit
E0 Count Value	Encoder count value	0~2^32-1	unsigned32	4 bytes
E0 Latch Value CH0	Latch value of encoder probe input channel 0	0~2^32-1	unsigned32	4 bytes
E0 Latch Value CH1	Latch value of encoder probe input channel 1	0~2^32-1	unsigned32	4 bytes

Uplink data description:

- **Encoder probe input signal channel E0 Input CH0/CH1 (Latch)**
  Each encoder is equipped with 2 probe input channels, indicating the presence or absence of input signals from the corresponding probe input channels.
  When the probe input channel latch function is not enabled, it can be used as a general digital input channel.

- **Encoder general input signal channel E0 Input CH2**
  Each encoder is equipped with 1 general digital input channel, indicating the presence or absence of input signals from the corresponding DI channel.

- **Encoder probe input channel latched completion flag E0 Latched Flag CH0/CH1**
  One encoder is equipped with 2 probe input channels. After a probe input channel completes one latching operation, the flag bit will toggle from 0->1 or 1->0.
  Example 1: The Encoder probe input channel latched completion flag is 0. After completion of one latching operation, the flag bit changes to 1. After another latching operation, the flag bit changes back to 0.

- **Encoder count value E0 Count Value**
  The encoder count value represents the current count value of the corresponding encoder, with a numerical range of 0 to 2^32-1. The actual counting range of an encoder is determined by the LSB position and MSB position of the encoder. The count range of the encoder is $0\sim2^{MSB-LSB+1}-1$.

- **Encoder probe input channel latch value E0 Latch Value CH0/CH1**
  Each encoder is equipped with 2 probe input channels. By inputting signals that meet the set conditions to the probe input channels, the current count value of the corresponding encoder can be quickly latched, with a numerical range of 0~2^32-1. The actual counting range of an encoder is determined by the LSB position and MSB position of the encoder. The count range of the encoder is $0\sim2^{MSB-LSB+1}-1$; The latch value has the same range as the count value, which is $0\sim2^{MSB-LSB+1}-1$.

Downlink data 1 byte				
Name	**Meaning**	**Value range**	**Data type**	**Length**
E0 Output CH0	Encoder output channel 0	0: high-level output 24V 1: low-level output 0V	bool	1 bit
E0 Output CH1	Encoder output channel 1	0: high-level output 24V 1: low-level output 0V	bool	1 bit
E0 Output CH2	Encoder output channel 2	0: high-level output 24V 1: low-level output 0V	bool	1 bit
E0 Output CH3	Encoder output channel 3	0: high-level output 24V 1: low-level output 0V	bool	1 bit
E0 Latch CH0 Enable	Encoder probe input channel 0 latch enabled	0: Disabled 1: Enable	bool	1 bit
E0 Latch CH1 Enable	Encoder probe input channel 1 latch enabled	0: Disabled 1: Enable	bool	1 bit

Downlink data description:

- **E0 Output CH0/CH1/CH2/CH3 (general output)**
  Digital channel output (NPN): Setting to "0" will output 24V high level, while setting to "1" will output 0V low level.

- **E0 Latch CH0/CH1 Enable**

When the encoder input latch channel enable flag is set to 1, the latch function will be enabled; when it is set to 0, the latch function will be disabled

6.5.2 Definition of configuration parameters

The module configuration has a total of 8 parameters, as shown in the table below.

Function	Parameter name	Value range	Default value
Encoder SSI frame length	E0 Frame Length	10~40	13
Clock frequency for encoder data reading	E0 Clock Frequency	0：2MHz 1：1.5MHz 2：1MHz 3：500KHz 4：250KHz 5：125KHz	0
Encoder interval time	E0 Interval Time	1~50000 (unit: 100us)	1
Encoder encoding method	E0 Encoder Type	0: Binary (binary code) 1: Gray (Gray code)	1
LSB position of encoder position value	E0 LSB Position	0~39	0
MSB position of encoder position value	E0 MSB Position	1~40	12
Encoder 0 probe mode	E0 Latch Mode	0：CH0 Single, CH1 Single Channel 0 single, Channel 1 single 1：CH0 Repeat, CH1 Single Channel 0 repeat, Channel 1 single 2：CH0 Single, CH1 Repeat Channel 0 single, Channel 1 repeat 3：CH0 Repeat, CH1 Repeat Channel 0 repeat, Channel 1 repeat	0
Encoder 0 probe trigger edge	E0 Latch Edge	0：CH0 Raising, CH1 Raising Channel 0 rising edge, Channel 1 rising edge 1：CH0 Falling, CH1 Raising Channel 0 falling edge, Channel 1 rising edge	0

		2：CH0 Raising，CH1 Falling Channel 0 rising edge, Channel 1 falling edge	
		3：CH0 Falling，CH1 Falling Channel 0 falling edge, Channel 1 falling edge	

Parameter Description:

Encoder SSI Frame Length

LSB Position of Position Value

MSB Position of Position Value

The frame length parameter, combined with LSB and MSB position parameters, can set the encoder count resolution and total count value. Resolution refers to the incremental value per revolution of the encoder.

Clock frequency during reading of data

The default clock frequency is 0, i.e., 2MHz.

Interval time

The default value is 1, i.e., 100us, with a configurable range of 1~50000 (100us).

Encoder type

The default value is 1, i.e., enabling Gray code conversion. When it is set to 0, Gray code conversion will be disabled and the binary code will be used.

The probe function parameters include **the probe mode Latch Mode** and **the probe trigger edge Latch Edge**. Each encoder is equipped with 2 probe input channels. By inputting corresponding signals to the probe input channels, the count value of the corresponding encoder can be latched.

Probe mode: The probe mode parameter can be used to configure each probe function channel of the encoder to single/continuous mode.

When the probe function channel is configured in single mode, after the probe function is enabled, the count value can be latched once when the channel input meets the set condition. When subsequent input meets the set condition, it will not trigger latching again unless the probe function channel is re-enabled.

When the probe function channel is configured in continuous mode, after the probe function is enabled, each time the channel input meets the set conditions, the count value can be latched once, allowing multiple latching of the count value.

Probe trigger edge: The probe trigger edge parameter can be used to configure each probe function channel of the encoder to be rising edge/falling edge trigger. The latch trigger signals for the two probe function channels of each encoder can be configured individually, and the latched values can be displayed separately.

The probe input channels are compatible with PNP/NPN signals through the COM terminal. When the COM terminal is connected to 0V, input signals are PNP-type, high-level 24V output signals are valid, and low-level 0V output signals are invalid. When the COM terminal is connected to 24V, the input signal is NPN-type, a low-level 0V output signal is valid and a high-level 24V output signal is invalid.

Rising edge trigger indicates the probe input channel transitions from an invalid signal to a valid signal, while falling edge trigger indicates the transition from a valid signal to an invalid signal.

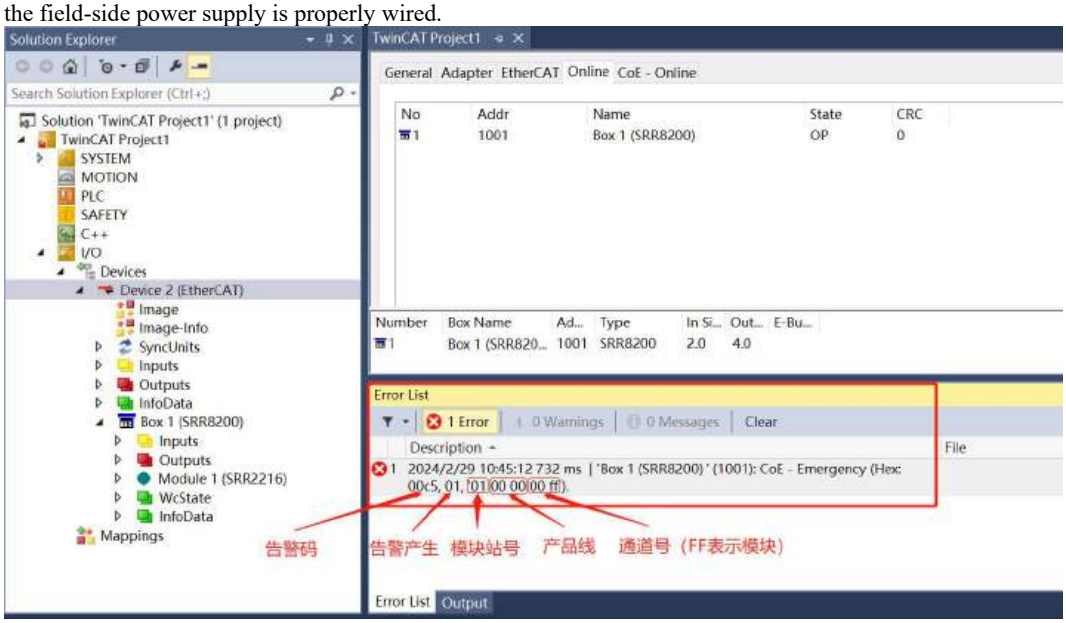
6.6 Fault Code Information

6.6.1 General Fault Codes for Couplers

Category	Serial Number	Error type	Error code	Event name	Event code (2#)	Event code (10#)	Event code (16#)	Handling method
General error	2	Online upgrade error	1	Firmware upgrade abnormality	0000000010000001	129	0x0081	Try upgrading again, check for environmental interference or oversized firmware
			2	Firmware incompatible with current module model	0000000010000010	130	0x0082	Check if the file is correct and whether there are any abnormalities or interference in the module
	3	Voltage error	5	Load-side voltage not connected	0000000011000101	197	0x00C5	Check if the field-site power supply is properly wired
	6	Channel error	4	Channel overflow/underflow	0000000110000100	388	0x0184	Check if the input signal of the corresponding channel exceeds the measurement range, and if the output signal exceeds the configurable range
	7	Parameter error	0	Abnormal parameter settings	0000000111000000	448	0x01C0	Check module parameter settings
	63	Communication error	1	Initialization failed	0000111111000001	4033	0x0FC1	Check if the module connection is normal
			2	Token timeout	0000111111000010	4034	0x0FC2	Check if there are any abnormalities or interference in the module
			3	Module operation offline	0000111111000011	4035	0x0FC3	Check if the module is online or experiencing interference
			4	Data parsing CRC error	0000111111000100	4036	0x0FC4	Check if there are any abnormalities or interference in the module

6.6.2 Fault Code Viewing

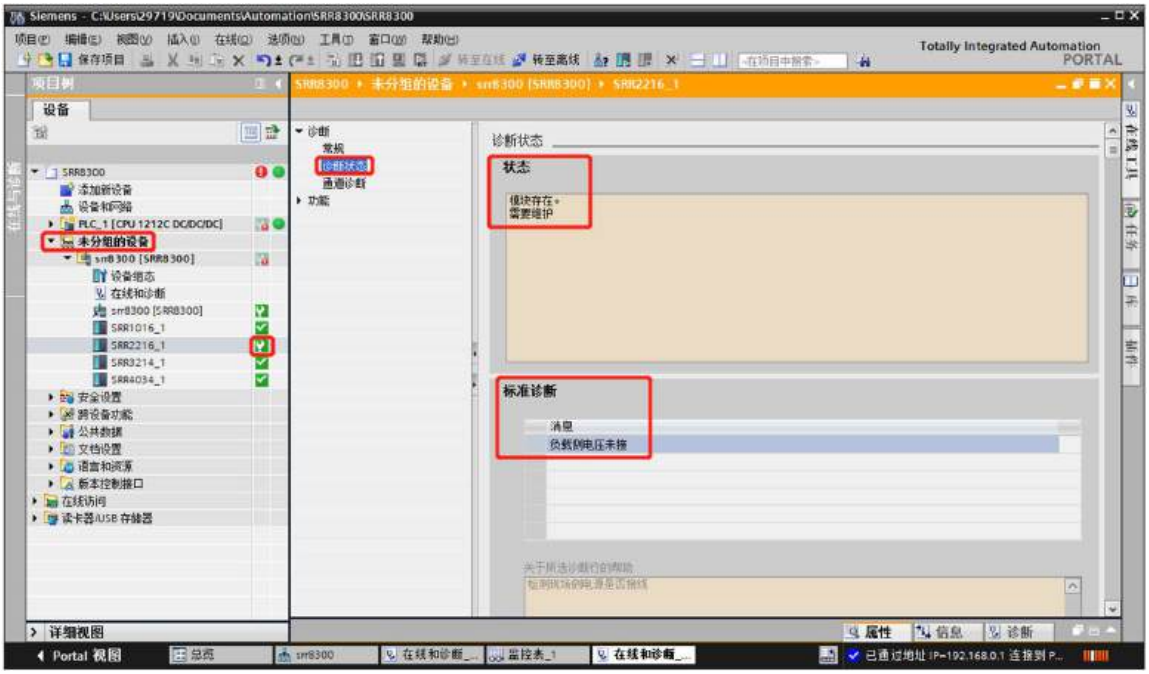
Taking TwinCAT3 software as an example, view alarm information under Error in the Error List window. As shown in the figure below, the alarm code is Hex: 00c5, indicating voltage error. The load-side voltage is not connected. Check if the field-side power supply is properly wired.



The method for viewing event information is shown in the table below:

Structure of event information							
byte0	byte1	byte2	byte3	byte4	byte5	byte6	byte7
Event code		Event status	Module station number	Product line		Channel number	
		Example 0x01: Event Generation 0x00: Event Disappearance				Example 0xFF: Channel-Level Event 0x00: Channel 0	

Taking TIA Portal V17 as an example, when a device fails during project operation, click the wrench icon on the right side of the device name under the project tree to view detailed diagnostic status and alarm information. As shown in the figure below, if it indicates power disconnection, you can check whether the field-side power supply is properly wired.



6.7 EtherCAT Coupler Configuration Application

6.7.1 Application in Sysmac Studio Software Environment

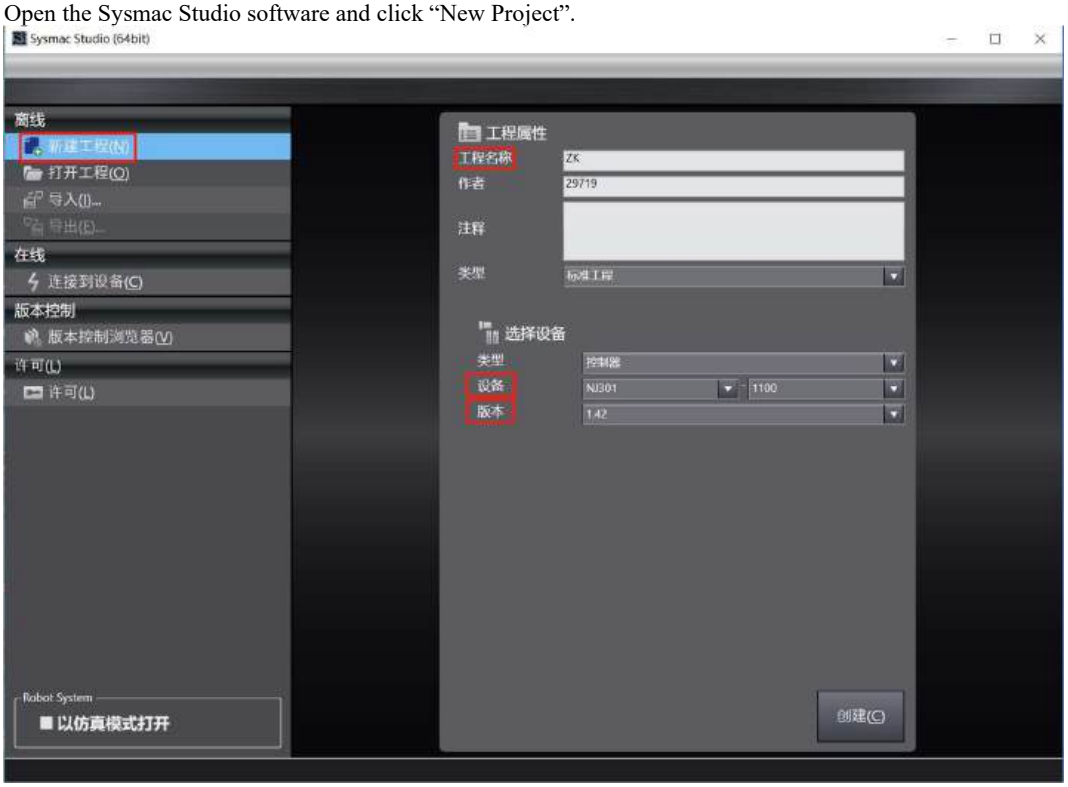
1. Preparation work

- **Hardware environment**
  - **Module preparation. This instruction takes the topology of SRR8200+SRR1016+SRR2116+SRR3214+SRR4034 as an example**
  - **One computer with Sysmac Studio software pre-installed**
  - **One Omron PLC**
    This instruction takes model NJ301-1100 as an example
  - **EtherCAT shielded cable**
  - **One switching power supply**
  - **Device configuration file**
    Please contact our staff for configuration files.
- **Hardware configuration and wiring**
  Please follow " 4 Assembly and disassemble" and " 5 Wiring"

- **Computer IP requirements**
  Set the computer's IP address and the PLC's IP address to ensure they are on the same subnet.

2. Create a new project

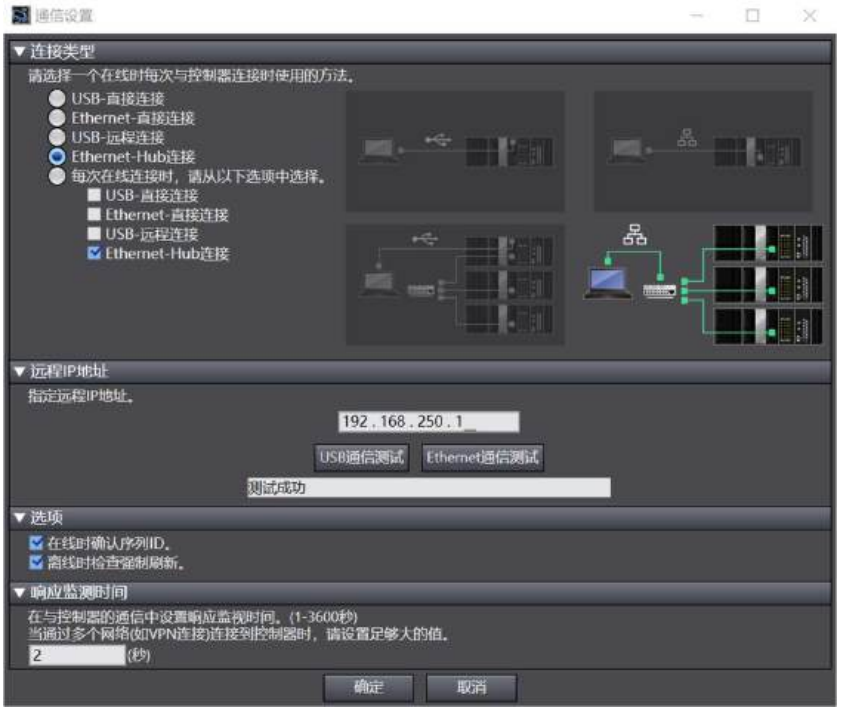
a. Open the Sysmac Studio software and click "New Project".



- Project Name: Custom.
- Select Device: Choose the corresponding PLC model under "Device", and select the corresponding version number under "Version".

b. After entering the project properties, click "Create".

c. Click the menu bar "Controller -> Communication Settings" to select the method used when connecting to the controller online each time, and enter the "Remote IP Address", as shown in the figure below.

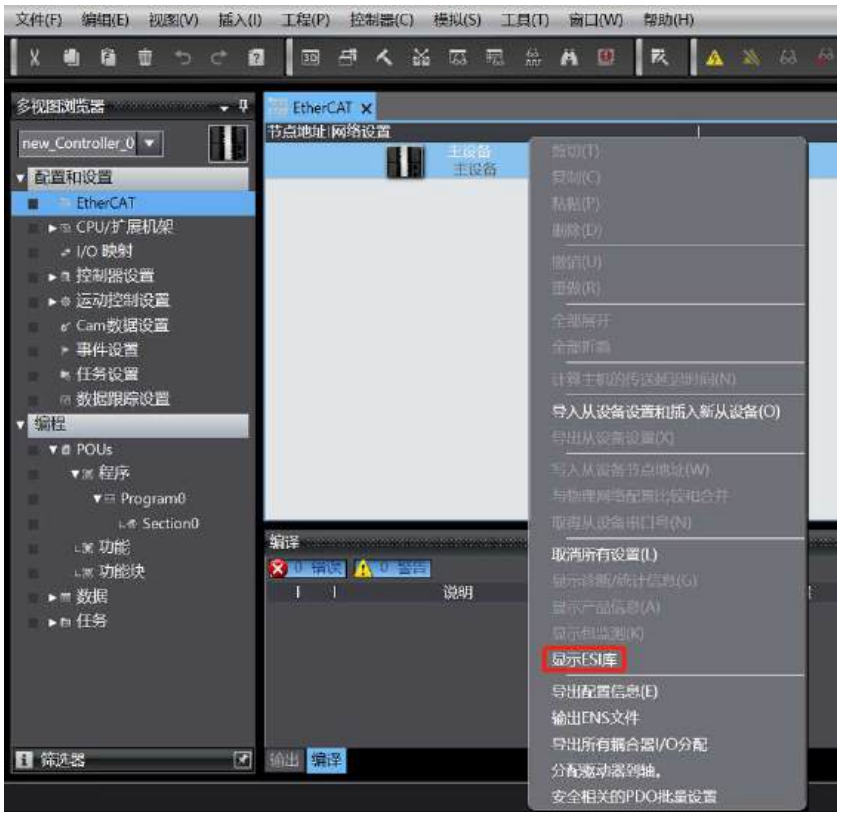


d. Click "Ethernet Communication Test", and the system displays a successful test.

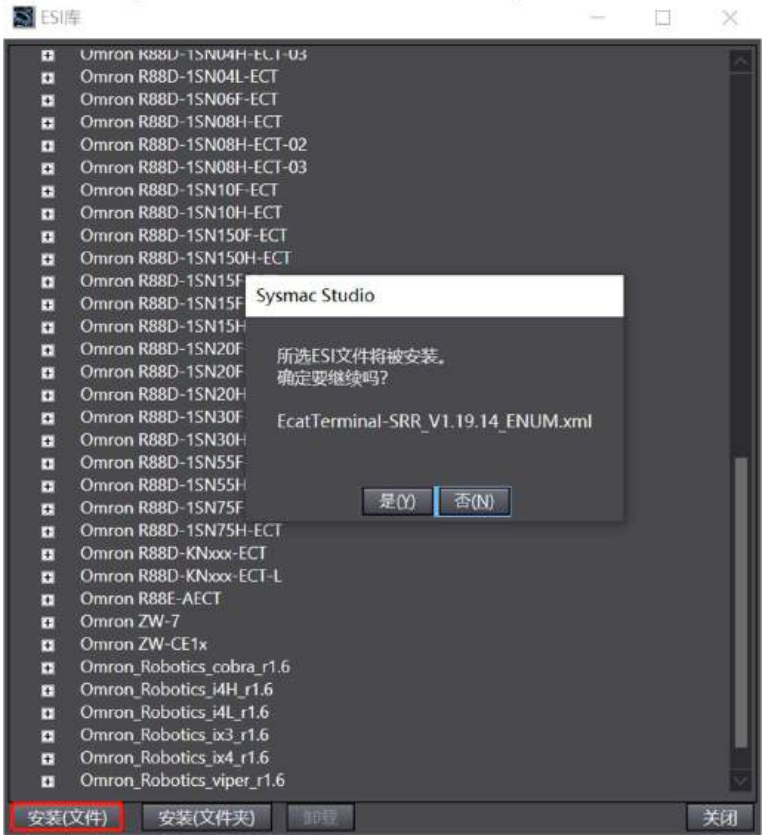
3. Install XML file

a. Expand "Configuration and Settings" in the left navigation tree, and then double-click "EtherCAT".

b. Right-click "Master Device", select "Show ESI Library", as shown in the figure below.



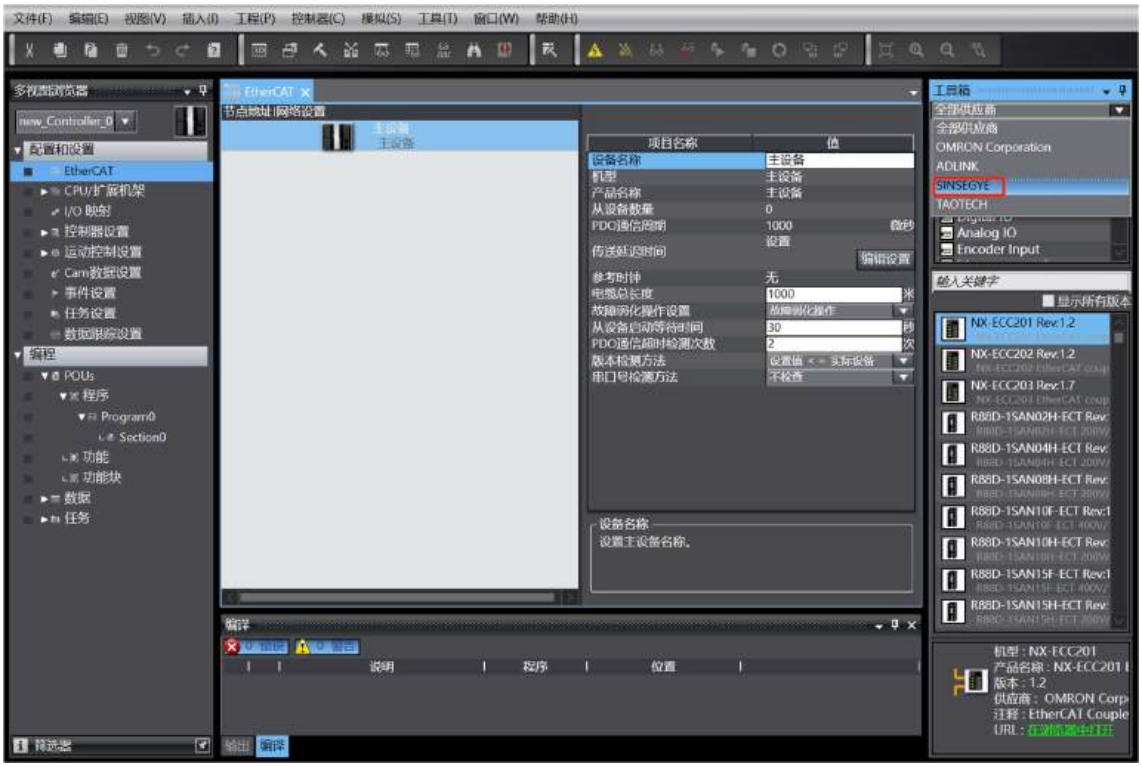
c. In the pop-up "ESI Library" window, click "Install (File)", select the module's XML file path, and then click "Yes" to complete the installation, as shown in the figure below.



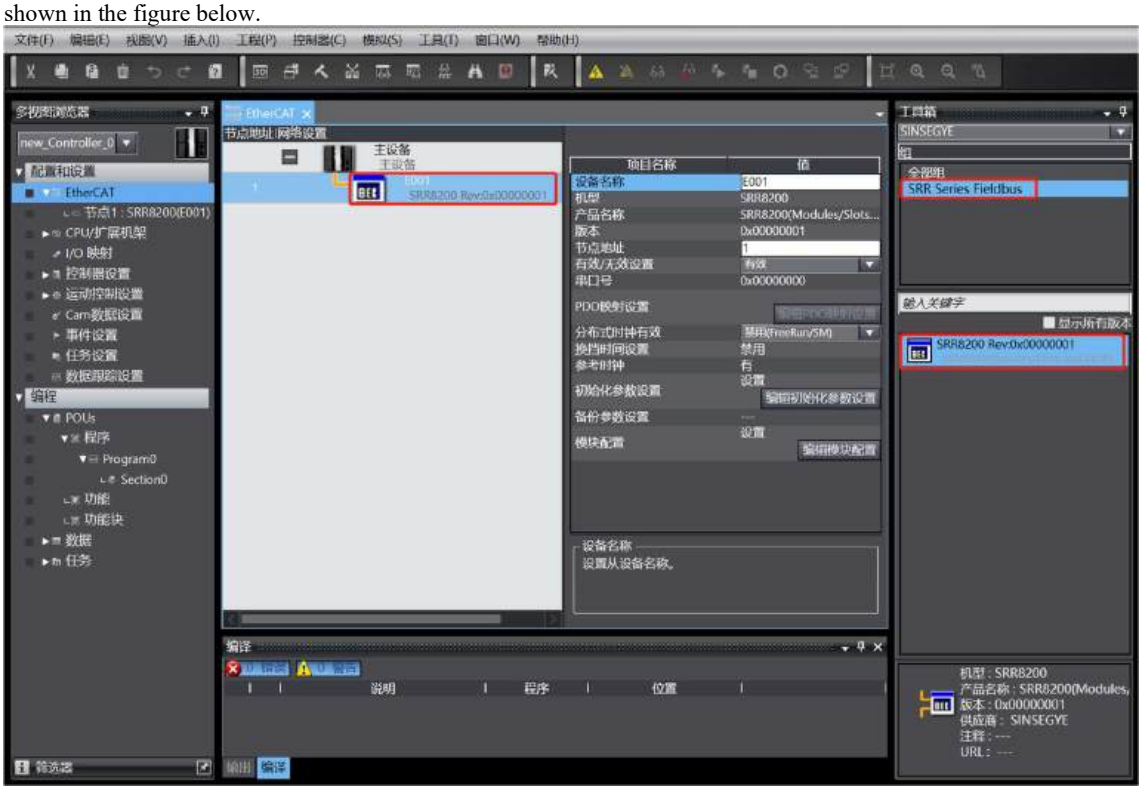
4. Add Device

There are two methods to add devices: online scanning and offline addition. This instruction takes offline addition as an example for demonstration.

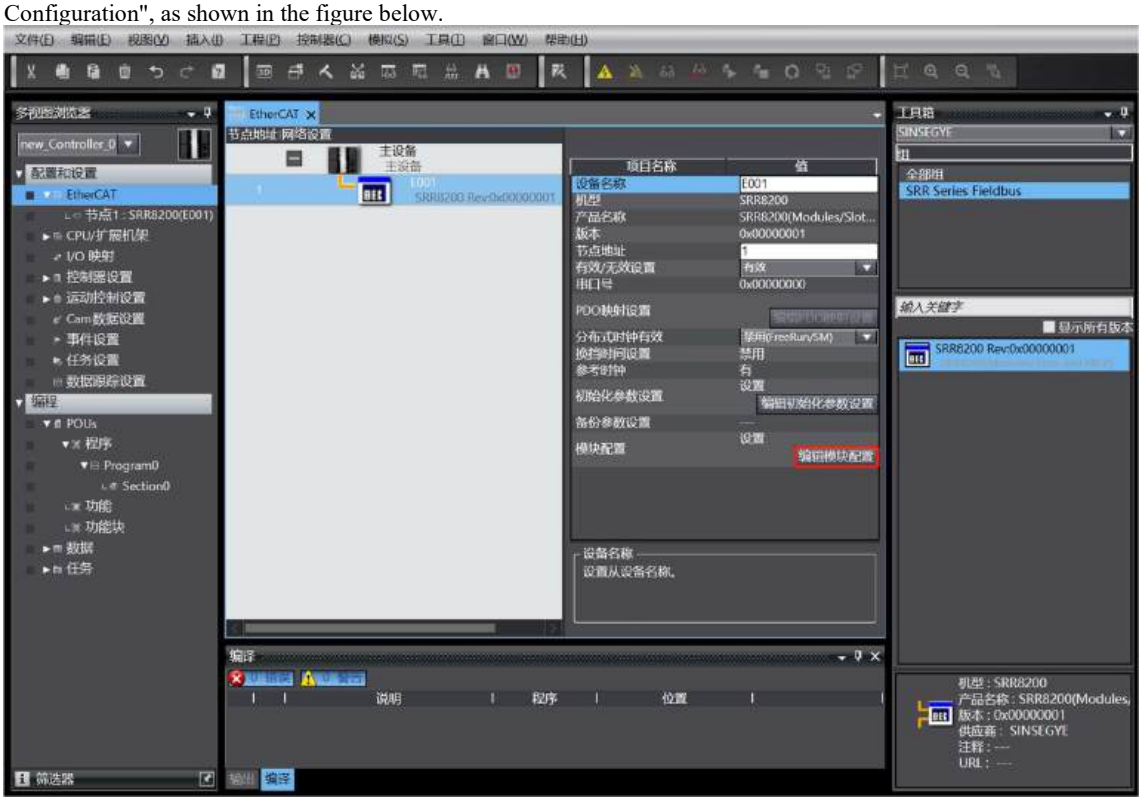
a. Under the "Toolbox" bar on the right, click to expand all vendors, select "SINSEGYE", as shown in the figure below.



b. Click to select SRR Series Fieldbus, and double-click the SRR8200 coupler module to add a slave device, as shown in the figure below.

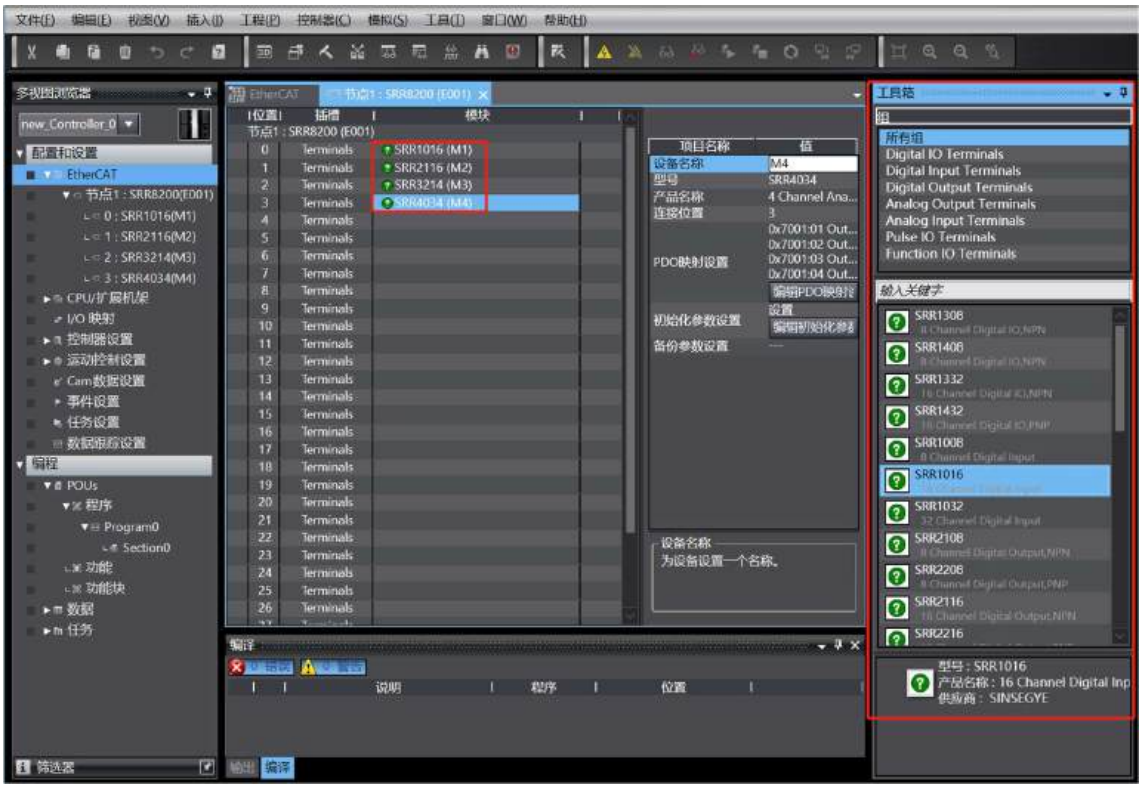


c. On the Home page of EtherCAT, select the newly added SRR8200 coupler module and choose "Edit Module Configuration", as shown in the figure below.



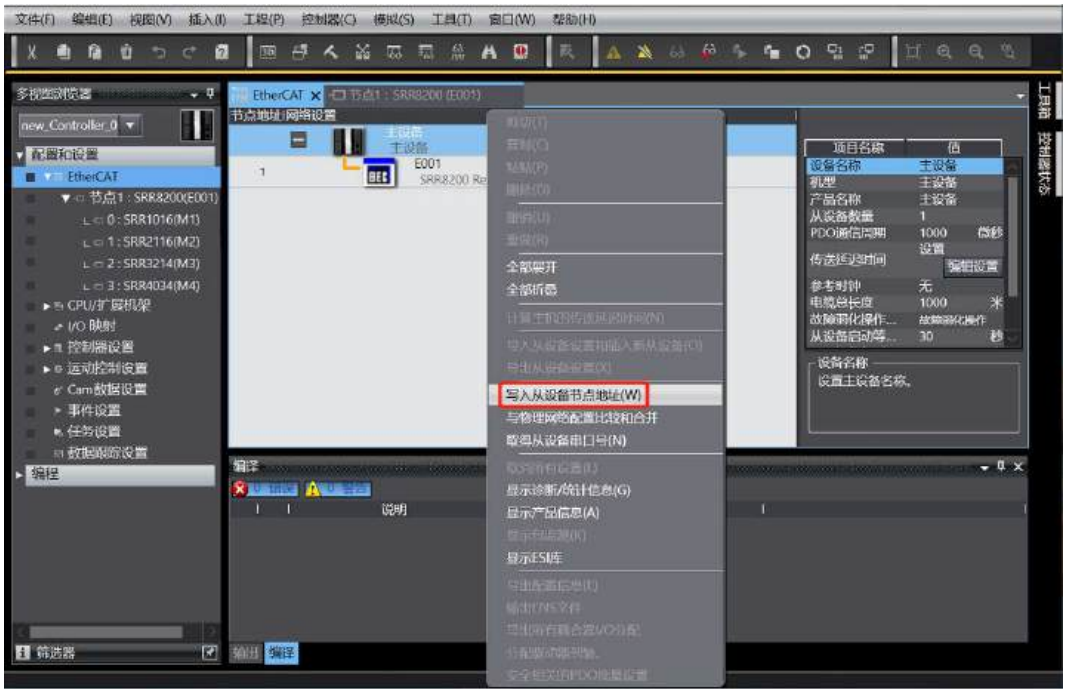
d. Position the cursor in the "Module", click on modules in the right toolbox module list, and add I/O modules one by one according to the I/O module configuration sequence. Note: The order and model must match the physical topology!

e.

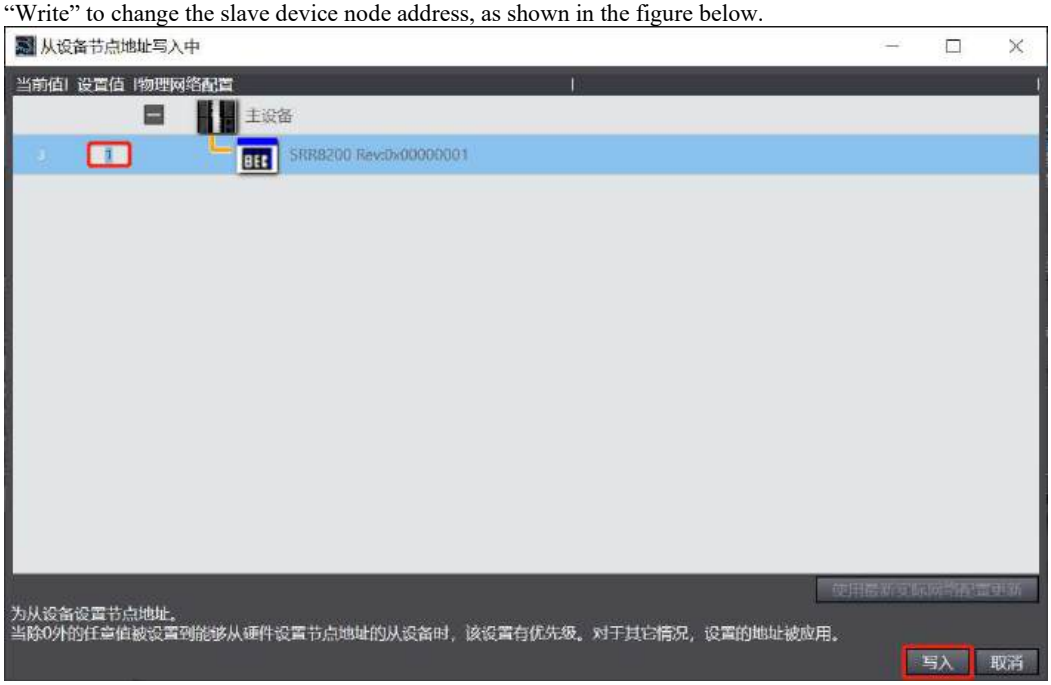


5. Set the node address

a. Click the menu bar "Controller -> Online" to switch the controller to online status. Right-click the master device and then click "Write Slave Device Node Address", as shown in the figure below.



b. In the window for setting the node address, click the value under “Set Value”, enter the node address, click “Write” to change the slave device node address, as shown in the figure below.

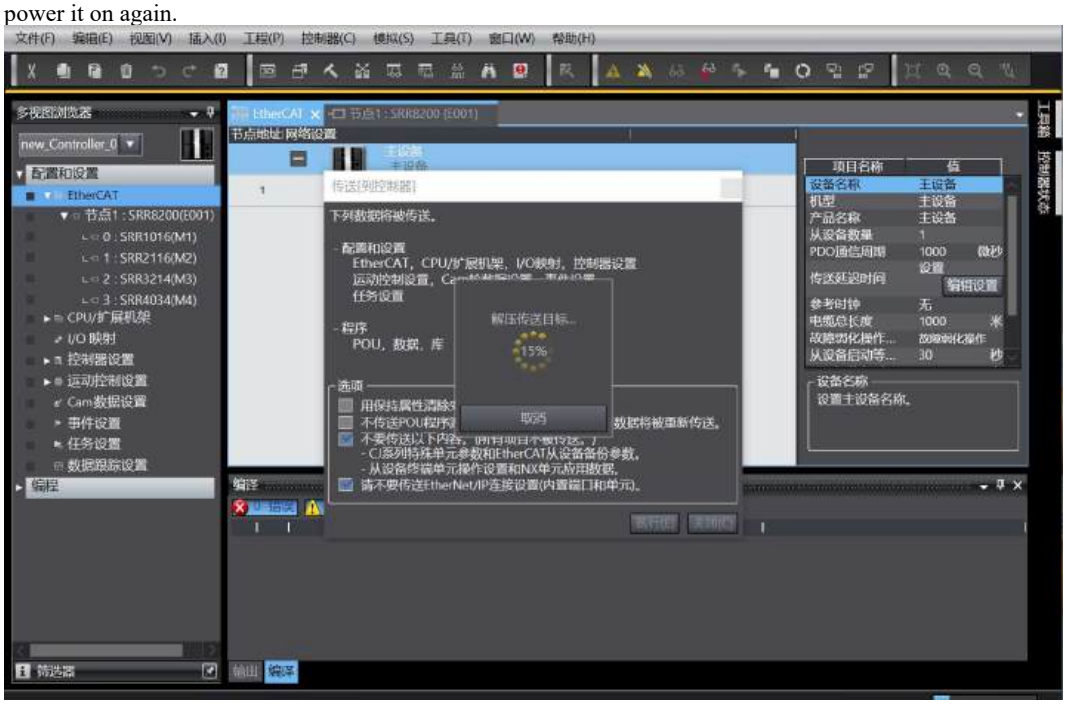


c. After writing, a “Power on again” prompt will pop up as shown in the figure below. Click “Write”, and then restart the slave device power according to the prompt.

6. Download the configuration to the PLC

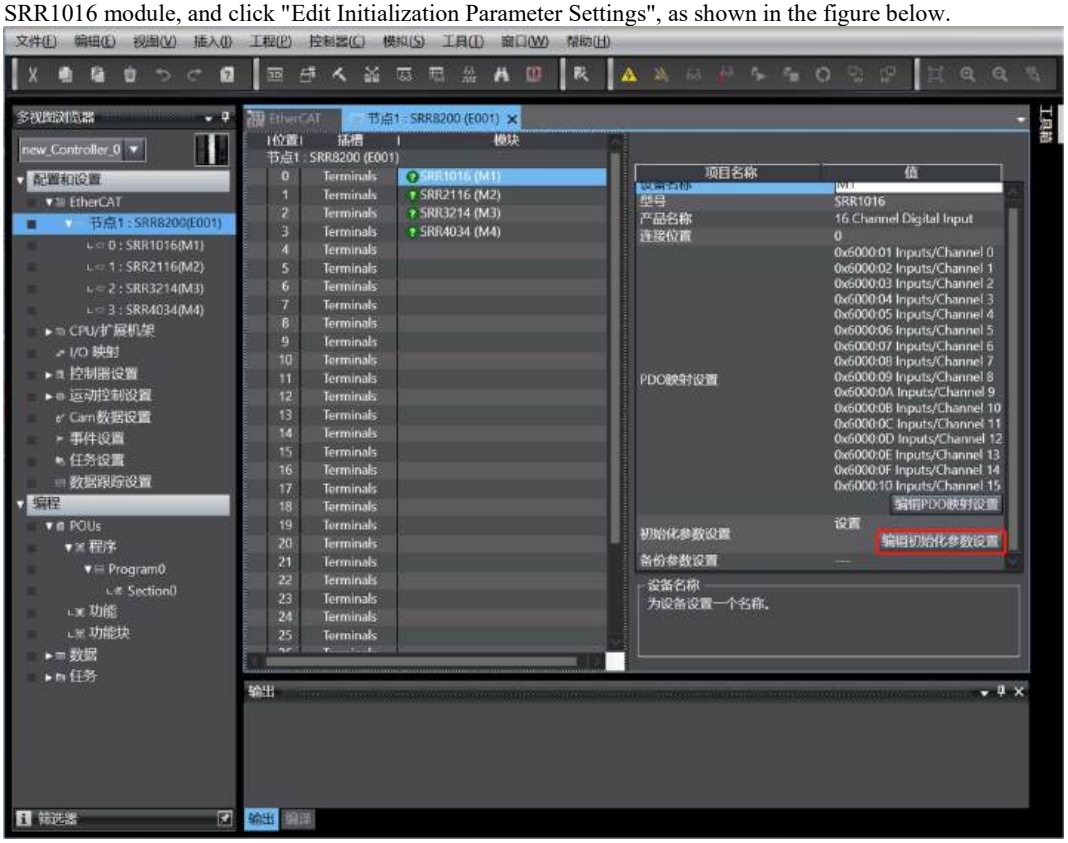
a. Click the “Controller -> Transferring (A) -> Transfer to Controller (T)” button in the menu bar, as shown in the figure below.

b. When the configuration is downloaded to the PLC, a transfer confirmation pop-up will appear. Click “Execute”, and then click “Yes/OK” in subsequent pop-ups as shown in the figure below. After completing the download, power it on again.



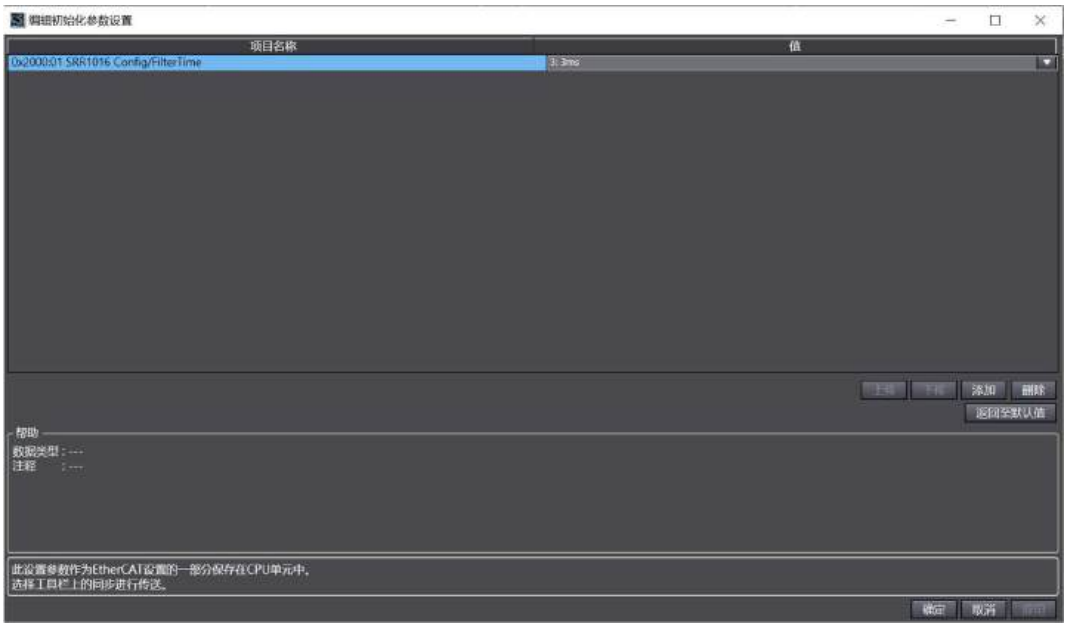
7. Parameter settings

a. Switch the configuration to the offline mode, then on the “Edit Module Configuration” page of Node 1, select the SRR1016 module, and click "Edit Initialization Parameter Settings", as shown in the figure below.

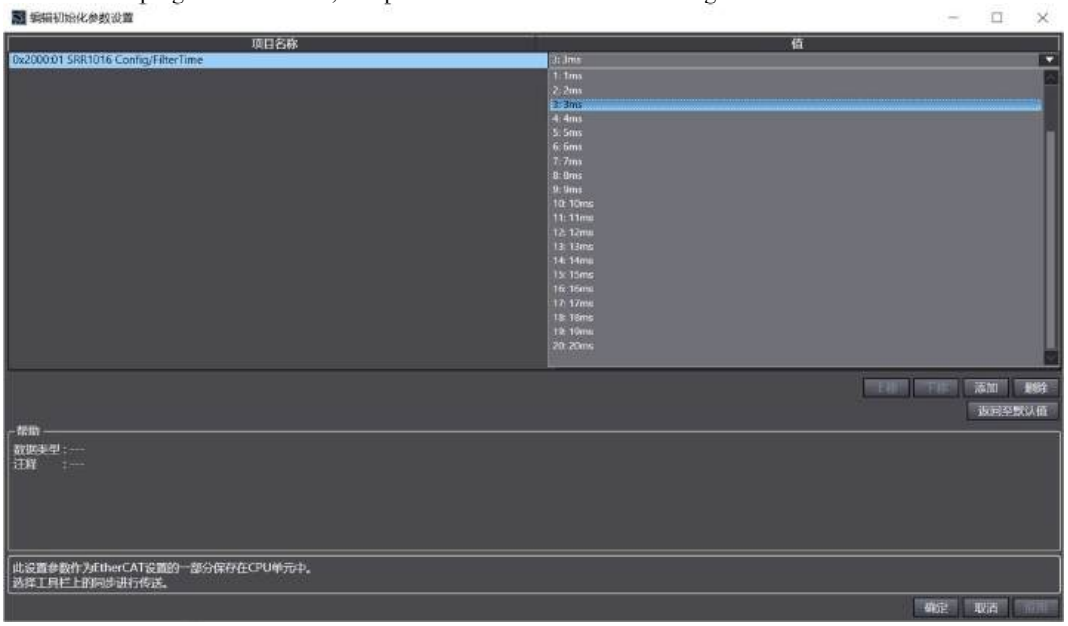


Note: If the PLC firmware version is too low, EC_CoESDOWrite and EC_CoESDORead commands shall be used to write and read SDO addresses.

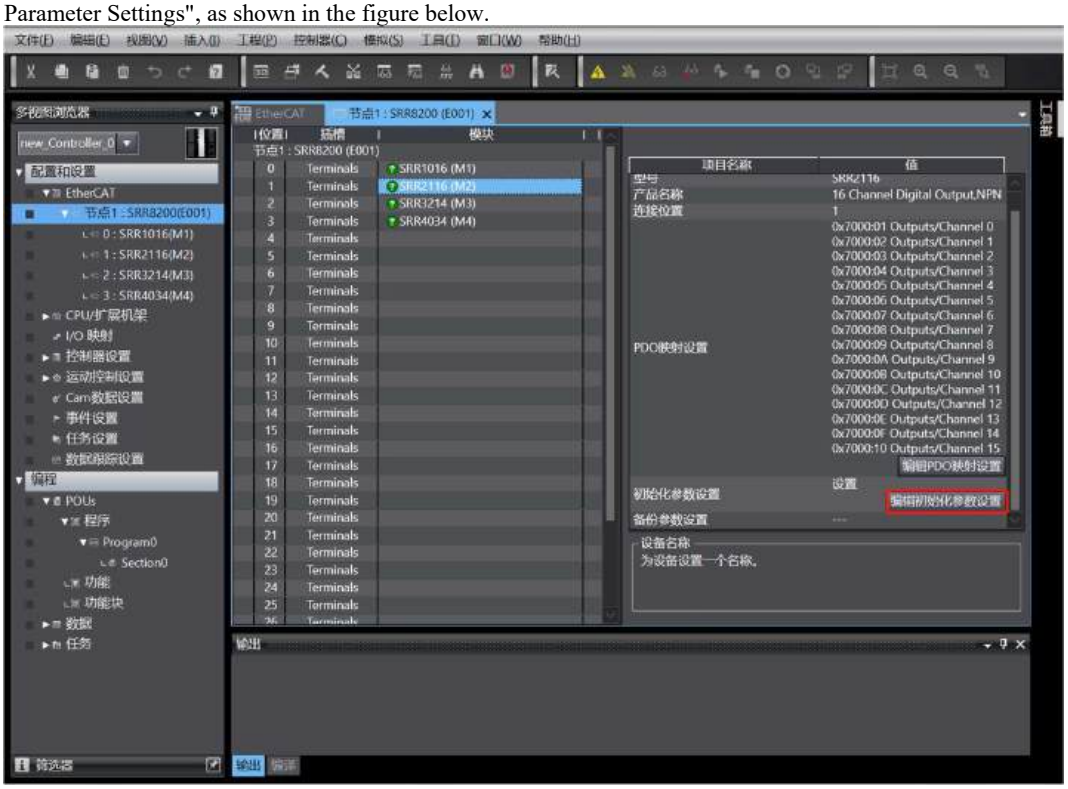
b. On the Parameter Settings page of SRR1016, the digital input filter function can be configured, as shown in the figure below.



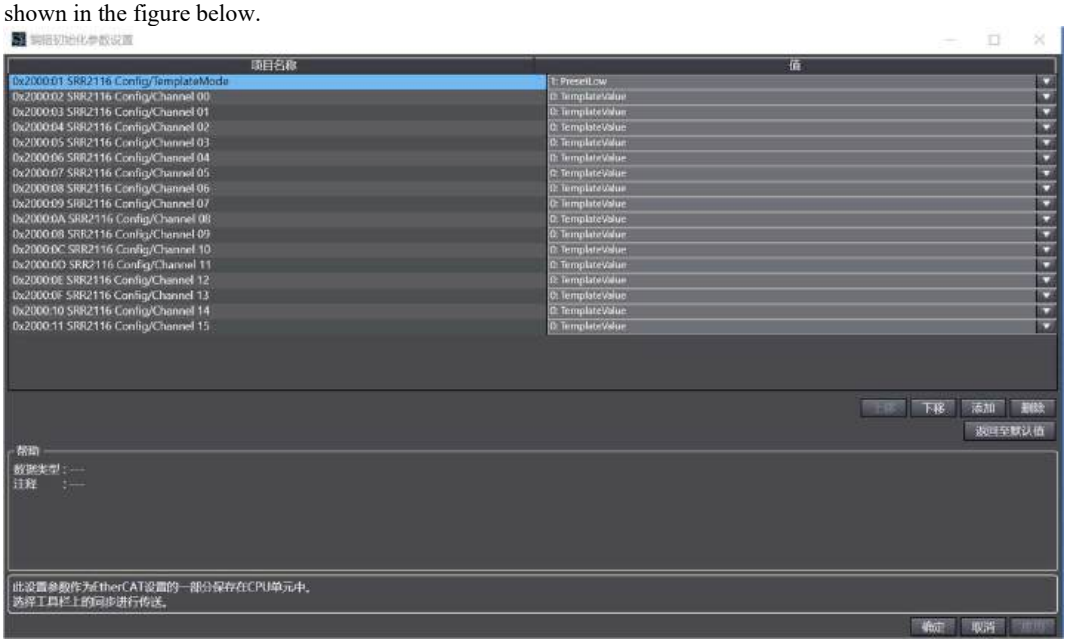
c. The digital input filter time (FilterTime) can be set in the range of 0~20ms. After completing the configuration, click "Apply" and then "OK", as shown in the figure below. After completing all parameter configurations, re-download the program to the PLC, and power on the PLC and modules again.



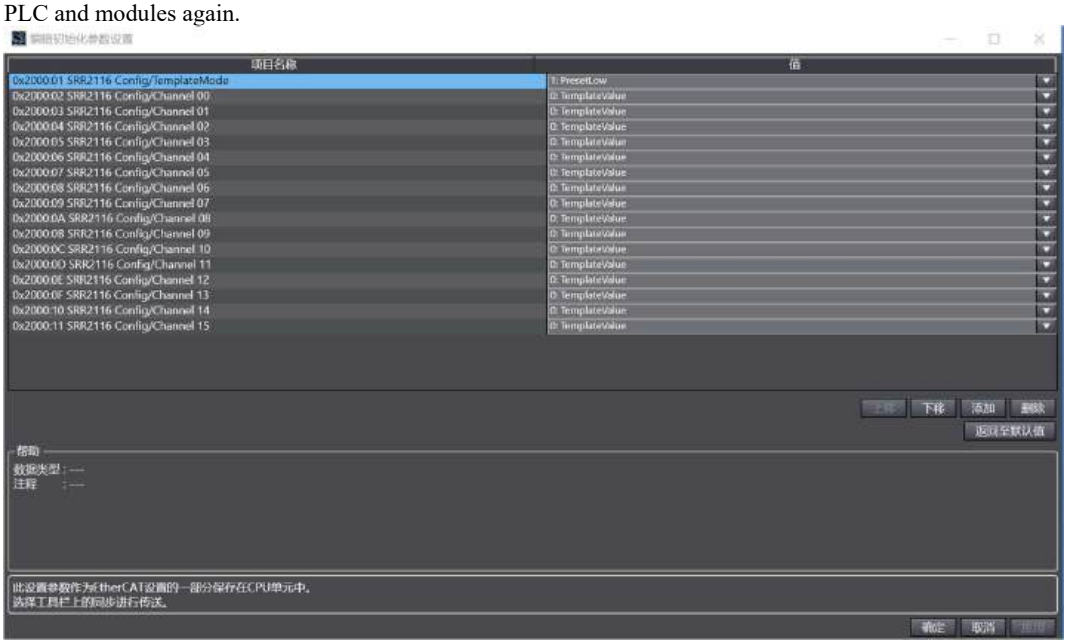
d. On the Edit Module Configuration page of Node 1, select the SRR2116 module and click "Edit Initialization Parameter Settings", as shown in the figure below.



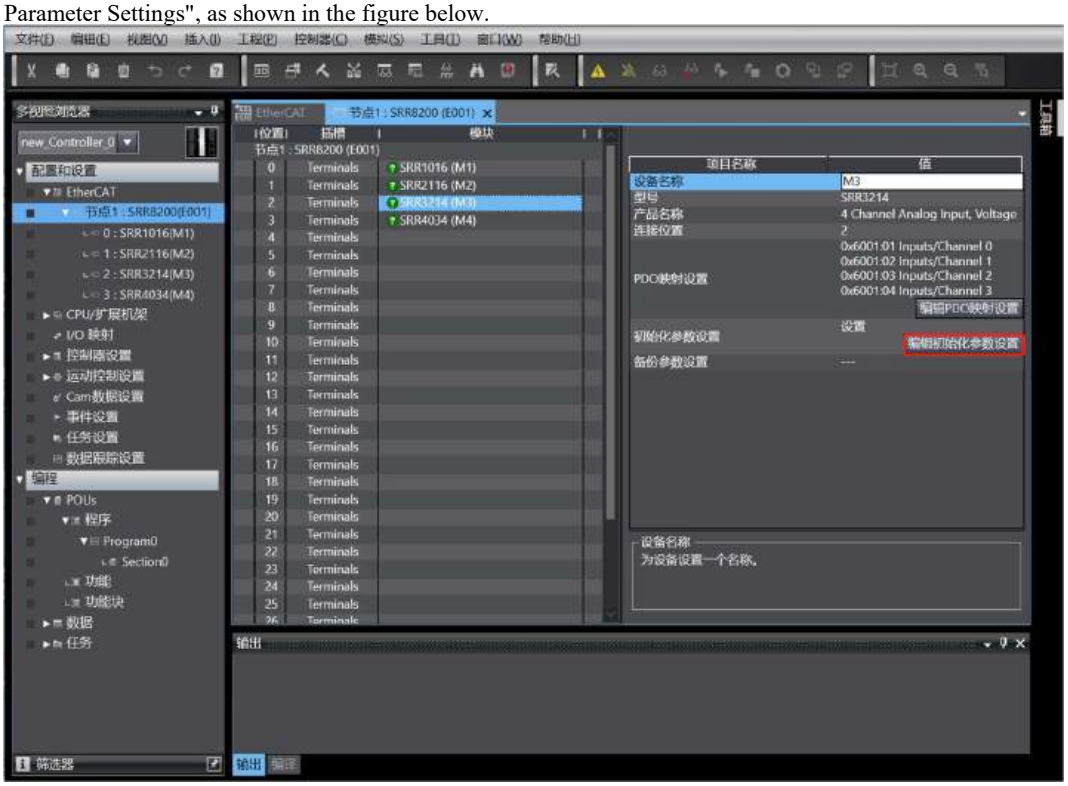
e. On the Parameter Settings page of SRR2116, the digital output signal clear/hold function can be configured, as shown in the figure below.



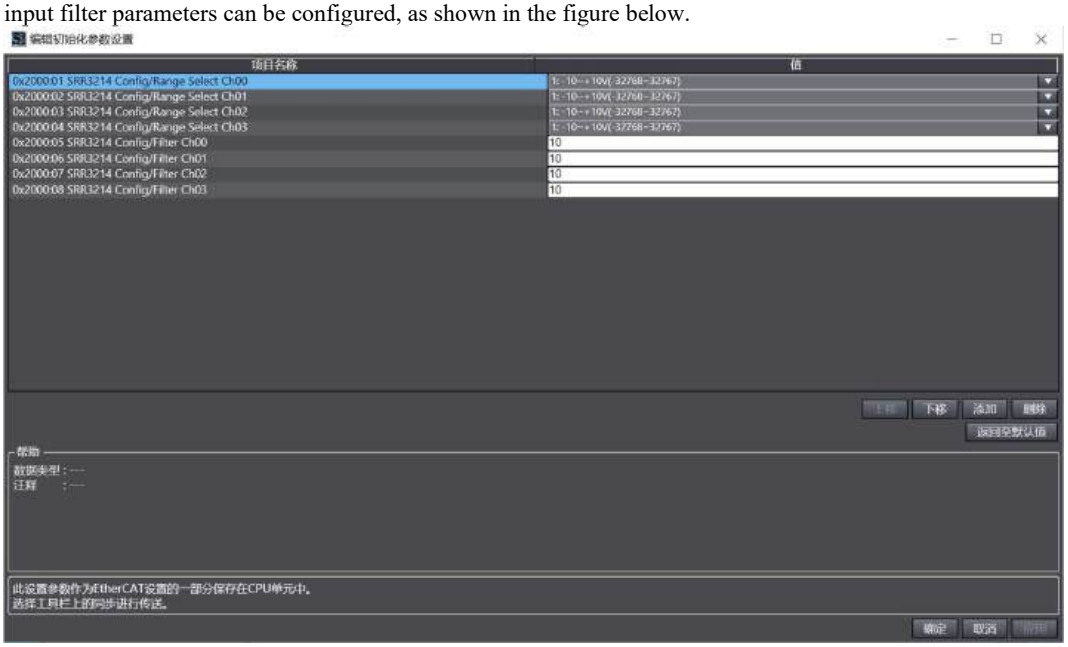
f. For the digital output signal clear/hold function, all channels are preset to output clear mode by default, and module channels can be configured separately. The corresponding relationship is detailed in 6.1.2 Digital output signal clear/hold. After the configuration is completed, click “Apply” and then “OK”, as shown in the figure below. After completing all parameter configurations, re-download the program to the PLC, and power on the PLC and modules again.



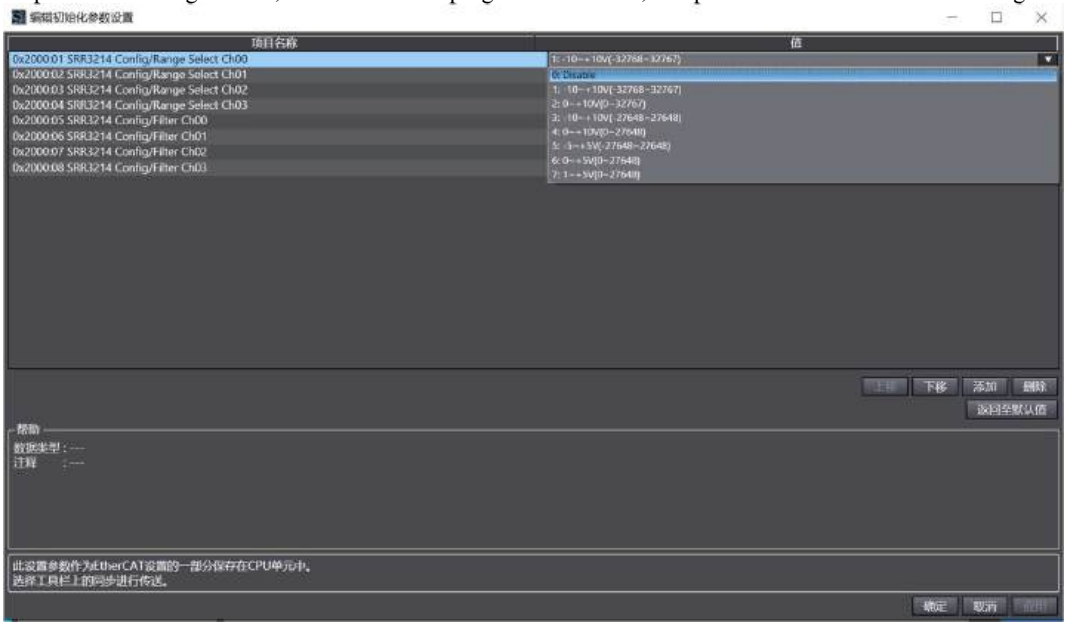
g. On the Edit Module Configuration page of Node 1, select the SRR3214 module and click "Edit Initialization Parameter Settings", as shown in the figure below.



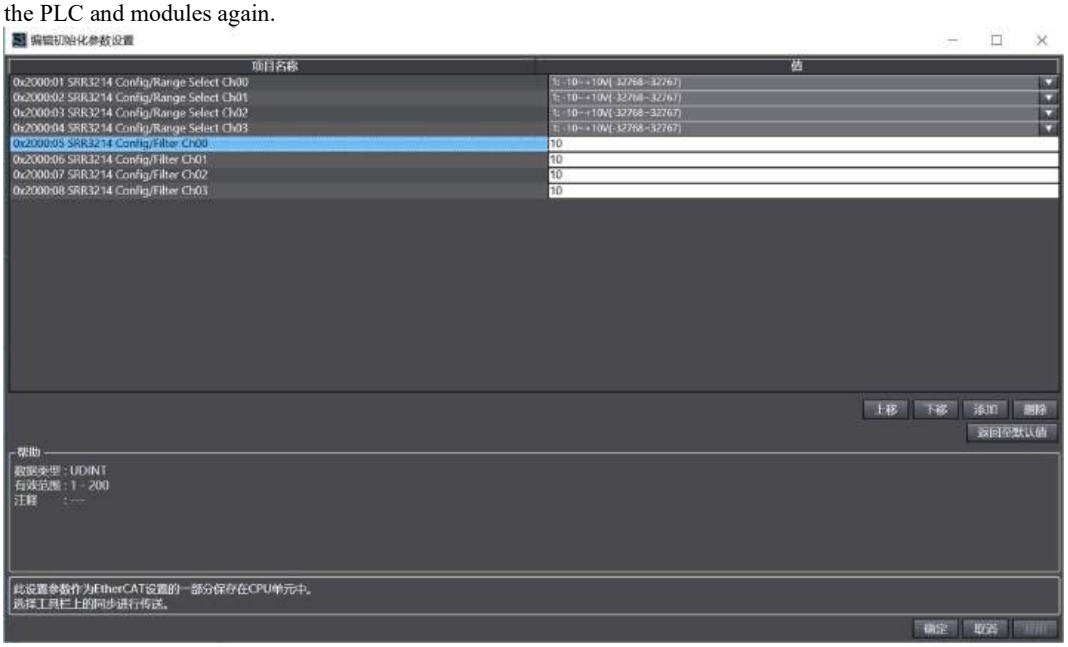
h. On the Parameter Setting page of SRR3214 analog voltage input module, the analog voltage range and analog input filter parameters can be configured, as shown in the figure below.



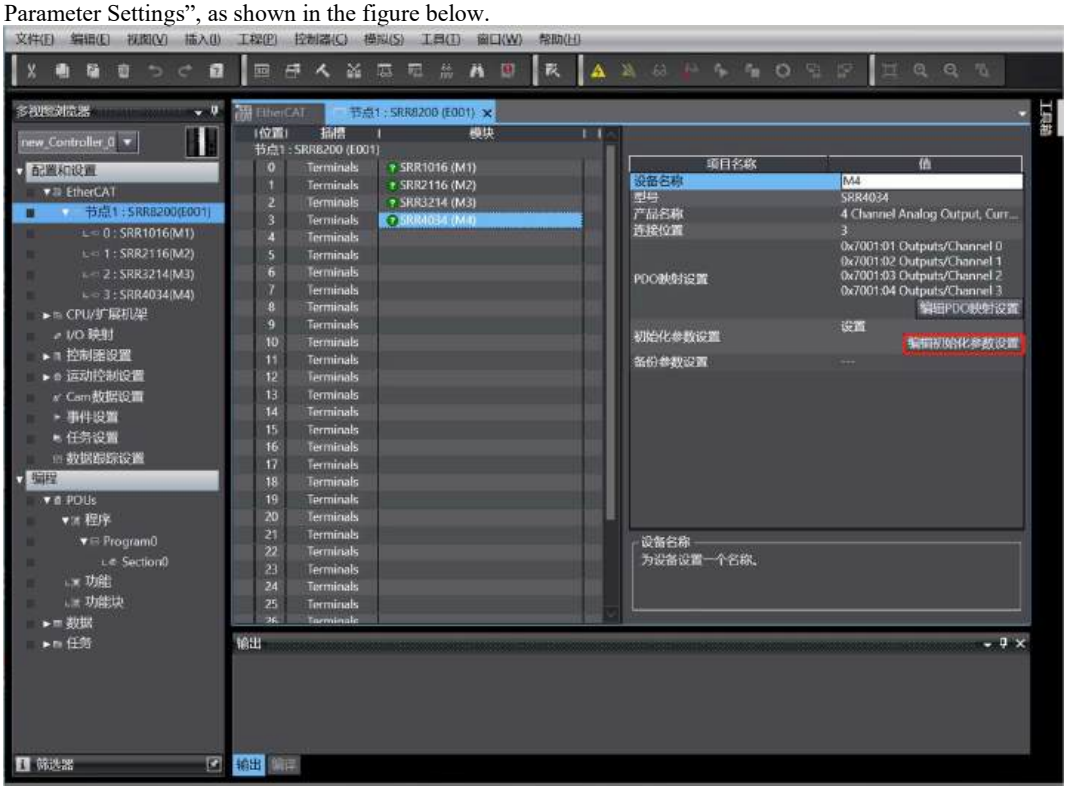
i. The analog input voltage can be configured into 8 range options, with independent configuration for each channel. After completing the configuration, click “Apply” and then “OK”, as shown in the figure below. After completing all parameter configurations, re-download the program to the PLC, and power on the PLC and modules again.



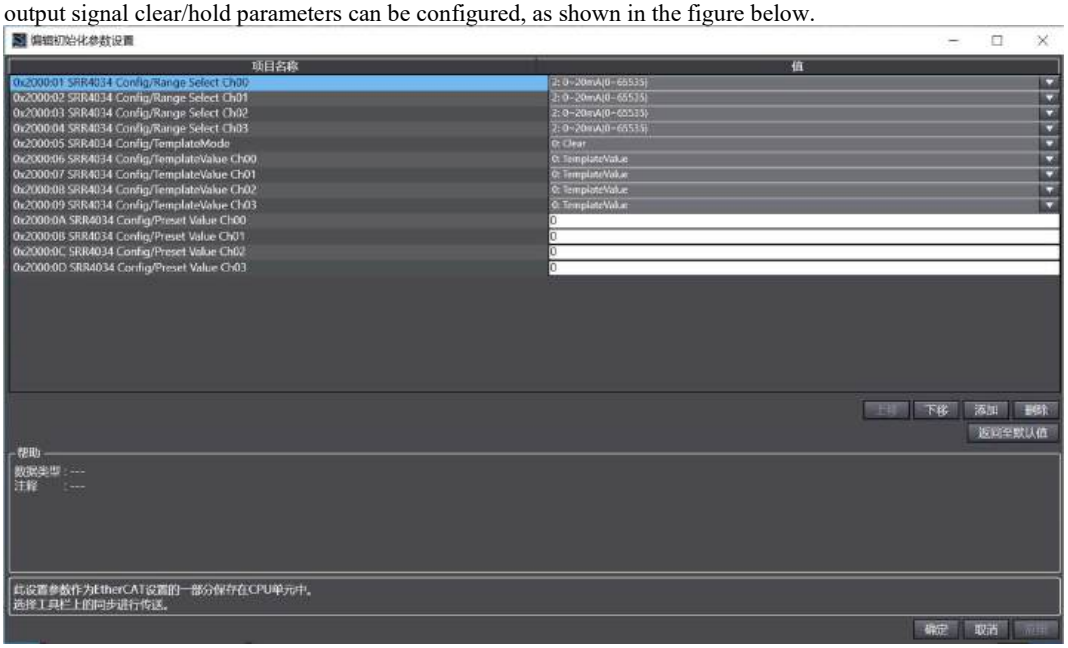
j. The analog input filter can be configured within a range of 1~200, and independent configuration can be supported for single channels. After completing the configuration, click “Apply” and then “OK”, as shown in the figure below. After completing all parameter configurations, re-download the program to the PLC, and power on the PLC and modules again.



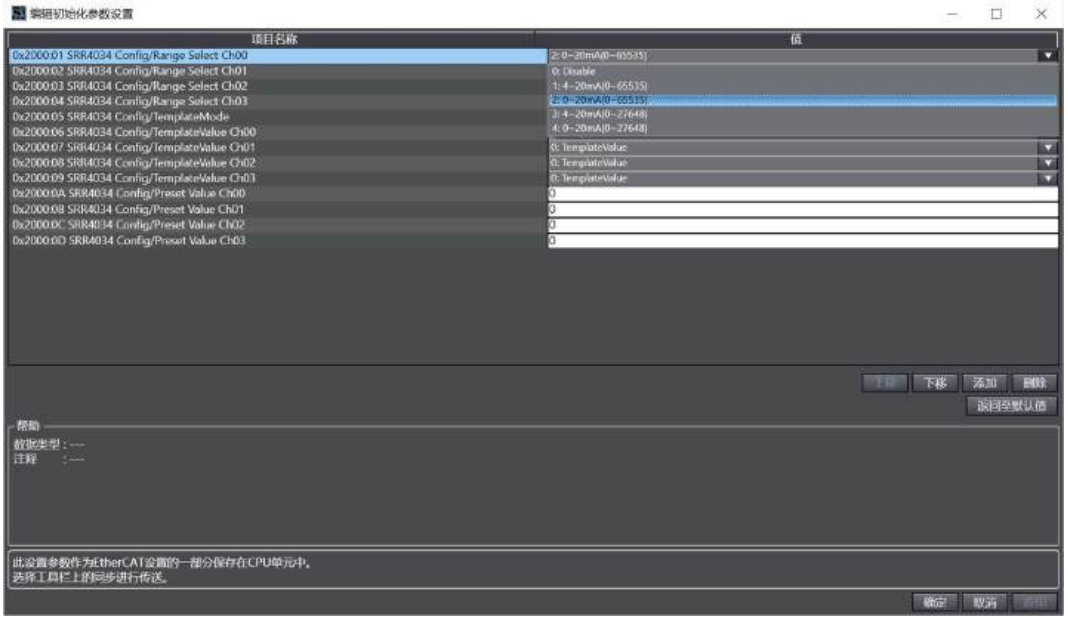
k. On the Edit Module Configuration page of Node 1, select the SRR4034 module and click “Edit Initialization Parameter Settings”, as shown in the figure below.



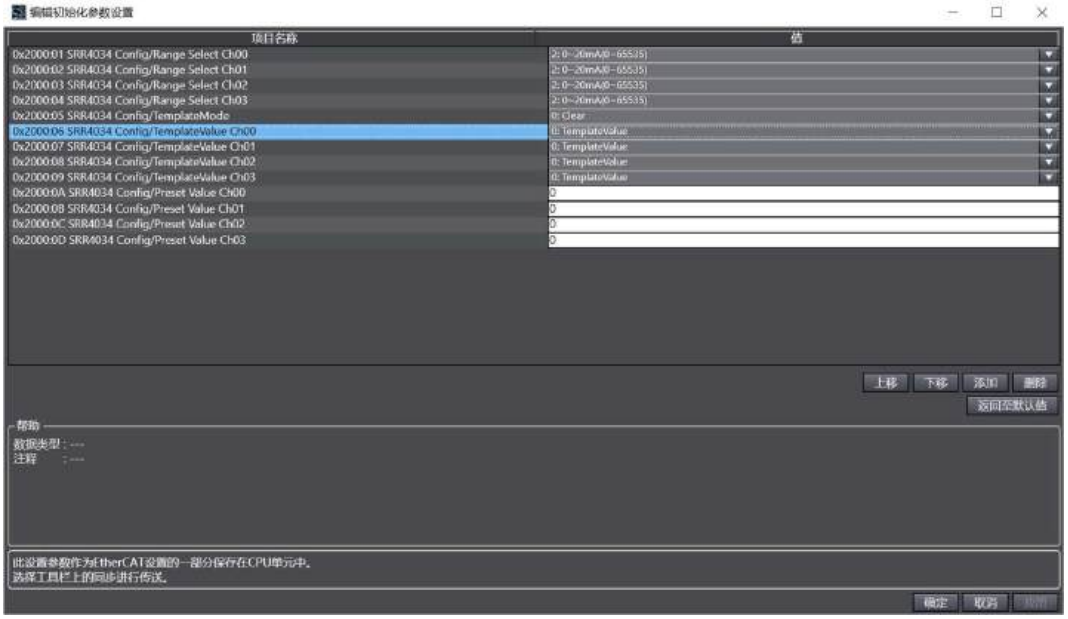
l. On the Parameter Setting page of SRR4034 analog current output module, the analog current range and analog output signal clear/hold parameters can be configured, as shown in the figure below.



m. The analog output current can be configured into 5 range options, with each channel independently configurable. After completing the configuration, click "Apply" and then "OK", as shown in the figure below. After completing all parameter configurations, re-download the program to the PLC, and power on the PLC and modules again.

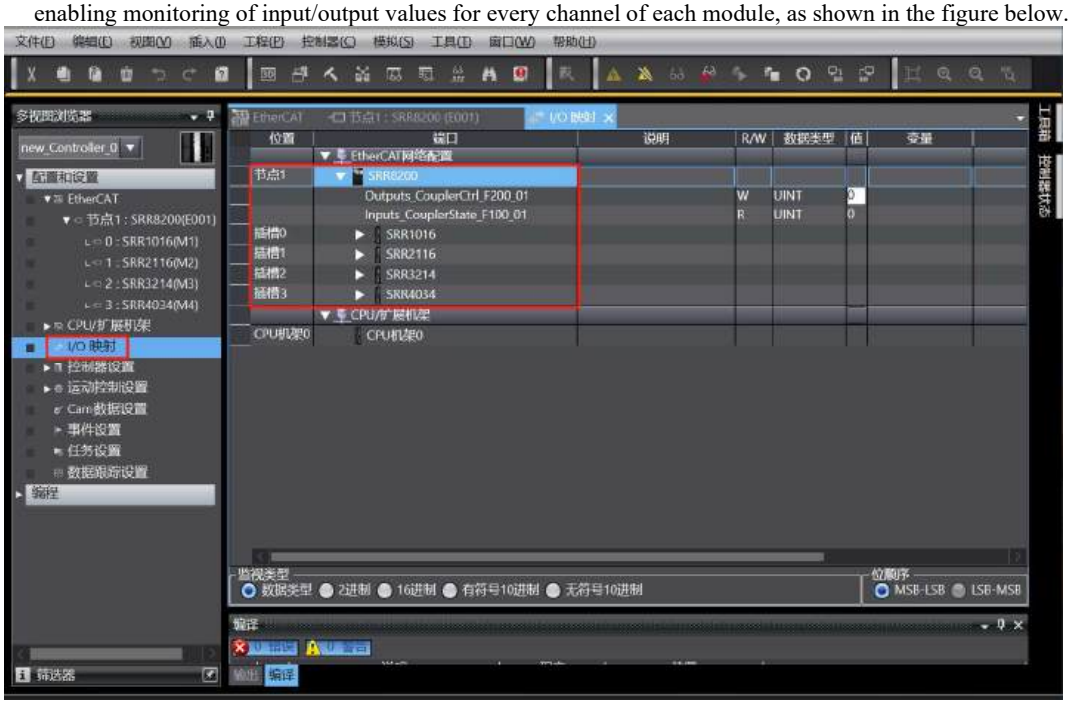


n. For analog output signal clear/hold function, all channels are in output clear mode by default, and module channels can be configured separately. The corresponding relationship is detailed in 6.1.5 Analog output signal clear/hold . After the configuration is complete, click “Apply” and then “OK”, as shown in the figure below. After completing all parameter configurations, re-download the program to the PLC, and power on the PLC and modules again.

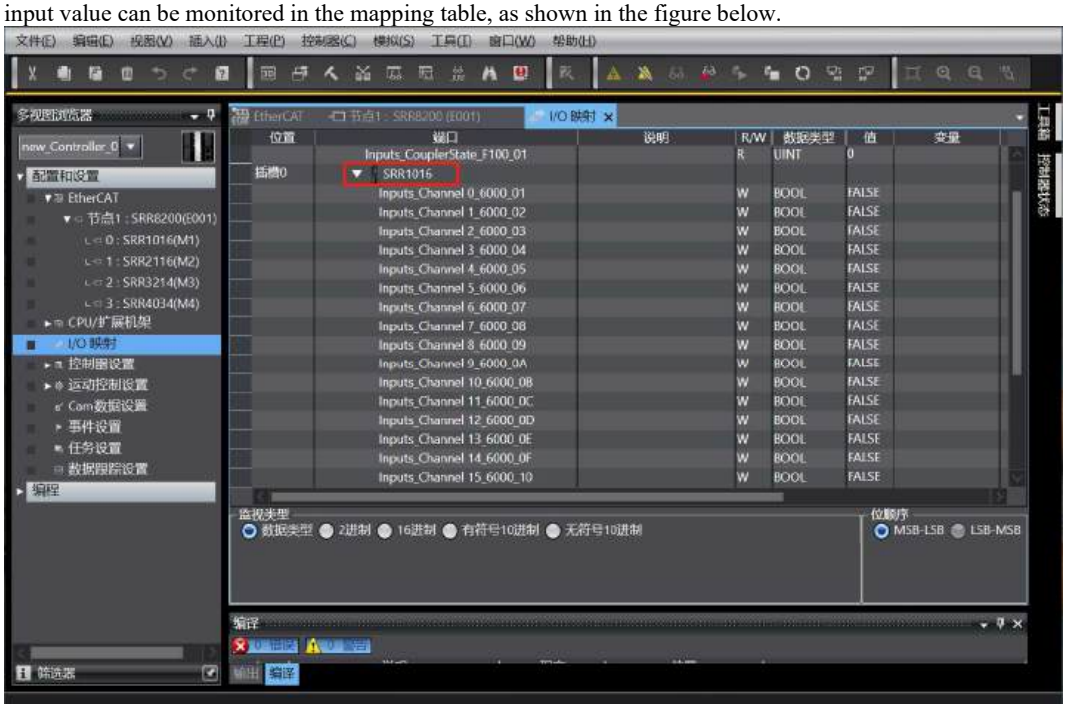


8. I/O Function

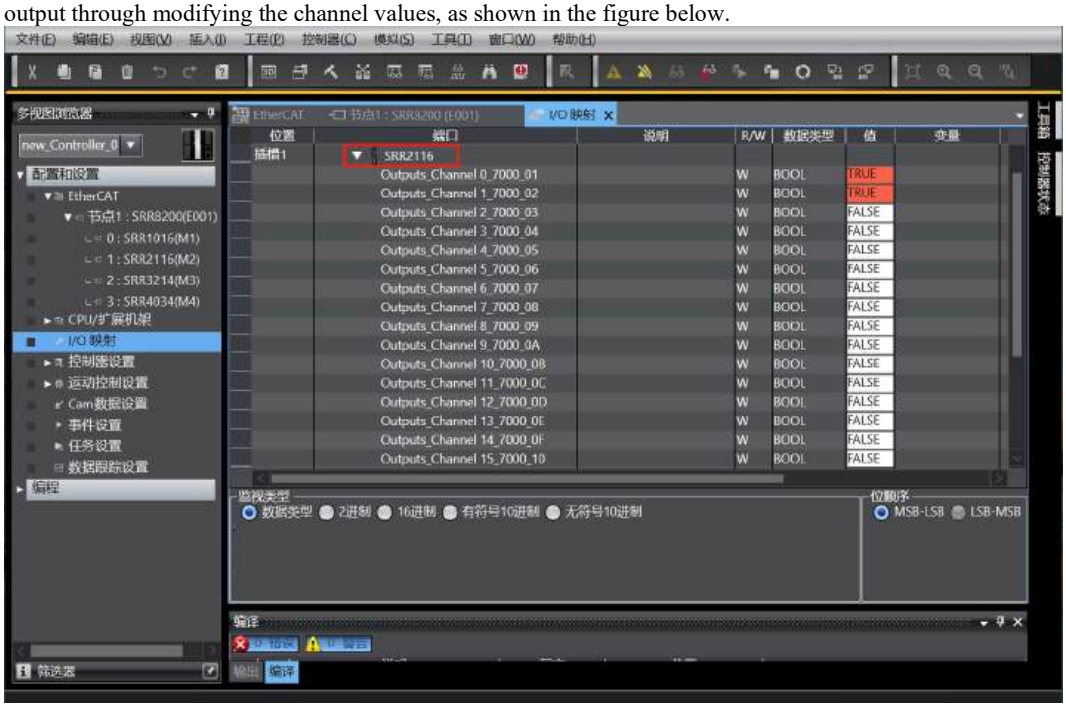
a. Double-click "I/O Mapping" in the left navigation tree to view the mapping table for each module in the topology, enabling monitoring of input/output values for every channel of each module, as shown in the figure below.



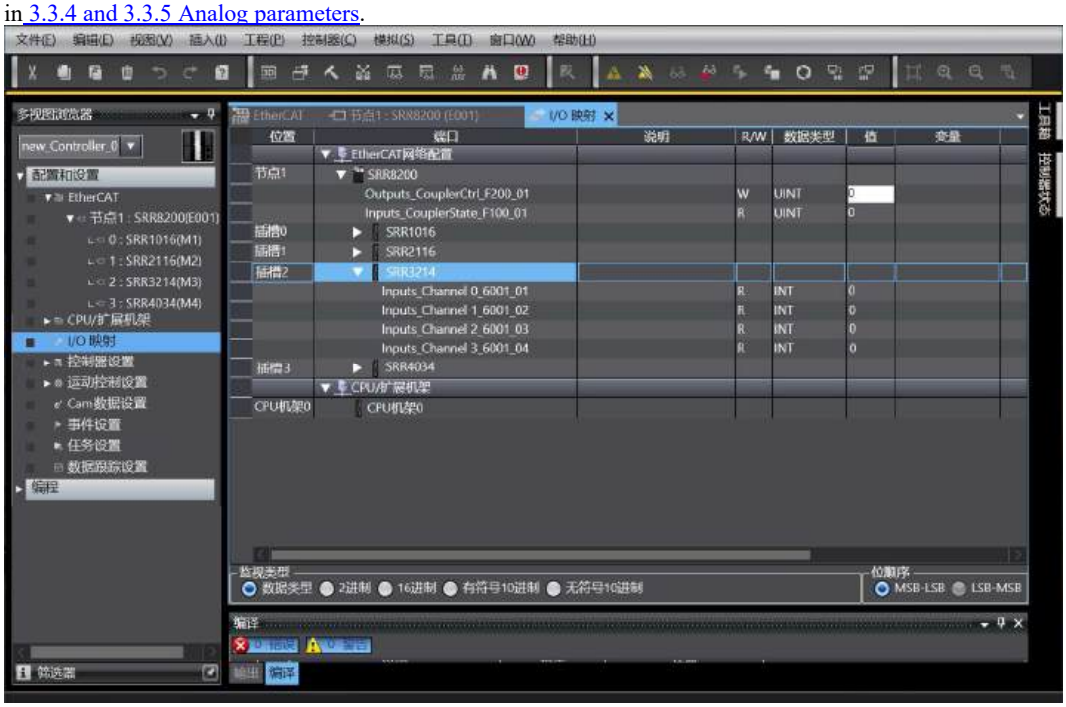
b. Expand the mapping table of the SRR1016 digital module. When an input channel receives valid voltage, the input value can be monitored in the mapping table, as shown in the figure below.



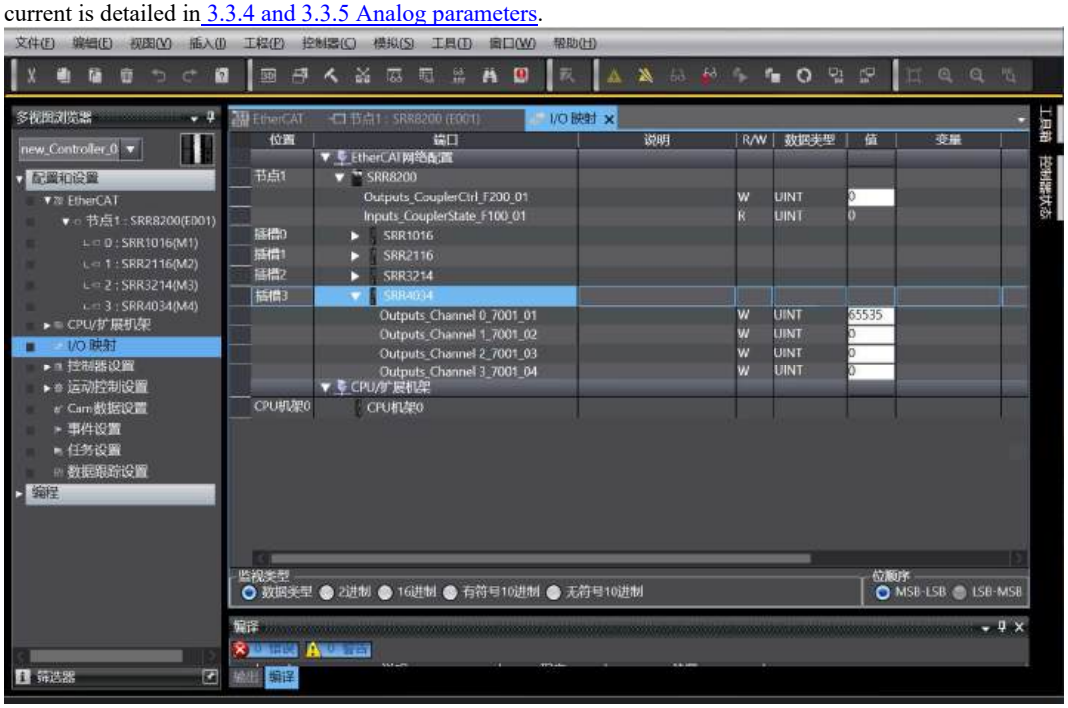
c. Expand the mapping table of the SRR2116 digital module. The output channels can be controlled by forcing output through modifying the channel values, as shown in the figure below.



d. Expand the mapping table of the SRR3214 analog module to monitor the input voltage code value of each channel, as shown in the figure below. The corresponding relationship between code value and voltage is detailed in 3.3.4 and 3.3.5 Analog parameters.



e. Expand the mapping table of the SRR4034 analog module and write the current code value to force the output of each channel, as shown in the figure below. The corresponding relationship between the code value and the current is detailed in 3.3.4 and 3.3.5 Analog parameters.



6.8 PROFINET coupler configuration application

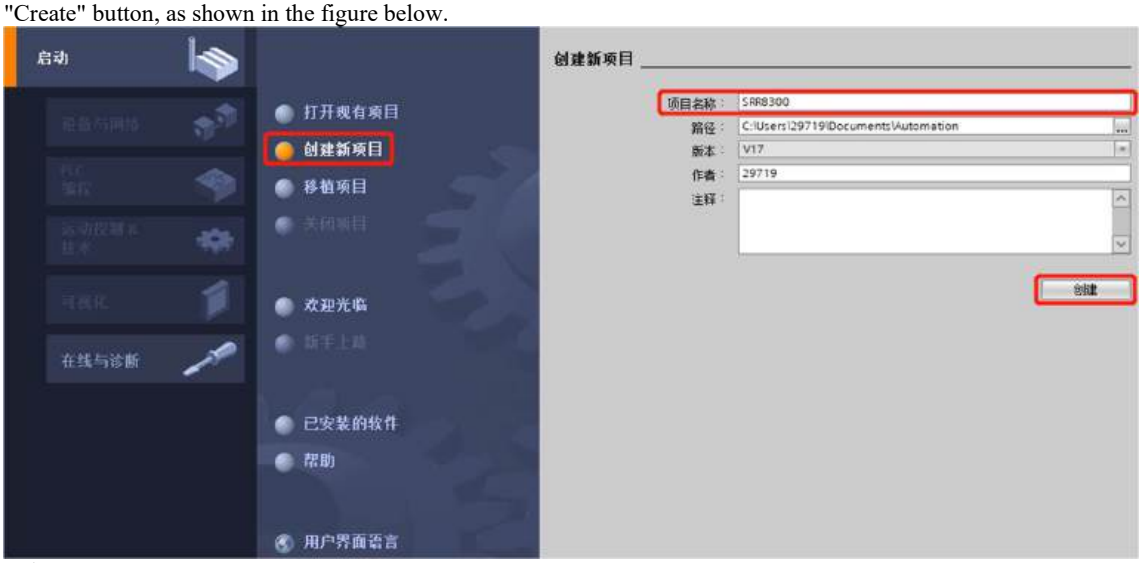
6.8.1 Application under TIA Portal V17 software environment

1. Preparation work

- **Hardware environment**
  - **Module preparation. This instruction takes the topology of SRR8300+SRR1016+SRR2116+SRR3214+SRR4034 as an example**
  - **One computer with TIA Portal V17 software pre-installed**
  - **One Siemens PLC. This instruction takes Siemens S7-1200 CPU 1212C DC/DC/DC as an example**
  - **Special shielded cable**
  - **One switching power supply**
  - **Device configuration file**
    Please contact our staff for configuration files.
- **Hardware configuration and wiring**
  Please follow " 4 Assembly and disassemble" and " 5 Wiring"

2. Create a new project

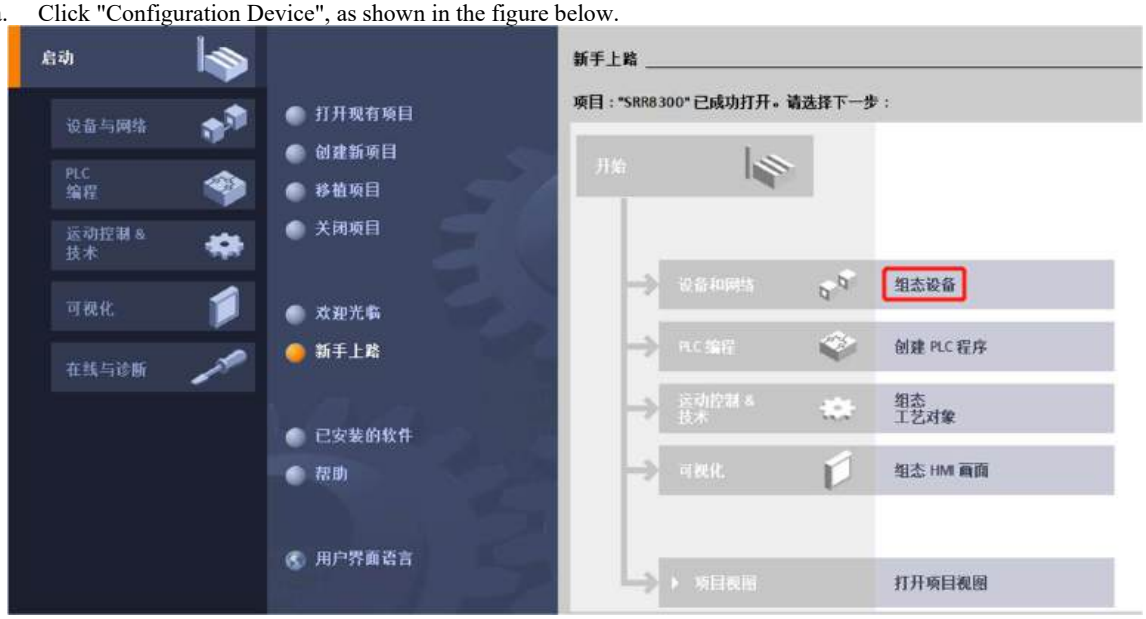
a. Open TIA Portal V17 software, click "Create new project". After entering all required information, click the "Create" button, as shown in the figure below.



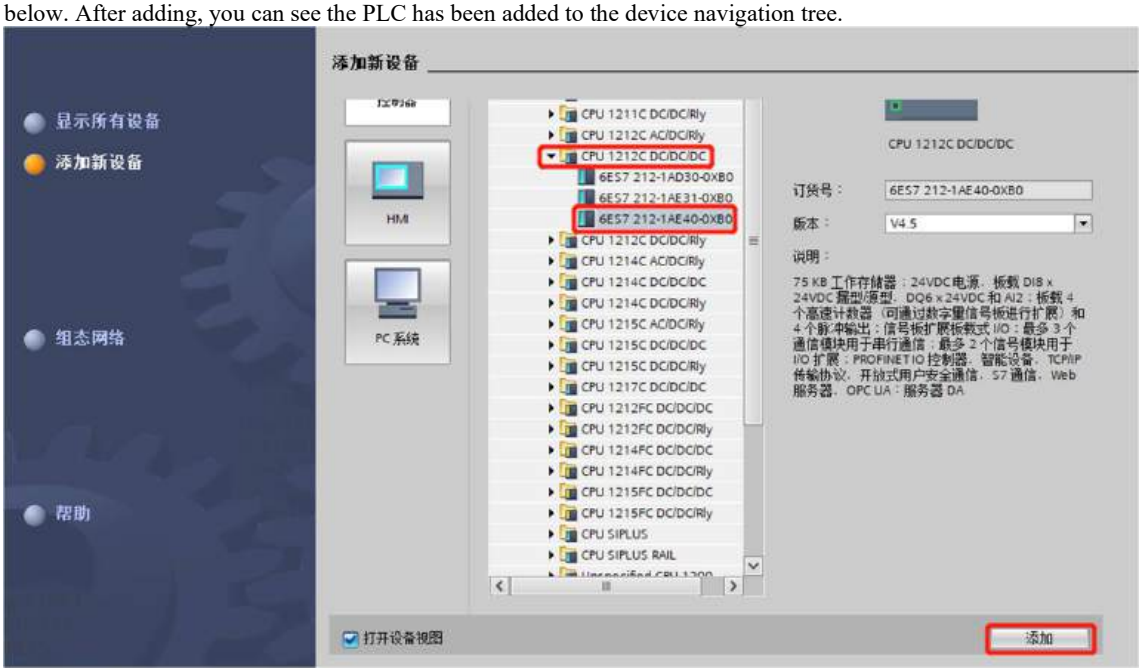
- Project name: Customizable, optional to default.
- Path: Project storage path, optional to default.
- Version: Optional to default.
- Author: Optional to default.
- Note: Customizable, optional to fill in.

3. Add PLC controller

a. Click "Configuration Device", as shown in the figure below.

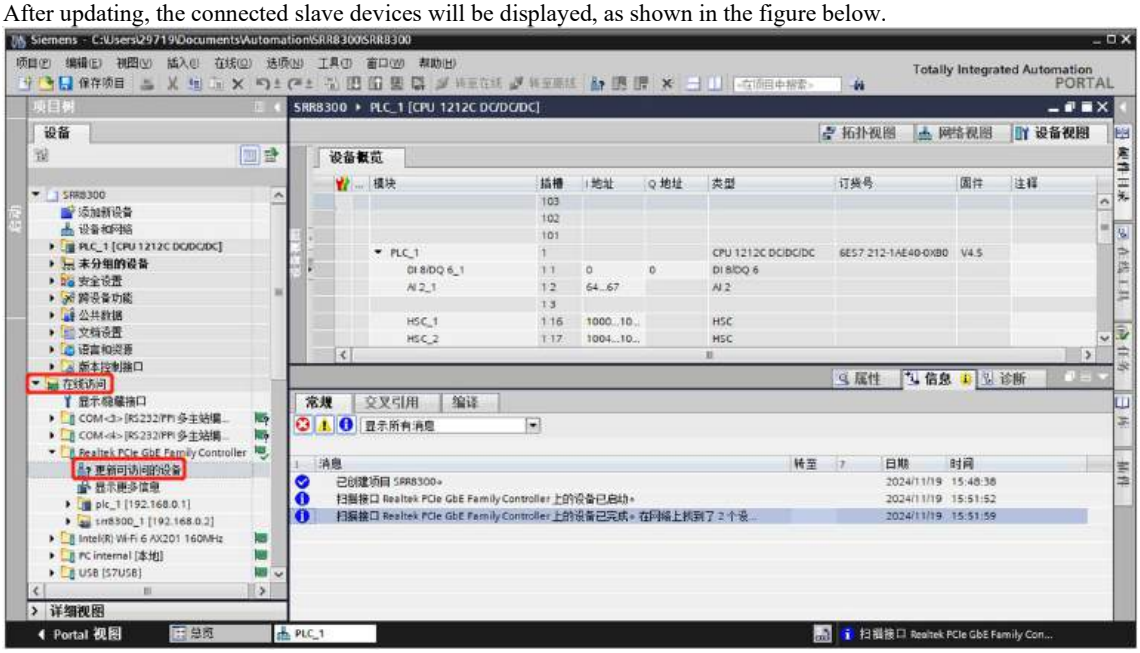


b. Click "Add New Device", select the currently used PLC model, and then click "Add", as shown in the figure below. After adding, you can see the PLC has been added to the device navigation tree.



4. Scan connected devices

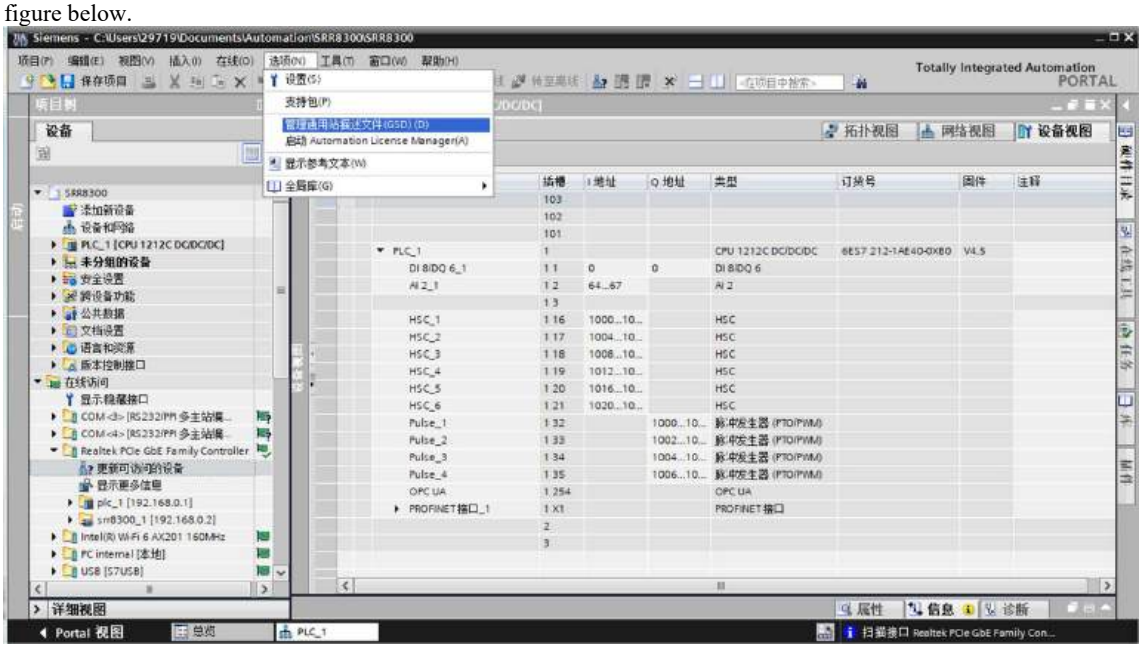
a. Click "Online Access -> Update Accessible Devices" in the left navigation tree, as shown in the figure below. After updating, the connected slave devices will be displayed, as shown in the figure below.



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

5. Add GSD configuration file

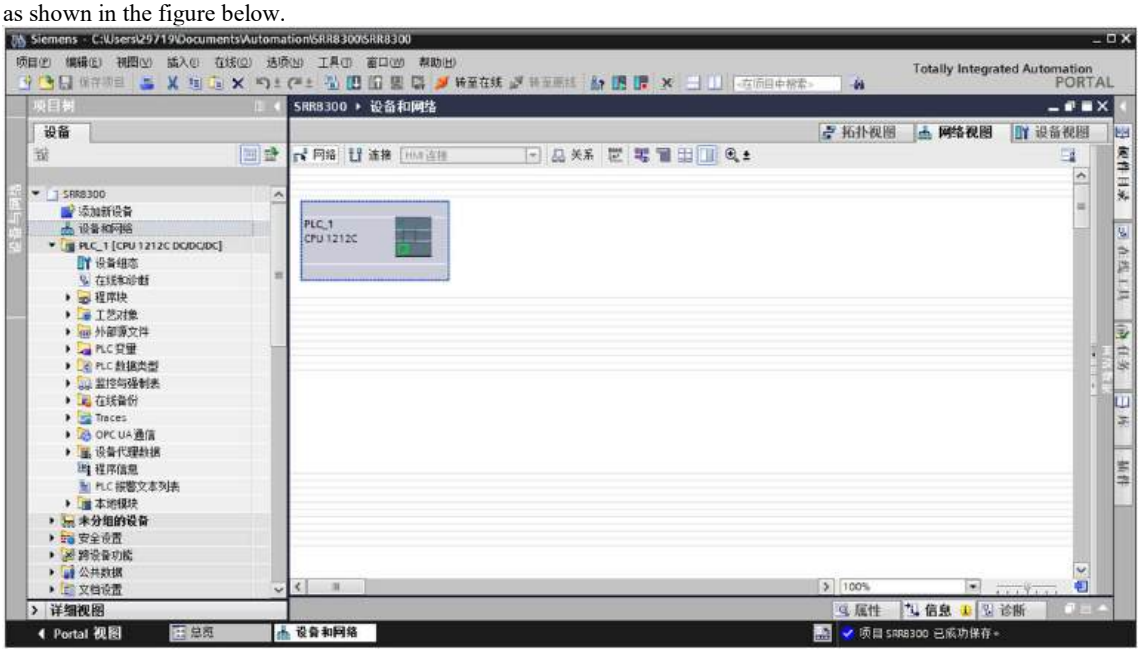
a. In the menu bar, select "Options -> Manage General Station Description Files (GSDML)(D)", as shown in the figure below.



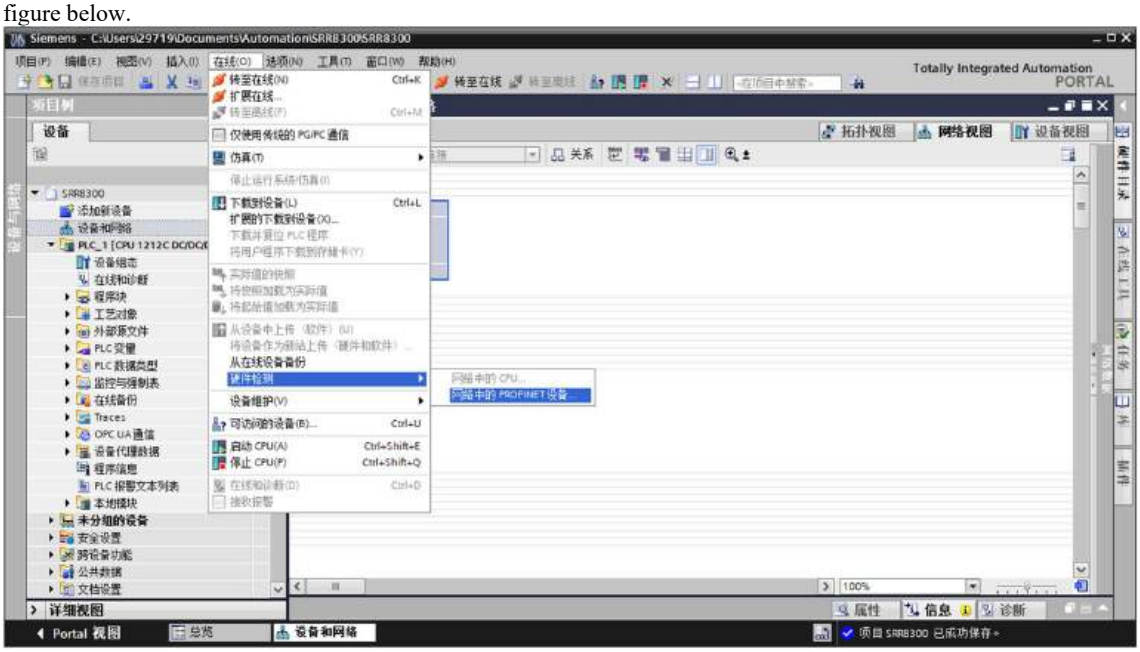
b. Click "Source Path" to select a folder, and check whether the status of the GSD file to be added is "Not installed". If not installed, click the "Install" button. If already installed, click "Cancel" to skip the installation step, as shown in the figure below.

6. Hardware detection for adding devices

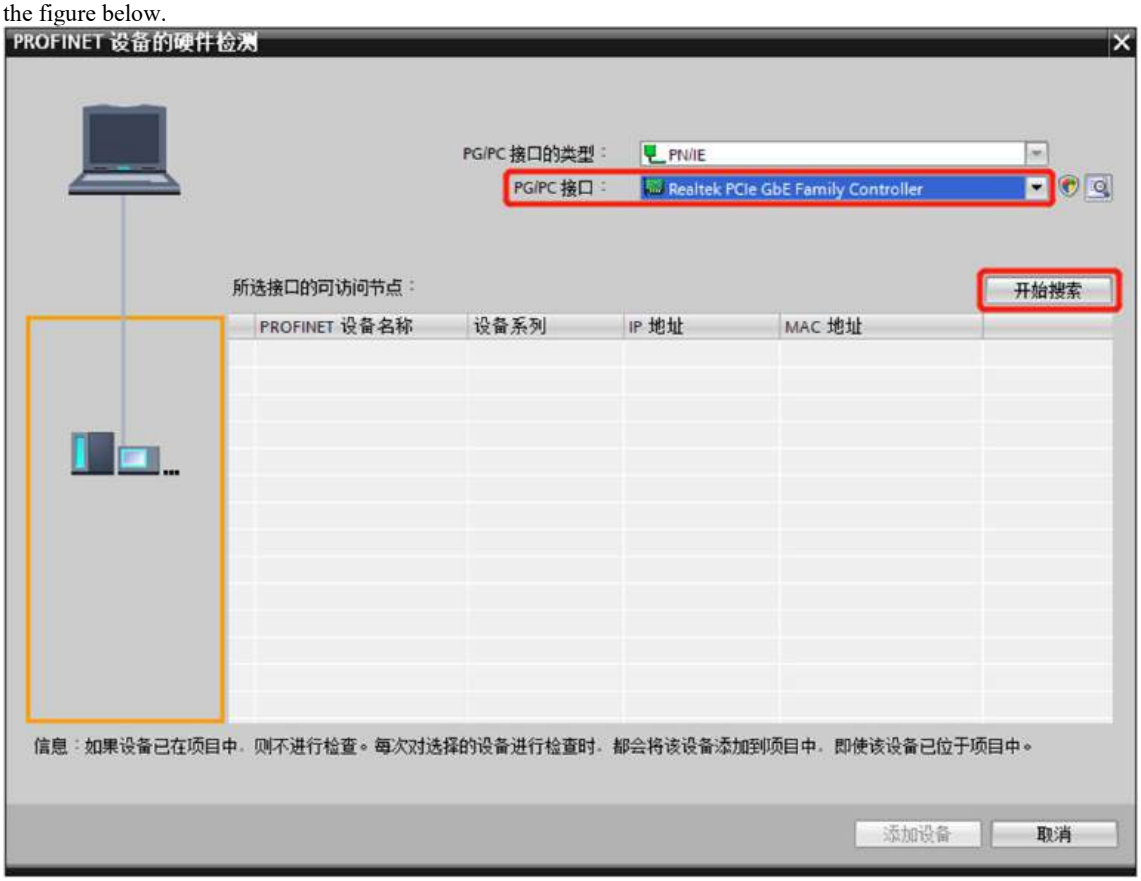
a. Double-click the "Devices and Networks" in the left navigation tree, and then select the PLC in the network view, as shown in the figure below.



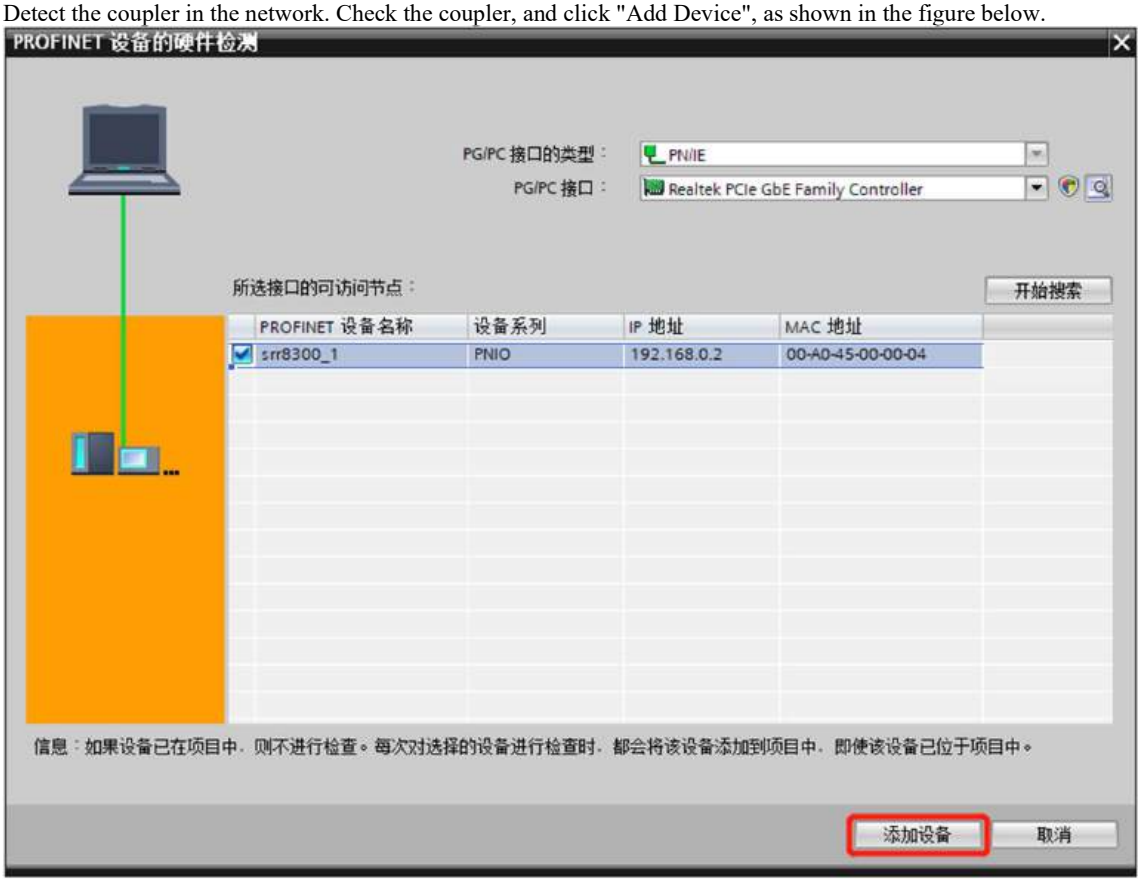
b. In the menu bar, select "Online -> Hardware Detection -> PROFINET Devices in Network", as shown in the figure below.



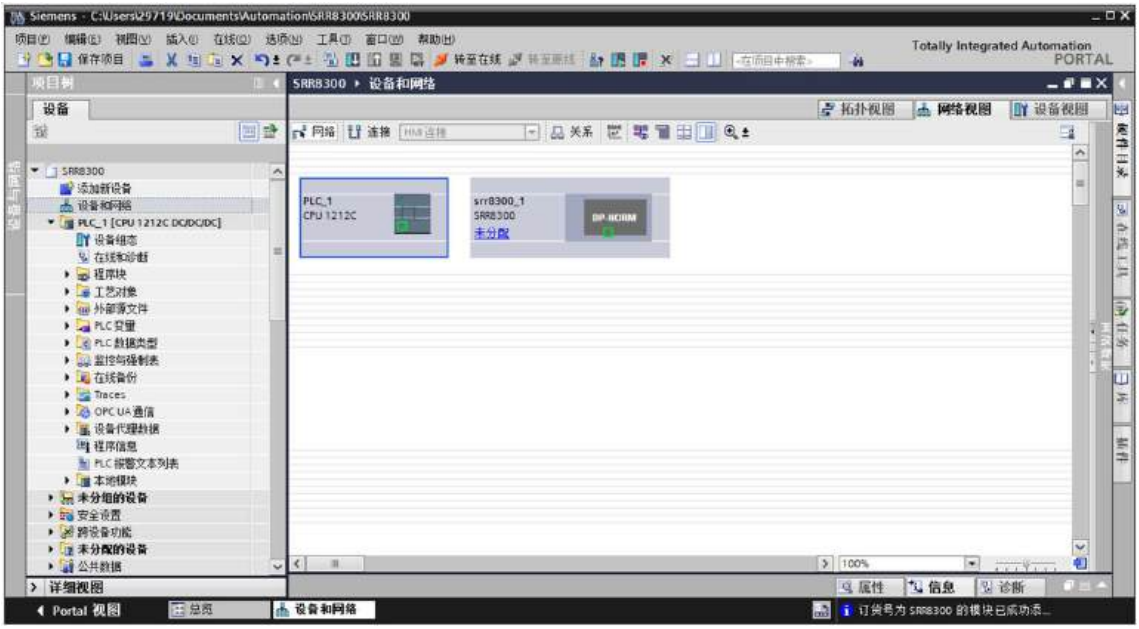
c. The hardware detection window pops up. Select the correct PG/PC interface and click "Start Search", as shown in the figure below.



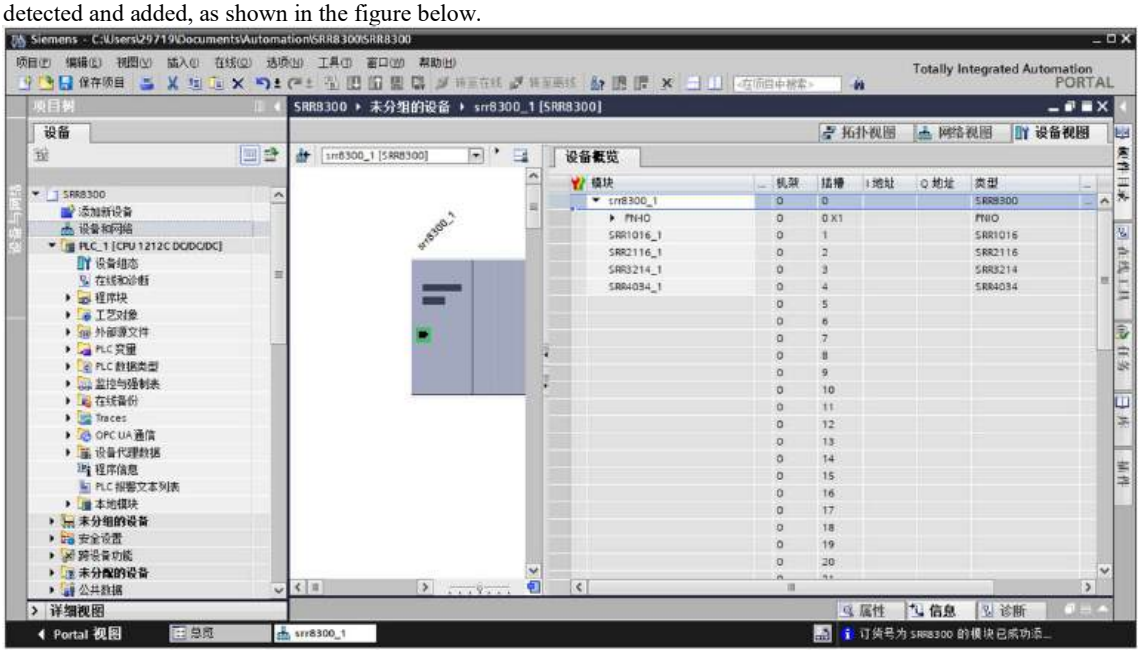
d. Detect the coupler in the network. Check the coupler, and click "Add Device", as shown in the figure below.



e. After the coupler is successfully added, the coupler icon can be seen in the network view, as shown in the figure below.



f. Select the coupler icon and switch to the device view. You can see that all IO devices in the topology have been detected and added, as shown in the figure below.

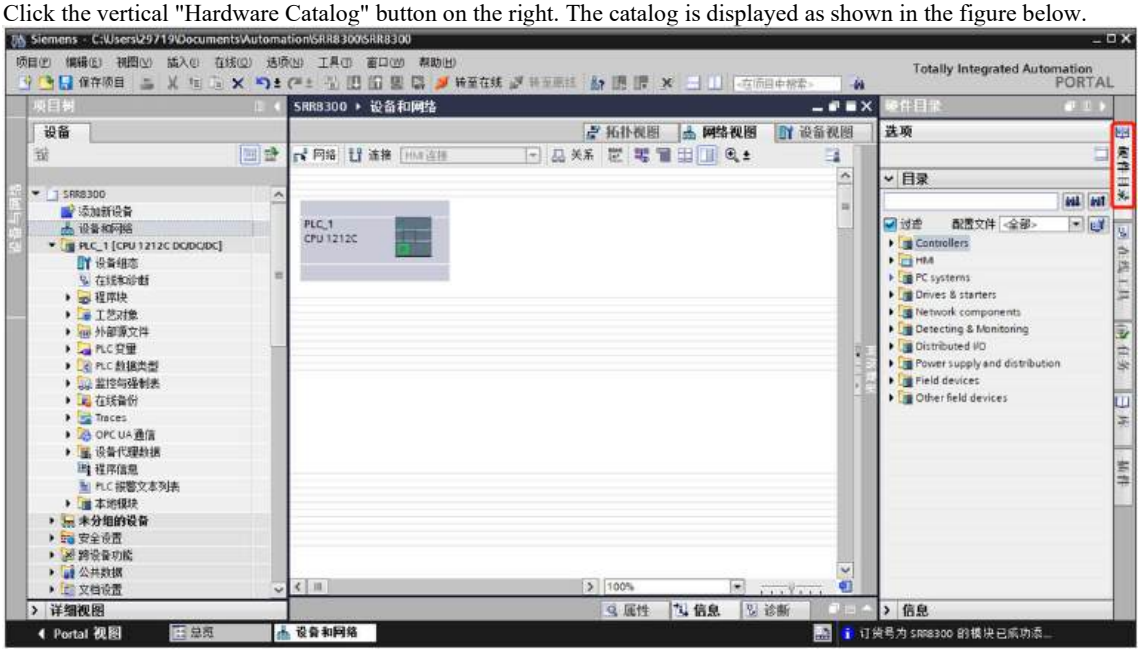


7. Manually add slave devices

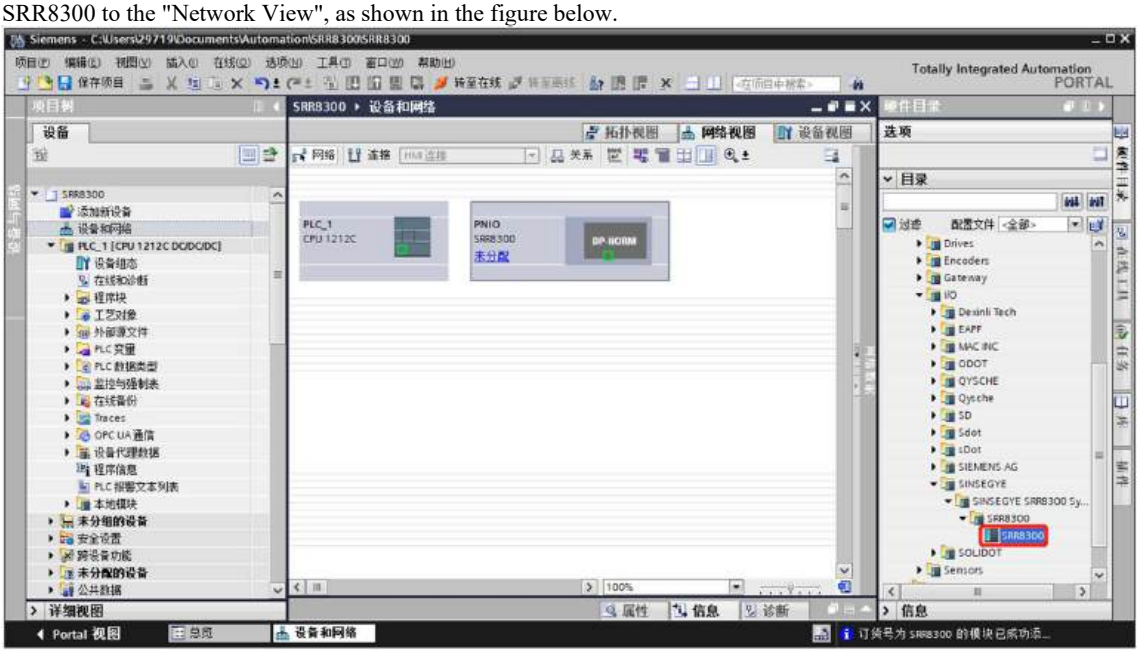
In addition to hardware detection for adding devices, you can also manually add devices. The specific steps are as follows.

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

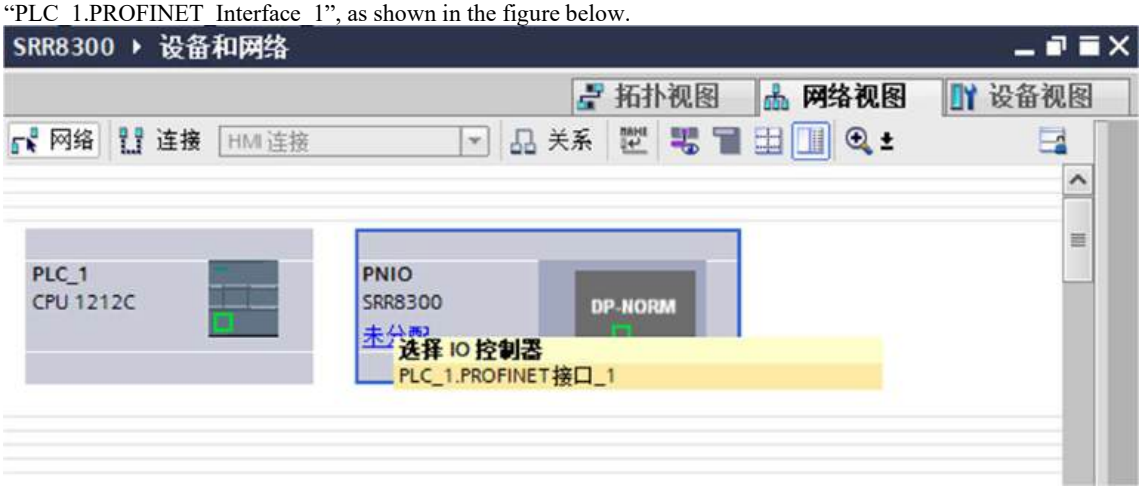
b. Click the vertical "Hardware Catalog" button on the right. The catalog is displayed as shown in the figure below.



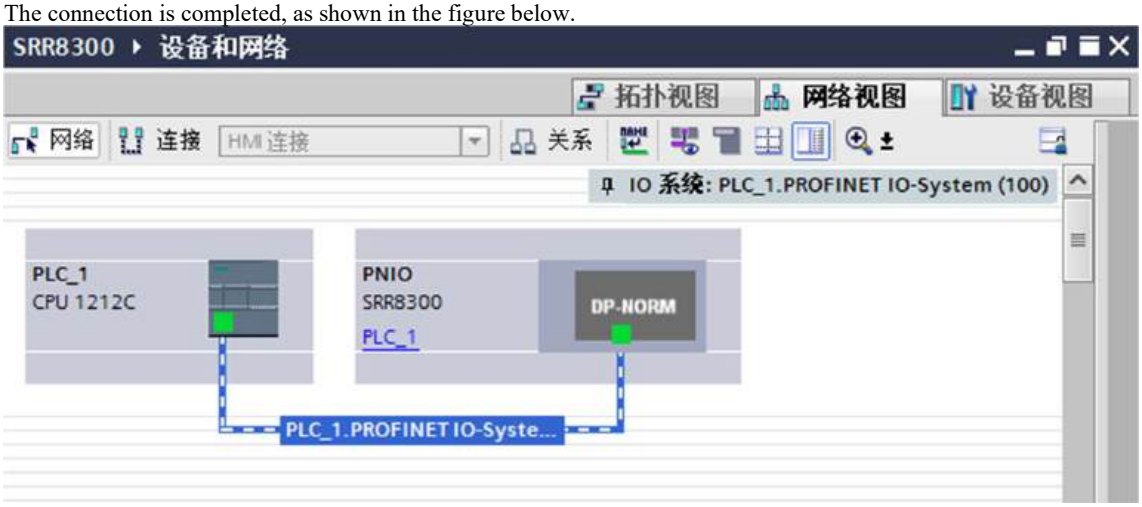
c. Select "Other field devices -> PROFINET IO -> I/O -> SINSEGYE -> SRR8300", and then drag or double-click SRR8300 to the "Network View", as shown in the figure below.



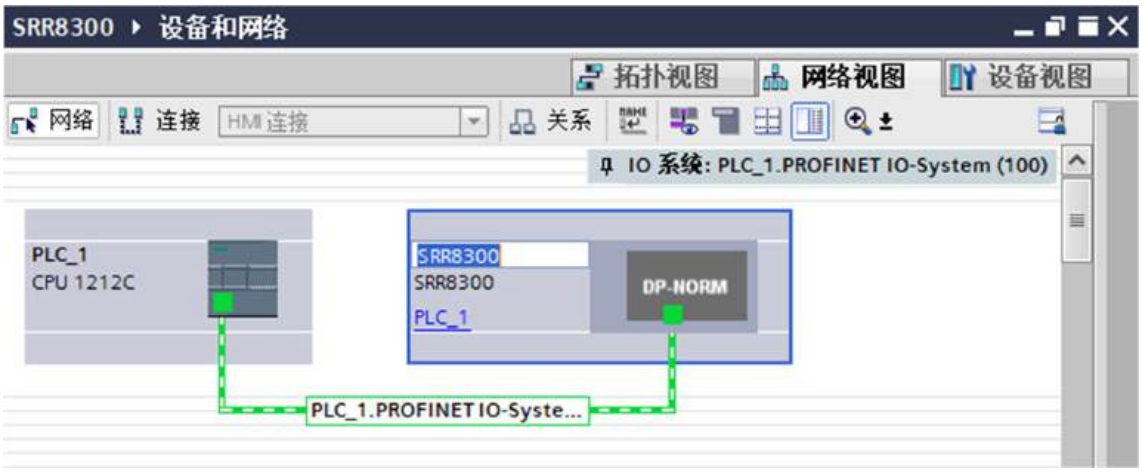
d. Switch to the Network View, click the "Unassigned (blue text)" on the coupler (slave device), and then select "PLC_1.PROFINET_Interface_1", as shown in the figure below.



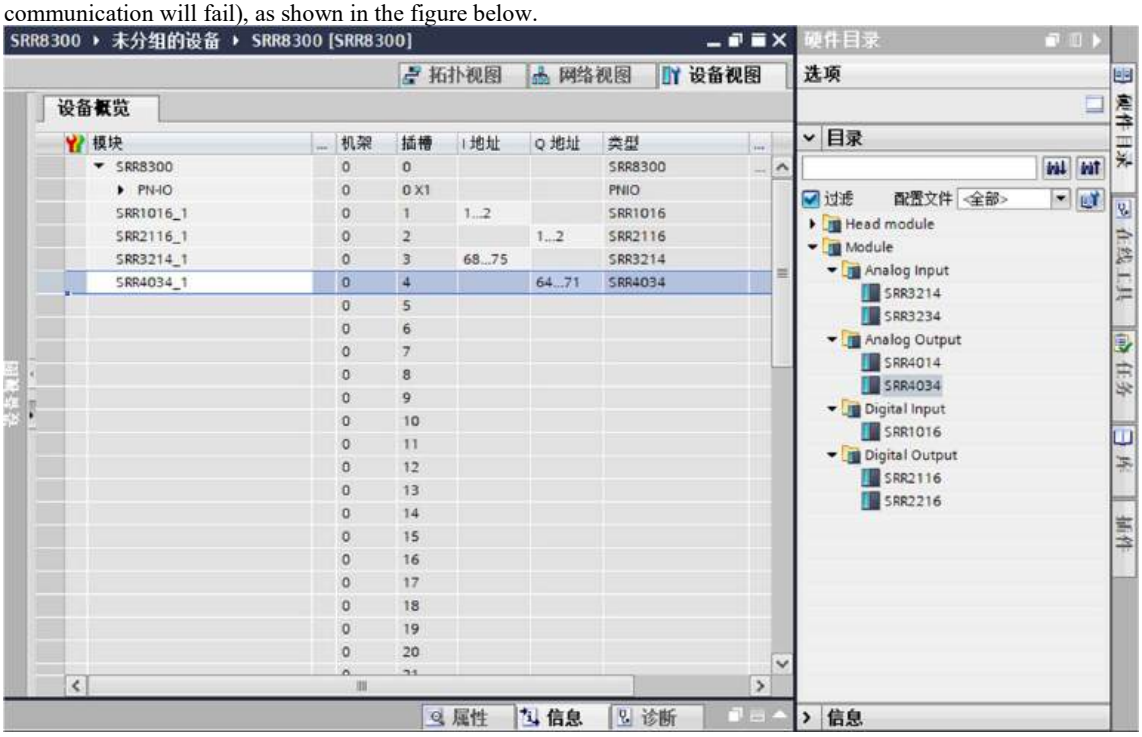
e. The connection is completed, as shown in the figure below.



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

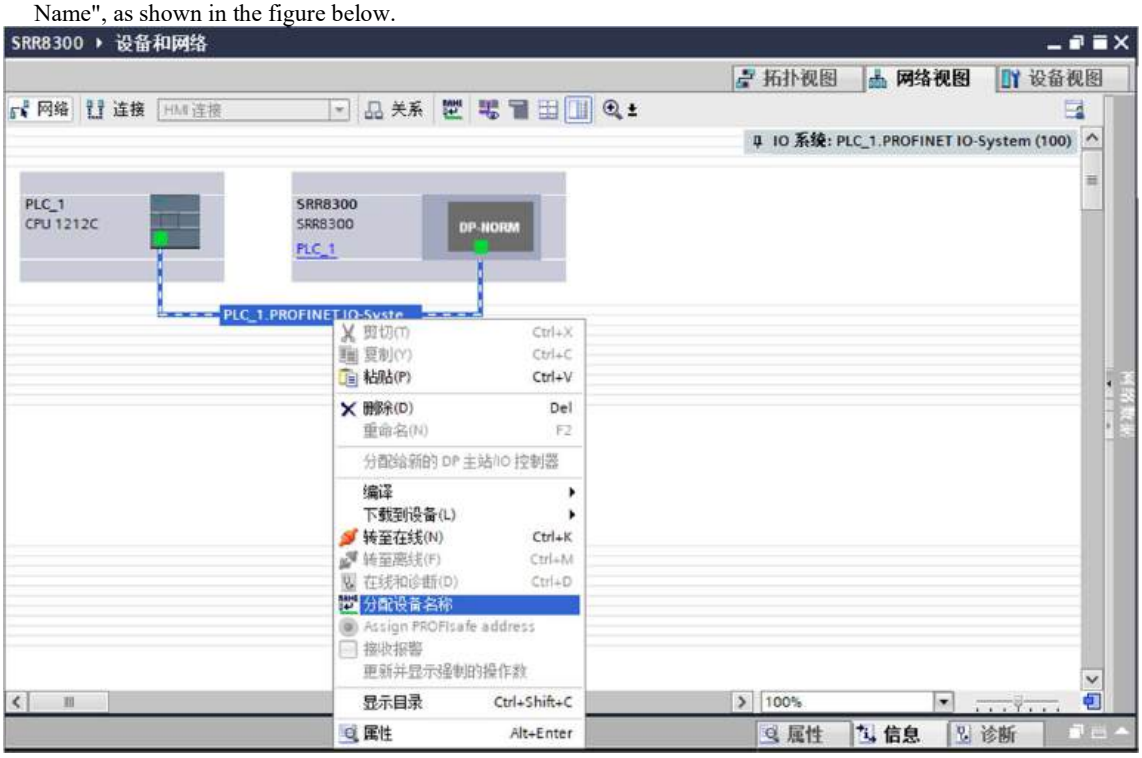


g. Click “Device View” to enter the coupler's Device Overview. Under the “Hardware Catalog” on the right, add modules sequentially according to the actual topology (the order must match the actual topology; otherwise. communication will fail), as shown in the figure below.

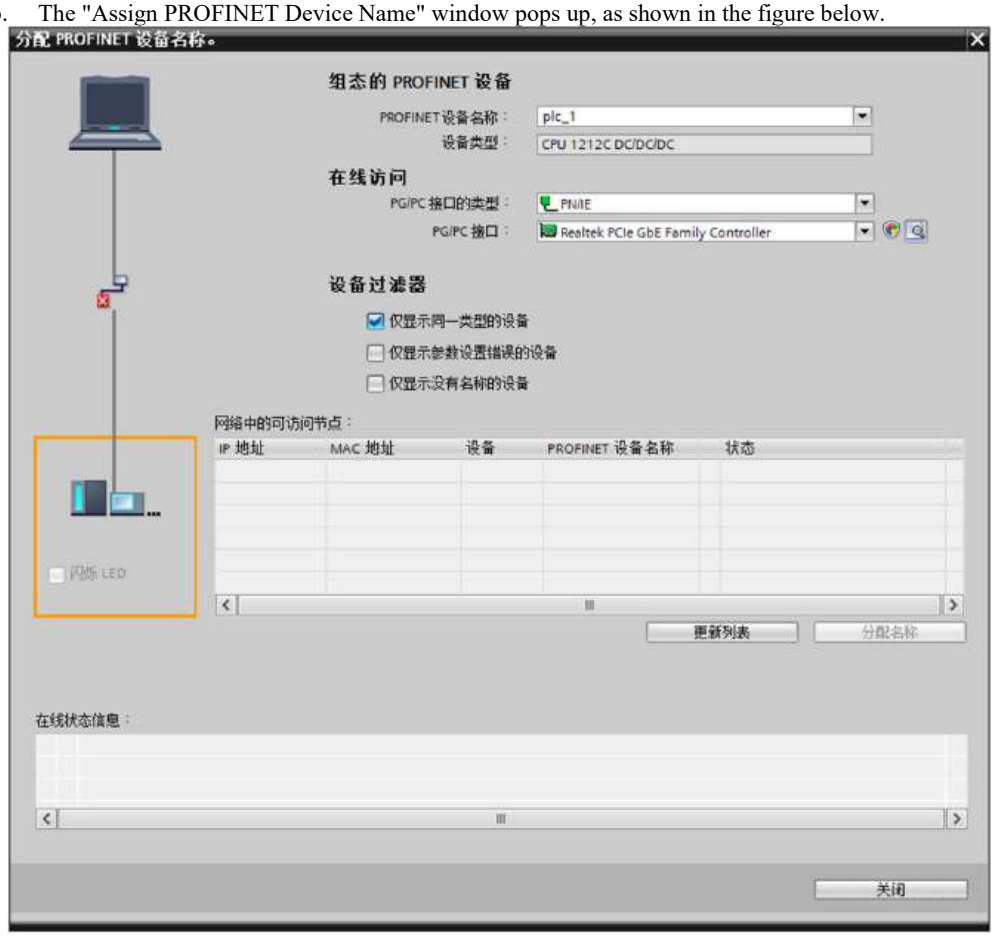


8. Assign Device Name

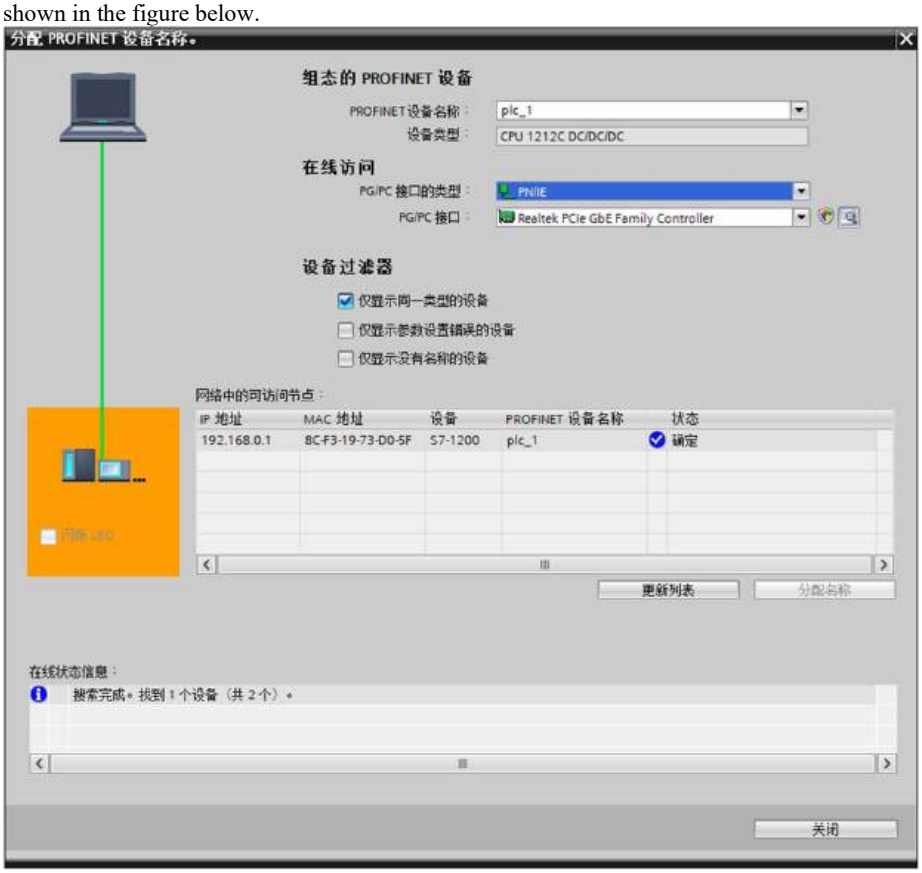
a. In the Network View, right-click the connection line between the PLC and the coupler, select "Assign Device Name", as shown in the figure below.



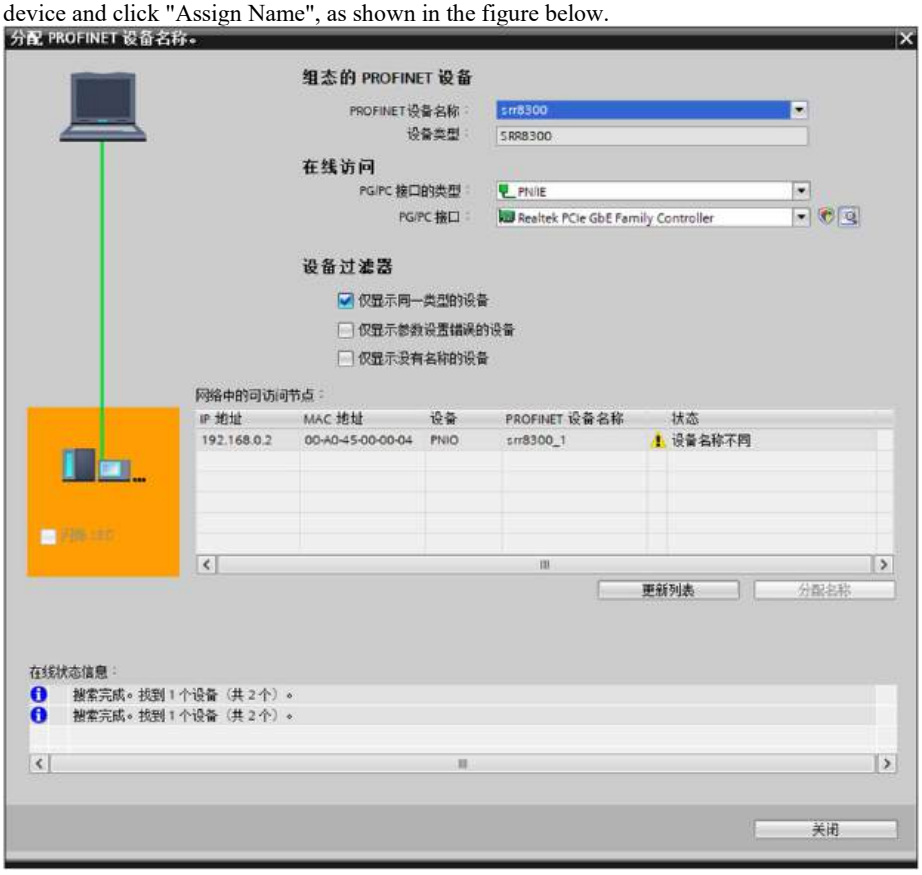
b. The "Assign PROFINET Device Name" window pops up, as shown in the figure below.



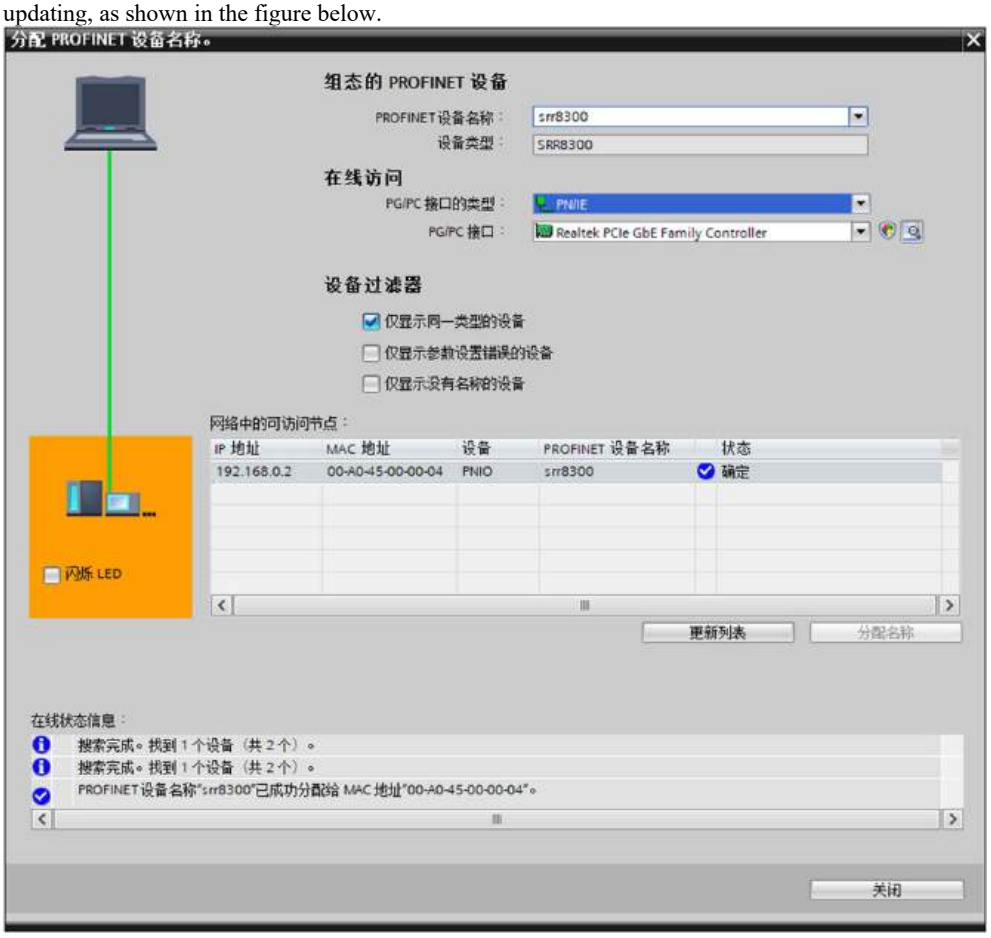
c. Select the PLC as the device name, and click "Update List". After the update is completed, it will appear, as shown in the figure below.



d. Check whether the status of the node in "Accessible Nodes in Network" is "OK". If it is not “OK”, select the device and click "Assign Name", as shown in the figure below.



e. Select the coupler as the device name, click "Update List", and then assign names using the same method after updating, as shown in the figure below.

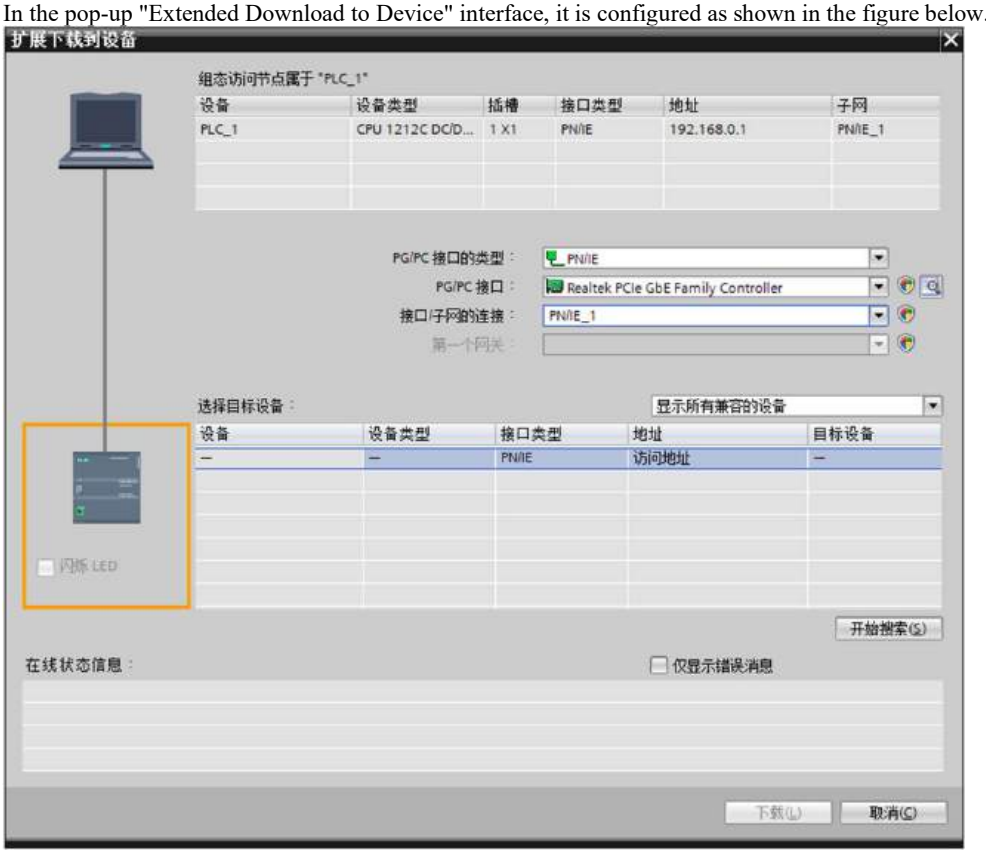


f. Check whether the MAC address on the module's silk print matches the MAC address of the assigned device name. Click "Off".

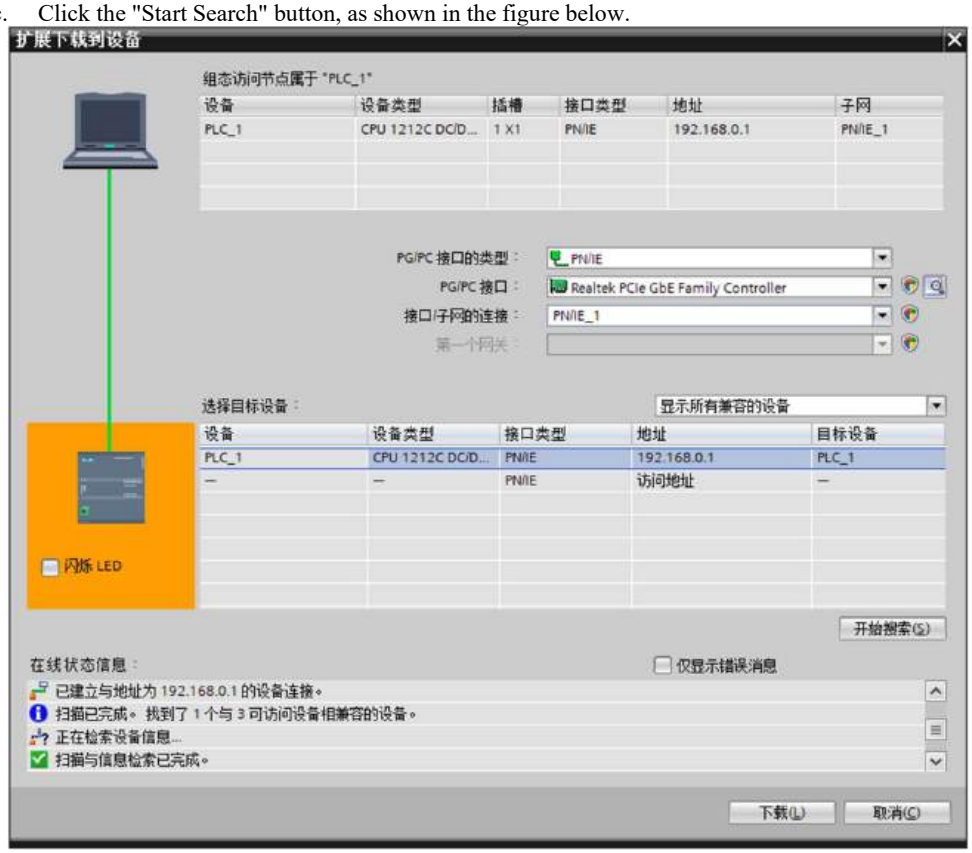
9. Download the configuration structure

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

b. In the pop-up "Extended Download to Device" interface, it is configured as shown in the figure below.



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

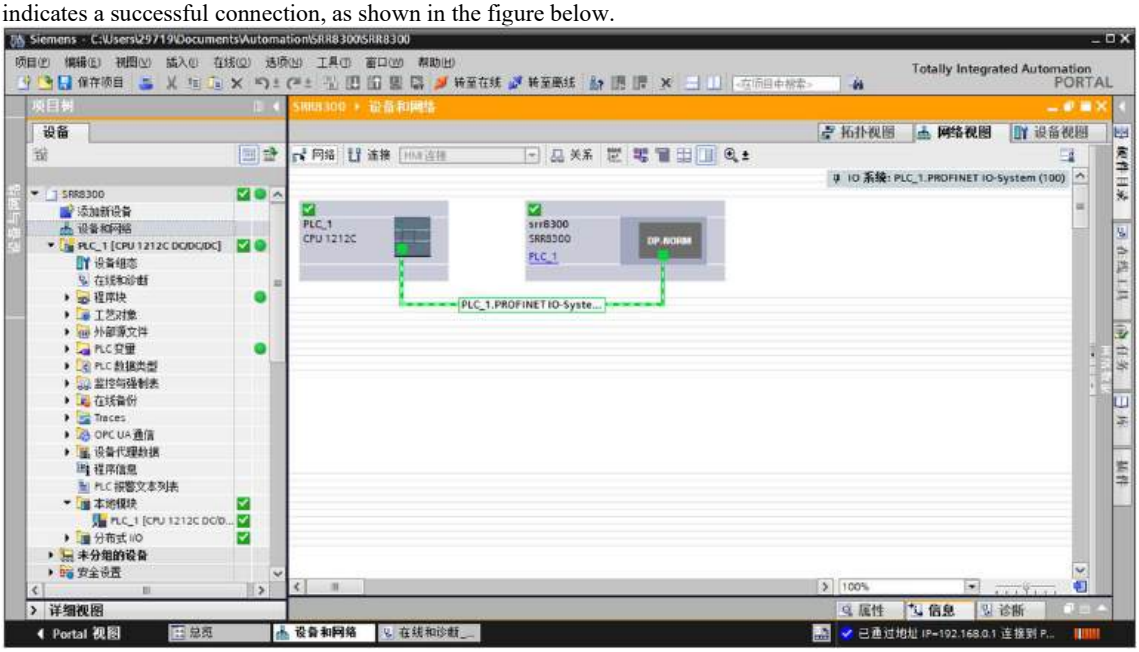


d. Click "Download", and a download preview window will pop up, as shown in the figure below.

e. Click "Load".
f. Click "Complete".
g. Power the device on again.

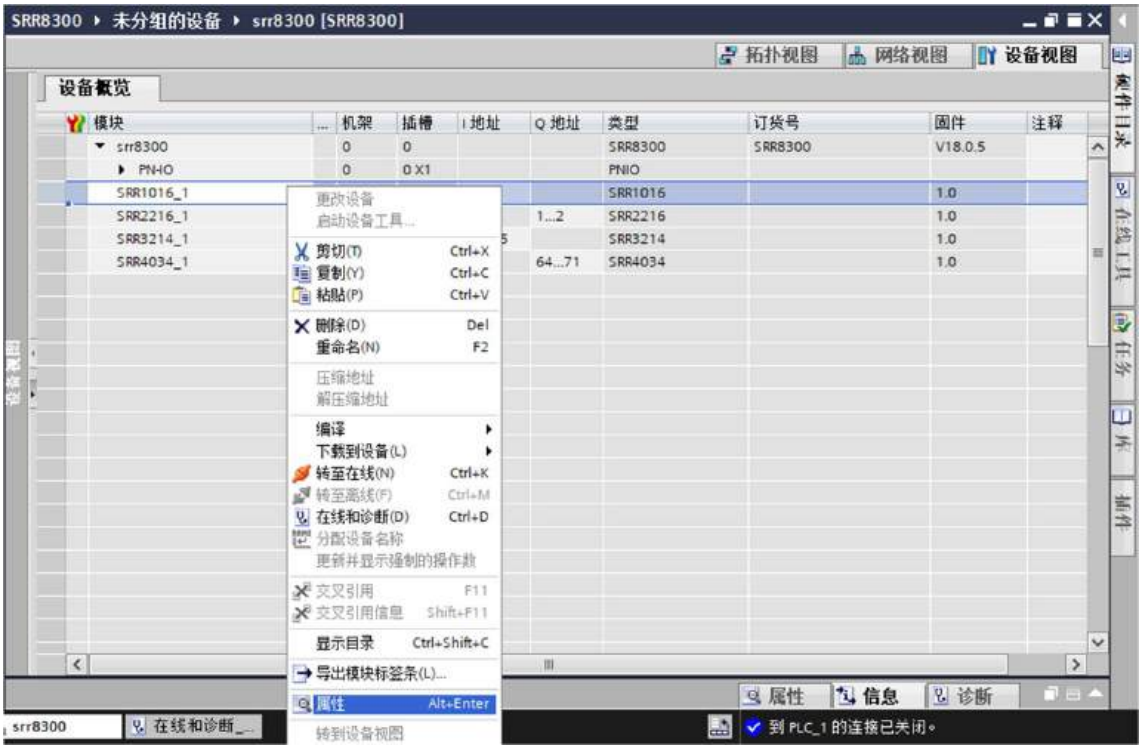
10. Communication connection

a. Click the "Start CPU" button in the menu bar, and then click the "Go Online" button. When the icons turn green, it indicates a successful connection, as shown in the figure below.

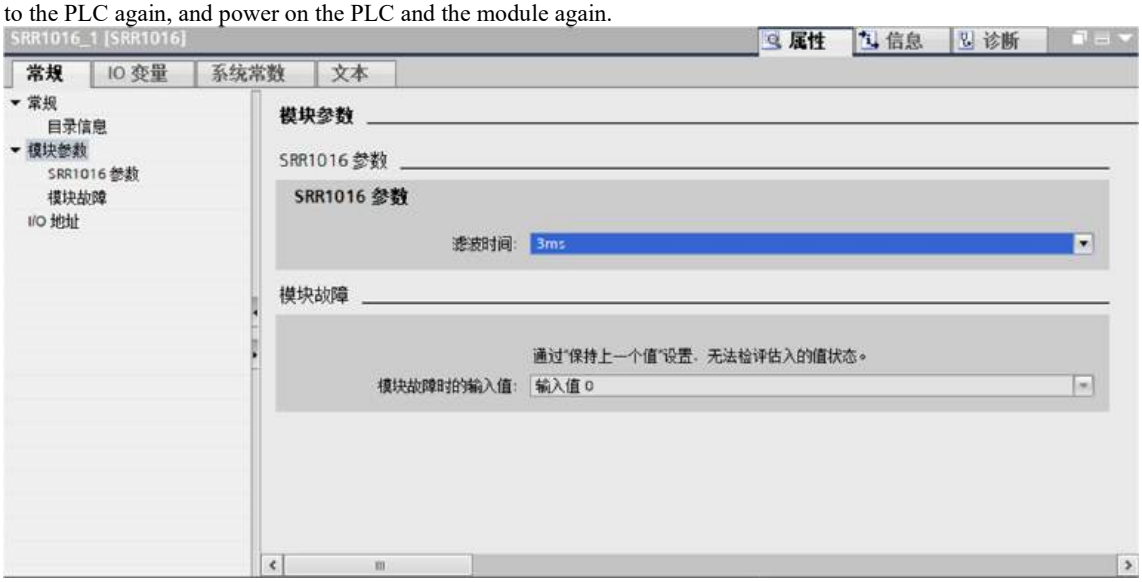


11. Parameter settings

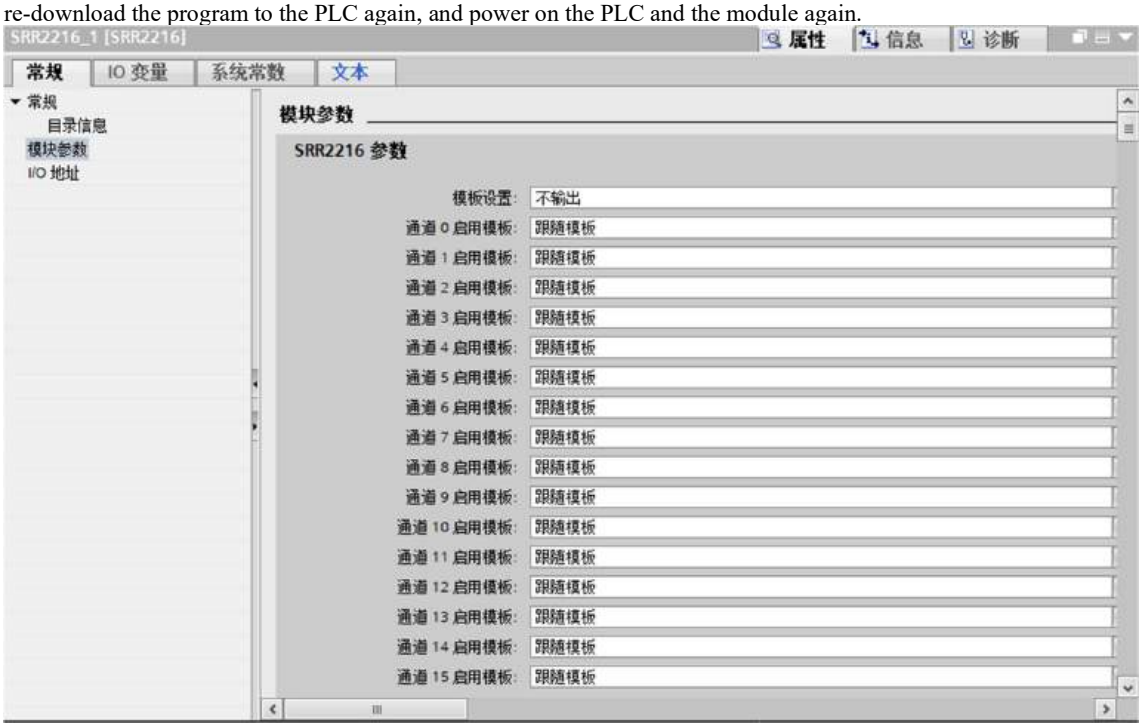
a. In offline mode, open "Network View", select the coupler module, switch to Device View, right-click the SRR1016 module, and click the "Properties" button to view and configure various module parameters, as shown in the figure below.



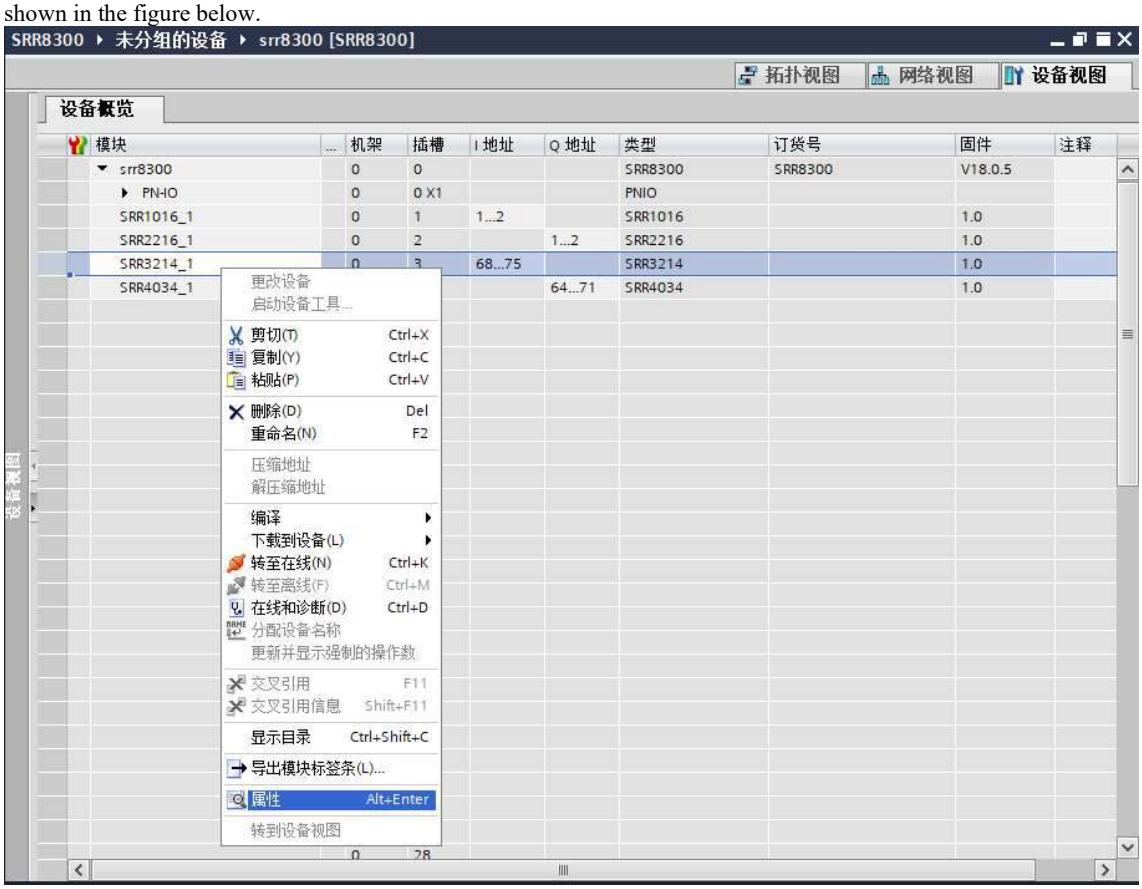
b. On the Properties page of SRR1016, click "Module Parameters", as shown in the figure below. Parameters can be configured according to actual usage requirements. After completing the configuration, re-download the program to the PLC again, and power on the PLC and the module again.



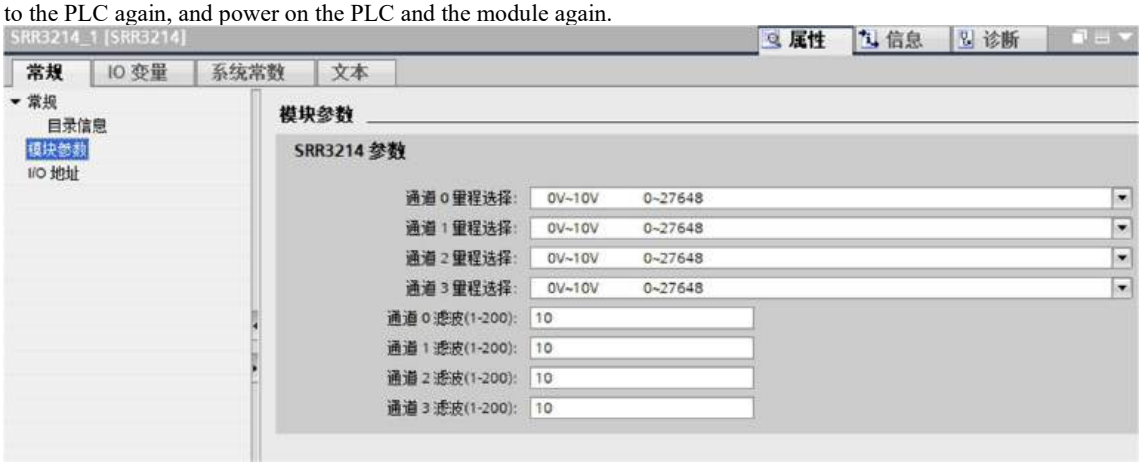
c. View the Properties page of SRR2116 with the same method, and click "Module Parameters", as shown in the figure below. Parameters can be configured according to actual usage requirements. After completing the configuration, re-download the program to the PLC again, and power on the PLC and the module again.



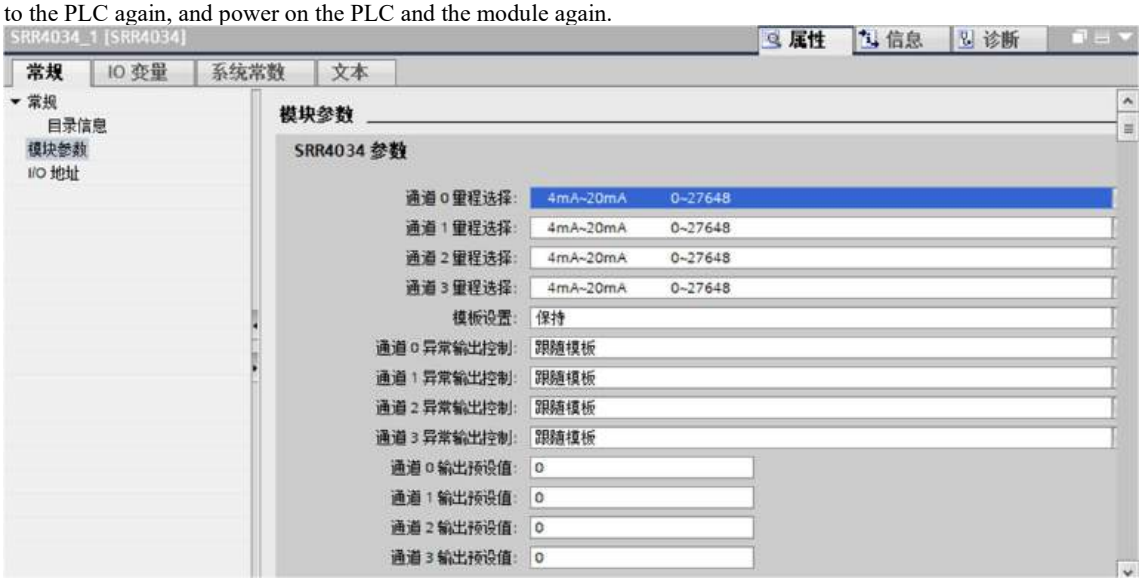
d. Right-click the SRR3214 module and click the "Properties" button to view and set various module parameters, as shown in the figure below.



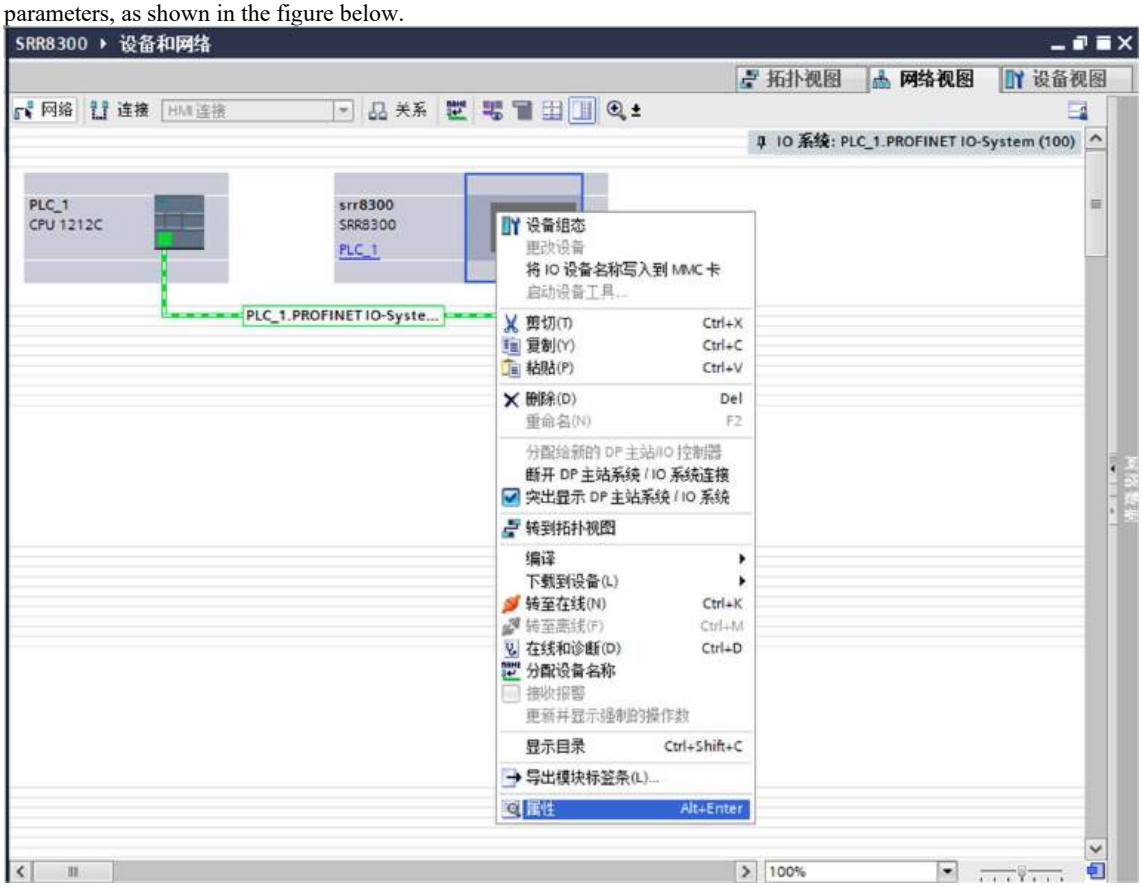
e. On the Properties page of SRR3214, click "Module Parameters", as shown in the figure below. Parameters can be configured according to actual usage requirements. After completing the configuration, re-download the program to the PLC again, and power on the PLC and the module again.



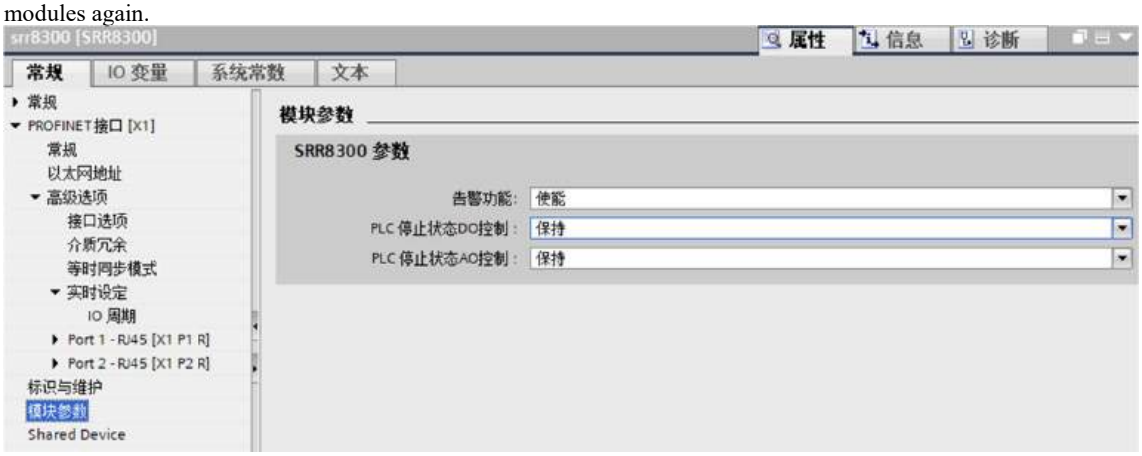
f. On the Properties page of SRR4034, click "Module Parameters", as shown in the figure below. Parameters can be configured according to actual usage requirements. After completing the configuration, re-download the program to the PLC again, and power on the PLC and the module again.



g. Right-click the coupler icon in the Network View and click the "Properties" button to view and set the coupler parameters, as shown in the figure below.

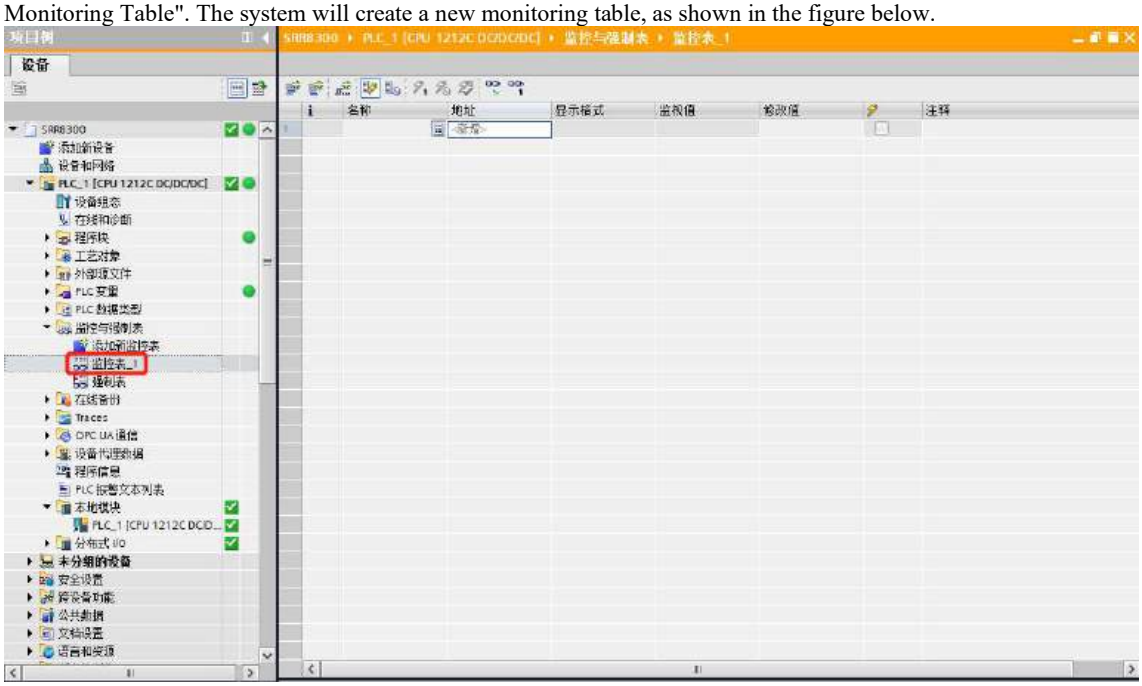


h. On the Properties page of the coupler, click "Module Parameters", as shown in the figure below. The alarm function enable/disable and AO/DO output control during PLC stop status can be configured according to actual use requirements. After completing the configuration, re-download the program to the PLC, and power on the PLC and modules again.



12. Function verification

a. Expand the project navigation on the left, select "Monitoring and Force Table", and then double-click "Add New Monitoring Table". The system will create a new monitoring table, as shown in the figure below.

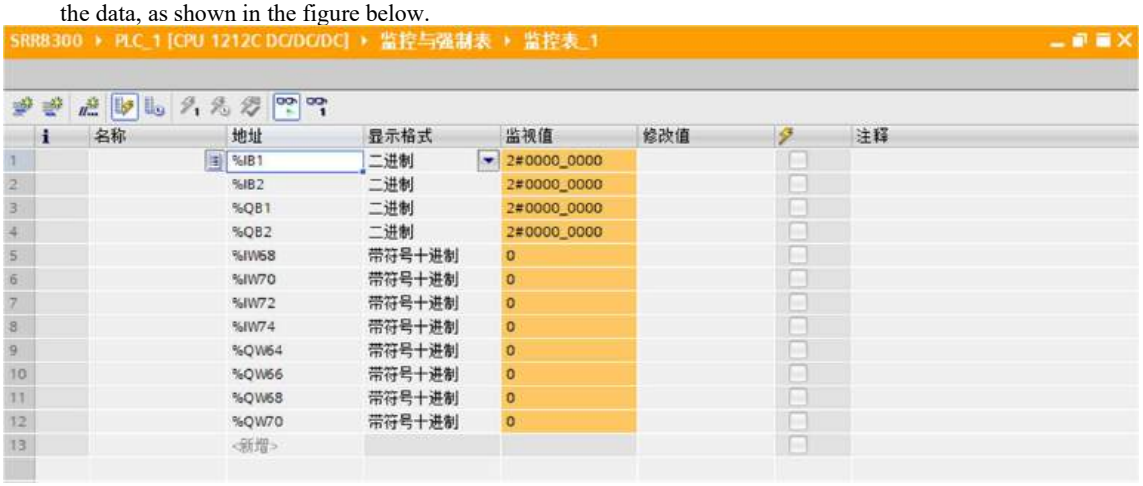


b. Open the "Device View" to check the “I address” (input signal channel addresses) and “Q address” (output signal channel addresses) of each module in the Device Overview.

For example, the "I address" of the SRR1016 module is 1 to 2, and the "Q address" of the SRR2116 module is 1 to 2, as shown in the figure below.

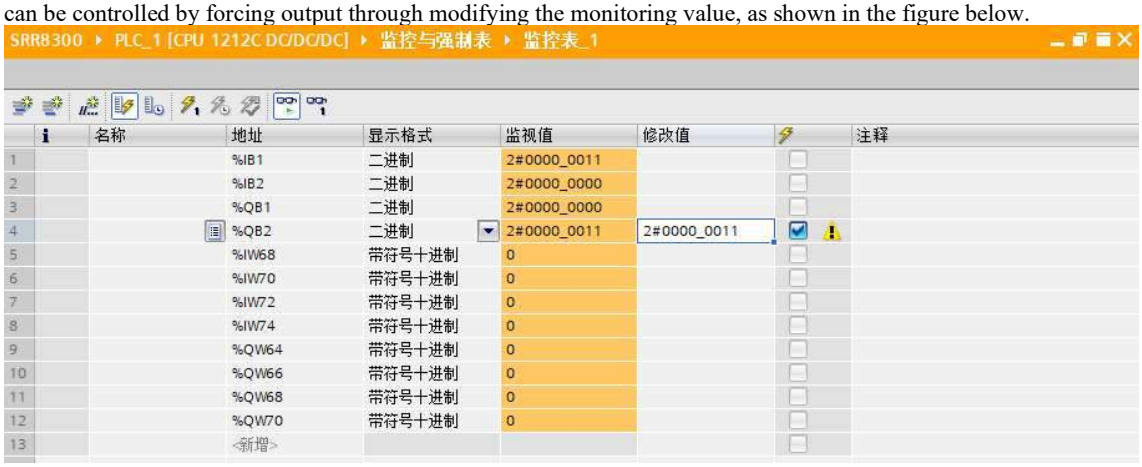
模块	机架	插槽	I 地址	Q 地址	类型	订货号	固件	注释
srr8300	0	0			SRR8300	SRR8300	V18.0.5	
PN-IO	0	0 X1			PNIO			
SRR1016_1	0	1	1...2		SRR1016		1.0	
SRR2216_1	0	2		1...2	SRR2216		1.0	
SRR3214_1	0	3	68...75		SRR3214		1.0	
SRR4034_1	0	4		64...71	SRR4034		1.0	
	0	5						

a. Fill in the input and output channel addresses in the address cells of the monitoring table, such as "IB1" to "IB2", "QB1" to "QB2", and then press "Enter". After filling in all dresses, click the  button to monitor the data, as shown in the figure below.



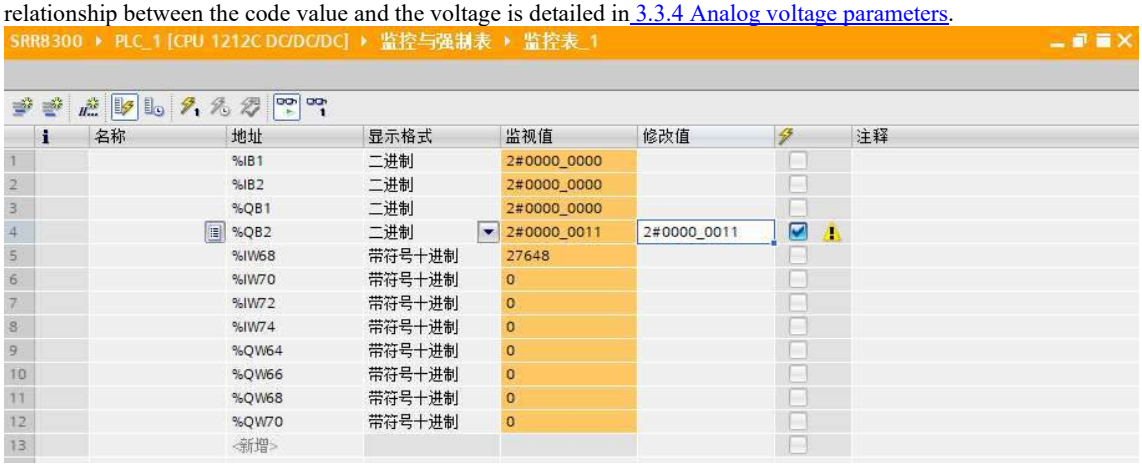
i	名称	地址	显示格式	监视值	修改值	注释
1		%IB1	二进制	2#0000_0000		
2		%IB2	二进制	2#0000_0000		
3		%QB1	二进制	2#0000_0000		
4		%QB2	二进制	2#0000_0000		
5		%IW68	带符号十进制	0		
6		%IW70	带符号十进制	0		
7		%IW72	带符号十进制	0		
8		%IW74	带符号十进制	0		
9		%QW64	带符号十进制	0		
10		%QW66	带符号十进制	0		
11		%QW68	带符号十进制	0		
12		%QW70	带符号十进制	0		
13		<新增>				

b. Taking input channel 0 and channel 1 of the SRR1016 module as an example, when there is valid voltage input on these channels, it can be observed in the monitored value cell of the monitoring table. The SRR2116 output channel can be controlled by forcing output through modifying the monitoring value, as shown in the figure below.



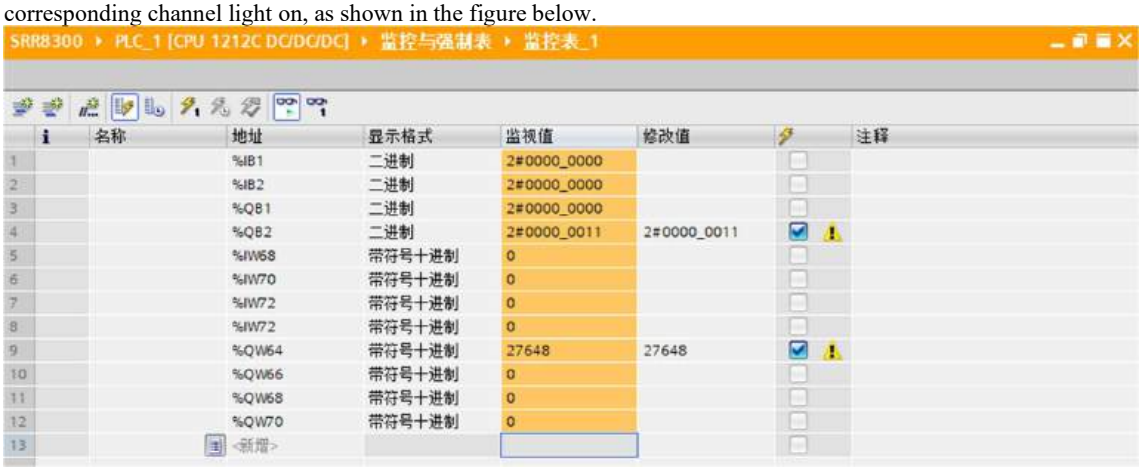
	名称	地址	显示格式	监视值	修改值	注释
1		%IB1	二进制	2#0000_0011		
2		%IB2	二进制	2#0000_0000		
3		%QB1	二进制	2#0000_0000		
4		%QB2	二进制	2#0000_0011	2#0000_0011	
5		%IW68	带符号十进制	0		
6		%IW70	带符号十进制	0		
7		%IW72	带符号十进制	0		
8		%IW74	带符号十进制	0		
9		%QW64	带符号十进制	0		
10		%QW66	带符号十进制	0		
11		%QW68	带符号十进制	0		
12		%QW70	带符号十进制	0		
13		<新增>				

c. Taking channel 0 of the SRR3214 module as an example, when there is voltage input in channel 0, the input voltage code value can be monitored in the monitoring table, as shown in the figure below. The corresponding relationship between the code value and the voltage is detailed in 3.3.4 Analog voltage parameters.



	名称	地址	显示格式	监视值	修改值	注释
1		%IB1	二进制	2#0000_0000		
2		%IB2	二进制	2#0000_0000		
3		%QB1	二进制	2#0000_0000		
4		%QB2	二进制	2#0000_0011	2#0000_0011	
5		%IW68	带符号十进制	27648		
6		%IW70	带符号十进制	0		
7		%IW72	带符号十进制	0		
8		%IW74	带符号十进制	0		
9		%QW64	带符号十进制	0		
10		%QW66	带符号十进制	0		
11		%QW68	带符号十进制	0		
12		%QW70	带符号十进制	0		
13		<新增>				

d. Taking channel 0 of the SRR4034 module as an example, if you want channel 0 to output, you can enter a value can be entered in the modified value cell of the monitoring table. The corresponding relationship between the code value and the current is detailed in 3.3.5 Analog current parameters. Click Writing, and you can see the corresponding channel light on, as shown in the figure below.



	名称	地址	显示格式	监视值	修改值	注释
1		%IB1	二进制	2#0000_0000		
2		%IB2	二进制	2#0000_0000		
3		%QB1	二进制	2#0000_0000		
4		%QB2	二进制	2#0000_0011	2#0000_0011	
5		%IW68	带符号十进制	0		
6		%IW70	带符号十进制	0		
7		%IW72	带符号十进制	0		
8		%IW72	带符号十进制	0		
9		%QW64	带符号十进制	27648	27648	
10		%QW66	带符号十进制	0		
11		%QW68	带符号十进制	0		
12		%QW70	带符号十进制	0		
13		<新增>				

6.8.2 Ring redundancy configuration application

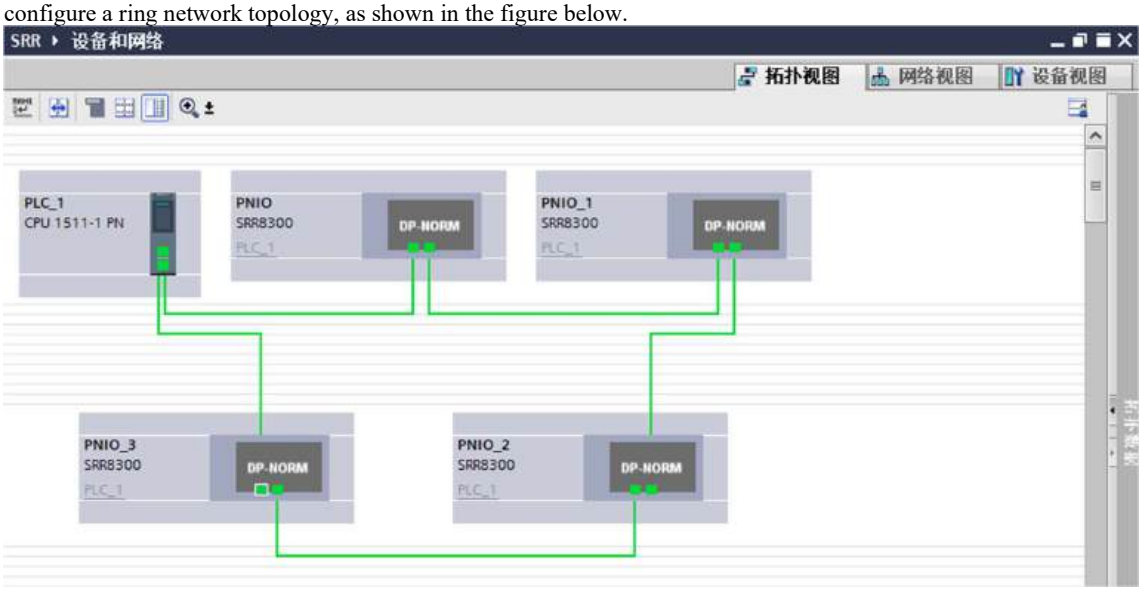
1. Preparation work

- **Hardware environment**
  - **Module preparation. This instruction takes the network topology of SRR8300+SRR8300+SRR8300+SRR8300 as an example.**
  - **One computer with TIA Portal V17 software pre-installed**
  - **One Siemens PLC. This instruction takes the Siemens S7-1500 CPU 1511-1 PN as an example.**
  - **Special shielded cable**
  - **One switching power supply**
  - **Device configuration file**
    Please contact our staff for configuration files.
- **Hardware configuration and wiring**
  Please follow " 4 Assembly and disassemble" and " 5 Wiring"

2. Ring redundancy

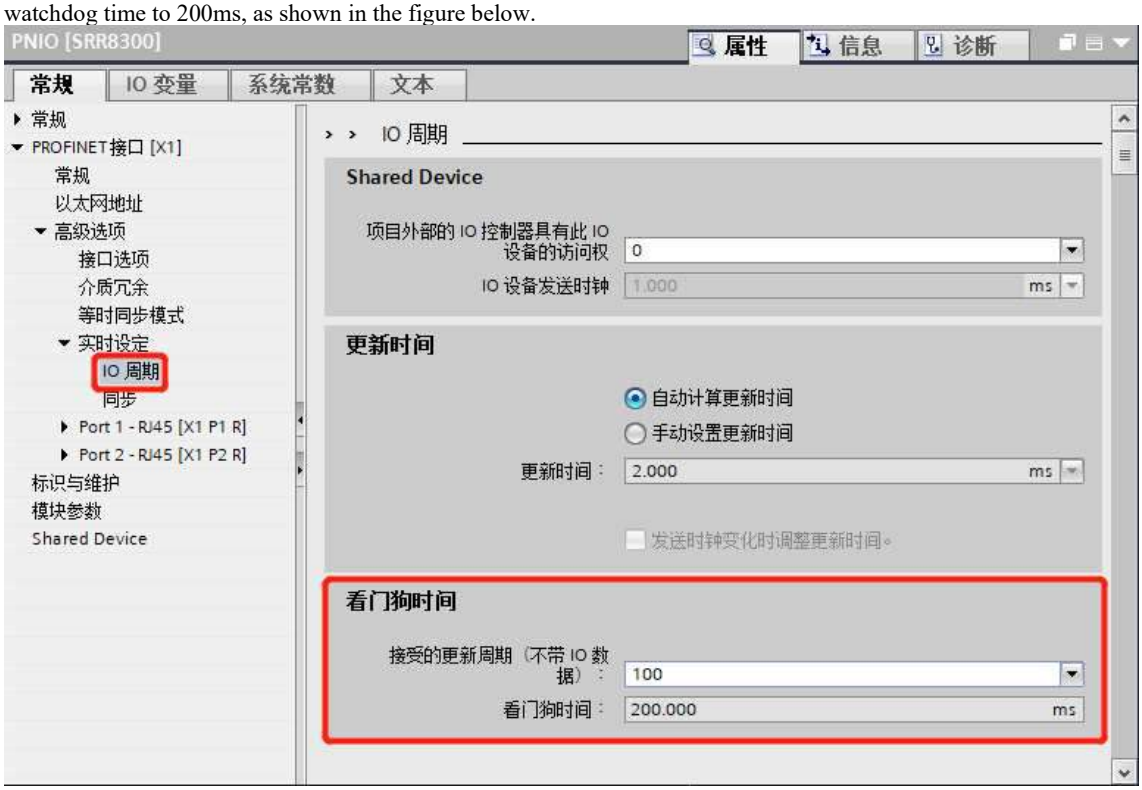
a. Create a project in TIA Portal V17 software and add the network topology of PLC+SRR8300+SRR8300+SRR8300+SRR8300 to the network configuration. The steps for configuring files and adding devices are the same as described in Chapter 6.5.1.

b. Create a topology configuration in the topology view, connect the two interfaces of each device end-to-end, and configure a ring network topology, as shown in the figure below.

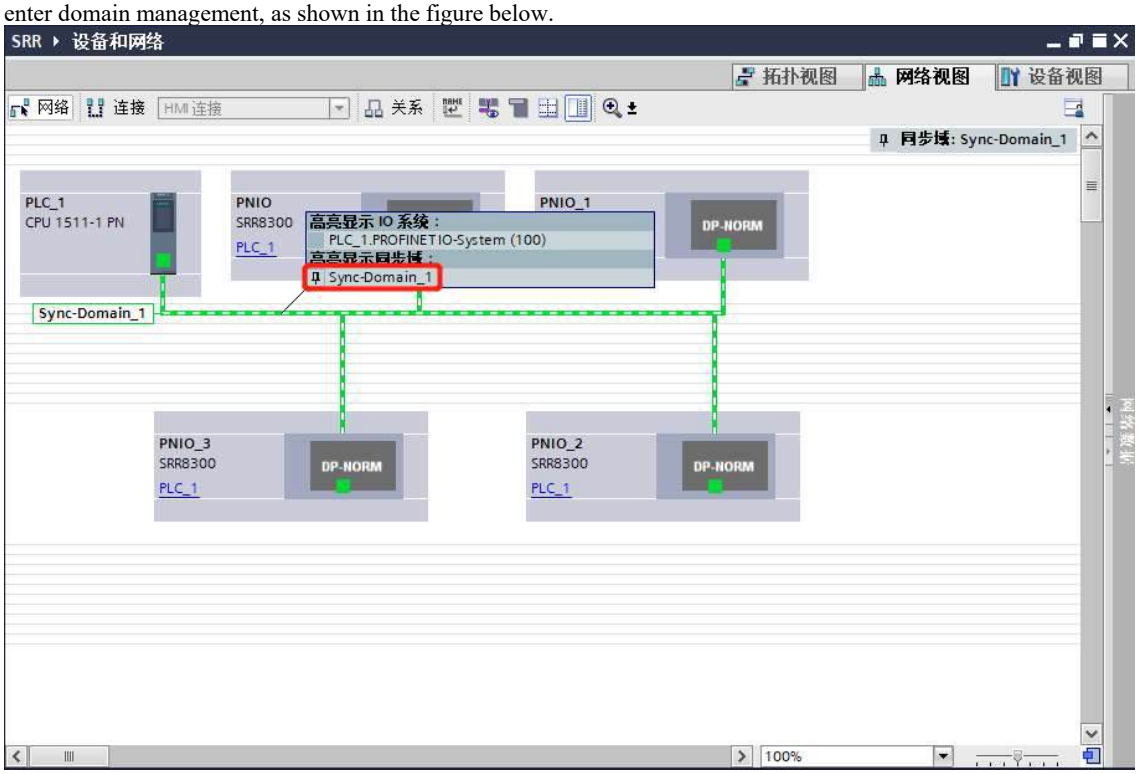


c. Assign a device name to each device (PLC and coupler) in the network view.

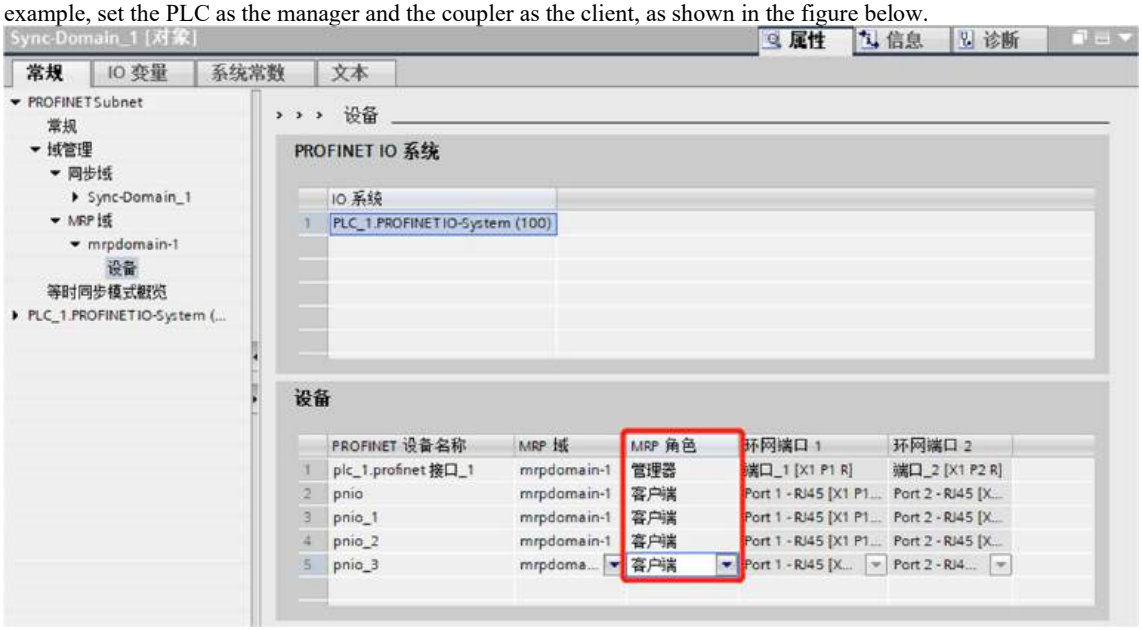
d. Set an IO cycle for each device (PLC and coupler). Taking the coupler as an example, right-click the coupler icon in the network view, click the "Properties" button, locate the watchdog time setting in the IO cycle, and set the watchdog time to 200ms, as shown in the figure below.



e. Highlight the synchronization domain in the network view, and then click the synchronization domain network to enter domain management, as shown in the figure below.

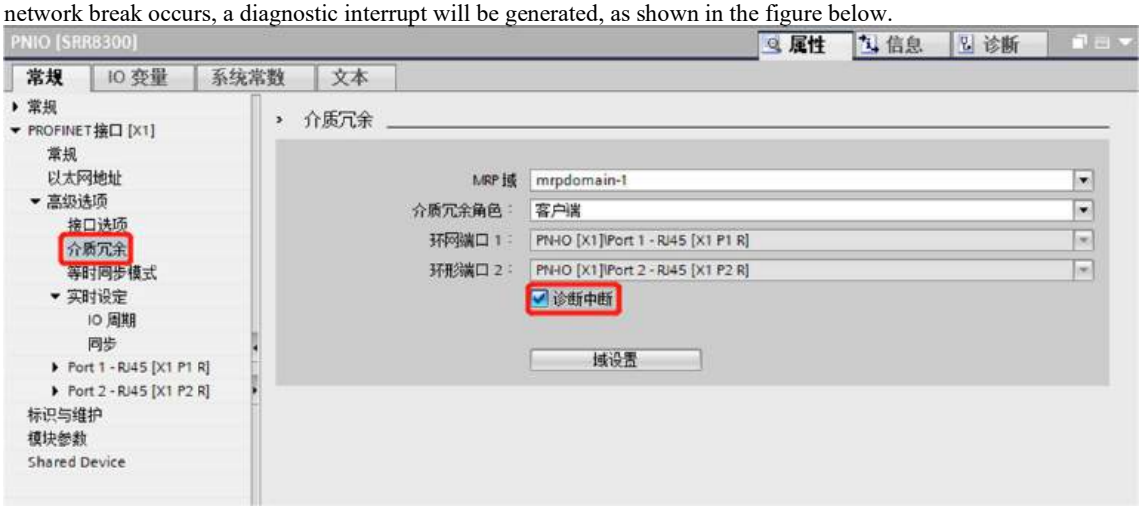


f. On the MRP Domain Management page, assign the MRP role and ring network port for each device. In this example, set the PLC as the manager and the coupler as the client, as shown in the figure below.



g. After compiling and downloading the program, enter the online topology view to check whether the device status is normal.

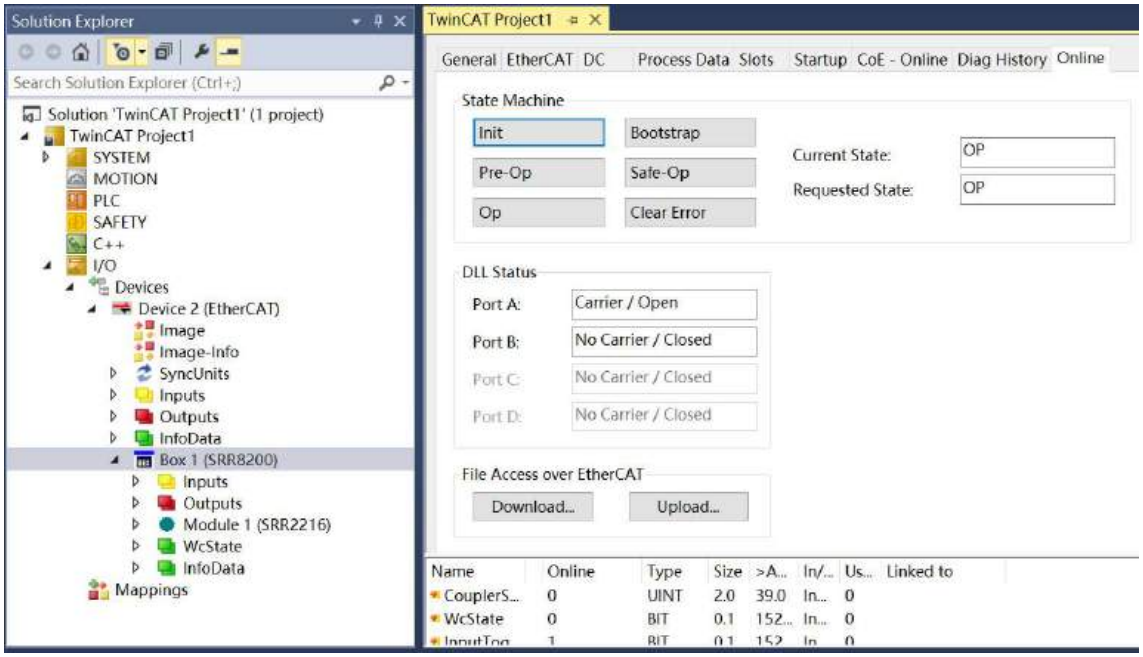
h. Check the diagnostic interrupt function. When there is a wiring or port error on the ring network port or a ring network break occurs, a diagnostic interrupt will be generated, as shown in the figure below.



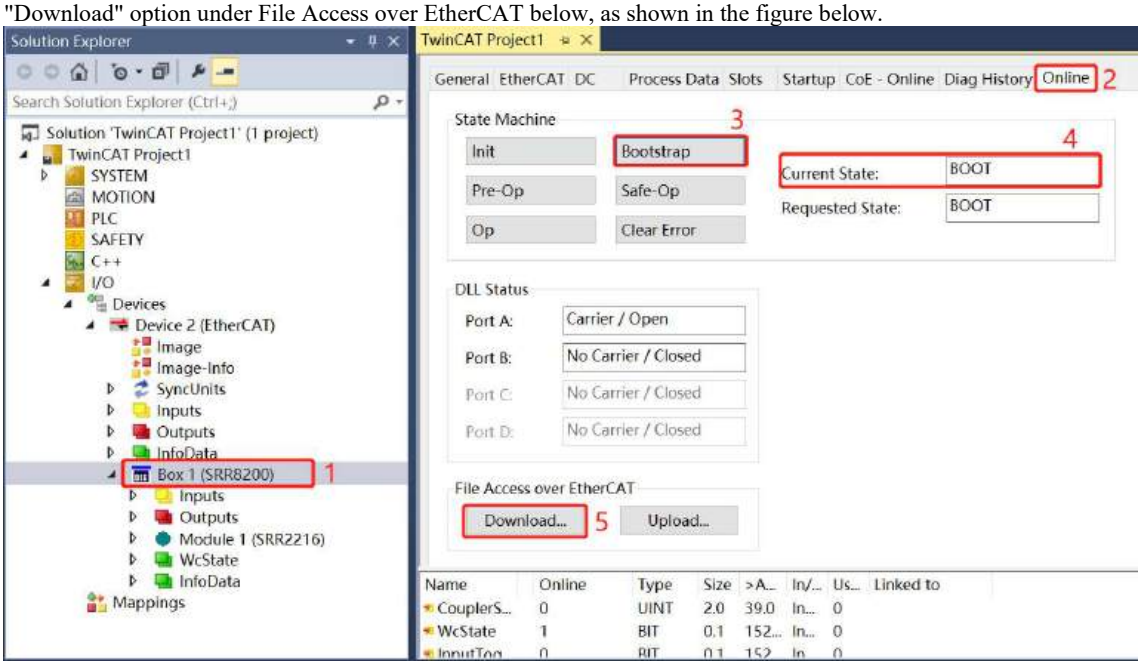
i. In the topology view, when there is a port error or device failure, the fault point can be quickly located.

6.9 Online Firmware Upgrade

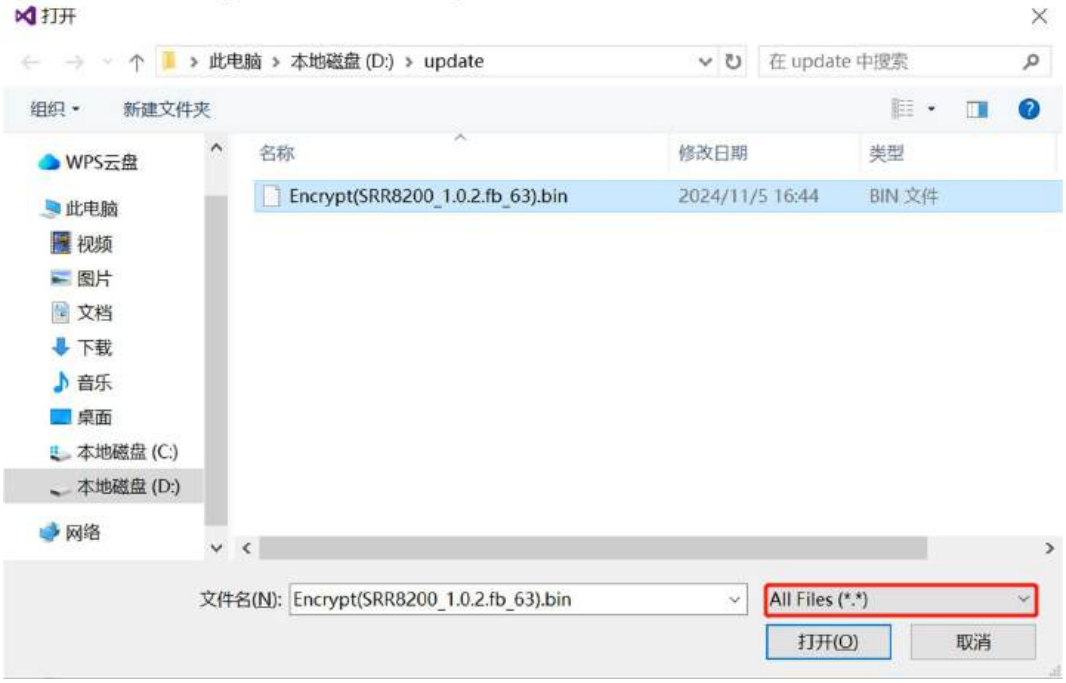
1. Taking TwinCAT3 software as an example, the topology is SRR8200+SRR2216, as shown in the figure below.



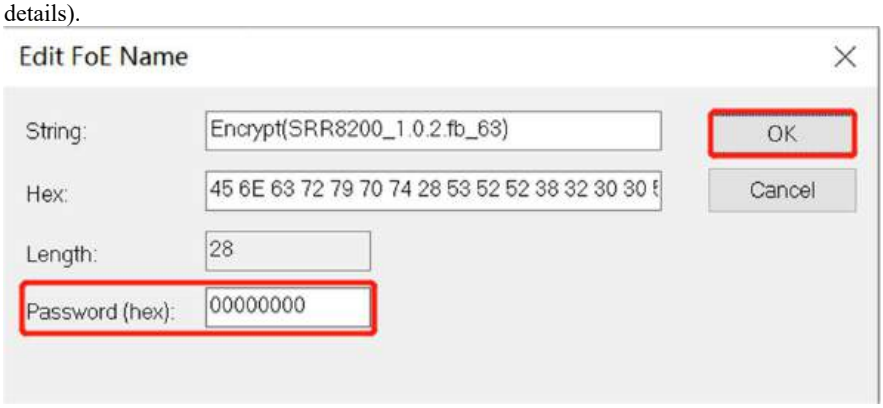
2. Click the coupler "SRR8200" in the left navigation tree, click the "Online" option in the right menu, and then click the "Bootstrap" option in the State Machine. Waiting until the Current State displays "BOOT" status, then click the "Download" option under File Access over EtherCAT below, as shown in the figure below.



3. A file open window will pop up. Select the "All Files" option, choose the corresponding bin file for the module to be upgraded, and click "Open", as shown in the figure below.



4. The settings window will pop up. Enter Password (where 0 represents upgrading the coupler), and then click "OK" to upgrade, as shown in the figure below. Note: To upgrade the corresponding slave module, enter the corresponding station number in the Password field. For example, enter 1 when upgrading SRR2216. After confirming the upgrade, observe the progress bar below and the module status to verify whether the update is successful (see next step for details).



5. Successful upgrade process of different modules

Online upgrade of EtherCAT coupler:

1) After the progress bar is full, the IOR indicator of the coupler starts flashing at 10Hz (50ms on, 50ms off);
2) When the IOR indicator changes from 10Hz flashing to 1Hz flashing, it indicates a successful upgrade;
3) After a successful online upgrade, manually switch to OP status to re-establish the connection;
4) To perform repeated upgrade, the OP status must be switched back to BOOT state.

Online upgrade of IO module:

1) After the progress bar is full, the IOR indicator of the coupler and the RUN indicator of the module being upgraded start flashing at 10Hz (50ms on, 50ms off).
2) When the RUN indicator of the module being upgraded turns from 10Hz flashing to off, it indicates a successful upgrade (a power cycle is required after upgrade for normal connection).
3) Other modules can be upgraded continuously without powering off.