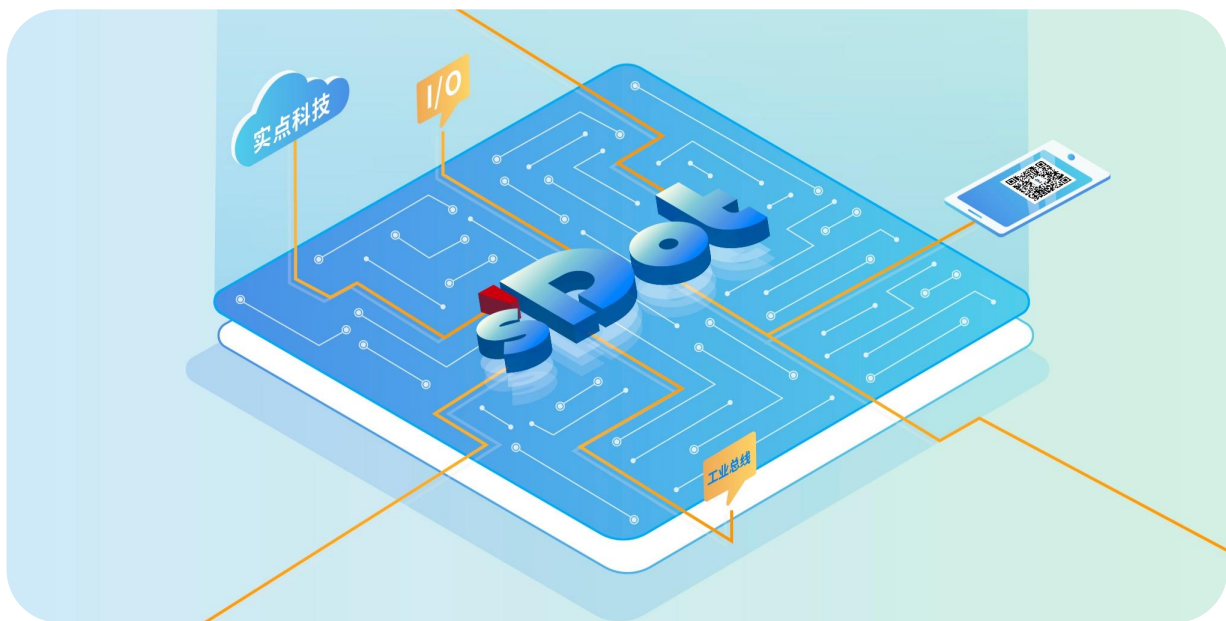




EtherCAT

XB6S Series Slice I/O

User Manual



Nanjing Solidot Electronic Technology Co., Ltd.

Copyright © 2024-2025 Nanjing Solidot Electronic Technology Co., Ltd. All rights reserved.

Without the written permission of this company, no organization or individual may excerpt or reproduce any part or all of the contents of this document, nor may they disseminate it in any form.

statement

This product uses EtherCAT technology. EtherCAT® is a registered trademark and patented technology licensed by Beckhoff Automation GmbH, Germany.

Trademark Declaration

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

All other trademarks or registered trademarks mentioned in this document are the property of their respective owners.

Certification



EtherCAT®
Conformance tested

Notice

Your purchase of products, services, or features is subject to the terms and conditions of the Solidot Company's commercial contracts. All or part of the products, services, or features described in this document may not be included in your purchase or use. Unless otherwise agreed in the contract, Solidot Company makes no express or implied representations or warranties regarding the contents of this document.

This document will be updated periodically due to product version upgrades or other reasons. Unless otherwise agreed, this document is for guidance only, and all statements, information, and suggestions in this document do not constitute any express or implied warranty.

Nanjing Solidot Electronic Technology Co., Ltd.

Address: 11th Floor, Angying Building, No. 91 Shengli Road, Jiangning District, Nanjing City, Jiangsu Province

Postal code: 211106

Telephone: 4007788929

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

目录

1 Product Overview	1
1.1 Product Introduction	1
1.2 Product Features	1
1.3 Application methods	2
2 Naming Rules	5
2.1 Naming Rules	5
2.1.1 Coupler naming rules	5
2.1.2 I/O module naming rules	6
2.2 Module list	8
3 Module Introduction	10
3.1 EtherCAT coupler	10
3.1.1 Panel structure	10
3.1.2 Indicator light function	11
3.1.3 Product Parameters	13
3.1.4 Power wiring diagram	15
3.1.5 Bus wiring	15
3.1.6 Outline Dimensions	16
3.2 Digital I/O modules	17
3.2.1 Panel structure	17
3.2.2 Indicator light function	17
3.2.3 Technical parameters	18
3.2.4 Wiring diagram	24
3.2.5 Outline Dimensions	39
3.3 Analog I/O module	41
3.3.1 Panel structure	41
3.3.2 Indicator light function	41
3.3.3 Technical parameters	42
3.3.4 Analog voltage module parameters	51
3.3.5 Analog current module parameters	57
3.3.6 Analog Current & Voltage Compatible Module Parameters	61
3.3.7 Wiring diagram	69

3.3.8 Outline Dimensions	85
3.4 Extended power module	87
3.4.1 Panel structure	87
3.4.2 Indicator light function	87
3.4.3 Technical parameters	88
3.4.4 Wiring diagram	89
3.4.5 Outline Dimensions	90
3.5 Public End Extension Module	91
3.5.1 Technical parameters	91
3.5.2 Wiring diagram	92
3.5.3 Outline Dimensions	93
3.6 Terminal cover	94
3.6.1 Outline Dimensions	94
4 Installation and removal	95
4.1 Installation Guide	95
4.2 Installation and disassembly steps	98
4.3 Installation and disassembly diagram	99
5 Wiring	106
5.1 Terminal blocks	106
5.2 Wiring instructions and requirements	106
5.3 MIL Connector Type Module Wiring Instructions	108
5.3.1 Compatible Product List	108
5.3.2 Terminal block naming rules	108
5.3.3 Cable naming rules	109
5.3.4 Terminal block parameters	109
5.3.5 Cable parameters	109
5.3.6 Configuration rules	110
6 Use	112
6.1 Parameter Description	112
6.1.1 Digital input filtering	112
6.1.2 Clear/Hold Digital output signal	114
6.1.3 Analog range settings	114

6.1.4 Analog input filtering	114
6.1.5 Analog output signal clear/hold	115
6.1.6 Analog signal power-off retention	115
6.1.7 Coupler parameters	116
6.2 Fault code information	117
6.2.1 Coupler general fault codes	117
6.2.2 Fault Code Viewing	119
6.3 EtherCAT coupler configuration application	120
6.3.1 Applications in the Sysmac Studio software environment	120
6.3.2 Application in the TwinCAT3 software environment	141
6.3.3 Application in the CODESYS V3.5 software environment	155
6.4 Firmware online upgrade	167
7 FAQ	170
7.1 Do EtherCAT slave devices support ring network redundancy?	170

1 Product Overview

1.1 Product Introduction

The XB6S series Slice I/O modules employ a combination of couplers and I/O modules. The coupler connects the expandable I/O modules to a real-time industrial Ethernet system. The backplane uses an X-bus bus, and the coupler module handles fieldbus communication, thus enabling various I/O modules to exchange data with the coupler/controller in real time.

The XB6S series of Slice I/O modules offers a wide variety and high real-time performance, providing users with support for high-speed data acquisition, optimized system configuration, simplified field wiring, and improved system reliability.

The XB6S-EC2002 series EC coupler has passed EtherCAT's official conformance and interoperability tests. (Test Report Number: 0x884443_001)

1.2 Product Features

- **Small number of nodes required**
A node consists of a bus coupler, 1 to 32 XB6S series I/O modules, 1 to 32 XBF series expansion I/O modules, and a terminal cover.
- **Rich functionality**
Supports flexible expansion and offers a complete range of I/O types; can integrate various Digital and analog modules. Analog current & voltage compatible modules and temperature modules are available to meet the needs of different applications.
- **Flexible configuration**
Various types of Slice I/O modules can be combined arbitrarily.
- **High compatibility**
The coupler communication interface conforms to communication standards and supports mainstream EtherCAT master stations.
- **Small size**
It has a compact structure and occupies little space.
- **Easy to diagnose**

The indicator lights are complete, making the module status clear at a glance and facilitating testing and maintenance.

- **Fast**

The backplane uses the X-bus bus: the minimum scan cycle is 200us, and the typical value is 1ms.

- **Easy to install**

Mounts on DIN 35 mm standard rails. Uses spring-loaded terminal blocks for easy and quick wiring.

1.3 Application methods

The coupler module connects to the controller at the application site, while the I/O module connects to the input and output sensors at the application site. The typical data acquisition, processing, and control flow is as follows:

- a. The input I/O module collects various field signals and sends them to the coupler via the internal bus;
- b. The controller reads and processes data from the coupler via fieldbus or industrial Ethernet, and then writes the output data back to the coupler.
- c. The coupler then writes the output data to the output I/O module via the internal bus, thereby enabling device control.

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

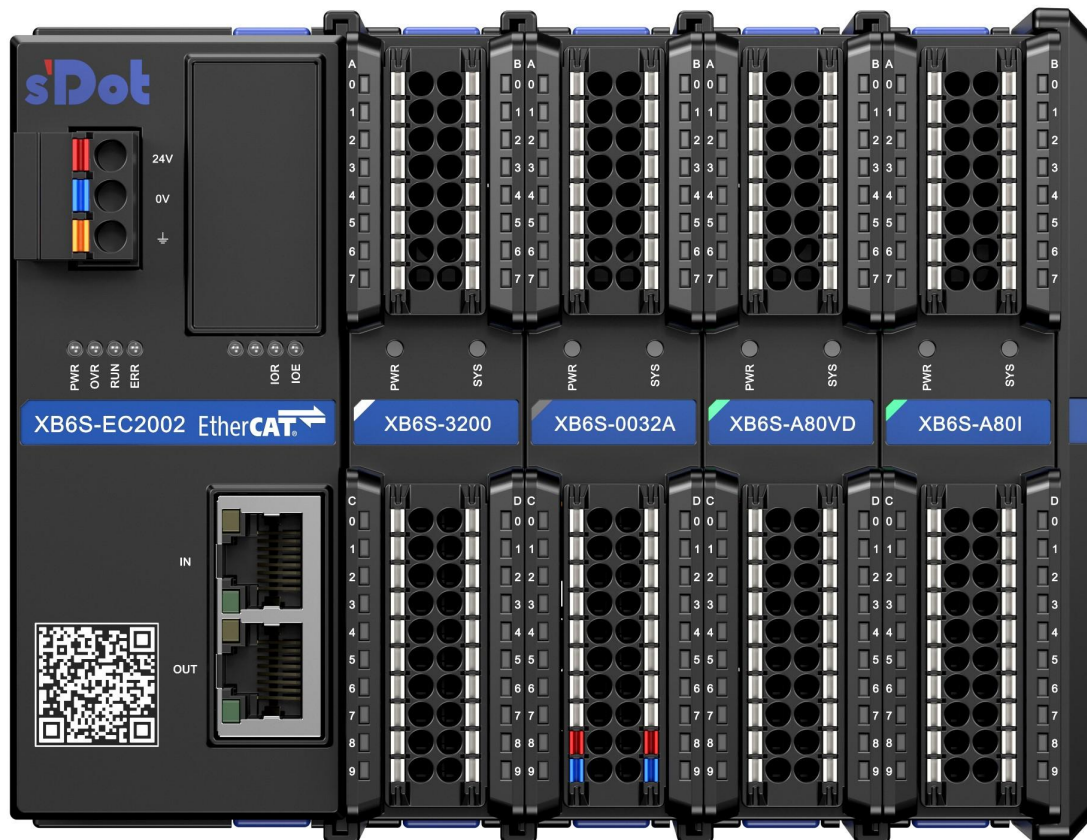
Application method: Applications employ a combination of modules such as couplers, Digital signals, analog signals, temperature sensors, and extended power supplies.

Application configuration: Depending on the requirements of the main station's access capabilities, number of stations, number of I/O points, and function types, it can adapt to different models of I/O module combinations and configurations.

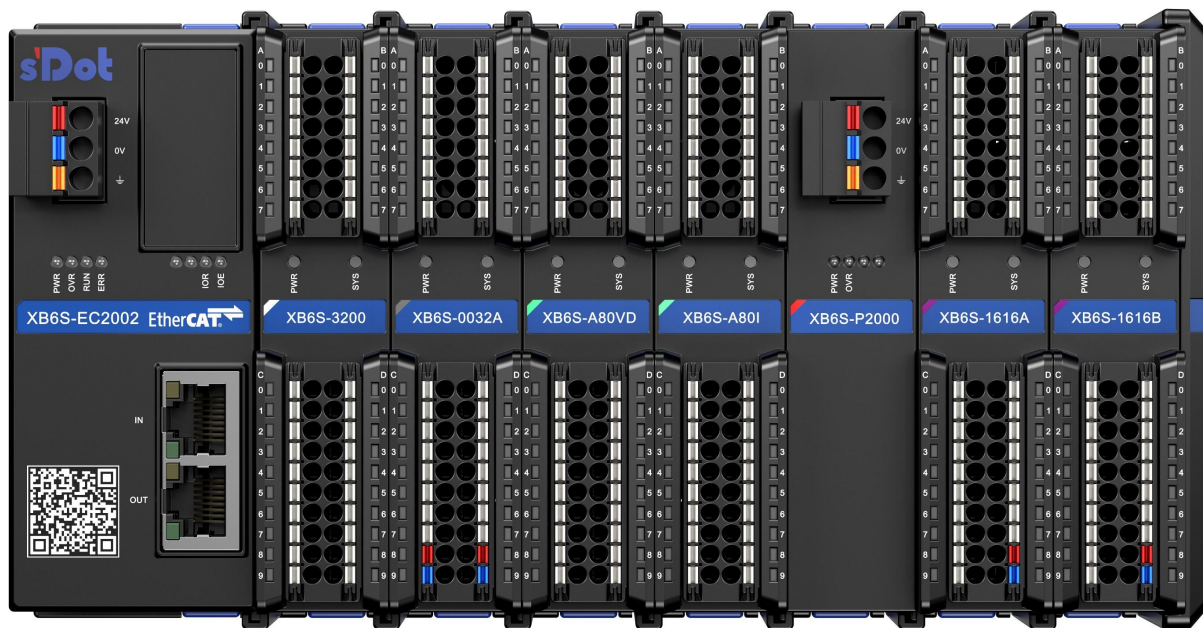
Configuration rules: The modules, from left to right, consist of a coupler module, a power module, an I/O module, and a terminal cover (which must be configured).

The product uses a combination of coupler, I/O module, and terminal cover, and there are two possible combinations.

Product combination option 1 (coupler module, I/O module, terminal cover)



Product combination option two (coupler module, I/O module, extended power supply module, I/O module, terminal cover)



2 Naming Rules

2.1 Naming Rules

2.1.1 Coupler naming rules

XB 6 S - EC 20 02
(1) (2)(3) (4) (5) (6)

serial number	meaning	Value description
(1)	Bus type	XB: X-bus
(2)	Product Series	6: Insert type
(3)	Product Version	S: Strengthen, upgraded version
(4)	Bus Protocol	EC: EtherCAT PN: PROFINET
(5)	Power supply	20:2A
(6)	Number of network ports	02: Dual network ports

2.1.2 I/O module naming rules

XB **6** **S** - **A** **8** **0** **V**
(1) **(2)** **(3)** **(4)** **(5)** **(6)** **(7)**

Serial number	Meaning	Value description					
(1)	Bus type	XB: X-bus					
(2)	Product Series	6: Insert type					
(3)	Product Version	S: Strengthen, upgraded version					
(4)	Types of I/O modules	A: Analog Default: Digital					
(5)	Number of input signal points	Analog: 0, 4, 8 Digital: 00, 08, 16, 32					
(6)	Number of output signal points	Analog: 0, 4, 8 Digital: 00, 08, 16, 32					
(7)	Input/output characteristics	Digital				Analog	
		coding	Input	Output	Connector type	coding	illustrate
		A	NPN/PNP compatible	NPN	/	V	Single-ended signal, adjustable range: Disable -10V~+10V, 0V~10V -5V~+5V, 0V~5V, 1V~5V
		B		PNP	/		
		N		/	MIL connectors	VD	Differential signal, adjustable range: Disable -10V~+10V, 0V~10V -5V~+5V, 0V~5V, 1V~5V
		AN		NPN			
		BN		PNP			
		default	NPN/PNP compatible	/		I	Single-ended signal, adjustable range: Disable 4mA~20mA, 0mA~20mA
		J	/	relay		ID	Differential signal, adjustable range: Disable 4mA~20mA, 0mA~20mA -20mA~+20mA
						default	Single-ended signal,

						compatible with analog current and voltage.
					TM	Temperature acquisition using RTDs, thermocouples, etc.

2.2 Module list

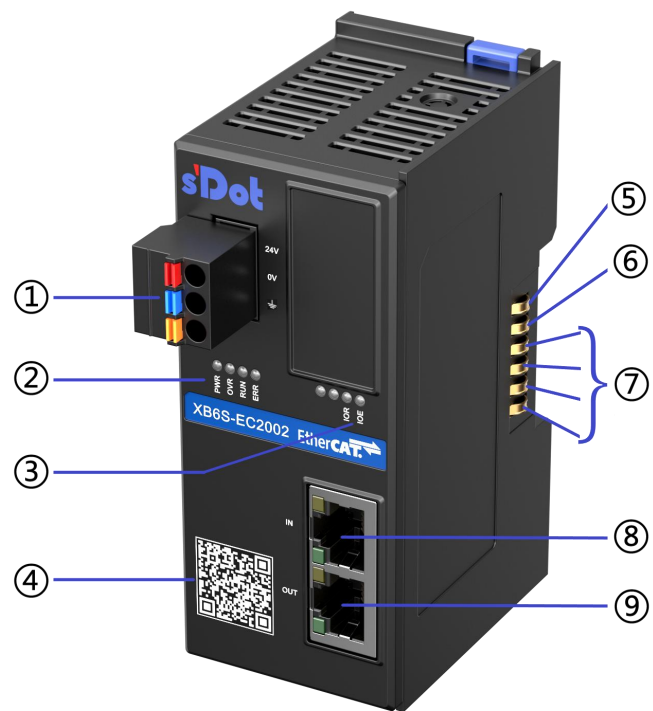
Model	Product Description	
XB6S-EC2002	EtherCAT bus Coupler module	
XB6S-3200	32-channel Digital input module, NPN/PNP compatible input, input filtering default 3ms	
XB6S-1600	16-channel Digital input module, NPN/PNP compatible input, input filtering default 3ms	
XB6S-0800	8-channel Digital input module, NPN/PNP compatible input, input filtering default 3ms	
XB6S-1616A	16-channel Digital input/16-channel Digital output module Input is NPN/PNP compatible, input filtering default is 3ms, output is NPN type.	
XB6S-1616B	16-channel Digital input/16-channel Digital output module Input is NPN/PNP compatible, input filtering default is 3ms, output is PNP type.	
XB6S-0032A	32-channel Digital output module, outputting NPN type	
XB6S-0032B	32-channel Digital output module, outputting PNP type	
XB6S-0016A	16-channel Digital output module, outputting NPN type	
XB6S-0016B	16-channel Digital output module, PNP type output	
XB6S-0008A	8-channel Digital output module, outputting NPN type	
XB6S-0008B	8-channel Digital output module, PNP type output	
XB6S-3200N	32-channel Digital input module, NPN/PNP compatible input, input filtering default 3ms, MIL connector type.	
XB6S-0032AN	32-channel Digital output module, NPN type output, MIL connector type	
XB6S-0032BN	32-channel Digital output module, PNP type, MIL connector type	
XB6S-0012J/6	12-channel relay output module (Note: The "/" in the model number can be omitted, meaning XB6S-0012J/6 and XB6S-0012J6 are the same module)	
XB6S-A80VD	8-channel analog voltage input module	Differential signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
XB6S-A80V	8-channel analog voltage input module	Single-ended signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
XB6S-A40VD	4-channel analog voltage input module	Differential signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
XB6S-A40V	4-channel analog voltage input module	Single-ended signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
XB6S-A80ID	8-channel analog current input module	Differential signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA, -20mA~+20mA
XB6S-A80I	8-channel analog current input module	Single-ended signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA
XB6S-A40ID	4-channel analog current input module	Differential signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA, -20mA~+20mA

XB6S-A40I	4-channel analog current input module	Single-ended signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA
XB6S-A08V	8-channel analog voltage output module	Single-ended signal, adjustable range: Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
XB6S-A04V	4-channel analog voltage output module	
XB6S-A08I	8-channel analog current output module	Single-ended signal, adjustable range: Disable, 4mA~20mA, 0mA~20mA
XB6S-A04I	4-channel analog current output module	
XB6S-A80	8-channel analog current & voltage compatible input module	Single-ended signal, adjustable range: Disable, 0mA~20mA, 4mA~20mA, -20mA~+20mA. -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V
XB6S-A40	4-channel analog current & voltage compatible input module	
XB6S-A08	8-channel analog current & voltage compatible output module	Single-ended signal, adjustable range: Disable, 0mA~20mA, 4mA~20mA, -10V~+10V, 0V~10V. -5V~+5V, 0V~5V, 1V~5V
XB6S-A04	4-channel analog current & voltage compatible output module	
XB6S-A80TM	8-channel RTD/thermocouple temperature acquisition module (for module details, please refer to the module user manual on the official website).	
XB6S-A40TM	4-channel RTD/thermocouple temperature acquisition module (for module details, please refer to the module user manual on the official website).	
XB6S-PL20	2-channel single-ended incremental encoder counting module (for module details, please refer to the module user manual on the official website).	
XB6S-PS20D	2-channel SSI absolute encoder counting module (for module details, please refer to the module user manual on the official website).	
XB6S-PL20D	2-channel differential incremental encoder counting module (for module details, please refer to the module user manual on the official website).	
XB6S-PC80	8-channel pulse counting module (for module details, please refer to the module user manual on the official website).	
XB6S-PT04A	4-channel PTO pulse output module (for module details, please refer to the module user manual on the official website).	
XB6S-C01SP	1-channel serial communication module (see the module user manual on the official website for module details).	
XB6S-P2000	Extended power module	
XB6S-C18_2	Public End Extension Module	
XB6S-CVR00	Terminal cover	

3 Module Introduction

3.1 EtherCAT coupler

3.1.1 Panel structure



Serial number	Name	Illustrate
①	Power terminal	3P spring-loaded terminal block
②	Module indicator lights and indicator light labels	Indicates the power supply status and operating status of the coupler
③	System indicator lights and indicator light labels	Indicates system operating status
④	Module QR code	Scan the QR code to access module-related information.

⑤	Power+	5V
⑥	Power supply-	0V
⑦	X-bus communication signals	Communication signals
⑧	Bus interface IN	RJ45 interface
9	Bus Interface OUT	RJ45 interface

3.1.2 Indicator light function

EtherCAT Coupler Indicator Definition				
Logo	Name		State	Status Description
PWR	Power indicator light	green	ON	The module power supply is working normally.
			OFF	Module not powered or power supply abnormal
OVR	Overload indicator light	red	OFF	Not overloaded
			ON	The load reaches 90% ($\pm 5\%$) or more.
RUN	EtherCAT running status indicator	green	ON	EtherCAT OP status
			Flashing at 2.5Hz	EtherCAT PreOP status
			Single flash (always on for 200ms, then off for 1 second, cycling through different modes).	EtherCAT SafeOP Status
			10Hz Flashing	Bootstrap status
			OFF	EtherCAT Init Status
ERR	EtherCAT fault indicator light	red	Hazard lights[1]	EtherCAT watchdog timeout
			Single flash (always on for 200ms, then off for 1 second, cycling through different modes).	Module local error
			Flashing at 2.5Hz	Common configuration error
			OFF	EtherCAT communication is normal.
IOR	IO communication indicator	green	ON	I/OProcess data has been established
			Flashing 1Hz	No business data interaction
			10Hz Flashing	Coupler firmware upgrade
IOE	IO error indicator	red	ON	Communication error
			OFF	No communication issues

Note [1]: Double flashing means that the light stays on for 200ms and then turns off for 200ms, then stays on for 200ms and turns off for 1000ms, and so on in a cycle.

Network status indicator definition				
Logo	Name		State	Status Description
IN	Network status indicator IN	orange	Flashing	Connection established and data exchanged
			OFF	No data interaction or anomaly
		green	ON	Establish network connection
			OFF	No network connection established or abnormal
OUT	Network status indicator OUT	orange	Flashing	Connection established and data exchanged
			OFF	No data interaction or anomaly
		green	ON	Establish network connection
			OFF	No network connection established or abnormal

3.1.3 Product Parameters

3.1.3.1 Interface parameters

EtherCAT interface parameters	
Bus Protocol	EtherCAT
Number of stations	It depends on the number of slave stations supported by the main station.
Data transmission medium	Ethernet/EtherCAT CAT5 cable
Transmission rate	100Mbps
Minimum loop time [1]	250us
Transmission distance	≤100m (distance between stations)
Bus interface	2×RJ45
Maximum number of modules connected in series	32
Input/output process data volume	1024 Bytes[2]

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

Note [2]: The total length of uplink and downlink data does not exceed 1024 bytes.

3.1.3.2 Power parameters

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

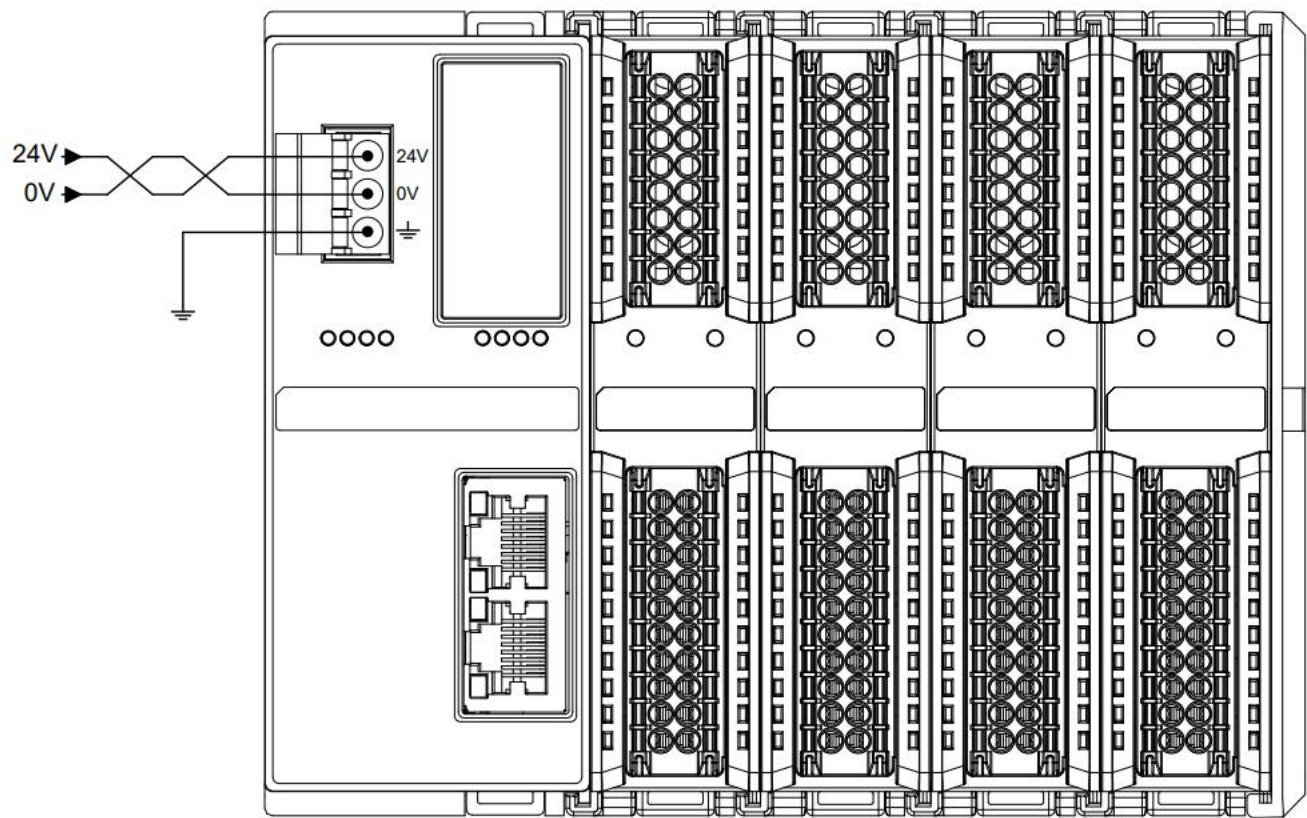
3.1.3.3 General parameters

General technical parameters		
Specifications and dimensions		106.4 × 43 × 61mm
Weight		155g
Usage Environment	Operating temperature	-20°C~+60°C
	Storage temperature	-40°C~+80°C
	relative humidity	95%, no condensation
	Altitude	≤2000m
	Vibration resistance	IEC 60068-2-6sinusoidal vibration 5Hz~8.4Hz,3.5mm,8.4Hz~150Hz,1g X/Y/ZTriaxial10One cycle/Axial (1)00min)
	Impact resistance	IEC 60068-2-27Mechanical shock 150m/s ² ,11ms, ±X/Y/ZSix directions 3Second-rate/Direction, Together18Second-rate
	Protection level	IP20
	Overvoltage category	I
	Pollution level	Level 2

Electromagnetic compatibility requirements	electrostatic discharge	Level 3	Contact $\pm 8\text{kV}$, Air $\pm 8\text{kV}$, IEC61000-4-2
	surge	Level 3	1KV DM 2KV CM, IEC61000-4-5
	Electrical Fast Burst	Level 4	Power cord $\pm 4\text{kV}$, IEC61000-4-4
Module error self-recovery		support	
Accessing PDO via SDO		support	
Diagnosis		support	
Alarm		support	
Firmware upgrade		support	
Short circuit protection		Supports (automatic recovery mechanism)	
Reverse connection protection		Supports (automatic recovery mechanism)	
Surge protection		support	
CE certification		EMC EN 61131-2 EN IEC 61000-6-4 EN IEC 61000-6-2	
		LVD EN 61010-1:2010/A1 EN IEC 61010-2-201	
UL certification		UL 61010-1/UL 61010-2-201	
RoHS certification		EU Directive 2011/65/EU Annex II	
REACH certification		EU Directive EC 1907/2006	
CTT Conformity Certification		EtherCAT Technology Group	

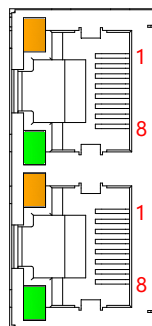
3.1.4 Power wiring diagram

Using a 24VDC power module, refer to the wiring method and connect the power supply according to the circuit shown in the diagram below, while ensuring reliable grounding (twisted pair cable is recommended for the power supply).



3.1.5 Bus wiring

It uses a standard RJ45 network interface and a standard crystal connector. The pin assignments are shown in the table below.



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

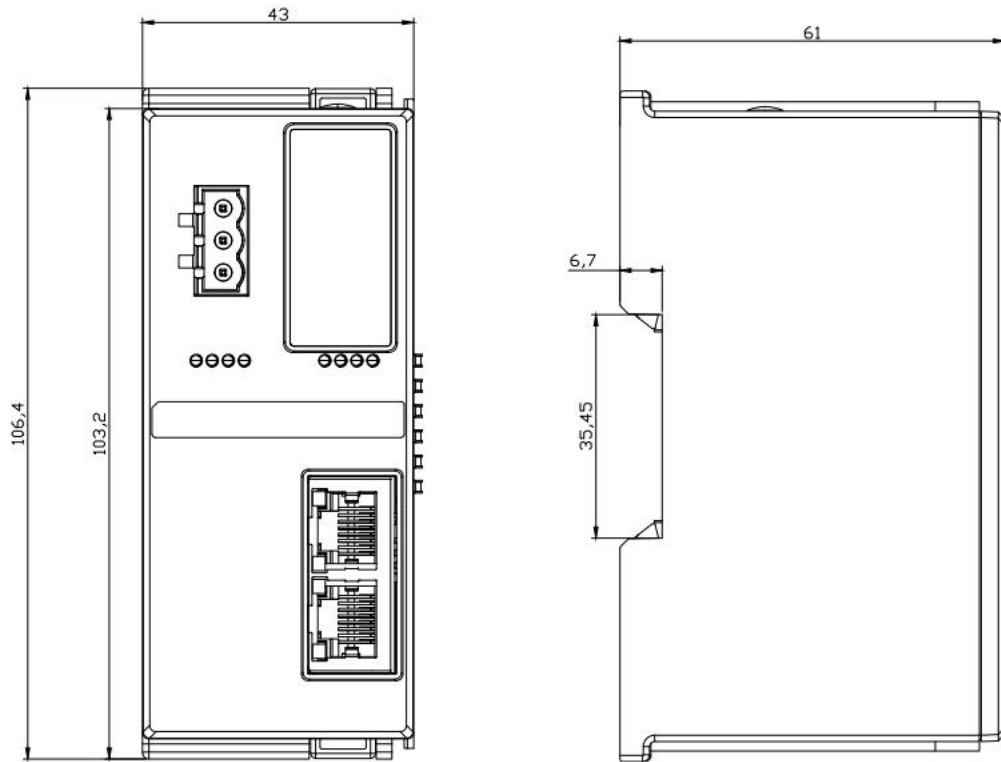
⚠ Precautions

- Category 5 or higher double-shielded (braided mesh + aluminum foil) STP cables are recommended for use as communication cables.

- The length of the cable between devices must not exceed 100m.

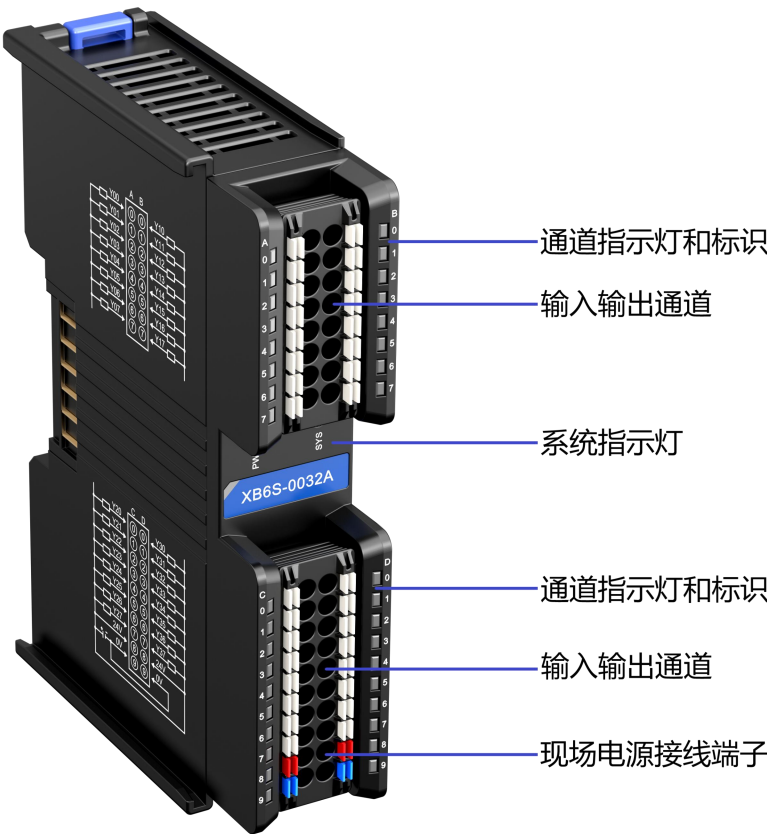
3.1.6 Outline Dimensions

Coupler dimensions (unit: mm)



3.2 Digital I/O modules

3.2.1 Panel structure



3.2.2 Indicator light function

Digital I/O module indicator light definitions				
Logo	Name		State	Status Description
PWR	Power indicator light	green	ON	Power supply is normal
			OFF	The product is not powered on or the power supply is abnormal.
SYS	Operating status indicator	green	ON	The system is running normally.
			Flashing 1Hz	No business data interaction, waiting to establish business data interaction.
			10Hz Flashing	Firmware upgrade
			OFF	The system is not working.
0~7	Input channel indicator	green	ON	The module channel has a signal input.
			OFF	The module channel has no signal input or the signal input is abnormal.
0~7	Output channel indicator	green	ON	The module channel has signal output.
			OFF	The module channel has no signal output or the signal output is abnormal.

3.2.3 Technical parameters

3.2.3.1 Digital input module parameters

Digital input				
Product Model	XB6S-3200	XB6S-3200N	XB6S-1600	XB6S-0800
Bus input power supply rated voltage	5VDC (4.5V~5.5V)			
Bus input power supply rated current	≤100mA	≤70mA	≤80mA	≤60mA
Input rated voltage	24VDC (20.4V~28.8V)			
Typical input current	5mA/ch (24VDC)			
Number of input signal points	32	32	16	8
Input signal type	NPN/PNP compatible			
Input signal form	direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form			
OFF voltage/OFF current	-3V to +5V / below 0.9mA			
ON voltage/ON current	11V~30V/2.1mA or above			
reaction time	<50us			
Input filtering	No filtering, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms			
Maximum input frequency	150Hz (Filtering time: 3ms)			
Input impedance	5.4KΩ			
Isolation methods	Optical isolation			
Isolation and withstand voltage	500VAC			
Rated current consumption	100mA	70mA	80mA	60mA
Power consumption	0.5W	0.35W	0.4W	0.3W
Numeric input type	Type1/Type3			
Channel indicator lights	Green LED lights			

3.2.3.2 Digital Input/Output Module Parameters

Digital input		
Product Model	XB6S-1616A	XB6S-1616B
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	≤130mA	≤100mA
Input rated voltage	24VDC (20.4V~28.8V)	
Typical input current	5mA/ch (24VDC)	
Number of input signal points	16	16
Input signal type	NPN/PNP compatible	
Input signal form	direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form	
OFF voltage/OFF current	-3V to +5V / below 0.9mA	
ON voltage/ON current	11V~30V/2.1mA or above	
reaction time	<50us	
Input filtering	No filtering, 0.1ms, 0.2ms, 0.5ms, 1ms, 2ms, 3ms (factory setting), 4ms...18ms, 19ms, 20ms	
Maximum input frequency	150Hz (Filtering time: 3ms)	
Input impedance	5.4KΩ	
Isolation methods	Optical isolation	
Isolation and withstand voltage	500VAC	
Rated current consumption	130mA	100mA
Power consumption	0.65W	0.5W
Numeric input type	Type1/Type3	
Channel indicator lights	Green LED lights	
Digital output		
Number of output signal points	16	16
Output signal type	NPN	PNP
Field-side input voltage range	24VDC (20.4V~28.8V)	
Output voltage drop	<1V	
Output load type	Resistive load, inductive load, lamp load	
Single-channel rated current	Max: 0.5A (see details) Figure 1	
Leakage current	<10uA	
reaction time	<150us	
Output channel protection	Short circuit protection (automatic recovery mechanism)	
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection	
Isolation methods	Optical isolation	
Isolation and withstand voltage	500VAC	
Channel indicator lights	Green LED lights	

3.2.3.3 Digital output module parameters

Digital output				
Product Model	XB6S-0032A	XB6S-0032B	XB6S-0032AN	XB6S-0032BN
Bus input power supply rated voltage	5VDC (4.5V~5.5V)			
Bus input power supply rated current	≤150mA	≤110mA	≤130mA	≤80mA
Field-side input voltage range	24VDC (20.4V~28.8V)			
Number of output signal points	32	32	32	32
Output signal type	NPN	PNP	NPN	PNP
Output voltage drop	<1V			
Output load type	Resistive load, inductive load, lamp load			
Single-channel rated current	Max: 0.5A (see details) Figure 1		Max: 0.1A	
Leakage current	<10uA			
reaction time	<150us			
Output channel protection	Short circuit protection (automatic recovery mechanism)			
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection			
Isolation methods	Optical isolation			
Isolation and withstand voltage	500VAC			
Rated current consumption	150mA	110mA	130mA	80mA
Power consumption	0.75W	0.55W	0.65W	0.4W
Channel indicator lights	Green LED lights			

Digital output				
Product Model	XB6S-0008A	XB6S-0008B	XB6S-0016A	XB6S-0016B
Bus input power supply rated voltage	5VDC (4.5V~5.5V)			
Bus input power supply rated current	≤70mA	≤60mA	≤110mA	≤90mA
Field-side input voltage range	24VDC (20.4V~28.8V)			
Number of output signal points	8	8	16	16
Output signal type	NPN	PNP	NPN	PNP
Output voltage drop	<1V			

Output load type	Resistive load, inductive load, lamp load			
Single-channel rated current	Max: 0.5A (see details) Figure 1			
Leakage current	<10uA			
reaction time	<150us			
Output channel protection	Short circuit protection (automatic recovery mechanism)			
Module protection	Reverse connection protection (automatic recovery mechanism), field-side surge protection			
Isolation methods	Optical isolation			
Isolation and withstand voltage	500VAC			
Rated current consumption	70mA	60mA	110mA	90mA
Power consumption	0.35W	0.3W	0.55W	0.45W
Channel indicator lights	Green LED lights			

3.2.3.4 Relay output module parameters

Relay output	
Product Model	XB6S-0012J/6
Bus input power supply rated voltage	5VDC (4.5V~5.5V)
Bus input power supply rated current	≤100mA
Field-side input voltage range	24VDC (20.4V~28.8V)
Number of output signal points	12
Output format	Relay
Output load type	Resistive load, inductive load, lamp load
minimum load current	10mA
minimum load voltage	5V
Single channel rated voltage	24VDC
Single-channel rated current	Max: 2A (see details) Figure 2
Hardware output response time	10ms/10ms
Module protection	Field-side reverse connection protection (automatic recovery mechanism), field-side surge protection
Isolation methods	Optical isolation + relay isolation
Isolation and withstand voltage	1500VAC
Rated current consumption	100mA
Power consumption	0.5W
Mechanical life	Minimum 20 million operations (18,000 operations/hour)
Electrical life	Minimum 100,000 operations (2A, 24VDC, inductive load)
Channel indicator lights	Green LED lights

3.2.3.5 General technical parameters

General technical parameters	
Specifications and dimensions	106.4 × 25.7 × 72.3mm
Weight	32-channel DIO: 110g
	16-channel DIO: 90g
	8-channel DIO: 90g
	XB6S-0012J/6: 135g
Operating temperature	-20°C~+60°C
Storage temperature	-40°C~+80°C
Relative humidity	95%, no condensation
Altitude	≤2000m
Pollution level	Level 2
Protection level	IP20
Safety certification	UL certification, CE certification
Green certification	RoHS certification, REACH certification

Figure 1:

数字量输出模块单通道最大额定电流与温度的关系图

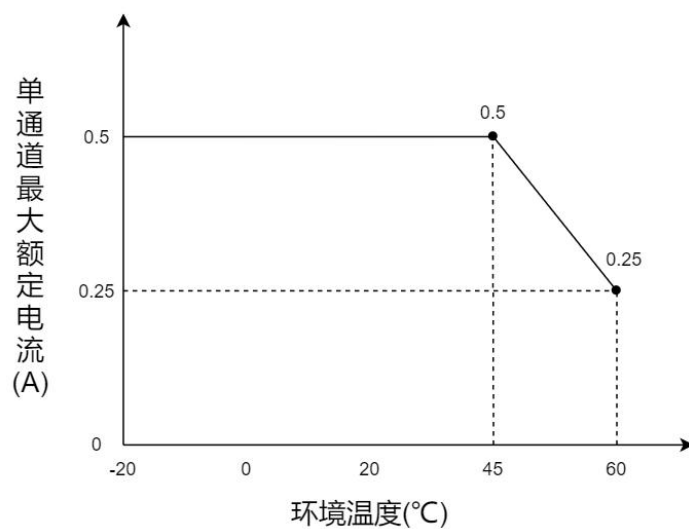
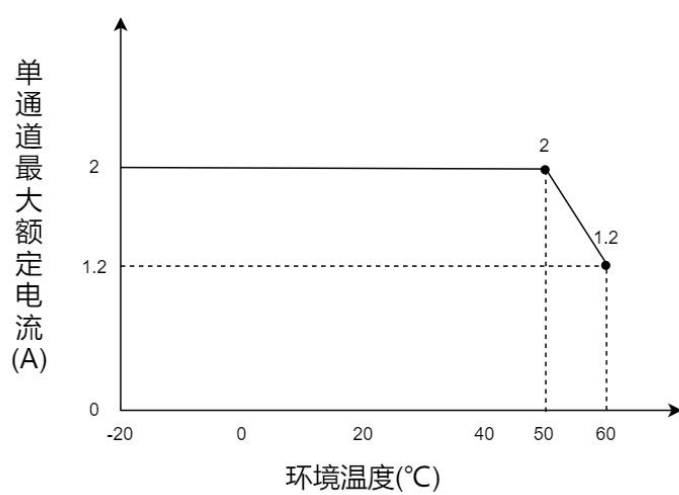


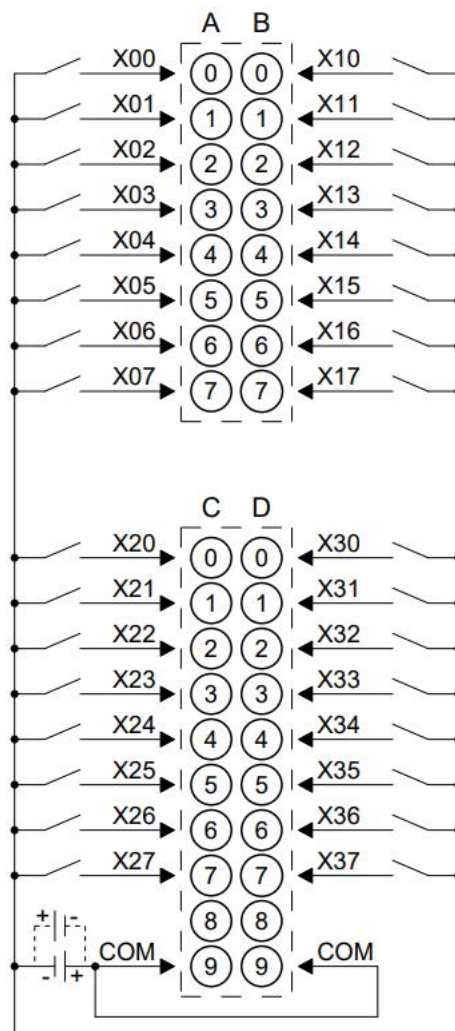
Figure 2:

继电器输出模块单通道最大额定电流与温度的关系图

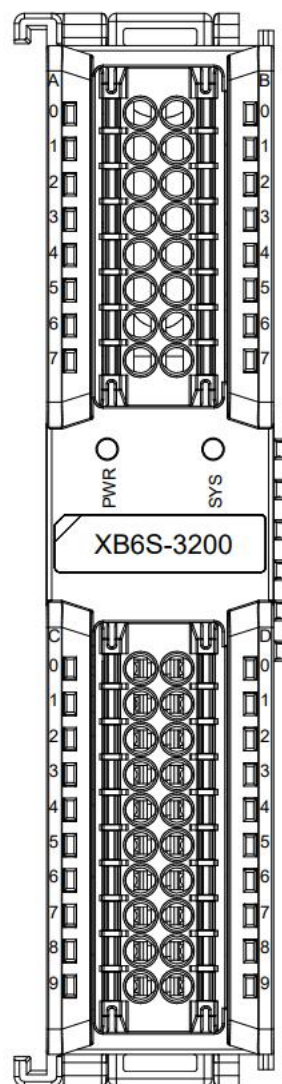


3.2.4 Wiring diagram

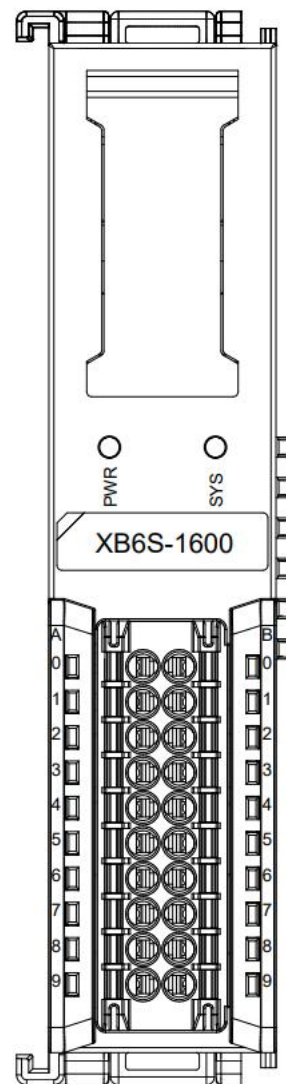
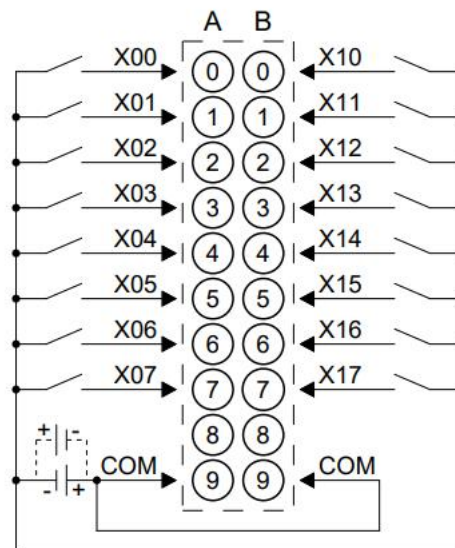
3.2.4.1 XB6S-3200



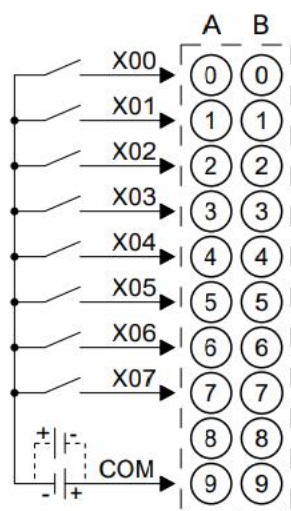
*COM internal conduction; NPN/PNP compatible



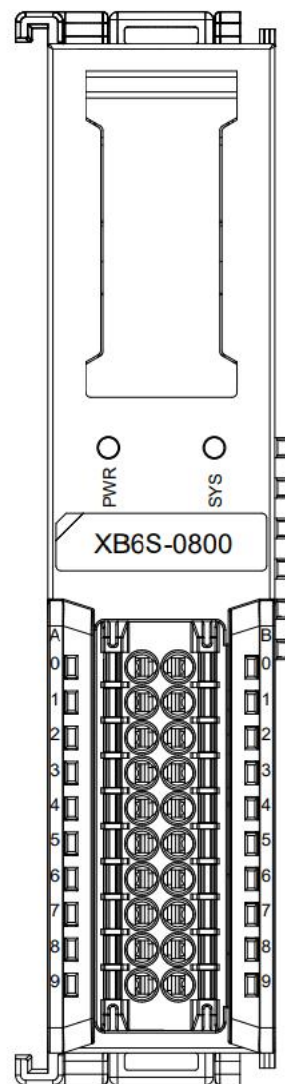
3.2.4.2 XB6S-1600



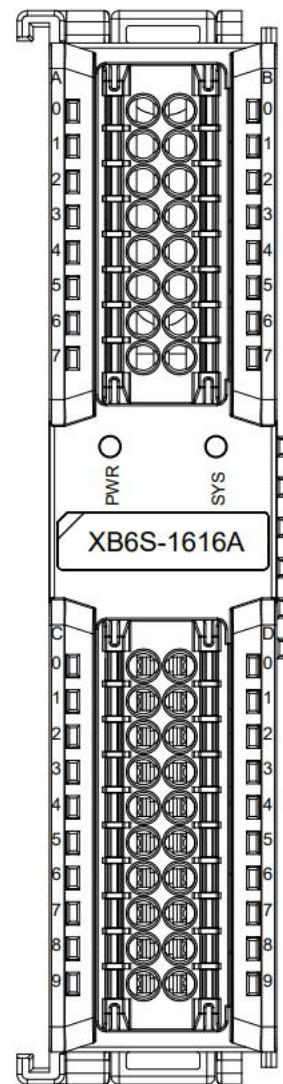
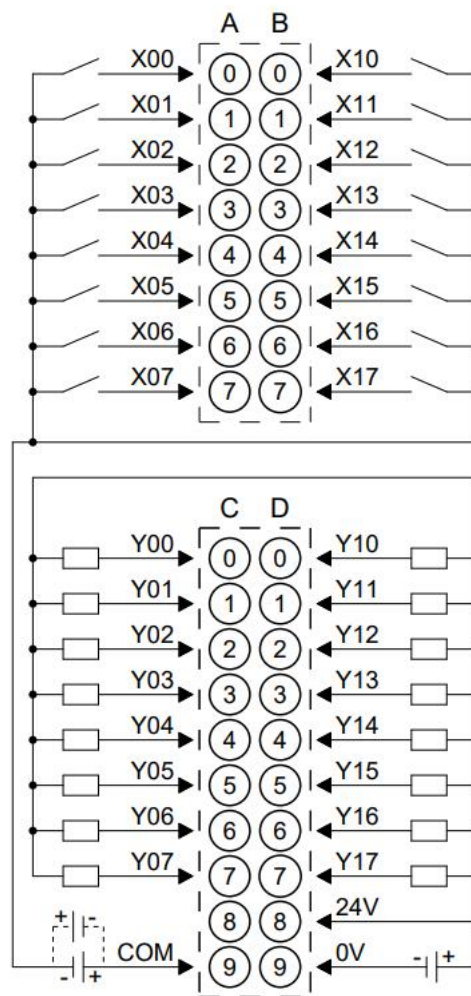
3.2.4.3 XB6S-0800



*NPN/PNP compatible

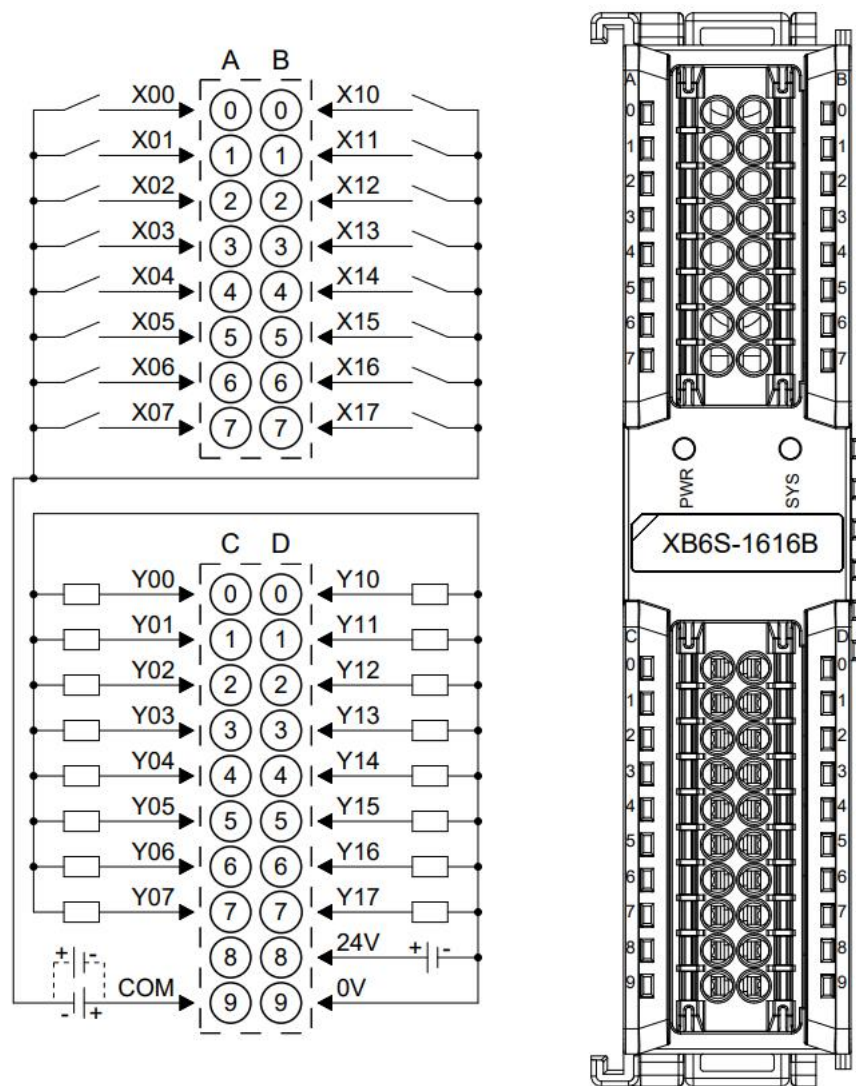


3.2.4.4 XB6S-1616A



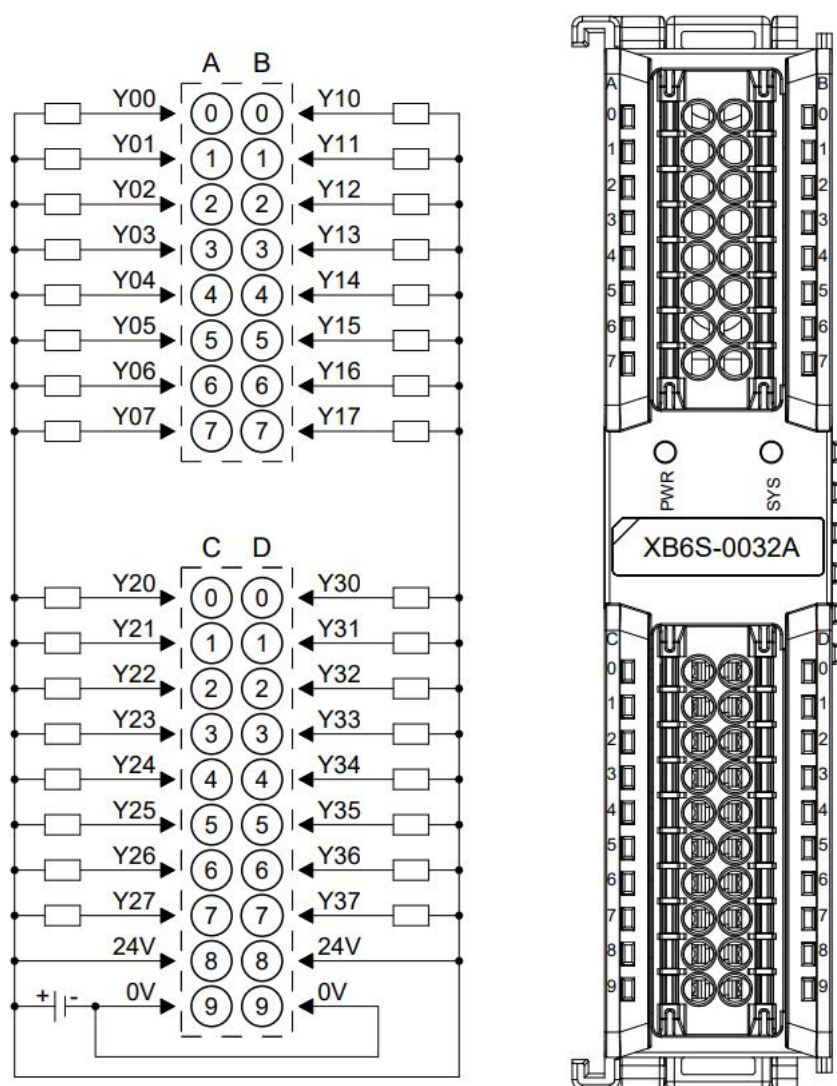
*COM is the common terminal for DI, DI is NPN/PNP compatible, and DO is NPN.

3.2.4.5 XB6S-1616B



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

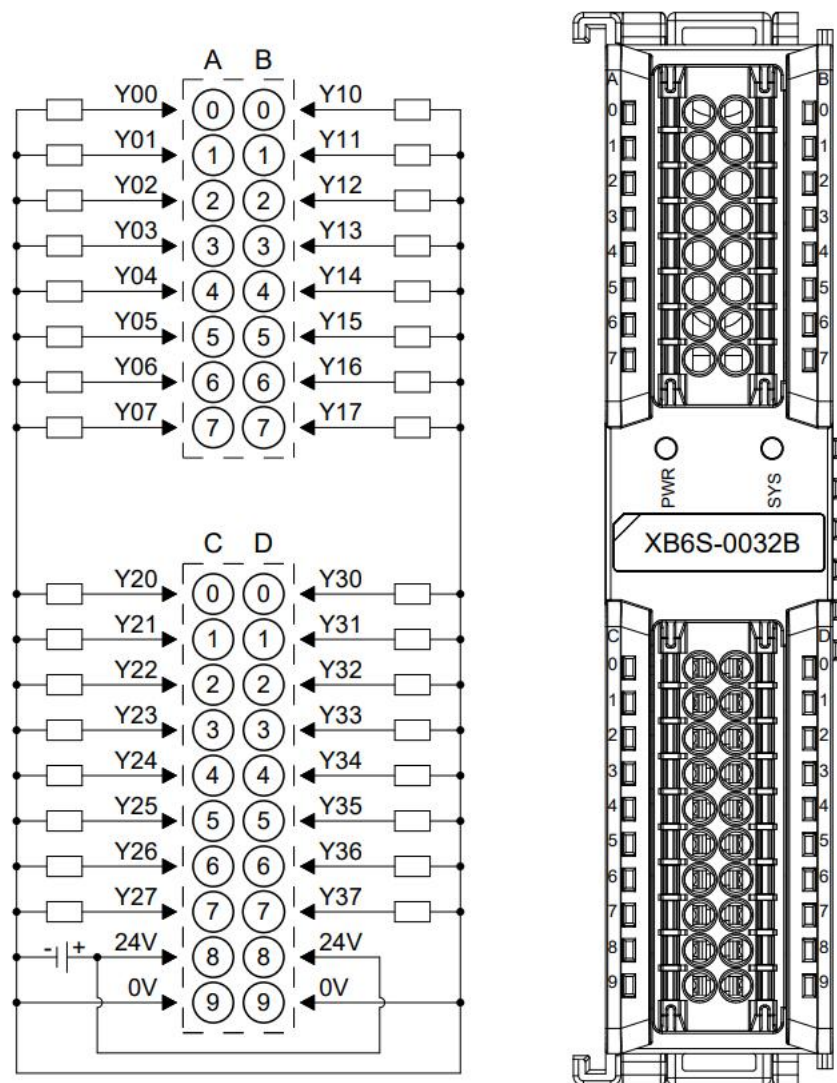
3.2.4.6 XB6S-0032A



*24V internal conduction; 0V internal conduction

*The load's common power supply must share the same power supply as the module.

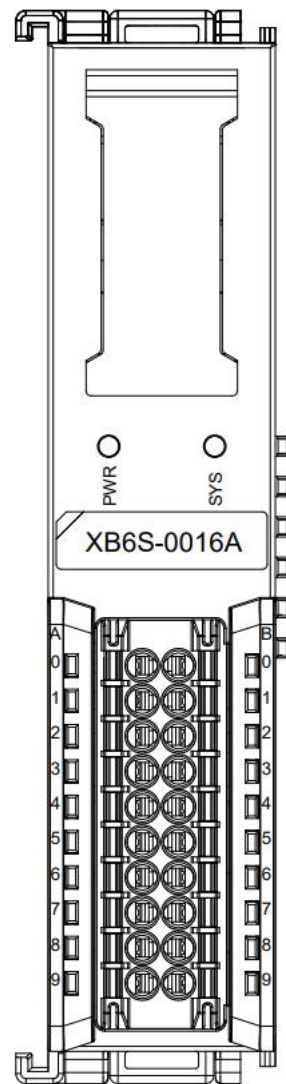
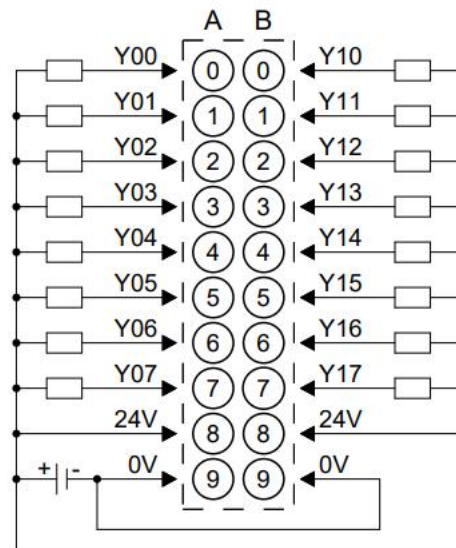
3.2.4.7 XB6S-0032B



*24V internal conduction; 0V internal conduction

*The load's common power supply must share the same power supply as the module.

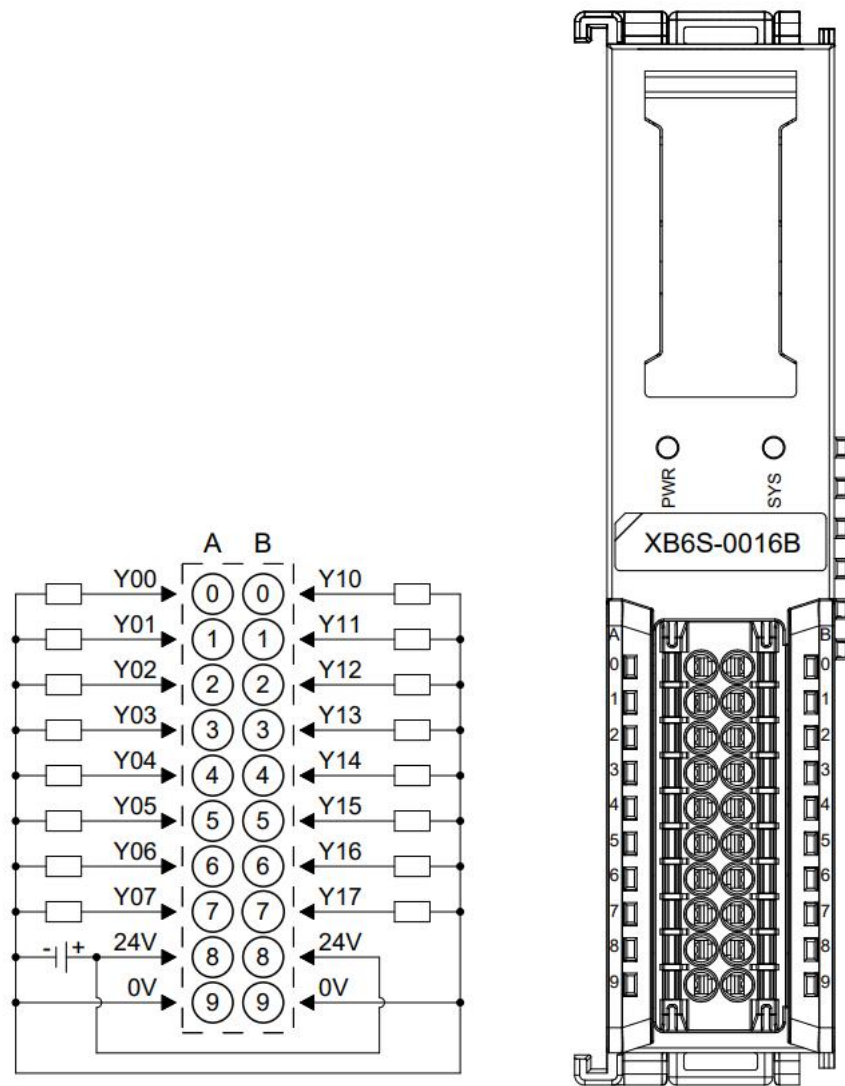
3.2.4.8 XB6S-0016A



*24V internal conduction; 0V internal conduction

*The load's common power supply must share the same power supply as the module.

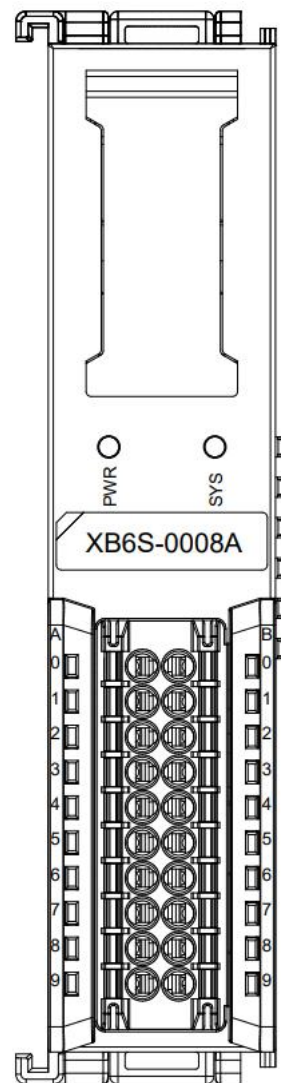
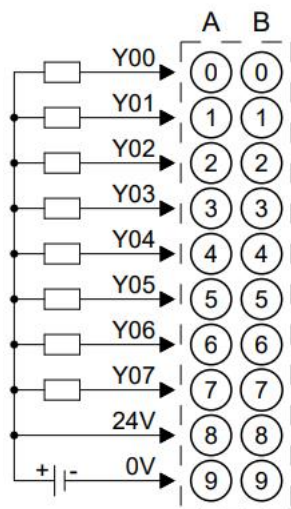
3.2.4.9 XB6S-0016B



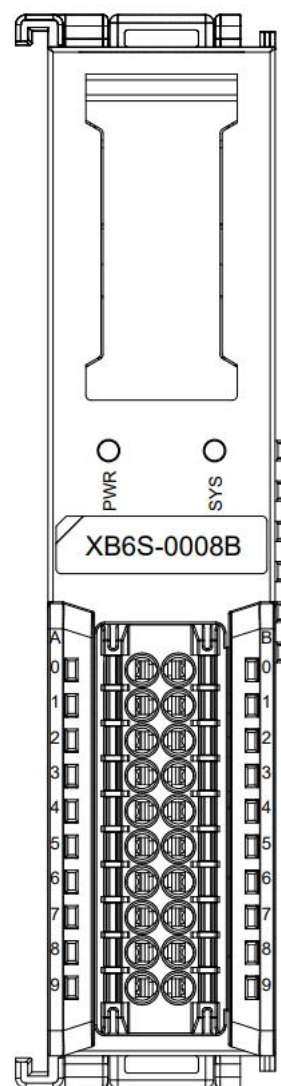
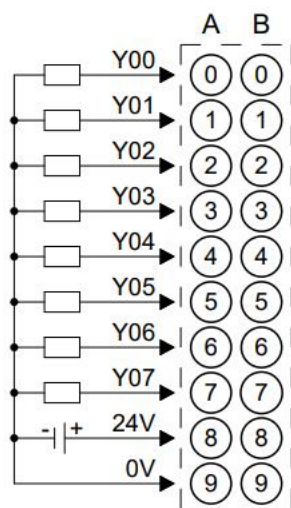
*24V internal conduction; 0V internal conduction

*The load's common power supply must share the same power supply as the module.

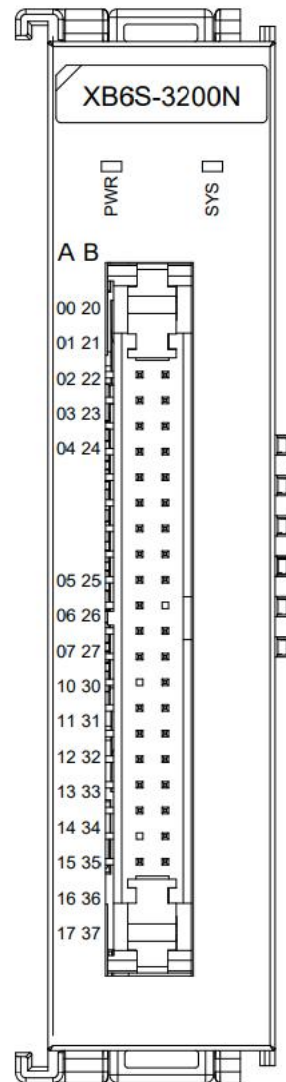
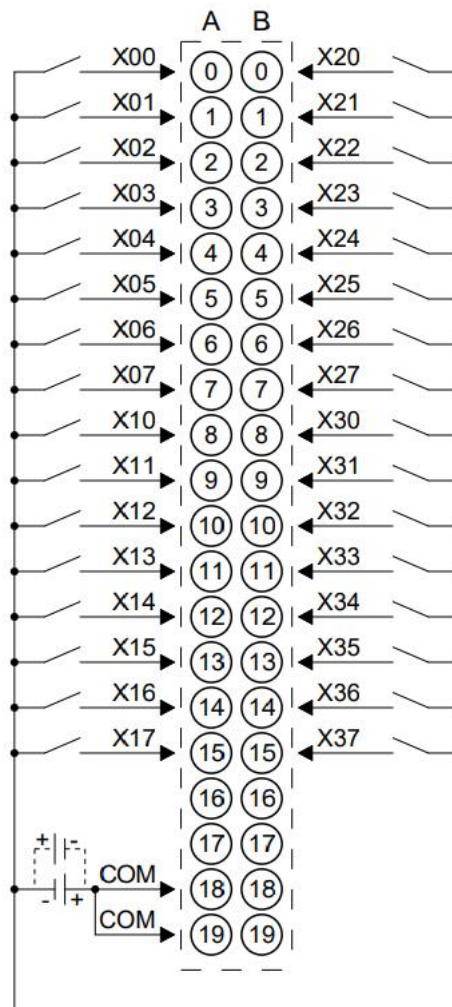
3.2.4.10 XB6S-0008A



3.2.4.11 XB6S-0008B

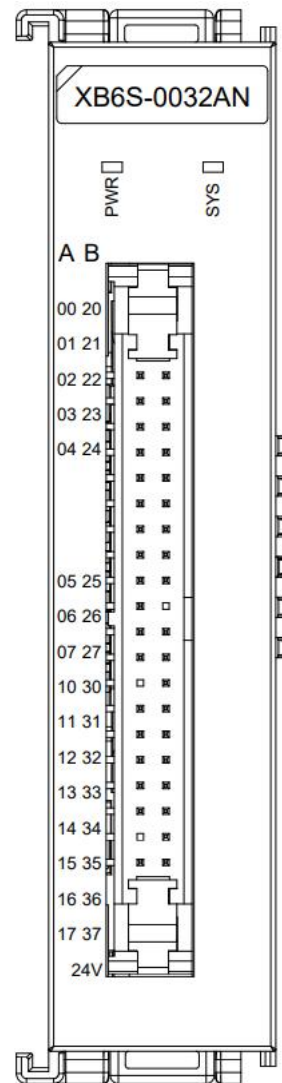
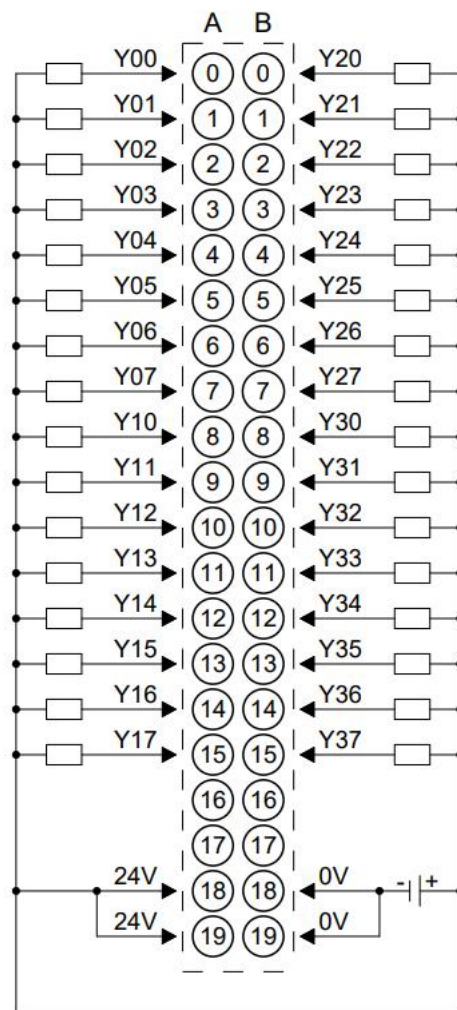


3.2.4.12 XB6S-3200N



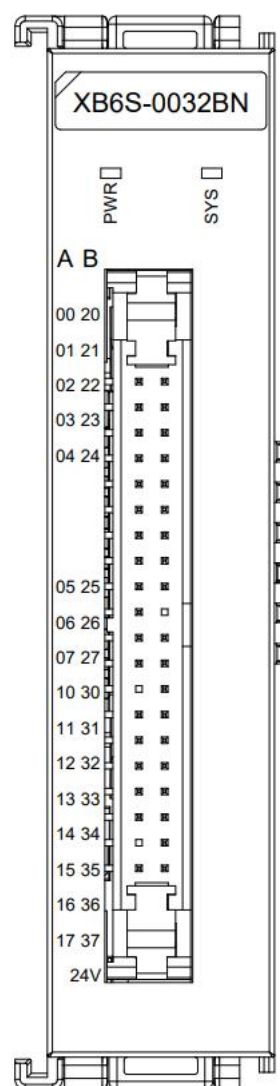
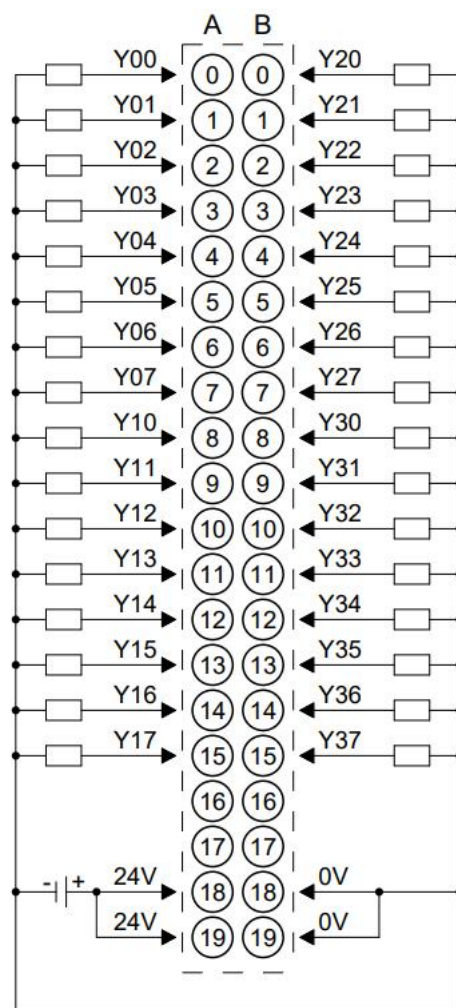
*COM internal conduction; NPN/PNP compatible

3.2.4.13 XB6S-0032AN



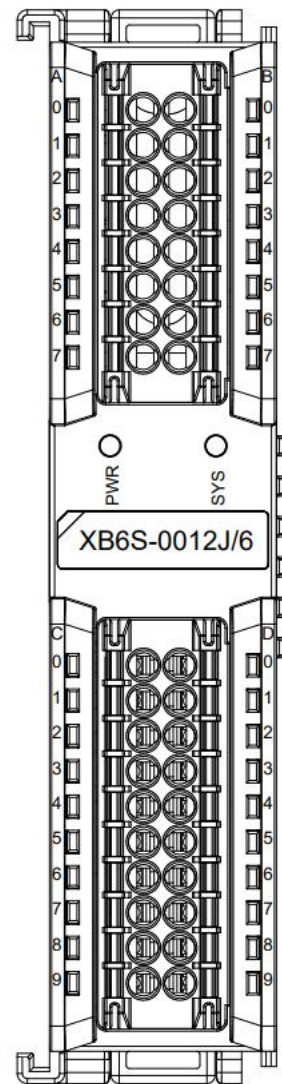
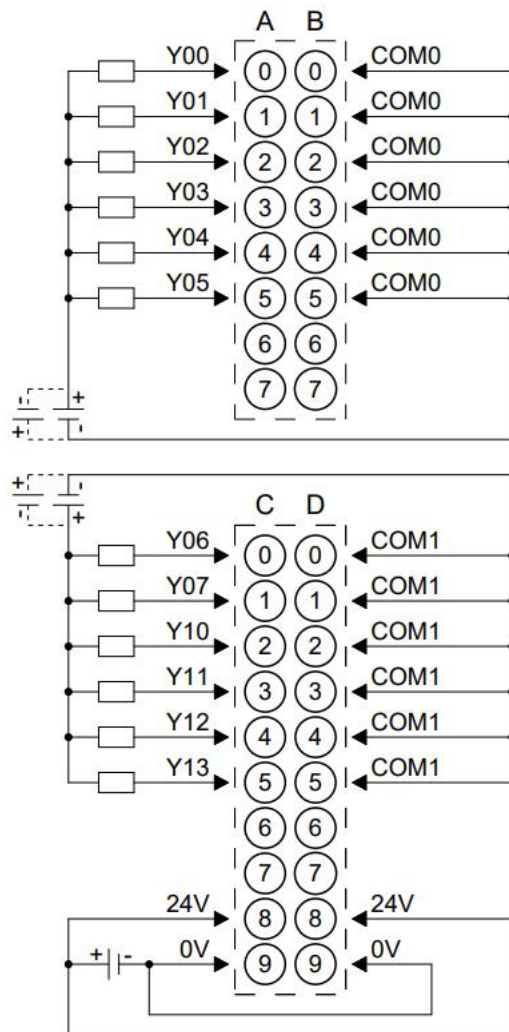
*24V internal conduction; 0V internal conduction

3.2.4.14 XB6S-0032BN



*24V internal conduction; 0V internal conduction

3.2.4.15 XB6S-0012J/6

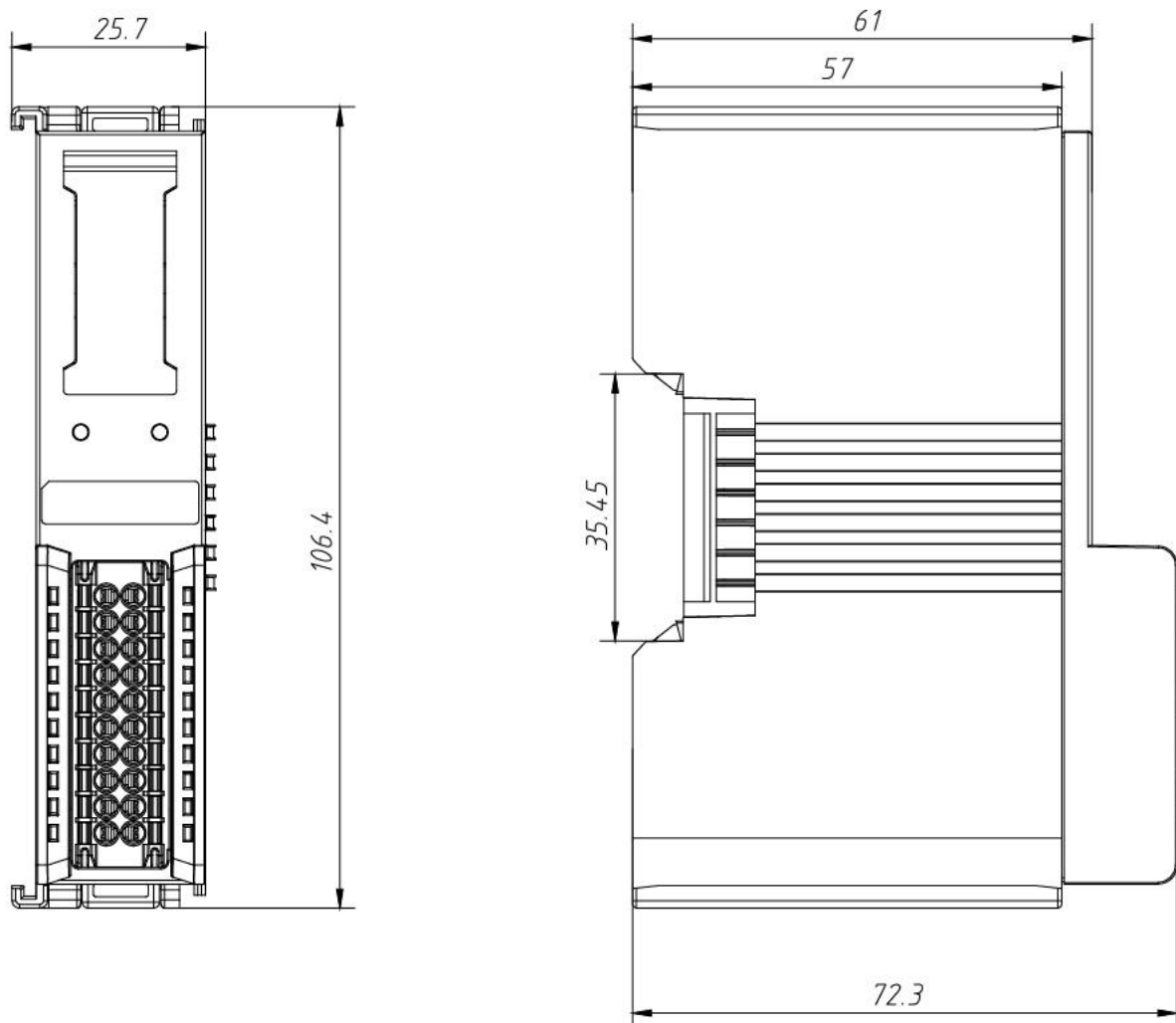


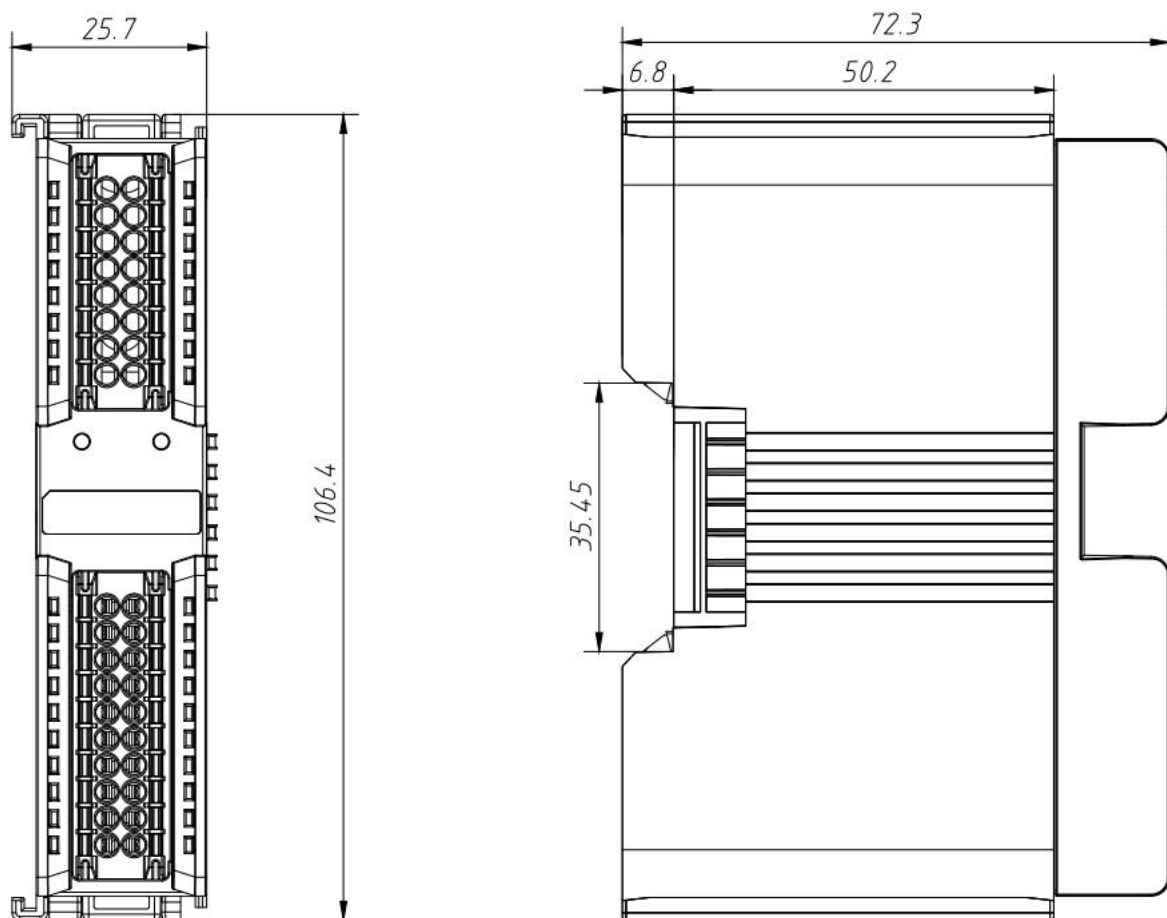
*24V internal conduction; 0V internal conduction

*COM0 is internally powered; COM1 is internally powered.

3.2.5 Outline Dimensions

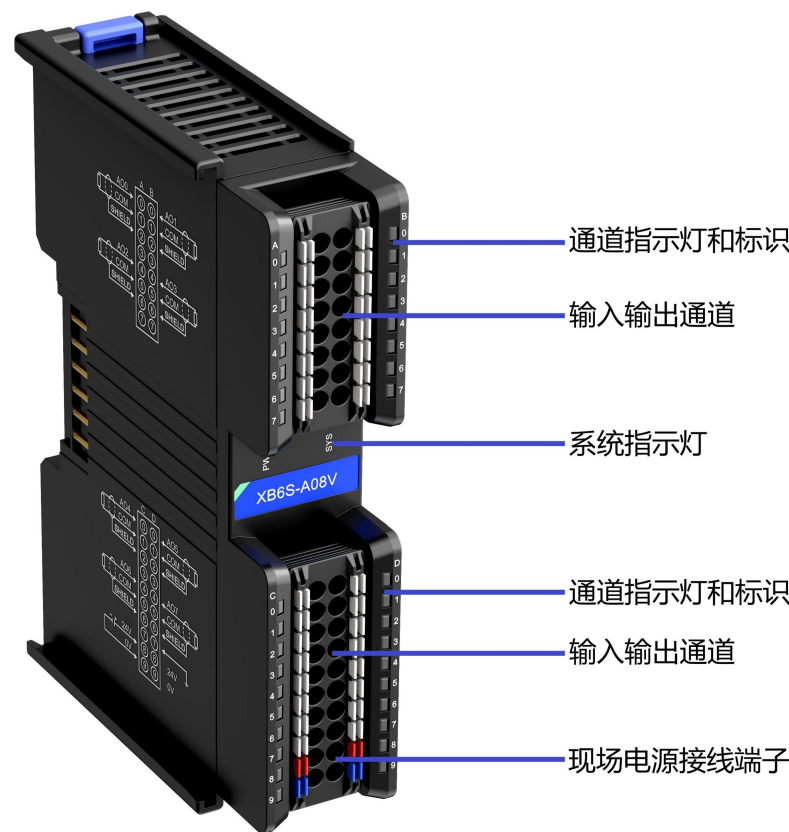
8/16 channel Digital I/O module dimensions (unit: mm)



32-channel Digital I/O module dimensions (unit: mm)

3.3 Analog I/O module

3.3.1 Panel structure



3.3.2 Indicator light function

Analog I/O module indicator light definitions				
logo	name		state	Status Description
PWR	Power indicator light	green	ON	Power supply is normal
			OFF	The product is not powered on or the power supply is abnormal.
SYS	Operating status indicator	green	ON	The system is running normally.
			Flashing 1Hz	No business data interaction, waiting to establish business data interaction.
			10Hz Flashing	Firmware upgrade
			OFF	The system is not working.
0~7	Input channel indicator	green	ON	The module channel has a signal input.
			OFF	The module channel has no signal input or the signal input is abnormal.
0~7	Output channel indicator	green	ON	The module channel has signal output.
			OFF	The module channel has no signal output or the signal output is abnormal.

3.3.3 Technical parameters

3.3.3.1 Analog input module parameters

Analog input module		
Product Model	XB6S-A80VD	XB6S-A80ID
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	$\leq 210\text{mA}$	
Input points	8	8
Input type	Voltage type	Current type
Input signal	Disable、-10V~+10V、 0V~10V、 -5V~+5V, 0V~5V, 1V~5V (range adjustable, default is -10V~+10V)	Disable, 4mA~20mA, 0mA~20mA, -20mA~+20mA (The measurement range is adjustable, with the default value being 0mA~20mA)
Input signal type	Differential signaling	
Channel reaction time	550us / ch 850us / 8ch	
resolution	16 bits	
Sampling rate (full channel)	$\leq 1\text{kps}$	
accuracy	$\pm 0.1\%$ at 25°C, $\pm 0.3\%$ over the entire temperature range.	
Input filtering	support	
Smooth series	1~200	
Input impedance (voltage type)	$\geq 1\text{M}\Omega$	-
Input impedance (current type)	-	$\leq 250\Omega$
Common mode voltage range	12VAC	-
Maximum allowable voltage for the channel (voltage type)	30V	-
Maximum allowable current for the channel (current type)	-	30mA
The system must not be affected	In the event of a short circuit due to a fault in the $\pm 15\text{V}$ power supply, the system's +5V power supply must not be affected.	
Potential isolation	There is no isolation between channels, isolation between channels and the backplane bus, and isolation between channels and the power supply voltage.	
Input overload protection	Support clamp protection	Supports rate limiting protection
Input protection	$\pm 30\text{V}$	$\pm 30\text{mA}$
Isolation and withstand voltage	500VDC	
Rated current consumption	210mA	
Power consumption	1.05W	
Channel indicator lights	Green LED lights	

Analog input module		
Product Model	XB6S-A80V	XB6S-A80I
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	$\leq 260\text{mA}$	$\leq 110\text{mA}$
Input points	8	8
Input type	Voltage type	Current type
Input signal	Disable、 $-10\text{V}\sim+10\text{V}$ 、 $0\text{V}\sim10\text{V}$ 、 $-5\text{V}\sim+5\text{V}$ 、 $0\text{V}\sim5\text{V}$ 、 $1\text{V}\sim5\text{V}$ (range adjustable, default is $-10\text{V}\sim+10\text{V}$)	Disable, $4\text{mA}\sim20\text{mA}$, $0\text{mA}\sim20\text{mA}$ (The measurement range is adjustable, with the default value being $0\text{mA}\sim20\text{mA}$)
Input signal type	single-ended signal	
Channel reaction time	$560\mu\text{s}$ / ch $770\mu\text{s}$ / 8ch	
resolution	16 bits	
Sampling rate (full channel)	$\leq 1\text{ksps}$	
accuracy	$\pm 0.1\%$ at 25°C , $\pm 0.3\%$ over the entire temperature range.	
Input filtering	support	
Smooth series	1~200	
Input impedance (voltage type)	$\geq 400\text{k}\Omega$	-
Input impedance (current type)	-	$\leq 100\Omega$
Maximum allowable voltage for the channel (voltage type)	30V	-
Maximum allowable current for the channel (current type)	-	30mA
The system must not be affected	In the event of a short circuit due to a fault in the $\pm 15\text{V}$ power supply, the system's $+5\text{V}$ power supply must not be affected.	
Potential isolation	There is no isolation between channels, isolation between channels and the backplane bus, and isolation between channels and the power supply voltage.	
Input overload protection	Support clamp protection	Supports rate limiting protection
Input protection	$\pm 30\text{V}$	$\pm 30\text{mA}$
Isolation and withstand voltage	500VDC	
Rated current consumption	260mA	110mA
Power consumption	1.35W	0.55W
Channel indicator lights	Green LED lights	

Analog input module		
Product Model	XB6S-A40VD	XB6S-A40ID
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	$\leq 150\text{mA}$	
Input points	4	4
Input type	Voltage type	Current type
Input signal	Disable、-10V~+10V、0V~10V、-5V~+5V、0V~5V、1V~5V (range adjustable, default is -10V~+10V)	Disable, 4mA~20mA, 0mA~20mA, -20mA~+20mA (The measurement range is adjustable, with the default value being 0mA~20mA)
Input signal type	Differential signaling	
Channel reaction time	300us / ch 600us / 4ch	
resolution	16 bits	
Sampling rate (full channel)	$\leq 1\text{ksps}$	
accuracy	$\pm 0.1\%$ at 25°C, $\pm 0.3\%$ over the entire temperature range.	
Input filtering	support	
Smooth series	1~200	
Input impedance (voltage type)	$\geq 1\text{M}\Omega$	-
Input impedance (current type)	-	$\leq 250\Omega$
Common mode voltage range	12VAC	-
Maximum allowable voltage for the channel (voltage type)	30V	-
Maximum allowable current for the channel (current type)	-	30mA
The system must not be affected	In the event of a short circuit due to a fault in the $\pm 15\text{V}$ power supply, the system's +5V power supply must not be affected.	
Potential isolation	There is no isolation between channels, isolation between channels and the backplane bus, and isolation between channels and the power supply voltage.	
Input overload protection	Support clamp protection	Supports rate limiting protection
Input protection	$\pm 30\text{V}$	$\pm 30\text{mA}$
Isolation and withstand voltage	500VDC	
Rated current consumption	150mA	
Power consumption	0.75W	
Channel indicator lights	Green LED lights	

Analog input module		
Product Model	XB6S-A40V	XB6S-A40I
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	≤180mA	≤100mA
Input points	4	4
Input type	Voltage type	Current type
Input signal	Disable、-10V~+10V、0V~10V、-5V~+5V、0V~5V、1V~5V (range adjustable, default is -10V~+10V)	Disable, 4mA~20mA, 0mA~20mA (The measurement range is adjustable, with the default value being 0mA~20mA)
Input signal type	single-ended signal	
Channel reaction time	400us / ch 700us / 4ch	300us / ch 600us / 4ch
resolution	16 bits	
Sampling rate (full channel)	≤1ksps	
accuracy	±0.1% at 25°C, ±0.3% over the entire temperature range.	
Input filtering	support	
Smooth series	1~200	
Input impedance (voltage type)	≥400kΩ	-
Input impedance (current type)	-	≤100Ω
Maximum allowable voltage for the channel (voltage type)	30V	-
Maximum allowable current for the channel (current type)	-	30mA
The system must not be affected	In the event of a short circuit due to a fault in the ±15V power supply, the system's +5V power supply must not be affected.	
Potential isolation	There is no isolation between channels, isolation between channels and the backplane bus, and isolation between channels and the power supply voltage.	
Input overload protection	Support clamp protection	Supports rate limiting protection
Input protection	±30V	±30mA
Isolation and withstand voltage	500VDC	
Rated current consumption	180mA	100mA
Power consumption	0.95W	0.5W
Channel indicator lights	Green LED lights	

3.3.3.2 Analog output module parameters

Analog output module		
Product Model	XB6S-A08V	XB6S-A08I
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	≤100mA	
Field-side input voltage range	24VDC (20.4V~28.8V)	
Output points	8	8
Output type	Voltage type	Current type
Output signal	Disable、-10V~+10V、0V~10V、-5V~+5V、0V~5V、1V~5V (range adjustable, default is -10V~+10V)	Disable, 4mA~20mA, 0mA~20mA (The measurement range is adjustable, with the default value being 0mA~20mA)
Channel reaction time	400us / ch 400us / 8ch	
resolution	16 bits	
accuracy	±0.1% at 25°C, ±0.3% over the entire temperature range.	
Load impedance (voltage type)	≥2kΩ (1kΩ accuracy: ±3‰ at 25°C, ±5‰ at full temperature)	-
Load impedance (current type)	-	≤500Ω
The system must not be affected	In the event of a short circuit due to a fault in the ±15V power supply, the system's +5V power supply must not be affected.	
Output protection	Overload protection, open circuit protection, and short circuit protection (all with automatic recovery mechanisms).	
Potential isolation	There is no isolation between channels, isolation between channels and the backplane bus, and isolation between channels and the power supply voltage.	
Isolation and withstand voltage	500VDC	
Rated current consumption	100mA	
Power consumption	0.5W	
Clearing and retaining optional functions in non-OP state	support	
Channel indicator lights	Green LED lights	

Analog output module		
Product Model	XB6S-A04V	XB6S-A04I
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	≤80mA	
Field-side input voltage range	24VDC (20.4V~28.8V)	
Output points	4	4
Output type	Voltage type	Current type
Output signal	Disable, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V (range adjustable, default is -10V~+10V)	Disable, 4mA~20mA, 0mA~20mA (The measurement range is adjustable, with the default value being 0mA~20mA)
Channel reaction time	200us / ch 200us / 4ch	
resolution	16 bits	
accuracy	±0.1% at 25°C, ±0.3% over the entire temperature range.	
Load impedance (voltage type)	≥2kΩ (1kΩ accuracy: ±3‰ at 25°C, ±5‰ at full temperature)	-
Load impedance (current type)	-	≤500Ω
The system must not be affected	In the event of a short circuit due to a fault in the ±15V power supply, the system's +5V power supply must not be affected.	
Output protection	Overload protection, open circuit protection, and short circuit protection (all with automatic recovery mechanisms).	
Potential isolation	There is no isolation between channels, isolation between channels and the backplane bus, and isolation between channels and the power supply voltage.	
Isolation and withstand voltage	500VDC	
Rated current consumption	80mA	
Power consumption	0.4W	
Clearing and retaining optional functions in non-OP state	support	
Channel indicator lights	Green LED lights	

3.3.3.3 Analog current & voltage compatible input module parameters

Analog current & voltage compatible input module		
Product Model	XB6S-A80	XB6S-A40
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	≤100mA	≤80mA
Input points	8	4
Input type	Current & Voltage Compatible	
Input signal	Disable, 0mA~20mA, 4mA~20mA, -20mA~+20mA, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V (range adjustable, default is 4mA~20mA)	
Input signal type	single-ended signal	
Channel reaction time	1ms / ch	
resolution	16 bits	
Sampling rate (full channel)	≤1ksps	
accuracy	±0.1% at 25°C, ±0.3% over the entire temperature range.	
Input filtering	support	
Smooth series	1~200	
Input impedance (voltage)	≥100kΩ	
Input impedance (current)	≤100Ω	
Maximum allowable voltage (voltage) for the channel	30V	
Maximum allowable current (current) for the channel	30mA	
The system must not be affected	In the event of a short circuit due to a fault in the ±15V power supply, the system's +5V power supply must not be affected.	
Potential isolation	There is no isolation between channels, isolation between channels and the backplane bus, and isolation between channels and the power supply voltage.	
Input overload protection	Supports clamping protection (voltage) / Supports current limiting protection (current).	
Input protection	±30V (voltage) / ±30mA (current)	
Isolation and withstand voltage	500VDC	
Rated current consumption	100mA	80mA
Power consumption	0.5W	0.4W
Channel indicator lights	Green LED lights	
Current/voltage input disconnection detection	support	

3.3.3.4 Analog current & voltage compatible output module parameters

Analog current & voltage compatible output module		
Product Model	XB6S-A08	XB6S-A04
Bus input power supply rated voltage	5VDC (4.5V~5.5V)	
Bus input power supply rated current	≤100mA	≤80mA
Field-side input voltage range	24VDC (20.4V~28.8V)	
Output points	8	4
Output type	Current & Voltage Compatible	
Output signal	Disable, 0mA~20mA, 4mA~20mA, -10V~+10V, 0V~10V, -5V~+5V, 0V~5V, 1V~5V (range adjustable, default is 4mA~20mA)	
Channel reaction time	400us / ch	
resolution	16 bits	
accuracy	±0.1% at 25°C, ±0.3% over the entire temperature range.	
Load impedance (voltage)	≥2kΩ (Accuracy: ±1‰ at 25°C, ±3‰ at full temperature)	
Load impedance (current)	≤600Ω	
The system must not be affected	In the event of a short circuit due to a fault in the ±15V power supply, the system's +5V power supply must not be affected.	
Output protection	Overload protection, open circuit protection, and short circuit protection (all with automatic recovery mechanisms).	
Potential isolation	There is no isolation between channels, isolation between channels and the backplane bus, and isolation between channels and the power supply voltage.	
Isolation and withstand voltage	500VDC	
Rated current consumption	100mA	80mA
Power consumption	0.5W	0.4W
Clearing and retaining optional functions in non-OP state	support	
Channel indicator lights	Green LED lights	
On-site power supply testing	support	

3.3.3.5 General technical parameters

General technical parameters	
Specifications and dimensions	106.4 × 25.7 × 72.3mm
weight	8-channel AIO: 125g
	4-channel AIO: 105g
Operating temperature	-20°C~+60°C
Storage temperature	-40°C~+80°C
relative humidity	95%, no condensation
Altitude	≤2000m
Pollution level	Level 2
Protection level	IP20
Safety certification	UL certification, CE certification
Green certification	RoHS certification, REACH certification

3.3.4 Analog voltage module parameters

3.3.4.1 Voltage Input Module Range Selection Table

Voltage input module range selection and code value range					
Range selection	Measuring range	Code value range	Voltage input calculation formula	Voltage output calculation formula	Code value mapping table
0	Disable indicates 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 Module 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 code value, U represents voltage, and the default range of the analog voltage input module is 1: -10V~+10V (-32768~32767).

3.3.4.2 Voltage Output Module Range Selection Table

Voltage output module range selection and code value range					
Range selection	Measuring range	Code value range	Voltage input calculation formula	Voltage output calculation formula	Code value mapping table
0	Disable indicates 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 Module 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, U represents the voltage, and the default range of the analog voltage output module is 1: -10V~+10V (-32768~32767).

3.3.4.3 Voltage Input Module Code Value Table

range Voltage	-10V~+10V	0V~10V	-10V~+10V	0V~10V
	-32768~32767	0~32767	-27648~27648	0~27648
	code value	code value	code value	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 = $(65535/20) \times \text{Voltage}$	Code value = $(32767/10) \times \text{Voltage}$	Code value = $(55296/20) \times \text{Voltage}$	Code value = $(27648/10) \times \text{Voltage}$
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), overflow function is supported. That is, when the channel input voltage is greater than 10V, the maximum code value of 32767 will be displayed; when the input voltage is less than -10V, the minimum code value will be displayed.-32768.

②When the voltage input module's range is selected from 0V to 10V (0~32767), it supports underflow, overflow, and underflow alarm functions. Overflow occurs when the channel input range exceeds the range; within -0.13V to +10V, the calculated code value is displayed. Overflow occurs when

the channel input voltage is greater than 10V; the maximum code value of 32767 is displayed. When the input voltage is less than -0.13V, the minimum overflow code value is displayed.-384, Simultaneously issue an alarm..

③ Voltage input module range selection: -10V to +10V (-27648~27648) It supports overshoot, overflow, and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range, and the calculated code value is displayed within the range of -10.13V to +10.12V. Overflow occurs when the channel input voltage is greater than 10.12V, and the maximum overshoot code value of 27980 is displayed, along with an alarm; when the input voltage is less than -10.13V, the minimum overshoot code value is displayed.-27980, alarm triggered simultaneously..

④ Voltage input module range selection 0V~10V (0~27648) It supports overshoot, overflow, and overflow alarm functions. Overshoot occurs when the channel input range exceeds the measurement range, and the calculated code value is displayed within the range of -0.13V to +10.12V. Overflow occurs when the channel input voltage is greater than 10.12V, and the maximum overshoot code value of 27980 is displayed, along with an alarm; when the input voltage is less than -0.13V, the minimum overshoot code value is displayed.-332, alarm triggered simultaneously.

range Voltage	-5V~+5V	0V~5V	1V~5V
	-27648~27648	0~27648	0~27648
	code value	code value	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:①When the voltage input module's range is selected as -5V to +5V (-27648 to 27648), it supports overshoot, overflow, and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range; within -5.07V to +5.06V, a normal calculated code value is displayed. Overflow occurs when the channel input voltage is greater than 5.06V; the maximum overshoot code value of

27980 is displayed, and an alarm is triggered. When the input voltage is less than -5.07V, the minimum overshoot code value of -27980 is displayed, and an alarm is triggered.

② Voltage input module range selection: 0V~5V (0~27648It supports overshoot, overflow, and overflow alarm functions. Overshoot occurs when the channel input range exceeds the measurement range, and the calculated code value is displayed within the range of -0.07V to +5.06V. Overflow occurs when the channel input voltage is greater than 5.06V, and the maximum overshoot code value of 27980 is displayed, along with an alarm; when the input voltage is less than -0.07V, the minimum overshoot code value is displayed.-332, alarm triggered simultaneously.

③ Voltage input module range selection: 1V~5V (0~27648It supports overshoot, overflow, and overflow alarm functions. Overshoot occurs when the channel input range exceeds the measurement range; within the range of 0.94V to 5.06V, the normal calculated code value is displayed. Overflow occurs when the channel input voltage is greater than 5.06V; the maximum overshoot code value of 27933 is displayed, and an alarm is triggered. When the input voltage is less than 0.94V, the minimum overshoot code value is displayed.-345, alarm triggered simultaneously.

3.3.4.4 Voltage output module code value table

range Voltage	-10V~+10V	0V~10V	-10V~+10V	0V~10V
	-32768~32767	0~32767	-27648~27648	0~27648
	code value	code value	code value	code value
-10	-32768	-	-27648	-
-9	-29491	-	-24883	-
-8	-26214	-	-22118	-
-7	-22937	-	-19354	-
-6	-19661	-	-16589	-
-5	-16384	-	-13824	-
-4	-13107	-	-11059	-
-3	-9830	-	-8294	-
-2	-6554	-	-5530	-
-1	-3277	-	-2765	-
0	0	0	0	0
1	3277	3277	2765	2765
2	6554	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 = $(65535/20) \times \text{Voltage}$	Code value = $(32767/10) \times \text{Voltage}$	Code value = $(55296/20) \times \text{Voltage}$	Code value = $(27648/10) \times \text{Voltage}$
Voltage formula	Voltage = $(\text{Code value} \times 20) / 65535$	Voltage = $(\text{Code value} \times 10) / 32767$	Voltage = $(\text{Code value} \times 20) / 55296$	Voltage = $(\text{Code value} \times 10) / 27648$

Note: ①The voltage output module supports overflow and overflow functions. 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 range, the channel outputs 10V voltage.

When the voltage output module range is selected as -10V to +10V and the code value is set to be less than the minimum code value corresponding to the range, all channels output -10V voltage.

When the voltage output module range is selected as 0V~10V and the code value is set to be less than the minimum code value corresponding to the range, the channel outputs 0V voltage.

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 e	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 overflow and overflow functions. 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 range, the channel outputs 5V voltage.

When the voltage output module range is selected as -5V to +5V and the code value is set to be less than the minimum code value corresponding to the range, all channels output -5V voltage.

When the voltage output module range is selected as 0V~5V and the code value is set to be less than the minimum code value corresponding to the range, all channels output 0V voltage.

When the voltage output module range is selected as 1V~5V and the code value is set to be less than the minimum code value corresponding to the range, the channel outputs 1V voltage.

3.3.5 Analog current module parameters

3.3.5.1 Current input module range selection table

Current input module range selection and code value range					
Range selection	Measuring range	Code value range	Current input calculation formula	Current output calculation formula	Code value mapping table
0	Disable indicates 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 Module 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, I represents current, and the default range of the analog current input module is 2: 0mA~20mA (0~65535).

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

3.3.5.2 Current output module range selection table

Current output module range selection and code value range					
Range selection	Measuring range	Code value range	Current input calculation formula	Current output calculation formula	Code value mapping table
0	Disable indicates 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 Module 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 code value, I represents current, and the default range of the analog current output module is 2: 0mA~20mA (0~65535).

3.3.5.3 Current Input Module Code Value Table

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 = $65535/16 * \text{current} - 16384$	Code value = $(65535/20) * \text{current}$	Code value = $(27648/16) * \text{current} - 6912$	Code value = $(27648/20) * \text{current}$	Code value $= (65535/40) * (\text{current} + 20)$

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

① When the current input module range is selected from 4mA to 20mA (0 to 65535), it supports overflow and overflow alarm functions. 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 triggered. When the input channel input current is less than 4mA, the minimum code value will be displayed.0.

②When the current input module's range is selected from 0mA to 20mA (0 to 65535), it supports overflow and overflow alarm functions. 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 triggered simultaneously.When the input current is less than 0mA, the minimum code value 0 is displayed.

③When the current input module's range is selected from 4mA to 20mA (0 to 27648), it supports overshoot, overflow, and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range; within the range of 4mA to 20.24mA, the normal calculated code value is displayed. Overflow occurs when the channel input current exceeds 20.24mA, and the maximum overshoot code value is displayed.28085Simultaneously, an alarm is triggered. Underflow occurs when the input current to the input channel is less than 4mA, and the minimum overshoot code value of 0 is displayed.

④When the current input module's range is selected from 0mA to 20mA (0~27648), it supports overshoot, overflow, and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range; within the range of 0mA to 20.24mA, the normal calculated code value is displayed. Overflow occurs when the channel input current exceeds 20.24mA, and the maximum overshoot code value is displayed.27986Simultaneously, an alarm is triggered. Underflow occurs when the input current to the input channel is less than 0mA, and the minimum overshoot code value of 0 is displayed.

⑤When the current input module's range is selected from -20mA to +20mA (0 to 65535), it supports overflow and overflow alarm functions. That is, when the channel input current is greater than 20mA, the maximum code value 65535 will be displayed, and an alarm will be triggered simultaneously.Input channel input less than -20mAWhen the current is applied, the minimum code value of 0 is always displayed.

3.3.5.4 Current output module code value table

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 = $65535/16 * \text{current} - 16384$	Code value = $(65535/20) * \text{current}$	Code value = $(27648/16) * \text{current} - 6912$	Code value = $(27648/20) * \text{current}$

Note: ① When the current output module range is selected as 4mA~20mA (0~27648) or 0mA~20mA (0~27648), it supports overflow, overshoot, and overflow alarm functions. That is, when the current output module range is selected as 4mA~20mA (0~27648) and the code value is set to greater than...32511At the same time, all channels output 22.81mA current and trigger an alarm. The current output module range is 0mA~20mA (0~27648), and the code value is set to be greater than...32511At that time, all channels output 23.52mA current and simultaneously trigger an alarm.

3.3.6 Analog Current & Voltage Compatible Module Parameters

3.3.6.1 Current & Voltage Compatible Input Module Range Selection Table

Current & Voltage Compatible Input Module Range Selection and Code Value Range					
Range selection	Measuring range	Code value range	Current/Voltage Input Calculation Formula	Current/Voltage Output Calculation Formula	Code value mapping table
0	Disable indicates that the channel is not enabled.				
1	0mA~20mA	0~27648	$D=(27648/20)*I$	$I=(D*20)/27648$	See 3.3.6.3 Current & Voltage Compatible Input Module Code Value Table
2 (default)	4mA~20mA	0~27648	$D=(27648/16)*I-6912$	$I=((D+6912)*16)/27648$	
3	-20mA~+20mA	-27648~27648	$D=(55296/40)*I$	$I=(D*40)/55296$	
4	-10V~+10V	-27648~27648	$D=(55296/20)*U$	$U=(D*20)/55296$	
5	-10V~+10V	-32768~32767	$D=(65535/20)*U$	$U=(D*20)/65535$	
6	0V~10V	0~27648	$D=(27648/10)*U$	$U=(D*10)/27648$	
7	0V~10V	0~32767	$D=(32767/10)*U$	$U=(D*10)/32767$	
8	-5V~+5V	-27648~27648	$D=(55296/10)*U$	$U=(D*10)/55296$	
9	-5V~+5V	-32768~32767	$D=(65535/10)*U$	$U=(D*10)/65535$	
10	0V~5V	0~27648	$D=(27648/5)*U$	$U=(D*5)/27648$	
11	0V~5V	0~32767	$D=(32767/5)*U$	$U=(D*5)/32767$	
12	1V~5V	0~27648	$D=(27648/4)*U-6912$	$U=(D+6912)*4/27648$	

3.3.6.2 Current & Voltage Compatible Output Module Range Selection Table

Current & Voltage Compatible Output Module Range Selection and Code Value Range					
Range selection	Measuring range	Code value range	Current/Voltage Input Calculation Formula	Current/Voltage Output Calculation Formula	Code value mapping table
0	Disable indicates that the channel is not enabled.				
1	0mA~20mA	0~27648	$D=(27648/20)*I$	$I=(D*20)/27648$	See 3.3.6.4 Current & Voltage Compatible Output Module Code Value Table
2 (default)	4mA~20mA	0~27648	$D=(27648/16)*I-6912$	$I=((D+6912)*16)/27648$	
3	-10V~+10V	-27648~27648	$D=(55296/20)*U$	$U=(D*20)/55296$	
4	-10V~+10V	-32768~32767	$D=(65535/20)*U$	$U=(D*20)/65535$	
5	0V~10V	0~27648	$D=(27648/10)*U$	$U=(D*10)/27648$	
6	0V~10V	0~32767	$D=(32767/10)*U$	$U=(D*10)/32767$	
7	-5V~+5V	-27648~27648	$D=(55296/10)*U$	$U=(D*10)/55296$	
8	-5V~+5V	-32768~32767	$D=(65535/10)*U$	$U=(D*10)/65535$	
9	0V~5V	0~27648	$D=(27648/5)*U$	$U=(D*5)/27648$	
10	0V~5V	0~32767	$D=(32767/5)*U$	$U=(D*5)/32767$	
11	1V~5V	0~27648	$D=(27648/4)*U-6912$	$U=(D+6912)*4/27648$	

3.3.6.3 Current & Voltage Compatible Input Module Code Value Table

range Current	0mA~20mA	4mA~20mA	-20mA~+20mA
	0~27648	0~27648	-27648~27648
	code value	code value	code value
-23.52	-	-	-32512
-20	-	-	-27648
-15	-	-	-20736
-10	-	-	-13824
-5	-	-	-6912
-3.52	-4864	-	-4864
-1	-1382	-	-1382
0	0	-	0
1	1382	-	1382
1.185	1638	-4864	1638
2	2765	-3456	2765
3	4147	-1728	4147
4	5530	0	5530
5	6912	1728	6912
6	8294	3456	8294
7	9677	5184	9677
8	11059	6912	11059
9	12442	8640	12442
10	13824	10368	13824
11	15206	12096	15206
12	16589	13824	16589
13	17971	15552	17971
14	19354	17280	19354
15	20736	19008	20736
16	22118	20736	22118
17	23501	22464	23501
18	24883	24192	24883
19	26266	25920	26266
20	27648	27648	27648
22.81	31538	32511	31533
23.52	32511	-	32511
Code value formula	Code value = (27648/20) * current	Code value = (27648/16) * current - 6912	Code value = (55296/40) * current

Note: ① When the current & voltage compatible input module range is selected from 0mA to 20mA (0~27648), it supports overshoot $\pm 3.52\text{mA}$ and supports overflow and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range. -3.52mA~23.52mA. The value displayed within mA is the normal calculated code value. Overflow or overflow is displayed as -32768/32767.

② The current & voltage compatible input module supports overshoot $\pm 2.81\text{mA}$ when the range selection is 4mA~20mA (0~27648), and supports overflow and overflow alarm functions. Overshoot

occurs when the channel input range exceeds the range. 1.185mA~2The normal calculation code value is displayed within 2.81mA. Overflow and overflow are displayed as -32768/32767.

③ The current & voltage compatible input module supports overshoot $\pm 3.52\text{mA}$ when the range selection is -20mA to 20mA (-27648 to 27648), and supports overflow and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range. -23.52mA~23.52The value displayed within mA is the normal calculated code value. Overflow or overflow is displayed as -32768/32767.

range Voltage	-10V~+10V	-10V~+10V	0V~10V	0V~10V
	-27648~27648	-32768~32767	0~27648	0~32767
	code value	code value	code value	code value
-11.759	-31512	-	-	-
-10	-27648	-32768	-	-
-9	-24883	-29491	-	-
-8	-22118	-26214	-	-
-7	-19354	-22937	-	-
-6	-16589	-19661	-	-
-5	-13824	-16384	-	-
-4	-11059	-13107	-	-
-3	-8294	-9830	-	-
-2	-5530	-6554	-	-
-1.759	-4864	-5764	-4864	-
-1	-2765	-3277	-2765	-
0	0	0	0	0
1	2765	3277	2765	3277
2	5530	6554	5530	6554
3	8294	9830	8294	9830
4	11059	13107	11059	13107
5	13824	16384	13824	16384
6	16589	19661	16589	19661
7	19354	22937	19354	22937
8	22118	26214	22118	26214
9	24883	29491	24883	29491
10	27648	32767	27648	32767
11.759	31511	-	31511	-
Code value formula	Code value = $(55296/20) \times \text{Voltage}$	Code value = $(65535/20) \times \text{Voltage}$	Code value = $(27648/10) \times \text{Voltage}$	Code value = $(32767/10) \times \text{Voltage}$
Voltage formula	Voltage = $(\text{Code value} \times 20) / 55296$	Voltage = $(\text{Code value} \times 20) / 65535$	Voltage = $(\text{Code value} \times 10) / 27648$	Voltage = $(\text{Code value} \times 10) / 32767$

Note: ① The current & voltage compatible input module supports overshoot $\pm 1.759\text{V}$ when the range is selected as -10V~+10V (-27648~27648), and supports overflow and overflow alarm functions.

Overshoot occurs when the channel input range exceeds the range. -11.759V~1V. The calculated code value is displayed within 1.759V. Overflow or overflow is displayed as -32768/32767.

② The current & voltage compatible input module does not support overshoot when the range selection is -10V~+10V (-32768~32767), but supports overflow and overflow alarm functions. Overflow is displayed as -32768/32767.

③ The current & voltage compatible input module supports overshoot $\pm 1.759V$ when the range selection is 0V~10V (0~27648), and supports overflow and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range. -1.759V~1V. The calculated code value is displayed within 1.759V. Overflow or overflow is displayed as -32768/32767.

④ The current & voltage compatible input module does not support overshoot when the range is selected from 0V to 10V (0~32767), but supports overflow and overflow alarm functions. Overflow is displayed as 0/32767.

range Voltage	-5V~+5V	-5V~+5V	0V~5V	0V~5V	1V~5V
	-27648~27648	-32768~32767	0~27648	0~32767	0~27648
	code value	code value	code value	code value	code value
-5.879	-32512	-	-	-	-
-5	-27648	-32768	-	-	-
-4	-22118	-26214	-	-	-
-3	-16588	-19661	-	-	-
-2	-11060	-13107	-	-	-
-1	-5530	-6554	-	-	-
-0.879	-4864	-5761	-4864	-	-
0	0	0	0	0	-
0.296	1637	1940	1637	1940	-4864
1	5530	6554	5530	6554	0
2	11060	13107	11060	13107	6912
3	16588	19661	16588	19661	13824
4	22118	26214	22118	26214	20736
5	27648	32767	27648	32767	27648
5.704	31541	-	31541	-	32511
5.879	32511	-	32511	-	-
Code value formula	code value=(55296/10)*Voltage	code value=(65535/10)*Voltage	code value=(27648/5)*Voltage	code value=(32767/5)*Voltage	code value=(27648/4)*Voltage-6912
Voltage formula	Voltage=(code value*10)/55296	Voltage=(code value*10)/65535	Voltage=(code value*5)/27648	Voltage=(code value*5)/32767	Voltage=(code value+6912)*4/27648

Note: ① When the current & voltage compatible input module range is selected as -5V~+5V (-27648~27648), it supports overshoot $\pm 0.879V$ and supports overflow and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range. -5.879V~5V. The calculated code value is displayed within 0.879V. Overflow or overflow is displayed as -32768/32767.

② The current & voltage compatible input module does not support overshoot when the range is selected as $-5V \sim +5V$ ($-32768 \sim 32767$), but supports overflow and overflow alarm functions. Overflow is displayed as $-32768/32767$.

③ The current & voltage compatible input module supports overshoot $\pm 0.879V$ when the range is selected from $0V$ to $5V$ ($0 \sim 27648$), and supports overflow and overflow alarm functions. Overshoot occurs when the channel input range exceeds the range. $-0.879V$ The calculated code value is displayed within the range of V to $5.879V$. Overflow or overflow is displayed as $-32768/32767$.

④ The current & voltage compatible input module does not support overshoot when the range is selected from $0V$ to $5V$ (0 to 32767), but supports overflow and overflow alarm functions. Overflow is displayed as $0/32767$.

⑤ The current & voltage compatible input module supports overshoot $\pm 0.704V$ when the range is selected from $1V$ to $5V$ (0 to 27648), and supports overflow and overshoot alarm functions. Overshoot occurs when the channel input range exceeds the range. $0.296V$ The calculated code value is displayed within the range of V to $5.704V$. Overflow or overflow is displayed as $-32768/32767$.

3.3.6.4 Current & Voltage Compatible Output Module Code Value Table

range Current	0mA~20mA	4mA~20mA
	0~27648	0~27648
	code value	code value
0	0	-
1	1382	-
2	2765	-
3	4147	-
4	5530	0
5	6912	1728
6	8294	3456
7	9677	5184
8	11059	6912
9	12442	8640
10	13824	10368
11	15206	12096
12	16589	13824
13	17971	15552
14	19354	17280
15	20736	19008
16	22118	20736
17	23501	22464
18	24883	24192
19	26266	25920
20	27648	27648
Code value formula	Code value = (27648/20) * current	Code value = (27648/16) * current - 6912
Current formula	Current = ((code value * 20) / 27648	Current = ((Code value + 6912) * 16) / 27648

Note: Code values set outside the range for current & voltage compatible output modules will not take effect. For analog output modules, if the preset value of the cleared and retained parameters exceeds the code value range, the preset value will not take effect, and the previous valid value will be maintained.

range Voltage	-10V~+10V	-10V~+10V	0V~10V	0V~10V
	-27648~27648	-32768~32767	0~27648	0~32767
	code value	code value	code value	code value
-10	-27648	-32768	-	-
-9	-24883	-29491	-	-
-8	-22118	-26214	-	-
-7	-19354	-22937	-	-
-6	-16589	-19661	-	-
-5	-13824	-16384	-	-
-4	-11059	-13107	-	-
-3	-8294	-9830	-	-
-2	-5530	-6554	-	-
-1	-2765	-3277	-	-
0	0	0	0	0
1	2765	3277	2765	3277
2	5530	6554	5530	6554
3	8294	9830	8294	9830
4	11059	13107	11059	13107
5	13824	16384	13824	16384
6	16589	19661	16589	19661
7	19354	22937	19354	22937
8	22118	26214	22118	26214
9	24883	29491	24883	29491
10	27648	32767	27648	32767
Code value formula	Code value = $(55296/20) \times \text{Voltage}$	Code value = $(65535/20) \times \text{Voltage}$	Code value = $(27648/10) \times \text{Voltage}$	Code value = $(32767/10) \times \text{Voltage}$
Voltage formula	Voltage = $(\text{Code value} \times 20) / 55296$	Voltage = $(\text{Code value} \times 20) / 65535$	Voltage = $(\text{Code value} \times 10) / 27648$	Voltage = $(\text{Code value} \times 10) / 32767$

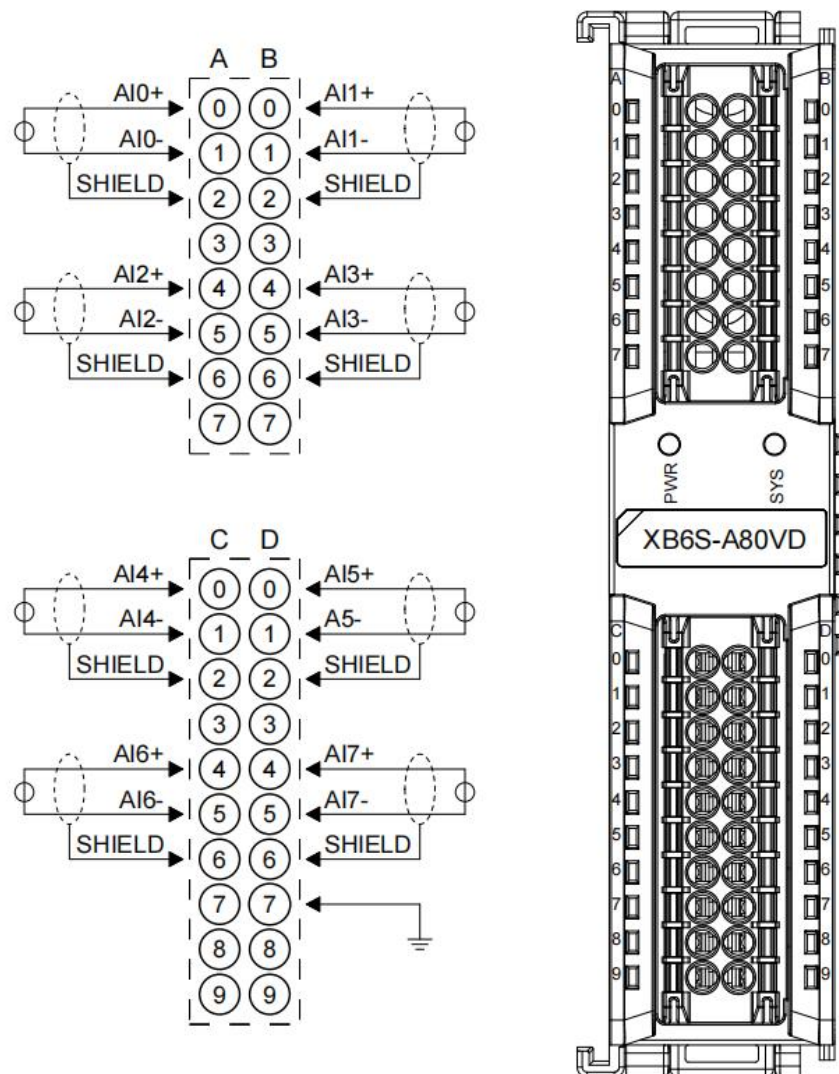
Note: Code values set outside the range for current & voltage compatible output modules will not take effect. For analog output modules, if the preset value of the cleared and retained parameters exceeds the code value range, the preset value will not take effect, and the previous valid value will be maintained.

range Voltage	-5V~+5V	-5V~+5V	0V~5V	0V~5V	1V~5V
	-27648~27648	-32768~32767	0~27648	0~32767	0~27648
	code value	code value	code value	code value	code value
-5	-27648	-32768	-	-	-
-4	-22118	-26214	-	-	-
-3	-16588	-19661	-	-	-
-2	-11060	-13107	-	-	-
-1	-5530	-6554	-	-	-
0	0	0	0	0	-
1	5530	6554	5530	6554	0
2	11060	13107	11060	13107	6912
3	16588	19661	16588	19661	13824
4	22118	26214	22118	26214	20736
5	27648	32767	27648	32767	27648
Code value formula	code value=(55296/10)*Voltage	code value=(65535/10)*Voltage	code value=(27648/5)*Voltage	code value=(32767/5)*Voltage	code value=(27648/4)*Voltage-6912
Voltage formula	Voltage=(code value*10)/55296	Voltage=(code value*10)/ 65535	Voltage=(code value*5)/27648	Voltage=(code value*5)/ 32767	Voltage=(code value+6912)*4/27648

Note: Code values set outside the range for current & voltage compatible output modules will not take effect. For analog output modules, if the preset value of the cleared and retained parameters exceeds the code value range, the preset value will not take effect, and the previous valid value will be maintained.

3.3.7 Wiring diagram

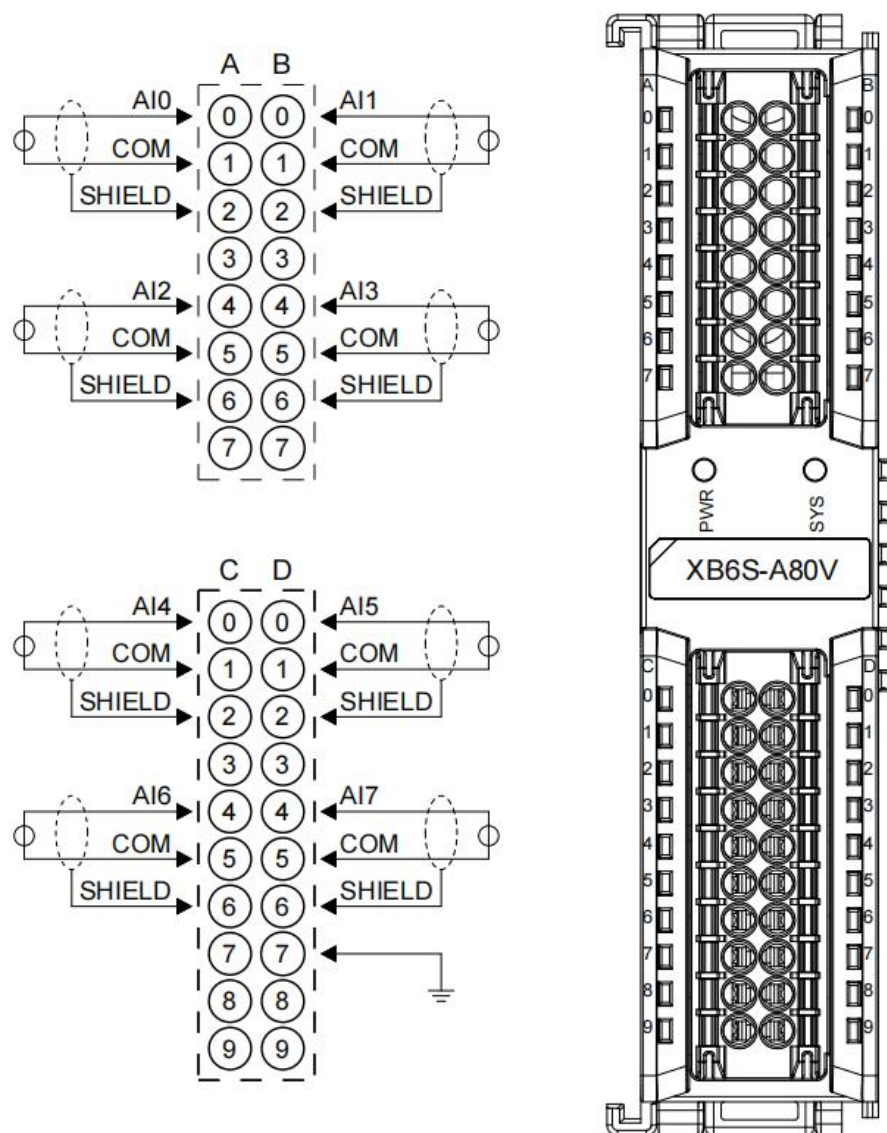
3.3.7.1 XB6S-A80VD



*All SHIELD internal conduction

*It is recommended to use shielded twisted-pair cable, connect the shield to the SHIELD port, and ground it reliably.

3.3.7.2 XB6S-A80V

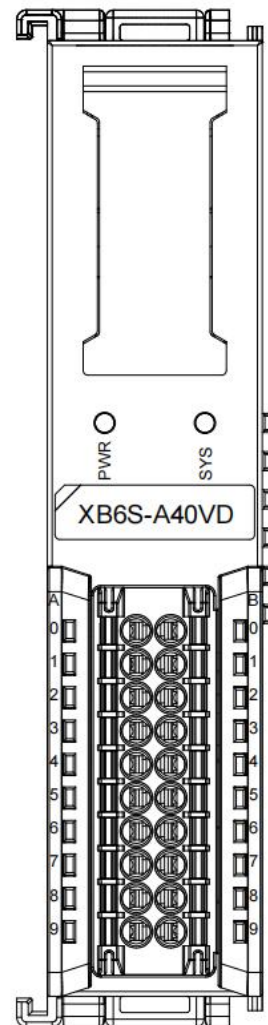
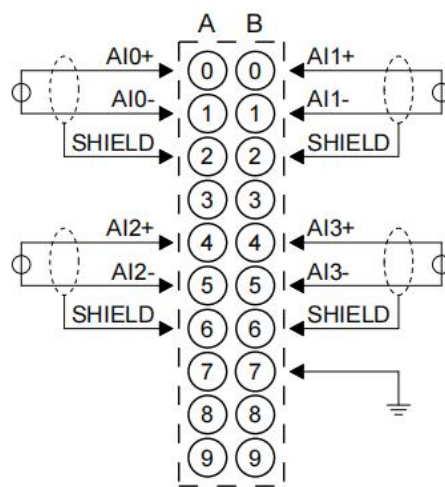


*COM internal conduction, SHIELD internal conduction

All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

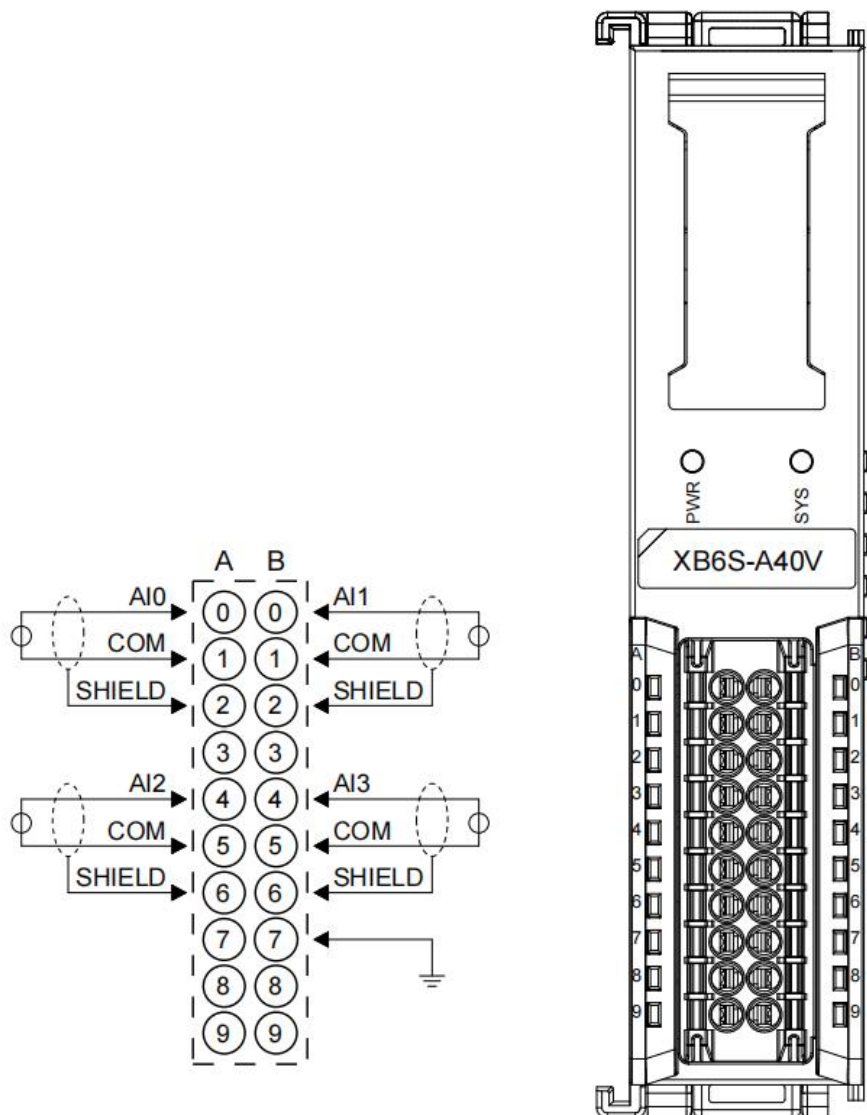
3.3.7.3 XB6S-A40VD



*All SHIELD internal conduction

*It is recommended to use shielded twisted-pair cable, connect the shield to the SHIELD port, and ground it reliably.

3.3.7.4 XB6S-A40V

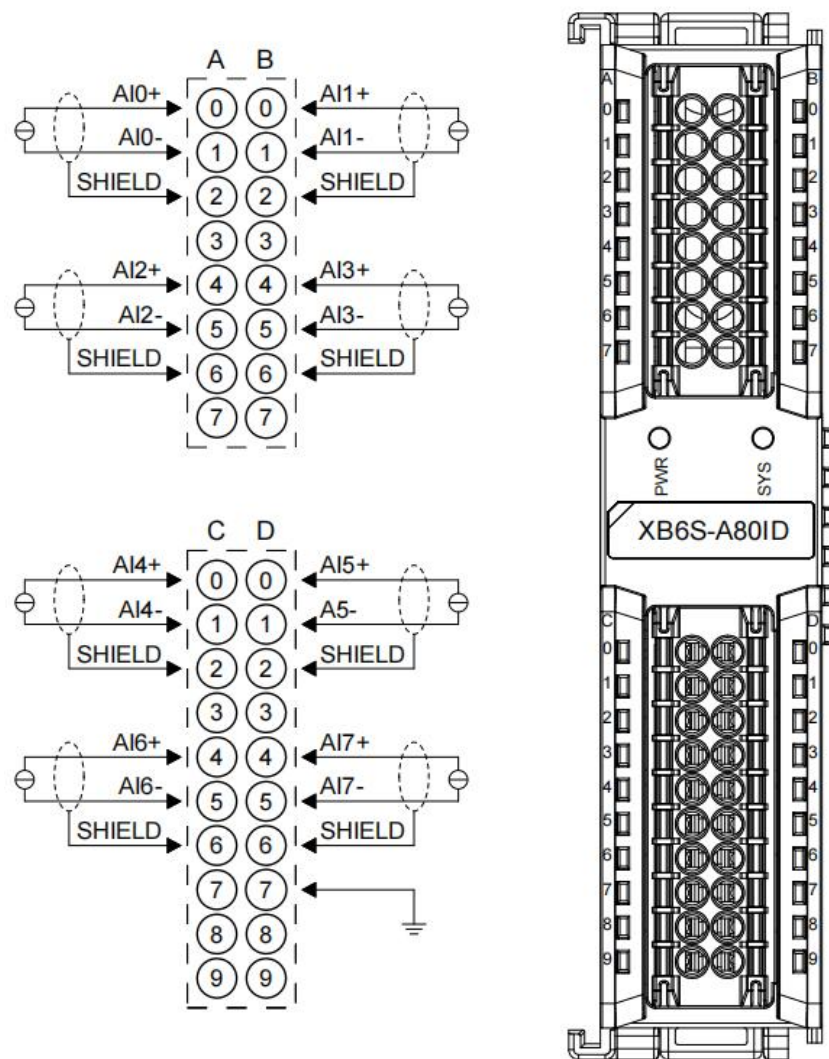


*COM internal conduction, SHIELD internal conduction

All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

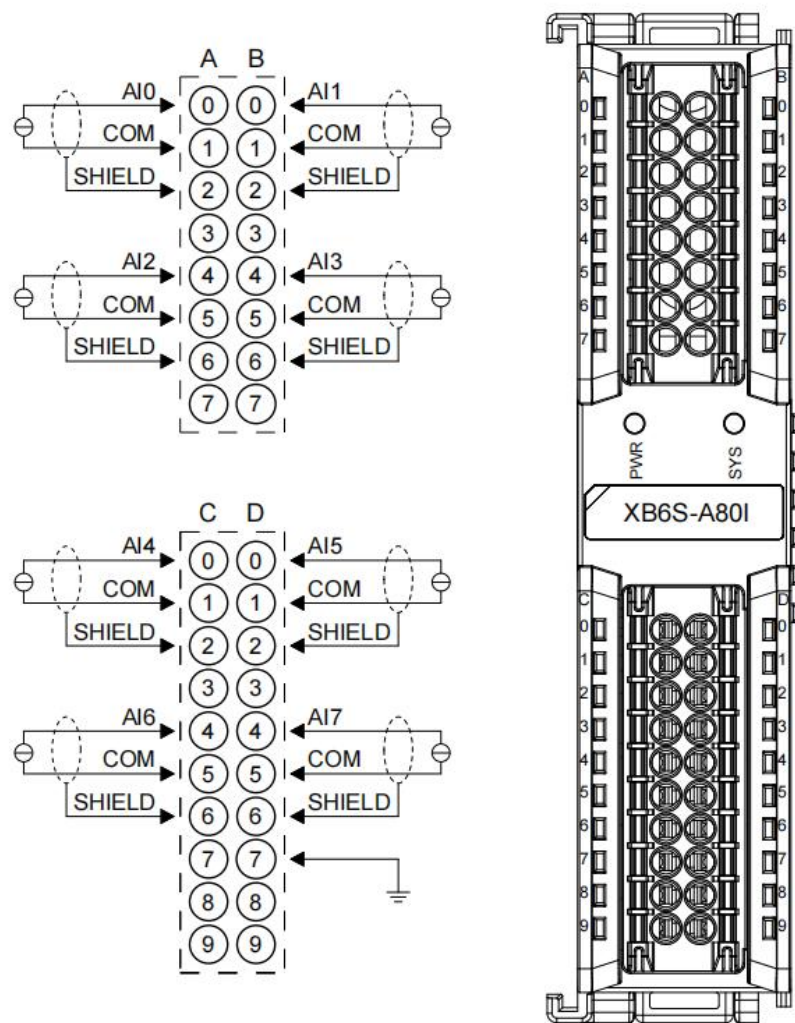
3.3.7.5 XB6S-A80ID



*All SHIELD internal conduction

*It is recommended to use shielded twisted-pair cable, connect the shield to the SHIELD port, and ground it reliably.

3.3.7.6 XB6S-A80I

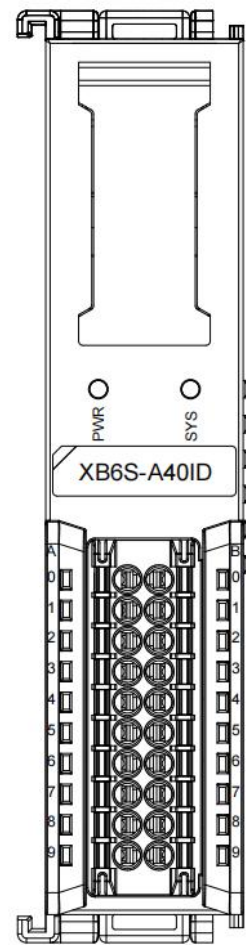
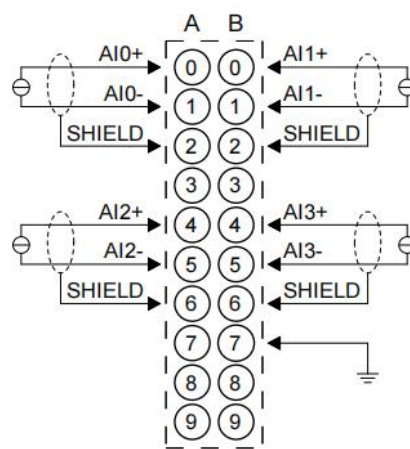


*COM internal conduction, SHIELD internal conduction

*All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

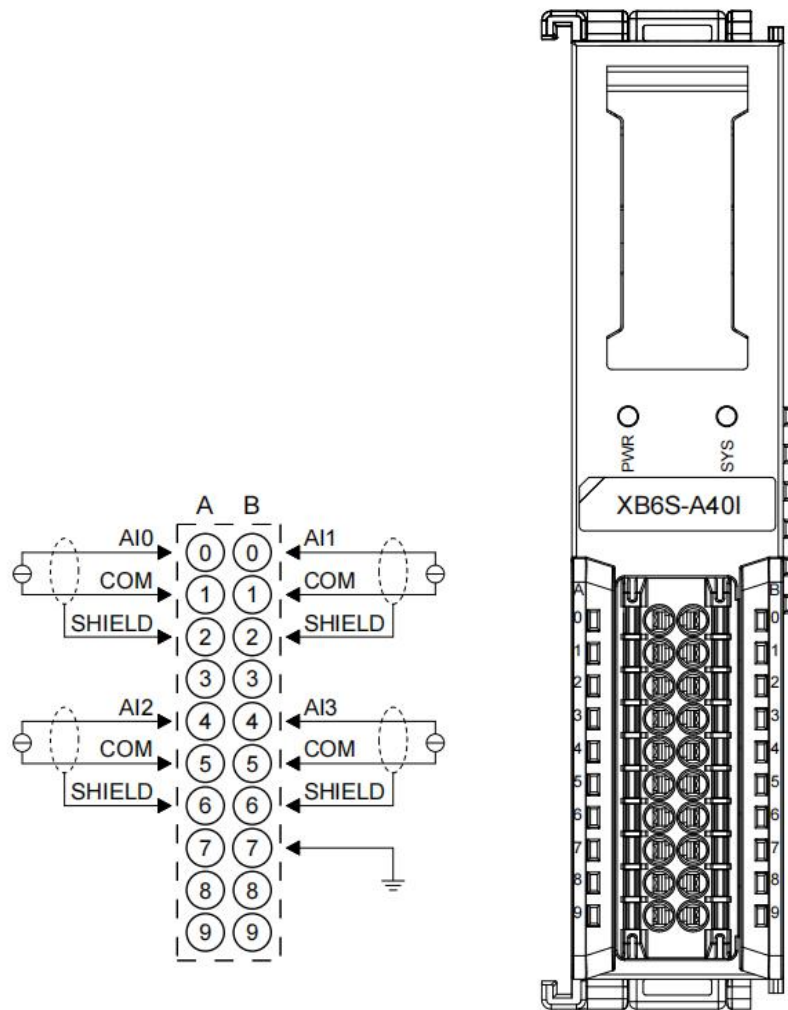
3.3.7.7 XB6S-A40ID



*All SHIELD internal conduction

*It is recommended to use shielded twisted-pair cable, connect the shield to the SHIELD port, and ground it reliably.

3.3.7.8 XB6S-A40I

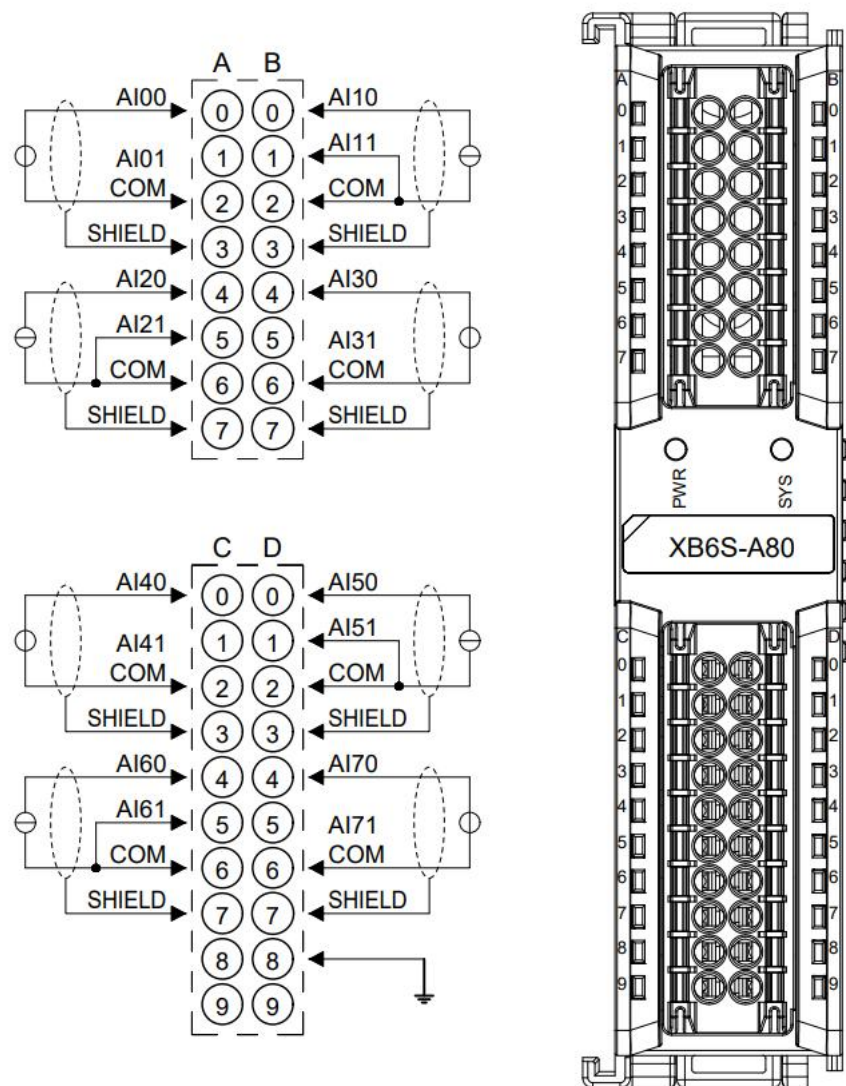


*COM internal conduction, SHIELD internal conduction

*All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

3.3.7.9 XB6S-A80



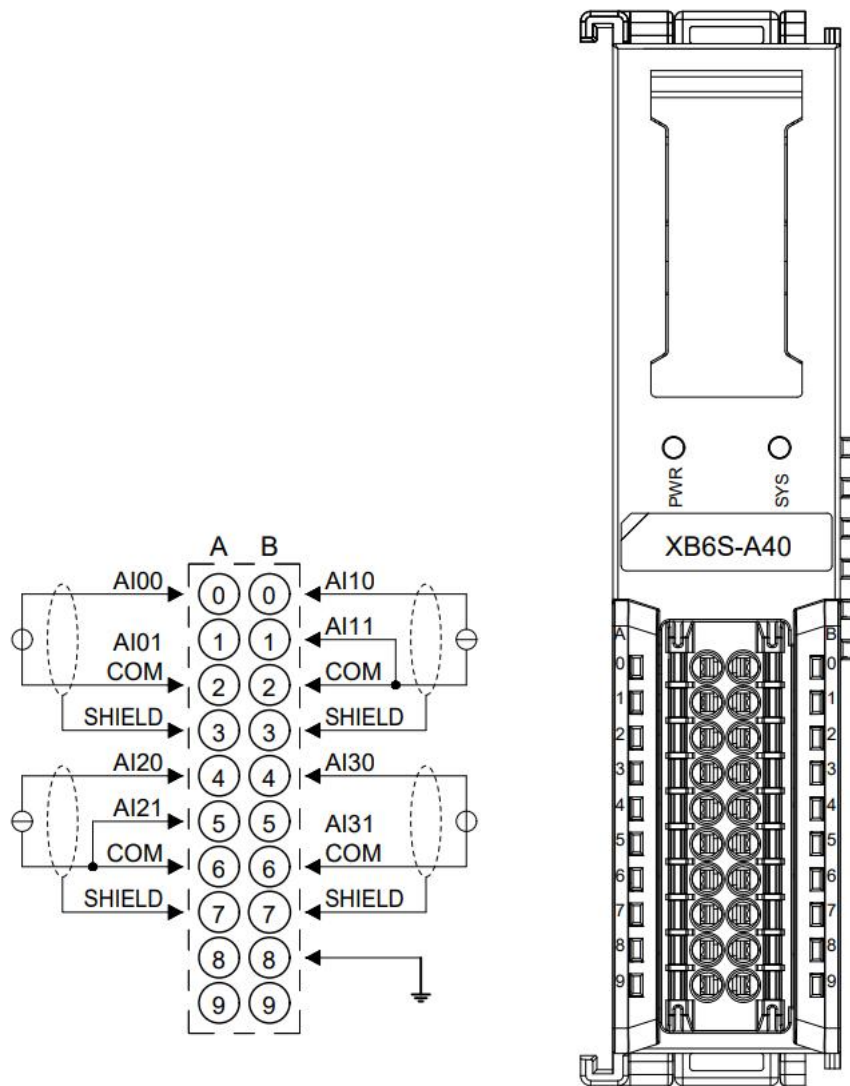
*COM internal conduction, SHIELD internal conduction

*For current-mode applications, AIx1 and COM need to be shorted externally.

*All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

3.3.7.10 XB6S-A40



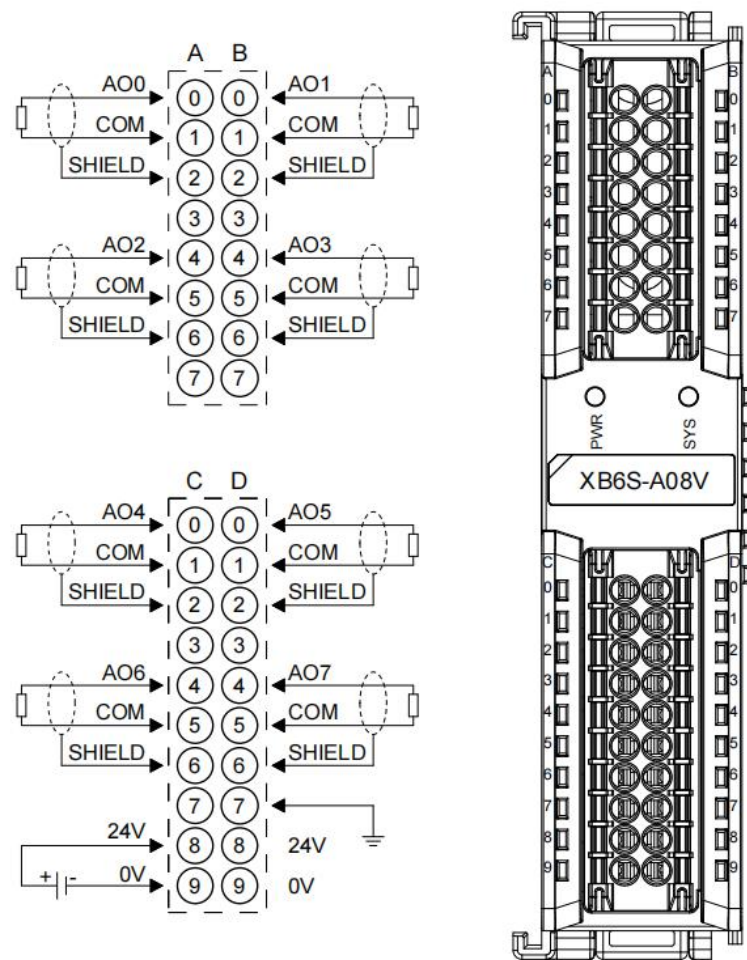
*COM internal conduction, SHIELD internal conduction

*For current-mode applications, AIx1 and COM need to be shorted externally.

*All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

3.3.7.11 XB6S-A08V

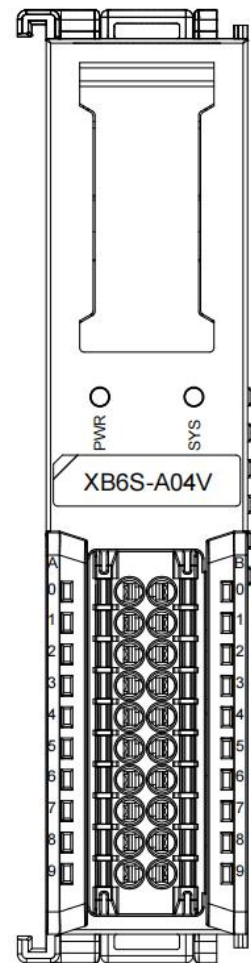
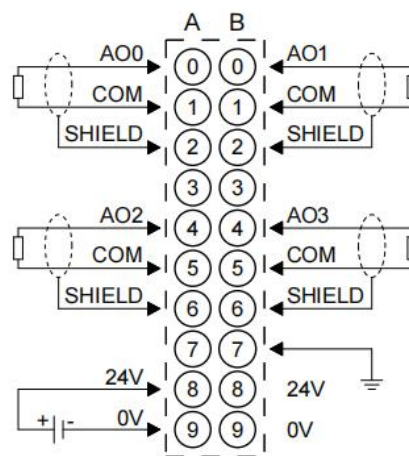


*COM internal conduction, SHIELD internal conduction

*All channel loads must originate from the same source.

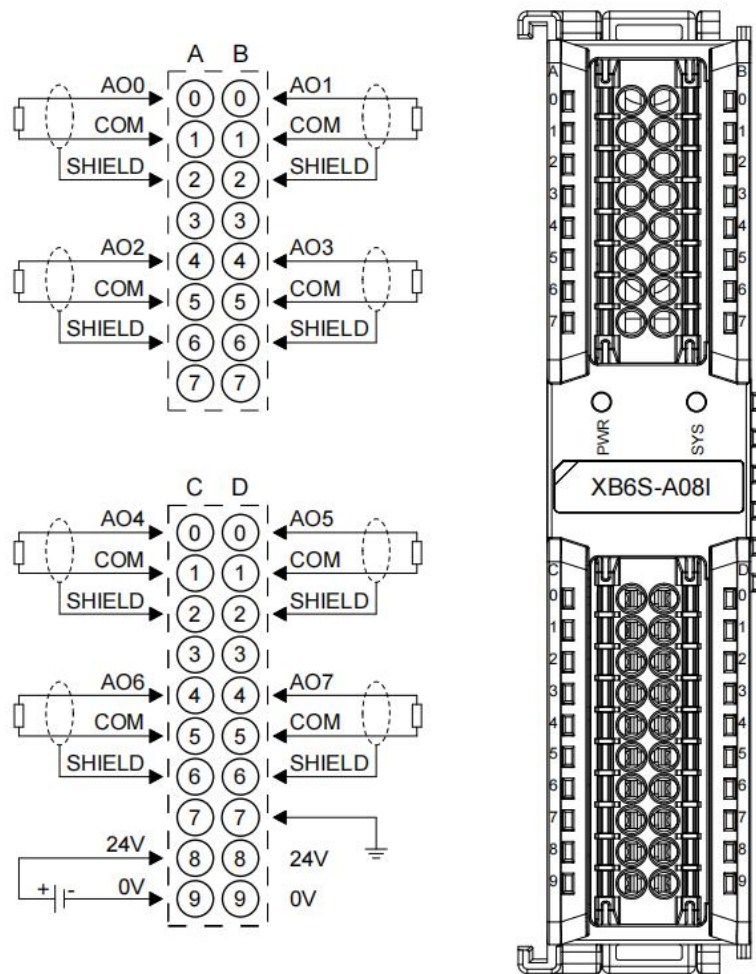
*Shielded twisted-pair cables are recommended for signal cables.

3.3.7.12 XB6S-A04V



- *COM internal conduction, SHIELD internal conduction
- *All channel loads must originate from the same source.
- *Shielded twisted-pair cables are recommended for signal cables.

3.3.7.13 XB6S-A08I

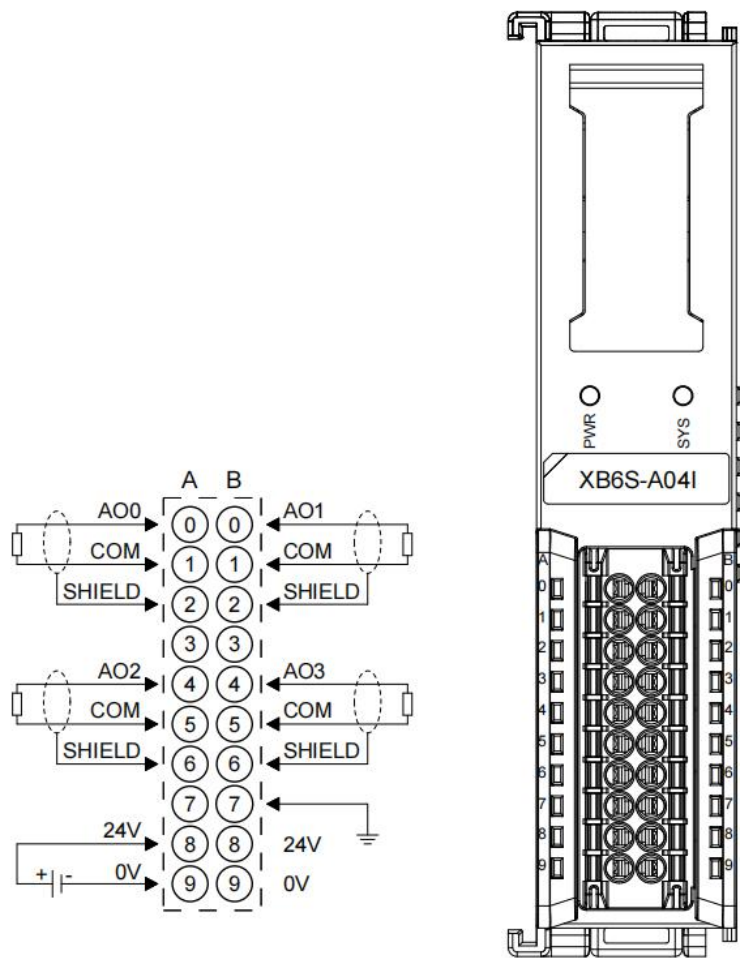


*COM internal conduction, SHIELD internal conduction

*All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

3.3.7.14 XB6S-A04I

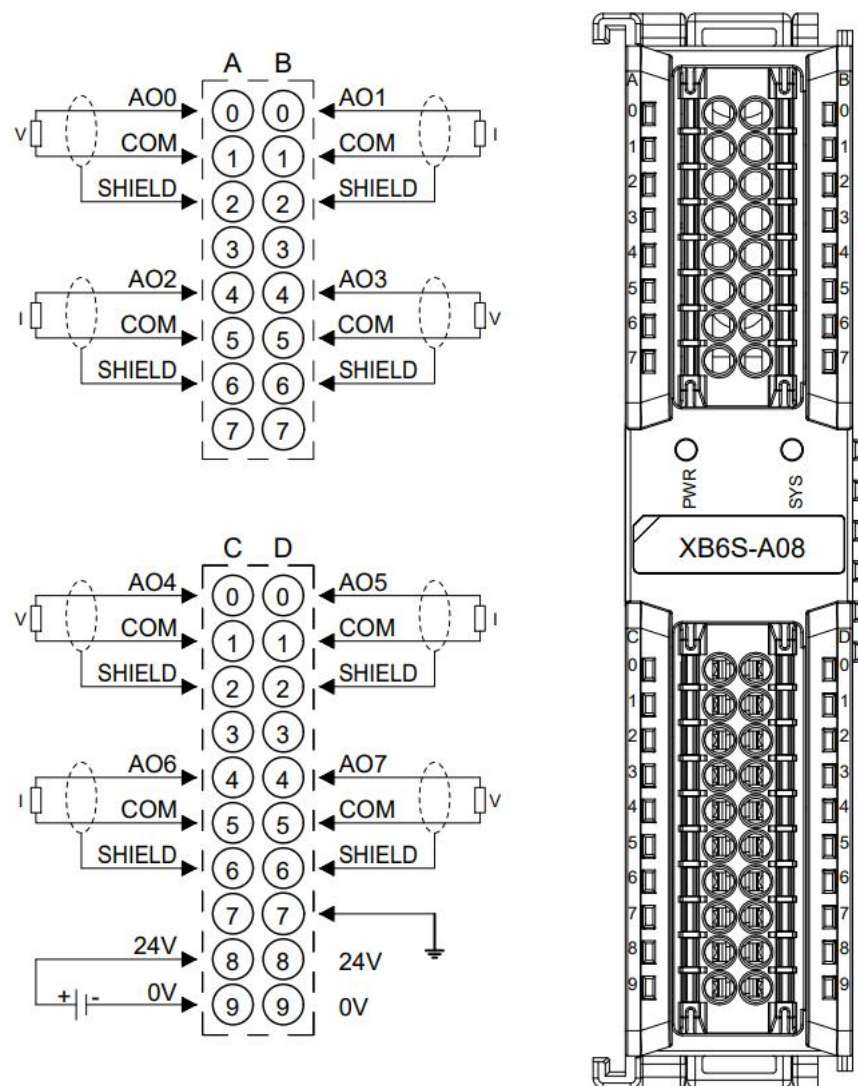


*COM internal conduction, SHIELD internal conduction

*All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

3.3.7.15 XB6S-A08

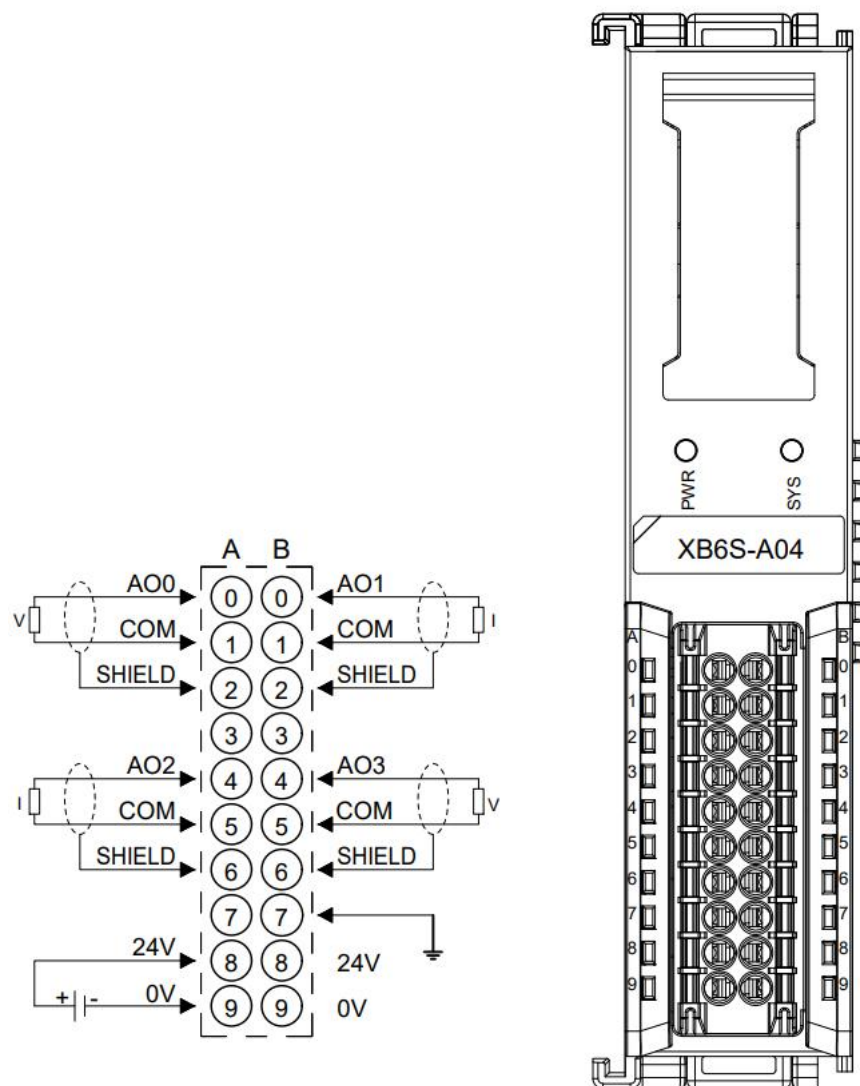


*COM internal conduction, SHIELD internal conduction

*All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

3.3.7.16 XB6S-A04



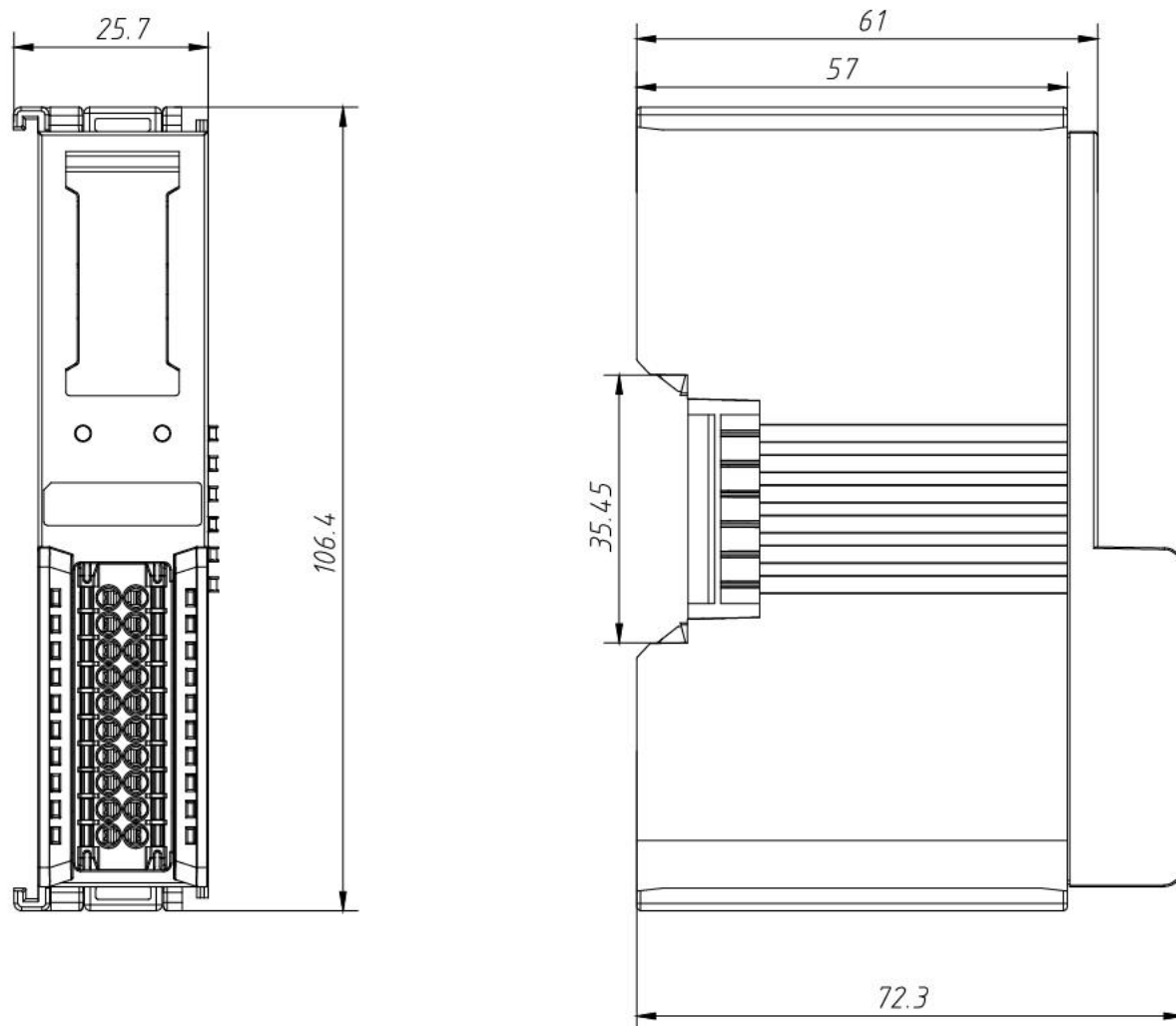
*COM internal conduction, SHIELD internal conduction

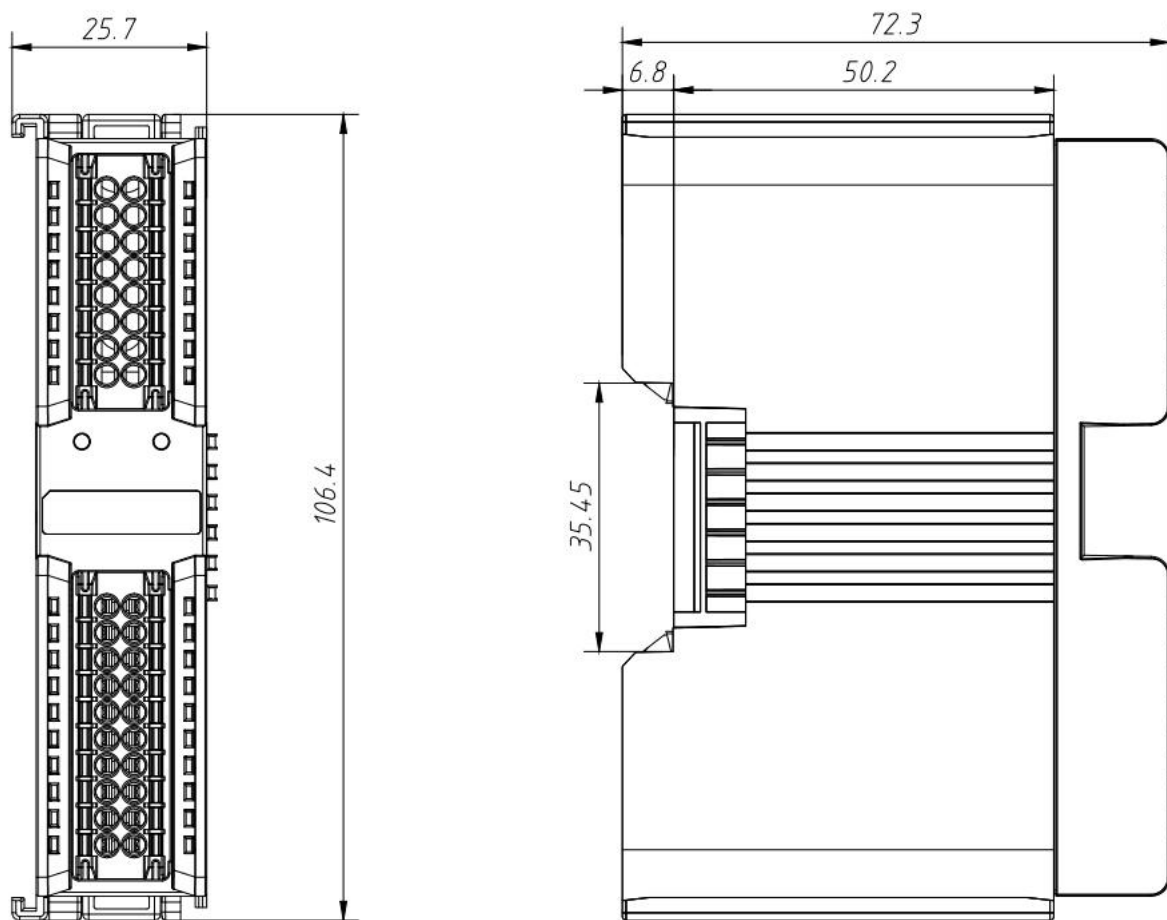
*All channel loads must originate from the same source.

*Shielded twisted-pair cables are recommended for signal cables.

3.3.8 Outline Dimensions

Dimensions of a 4-channel analog I/O module (in mm)



Dimensions of an 8-channel analog I/O module (in mm)

3.4 Extended power module

3.4.1 Panel structure



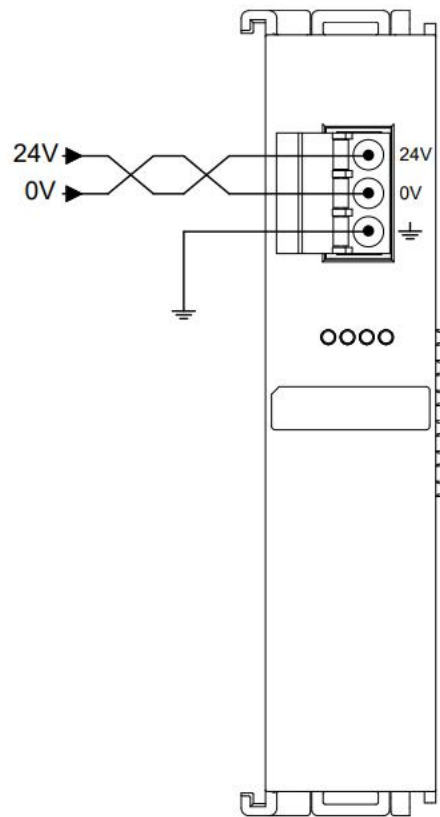
3.4.2 Indicator light function

Extended power module indicator light definition				
Logo	Name		State	Status Description
PWR	Power indicator light	green	ON	The module power supply is working normally.
			OFF	Module not powered or power supply abnormal
OVR	Overload indicator light	red	OFF	Not overloaded
			ON	The load reaches 90% (±5%) or more.

3.4.3 Technical parameters

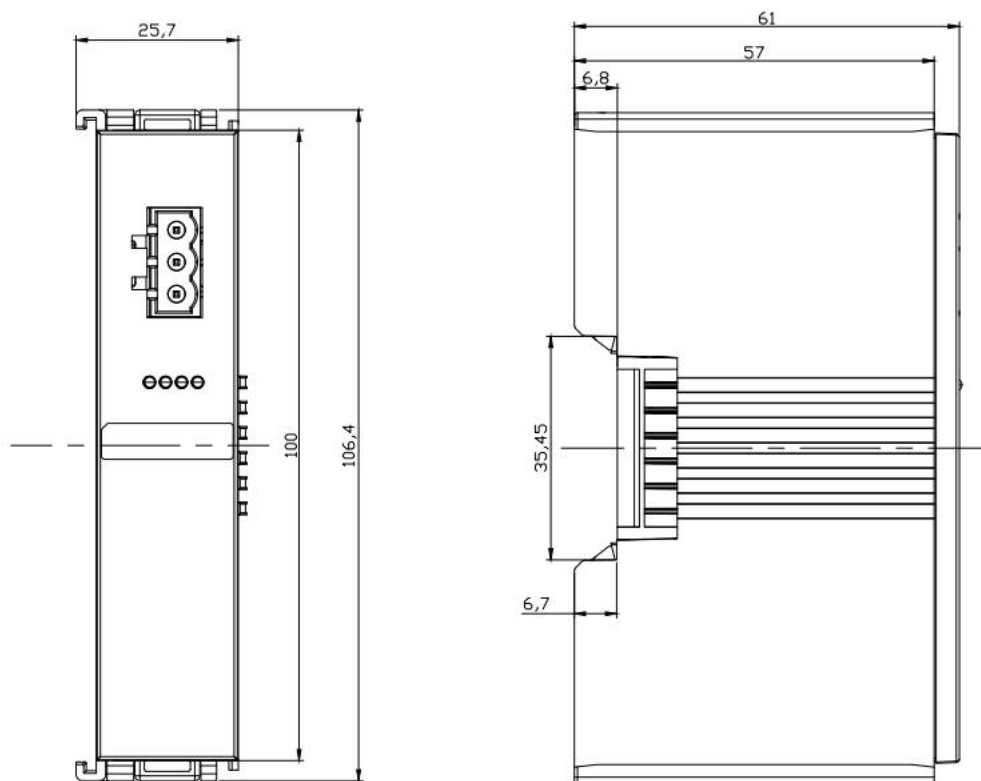
Power parameters	
Input voltage	SELV Input 24VDC (18V~36V)
Input current	600mA (24VDC)
Output voltage	5VDC
Output current	2A
General technical parameters	
Specifications and dimensions	106.4 × 25.7 × 61mm
weight	110g
Operating temperature	-20°C ~ +60°C
Storage temperature	-40°C ~ +80°C
relative humidity	95%, no condensation
Altitude	≤2000m
Pollution level	Level 2
Short circuit protection	Supports (automatic recovery mechanism)
Reverse connection protection	Supports (automatic recovery mechanism)
Surge protection	Support
Protection level	IP20
Safety certification	UL certification, CE certification
Green certification	RoHS certification, REACH certification

3.4.4 Wiring diagram



3.4.5 Outline Dimensions

Extended power supply dimensions (unit: mm)

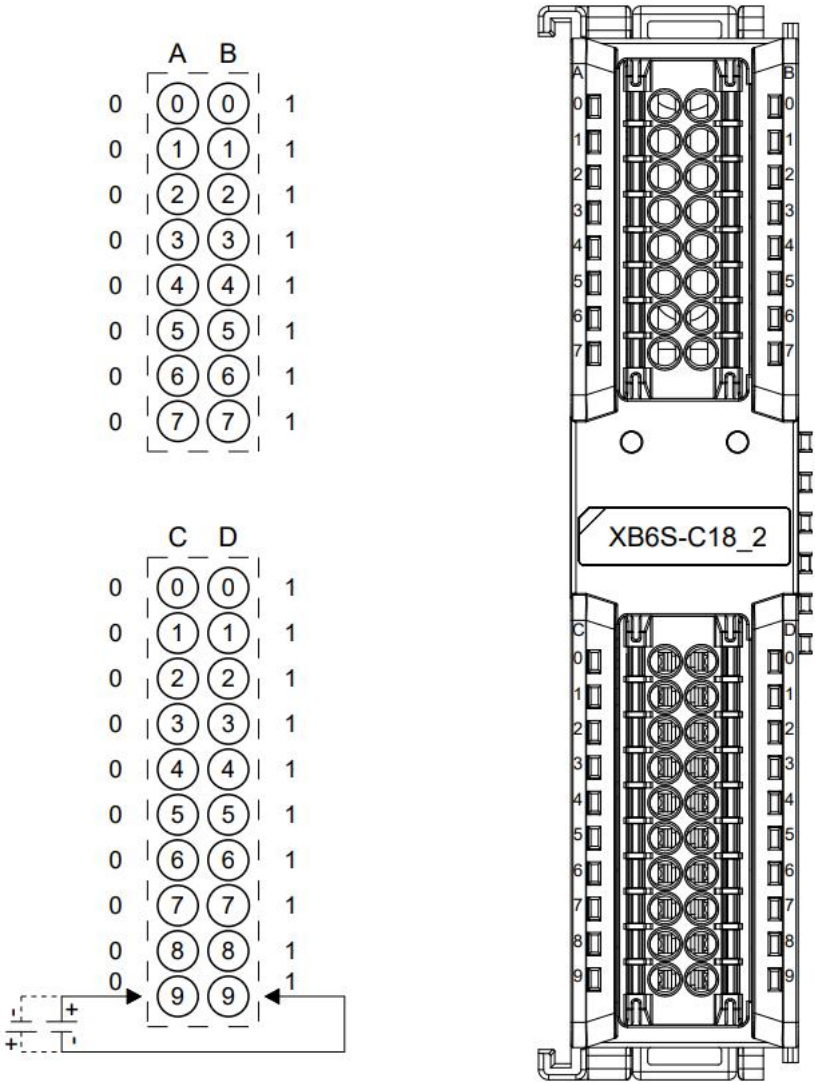


3.5 Public End Extension Module

3.5.1 Technical parameters

Common terminal parameters	
Rated voltage	24VDC (18V~36V)
Rated current	8A
Number of public terminals	2 groups
General technical parameters	
Specifications and dimensions	106.4 × 25.7 × 72.3mm
Weight	95g
Operating temperature	-20°C~+60°C
Storage temperature	-40°C~+80°C
Relative humidity	95%, no condensation
Altitude	≤2000m
Pollution level	Level 2
Protection level	IP20
Safety certification	UL certification, CE certification
Green certification	RoHS certification, REACH certification

3.5.2 Wiring diagram

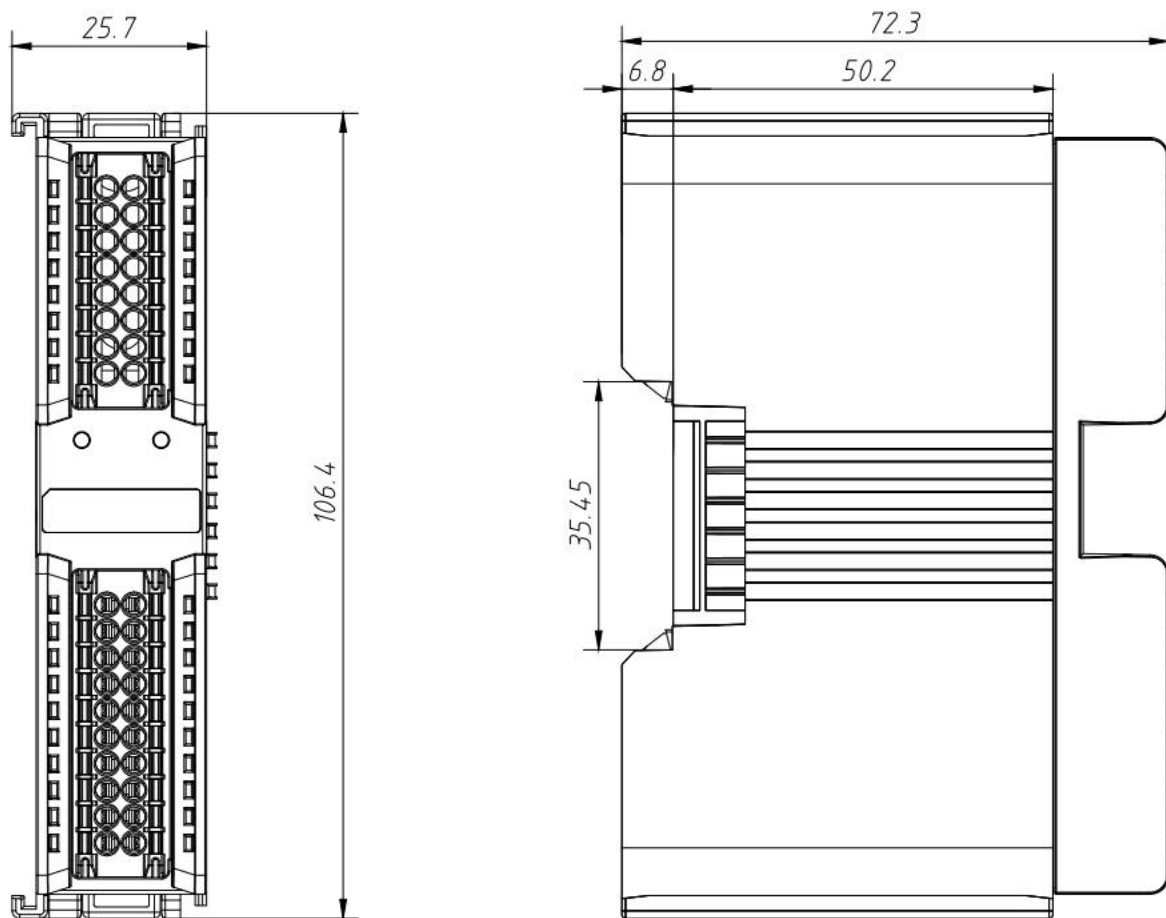


*Channel identifier 0 indicates internal conduction.

*Channel Identifier 1: Internal Conductor

3.5.3 Outline Dimensions

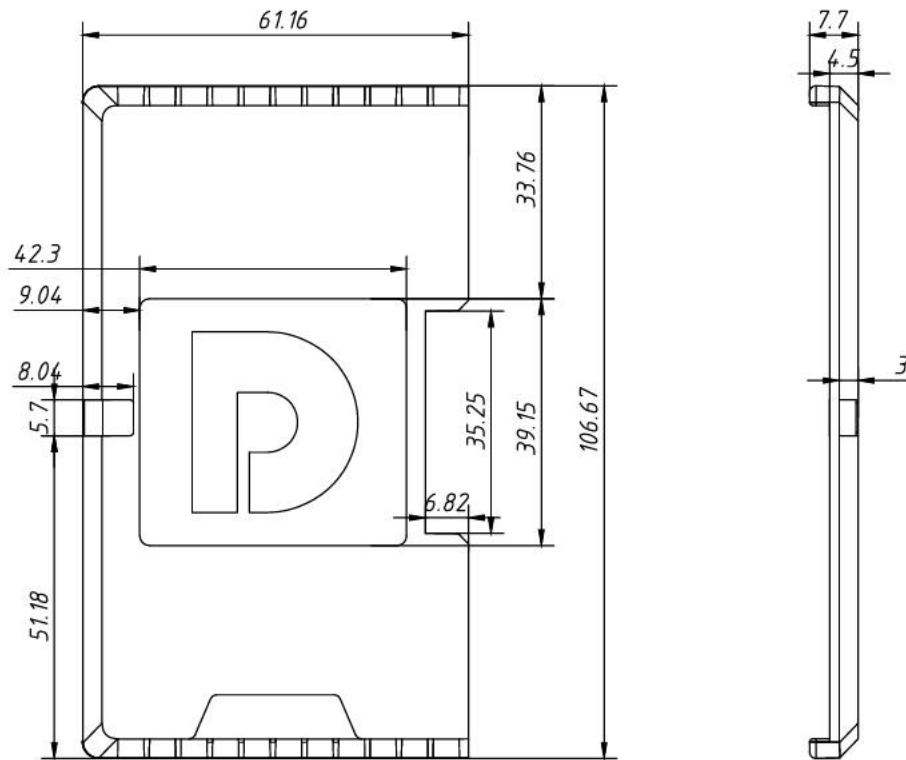
External dimensions (unit: mm)



3.6 Terminal cover

3.6.1 Outline Dimensions

Terminal cover dimensions (unit: mm)



Note: All installations use DIN 35 mm standard rails. DIN rail specifications are 35*7.5*1.0 and 35*15*1.0 (unit: mm).

4 Installation and removal

4.1 Installation Guide

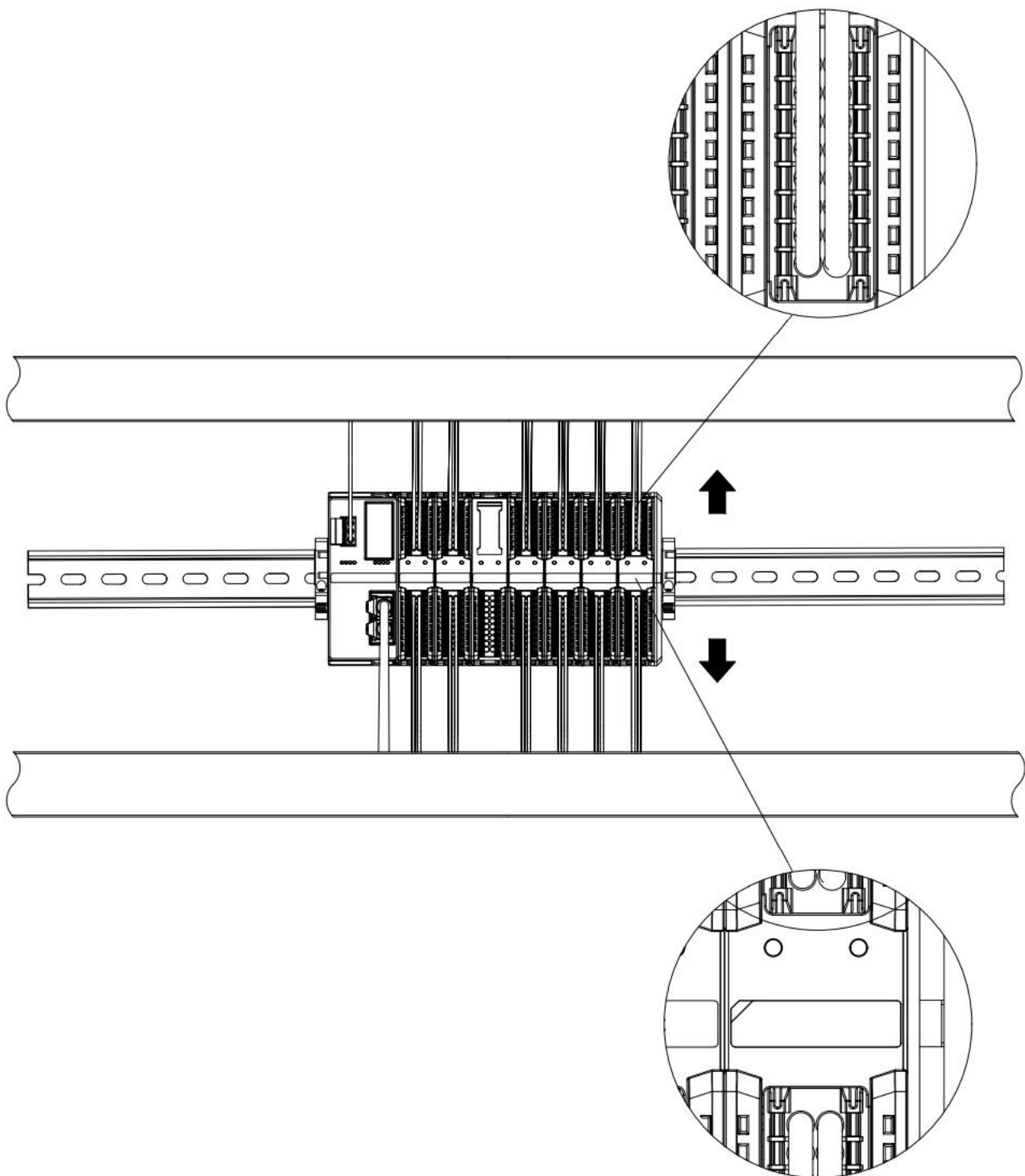
Installation/Removal Precautions

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

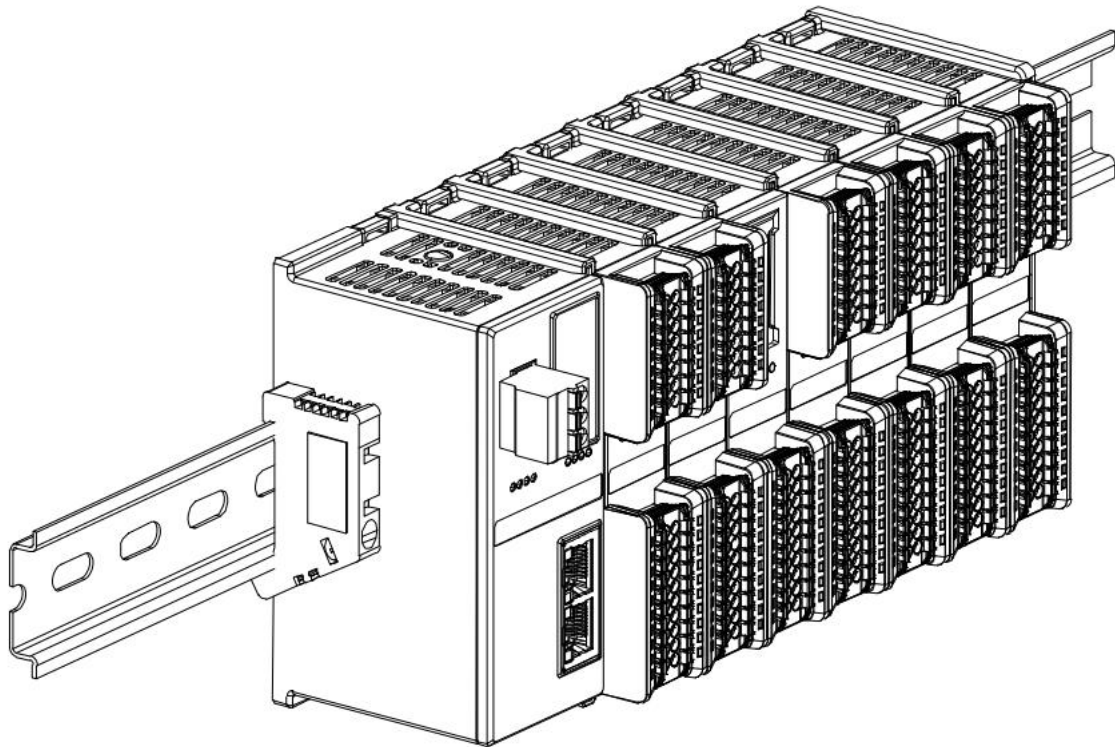


Warn

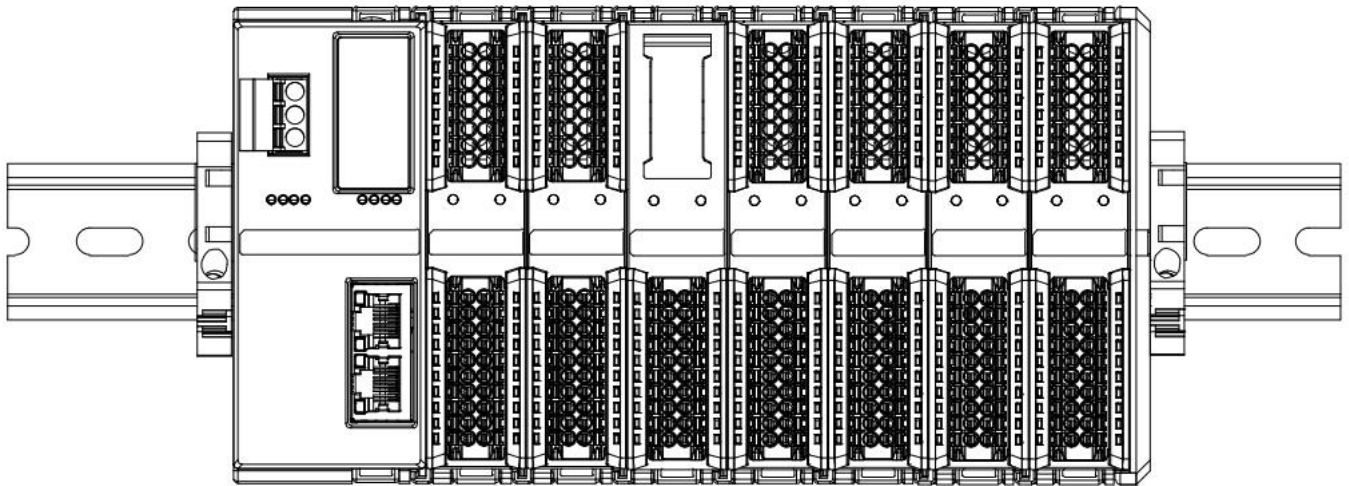
- If the device is not used in accordance with the product user manual, the protection it provides may be compromised.
-

Module installation diagram, minimum vertical clearance ($\geq 50\text{mm}$)

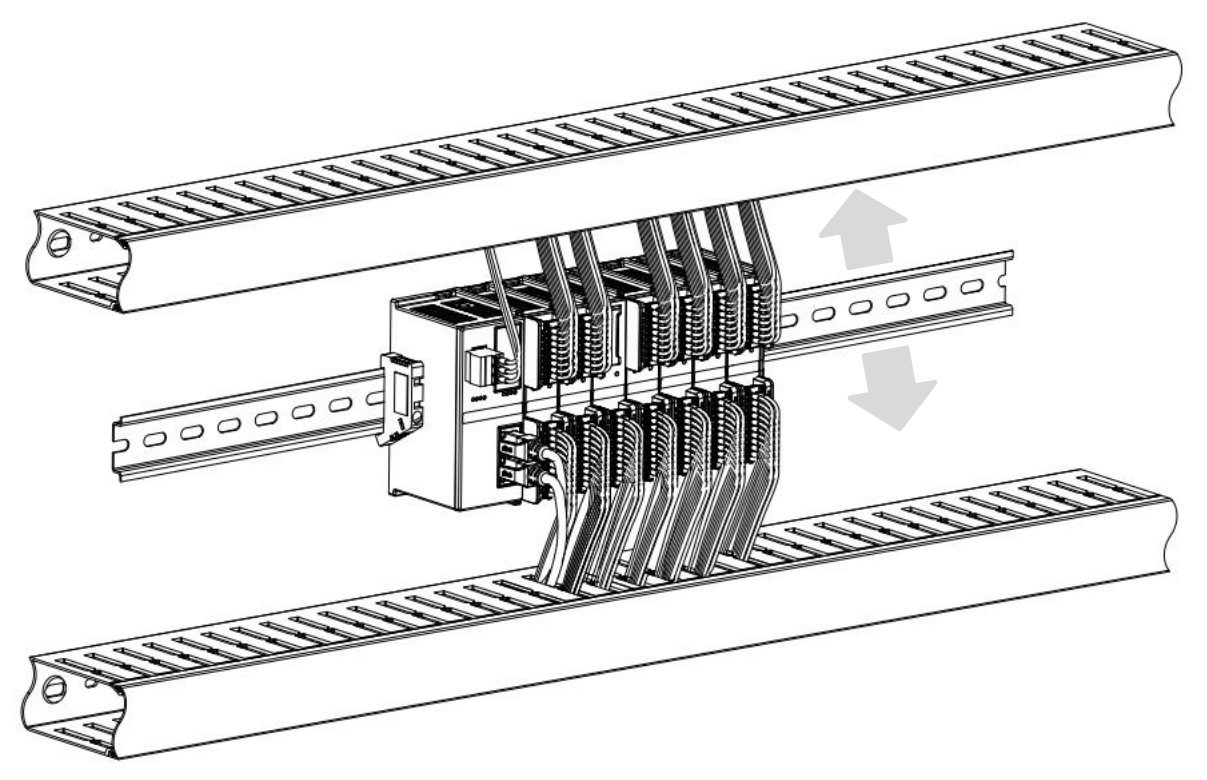
Ensure the module is installed vertically on the fixed guide rail.



Be sure to install the guide rail fasteners.



Module top and bottom wiring diagram



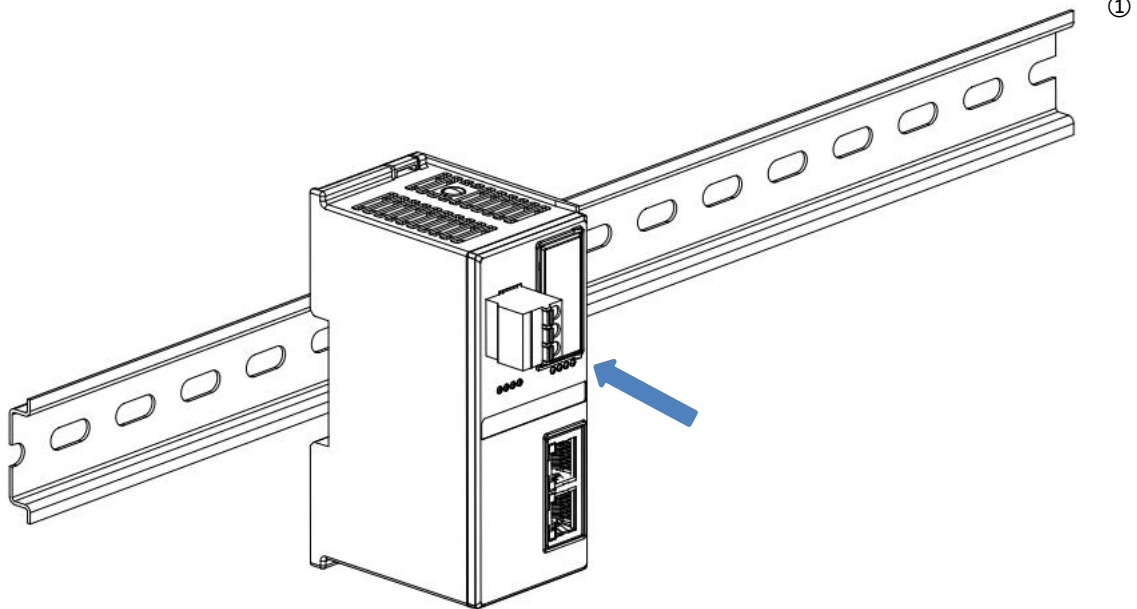
4.2 Installation and disassembly steps

Module installation and removal	
Module installation steps	1. First, install the coupler module on the fixed guide rail.
	2. Install the required I/O modules or functional modules in sequence on the right side of the coupler module.
	3. After installing all the necessary modules, install the terminal cover to complete the module assembly.
	4. Install guide rail fasteners at both ends of the coupler module and the terminal cover to fix the module.
Module disassembly steps	1. Loosen the guide rail fasteners at both ends of the module.
	2. Use a flathead screwdriver to pry open the module clips.
	3. Remove the disassembled module.

4.3 Installation and disassembly diagram

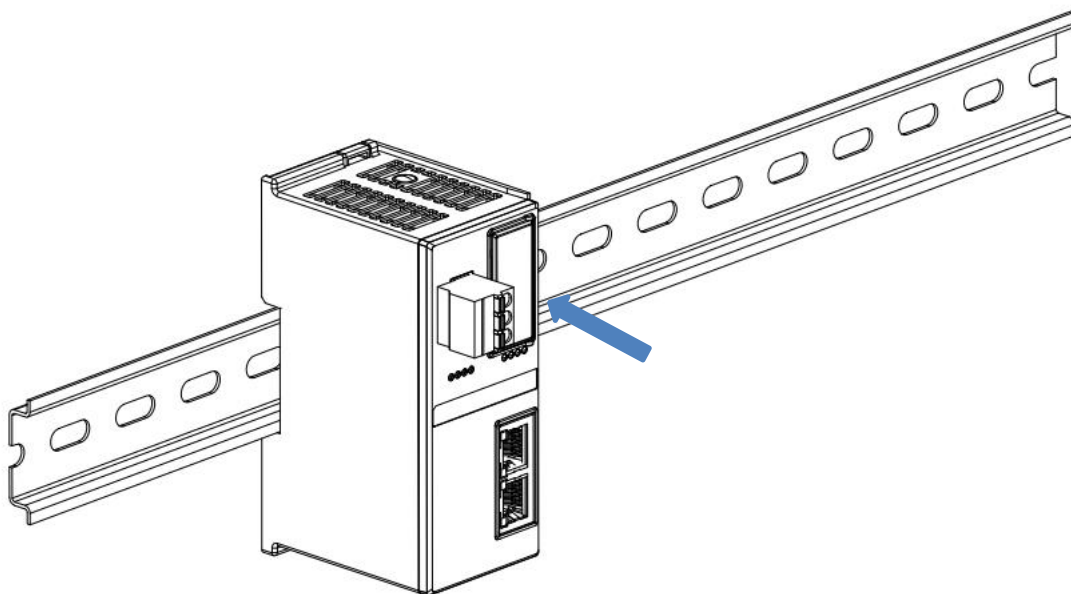
Coupler module installation

- Align the coupler module vertically with the guide rail slot, as shown in Figure ① below.



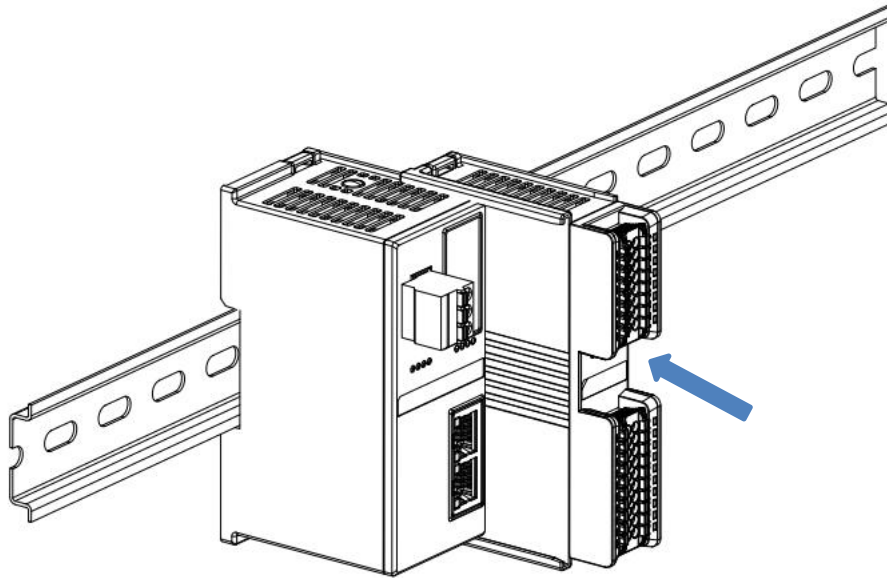
- Press the coupler module firmly into the guide rail direction until you hear a "click" sound, indicating that the module is installed in place, as shown in Figure ② below.

②

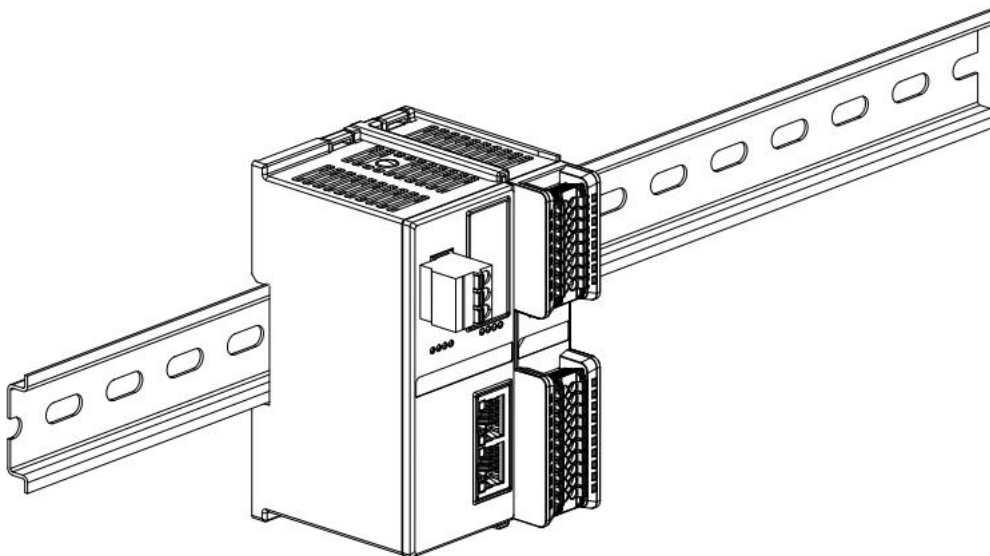


I/O module installation

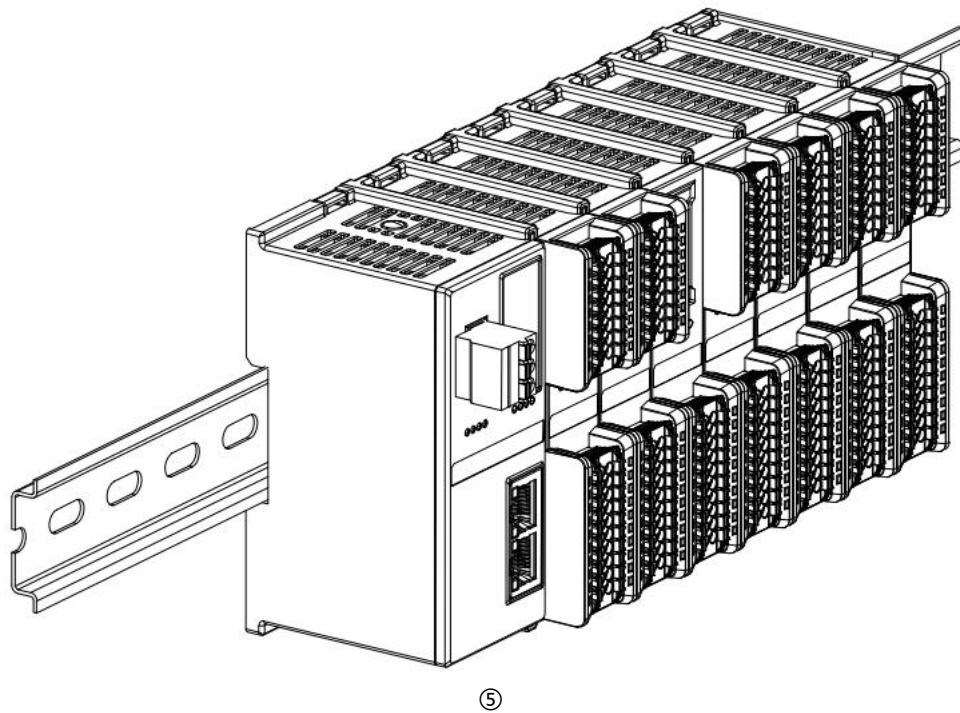
- Following the steps described above for installing the coupler module, install the required I/O modules or functional modules one by one, as shown in Figures ③, ④, and ⑤. Push them in until you hear a "click" sound, indicating that the module is installed in place.



③

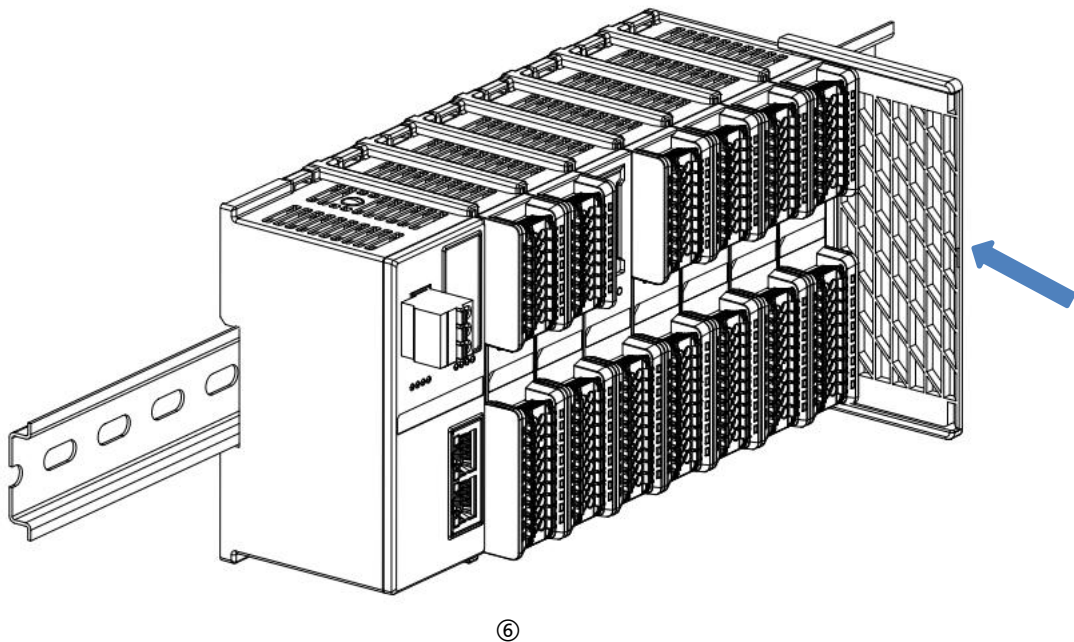


④

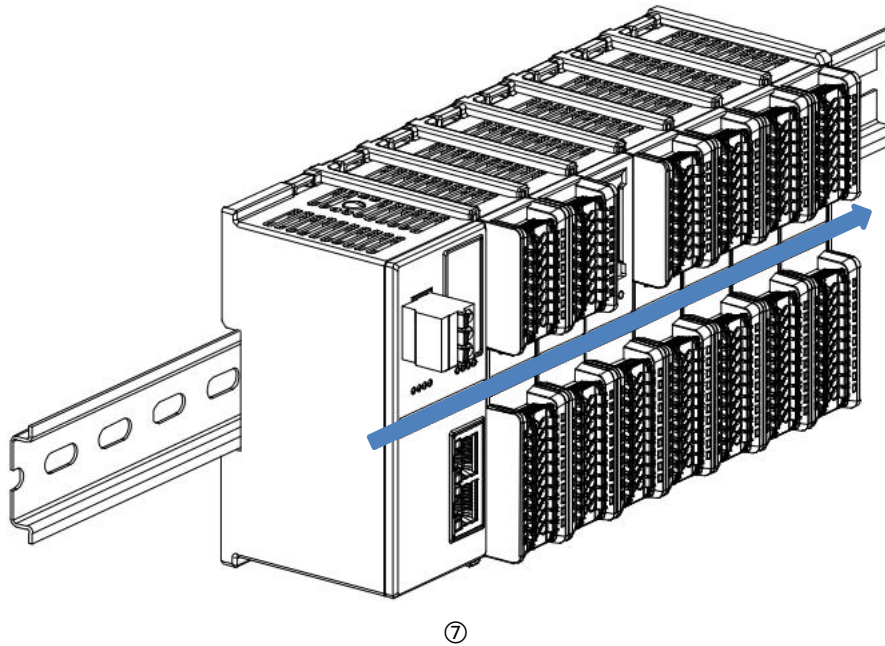


Terminal cover installation

- Install the terminal cover on the right side of the last module. Align the groove side of the terminal cover with the guide rail. For the installation method, please refer to the installation method of the I/O module. Push the terminal cover inward into place, as shown in Figure 6 below.

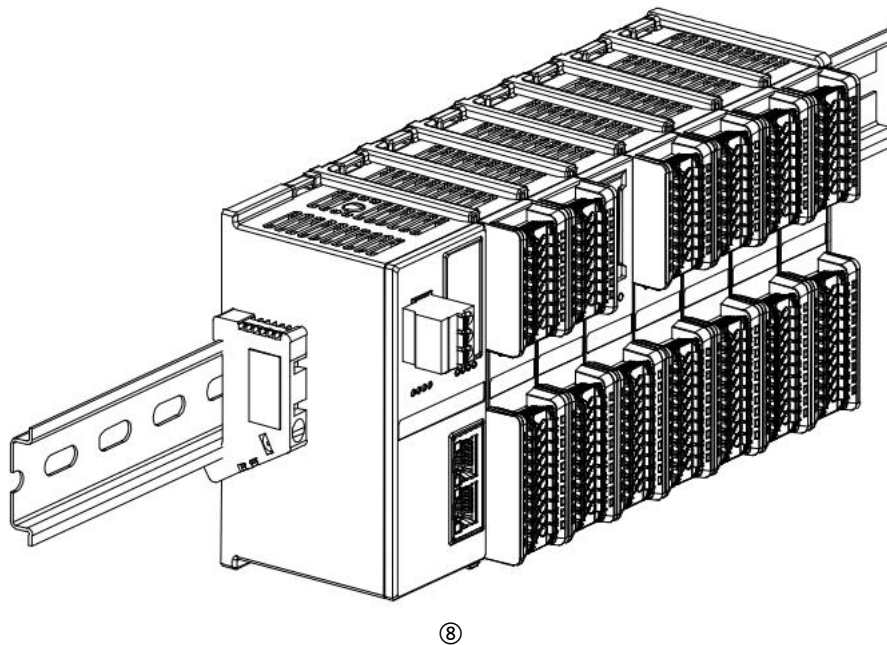


- After the terminal cover is installed, check whether the front of the entire module is flat, and ensure that all modules and end covers are installed in place and the front is flush, as shown in Figure 7 below.

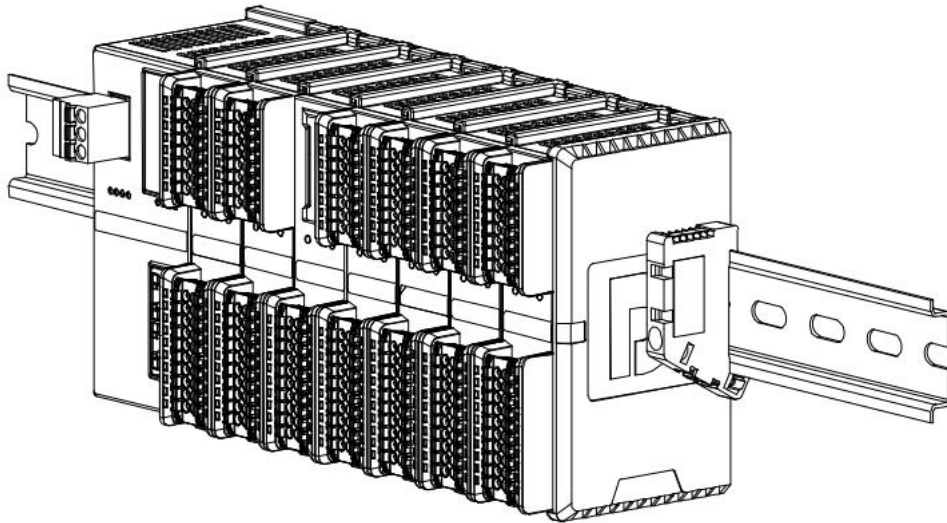


Guide rail fastener installation

- Install and tighten the guide rail fastener close to the left side of the coupler, as shown in Figure 8 below.



- Install the guide rail fastener on the right side of the terminal cover. First, push the guide rail fastener towards the coupler to ensure that the module is installed securely, and then tighten the guide rail fastener with a screwdriver, as shown in Figure 9 below.

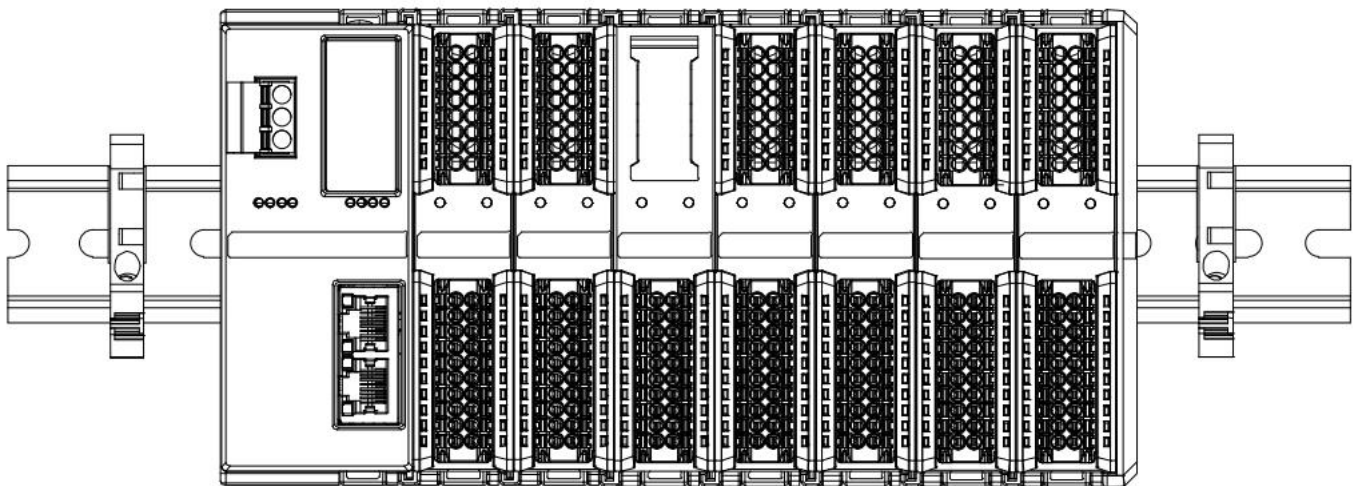


9

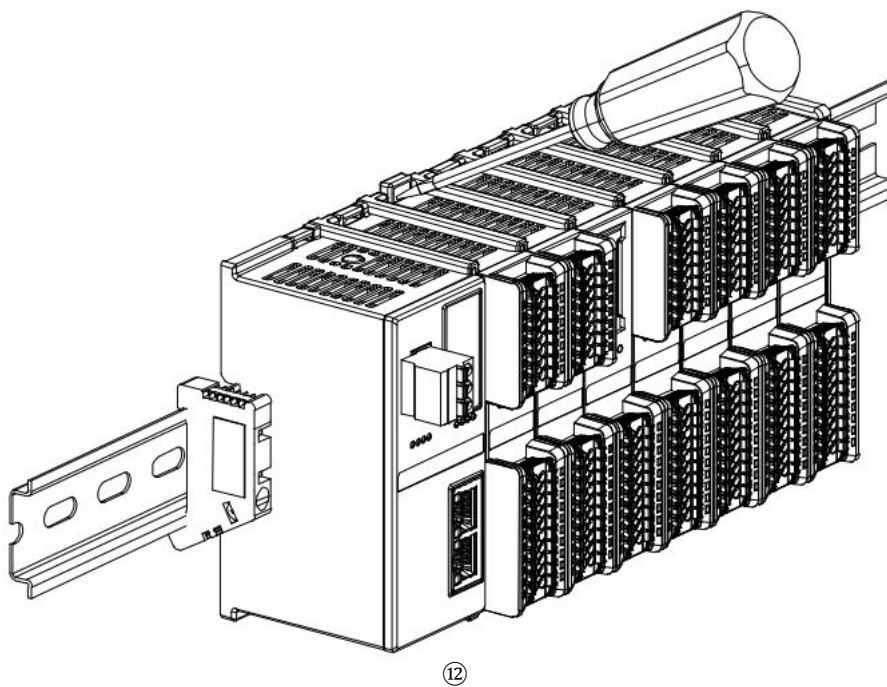
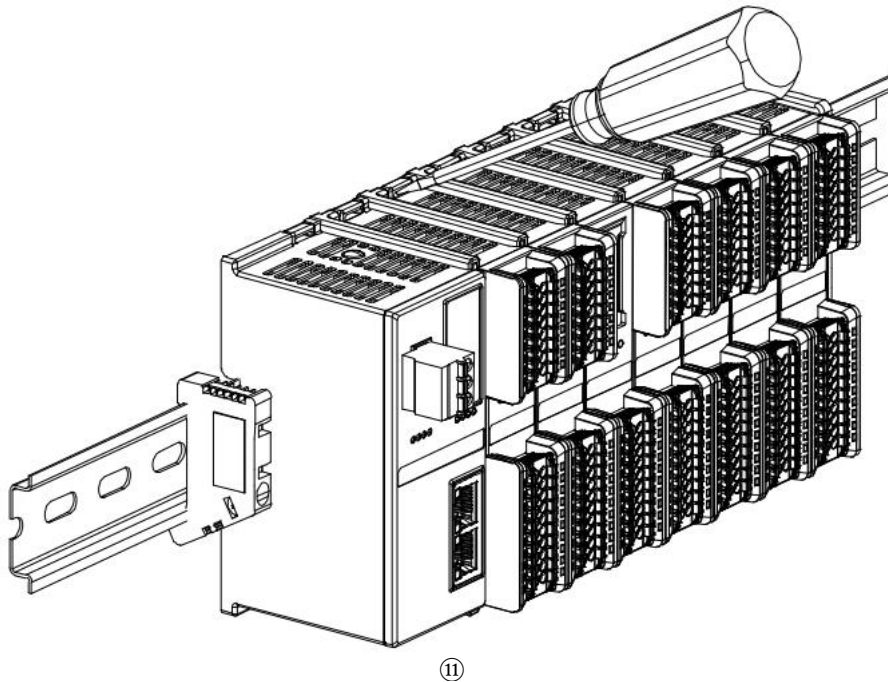
Disassembly

- Loosen the guide rail fastener at one end of the module with a screwdriver and move it to one side, ensuring there is a gap between the module and the guide rail fastener, as shown in Figure 10 below.

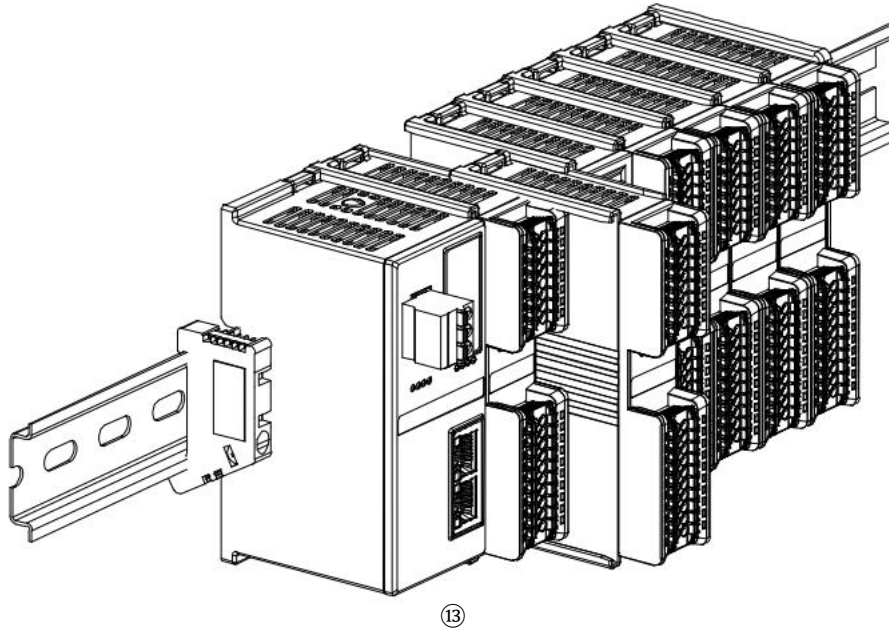
⑩



- Insert the flathead screwdriver into the clips of the module to be removed, and apply force from the side towards the module (you will hear a click), as shown in the picture below.⑪and⑫As shown.
Note: Each module has a latch at the top and bottom; operate in the same way for all of them.



- Disassemble the module following the reverse procedure of installing the module, as shown in the following figure.⑬As shown.



5 Wiring

5.1 Terminal blocks



Warn

Terminal blocks		
Power terminals	Rated voltage	320V
	Rated current	20A
	Extreme number	3P
	wire diameter	22~16 AWG 0.3~1.5 mm ²
Signal line terminals (i.e., input/output terminals)	Rated voltage	200V
	Rated current	9.5A
	Extreme number	16P+20P
	wire diameter	22~17 AWG 0.3~1.0 mm ²
Bus interface	2×RJ45	UTP or STP of Category 5 or higher (STP recommended)

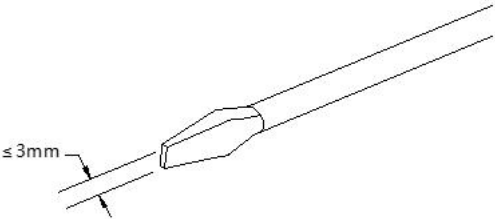
5.2 Wiring instructions and requirements

Power connection precautions

- The power supply for the module system side and the power supply for the field side should be configured and used separately. Do not mix them.
- Reliable grounding is required.

Wiring tool requirements

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



Stripping length requirements

For power and signal line terminals, a cable stripping length of 10 mm is recommended.



Wiring method

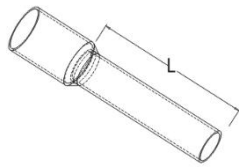
For a single-strand rigid wire, after stripping the wire to the corresponding length, press the button and insert the single-strand wire directly into the corresponding end hole.



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



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

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

⚠ Warn

- Only copper wires can be used for wiring.

⚠ Warn

- Cable temperature: 80°C.

5.3 MIL Connector Type Module Wiring Instructions

5.3.1 Compatible Product List

MIL connector type I/O modules require connection to a terminal block via a cable with a connector for use.

Model	Describe	Adapter terminal block	Adapter Cable
XB6S-3200N	32-channel Digital input, NPN/PNP compatible	TM40-32AE	TM40-XXXX-1 TM40-XXXX-1S
		TM40-32BE	TM40-XXXX-2 TM40-XXXX-2S
XB6S-0032AN	32-channel Digital output, NPN type	TM40-32AE	TM40-XXXX-1 TM40-XXXX-1S
XB6S-0032BN	32-channel Digital output, PNP type	TM40-32BE	

Note: The TM40-XXXX-2/TM40-XXXX-2S model cable is a PNP type input cable and cannot be used with other types of input/output.

5.3.2 Terminal block naming rules

The terminal blocks for this product include TM40-32AE and TM40-32BE, and the naming rules are as follows.

TM40-32

(1)

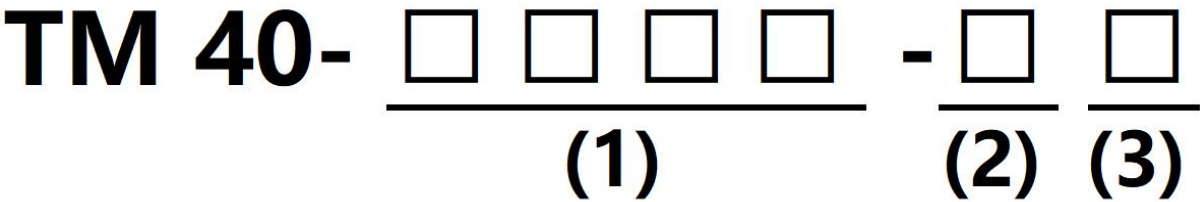
(2)

(3)

serial number	meaning	Options	illustrate
(1)	Number of terminal blocks	32	32 points
(2)	Input/Output Types	A	NPN type input/output
		B	PNP type input/output
(3)	Terminal block type	E	European-style terminal block

5.3.3 Cable naming rules

The terminal blocks and I/O connection cables for this product include TM40-XXXX-1, TM40-XXXX-1S, TM40-XXXX-2, and TM40-XXXX-2S, and the naming rules are as follows.



serial number	meaning	Options	illustrate
(1)	Cable length	0500~1500	Cable length range, unit mm
(2)	Cable function	1	adaptation: NPN type input PNP type output NPN type output
		2	PNP type input dedicated
(3)	Cable shielding	S	Shielded cables
		default	Unshielded cable

Note: The TM40-XXXX-2/TM40-XXXX-2S model cable is a PNP type input cable and cannot be used with other types of input/output.

5.3.4 Terminal block parameters

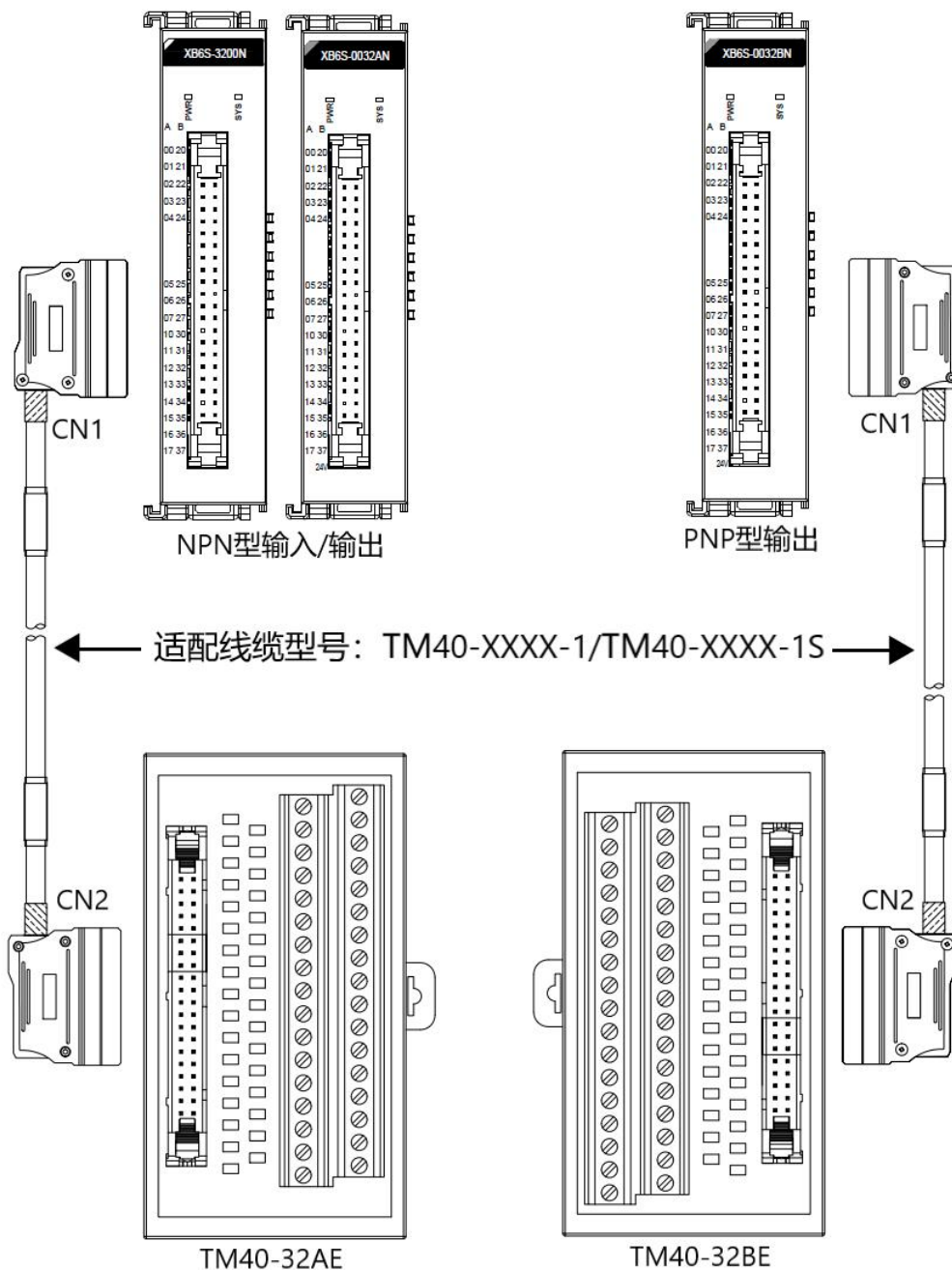
Technical Specifications	
Rated current	1A
Rated voltage	DC24V
Suitable for wires	1.5mm²/AWG16 and below

5.3.5 Cable parameters

Technical Specifications	
Line gauge	AWG28
Conductor composition	7/0.127
Conductor materials	soft copper wire
Insulating materials	PE
Core wire twisting	Stuffing, cotton thread, straps, paper bags
Exterior covered	PVC
Conductor impedance (20°C)	Less than 239Ω/Kn
Withstand voltage (in the air)	AC500V/min
Insulation resistance (20°C)	50MΩ/Kn or higher

5.3.6 Configuration rules

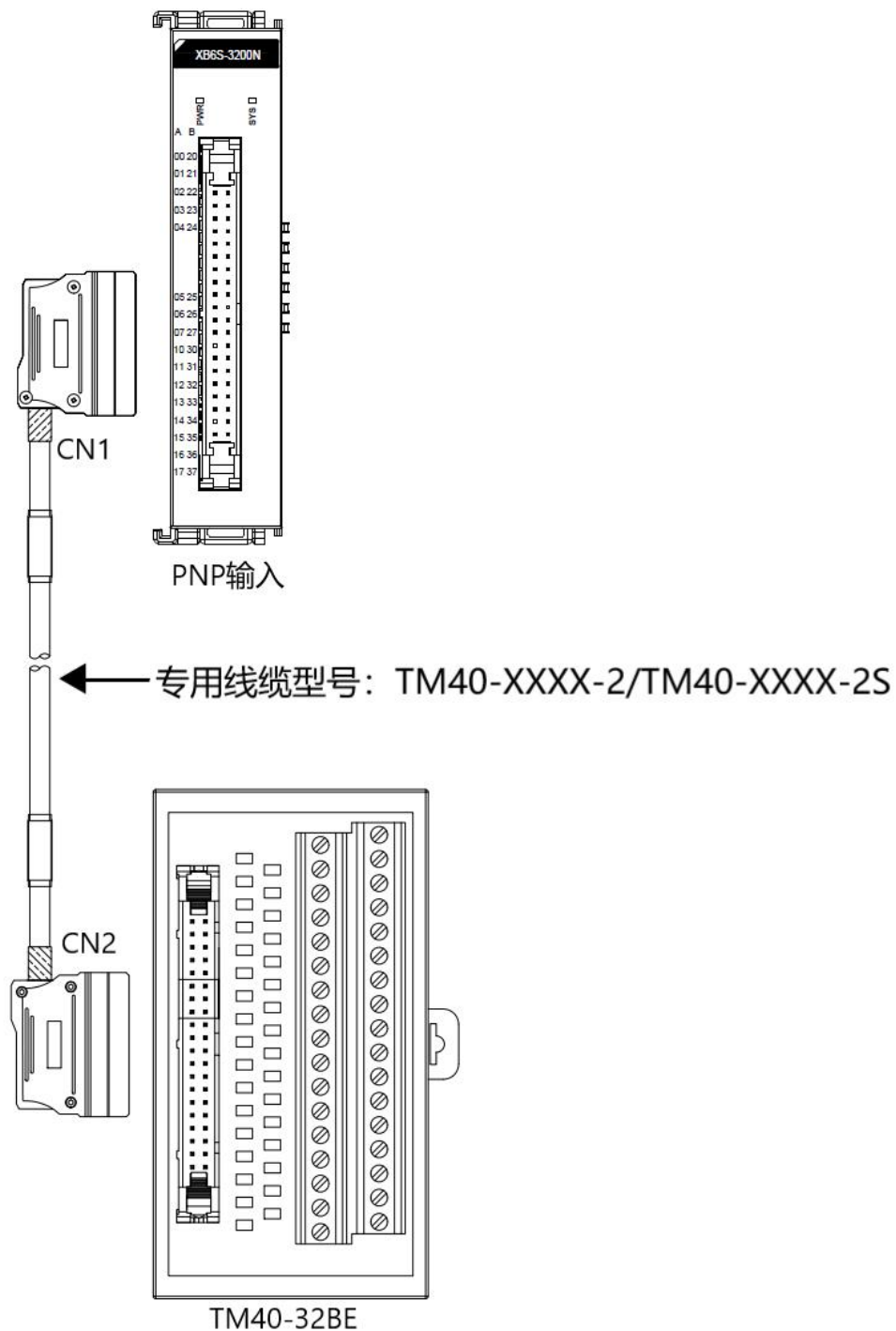
- Configuration examples for NPN type input, NPN type output, and PNP type output



The cable is marked CN1 and CN2 at both ends. The I/O side is connected to the CN1 end, and the terminal block side is connected to the CN2 end.

- Configuration example for PNP type input

When using the XB6S-3200N PNP type input, it must be used with a cable of type TM40-XXXX-2/TM40-XXXX-2S.



The cable is marked CN1 and CN2 at both ends. The I/O side is connected to the CN1 end, and the terminal block side is connected to the CN2 end.

6 Use

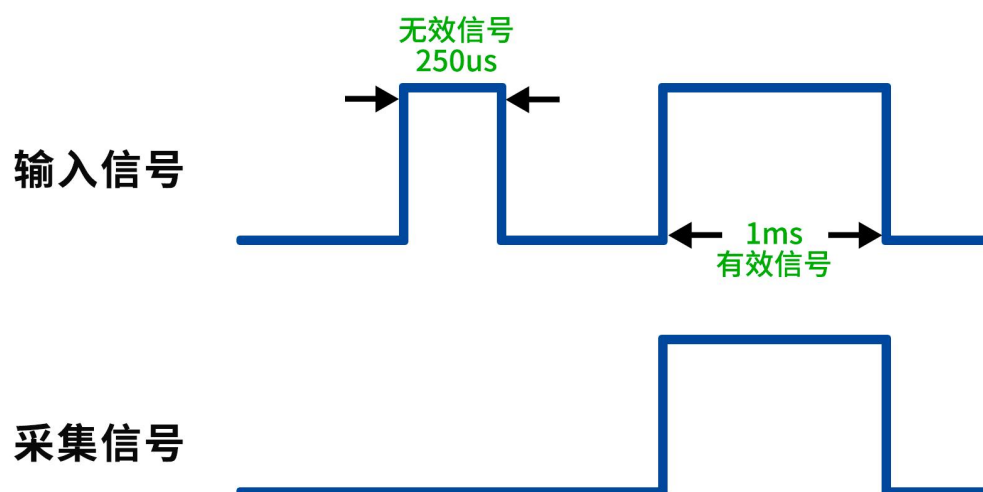
6.1 Parameter Description

6.1.1 Digital input filtering

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

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

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



6.1.2 Clear/Hold Digital output signal

The Clear/Hold function is for modules with output channels. This function configures the output mode of the output channels when the module is not in an OP state (stopped running/coupler network cable disconnected/X-bus offline). This parameter supports the following output states:

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

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

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

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

Clear and hold parameters of Digital output module				
Parameter name	Parameter meaning	Parameter values	Parameter value meaning	default value
TemplateMode	Template mode	1	Preset Low clears the output, i.e., outputs 0.	1
		2	Preset High outputs a valid value, i.e., 1.	
		3	Keep Mode retains the previous output value.	
Channel x	Single-channel mode settings	0	Template Value is the template mode value, meaning single-channel mode is not enabled.	0
		1	Preset Low clears the output, i.e., outputs 0.	
		2	Preset High outputs a valid value, i.e., 1.	
		3	Keep Mode retains the previous output value.	

6.1.3 Analog range settings

The Range Select setting is used to set the range of analog signals. Each channel can be configured individually (see details for range settings).[3.3.4](#) and [3.3.5 Analog Parameters](#)).

6.1.4 Analog input filtering

● Analog input filtering function

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

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

● Filtering function configuration

Each channel can be configured individually, with a configuration range of 1 to 200, and a default of 10 times.

6.1.5 Analog output signal clear/hold

The Clear/Hold function is for modules with output channels. This function configures the output mode of the output channels when the module is not in an OP state (stopped running/coupler network cable disconnected/X-bus offline). This parameter supports the following output states:

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

Maintain output: The module's output channel continues to output even when communication is interrupted.

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

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

Analog output module clear hold parameters				
Parameter name	Parameter meaning	Parameter values	Parameter value meaning	default value
TemplateMode	Template mode	0	Clear all channels and output.	0
		1	Hold all channels to maintain output.	
		2	Preset all channel output preset values	
TemplateValue Chx	Single channel clear/keep configuration	0	Template Value is the template mode value, meaning single-channel mode is not enabled.	0
		1	Clear single-channel output.	
		2	Hold single channel to maintain output.	
		3	Preset Single Channel Output Preset Value	
Preset Value Chx	Single channel preset value	Code value range	Output code value corresponding to current/voltage value (Corresponding range code value table)	0

Note: When the overall module setting (template mode) is configured to 2, that is, when the full channel output preset value is effective, the preset value is based on the preset code value of channel 0 in the single channel preset value, and the full channel output is performed.

6.1.6 Analog signal power-off retention

The analog parameters support the function of saving all configuration parameters of the module when communication is interrupted due to abnormal power failure. Analog modules all support power failure saving by default.

6.1.7 Coupler parameters

6.1.7.1 IO communication exception configuration function

IO communication exception configuration parameters The X-bus interaction state can be configured when a communication failure occurs in a certain IO module during operation. The parameter can be configured to the following three states:

Abnormal and not interactive(Default state): When a module encounters an error, X-bus will no longer exchange process data. The original interaction can be resumed after the module error disappears.

stop communication When a module malfunctions, X-bus stops interacting. Even after the malfunction disappears, communication will not resume. A power cycle is required to restore the original interaction.

Interactive exceptions When a module malfunctions, all modules following the malfunctioning module are considered offline. Normal modules preceding the malfunctioning module can interact normally with X-bus, and X-bus can monitor these modules normally. Once the malfunctioning module recovers, the original interaction (soft hot-swap function) can be restored.

This manual uses Sysmac Studio as an example to introduce the parameter configuration method of the XB6S-EC2002 coupler + I/O module combination. For detailed steps, please refer to [link/reference].[Parameter settings in section 6.3.1](#) After making the modifications, it is recommended to power on again.

6.2 Fault code information

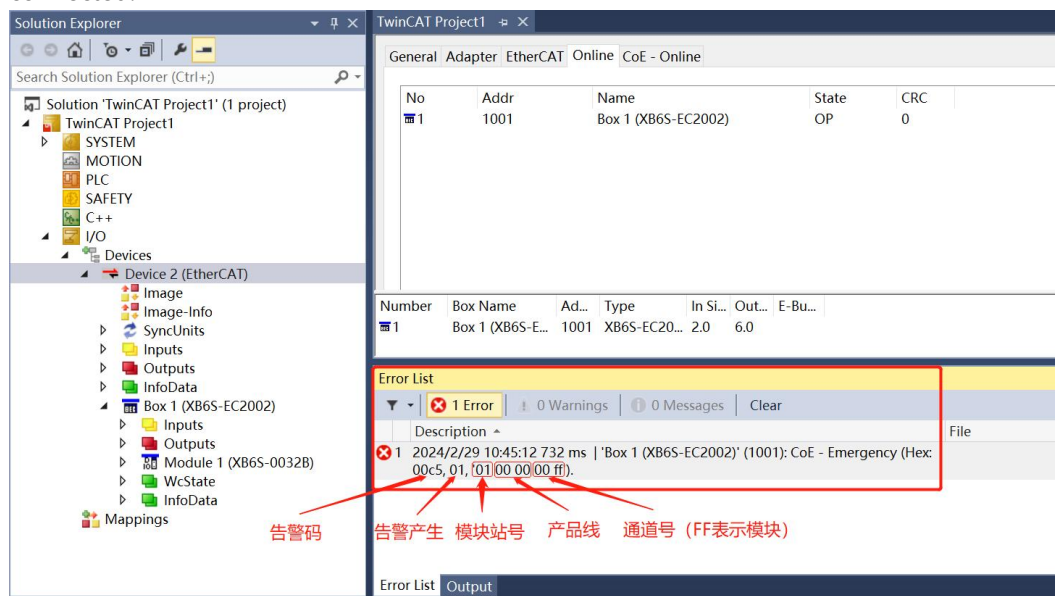
6.2.1 Coupler general fault codes

category	serial number	Error Type	Error code	Event Name	Event Code (2#)	Event code (10#)	Event code (16#)	processing method
General Error	2	Online upgrade error	1	Firmware upgrade error	000000010000001	129	0x0081	Try upgrading again, check for environmental interference, and check if the firmware is too large, etc.
			2	Firmware is incompatible with the current module model	0000000010000010	130	0x0082	Check if the files are correct, and if there are any abnormalities or interferences in the modules.
	3	Voltage error	5	Load-side voltage not connected	0000000011000101	197	0x00C5	Check if the on-site power supply is connected.
	6	Channel error	4	overflowing from the channel	0000000110000100	388	0x0184	Check whether the input signal of the corresponding channel exceeds the measurement range and whether the output signal exceeds the configurable range.
	7	Parameter error	0	Parameter setting error	0000000111000000	448	0x01C0	Check module parameter settings
	63	X-bus communication error	1	X-bus initialization failed.	0000111111000001	4033	0x0FC1	Check if the module connection is normal.
			2	X-bus token timed out	0000111111000010	4034	0x0FC2	Check if the module has any abnormalities or interference.
			3	X-bus module disconnected	0000111111000011	4035	0x0FC3	Check if the module is online or experiencing interference, etc.
			4	CRC error in parsing data	0000111111000100	4036	0x0FC4	Check if the module has any abnormalities or interference.
			5	The X-bus	000011111100	4037	0x0FC5	Upgrade module

				module does not support abnormal interactive functionality.	0101			software version or disable abnormal interactive functions
Analog	1	XB6S-A80TM	0	Disconnection	001000000100 0000	8256	0x2040	Check if the wiring of the corresponding channel is normal.
gateway	0	XB6S-C01SP	0	General parameter error	010100000000 0000	20480	0x5000	Check if any general parameters exceed parameter limits.
			1	Communication node parameter error	010100000000 0001	20481	0x5001	Check whether the communication node format and node settings are consistent with the communication mode and control mode.
			2	Process data error	010100000000 0010	20482	0x5002	After parameter configuration is complete and no other alarms are detected, the module will rescan after power-down and power-on.
			3	Modbus register mapping conflict	010100000000 0011	20483	0x5003	Compare the starting address and length settings of each Modbus write command for communication node parameter 1 to see if they overlap.
			4	Modbus node ID setting error	010100000000 0100	20484	0x5004	Check if the slave ID range of communication node parameter 2 is between 1 and 247.

6.2.2 Fault Code Viewing

Taking TwinCAT3 software as an example, view the alarm information below Error in the Error List window, as shown in the figure below. The alarm code is Hex: 00c5, which means voltage error. The voltage on the load side is not connected. You can check whether the power supply on the field side is connected.



The methods for viewing event information are 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
		For example, 0x01: Event generated. 0x00: Event disappears					For example, 0xFF: channel-level event. 0x00: Channel 0

6.3 EtherCAT coupler configuration application

6.3.1 Applications in the Sysmac Studio software environment

1、Preparation

- **Hardware environment**

- **Module preparation:** This guide uses the XB6S-EC2002+XB6S-1616B+XB6S-A80VD+XB6S-A08I topology as an example.
- **One computer, pre-installed with Sysmac Studio software.**
- **One Omron PLC**
This instruction uses model NJ301-1100 as an example.
- **EtherCAT dedicated shielded cable**
- **One switching power supply**
- **Device configuration file**

Configuration file retrieval

address:<https://www.solidotech.com/cn/resources/configuration-files>

- **Hardware configuration and wiring**

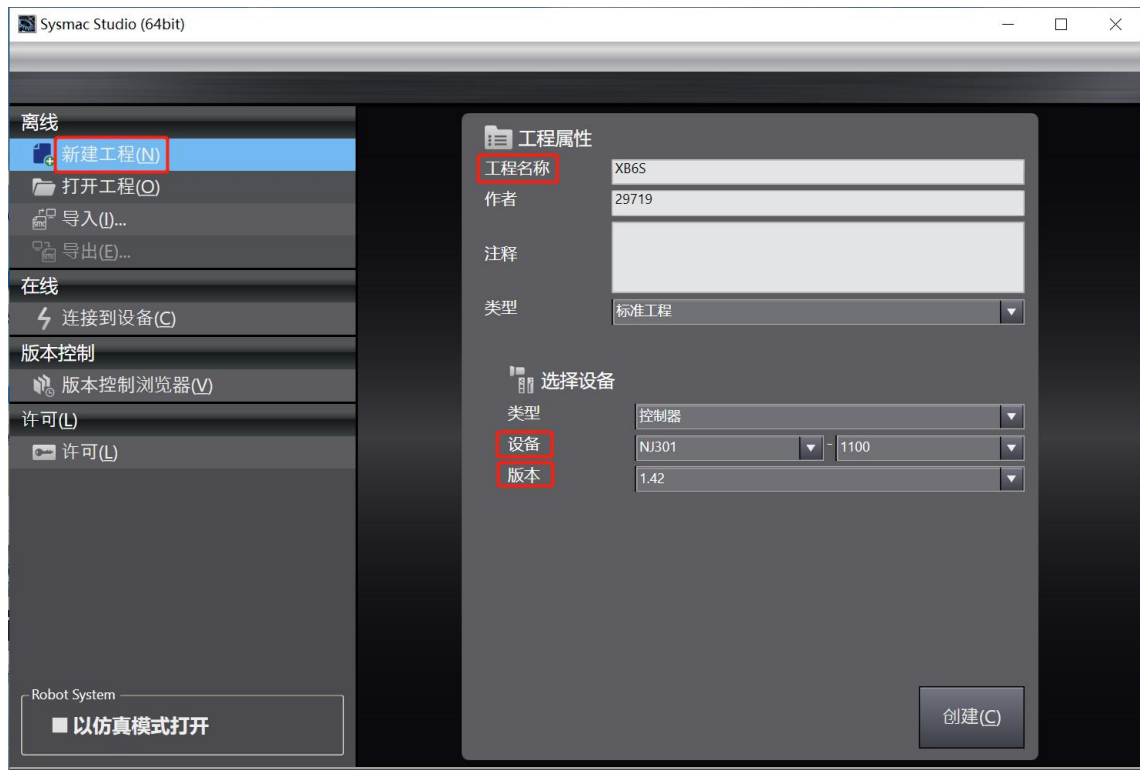
Please follow the instructions [4. Installation and Removal](#) and [5-wire connection](#) "Required Operation"

- **Computer IP Requirements**

Configure the computer's IP address and the PLC's IP address to ensure they are on the same network segment.

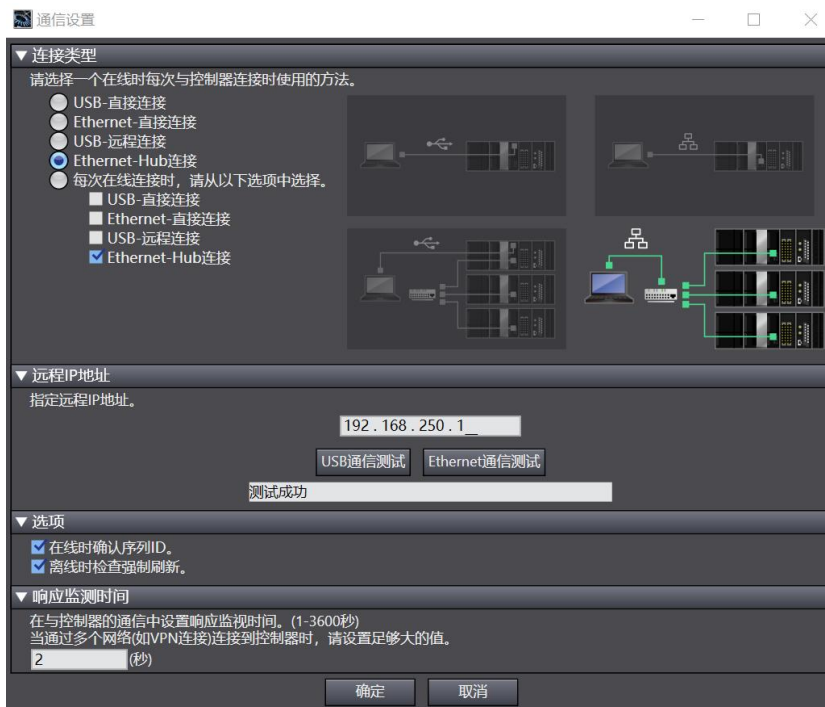
2、New construction projects

- a. Open Sysmac Studio and click "New Project".



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

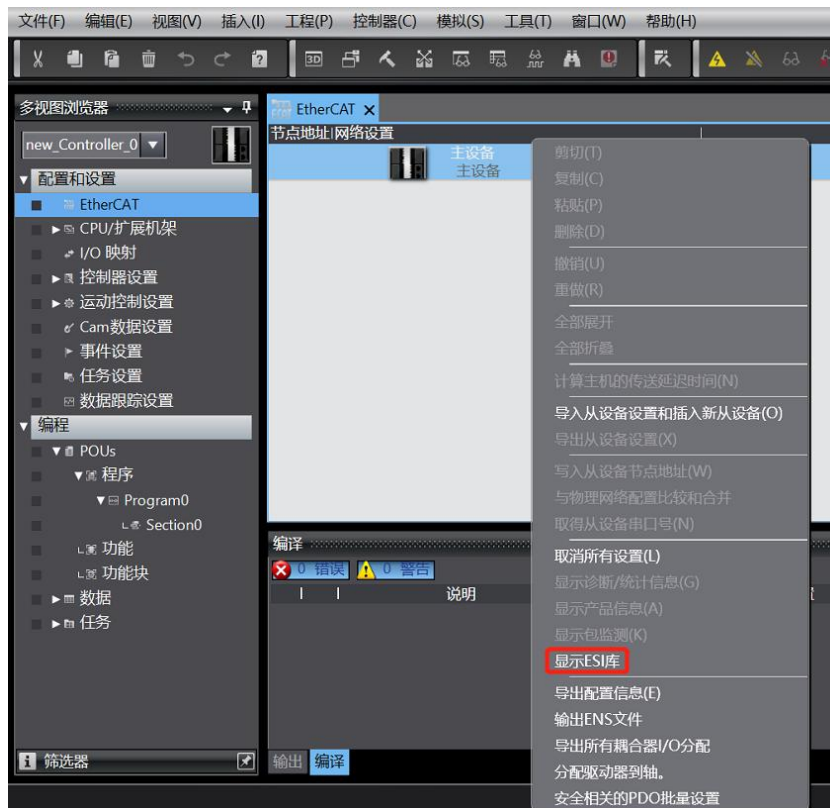
- b. After entering the project properties, click "Create".
- c. Click "Controller -> Communication Settings" in the menu bar, select the method to use each time you connect to the controller when online, and enter the "Remote IP Address", as shown in the figure below.



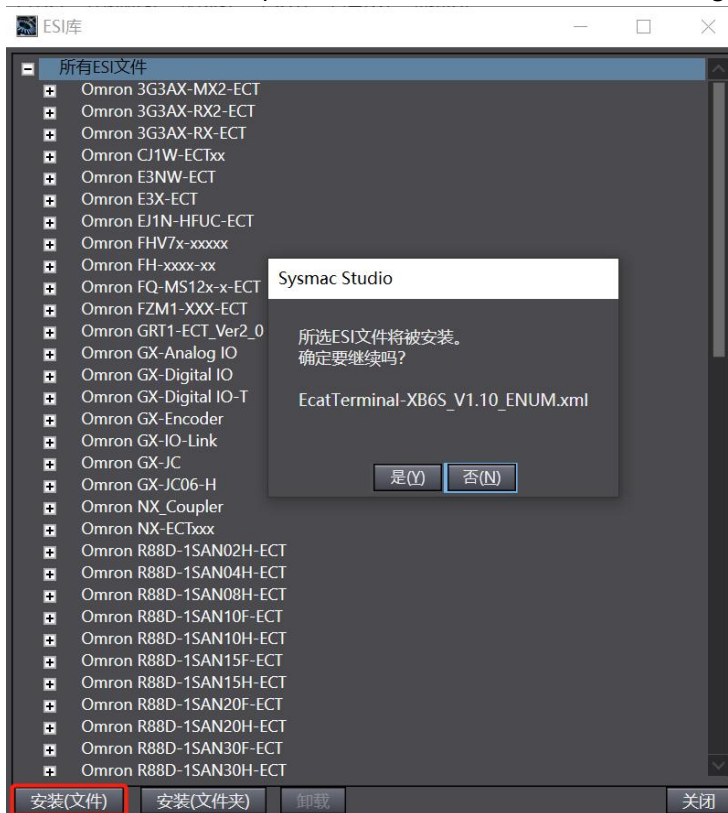
- d. Click "Ethernet Communication Test", and the system displays that the test was successful.

3、Install XML file

- a. Expand "Configuration and Settings" in the left navigation tree and double-click "EtherCAT".
- b. Right-click "Master Device" and select "Show ESI Libraries", as shown in the figure below.



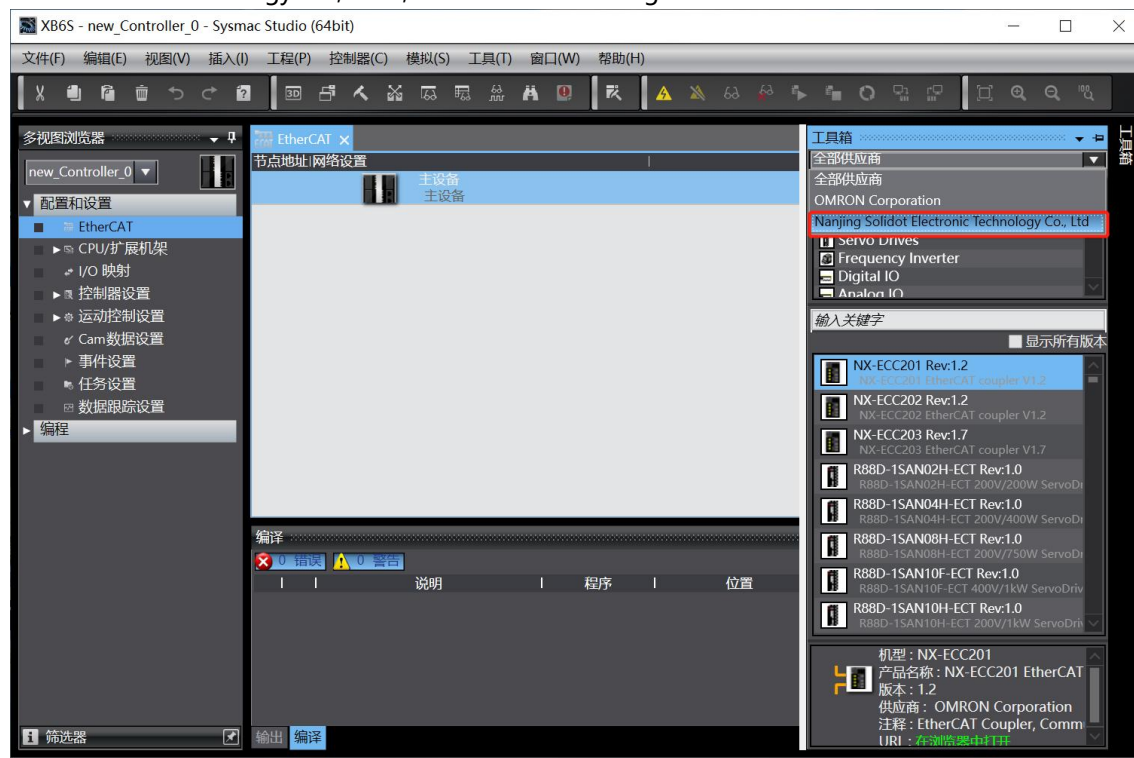
- c. In the pop-up "ESI Library" window, click "Install (File)", select the XML file path of the module, and click "Yes" to complete the installation, as shown in the figure below.



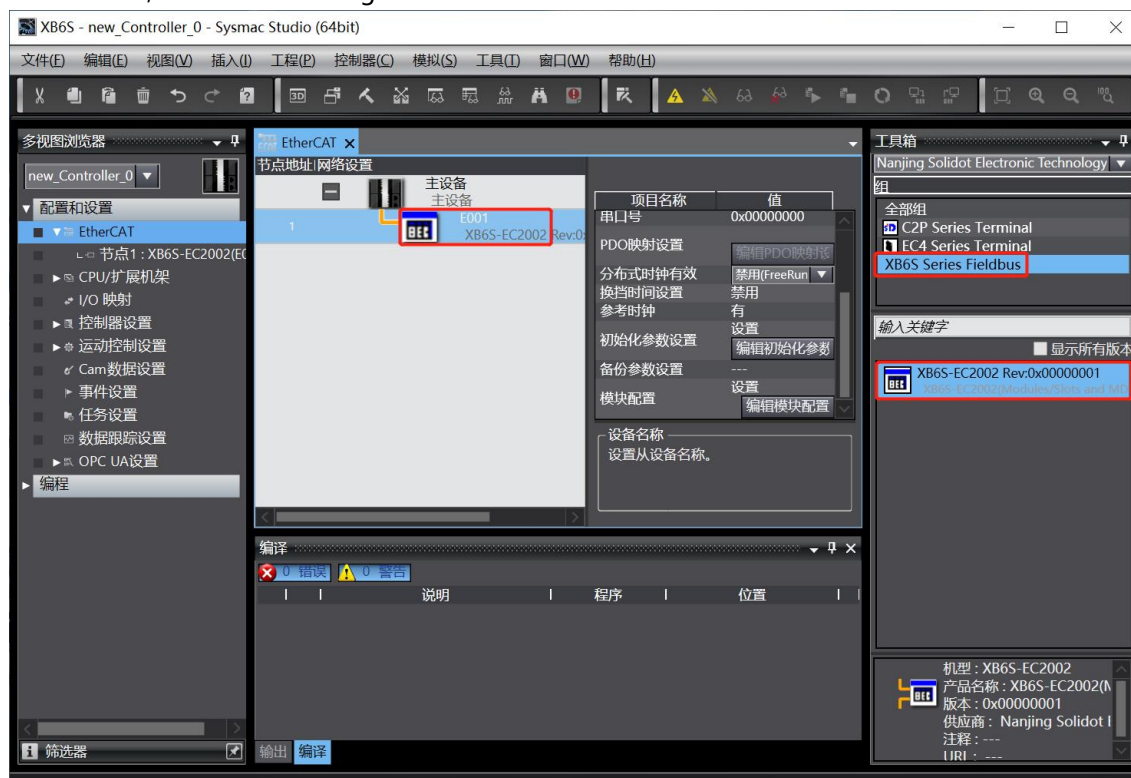
4. Add device

There are two ways to add a device: online scanning and offline addition. This guide will use offline addition as an example.

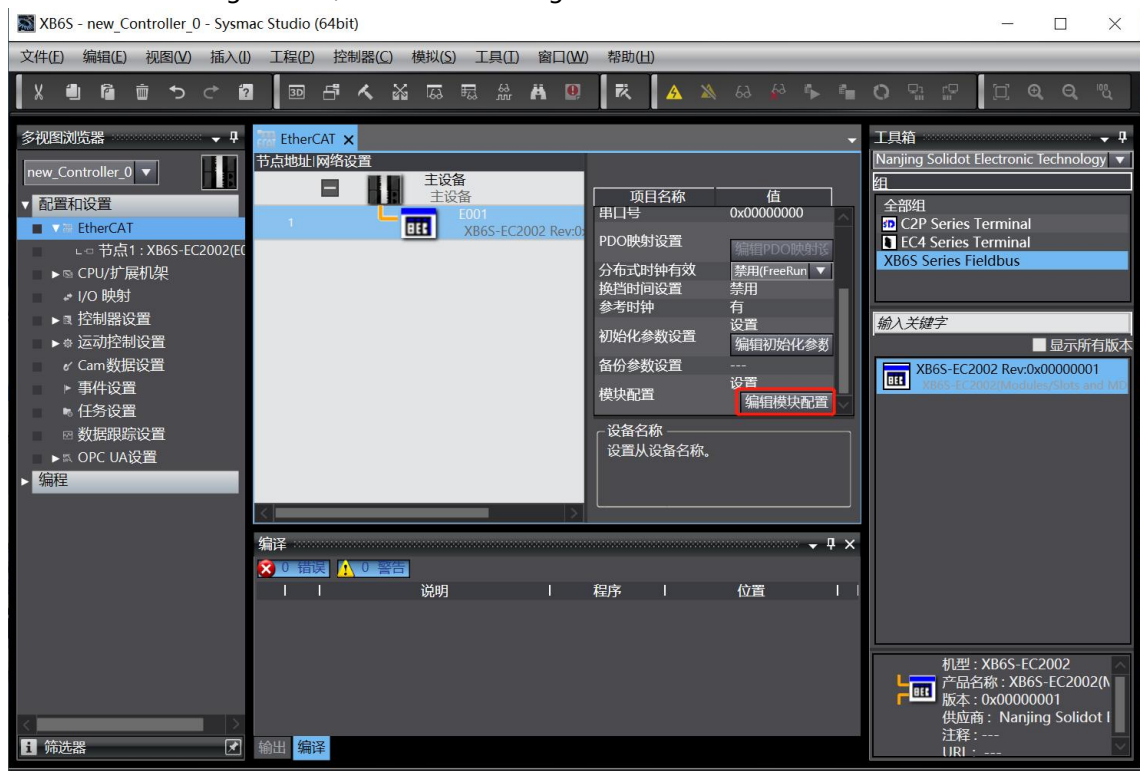
- a. In the "Toolbox" section on the right, click to expand all suppliers and select "Nanjing Solidot Electronic Technology Co., Ltd.", as shown in the image below



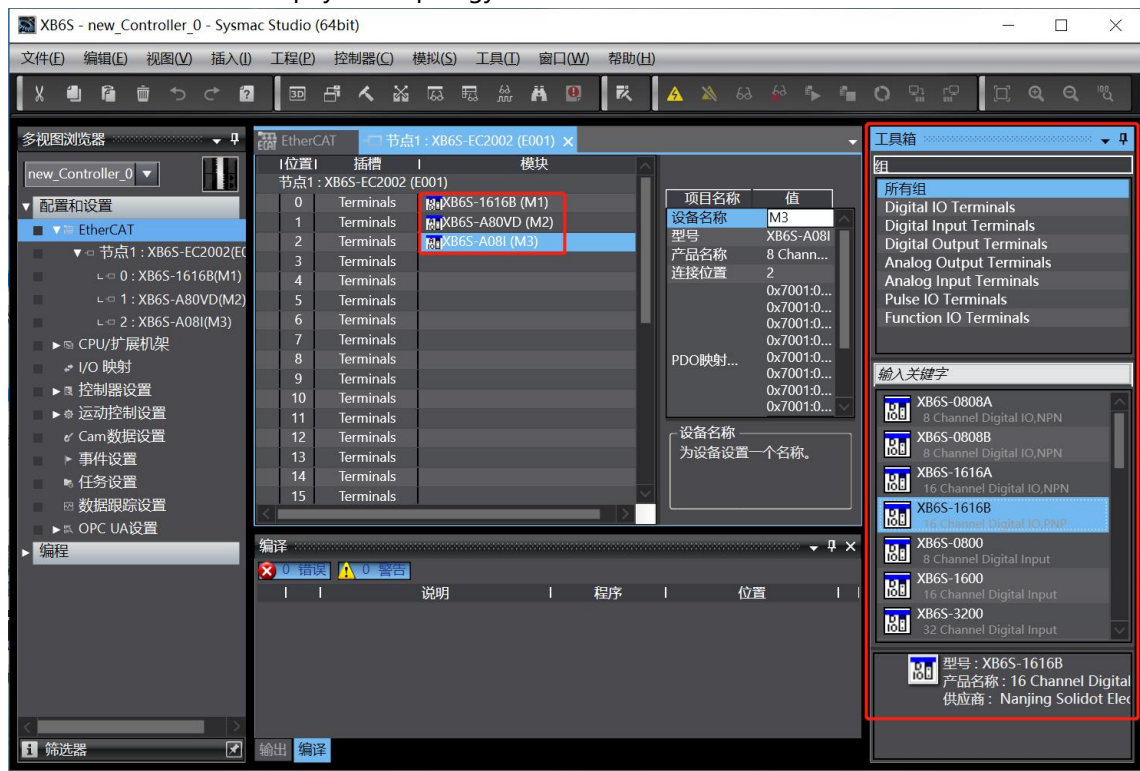
- b. Click to select XB6S Series Fieldbus, double-click the XB6S-EC2002 coupler module, and add a slave device, as shown in the figure below.



- c. On the EtherCAT main page, select the newly added XB6S-EC2002 coupler module and select "Edit Module Configuration", as shown in the figure below.

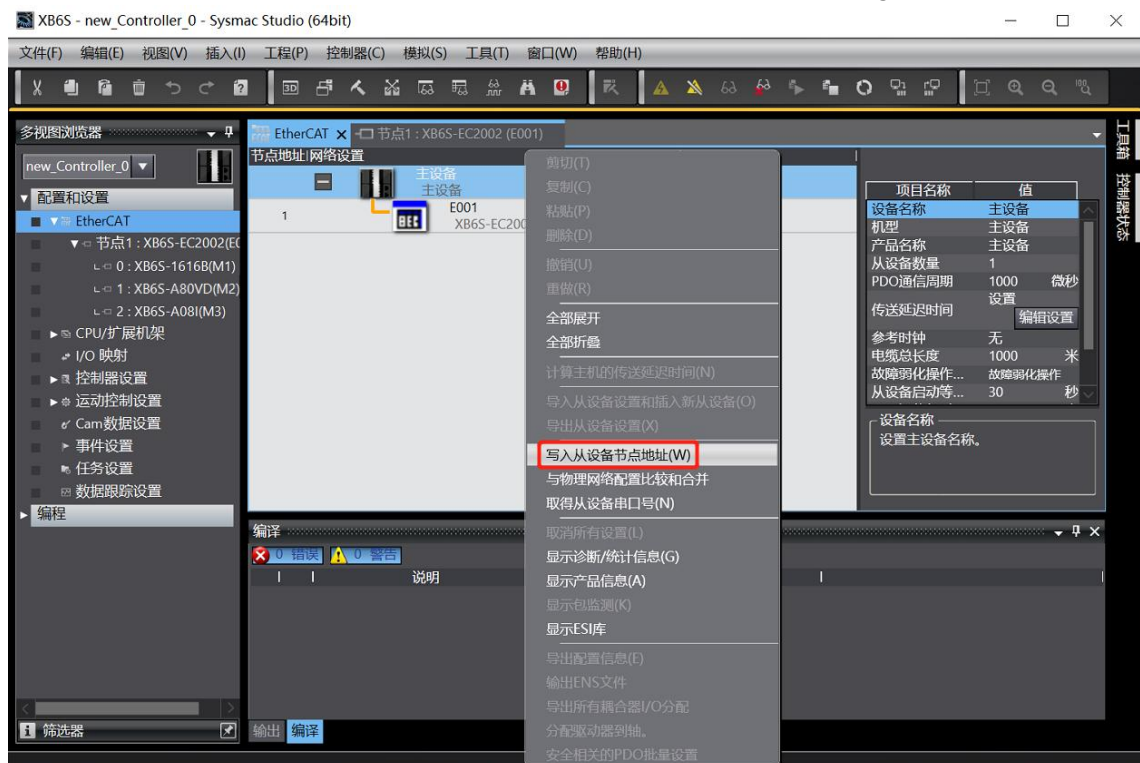


- d. Position the cursor in "Modules," then click on a module in the toolbox list on the right. Add I/O modules one by one, following the order of their configuration. Note: The order and model number must match the physical topology!

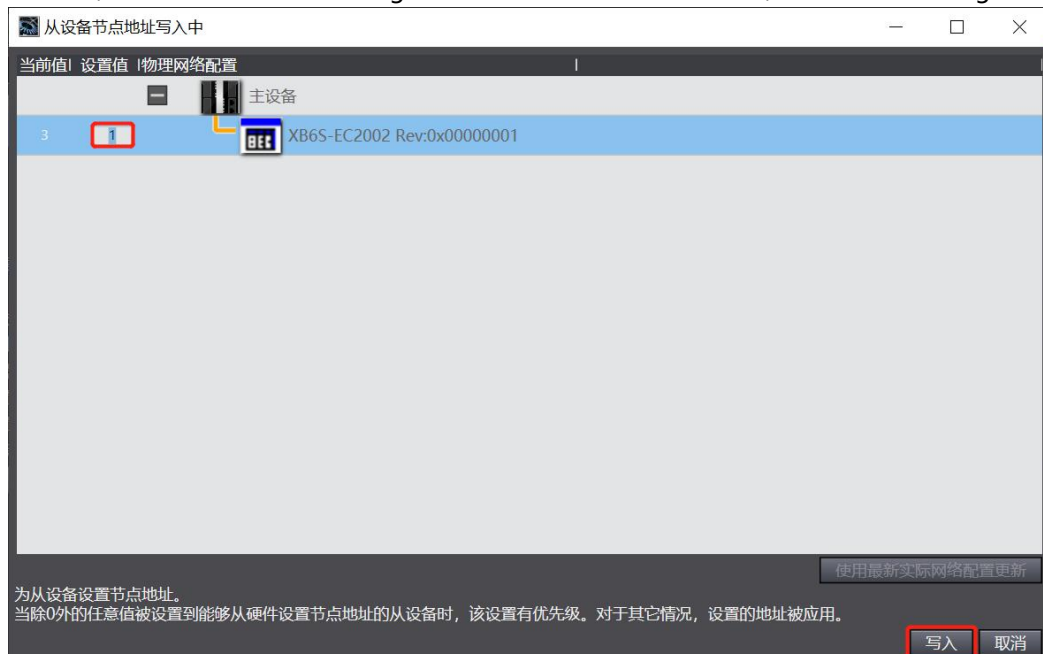


5. Set node address

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



- In the window for setting the node address, click the value under Setting Value, enter the node address, and click "Write" to change the slave device node address, as shown in the figure below.

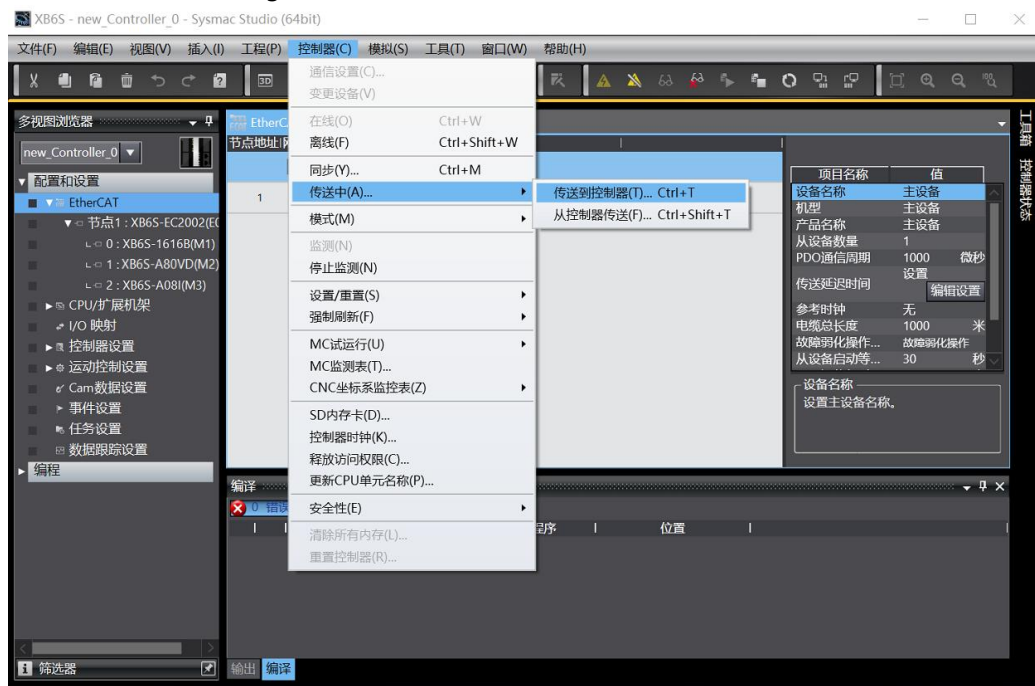


- After writing, a power-on prompt will appear as shown in the image below. Click "Write" and then restart the slave device power as prompted.

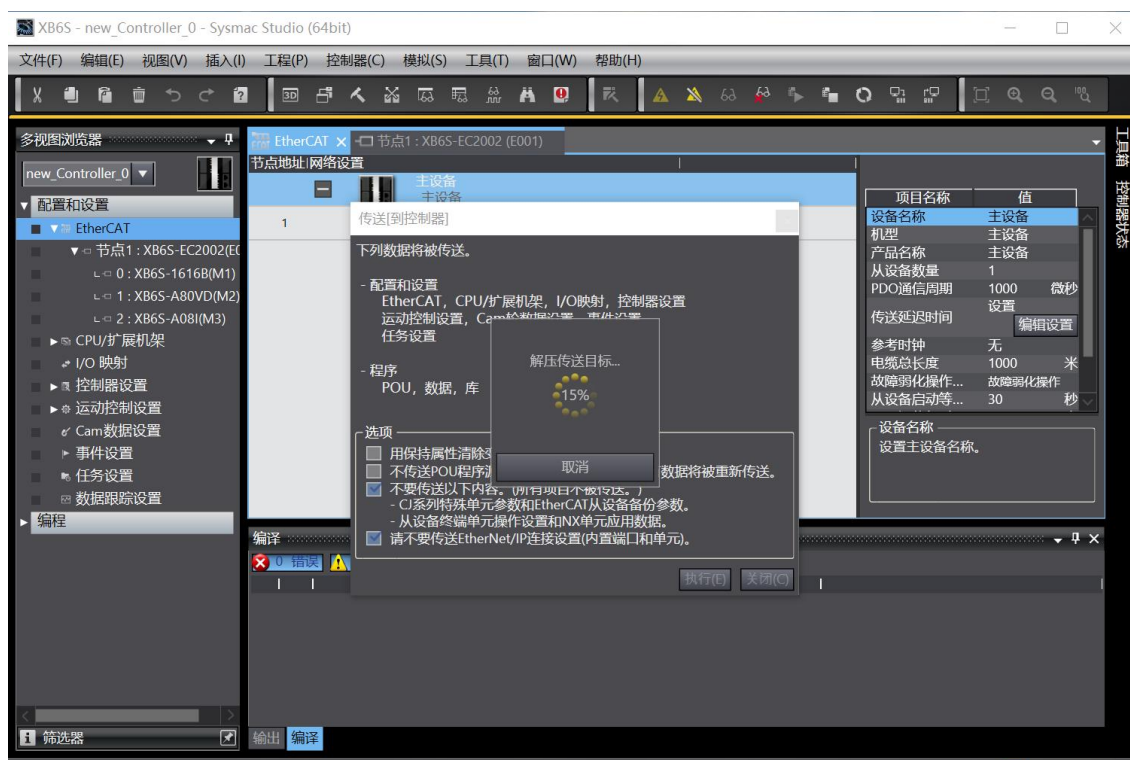


6. Download the configuration to the PLC

- Click the "Controller -> Transmitting (A) -> Transmitting to Controller (T)" button in the menu bar, as shown in the figure below.

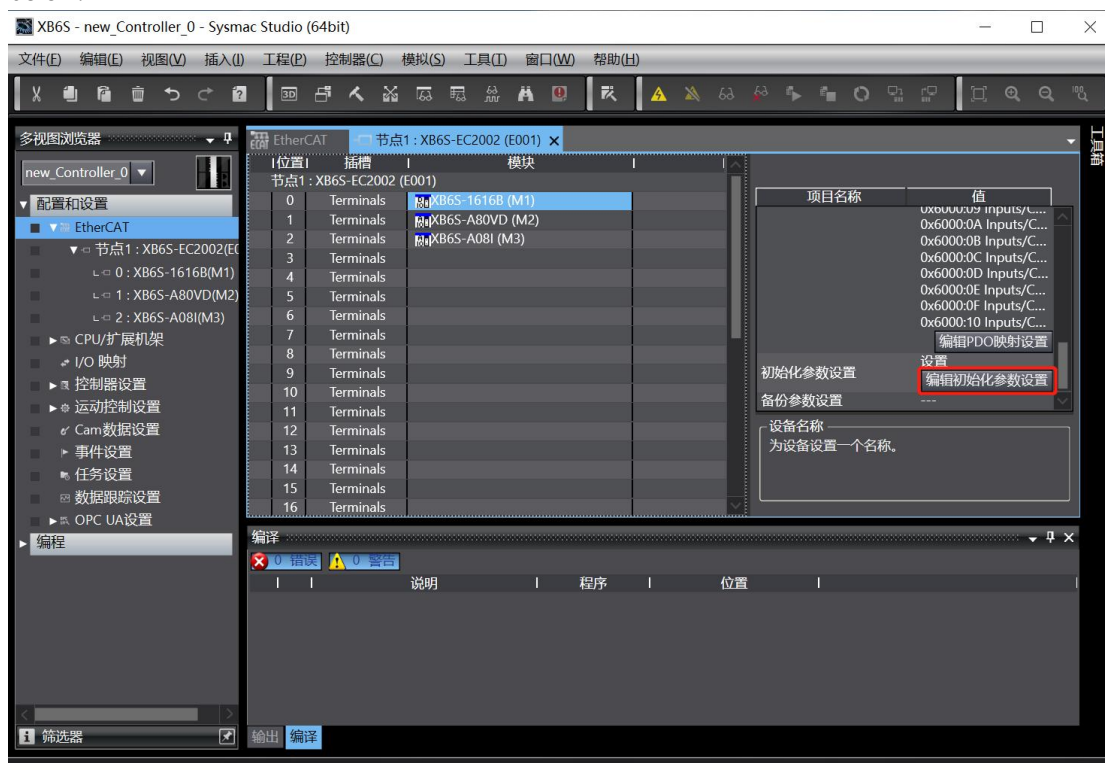


- Download the configuration to the PLC. A confirmation window will pop up. Click "Execute". In the subsequent pop-up windows, click "Yes/OK" in sequence, as shown in the figure below. After the download is complete, you need to power it on again.



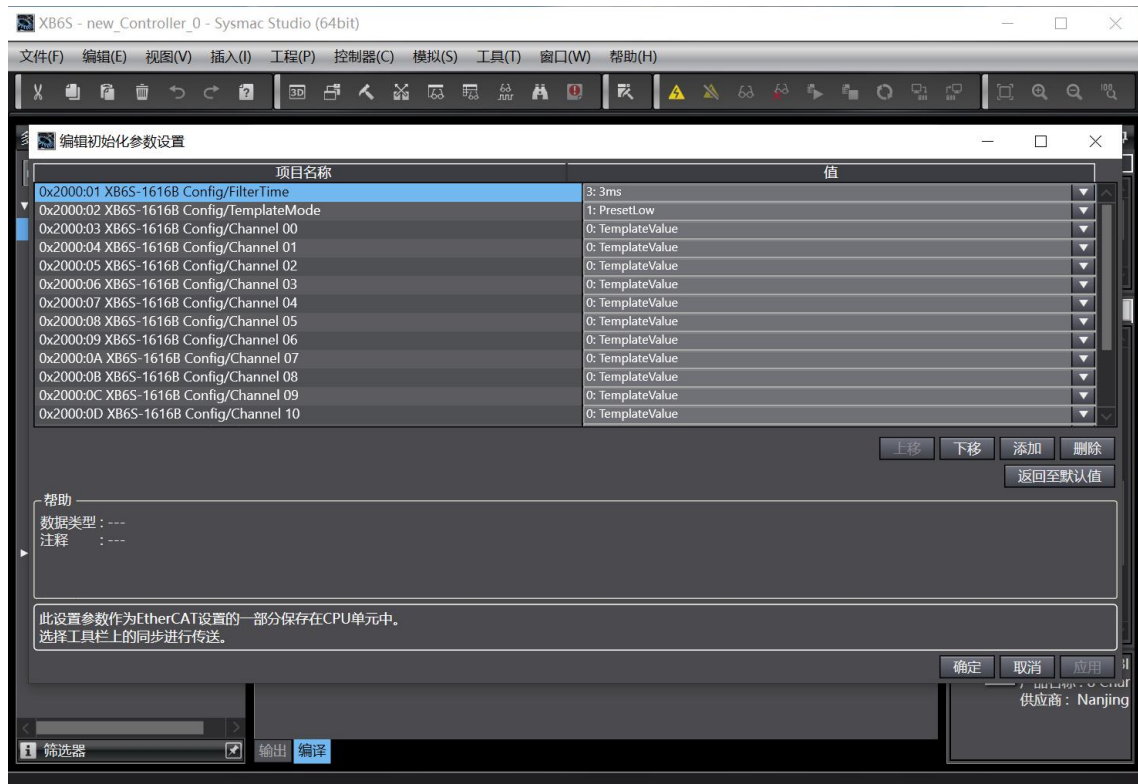
7、Parameter settings

- Switch the configuration to offline mode. On the module configuration page of node 1, select the XB6S-1616B module and click "Edit Initialization Parameter Settings", as shown in the figure below.

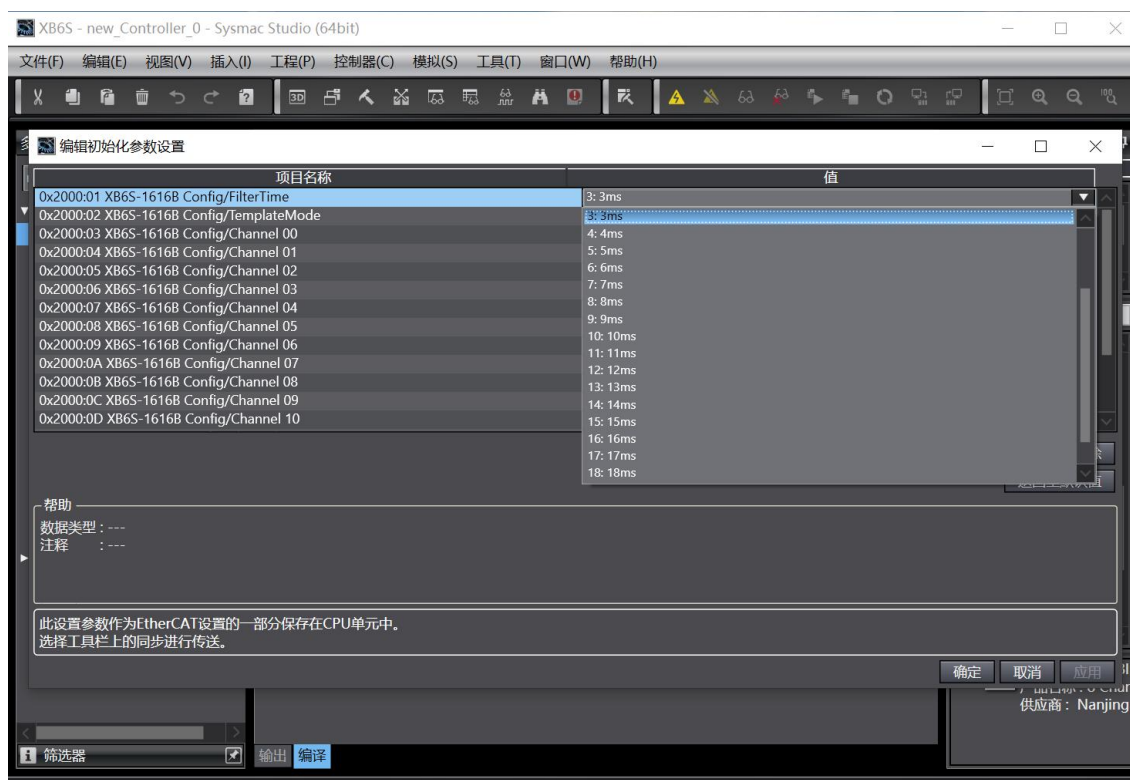


Note: If the PLC firmware version is too low, so the EC_CoESDOWrite and EC_CoESDORRead instructions are needed to write and read the SDO address.

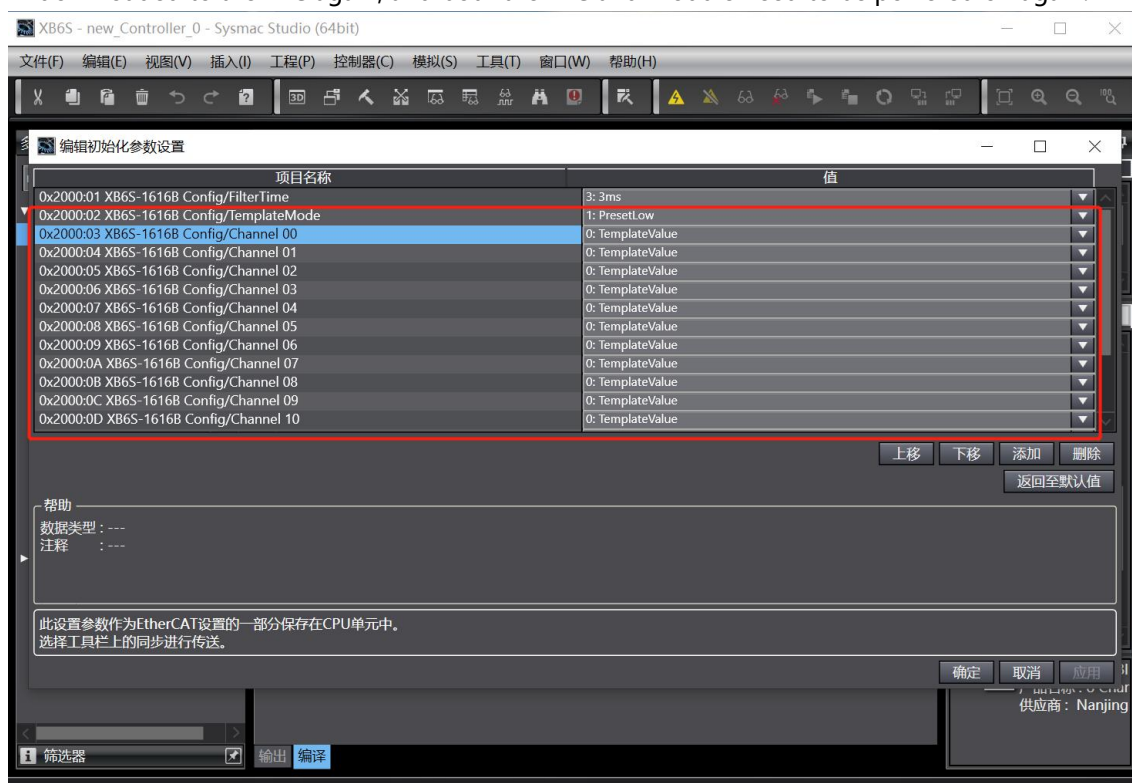
- b. existThe XB6S-1616B parameter settings page allows you to configure Digital input filtering and output signal clear/hold functions, as shown in the figure below.



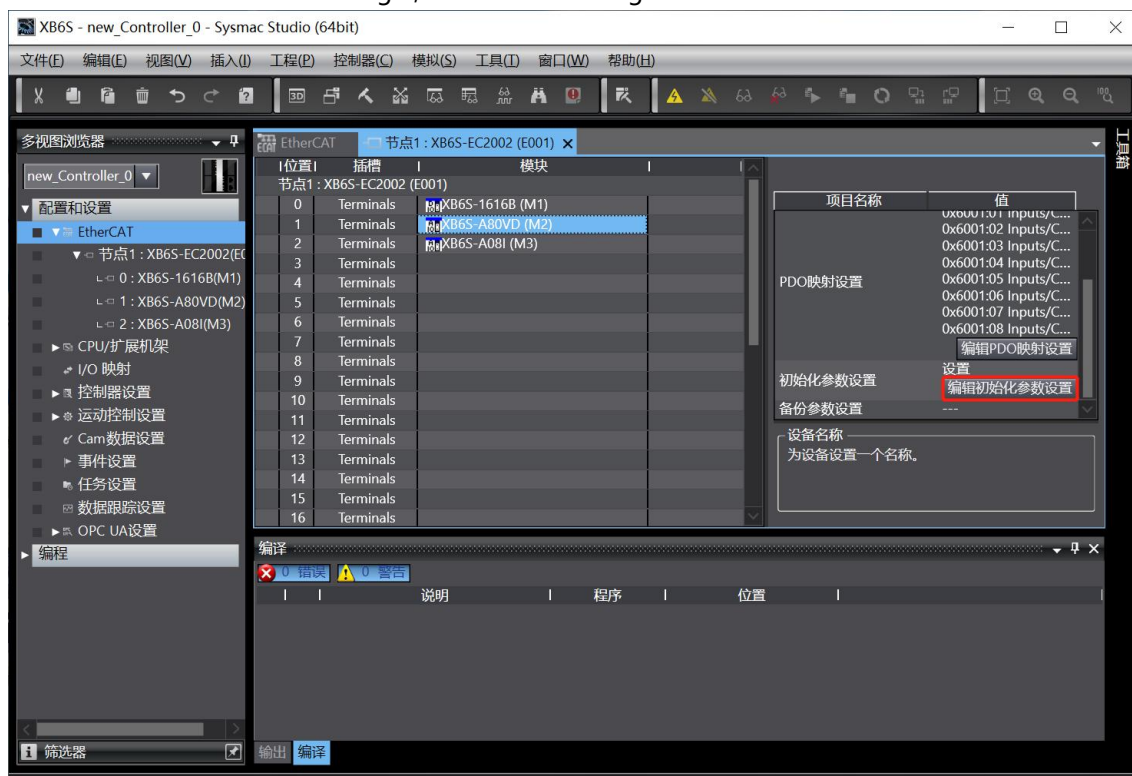
- c. The Digital input filtering time (FilterTime) can be set from 0 to 20ms. After configuration, click "Apply" and then "OK," as shown in the image below. After all parameters are configured, the program needs to be downloaded to the PLC again, and both the PLC and the module need to be powered on again.



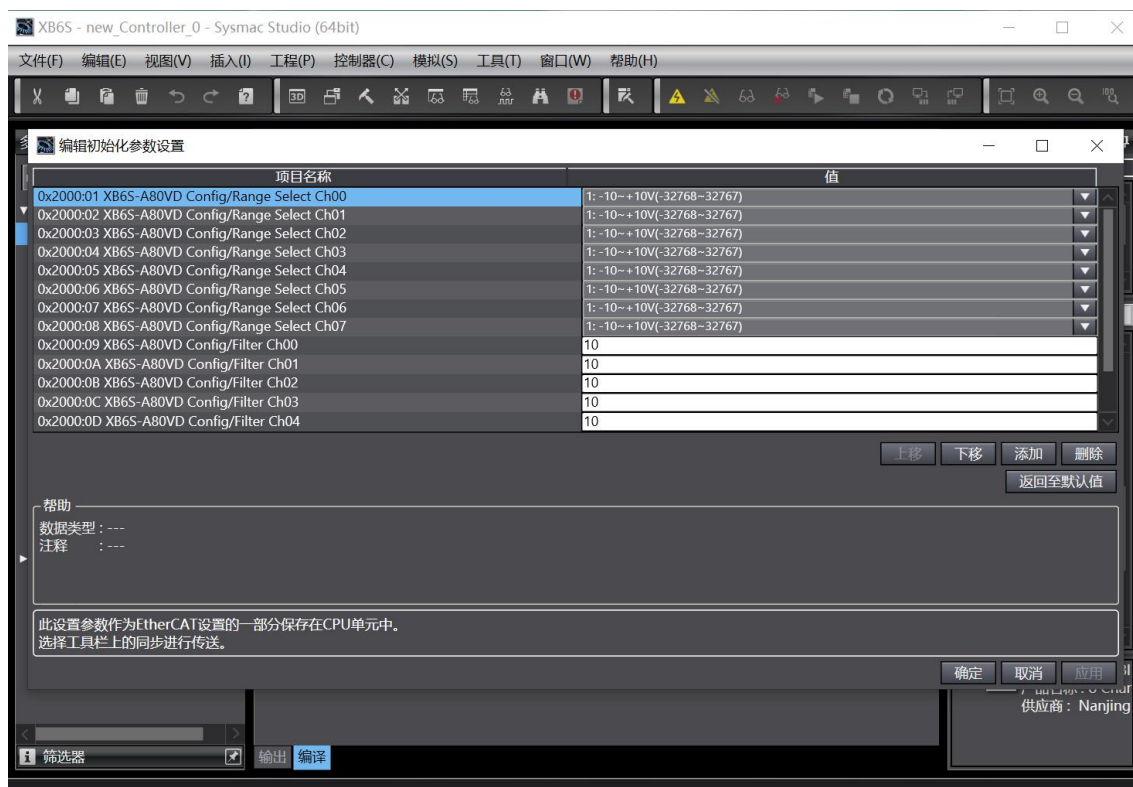
- d. The Digital output signal clear/hold function is preset to output clear mode for all channels by default. Module channels can be configured individually; see the corresponding relationship below. [6.1.2 Clearing/Holding Digital Output Signals](#) After configuration, click "Apply" and then "OK", as shown in the image below. After all parameters are configured, the program needs to be downloaded to the PLC again, and both the PLC and module need to be powered on again.



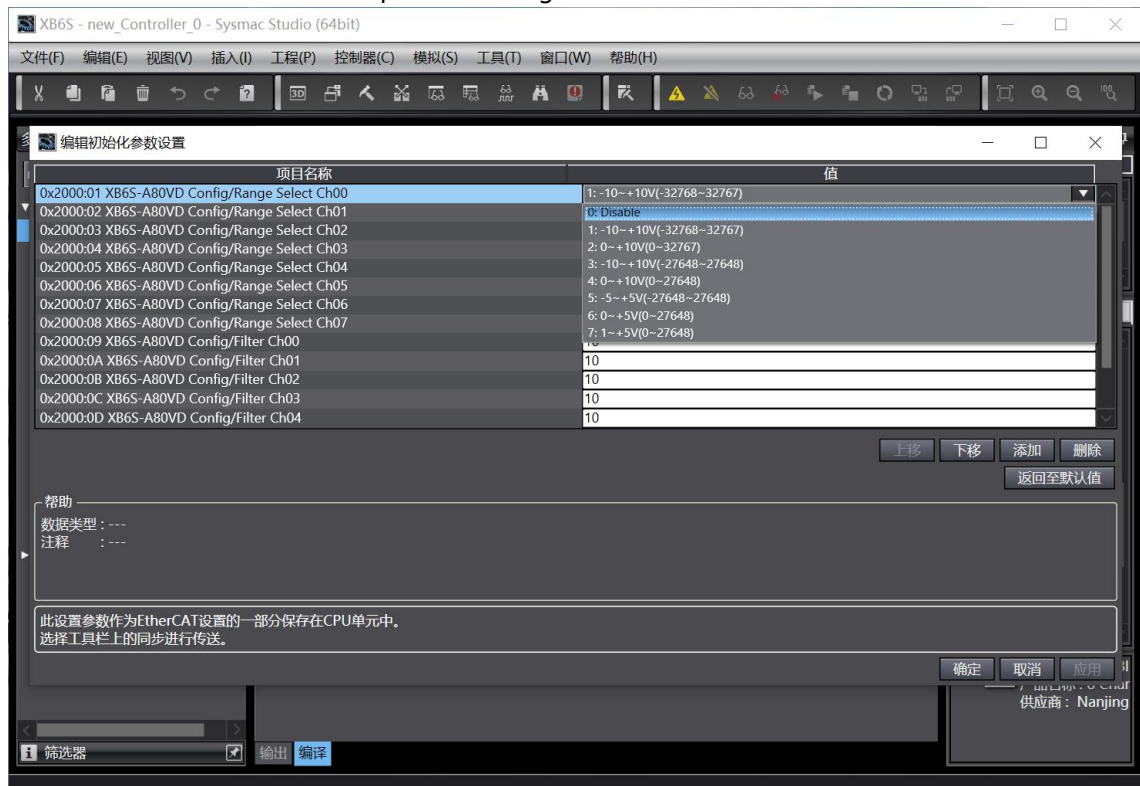
- e. On the module configuration page of node 1, select the XB6S-A80VD module and click "Edit Initialization Parameter Settings", as shown in the figure below.



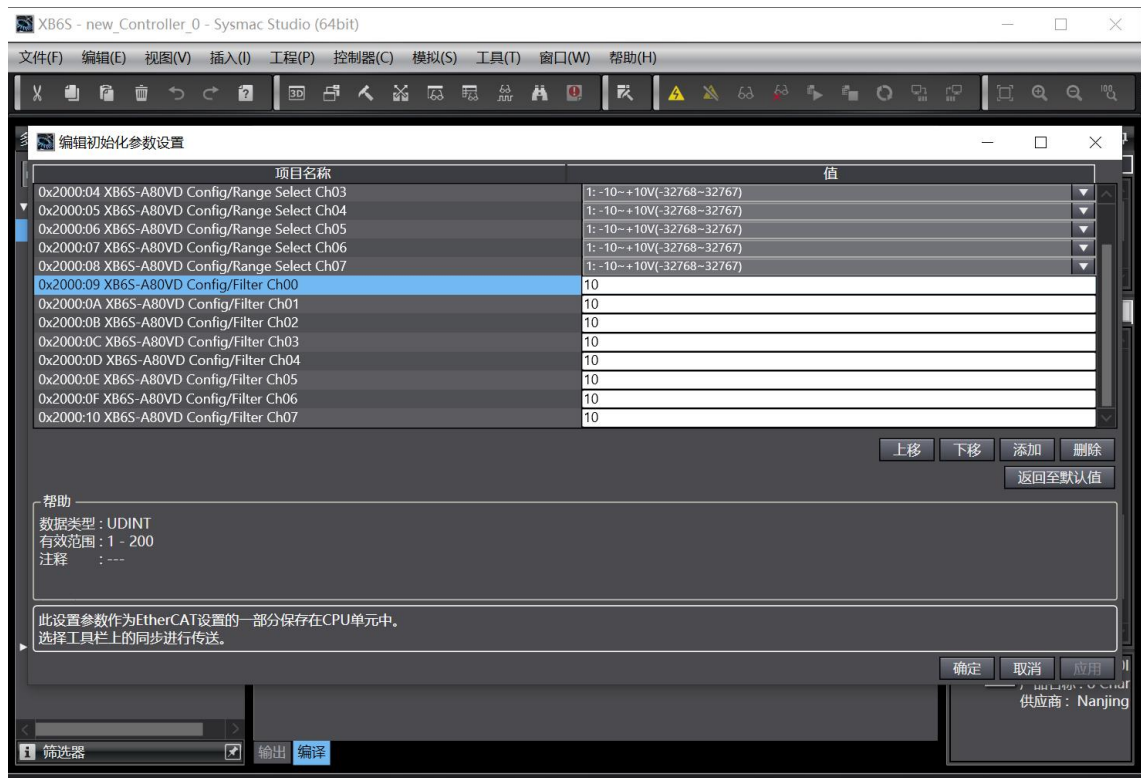
- f. On the parameter setting page of the XB6S-A80VD analog voltage input module, you can configure the analog voltage range and analog input filtering parameters, as shown in the figure below.



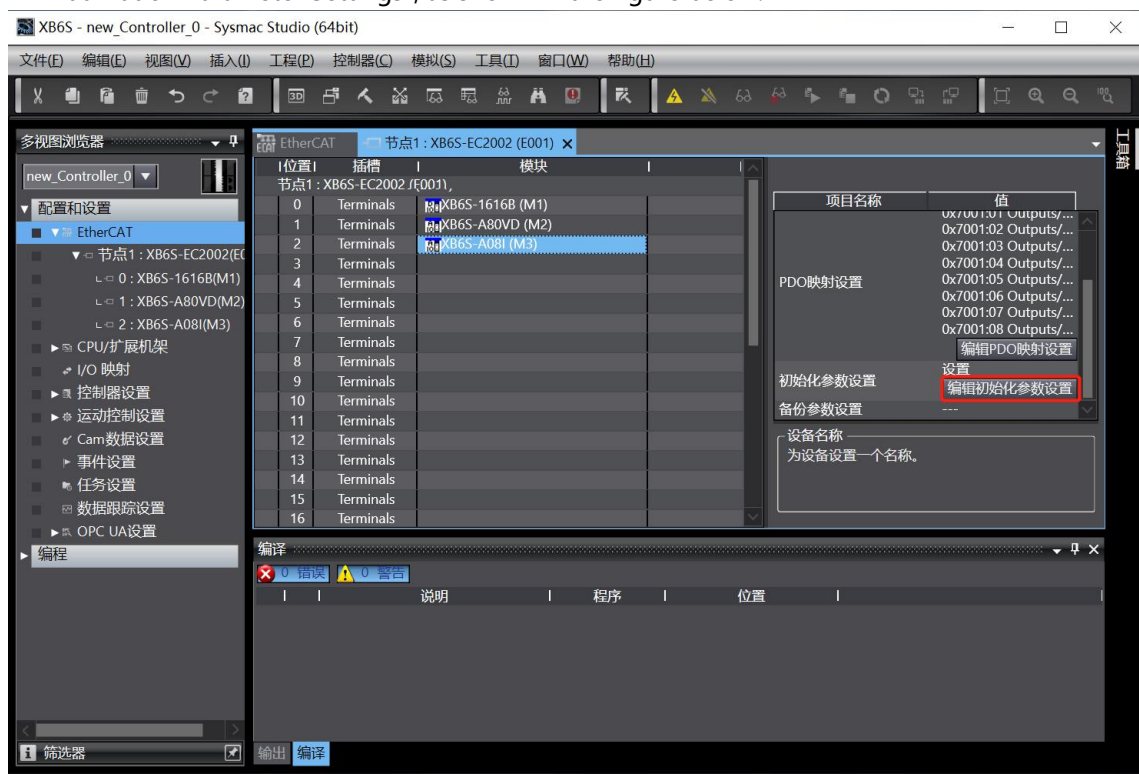
- g. The analog input voltage can be configured with 8 ranges, each channel can be configured independently. After configuration, click "Apply" and then "OK", as shown in the figure below. After all parameters are configured, the program needs to be downloaded to the PLC again, and the PLC and module need to be powered on again.



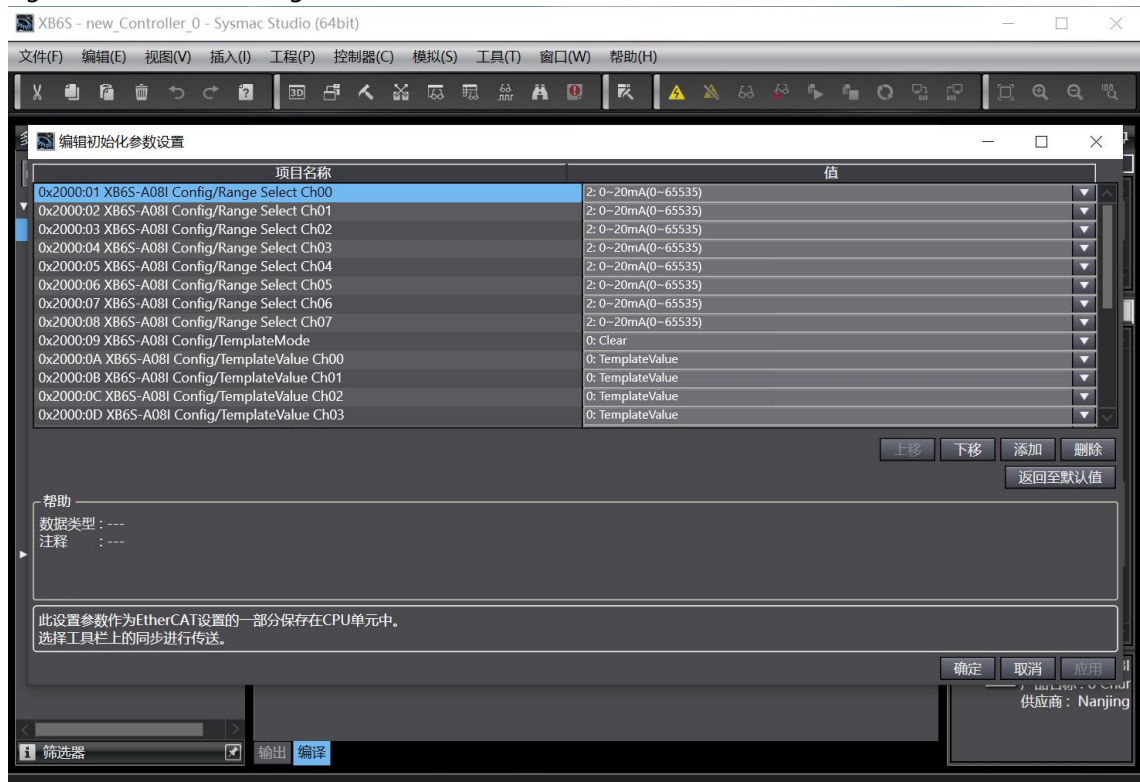
- h. The analog input filtering is configurable from 1 to 200, supporting independent configuration for each channel. After configuration, click "Apply" and then "OK," as shown in the figure below. After all parameters are configured, the program needs to be downloaded to the PLC again, and both the PLC and the module need to be powered on again.



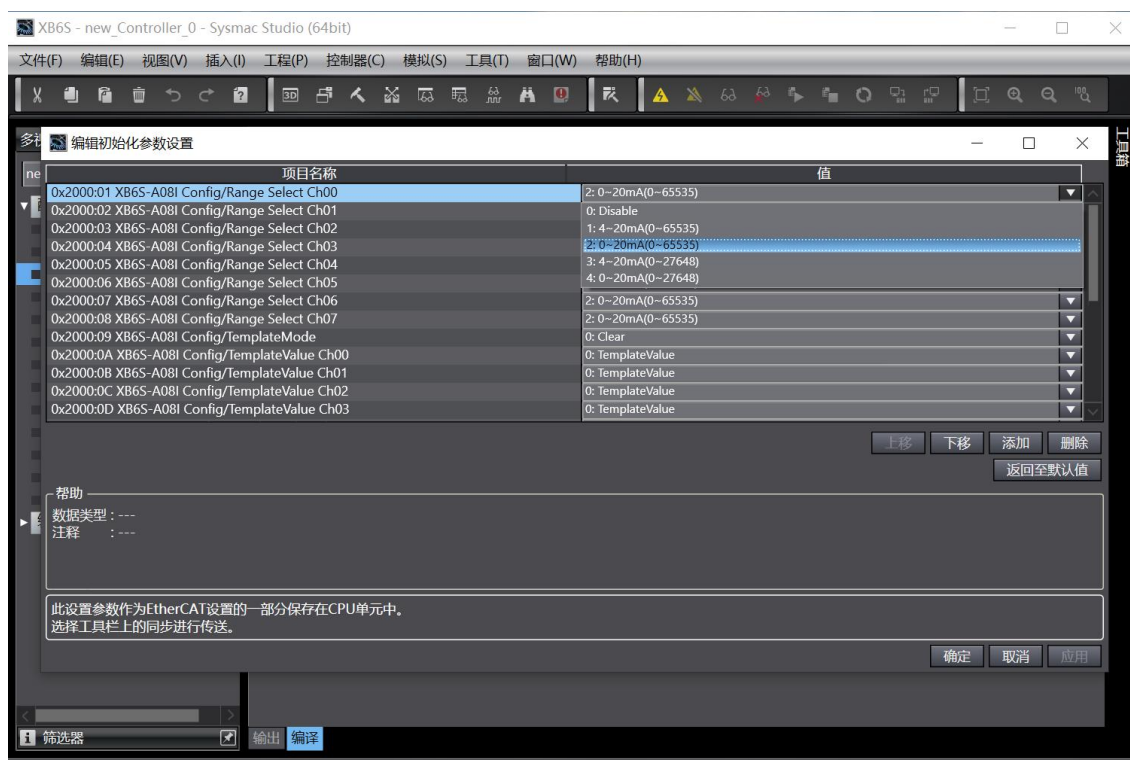
- i. On the module configuration page of node 1, select the XB6S-A08I module and click "Edit Initialization Parameter Settings", as shown in the figure below.



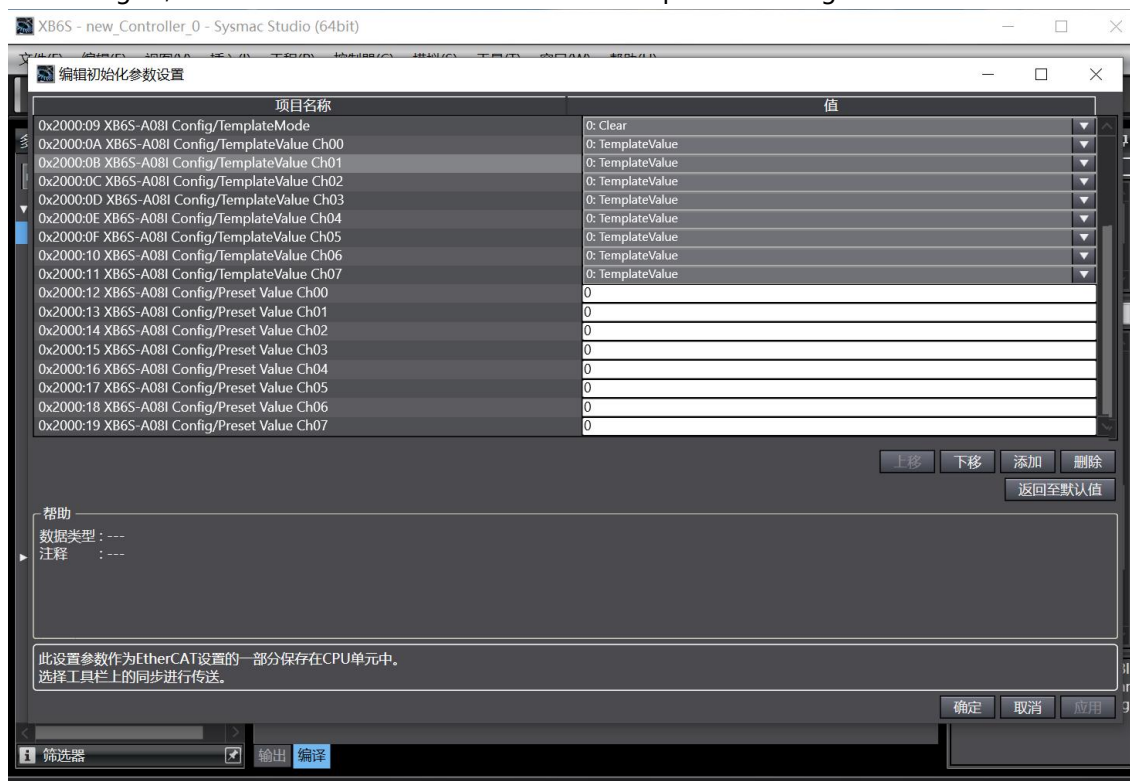
- j. On the parameter setting page of the XB6S-A08I analog current output module, you can configure the analog current range and the parameters for clearing/holding the analog output signal, as shown in the figure below.



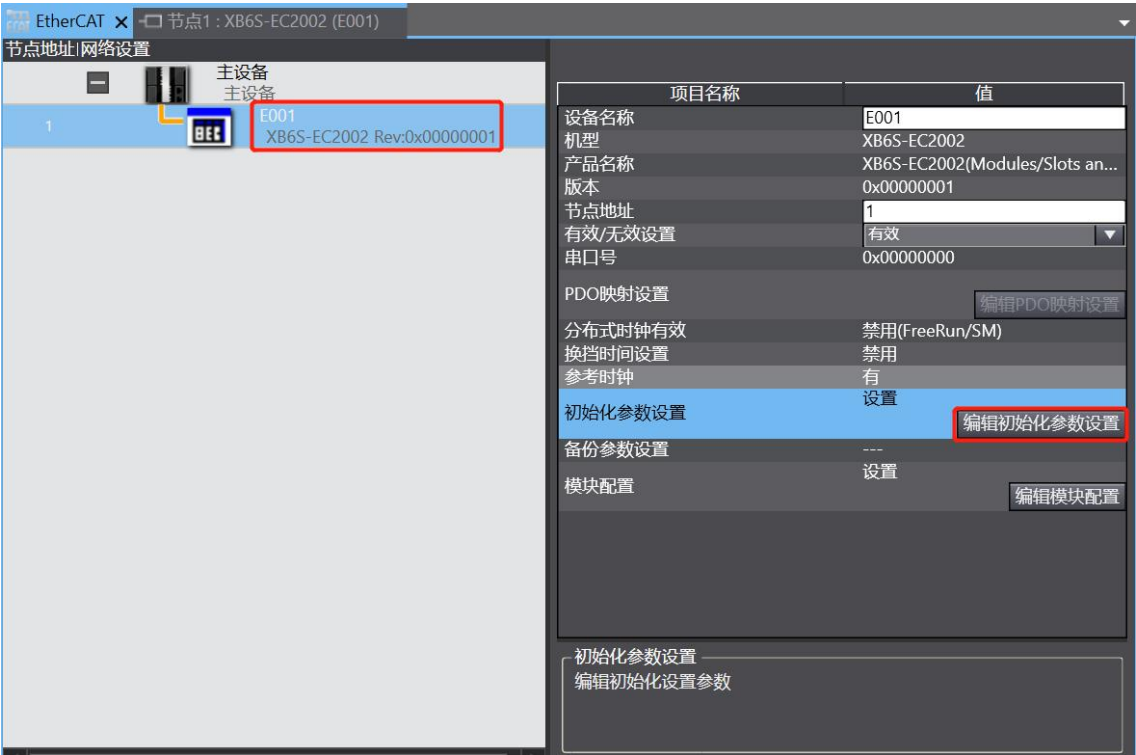
- k. The analog output current can be configured to five ranges, each channel can be configured independently. After configuration, click "Apply" and then "OK", as shown in the figure below. After all parameters are configured, the program needs to be downloaded to the PLC again, and the PLC and module need to be powered on again.



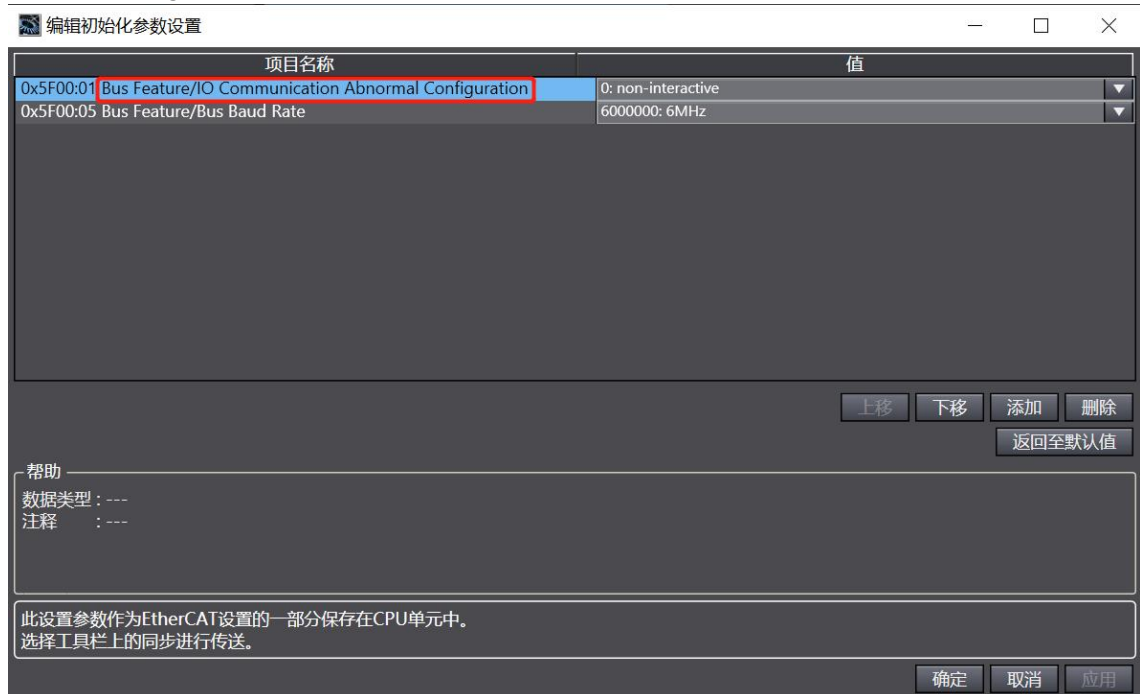
- I. Analog output signal clear/hold function. By default, all channels are in output clear mode. Module channels can be configured individually; see the corresponding relationship [6.1.5 Clear/Hold Analog Output Signal](#). After configuration, click "Apply" and then "OK", as shown in the image below. After all parameters are configured, the program needs to be downloaded to the PLC again, and both the PLC and module need to be powered on again.



- m. On the EtherCAT main page, click the Coupler module, then click "Edit Initialization Parameter Settings" to enter the Coupler Parameters page, as shown in the figure below.

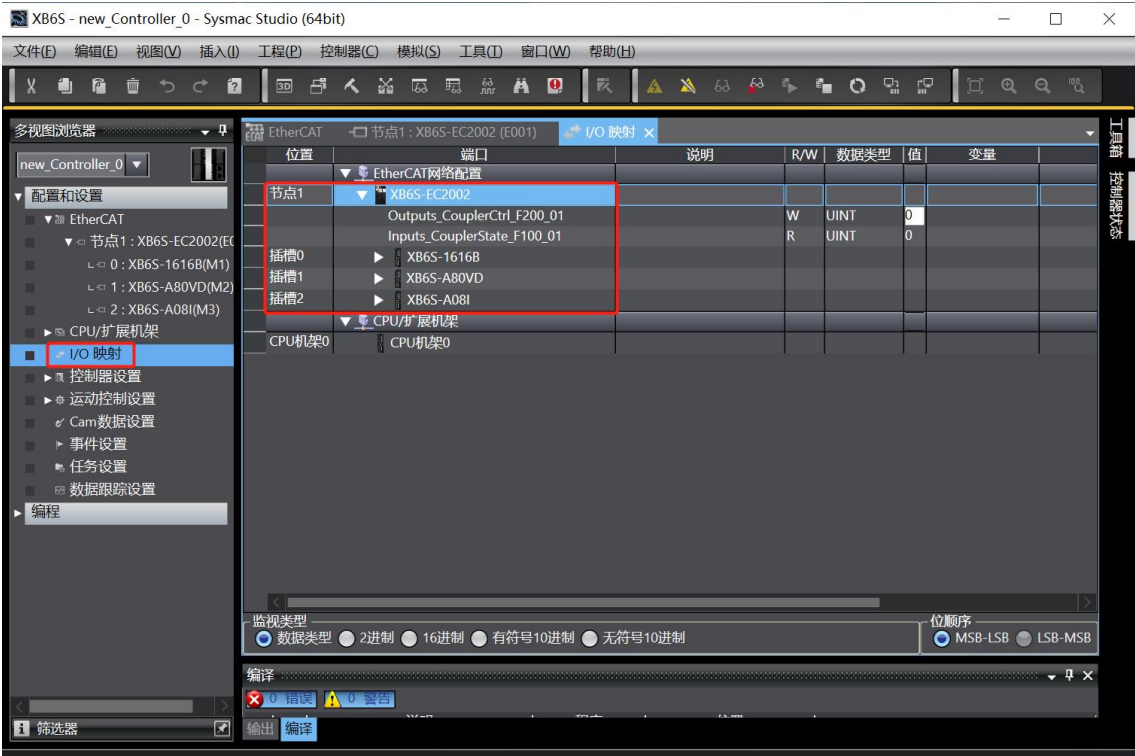


- n. On the coupler parameters page, you can view and set various coupler parameters, such as the IO communication exception configuration parameters, which can be configured according to actual usage needs, as shown in the figure below. After all parameters are configured, the program needs to be re-downloaded to the PLC, and both the PLC and the module need to be powered on again.

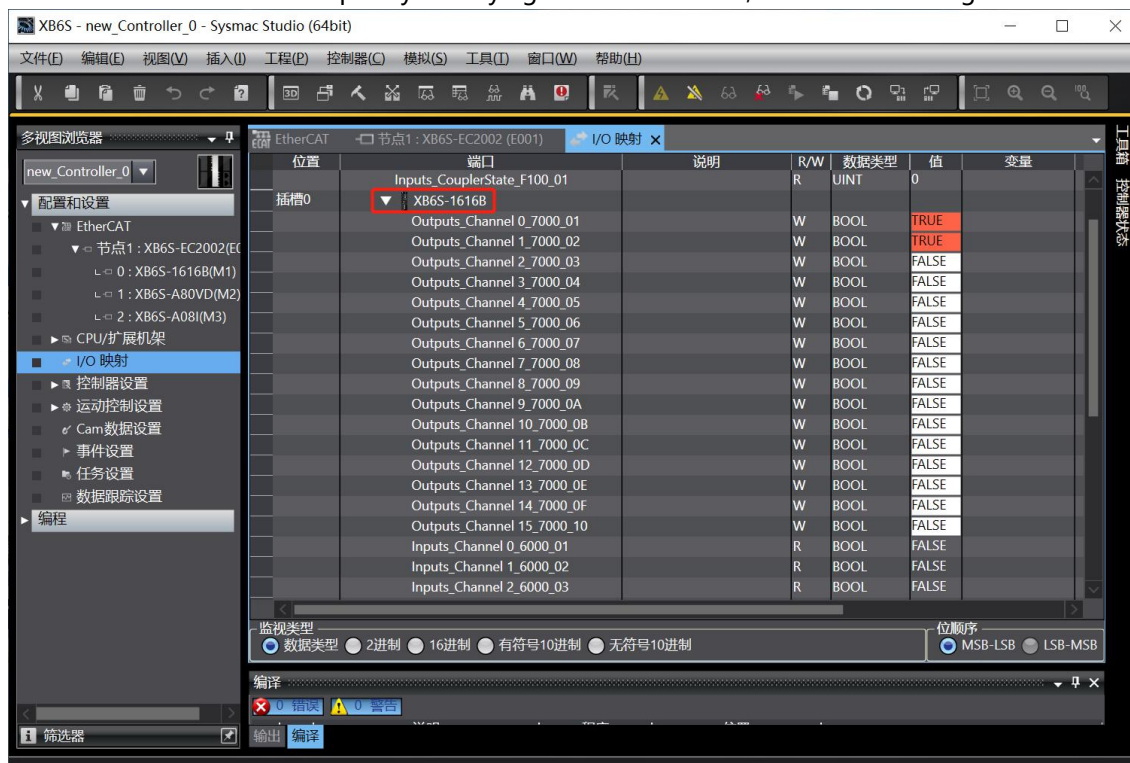


8、I/O function

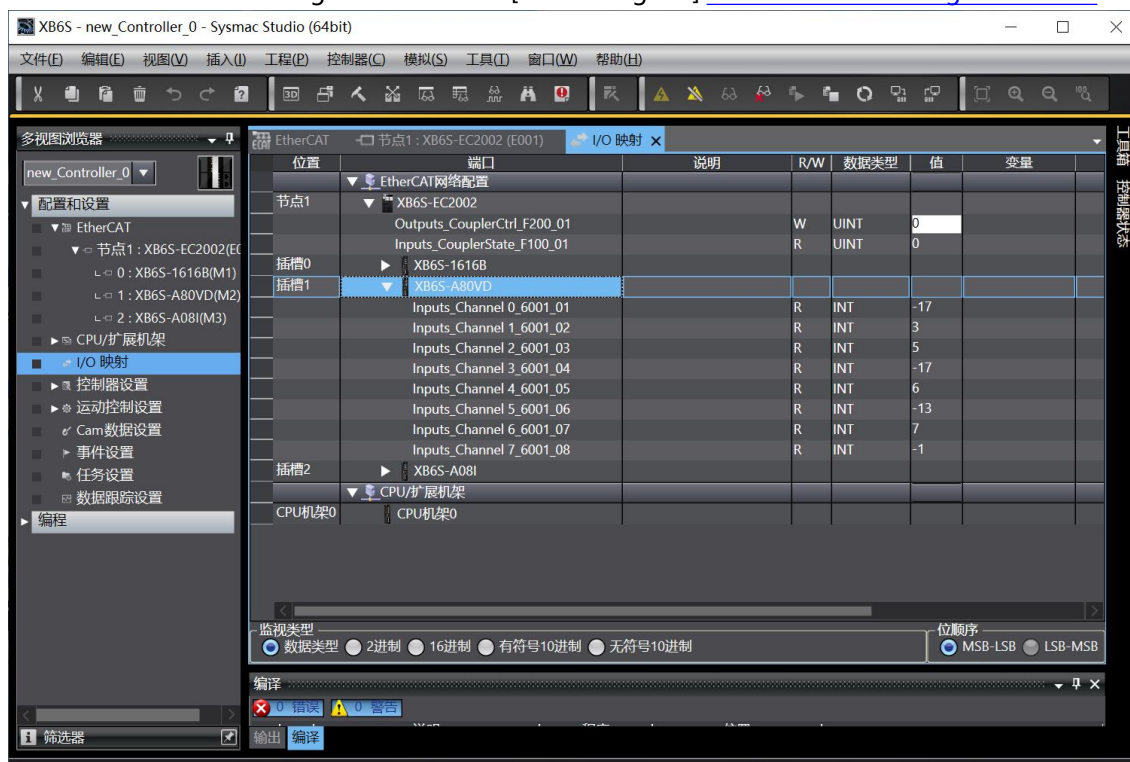
- a. Double-clicking "I/O Mapping" in the left navigation tree will display the mapping table for each module in the topology, allowing you to monitor the input and output values of each channel of each module, as shown in the figure below.



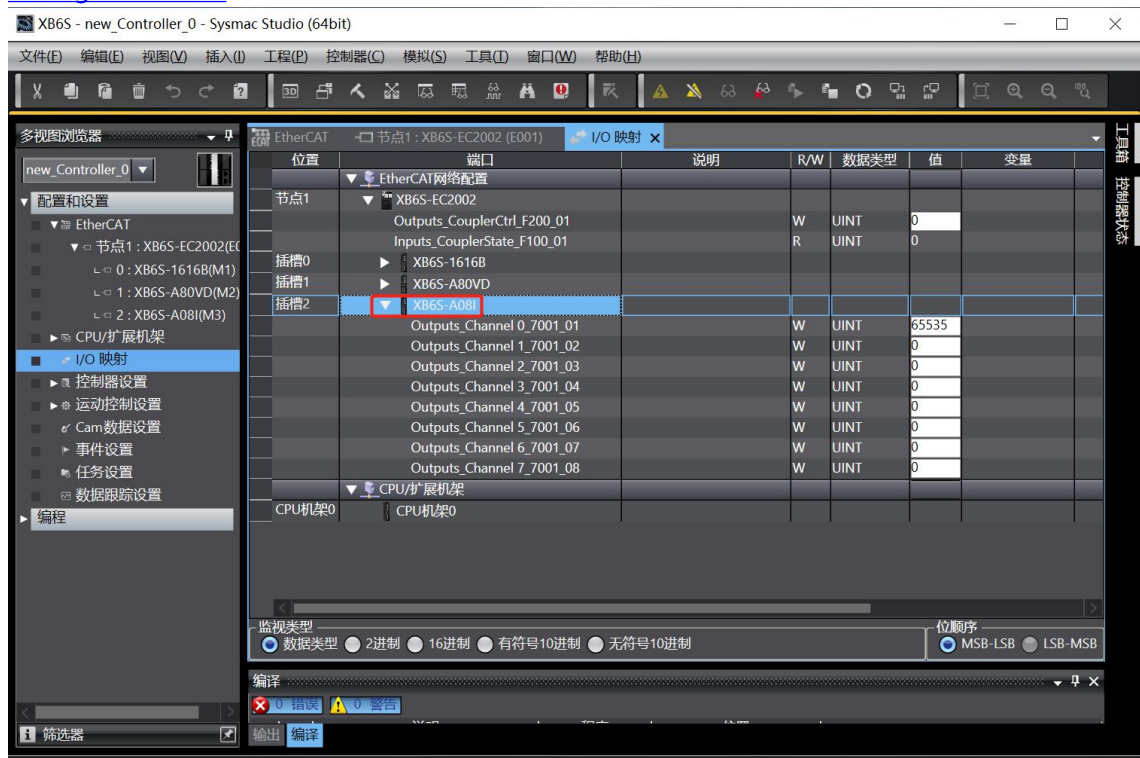
- b. Expand the mapping table of the XB6S-1616B Digital input module. When an effective voltage is input to the input channel, the input value can be monitored in the mapping table; the output channel can be forced to output by modifying the channel value, as shown in the figure below.



- c. Expanding the mapping table of the XB6S-A80VD analog module allows monitoring of the input voltage code value for each channel. As shown in the figure below, the correspondence between code values and voltages is detailed in [link to diagram]. [3.3.4](#) and [3.3.5 Analog Parameters](#).



- d. Expanding the mapping table of the XB6S-A08I analog module and writing the current code value allows you to force output for each channel. As shown in the figure below, the correspondence between code value and current is detailed in [link to diagram]. [3.3.4 and 3.3.5 Analog Parameters](#).



6.3.2 Application in the TwinCAT3 software environment

1、Preparation

- **Hardware environment**
 - **Module preparation:** This guide uses the **XB6S-EC2002+XB6S-1616B+XB6S-A80VD+XB6S-A08I topology as an example.**
 - **One computer, pre-installed with TwinCAT3 software.**
 - **EtherCAT dedicated shielded cable**
 - **One switching power supply**
 - **Device configuration file**
Configuration file retrieval
address:<https://www.solidotech.com/cn/resources/configuration-files>
- **Hardware configuration and wiring**
Please follow the instructions [4. Installation and Removal](#) and [5-wire connection](#) "Required Operation"
- **Computer IP Requirements**
Configure the computer's IP address and the PLC's IP address to ensure they are on the same network segment.

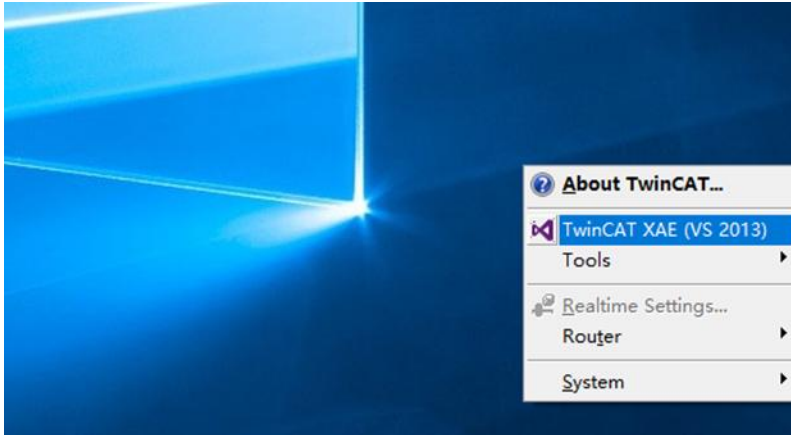
2、Pre-configured configuration files

Place the ESI configuration file (EcatTerminal-XB6S_V2.0.2_ENUM.xml) in the TwinCAT installation directory "C:\TwinCAT\3.1\Config\Io\EtherCAT", as shown in the image below.

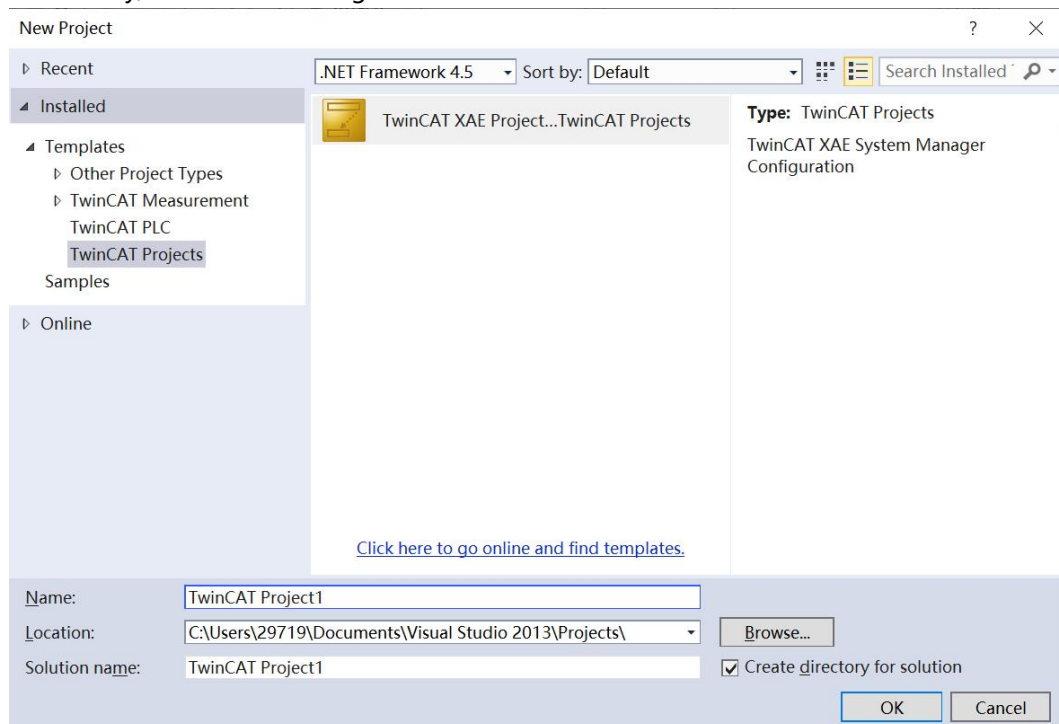
此电脑 Windows (C:) TwinCAT 3.1 Config Io EtherCAT 在 EtherCAT 中搜索			
名称	修改日期	类型	大小
Beckhoff EPP5xxx.xml	2016/12/22 10:57	XML 文档	736 KB
Beckhoff EPP6xxx.xml	2017/4/5 14:46	XML 文档	1,272 KB
Beckhoff EPP7xxx.xml	2016/12/22 10:57	XML 文档	1,466 KB
Beckhoff EQ1xxx.xml	2015/11/12 14:24	XML 文档	22 KB
Beckhoff EQ2xxx.xml	2016/11/23 10:42	XML 文档	73 KB
Beckhoff EQ3xxx.xml	2016/11/22 11:22	XML 文档	1,386 KB
Beckhoff ER1xxx.XML	2016/11/21 15:46	XML 文档	165 KB
Beckhoff ER2xxx.XML	2016/11/21 14:32	XML 文档	259 KB
Beckhoff ER3xxx.XML	2017/6/9 13:35	XML 文档	1,177 KB
Beckhoff ER4xxx.xml	2016/11/22 12:58	XML 文档	318 KB
Beckhoff ER5xxx.xml	2016/3/14 11:52	XML 文档	273 KB
Beckhoff ER6xxx.xml	2016/3/14 11:52	XML 文档	494 KB
Beckhoff ER7xxx.xml	2016/11/22 12:14	XML 文档	1,503 KB
Beckhoff ER8xxx.xml	2016/3/14 11:52	XML 文档	207 KB
Beckhoff EtherCAT EvaBoard.xml	2015/2/4 12:57	XML 文档	72 KB
Beckhoff EtherCAT Terminals.xml	2015/2/4 12:57	XML 文档	53 KB
Beckhoff FB1XXX.xml	2017/5/24 12:26	XML 文档	49 KB
Beckhoff FCxxx.xml	2015/2/4 12:57	XML 文档	21 KB
Beckhoff ILxxx-B110.xml	2015/2/4 12:57	XML 文档	8 KB
EcatTerminal-XB6S_V2.0.2_ENUM.xml	2024/11/22 9:36	XML 文档	1,990 KB

3. Create a project

- a. Click the TwinCAT icon in the lower right corner of the desktop, select "TwinCAT XAE (VS xxxx)" to open the TwinCAT software, as shown in the image below.



- b. Click "New TwinCAT Project". In the pop-up window, "Name" and "Solution name" correspond to the project name and solution name, respectively, and "Location" corresponds to the project path. These three items can be left as default. Then click "OK". The project will be created successfully, as shown in the figure below.

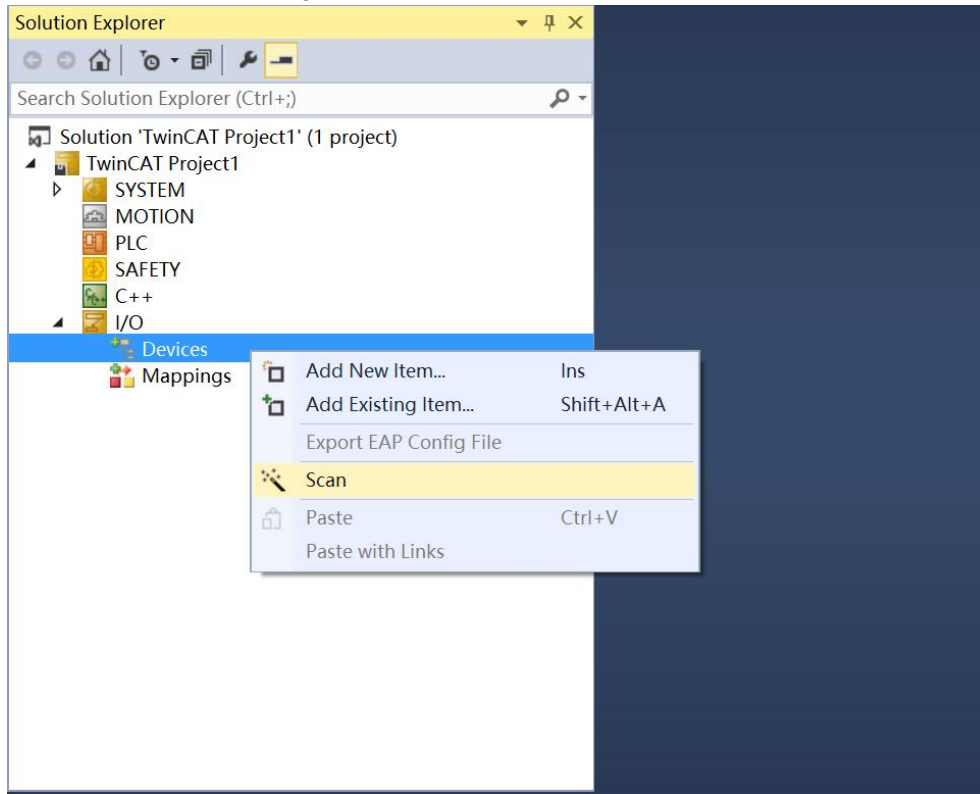


4. Add device

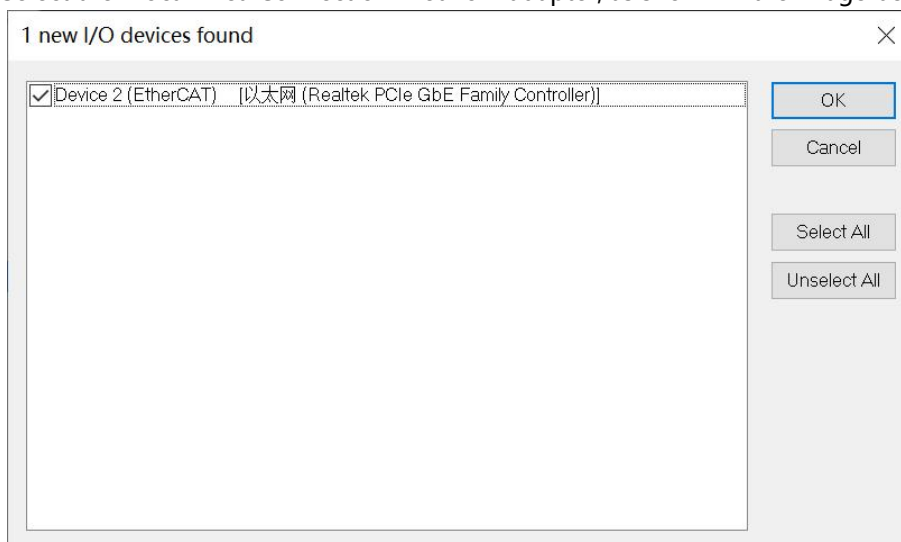
There are two ways to add a device: scanning the device or adding it manually.

➤ **Scanning equipment**

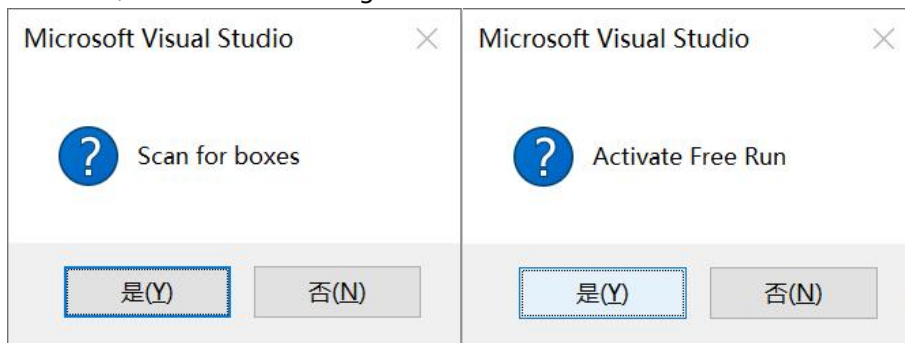
- a. After creating the project, right-click the "Scan" option under "I/O -> Devices" to scan for slave devices, as shown in the figure below.



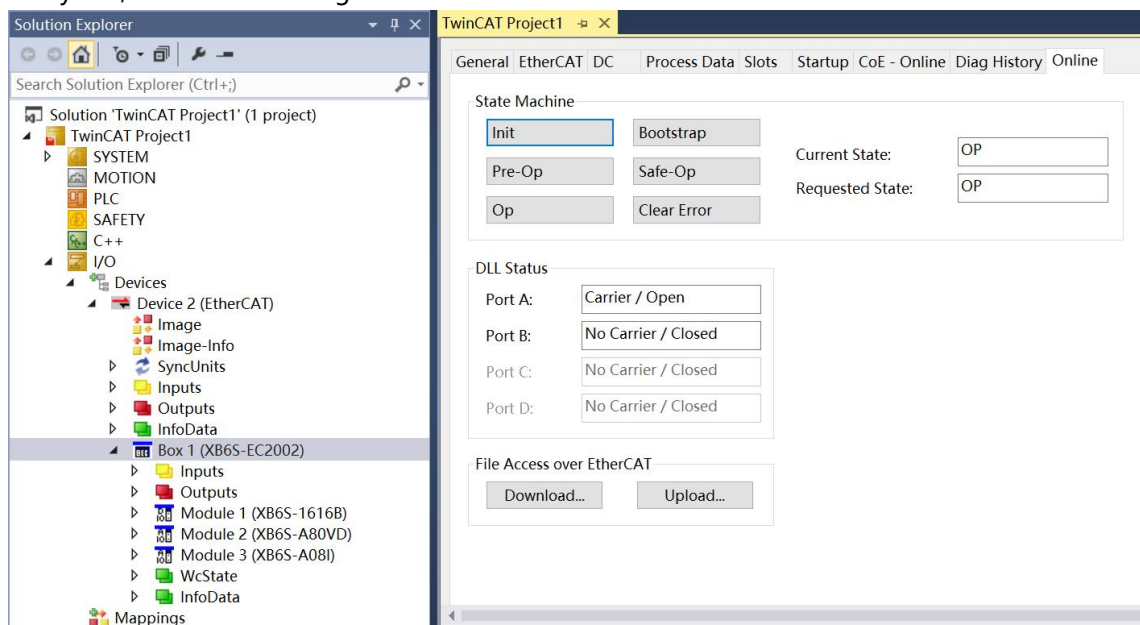
- b. Select the "Local Area Connection" network adapter, as shown in the image below.



- c. In the pop-up window "Scan for boxes", click "Yes"; in the pop-up window "Activate Free Run", click "Yes", as shown in the image below.

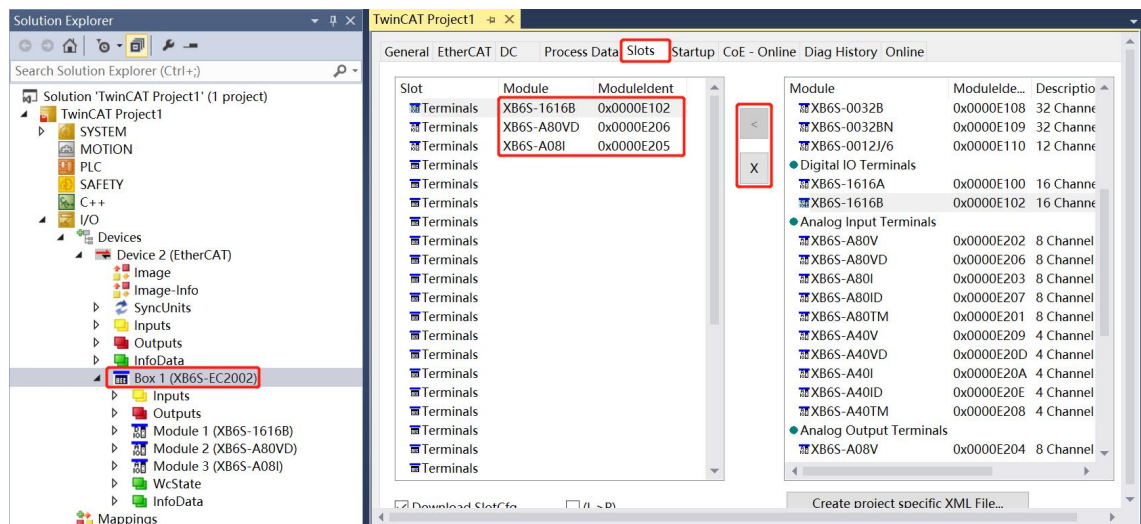


- d. After the device is scanned, you can see Box1 (XB6S-EC2002), Module1 (XB6S-1616B), Module2 (XB6S-A80VD), and Module3 (XB6S-A08I) in the left navigation tree. Under "Online", you can see that TwinCAT is in "OP" state. You can also observe that the RUN light of the slave device is always on, as shown in the figure below.



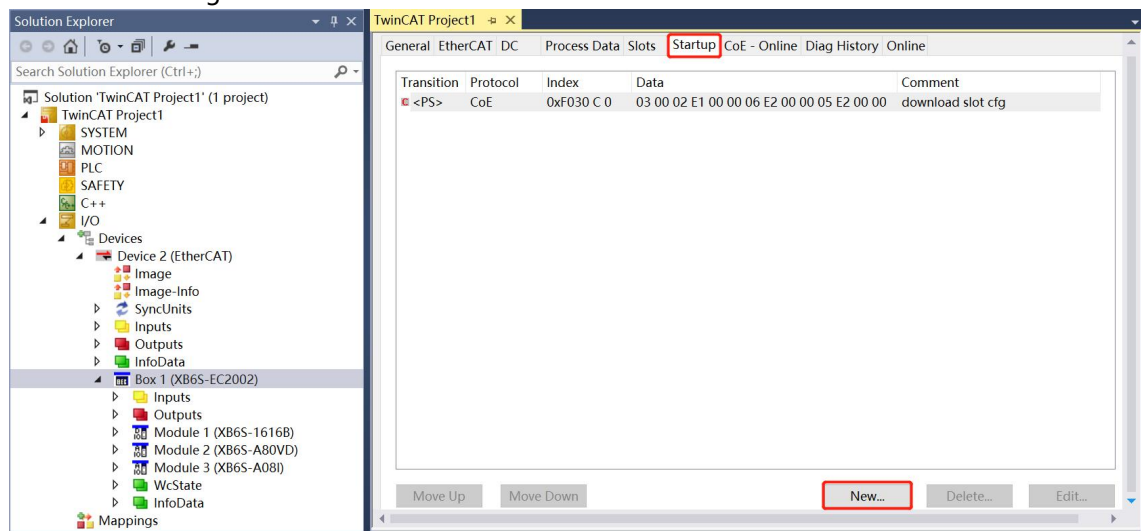
➤ **Add manually**

- a. After adding the coupler, on the "Slots" page, click according to the actual topology.  and  Add the modules one by one, as shown in the image below.



5. Parameter configuration

- Clicking "Box 1 -> Startup -> New" in the left navigation tree will take you to the configuration parameter editing page, where you will enter the "Edit CANopen Startup Entry" interface, as shown in the image below.



- In the Edit CANopen Startup Entry pop-up window, click the "+" in front of the IO module Index to expand the configuration parameter menu. You can see the configuration parameters. Click on any parameter to set the relevant configuration, as shown in the figure below.

Edit CANopen Startup Entry ✕

Transition

☐ I → P Index (hex):

☒ P → S ☐ S → P Sub-Index (dec):

☐ S → O ☐ O → S ☐ Validate ☐ Complete Access

Data (hexbin): Hex Edit...

Validate Mask:

Comment: Edit Entry...

Index	Name	Flags	Value	Unit
+ 10F1:0	Error Settings	RW		
+ 10F3:0	Diagnosis History	RO	> 5 <	
+ 1C32:0	SM output parameter		> 32 <	
+ 1C33:0	SM input parameter		> 32 <	
+ 2000:0	XB6S-1616B Config	RO	> 18 <	
+ 2010:0	XB6S-A80VD Config	RO	> 16 <	
+ 2020:0	XB6S-A08I Config	RO	> 25 <	
+ 5F00:0	Bus Feature	RO	> 4 <	
+ F030:0	Configured Module Ident List	RW	> 0 <	

- c. For example, to modify the configuration parameters of Module1 (XB6S-1616B), click the "+" in front of Index 2000:0 to expand the configuration parameter menu, where you can configure the Digital input filtering and output signal clear/hold functions, as shown in the figure below.

Edit CANopen Startup Entry

Transition:

☐ I->P ☒ P->S ☐ S->P ☐ S->O ☐ O->S

Index (hex): 0 Sub-Index (dec): 0

☐ Validate ☐ Complete Access

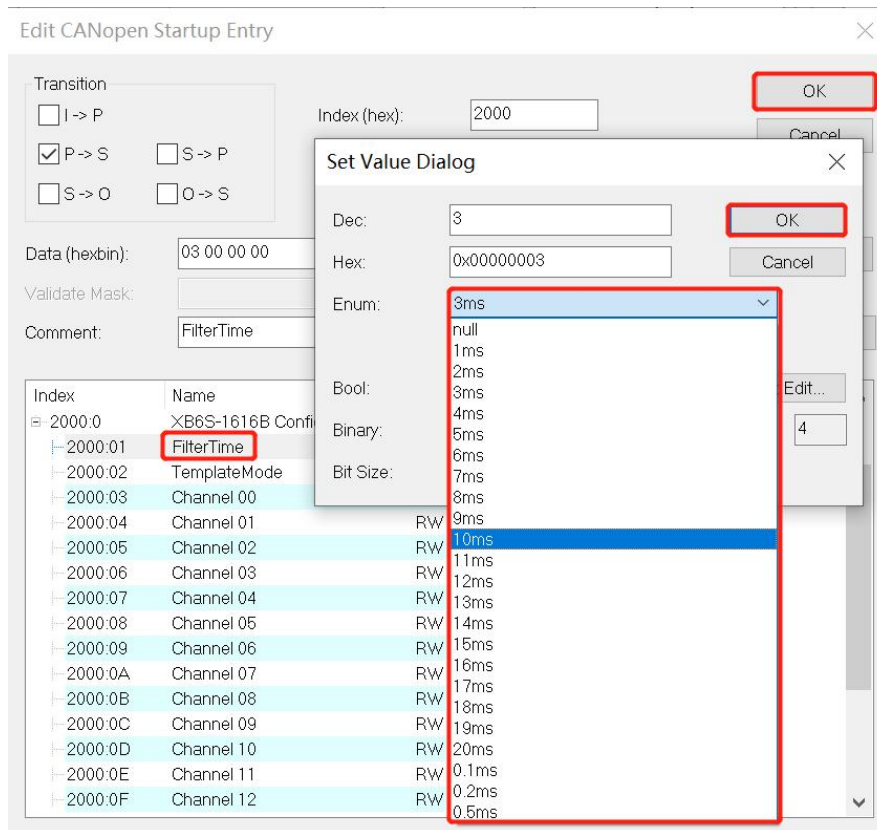
Data (hexbin): Hex Edit...

Validate Mask:

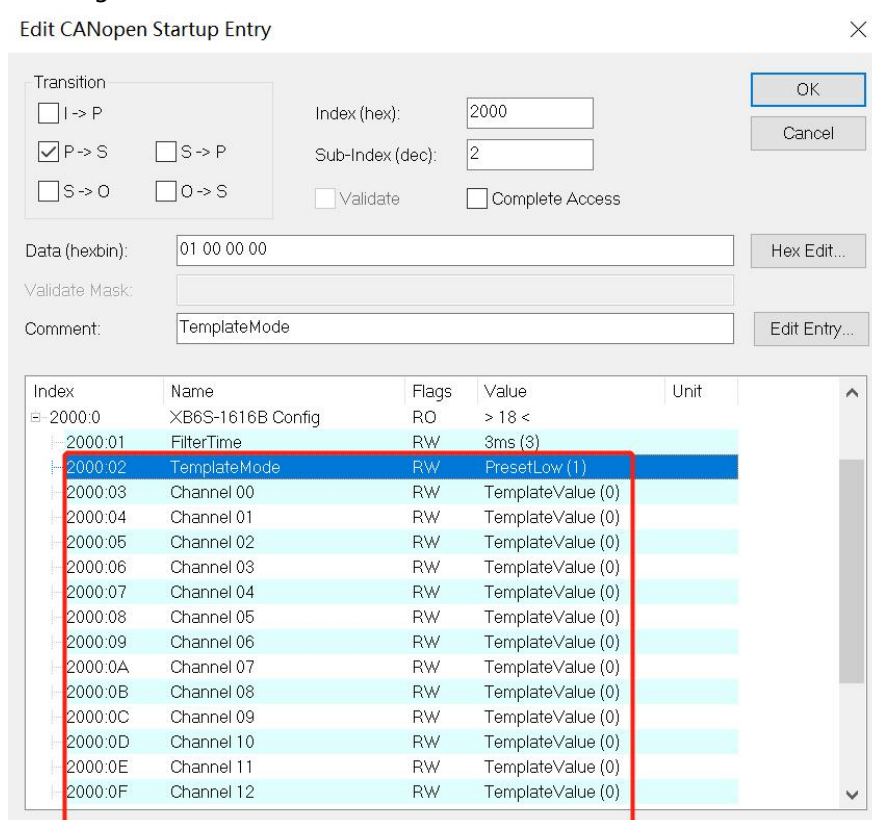
Comment: Edit Entry...

Index	Name	Flags	Value	Unit
2000:0	XB6S-1616B Config	RO	> 18 <	
2000:01	FilterTime	RW	3ms (3)	
2000:02	TemplateMode	RW	PresetLow (1)	
2000:03	Channel 00	RW	TemplateValue (0)	
2000:04	Channel 01	RW	TemplateValue (0)	
2000:05	Channel 02	RW	TemplateValue (0)	
2000:06	Channel 03	RW	TemplateValue (0)	
2000:07	Channel 04	RW	TemplateValue (0)	
2000:08	Channel 05	RW	TemplateValue (0)	
2000:09	Channel 06	RW	TemplateValue (0)	
2000:0A	Channel 07	RW	TemplateValue (0)	
2000:0B	Channel 08	RW	TemplateValue (0)	
2000:0C	Channel 09	RW	TemplateValue (0)	
2000:0D	Channel 10	RW	TemplateValue (0)	
2000:0E	Channel 11	RW	TemplateValue (0)	
2000:0F	Channel 12	RW	TemplateValue (0)	

- d. The Digital input filtering time FilterTime can be set from 0 to 20ms. Double-click "Filter Time" and modify the parameter value in the drop-down box, as shown in the figure below.



- e. The Digital output signal clear/hold function is preset to output clear mode for all channels by default. Module channels can be configured individually; see the corresponding relationship below. [6.1.2 Clearing/Holding Digital Output Signals](#) After configuration, click "OK", as shown in the image below.



- f. On the parameter setting page of the XB6S-A80VD analog voltage input module, you can configure the analog voltage range and analog input filtering parameters, as shown in the figure below.

Edit CANopen Startup Entry

Transition:
☐ I → P
☒ P → S ☐ S → P
☐ S → O ☐ O → S

Index (hex): 2010
 Sub-Index (dec): 0

☐ Validate ☐ Complete Access

Data (hexbin): 10 Hex Edit...

Validate Mask:

Comment: SubIndex 000 Edit Entry...

Index	Name	Flags	Value	Unit
2010.0	XB6S-A80VD Config	RO	> 16 <	
2010.01	Range Select Ch00	RW	-10~+10V(-32768~32767) (1)	
2010.02	Range Select Ch01	RW	-10~+10V(-32768~32767) (1)	
2010.03	Range Select Ch02	RW	-10~+10V(-32768~32767) (1)	
2010.04	Range Select Ch03	RW	-10~+10V(-32768~32767) (1)	
2010.05	Range Select Ch04	RW	-10~+10V(-32768~32767) (1)	
2010.06	Range Select Ch05	RW	-10~+10V(-32768~32767) (1)	
2010.07	Range Select Ch06	RW	-10~+10V(-32768~32767) (1)	
2010.08	Range Select Ch07	RW	-10~+10V(-32768~32767) (1)	
2010.09	Filter Ch00	RW	0x0000000A (10)	
2010.0A	Filter Ch01	RW	0x0000000A (10)	
2010.0B	Filter Ch02	RW	0x0000000A (10)	
2010.0C	Filter Ch03	RW	0x0000000A (10)	
2010.0D	Filter Ch04	RW	0x0000000A (10)	
2010.0E	Filter Ch05	RW	0x0000000A (10)	
2010.0F	Filter Ch06	RW	0x0000000A (10)	

- g. On the parameter setting page of the XB6S-A08I analog current output module, you can configure the analog current range and the parameters for clearing/holding the analog output signal, as shown in the figure below.

Edit CANopen Startup Entry

Transition:
☐ I → P
☒ P → S
☐ S → O
☐ S → P
☐ O → S

Index (hex): 2020
 Sub-Index (dec): 0

☐ Validate ☐ Complete Access

Data (hexbin): 19 Hex Edit...

Validate Mask:

Comment: SubIndex 000 Edit Entry...

Index	Name	Flags	Value	Unit
2020.0	XB6S-A08I Config	RO	> 25 <	
2020.01	Range Select Ch00	RW	0~20mA(0~65535) (2)	
2020.02	Range Select Ch01	RW	0~20mA(0~65535) (2)	
2020.03	Range Select Ch02	RW	0~20mA(0~65535) (2)	
2020.04	Range Select Ch03	RW	0~20mA(0~65535) (2)	
2020.05	Range Select Ch04	RW	0~20mA(0~65535) (2)	
2020.06	Range Select Ch05	RW	0~20mA(0~65535) (2)	
2020.07	Range Select Ch06	RW	0~20mA(0~65535) (2)	
2020.08	Range Select Ch07	RW	0~20mA(0~65535) (2)	
2020.09	TemplateMode	RW	Clear (0)	
2020.0A	TemplateValue Ch00	RW	TemplateValue (0)	
2020.0B	TemplateValue Ch01	RW	TemplateValue (0)	
2020.0C	TemplateValue Ch02	RW	TemplateValue (0)	
2020.0D	TemplateValue Ch03	RW	TemplateValue (0)	
2020.0E	TemplateValue Ch04	RW	TemplateValue (0)	
2020.0F	TemplateValue Ch05	RW	TemplateValue (0)	

- h. Expanding the "Bus Feature" parameter allows you to view and set various parameters of the coupler, such as the IO communication exception configuration parameters, which can be configured according to actual usage needs, as shown in the figure below.

Edit CANopen Startup Entry

Transition:
☐ I → P
☒ P → S
☐ S → O
☐ S → P
☐ O → S

Index (hex): 0
 Sub-Index (dec): 0

☐ Validate ☐ Complete Access

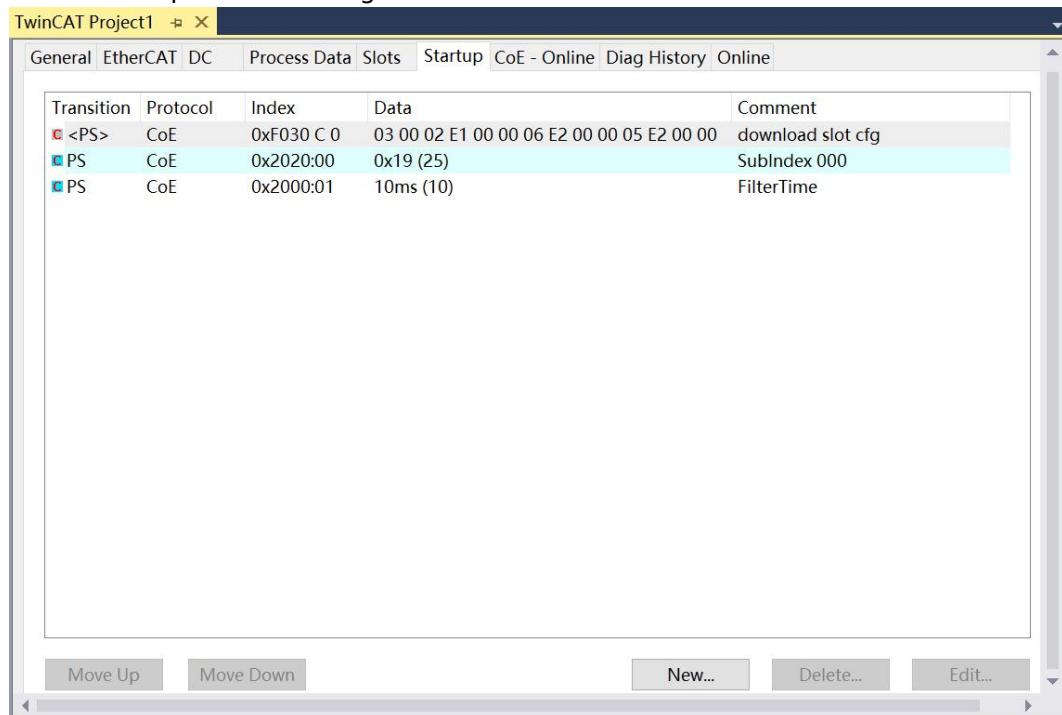
Data (hexbin): Hex Edit...

Validate Mask:

Comment: Edit Entry...

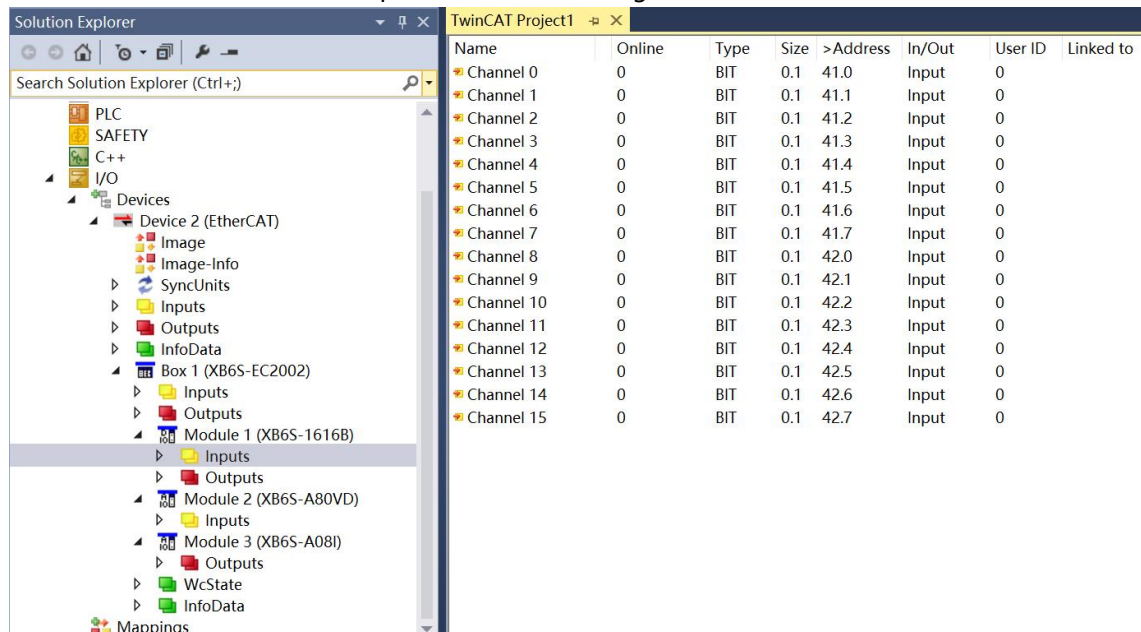
Index	Name	Flags	Value	Unit
10F1.0	Error Settings	RW		
10F3.0	Diagnosis History	RO	> 5 <	
1C32.0	SM output parameter		> 32 <	
1C33.0	SM input parameter		> 32 <	
2000.0	XB6S-1616B Config	RO	> 18 <	
2010.0	XB6S-A80VD Config	RO	> 16 <	
2020.0	XB6S-A08I Config	RO	> 25 <	
5F00.0	Bus Feature	RW	> 5 <	
5F00.01	IO Communication Abnormal Configuration	RW	non-interactive (0)	
5F00.02	Bus Communication CycleTime Min	RO	0x00000000 (0)	
5F00.03	Bus Communication CycleTime Max	RO	0x00000000 (0)	
5F00.04	Bus Communication CycleTime Current	RO	0x00000000 (0)	
5F00.05	Bus Baud Rate	RW	6MHz (6000000)	
F030.0	Configured Module Ident List	RW	> 0 <	

- i. After modifying the parameters, you can see the modified parameter items and values below Startup, as shown in the image below. After setting the parameters, a Reload operation and a power-on restart of the module are required to enable the main station to automatically distribute the parameter settings.

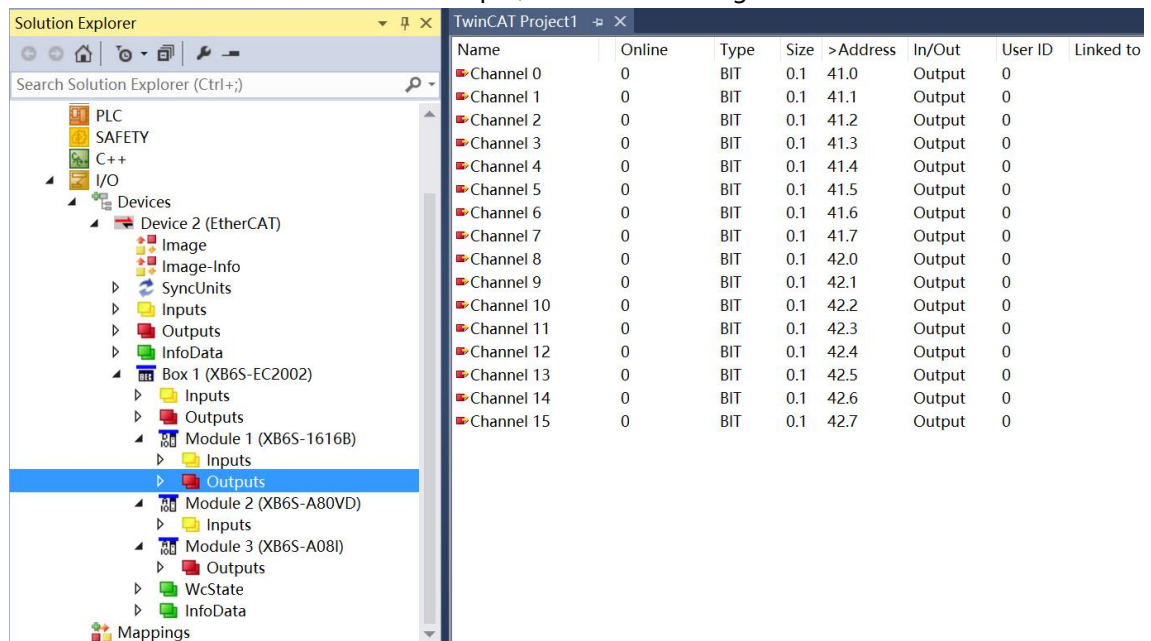


6. Verify basic functions

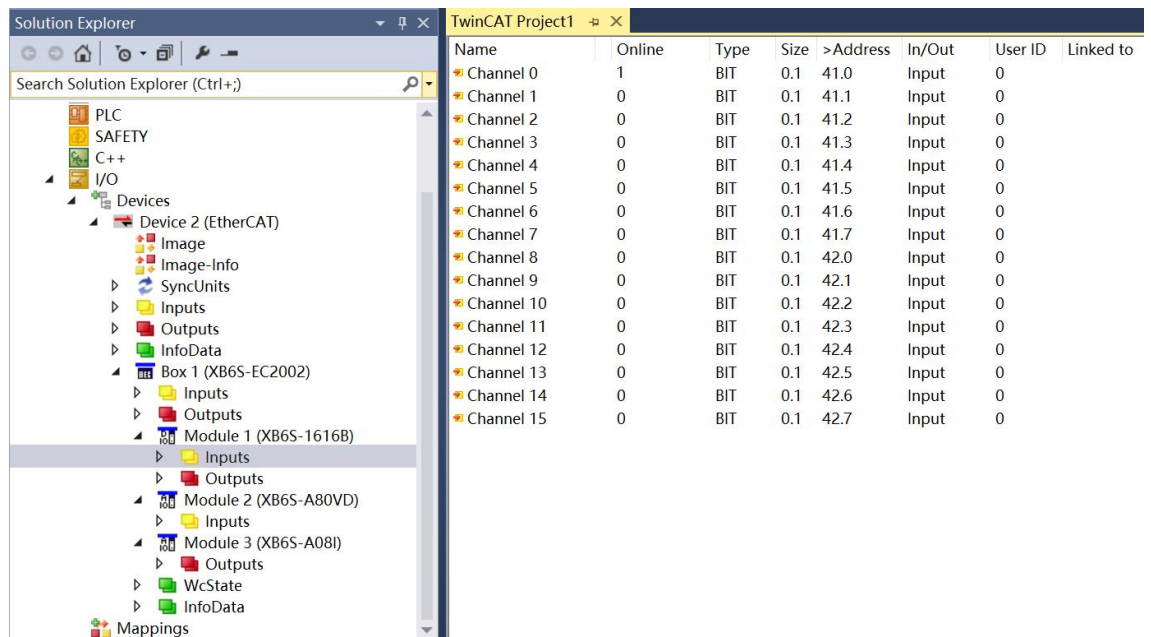
- a. The left-hand navigation tree "Module -> Inputs" displays the upstream data of the module, used to monitor the module's input, as shown in the figure below.



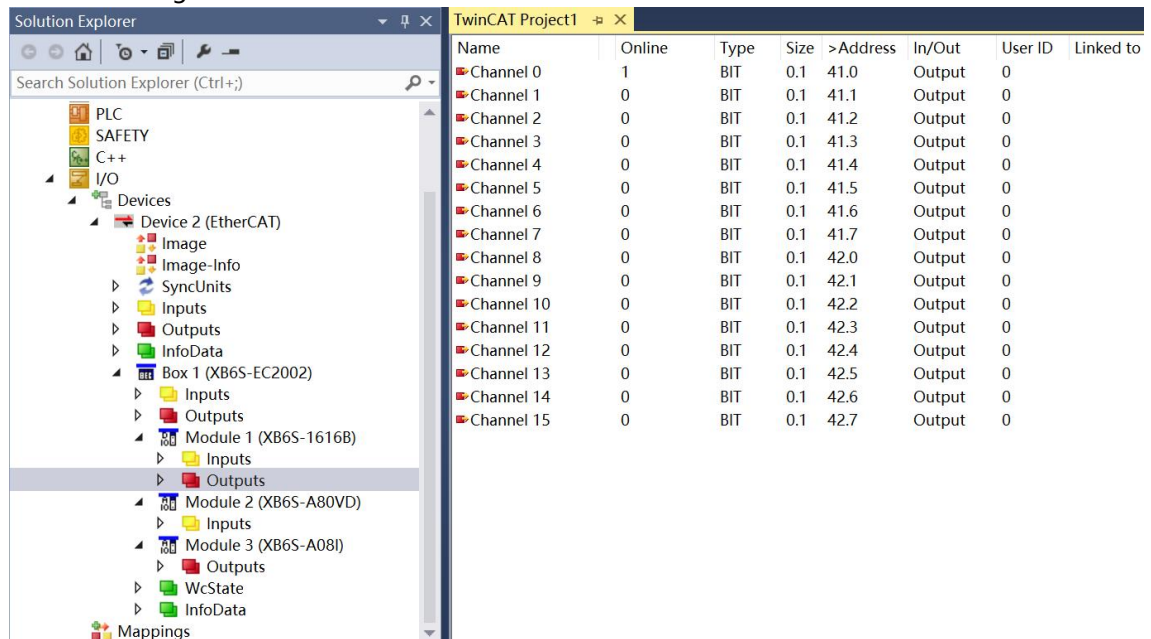
- b. The left-hand navigation tree "Module -> Outputs" displays the module's downstream data, which is used to control the module's output, as shown in the figure below.



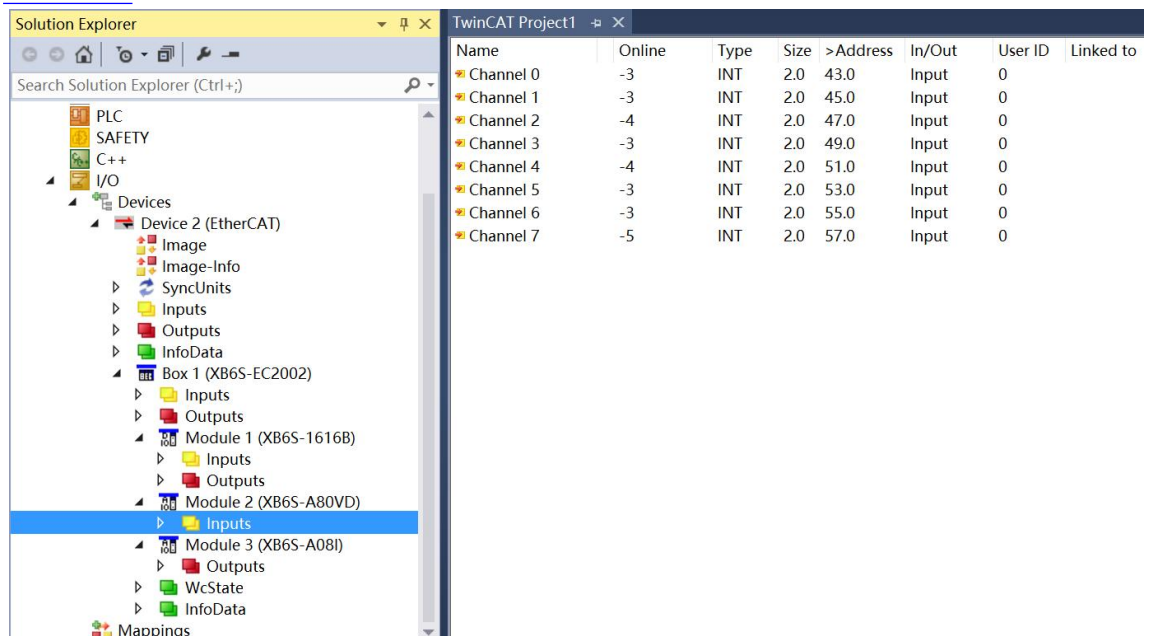
- c. Taking channel 0 of Module1 (XB6S-1616B) as an example, if there is a valid voltage input to input channel 0 of this module, it can be observed in "Module1 -> Inputs", as shown in the figure below.



- d. Taking channel 0 of Module1 (XB6S-1616B) as an example, if you want the Digital output channel 0 of this module to output, you can click on Channel 0 in "Module1 -> Outputs", right-click and enter 1. You will then see the corresponding channel light on the module, as shown in the figure below.



- e. The Inputs datasheet of the XB6S-A80VD allows you to monitor the input voltage code value for each channel, as shown in the figure below. For details on the correspondence between code values and voltages, please refer to [link to relevant documentation]. [3.3.4 and 3.3.5 Analog Parameters.](#)



- f. In the Outputs datasheet of the XB6S-A08I, writing a current code value can force an output for each channel, as shown in the figure below. For details on the correspondence between code values and current values, please refer to [link to relevant documentation].[3.3.4](#) and [3.3.5](#)
- [Analog Parameters.](#)

Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Channel 0	65535	UINT	2.0	43.0	Output	0	
Channel 1	0	UINT	2.0	45.0	Output	0	
Channel 2	0	UINT	2.0	47.0	Output	0	
Channel 3	0	UINT	2.0	49.0	Output	0	
Channel 4	0	UINT	2.0	51.0	Output	0	
Channel 5	0	UINT	2.0	53.0	Output	0	
Channel 6	0	UINT	2.0	55.0	Output	0	
Channel 7	0	UINT	2.0	57.0	Output	0	

6.3.3 Application in the CODESYS V3.5 software environment

1、Preparation

- **Hardware environment**

- **Module preparation:** This guide uses the **XB6S-EC2002+XB6S-1616B+XB6S-A80VD+XB6S-A08I** topology as an example.
- **One computer, pre-installed with CODESYS V3.5 and CODESYS Control Win V3 - x64 SysTray software.**
- **EtherCAT dedicated shielded cable**
- **One switching power supply**
- **Device configuration file**
Configuration file retrieval

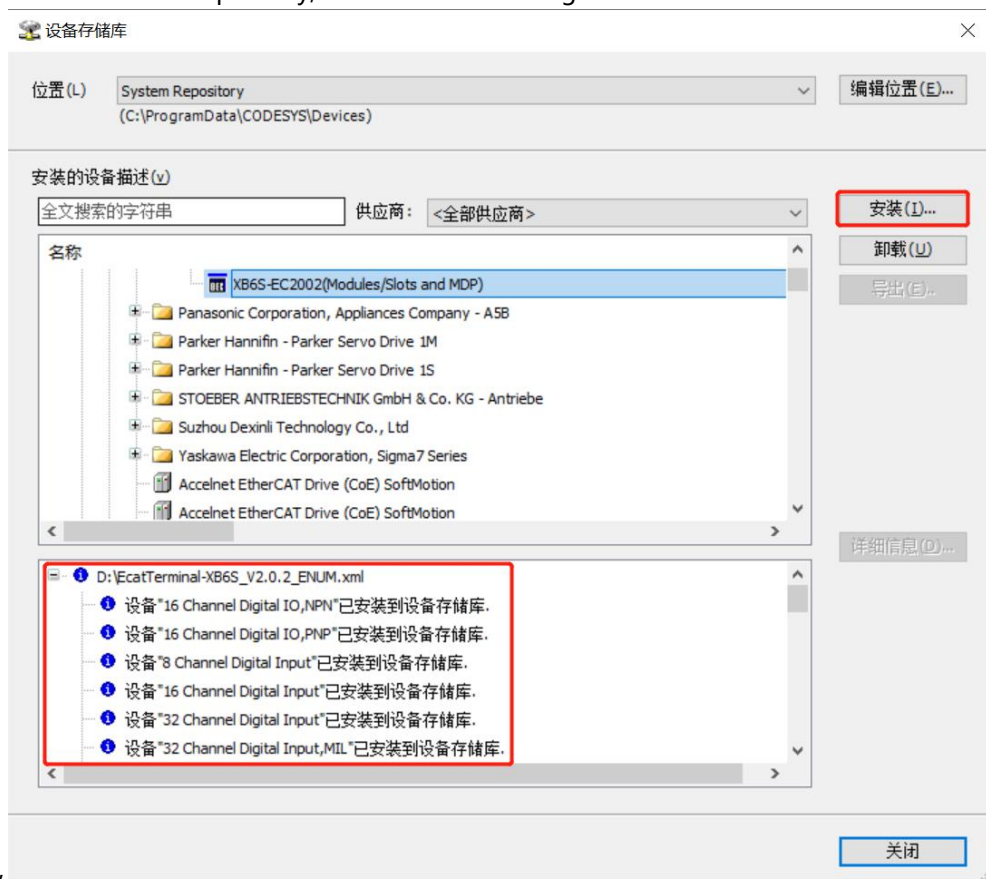
address: <https://www.solidotech.com/cn/resources/configuration-files>

- **Hardware configuration and wiring**

Please follow the instructions [4. Installation and Removal](#) and [5-wire connection](#) "Required Operation"

2、Install device configuration file

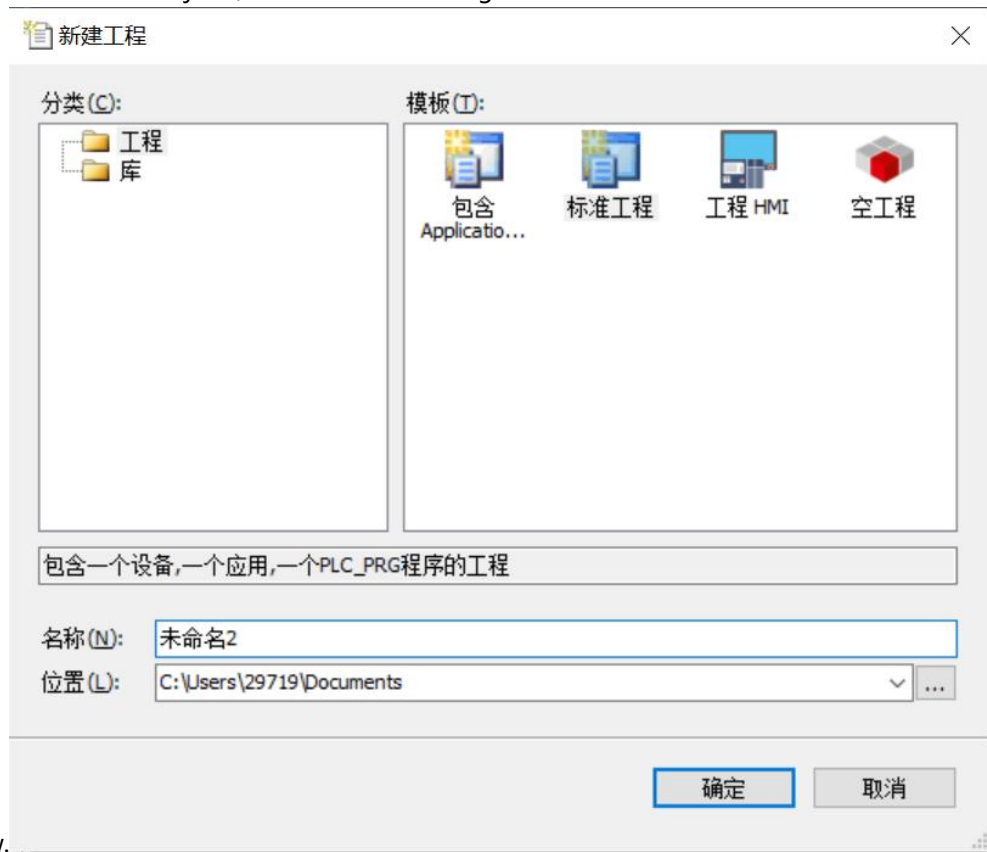
- Log in to CODESYS.
- Select "Tools -> Device Repository".
- Click "Install," select the relevant XML file for installation (file format: EcatTerminal-XB6S_V2.0.2_ENUM.xml). Successful installation will display "Device xxxx has been installed to the device repository," as shown in the image



below.

3. New construction projects

- a. Click "File -> New Project", as shown in the image



below.

4. Scanning Network

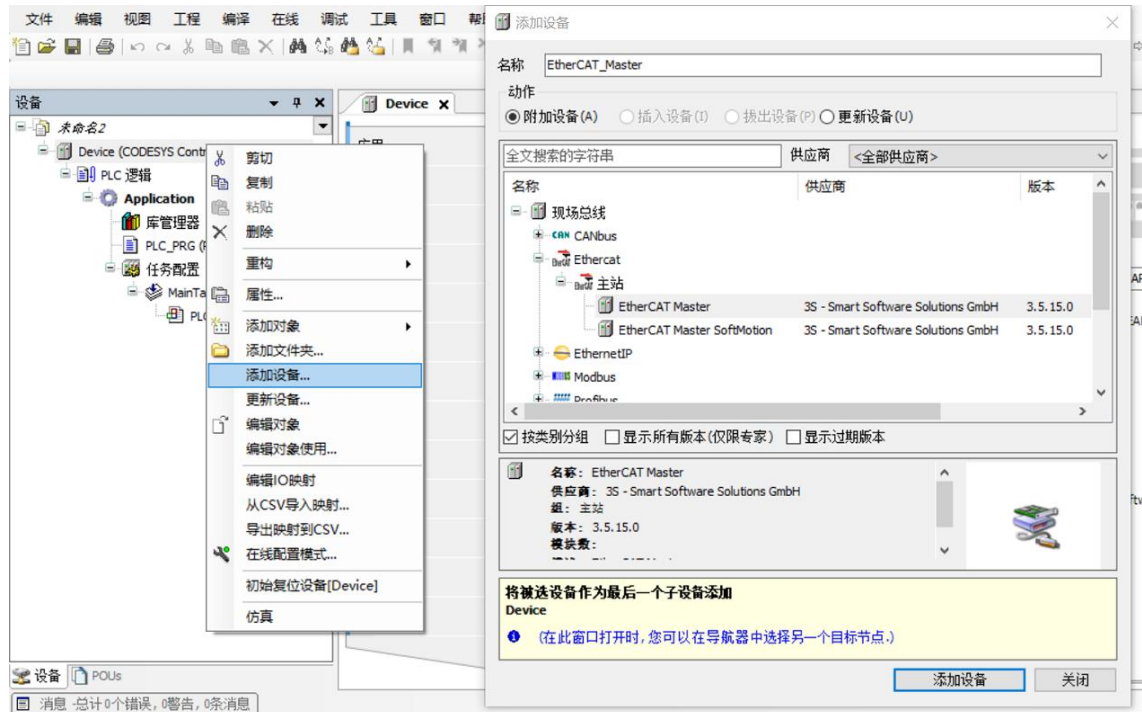
- a. To start the PLC, use "CODESYS Control Win V3 - x64 SysTray". Locate "CODESYS Control Win V3 - x64 SysTray" in the lower right corner of your computer, right-click and select "Start PLC".
- b. Double-click "Device (CODESYS Control Win V3 X64)" in the left navigation tree of CODESYS, and then click "Scan Network".

- c. Select the device and choose the correct controller network path, as shown in the figure below.



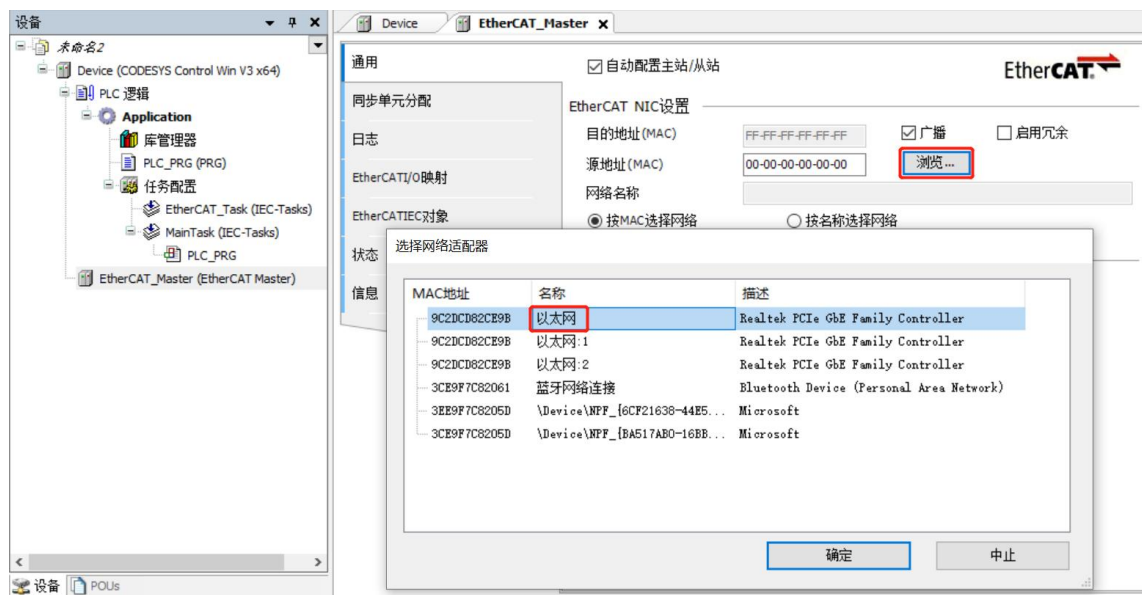
5. Add EtherCAT Master

- Right-click "Device (CODESYS Control Win V3 X64)" in the left navigation tree of CODESYS, click "Add Device", and select...Add the following settings: "EtherCAT -> Master -> EtherCAT Master", as shown in the image below.



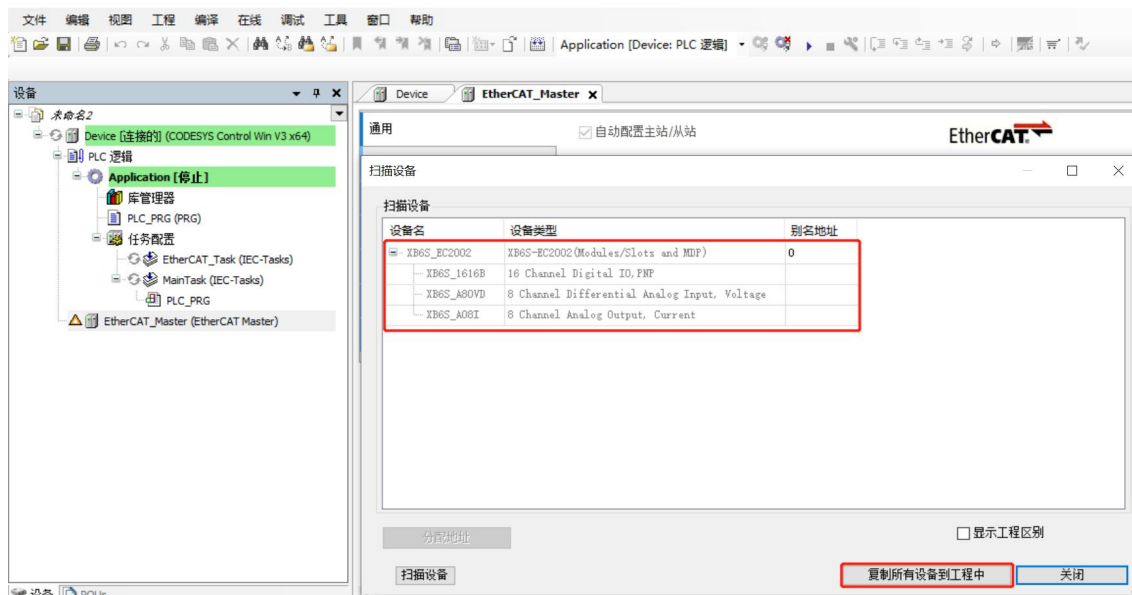
6. Configure EtherCAT Master

- Double-click "EtherCAT_Master (EtherCAT Master)" in the left navigation tree to open the main menu on the right, then click...Click the "Browse" button and select Ethernet.

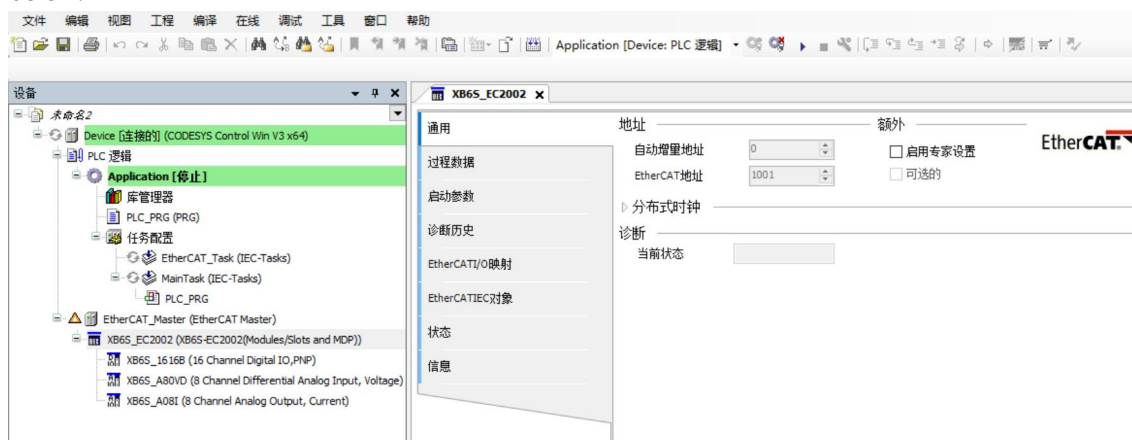


7. Scanning equipment

- Before the first scan, you must log in to the PLC program, right-click "EtherCAT_Master (EtherCAT Master)" in the left navigation tree, select the scanning device, scan the corresponding device, select the module, and click "Copy to Project", as shown in the figure below.

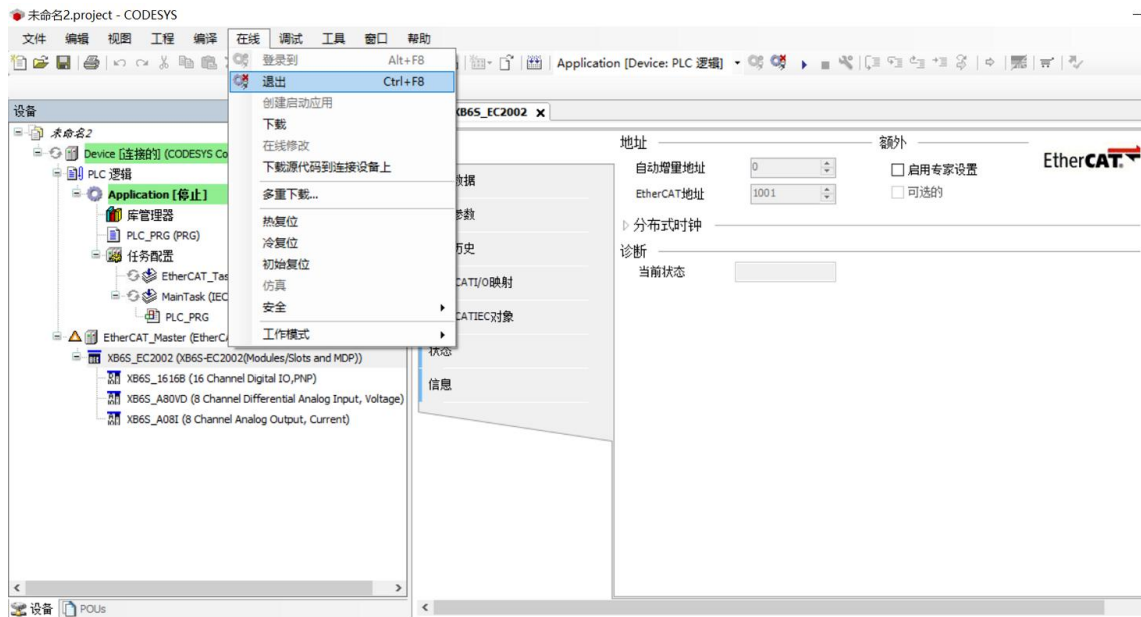


- After successful copying, it will look like the image below.

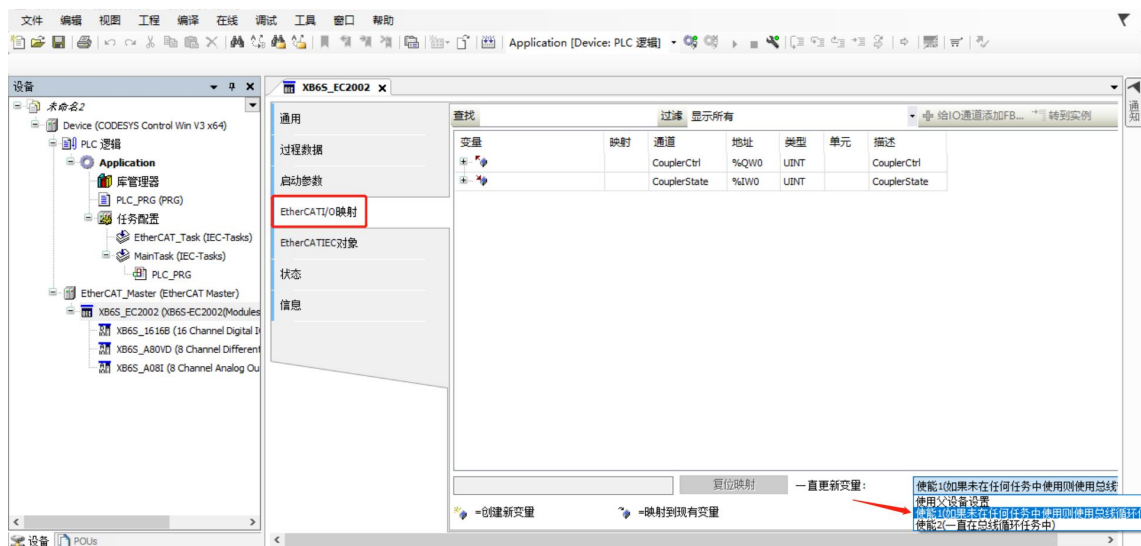


8、Test IO module

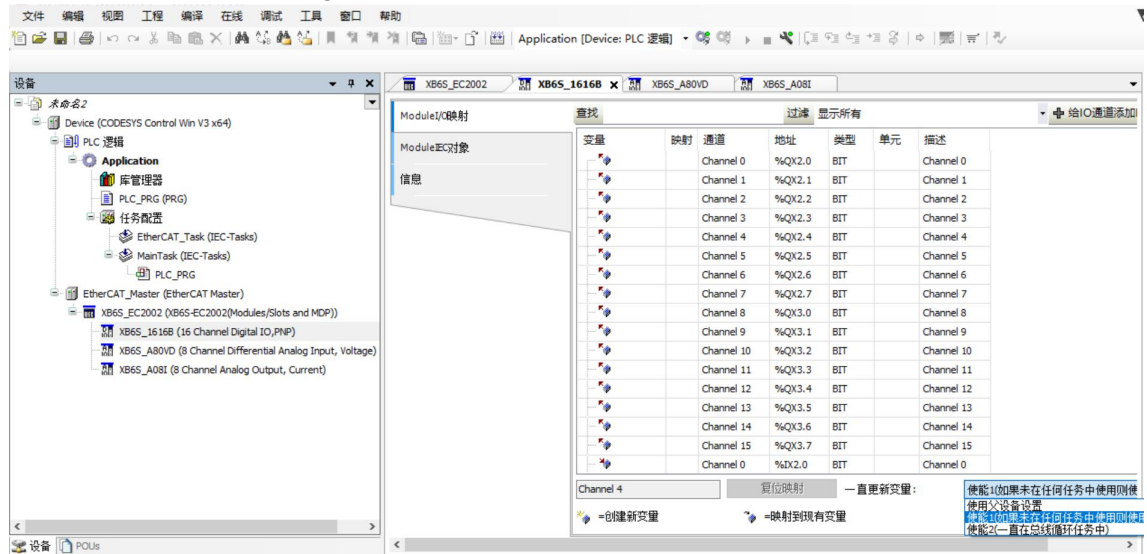
- Configure the I/O module bus mode by clicking the menu bar."Online -> Exit" to exit the PLC, as shown in the figure below.



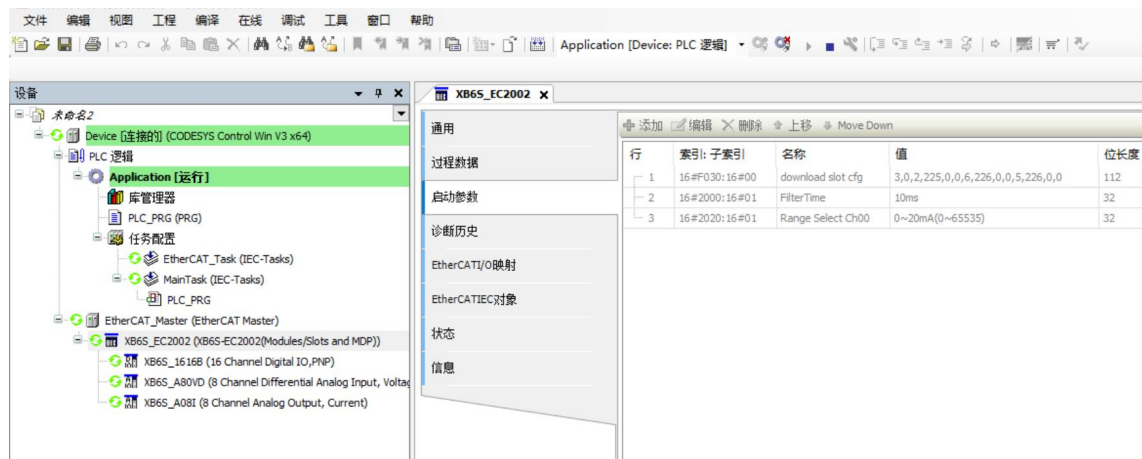
- Select the module coupler, then select "EtherCAT I/O Mapping" from the menu.
- In the "Continuously Update Variables" menu at the bottom right of the page, select "Enable 1" mode, as shown in the image below.



- d. Select module XB6S-1616B/XB6S-A80VD/XB6S-A08I, then select "Module I/O Mapping" from the menu. In the "Always Update Variables" menu at the bottom right of the page, select "Enable 1" mode, as shown in the figure below.

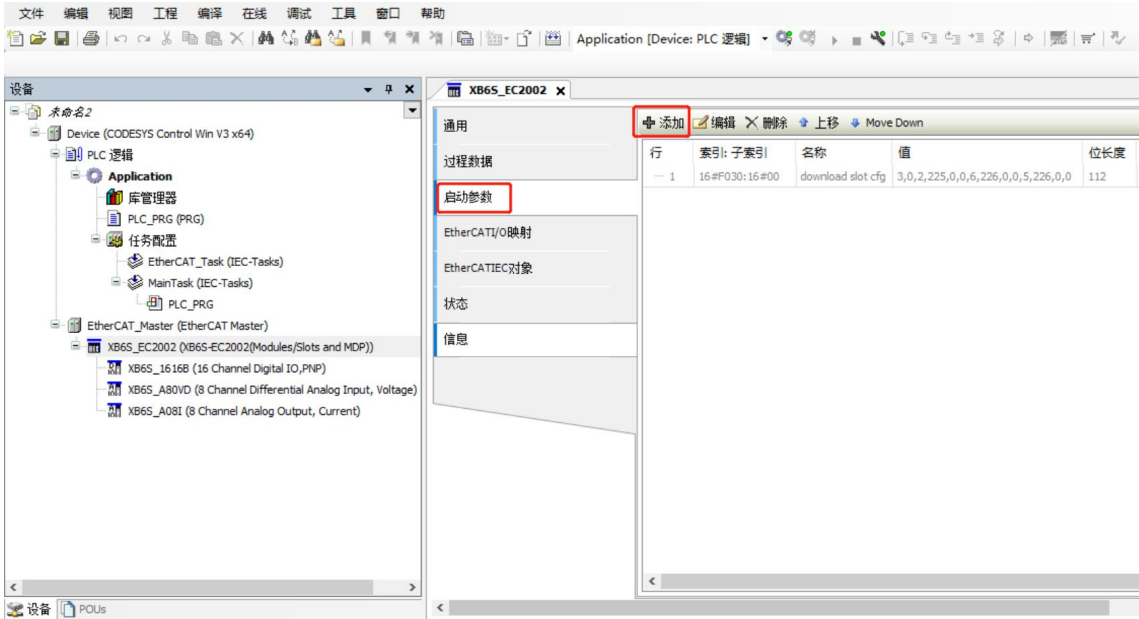


- e. Click "Online -> Multiple Downloads" in the menu bar. In the Multiple Downloads window, select "Always perform full download" and click "OK".
- f. Log in again and run the software to test the module, as shown in the image below.

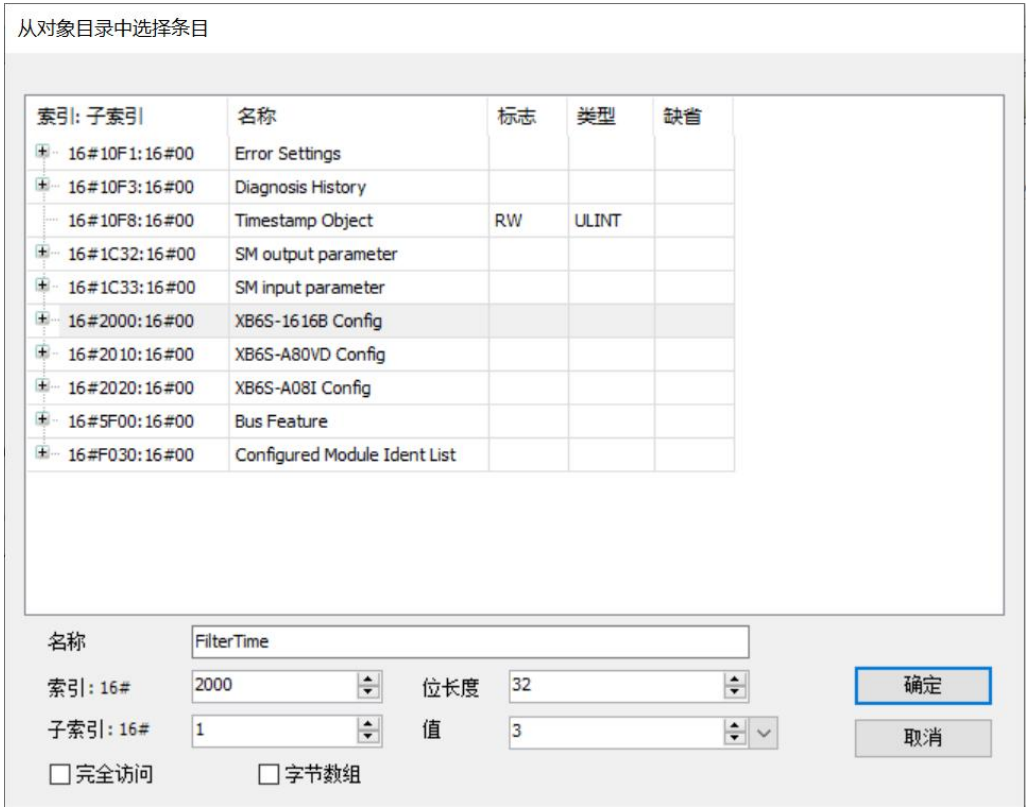


9、Parameter settings

- a. Log out, double-click the coupler XB6S-EC2002 in the left navigation bar, select the "Startup Parameters" page in its properties tab, and click the "Add" button, as shown in the figure below.



- b. The parameters of the IO module can be viewed on the parameter settings page, as shown in the following figure.



- c. On the XB6S-1616B parameter settings page, you can configure the Digital input filtering and output signal clear/hold functions, as shown in the figure below.

从对象目录中选择条目

索引: 子索引	名称	标志	类型	缺省
16#2000:16#00	XB6S-1616B Config			
:16#01	FilterTime	RW	UDINT	16#00000003
:16#02	TemplateMode	RW	UDINT	16#00000001
:16#03	Channel 00	RW	UDINT	16#00000000
:16#04	Channel 01	RW	UDINT	16#00000000
:16#05	Channel 02	RW	UDINT	16#00000000
:16#06	Channel 03	RW	UDINT	16#00000000
:16#07	Channel 04	RW	UDINT	16#00000000
:16#08	Channel 05	RW	UDINT	16#00000000
:16#09	Channel 06	RW	UDINT	16#00000000
:16#0A	Channel 07	RW	UDINT	16#00000000
:16#0B	Channel 08	RW	UDINT	16#00000000
:16#0C	Channel 09	RW	UDINT	16#00000000
:16#0D	Channel 10	RW	UDINT	16#00000000

名称: FilterTime

索引: 16# 2000 位长度 32

子索引: 16# 1 值 10

☐ 完全访问 ☐ 字节数组

确定 取消

- d. On the parameter setting page of the XB6S-A80VD analog voltage input module, you can configure the analog voltage range and analog input filtering parameters, as shown in the figure below.

从对象目录中选择条目

索引: 子索引	名称	标志	类型	缺省
16#2010:16#00	XB6S-A80VD Config			
:16#01	Range Select Ch00	RW	UDINT	16#00000001
:16#02	Range Select Ch01	RW	UDINT	16#00000001
:16#03	Range Select Ch02	RW	UDINT	16#00000001
:16#04	Range Select Ch03	RW	UDINT	16#00000001
:16#05	Range Select Ch04	RW	UDINT	16#00000001
:16#06	Range Select Ch05	RW	UDINT	16#00000001
:16#07	Range Select Ch06	RW	UDINT	16#00000001
:16#08	Range Select Ch07	RW	UDINT	16#00000001
:16#09	Filter Ch00	RW	UDINT	16#0000000a
:16#0A	Filter Ch01	RW	UDINT	16#0000000a
:16#0B	Filter Ch02	RW	UDINT	16#0000000a
:16#0C	Filter Ch03	RW	UDINT	16#0000000a
:16#0D	Filter Ch04	RW	UDINT	16#0000000a

名称: Range Select Ch00

索引: 16# 2010 位长度 32

子索引: 16# 1 值 -10~+10V(-32768~32767)

☐ 完全访问 ☐ 字节数组

确定 取消

- e. On the parameter setting page of the XB6S-A08I analog current output module, you can configure the analog current range and the parameters for clearing/holding the analog output signal, as shown in the figure below.

从对象目录中选择条目

索引: 子索引	名称	标志	类型	缺省
16#2020:16#00	XB6S-A08I Config			
:16#01	Range Select Ch00	RW	UDINT	16#00000002
:16#02	Range Select Ch01	RW	UDINT	16#00000002
:16#03	Range Select Ch02	RW	UDINT	16#00000002
:16#04	Range Select Ch03	RW	UDINT	16#00000002
:16#05	Range Select Ch04	RW	UDINT	16#00000002
:16#06	Range Select Ch05	RW	UDINT	16#00000002
:16#07	Range Select Ch06	RW	UDINT	16#00000002
:16#08	Range Select Ch07	RW	UDINT	16#00000002
:16#09	TemplateMode	RW	UDINT	16#00000000
:16#0A	TemplateValue Ch00	RW	UDINT	16#00000000
:16#0B	TemplateValue Ch01	RW	UDINT	16#00000000
:16#0C	TemplateValue Ch02	RW	UDINT	16#00000000
:16#0D	TemplateValue Ch03	RW	UDINT	16#00000000

名称: Range Select Ch00

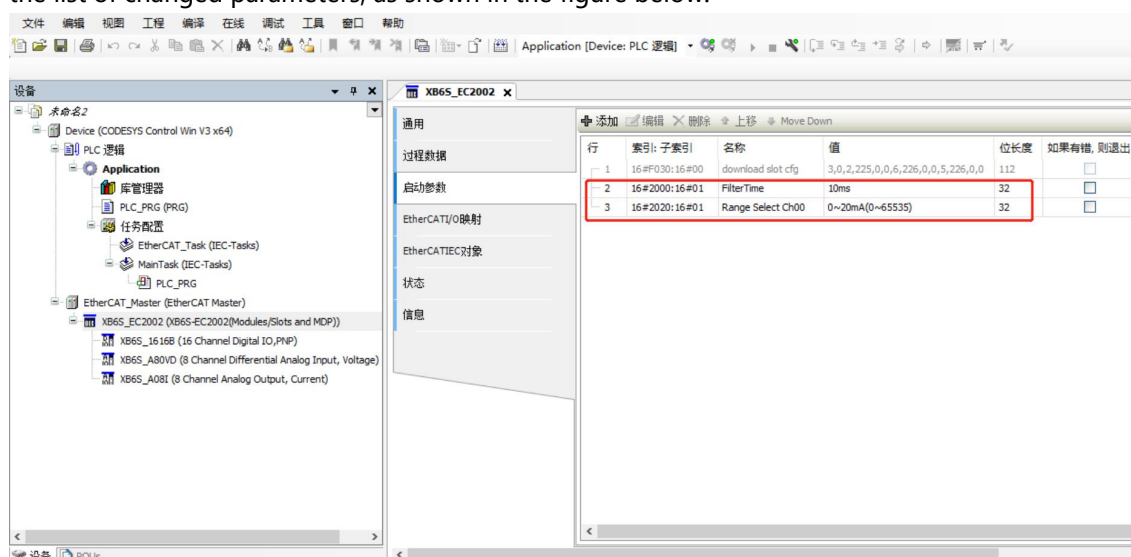
索引: 16# 2020 位长度 32

子索引: 16# 1 值 0~20mA(0~65535)

☐ 完全访问 ☐ 字节数组

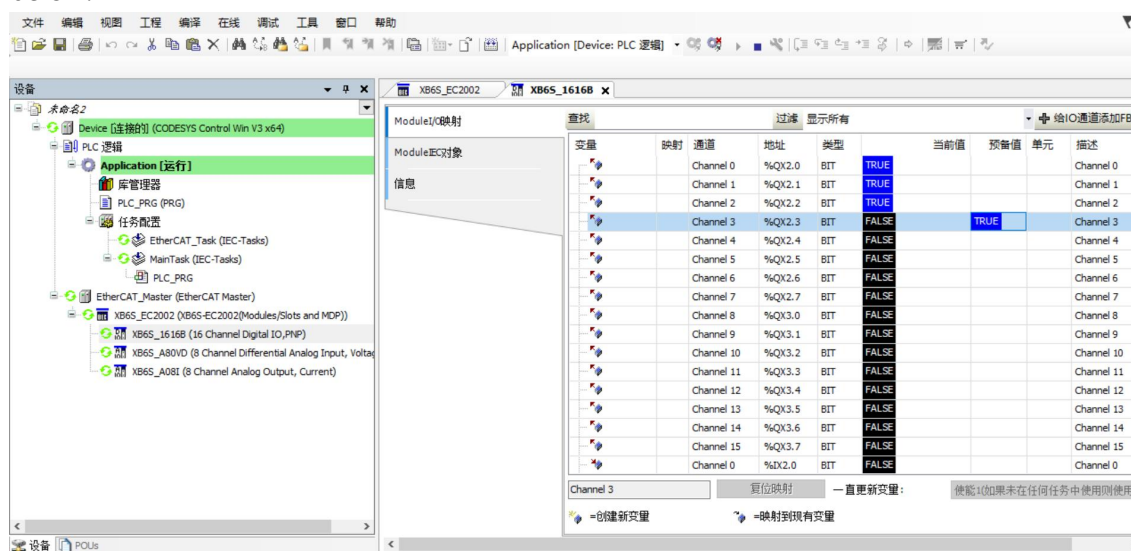
确定 取消

- f. After setting the parameters, click the OK button. On the "Startup Parameters" page, you can see the list of changed parameters, as shown in the figure below.

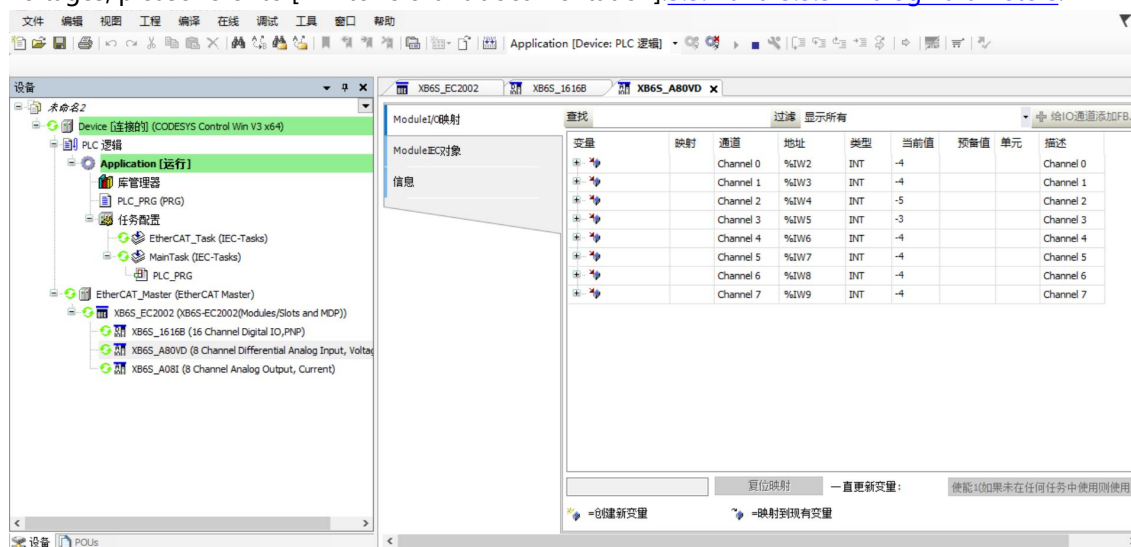


10. Verify basic functions

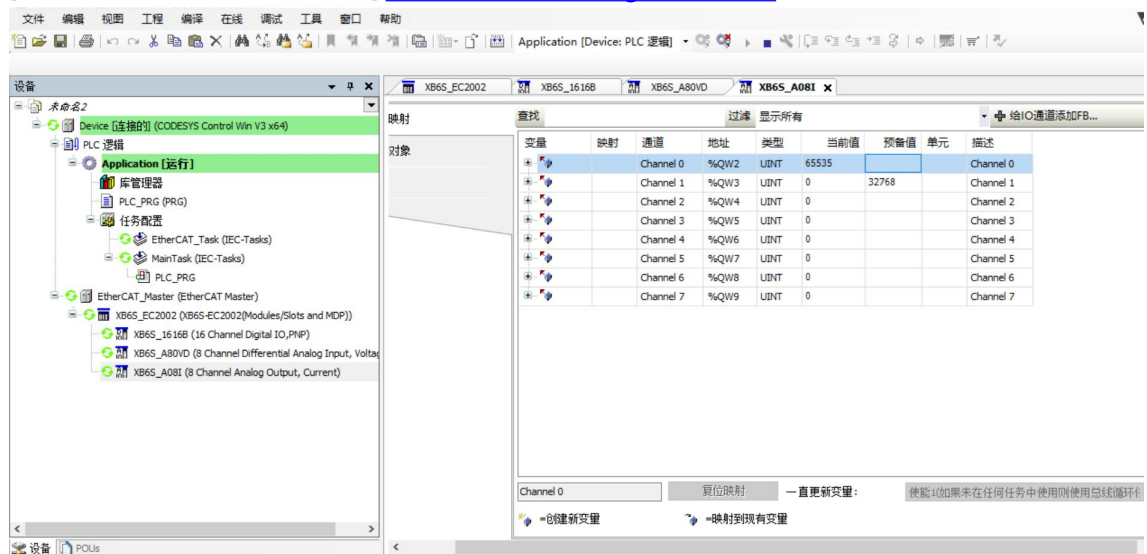
- Click "Online -> Multiple Downloads" in the menu bar. In the Multiple Downloads window, select "Always perform full download" and click "OK".
- Click the "Login" button to log in again. Double-click XB6S-1616B in the left navigation bar to expand the mapping table of the XB6S-1616B module. When an effective voltage is input to the input channel, the input value can be monitored in the mapping table. The output channel can be forced to output by clicking the cell to modify the pre-set value and clicking "Debug -> Write Value" in the menu bar, as shown in the figure below.



- Double-click XB6S-A80VD in the left navigation bar to expand the XB6S-A80VD module's mapping table. This allows you to monitor the input voltage code value for each channel, as shown in the figure below. For details on the correspondence between code values and voltages, please refer to [link to relevant documentation]. [3.3.4](#) and [3.3.5 Analog Parameters](#).

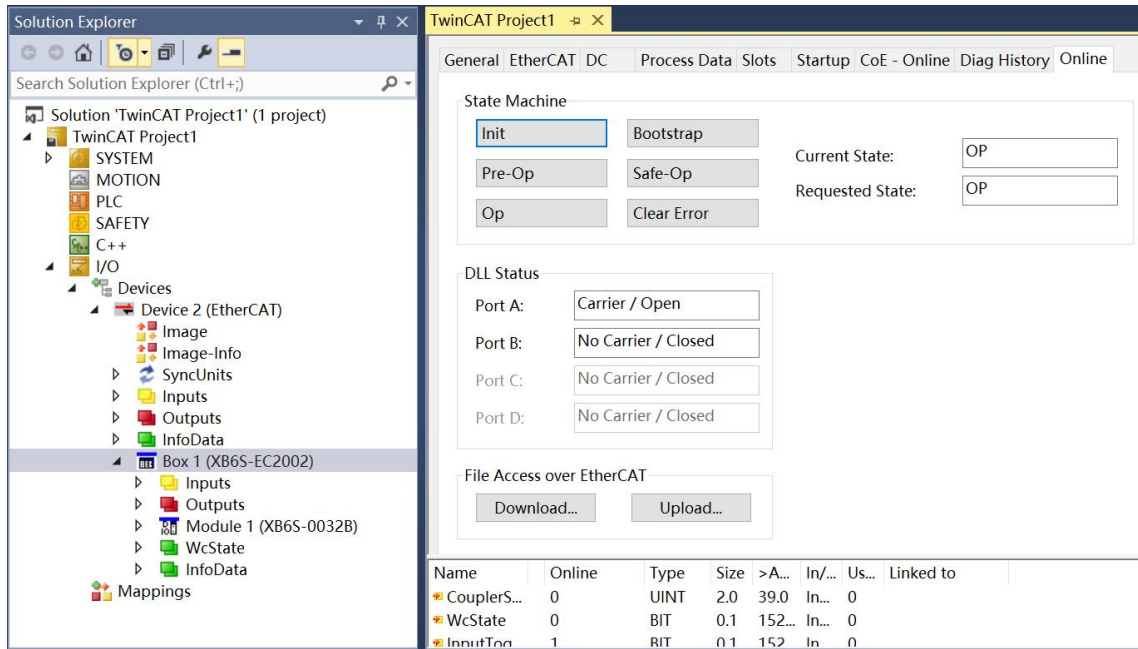


- d. Double-click XB6S-A08I in the left navigation bar to expand the XB6S-A08I module's mapping table. Entering the current code value forces output for each channel, as shown in the figure below. For details on the correspondence between code values and current, please refer to [link to relevant documentation]. [3.3.4 and 3.3.5 Analog Parameters](#).

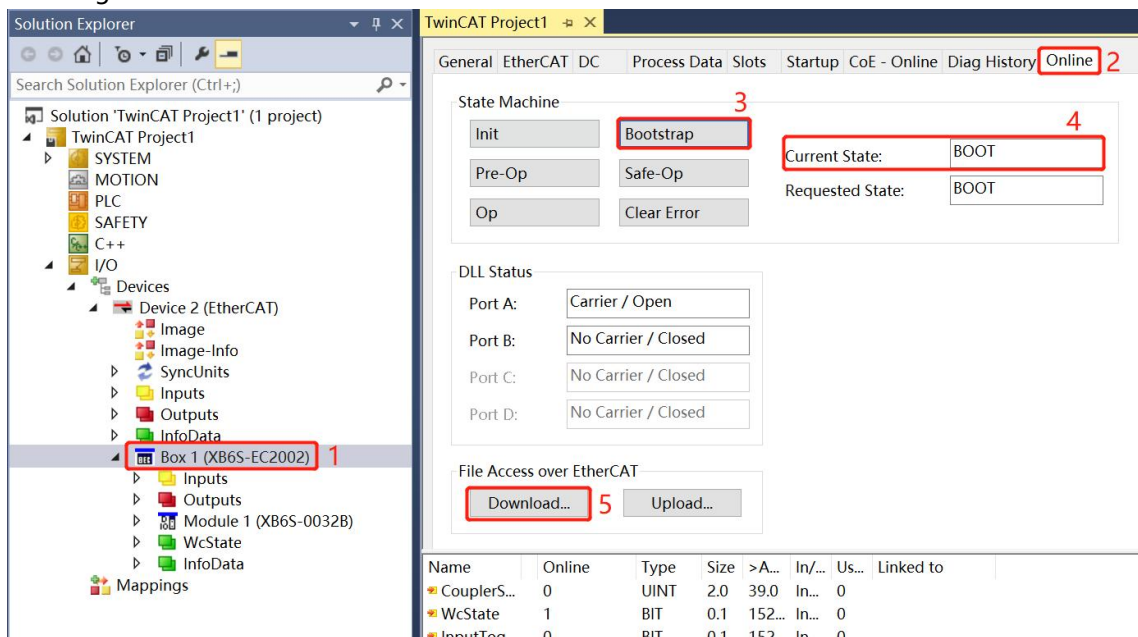


6.4 Firmware online upgrade

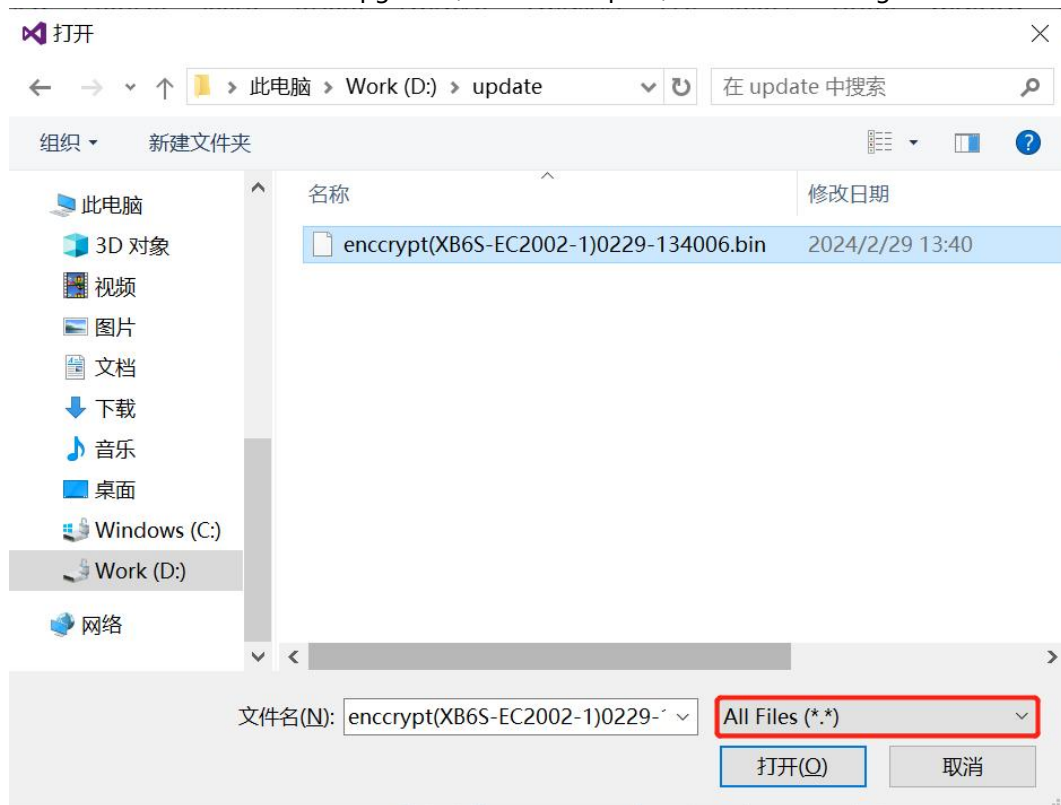
- 1、Taking TwinCAT3 software as an example, the topology is XB6S-EC2002+XB6S-0032B, as shown in the figure below.



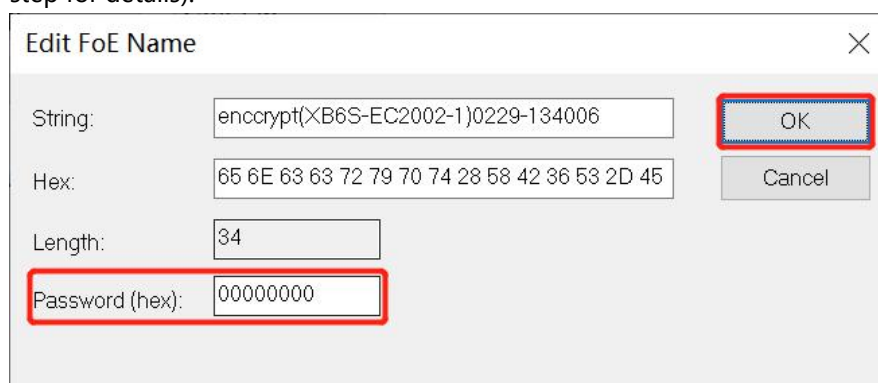
- 2、Click the coupler "XB6S-EC2002" in the left navigation tree, click the "Online" option in the right menu, click the "Bootstrap" option in State Machine, wait for the Current State to display the "BOOT" status, and then click the "Download" option in File Access over EtherCAT below, as shown in the figure below.



- 3、 In the pop-up file opening window, select the "All Files" option, select the bin file corresponding to the module that needs to be upgraded, and click "Open", as shown in the figure below.



- 4、 A settings window will pop up. Enter the password; a password of 0 indicates an upgrade of the coupler. Click "OK" to proceed with the upgrade, as shown in the image below. Note: To upgrade the corresponding slave module, enter the corresponding station number in the Password field. For example, to upgrade XB6S-0032B, enter 1 here. After confirming the upgrade, observe the progress bar below and the module's behavior to confirm whether the upgrade was successful (see the next step for details).



5、Successful upgrade process for different modules

EtherCAT coupler online upgrade:

- 1) Once the progress bar is full, the IOR of the coupler starts flashing at 10Hz (on for 50ms and off for 50ms);
- 2) The IOR (Interference Orbit) changes from flashing at 10Hz to flashing at 1Hz, indicating a successful upgrade.
- 3) After a successful online upgrade, you need to manually switch to OP mode before you can re-establish the connection.
- 4) If you need to upgrade again, you need to switch the OP state back to the BOOT state.

Online upgrade of IO module:

- 1) Once the progress bar is full, the coupler IOR and the SYS of the module being upgraded begin to flash at 10Hz (50ms on and 50ms off);
- 2) The SYS signal of the module being upgraded changes from 10Hz to off, indicating a successful upgrade (a power cycle is required after the upgrade to reconnect properly).
- 3) Other modules can be upgraded without interrupting power.

7 FAQ

7.1 Do EtherCAT slave devices support ring network redundancy?

1, In EtherCAT, ring network redundancy is a function of the PLC and is not related to I/O slave devices.