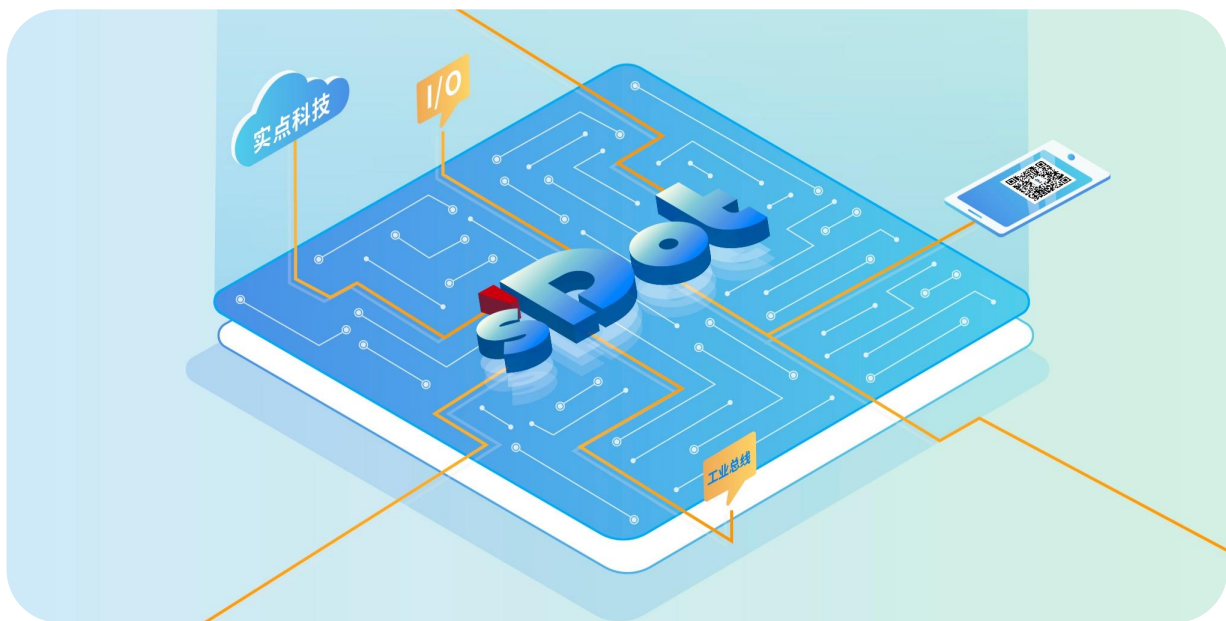




XBF5 series

Discrete I/O modules

User Manual



Nanjing Solidot Electronic Technology Co., Ltd.

Copyright © 2025-2026 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.

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: Building 40, No. 9-1, Yinlong Road, Jiangning District, Nanjing City, Jiangsu Province

Postal code: 211106

Telephone: 4007788929

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

Table of contents

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	6
3	Module Introduction	9
3.1	EtherCAT coupler	9
3.1.1	Panel structure	9
3.1.2	Indicator light function	10
3.1.3	Product Parameters	12
3.1.3.1	Interface parameters	12
3.1.3.2	Power parameters	12
3.1.3.3	General parameters	13
3.1.4	Power wiring diagram	14
3.1.5	Bus wiring	14
3.1.6	Expansion interface wiring	15
3.1.7	Outline Dimensions	15
3.2	PROFINET coupler	16
3.2.1	Panel structure	16
3.2.2	Indicator light function	17
3.2.3	Product Parameters	18
3.2.3.1	Interface parameters	18
3.2.3.2	Power parameters	18
3.2.3.3	General parameters	19
3.2.4	Power wiring diagram	20
3.2.5	Bus wiring	20
3.2.6	Expansion interface wiring	21

3.2.7	Outline Dimensions	21
3.3	Digital I/O modules	22
3.3.1	Panel structure	22
3.3.2	Indicator light function	21
3.3.3	Rotary DIP switch	22
3.3.4	Technical parameters	23
3.3.4.1	Digital input module parameters	23
3.3.4.2	Digital Input/output Module Parameters	24
3.3.4.3	Digital output module parameters	29
3.3.4.4	General technical parameters	31
3.3.5	Discrete I/O expansion interface wiring	32
3.3.5.1	RJ45 communication interface	32
3.3.5.2	M8 communication interface	32
3.3.6	I/O Wiring Diagram	34
3.3.6.1	XBF5-3200/XBF5A-3200/XBF5B-3200/XBF5C-3200	34
3.3.6.2	XBF5-0032A/XBF5A-0032A/XBF5B-0032A/XBF5C-0032A	35
3.3.6.3	XBF5-0032B/XBF5A-0032B/XBF5B-0032B/XBF5C-0032B	36
3.3.6.4	XBF5-1616A/XBF5A-1616A/XBF5B-1616A/XBF5C-1616A	37
3.3.6.5	XBF5-1616B/XBF5A-1616B/XBF5B-1616B/XBF5C-1616B	38
3.3.6.6	XBF5A-1600	39
3.3.6.7	XBF5A-0016A	40
3.3.6.8	XBF5A-0016B	41
3.3.6.9	XBF5A-0808A	42
3.3.6.10	XBF5A-0808B	43
3.3.7	Outline Dimensions	44
4	Installation and removal	45
4.1	Installation Guide	45
4.2	Installation and disassembly steps	46
4.3	Installation and disassembly diagram	47
4.3.1	Coupler installation and disassembly diagram	47
4.3.2	I/O module installation and removal diagram	50
5	Wiring	54
5.1	Terminal blocks	54
5.2	E-CON Terminal Usage Specifications	55
5.3	M8 Communication Interface Dedicated Cable Specifications	55

5.4	Wiring instructions and requirements	56
6	Use	58
6.1	Parameter Description	58
6.1.1	Digital input filtering	58
6.1.2	Clear/Hold digital output signal	59
6.2	Fault code information	60
6.2.1	Coupler general fault codes	60
6.2.2	Fault Code Viewing	62
6.3	EtherCAT coupler configuration application	63
6.3.1	Application in the TwinCAT3 software environment	63
6.4	PROFINET Coupler Configuration Application	75
6.4.1	Application in the TIA Portal V17 software environment	75
6.5	Firmware online upgrade	97

1 Product Overview

1.1 Product Introduction

The XBF5 series discrete I/O modules are used in combination with discrete scalable couplers. The coupler handles fieldbus communication, connecting the expanded I/O modules to a real-time industrial Ethernet system, thereby enabling real-time data exchange between the expanded I/O modules and the coupler/controller.

The XBF5 series of discrete 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.

1.2 Product Features

- **Low node usage**
A node consists of a bus coupler and 1 to 32 XBF5 series discrete I/O modules.
- **Flexible expansion and configuration**
The bus coupler has four RJ45 expansion interfaces, which can be serially combined to connect various types of I/O modules.
- **Rich functionality**
It offers a complete range of I/O types and can integrate various digital modules, relay modules, etc., to meet the needs of different applications.
- **High compatibility**
The bus coupler communication interface conforms to communication standards and supports mainstream 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**
Digital input module combination, baud rate 6MHz, maximum scan cycle approximately 1ms;

This is a combination of digital and analog input modules, with a baud rate of 6MHz and a maximum scan cycle of approximately 3.5ms. (The connected modules can handle up to 1020 bytes of uplink and downlink data.)

- **Easy to install**

Mounted on DIN 35 mm standard rails.

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

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, relay modules, etc.

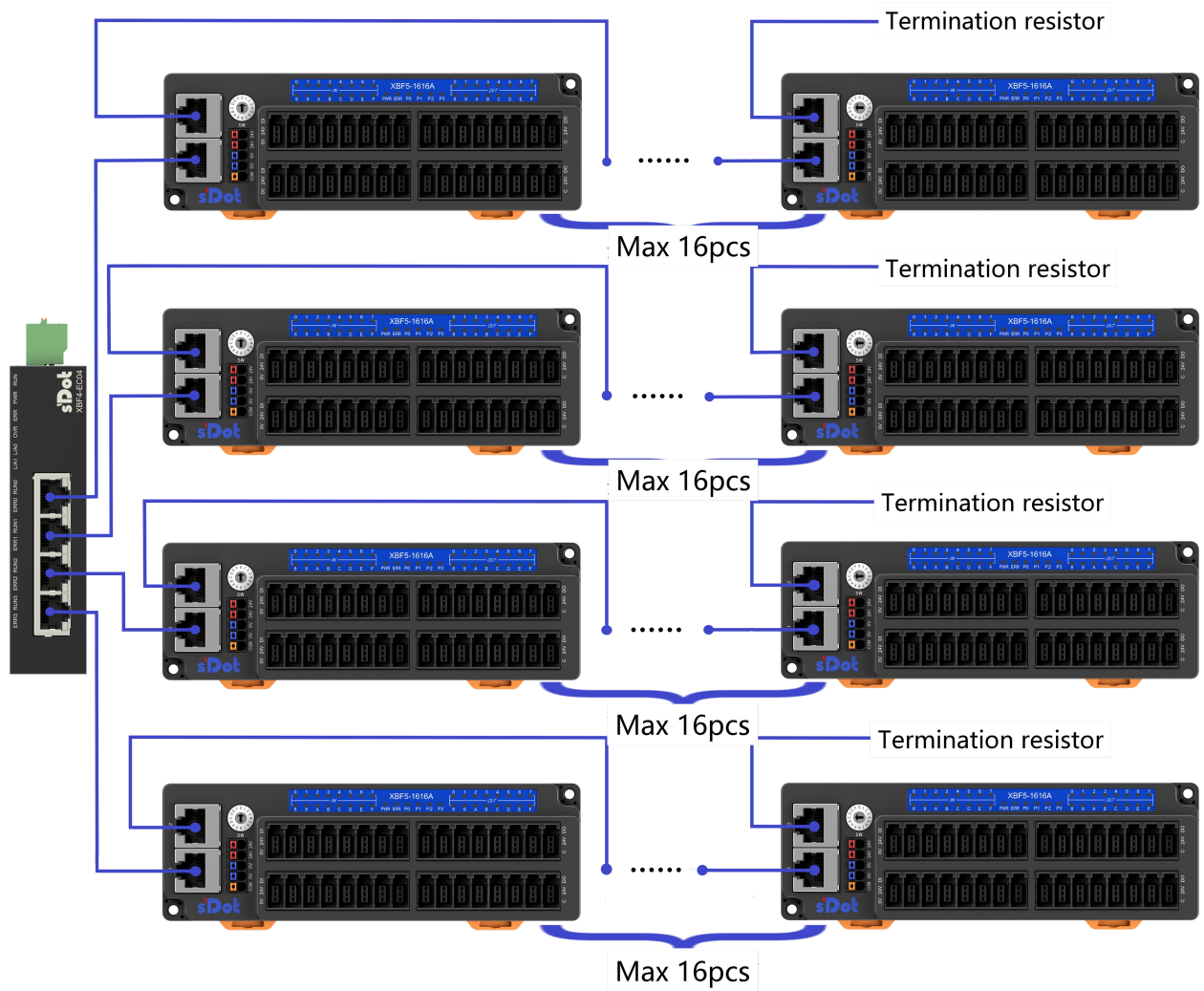
Application method: An application approach that combines modules such as couplers, digital signals, and relays.

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.

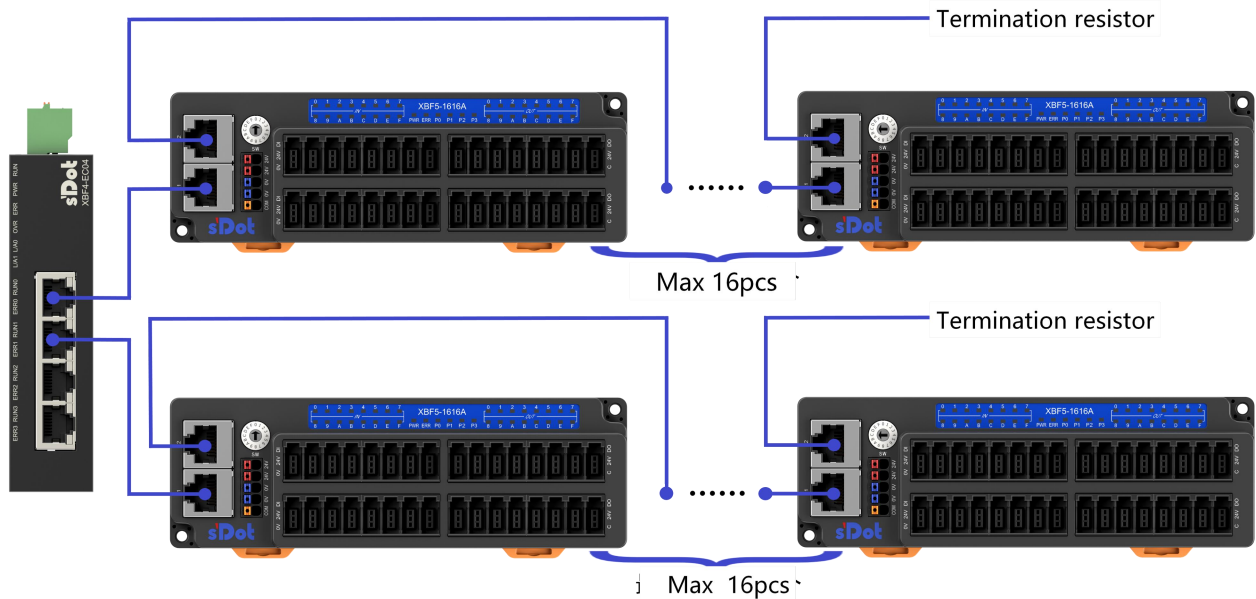
Configuration rules: The bus coupler has four module expansion interfaces (RJ45 type), each of which can serially connect up to 16 modules (module DIP switch station numbers 0~F, which cannot be repeated), and can be expanded to a maximum of 32 XB6S discrete I/O modules.

The product uses a combination of couplers and XB6S discrete I/O modules, and the following two types of topology combinations are provided for reference.

Product combination option 1 (all 4 interfaces are used, each interface can connect up to 16 XB6S discrete I/O modules, for a total of up to 32 XB6S discrete I/O modules)



Product combination option two (using 2 interfaces, each interface can connect up to 16 XBF5 discrete I/O modules, for a total of up to 32 XBF5 discrete I/O modules)



Note: In addition to the two methods mentioned above, you can also combine them freely, for example:

- The first interface connects 16 modules;
- The second interface connects to four modules;
- The third interface connects to four modules;
- The fourth interface connects to four modules;

A total of 28 modules can be connected. In total, no more than 16 modules can be connected to a single interface, and no more than 32 modules can be connected to all interfaces. Otherwise, the power consumption will be too high, which may damage the bus coupler.

2 Naming Rules

2.1 Naming Rules

2.1.1 Coupler naming rules

XBF 4 - EC 04
(1) (2) (3) (4)

Serial Number	Meaning	Value description
(1)	Product Type	XBF: XB6S Discrete I/O
(2)	Product Series	4: Integrated
(3)	Bus Protocol	EC: EtherCAT protocol PN: PROFINET protocol
(4)	Number of expansion module interfaces	04: Four RJ45 expansion ports

2.1.2 I/O module naming rules

XBF **5** **-** **16** **16** **A**
(1) **(2)** **(3)** **(4)** **(5)**

Serial number	Meaning	Value description		
(1)	Product Type	XBF: XB6S Discrete I/O		
(2)	Product Series	5: Discrete I/O numbering, E-CON pluggable terminal block, RJ45 communication interface		
		5A: Discrete I/O numbering, spring-loaded terminals, RJ45 communication interface		
		5B: Discrete I/O numbering, E-CON pluggable terminal block, M8 communication interface		
		5C: Discrete I/O numbering, spring-loaded terminals, M8 communication interface		
(3)	Number of input signal points	Number of digital: 00, 08, 16, 32		
(4)	Number of output signal points	Number of digital: 00, 08, 16, 32		
(5)	Input/output characteristics	Digital		
		coding	Input	Output
		A	NPN/PNP compatible	NPN
		B	NPN/PNP compatible	PNP
		default	NPN/PNP compatible	/

2.2 Module list

Model	Product Description
XBF4-EC04	Integrated Scalable EtherCAT bus Coupler module
XBF4-EC04A	Integrated Scalable EtherCAT bus Coupler module
XBF4-PN04	Integrated Scalable PROFINET bus Coupler module
XBF5-3200	32-channel digital input module, NPN/PNP compatible input, input filtering default 3ms

	(E-CON plug-in terminal, RJ45 communication interface)
XBF5-0032A	32-channel digital output module, NPN type output (E-CON pluggable terminal, RJ45 communication interface)
XBF5-0032B	32-channel digital output module, PNP type output (E-CON pluggable terminal, RJ45 communication interface)
XBF5-1616A	16-channel digital input and 16-channel digital output module (E-CON pluggable terminal block, RJ45 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is NPN type.
XBF5-1616B	16-channel digital input and 16-channel digital output module (E-CON pluggable terminal block, RJ45 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is PNP type.
XBF5A-3200	32-channel digital input module, NPN/PNP compatible input, input filtering default 3ms (Spring-loaded terminal block, RJ45 communication interface)
XBF5A-0032A	32-channel digital output module, NPN type output (spring-loaded terminal, RJ45 communication interface).
XBF5A-0032B	32-channel digital output module, PNP type output (spring-loaded terminal, RJ45 communication interface).
XBF5A-1616A	16-channel digital input and 16-channel digital output module (spring-loaded terminals, RJ45 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is NPN type.
XBF5A-1616B	16-channel digital input and 16-channel digital output module (spring-loaded terminals, RJ45 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is PNP type.
XBF5A-1600	16-channel digital input module, NPN/PNP compatible input, input filtering default 3ms (Spring-loaded terminal block, RJ45 communication interface)
XBF5A-0016A	16-channel digital output module, NPN type output (spring-loaded terminal, RJ45 communication interface).
XBF5A-0016B	16-channel digital output module, PNP type output (spring-loaded terminal, RJ45 communication interface).
XBF5A-0808A	8-channel digital input and 8-channel digital output module (spring-loaded terminals, RJ45 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is NPN type.
XBF5A-0808B	8-channel digital input and 8-channel digital output module (spring-loaded terminals, RJ45 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is PNP type.
XBF5B-3200	32-channel digital input module, NPN/PNP compatible input, input filtering default 3ms (E-CON plug-in terminal, M8 communication interface)
XBF5B-0032A	32-channel digital output module, NPN type output (E-CON pluggable terminal, M8 communication interface)
XBF5B-0032B	32-channel digital output module, PNP type output (E-CON pluggable terminal, M8 communication interface)

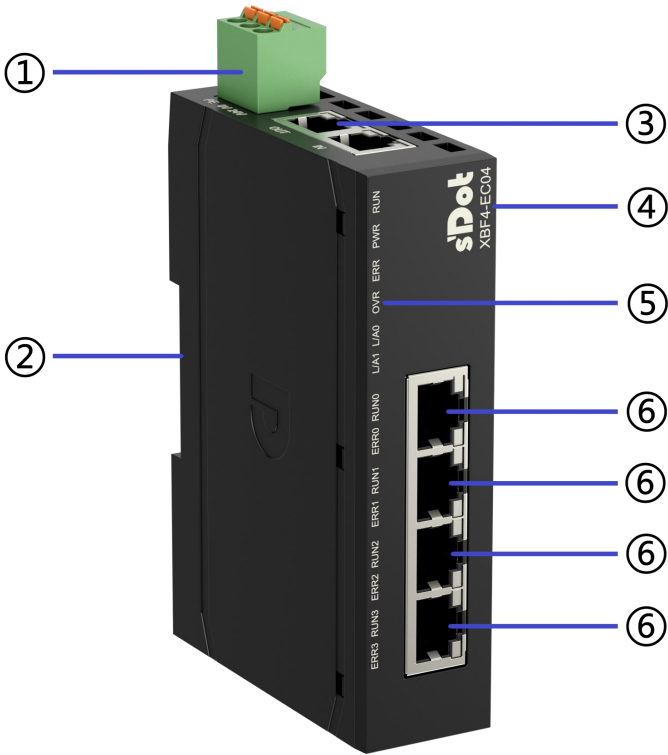
XBF5B-1616A	16-channel digital input and 16-channel digital output module (E-CON pluggable terminal block, M8 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is NPN type.
XBF5B-1616B	16-channel digital input and 16-channel digital output module (E-CON pluggable terminal block, M8 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is PNP type.
XBF5C-3200	32-channel digital input module, NPN/PNP compatible input, input filtering default 3ms (Spring-loaded terminal block, M8 communication interface)
XBF5C-0032A	32-channel digital output module, NPN type output (spring-loaded terminal, M8 communication interface).
XBF5C-0032B	32-channel digital output module, PNP type output (spring-loaded terminal, M8 communication interface).
XBF5C-1616A	16-channel digital input and 16-channel digital output module (spring-loaded terminals, M8 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is NPN type.
XBF5C-1616B	16-channel digital input and 16-channel digital output module (spring-loaded terminals, M8 communication interface) Input is NPN/PNP compatible, input filtering defaults to 3ms, output is PNP type.

Note: All XBF5 models support optional dust covers.

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	Guide rail slot	Suitable for mounting on DIN 35 mm guide rails
③	Bus interface	2×RJ45, EtherCAT bus interface
④	Module identifier	Marking module logo and model
⑤	Module indicator lights and indicator light labels	Indicator module power status and operating status

⑥	Extension module interface	4×RJ45, expansion interface
---	----------------------------	-----------------------------

3.1.2 Indicator light function

EtherCAT Coupler Indicator Definition				
logo	name	color	state	Status Description
RUN	Operating status indicator	Green	ON	EtherCAT OP status
			Flickering 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 flicker	Bootstrap status
			OFF	EtherCAT Init Status
PWR	Power indicator light	Green	ON	Coupler power supply is normal
			OFF	The module is not powered on or the power supply is abnormal.
ERR	Alarm indicator	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
			Flickering at 2.5Hz	Common configuration error
			OFF	EtherCAT communication is normal.
OVR	Overload indicator light	Red	ON	The power supply load reaches 90% ($\pm 5\%$) or more.
			OFF	Power supply load is less than 90% ($\pm 5\%$)
L/A0	Network port IN status indicator	Green	ON	Establish network connection
			Flashing	Connection established and data exchanged
			OFF	No network connection established or abnormal
L/A1	Network port OUT status indicator	Green	ON	Establish network connection
			Flashing	Connection established and data exchanged

			OFF	No network connection established or abnormal
RUN0~3	Interface running status indicator	Green	ON	The interface and the extension module have business data interaction.
			flickering 1Hz	The interface establishes a connection with the extension module without exchanging business data.
			OFF	The interface and the expansion module failed to establish a connection or communication was abnormal.
ERR0~3	Interface fault indicator light	Red	ON	Interface communication initialization failed or communication anomalies occurred, such as module offline or station number conflict.
			OFF	Expansion module not connected, or communication is normal.

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.

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 S/FTP cable			
Transmission rate		100Mbps			
Minimum cycle time		250us			
Transmission distance		≤100m (distance between stations)			
Bus interface		2×RJ45			
Coupler extension interface parameters					
Extension module interface		4×RJ45			
Maximum number of coupler slave stations connected in series		32			
Maximum number of slave stations connected in series on a single interface		16			
Data transmission medium		Ethernet/EtherCAT CAT5 S/FTP cable			
baud rate and corresponding scan cycle	baud rate	6MHz	3MHz	1MHz	115200Hz
	Typical data volume	1ms	1.5ms	3ms	22ms
	Maximum data volume	3.5ms	5.5ms	14.5ms	114ms
Transmission distance		≤50m (total distance from the coupler interface to the last I/O module of this branch, with a single interface supporting 16 modules)			
Maximum transmission distance between discrete I/O modules		30m			
Input/output process data volume	XBF-EC04	1020 Bytes[1]			
	XBF-EC04A	988 Bytes[1]			

Note [1]: The total length of uplink and downlink data does not exceed 1020Bytes/988Bytes.

3.1.3.2 Power parameters

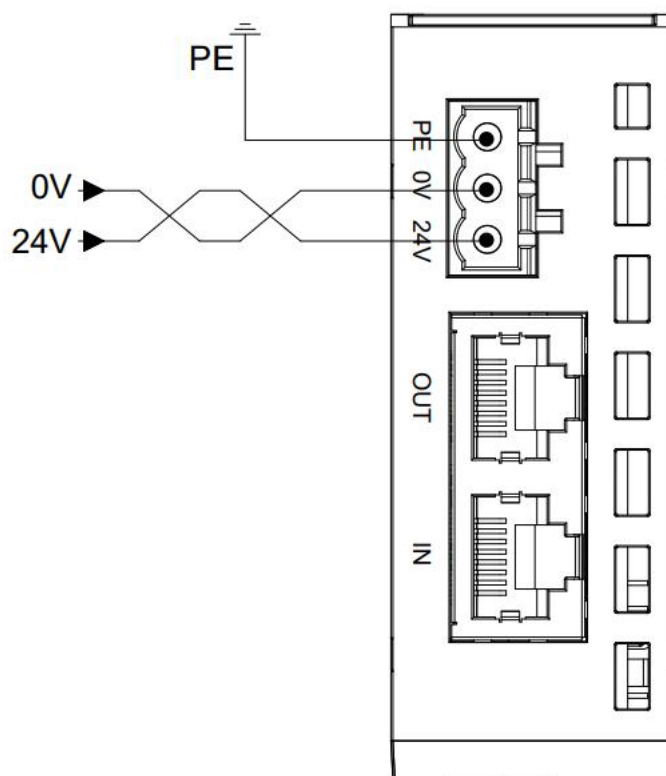
Power parameters	
Input voltage	SELV Input 24VDC (18V~36V)
Input current	<0.95A
Supply current	<500mA (maximum supply current for a single interface) <750mA (maximum supply current for all four interfaces)
Power supply voltage	20VDC~24VDC

3.1.3.3 General parameters

General technical parameters		
Specifications and dimensions		112.7×28×76mm
Weight		140g
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/Z Triaxial, 10 cycle/Axial (100min)
	Impact resistance	IEC 60068-2-27Mechanical shock 150m/s ² ,11ms, ±X/Y/Z Six directions 3Second-rate/Direction, Together18Second-rate
	Protection level	IP20
	Overvoltage category	I
	Pollution level	Level 2
Module error self-recovery		support
Disconnection check		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)
Reverse connection protection		support
Surge protection		support

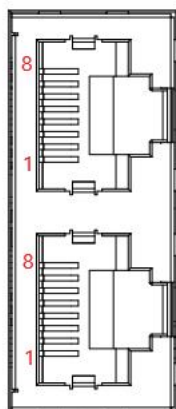
3.1.4 Power wiring diagram

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 that the PE is reliably grounded (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	—
5	—
6	RD-
7	—
8	—

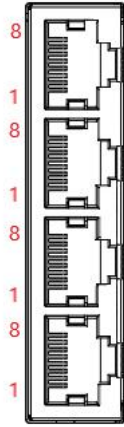
⚠ Precautions

- 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 Expansion interface wiring

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



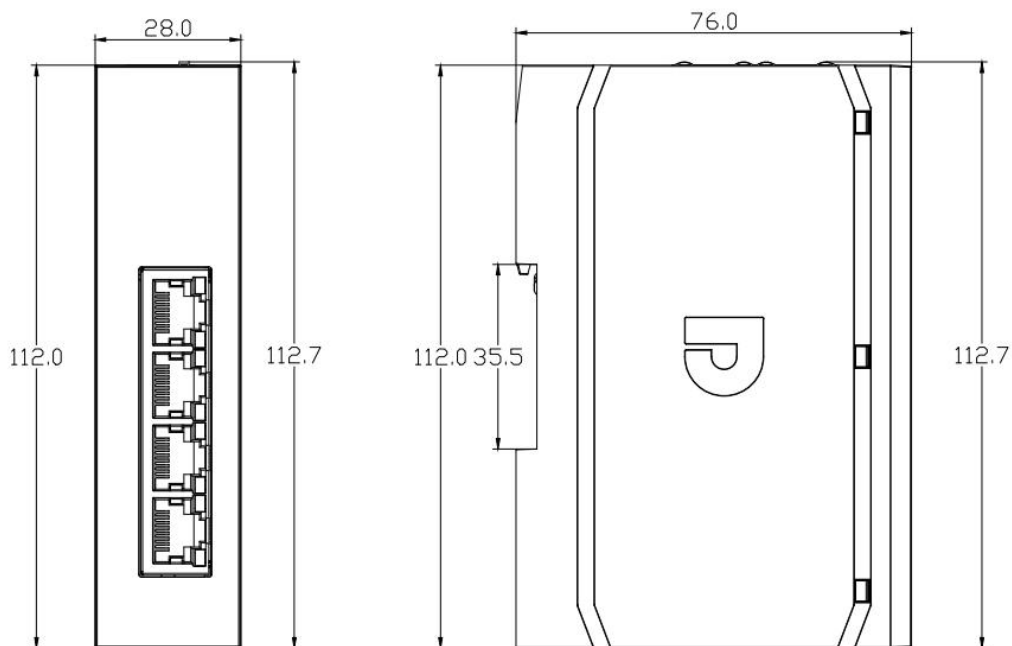
pin number	Signal
1	B
2	A
3	SGND
4	—
5	—
6	S24V
7	—
8	—

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 30m.
- Please do not connect to any device other than our product interface.

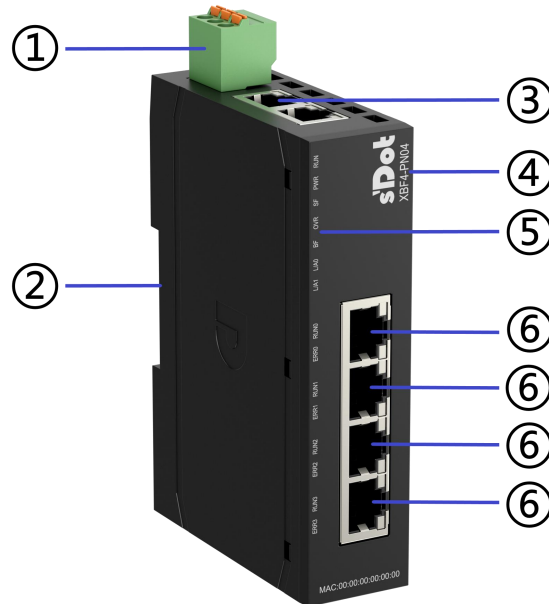
3.1.7 Outline Dimensions

Coupler dimensions (unit: mm)



3.2 PROFINET coupler

3.2.1 Panel structure



serial number	name	illustrate
①	Power terminal	3P spring-loaded terminal block
②	Guide rail slot	Suitable for mounting on DIN 35 mm guide rails
③	Bus interface	2×RJ45, PROFINET bus interface
④	Module identifier	Marking module logo and model
⑤	Module indicator lights and indicator light labels	Indicator module power status and operating status
⑥	Extension module interface	4×RJ45, expansion interface

3.2.2 Indicator light function

PROFINET Coupler Indicator Definitions				
logo	name	color	state	Status Description
RUN	Operating status indicator	Green	ON	Equipment starts normally
			Flashing	Main controller startup failed
			OFF	The device cannot start.
PWR	Power indicator light	Green	ON	Coupler power supply is normal
			OFF	The module is not powered on or the power supply is abnormal.
SF	System error indicator	Red	ON	There is a PROFINET alarm message.
			OFF	No PROFINET alarm information
BF	Bus fault indicator light	Red	ON	No network connection
			Flashing	No PROFINET connection established with the controller
			OFF	Establish PROFINET connection with controller
OVR	Overload indicator light	Red	ON	The power supply load reaches 90% ($\pm 5\%$) or more.
			OFF	Power supply load is less than 90% ($\pm 5\%$)
L/A0	Network port IN status indicator	Green	ON	Establish network connection
			Flashing	Connection established and data exchanged
			OFF	No network connection established or abnormal
L/A1	Network port OUT status indicator	Green	ON	Establish network connection
			Flashing	Connection established and data exchanged
			OFF	No network connection established or abnormal
RUN0~3	Interface running status indicator	Green	ON	The interface and the extension module have business data interaction.
			flickering 1Hz	The interface establishes a connection with the extension module without exchanging business data.
			OFF	The interface and the expansion module failed to establish a connection or communication was abnormal.
ERR0~3	Interface fault indicator light	Red	ON	Interface communication initialization failed or communication anomalies occurred, such as module offline or station number conflict.
			OFF	Expansion module not connected, or communication is normal.

3.2.3 Product Parameters

3.2.3.1 Interface parameters

PROFINET interface parameters					
Bus Protocol		PROFINET			
Number of stations		It depends on the number of slave stations supported by the main station.			
Data transmission medium		Ethernet CAT5 cable			
Transmission rate		100Mbps			
Minimum loop time [1]		1ms			
Transmission distance		≤100m (distance between stations)			
Bus interface		2×RJ45			
Coupler extension interface parameters					
Extension module interface		4×RJ45			
Maximum number of coupler slave stations connected in series		32			
Maximum number of slave stations connected in series on a single interface		16			
Data transmission medium		Ethernet CAT5 cable			
baud rate and corresponding scan cycle	baud rate	6MHz	3MHz	1MHz	115200Hz
	Typical data volume	1ms	1.5ms	3ms	22ms
	Maximum data volume	3.5ms	5.5ms	14.5ms	114ms
Transmission distance		≤50m (total distance from the coupler interface to the last I/O module of this branch, with a single interface supporting 16 modules)			
Maximum transmission distance between discrete I/O modules		30m			
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.

3.2.3.2 Power parameters

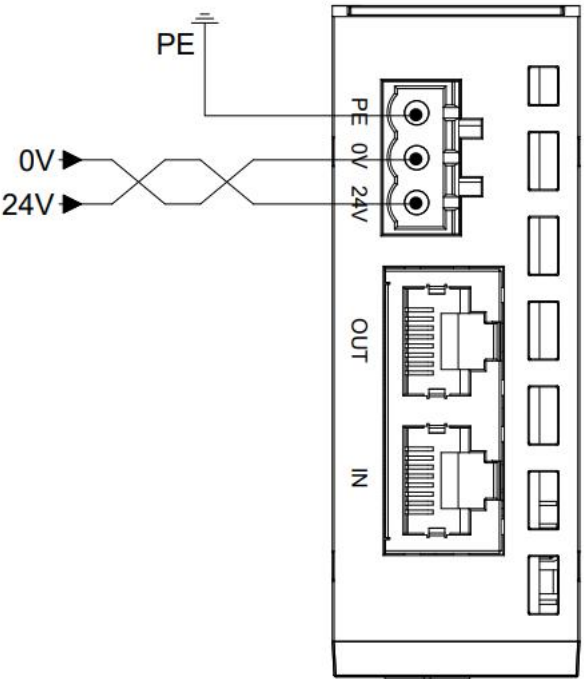
Power parameters	
Input voltage	SELV Input 24VDC (18V~36V)
Input current	<0.95A
Supply current	<500mA (maximum supply current for a single interface) <750mA (maximum supply current for all four interfaces)
Power supply voltage	20VDC~24VDC

3.2.3.3 General parameters

General technical parameters		
Specifications and dimensions		112.7×28×76mm
weight		140g
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/Z Six directions 3Second-rate/Direction, Total 18 Second-rate
	Protection level	IP20
	Overvoltage category	I
	Pollution level	Level 2
PROFINET IO RT		support
Abnormal self-recovery		support
Hardware testing		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

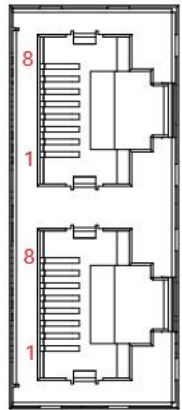
3.2.4 Power wiring diagram

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 that the PE is reliably grounded (twisted pair cable is recommended for the power supply).



3.2.5 Bus wiring

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



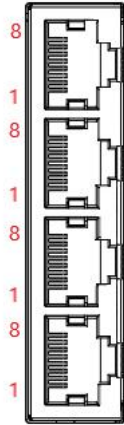
pin number	Signal
1	TD+
2	TD-
3	RD+
4	—
5	—
6	RD-
7	—
8	—

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.

3.2.6 Expansion interface wiring

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



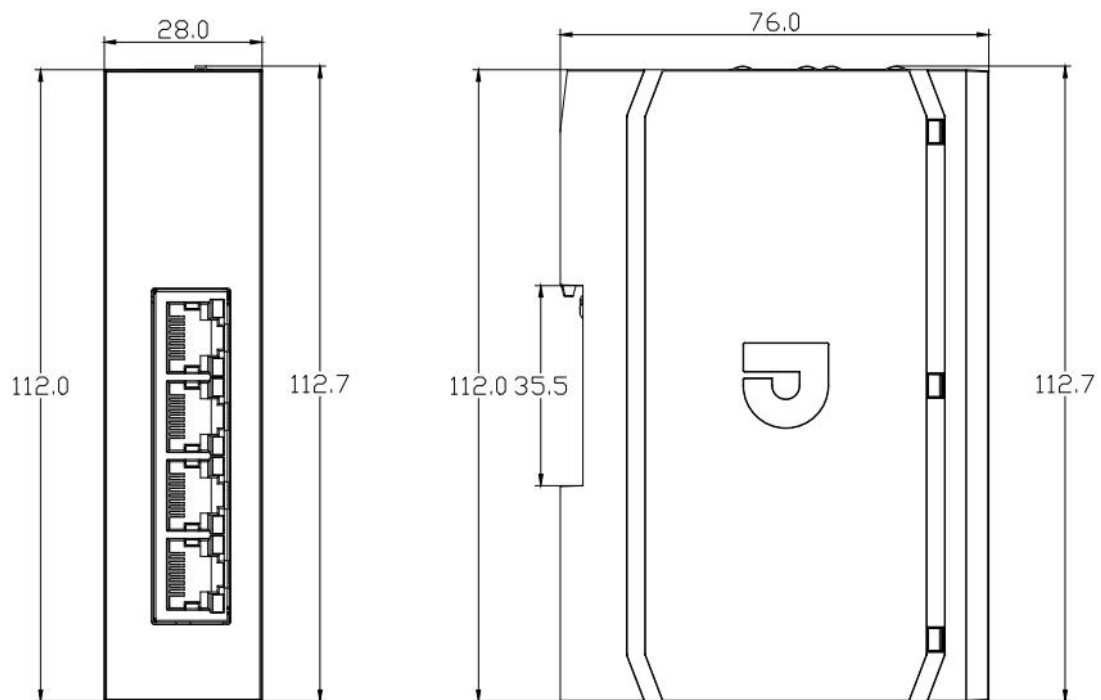
pin number	Signal
1	B
2	A
3	SGND
4	—
5	—
6	S24V
7	—
8	—

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 30m.
- Please do not connect to any device other than our product interface.

3.2.7 Outline Dimensions

Coupler dimensions (unit: mm)



3.3 Digital I/O modules

3.3.1 Panel structure



serial number	name	illustrate
①	Rotary DIP switch	Set station number
②	Power terminal	5P spring-loaded terminal block
③	Extension Interface	2×RJ45
④	Module indicator lights and indicator light labels	Indicator module power status and operating status
⑤	Channel indicator lights and signs	Indicate channel status
⑥	Input/output channels	Terminal blocks

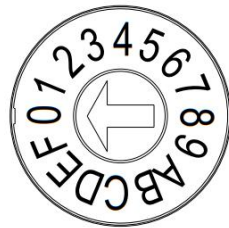
3.3.2 Indicator light function

Digital I/O module indicator light definitions				
logo	name	color	state	Status Description
PWR	Power indicator light	Green	ON	The module's internal 3.3V power supply is powered on normally.
			OFF	The module's internal 3.3V power supply is malfunctioning.
ERR	Fault indicator light	Red	ON	Module communication with the main station is abnormal.
			10Hz flicker	The online module upgrade has completed and is restarting.
			OFF	The module communicates normally with the main station.
Pn (n: 0~3)	Interface operation indicator light	Green	ON	In business data interaction, this simultaneously indicates that the module is connected to the nth interface of the coupler.
			flickering 1Hz	Initialization successful, no business data interaction.
			10Hz flicker	Firmware upgrade phase
			OFF	The module and coupler did not establish communication.
0~F	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~F	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.

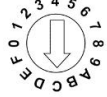
3.3.3 Rotary DIP switch

Rotary DIP switch instructions

When an I/O module combination acts as a slave in a configuration application, its station number in the network must first be set. The station number is set using a rotary DIP switch, with a range of 0 to F. A single coupler interface can occupy a maximum of 16 station numbers (station numbers cannot be repeated), therefore each coupler interface can connect a maximum of 16 modules serially. The DIP switches and their meanings are shown in the following diagram:



Station number rotary dial setting diagram

DIP switch settings	Setting value	Station number value
	0	0
	1	1
⋮	⋮	⋮
	B	B(11)
	C	C(12)
	D	D (13)
	E	E(14)
	F	F(15)

- Remark:**
- 1、 Please select a flat-top rotary dial switch with a 2mm opening.
 - 2、 If the station number needs to be changed during communication, after the new station number is set, the entire I/O module group must be deleted and powered on again. The module must then be added and configured again for the new settings to take effect.

- 3、 If the station number is set to be duplicated, the module will encounter communication errors or be unable to connect to the main station.**

3.3.4 Technical parameters

3.3.4.1 Digital input module parameters

Digital input		
Product Model	XBF5-3200/XBF5A-3200/XBF5B-3200/XBF5C-3200	XBF5A-1600
Input power supply rated voltage	24VDC (20V~24V)	
Input power supply rated current	≤20mA	≤12mA
Input rated voltage	24VDC (20.4V~28.8V)	
Typical input current	5mA/ch (24VDC)	
Number of input signal points	32	16
Input signal type	NPN/PNP compatible	
Input signal form	direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form	
OFF voltage/OFF current	-3V to +5V / less than 0.9mA	
ON voltage/ON current	11V~30V/2.1mA or more	
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	20mA	12mA
Power consumption	0.48W	0.288W
Numeric input type	Type1/Type3	
Channel indicator lights	Green LED lights	

3.3.4.2 Digital Input/Output Module Parameters

Digital input		
Product Model	XBF5-1616A/XBF5A-1616A/XBF5B-1616A/XBF5C-1616A	XBF5-1616B/XBF5A-1616B/XBF5B-1616B/XBF5C-1616B
Input power supply rated voltage	24VDC (20V~24V)	
Input power supply rated current	≤20mA	
Input rated voltage	24VDC (20.4V~28.8V)	
Typical input current	5mA/ch (24VDC)	
Number of input signal points	16	
Input signal type	NPN/PNP compatible	
Input signal form	direct voltage input form Sink input: NPN open-collector input form Source type input: PNP open collector input form	
OFF voltage/OFF current	-3V to +5V / less than 0.9mA	
ON voltage/ON current	11V~30V/2.1mA or more	
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	20mA	
Power consumption	0.48W	
Numeric input type	Type1/Type3	
Channel indicator lights	Green LED lights	
Digital output		
Number of output signal points	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	

Digital input		
Product Model	XBF5A-0808A	XBF5A-0808B
Input power supply rated voltage	24VDC (20V~24V)	
Input power supply rated current	≤15mA	≤15mA
Input rated voltage	24VDC (20.4V~28.8V)	
Typical input current	5mA/ch (24VDC)	
Number of input signal points	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 / less than 0.9mA	
ON voltage/ON current	11V~30V/2.1mA or more	
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	15mA	15mA
Power consumption	0.36W	0.36W
Numeric input type	Type1/Type3	
Channel indicator lights	Green LED lights	
Digital output		
Number of output signal points	8	
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	

3.3.4.3 Digital output module parameters

Digital output		
Product Model	XBF5-0032A/XBF5A-0032A/XBF5B-0032A/XBF5C-0032A	XBF5-0032B/XBF5A-0032B/XBF5B-0032B/XBF5C-0032B
Input power supply rated voltage	24VDC (20V~24V)	
Input power supply rated current	$\leq 20\text{mA}$	
Field-side input voltage range	24VDC (20.4V~28.8V)	
Number of output signal points	32	32
Output signal type	NPN	PNP
Output voltage drop	$< 1\text{V}$	
Output load type	Resistive load, inductive load, lamp load	
Single-channel rated current	Max: 0.5A (see details) Figure 1	
Leakage current	$< 10\mu\text{A}$	
reaction time	$< 150\mu\text{s}$	
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	20mA	
Power consumption	0.48W	
Channel indicator lights	Green LED lights	

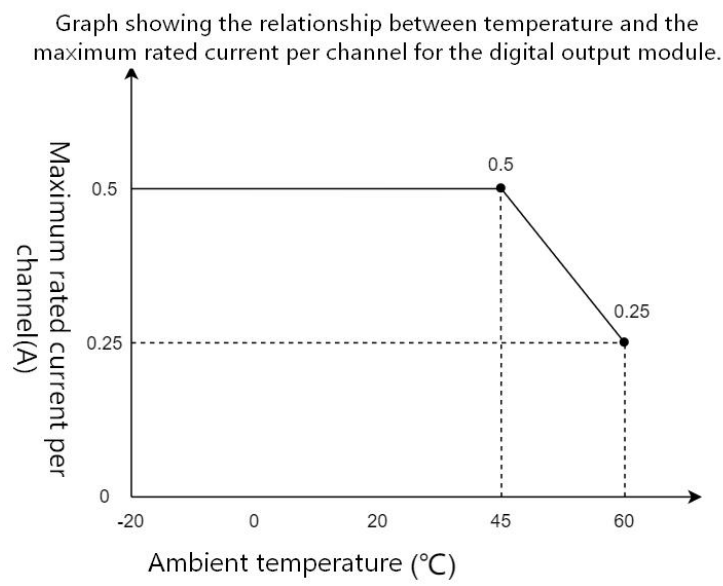
Digital output		
Product Model	XBF5A-0016A	XBF5A-0016B
Input power supply rated voltage	24VDC (20V~24V)	
Input power supply rated current	$\leq 18\text{mA}$	$\leq 18\text{mA}$
Field-side input voltage range	24VDC (20.4V~28.8V)	
Number of output signal points	16	
Output signal type	NPN	PNP
Output voltage drop	$< 1\text{V}$	
Output load type	Resistive load, inductive load, lamp load	
Single-channel rated current	Max: 0.5A (see details) Figure 1	
Leakage current	$< 10\mu\text{A}$	
reaction time	$< 150\mu\text{s}$	
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	18mA	18mA
Power consumption	0.432W	0.432W
Channel indicator lights	Green LED lights	

3.3.4.4 General technical parameters

General technical parameters	
Specifications and dimensions	32 channels: 152 × 53.3 × 33mm
	16 channels: 112.5 × 53.3 × 33mm
weight	32 channels: 160g
	16 channels: 125g
Operating temperature	-20°C ~ +60°C
Storage temperature	-40°C ~ +80°C
relative humidity	95%, no condensation
Altitude	≤2000m
Protection level	IP20
Overvoltage category	I
Pollution level	Level 2
Module error self-recovery	support
Disconnection check	support
Firmware upgrade	support
Short circuit protection	Supports (automatic recovery mechanism)
Reverse connection protection	Supports (automatic recovery mechanism)
Surge protection	support

Figure 1:



3.3.5 Discrete I/O expansion interface wiring

3.3.5.1 RJ45 communication interface

The XBF5/5A series discrete I/O expansion interface uses a standard RJ45 network interface and a standard crystal connector. The pin assignments are shown in the table below.

X1 X2

pin number	Signal
1	B
2	A
3	SGND
4	—
5	—
6	S24V
7	—
8	—

3.3.5.2 M8 communication interface

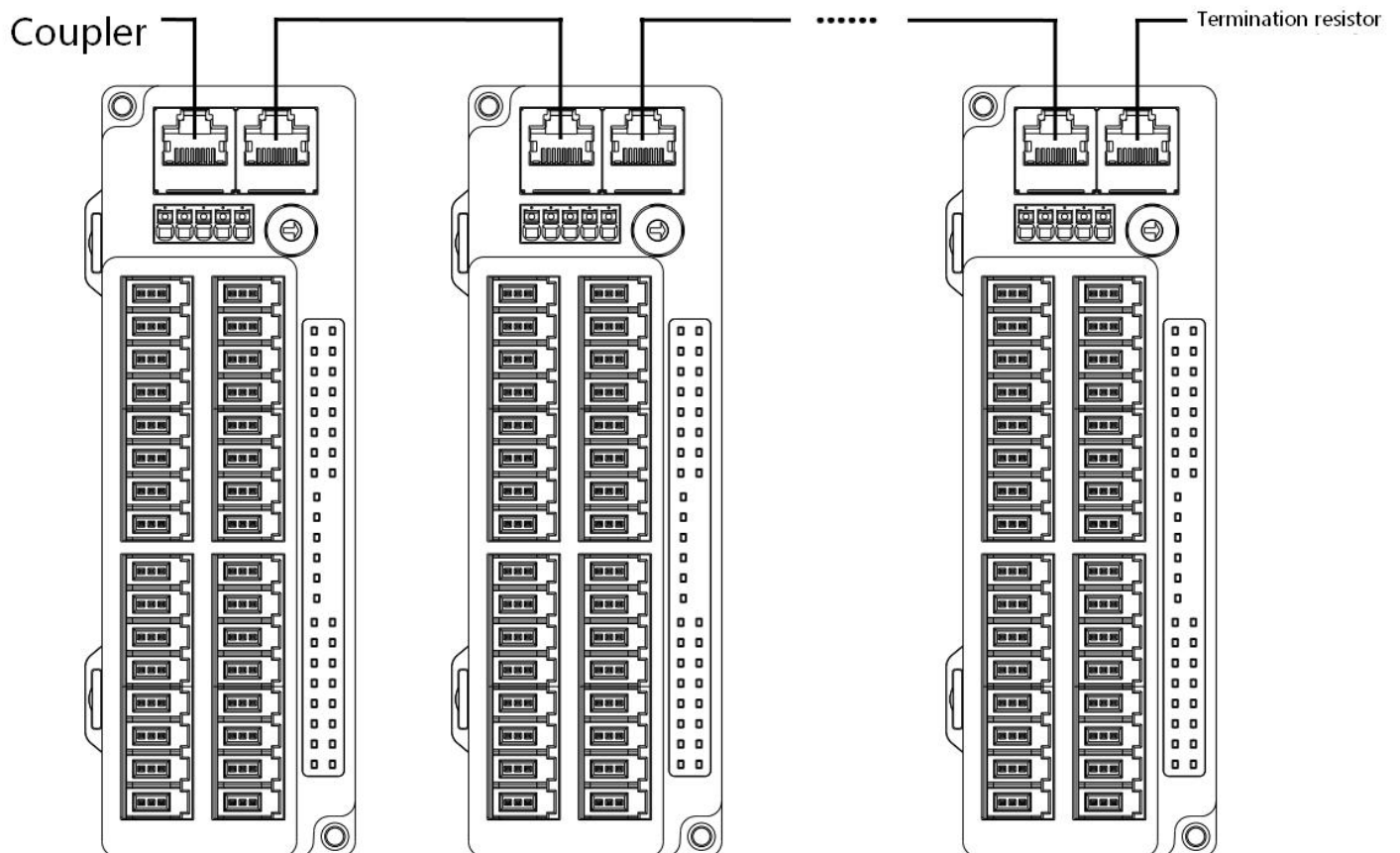
I/O expansion interface connection view (A-code, 4-pin, hole end)

1 2
3 4

Pin	Function
1	B
2	SGND
3	S24V
4	A

Definitions

The discrete I/O expansion interface provides two interfaces, one input and one output, for convenient connection of multiple discrete I/O modules. A terminating resistor needs to be inserted into the unused discrete I/O interface of the last discrete I/O module. The wiring method for the discrete I/O expansion interface is shown in the figure below. (The figure uses an RJ45 communication interface as an example.)

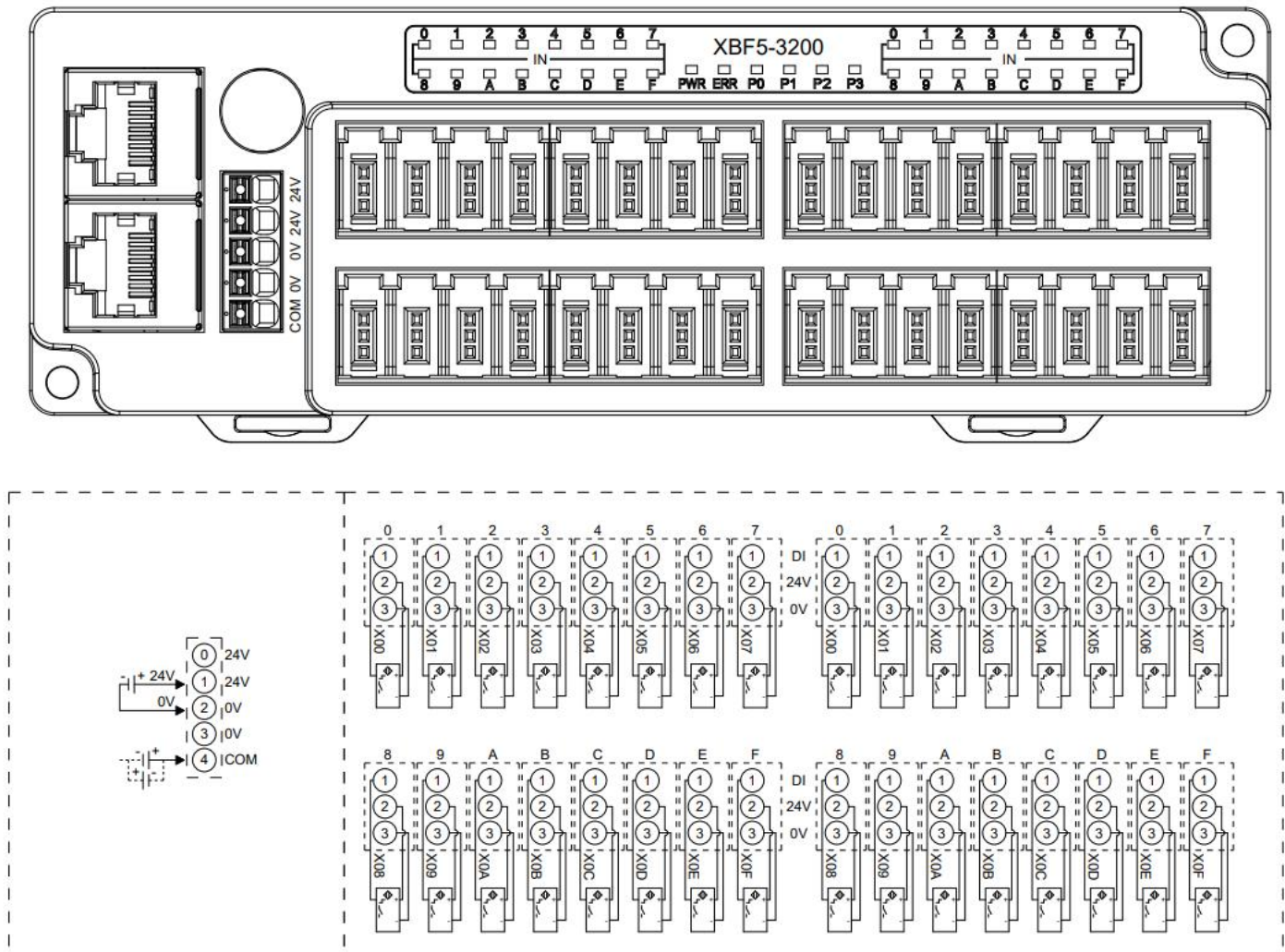


Precautions

- 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 30m.
- Do not connect to any device other than our product's discrete I/O interface.

3.3.6 I/O Wiring Diagram

3.3.6.1 XBF5-3200/XBF5A-3200/XBF5B-3200/XBF5C-3200

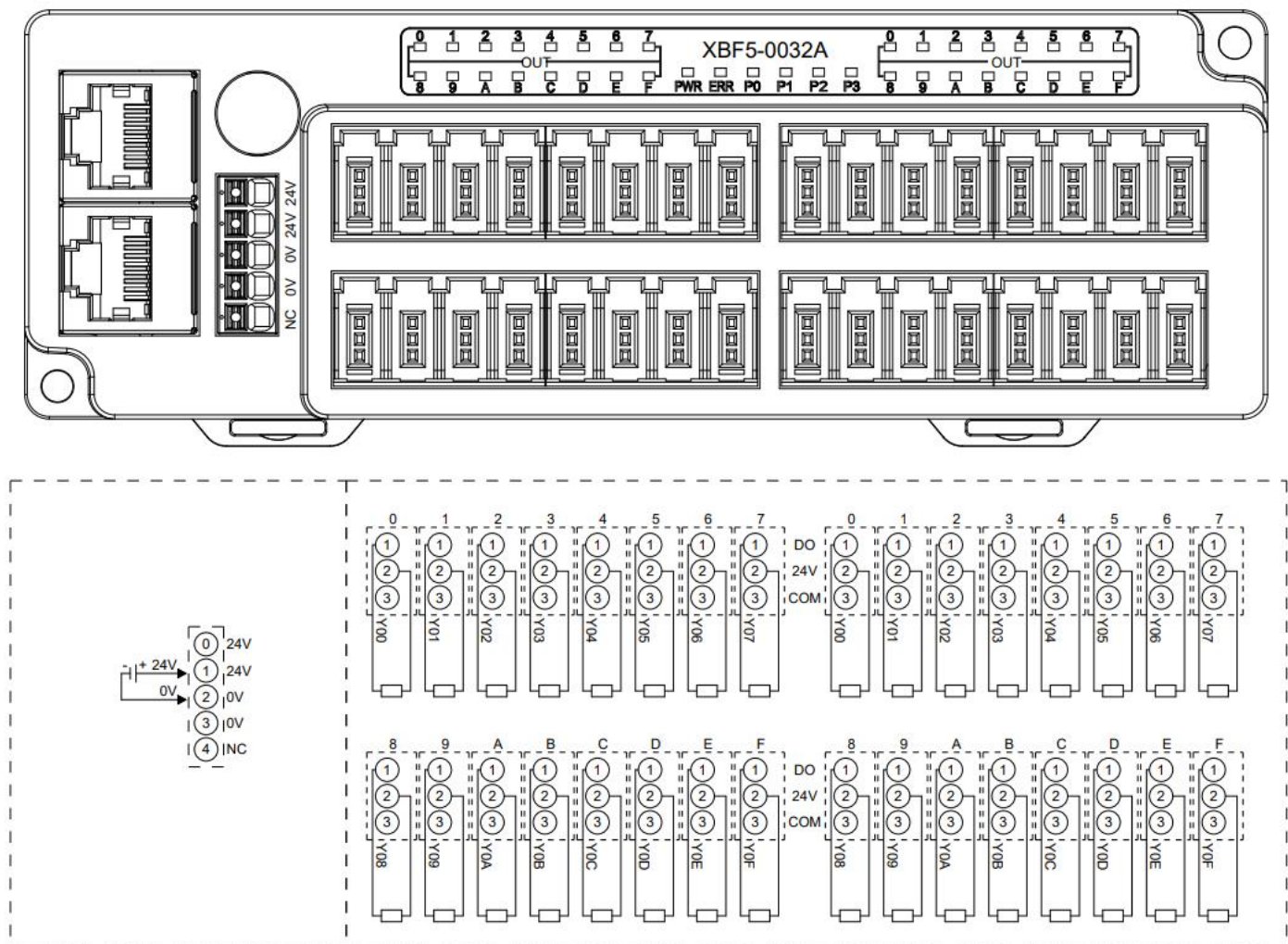


*24V internal conduction; 0V internal conduction

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

*The panel is taken as an example of XBF5-3200; the wiring is the same for all models.

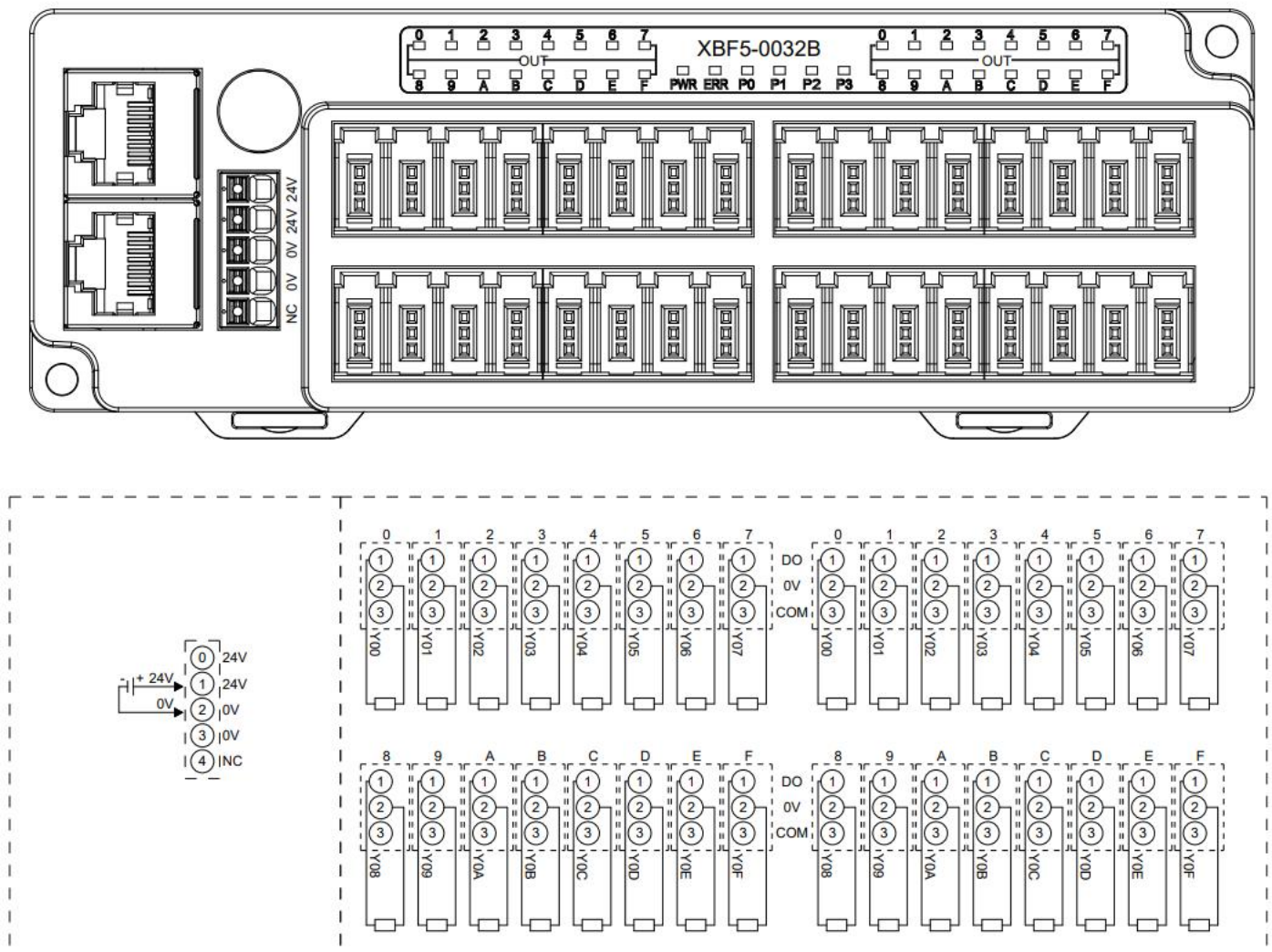
3.3.6.2 XBF5-0032A/XBF5A-0032A/XBF5B-0032A/XBF5C-0032A



*24V internal conduction; 0V internal conduction

*The panel is taken as an example of XBF5-0032A; the wiring is the same for all models.

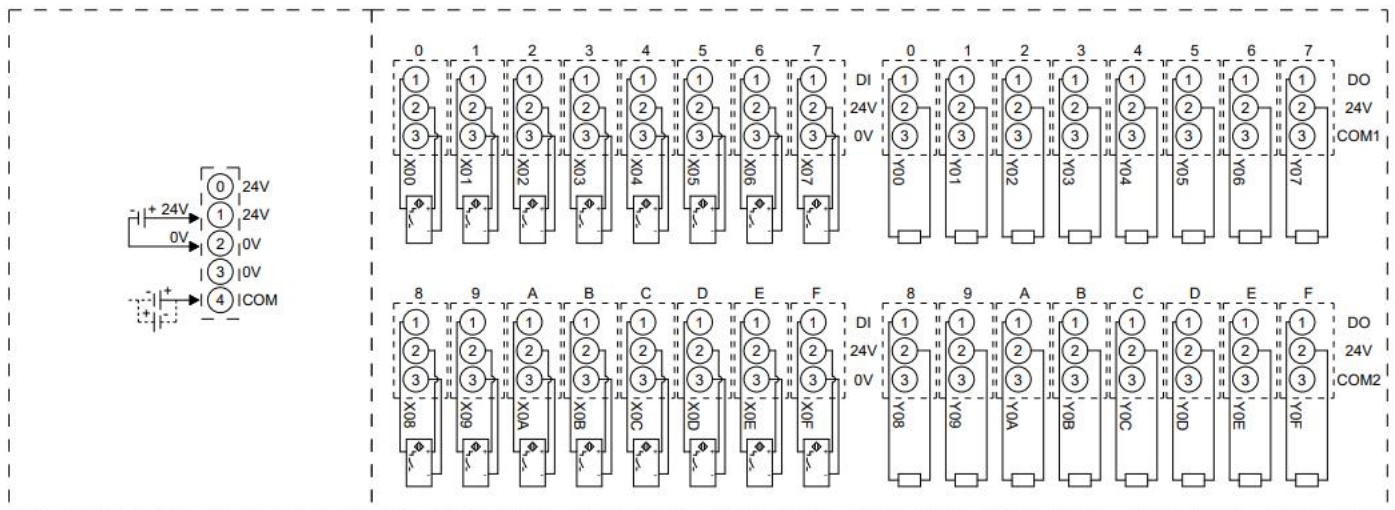
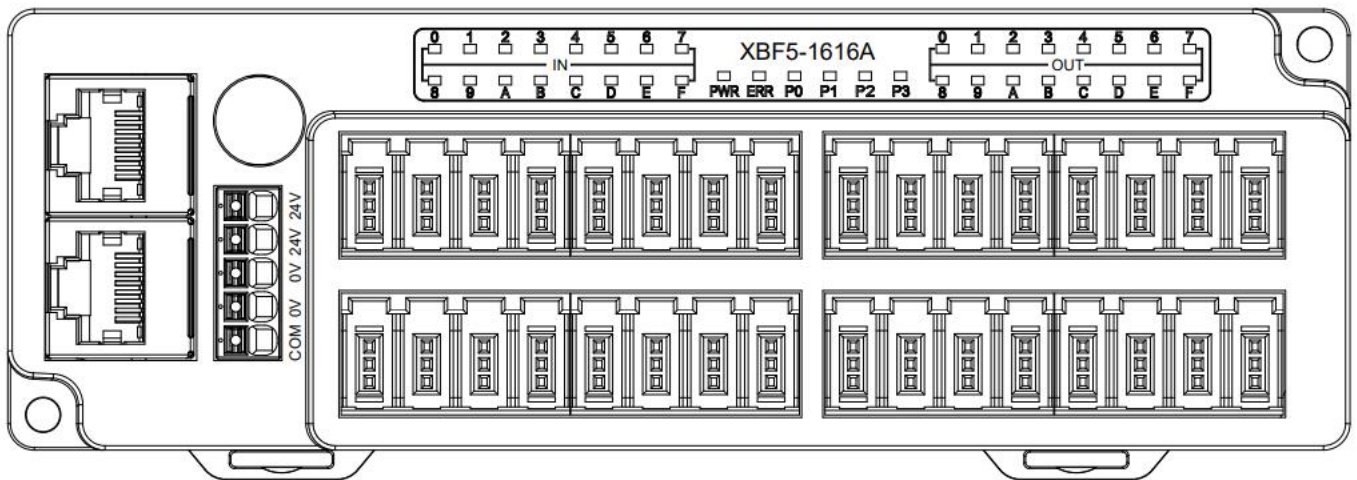
3.3.6.3 XBF5-0032B/XBF5A-0032B/XBF5B-0032B/XBF5C-0032B



*24V internal conduction; 0V internal conduction

*The panel is taken as an example with XBF5-0032B; the wiring is the same for all models.

3.3.6.4 XBF5-1616A/XBF5A-1616A/XBF5B-1616A/XBF5C-1616A

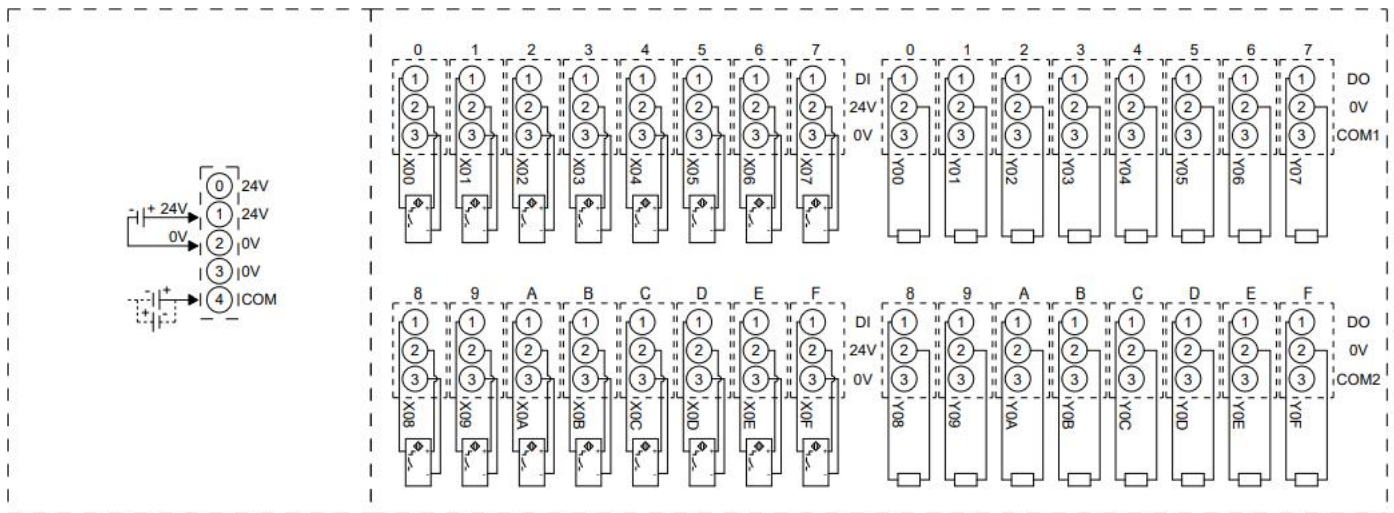
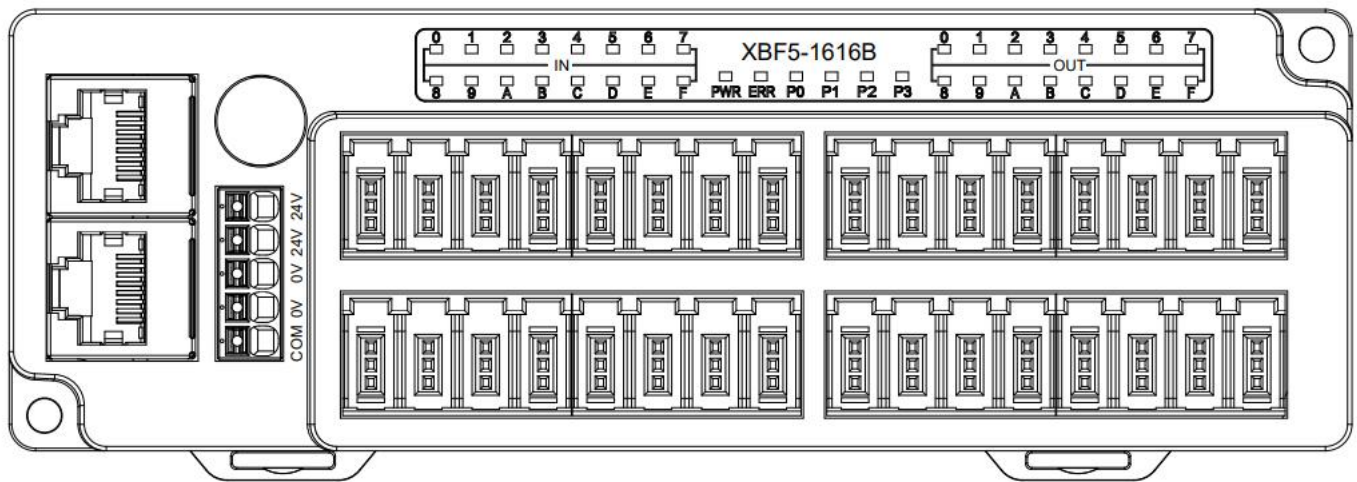


*24V internal conduction; 0V internal conduction

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

*The panel is taken as an example of XBF5-1616A; the wiring section is the same for all models.

3.3.6.5 XBF5-1616B/XBF5A-1616B/XBF5B-1616B/XBF5C-1616B

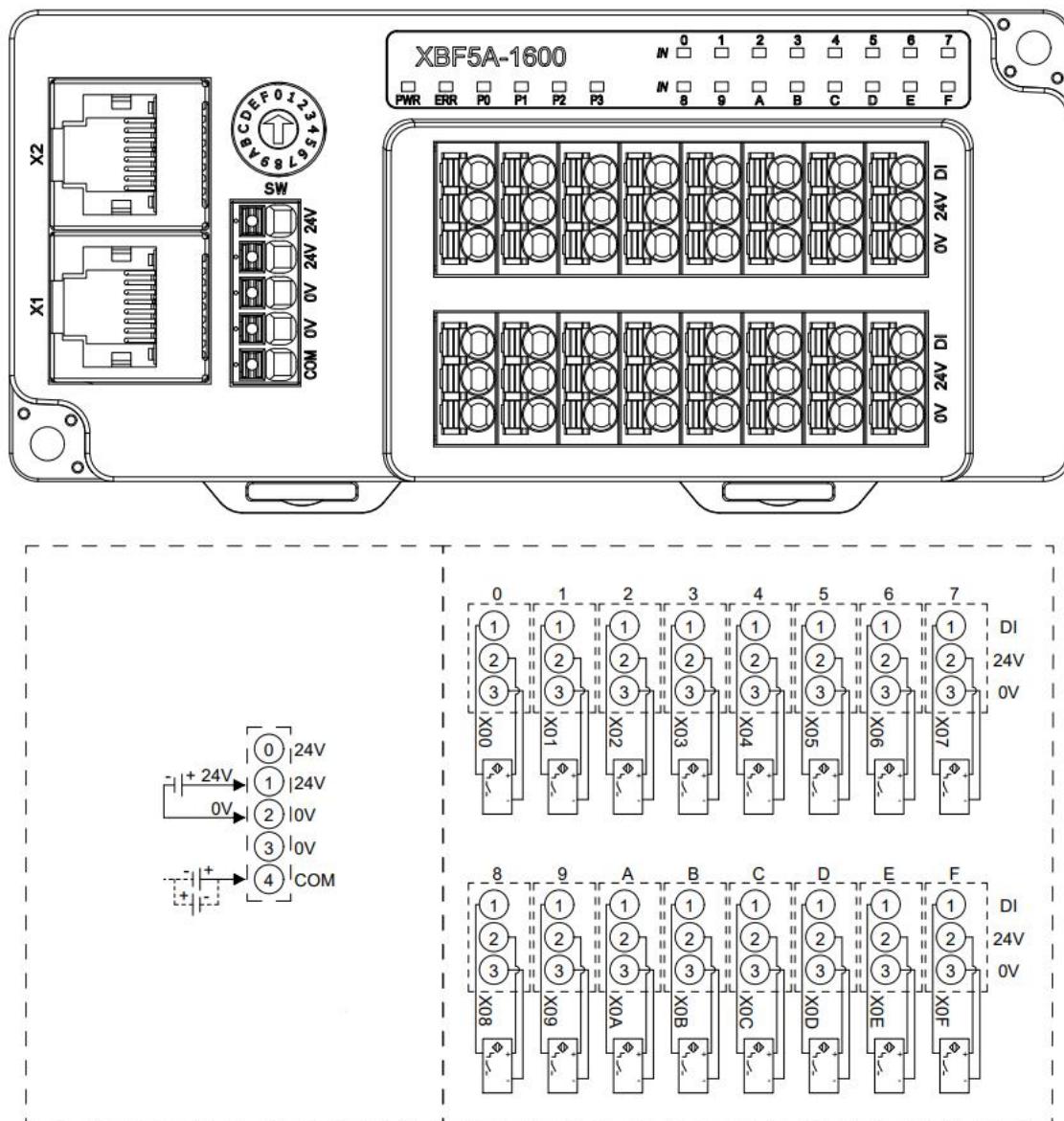


*24V internal conduction; 0V internal conduction

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

*The panel is taken as an example with XBF5-1616B; the wiring is the same for all models.

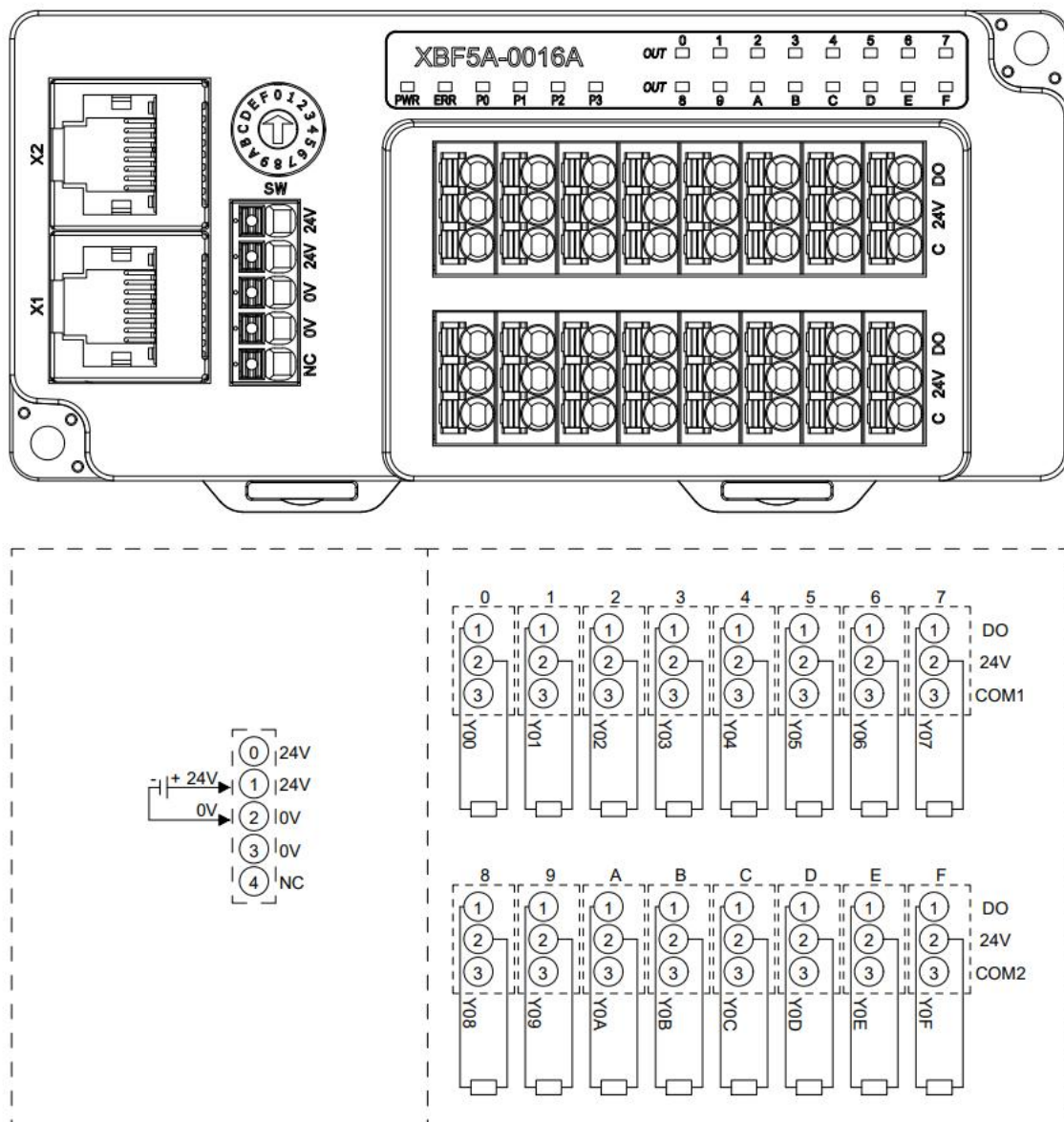
3.3.6.6 XBF5A-1600



*24V internal conduction; 0V internal conduction

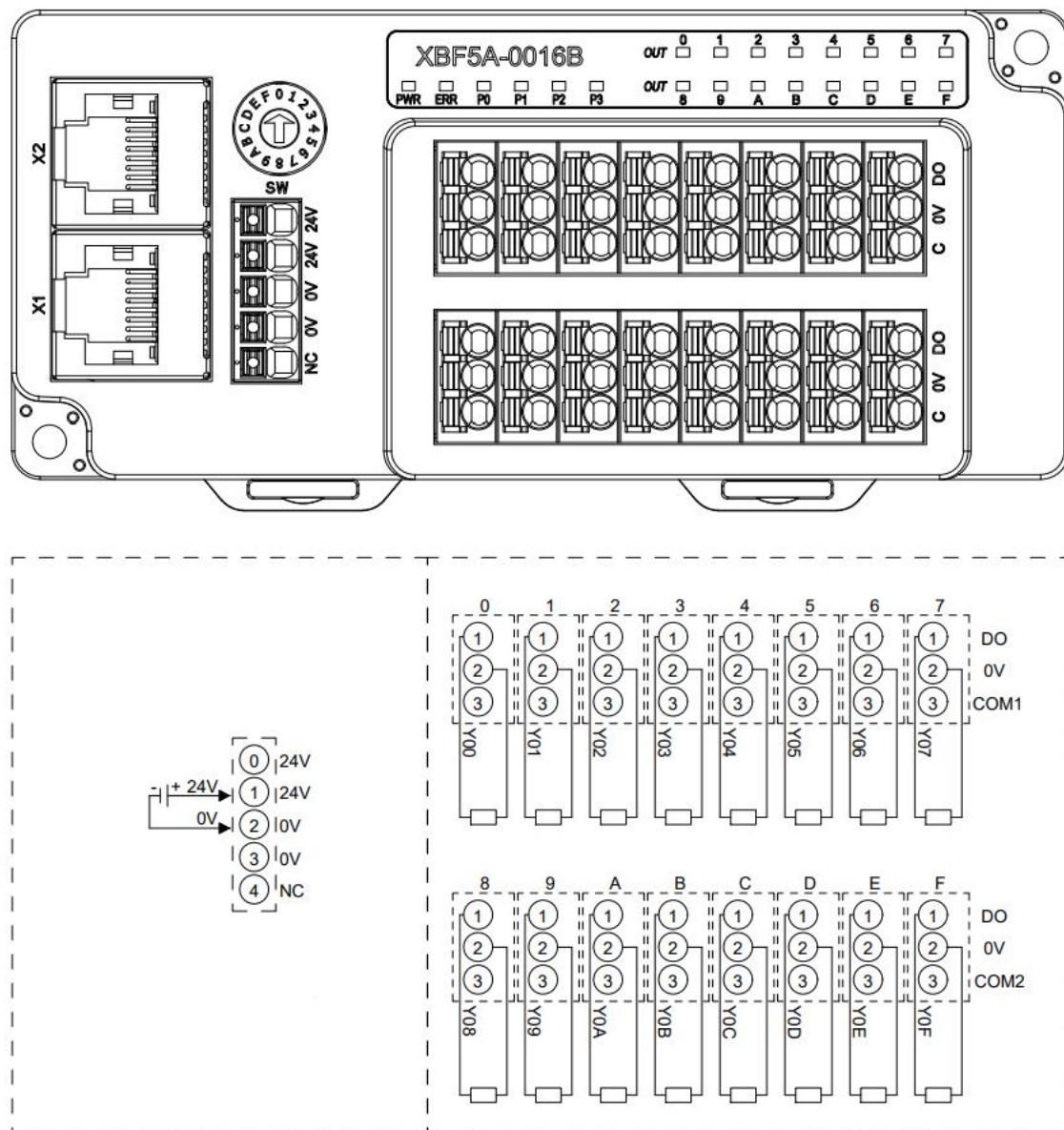
*COM is the common terminal for DI, compatible with NPN/PNP.

3.3.6.7 XBF5A-0016A



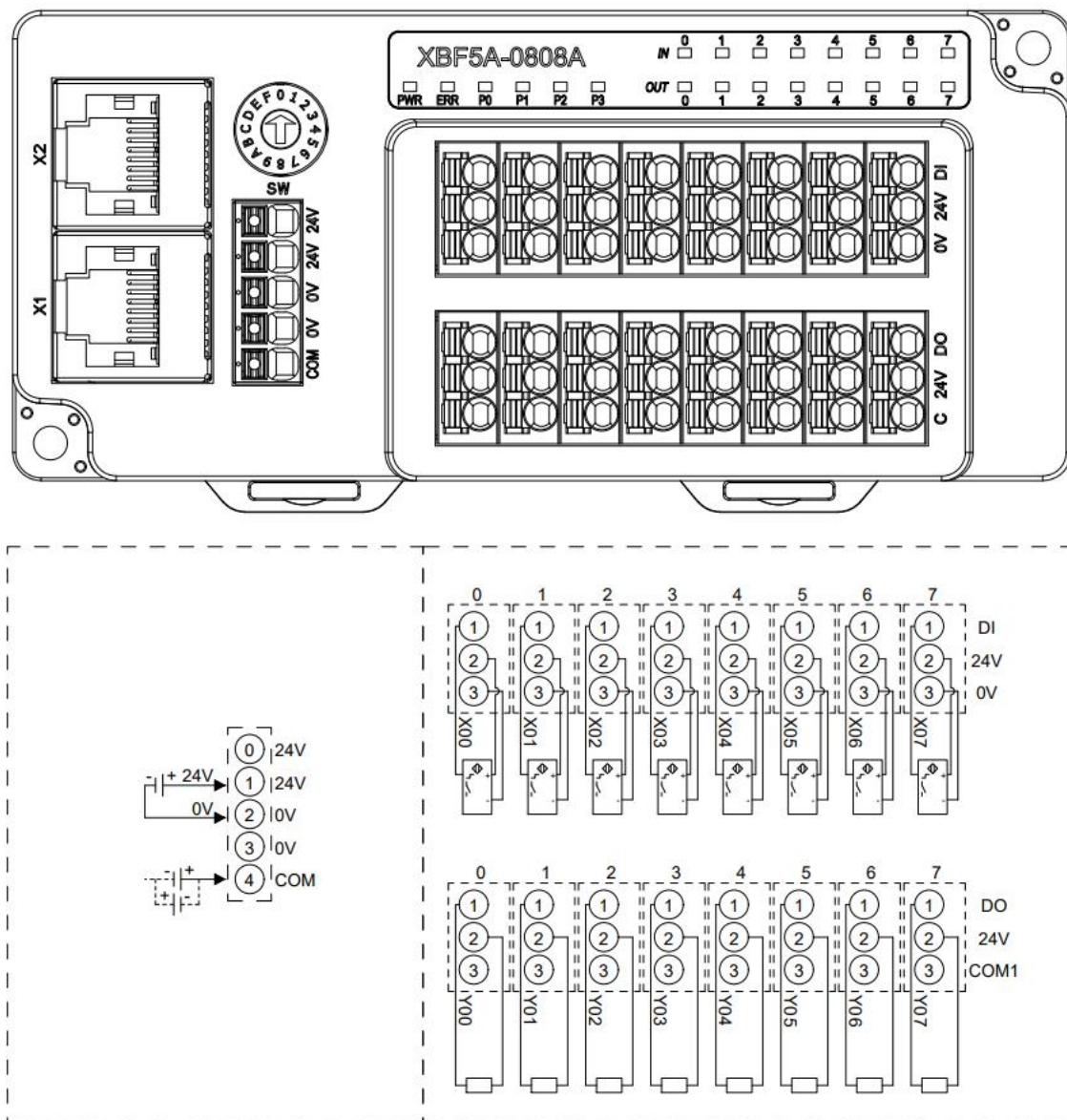
*24V internal conduction; 0V internal conduction

3.3.6.8 XBF5A-0016B



*24V internal conduction; 0V internal conduction

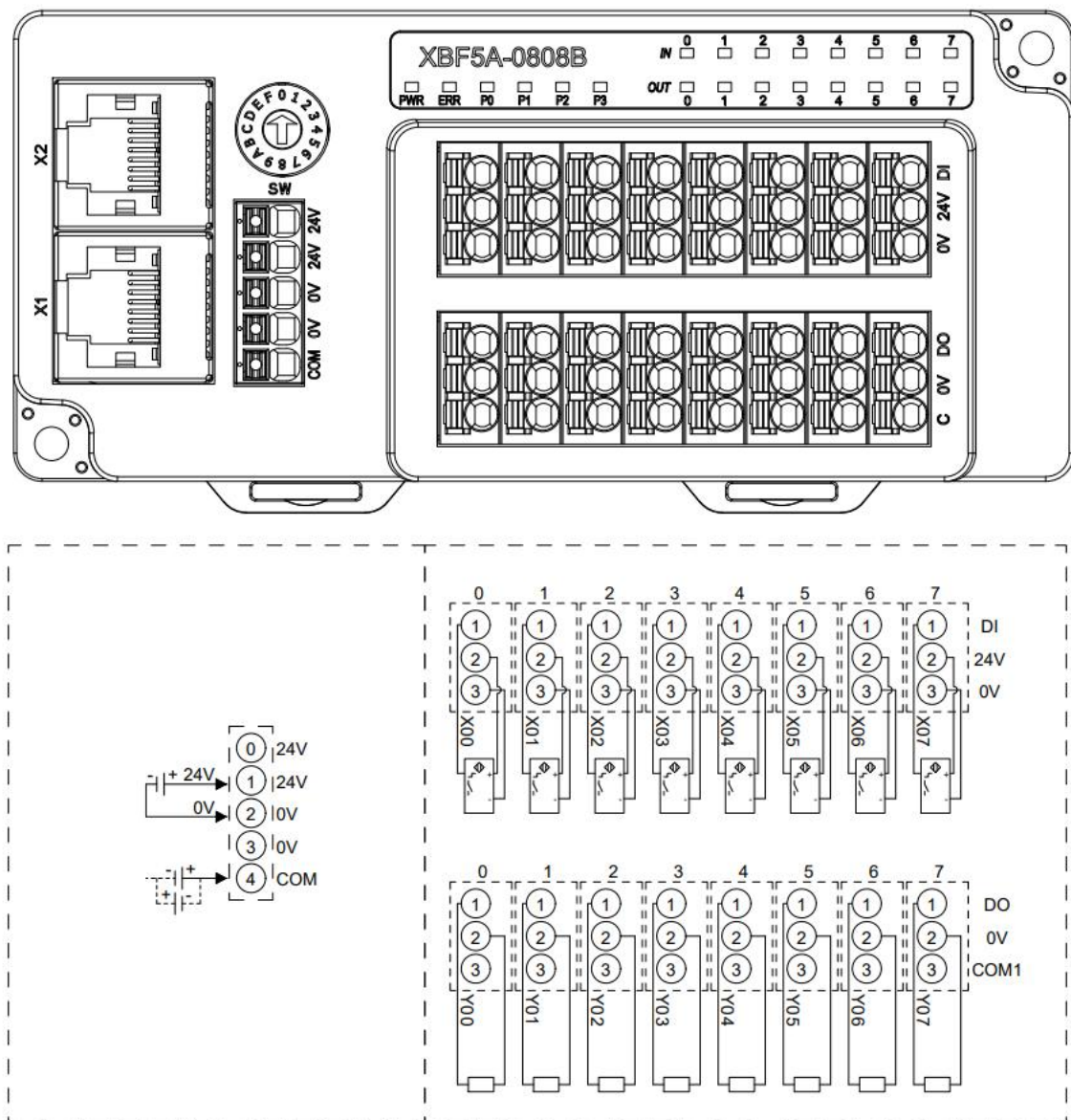
3.3.6.9 XBF5A-0808A



*24V internal conduction; 0V internal conduction

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

3.3.6.10 XBF5A-0808B

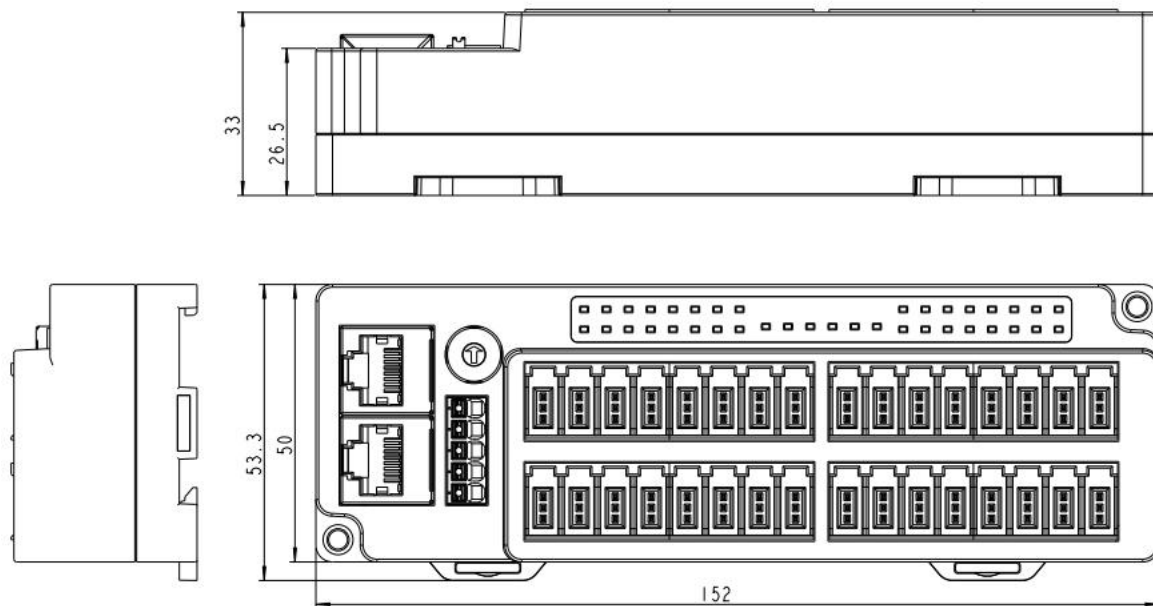


*24V internal conduction; 0V internal conduction

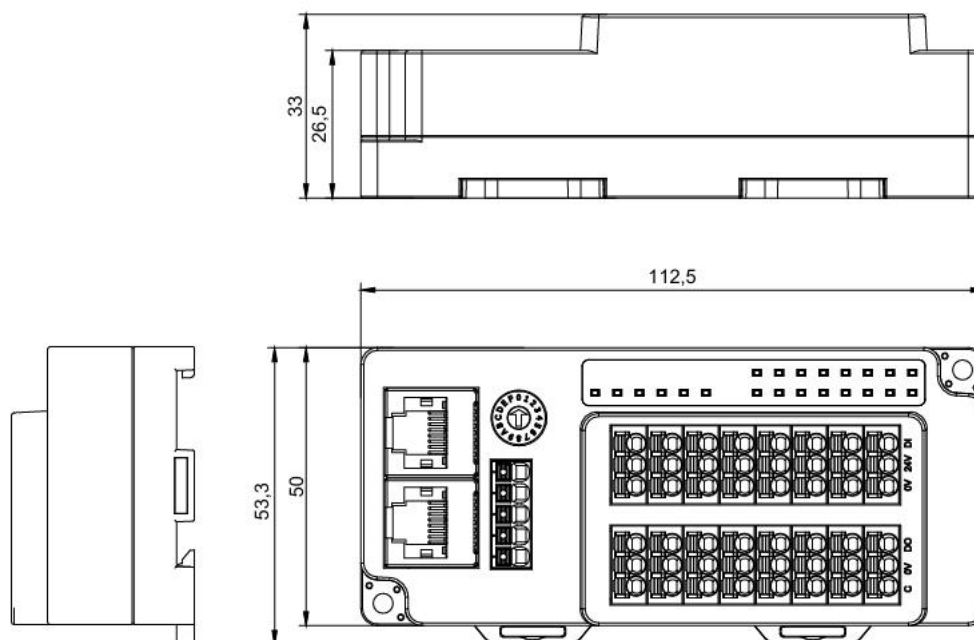
*COM is the common terminal for DI, compatible with NPN/PNP.

3.3.7 Outline Dimensions

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



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



4 Installation and removal

4.1 Installation Guide

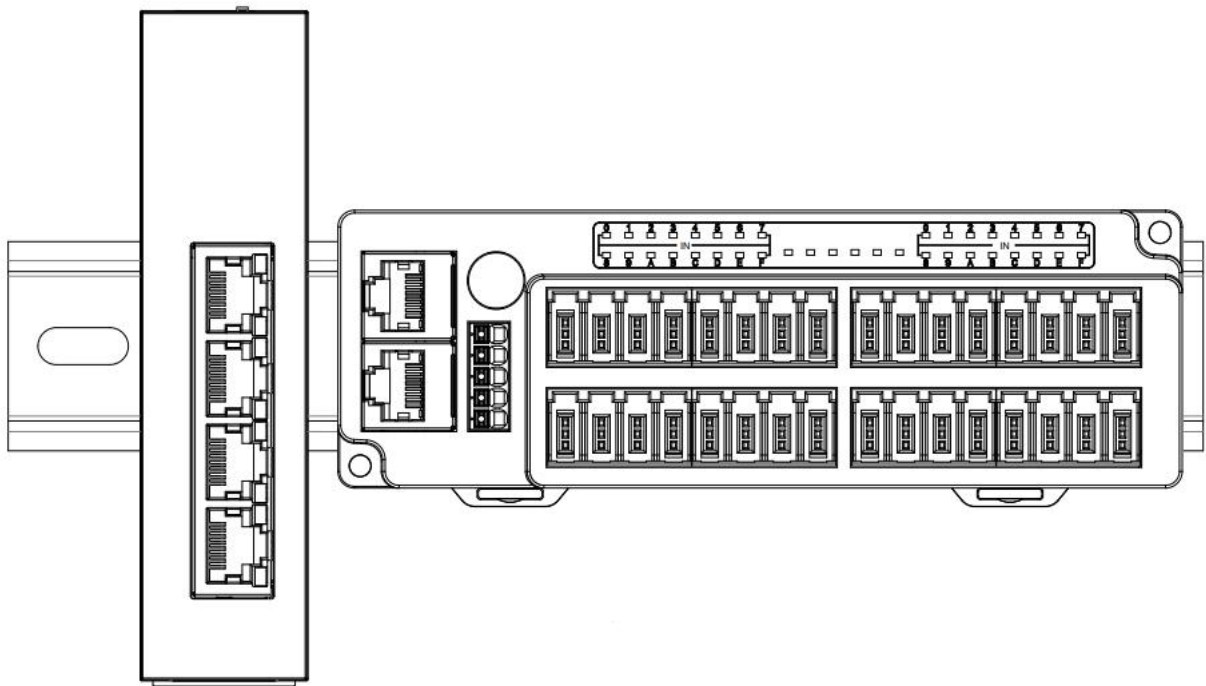
Installation/Removal Precautions

- 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).
- Installation/removal must be performed with the power off.



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

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



4.2 Installation and disassembly steps

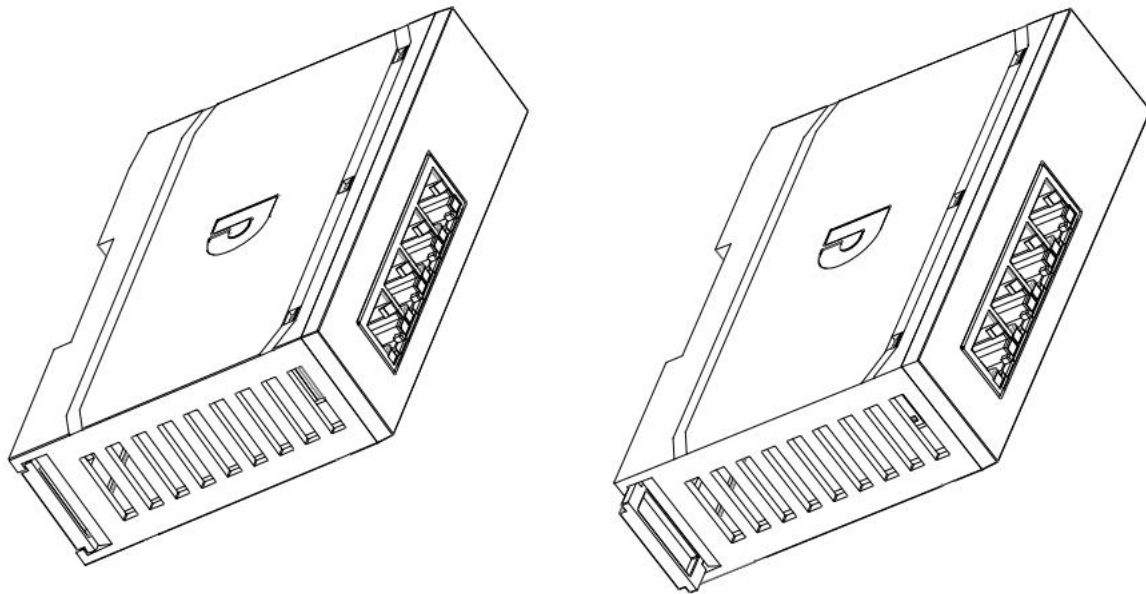
Module installation and removal	
Module installation steps	1. Push the clips at the bottom of the back of the module outwards until you hear a "click" sound.
	2. First, install the coupler module on the fixed guide rail. Align the upper edge of the coupler module slot with the upper edge of the guide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

4.3 Installation and disassembly diagram

4.3.1 Coupler installation and disassembly diagram

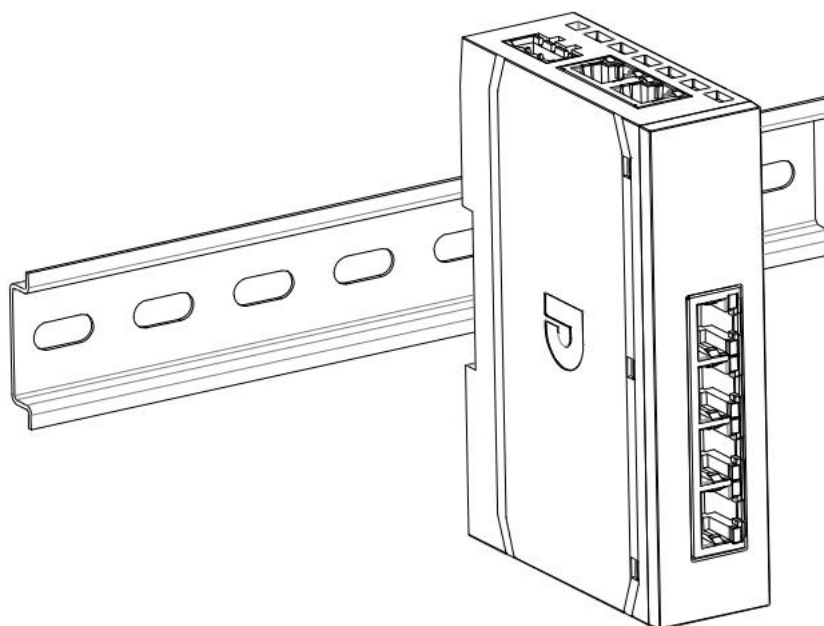
Coupler module installation

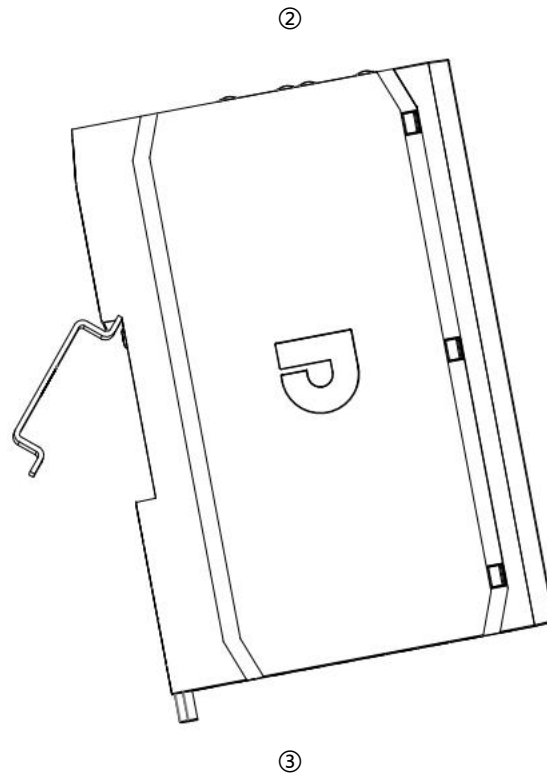
- Push the latch at the bottom of the back of the module outwards until you hear a "click" sound, as shown in Figure ① below.



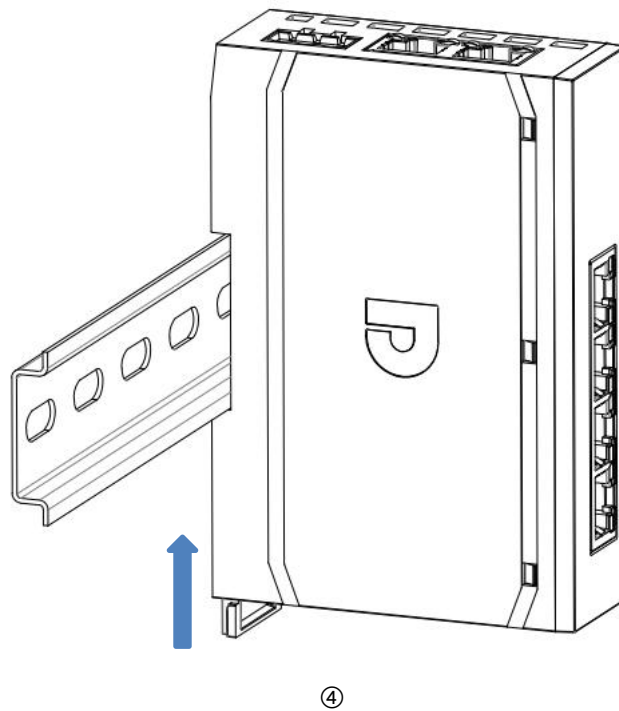
①

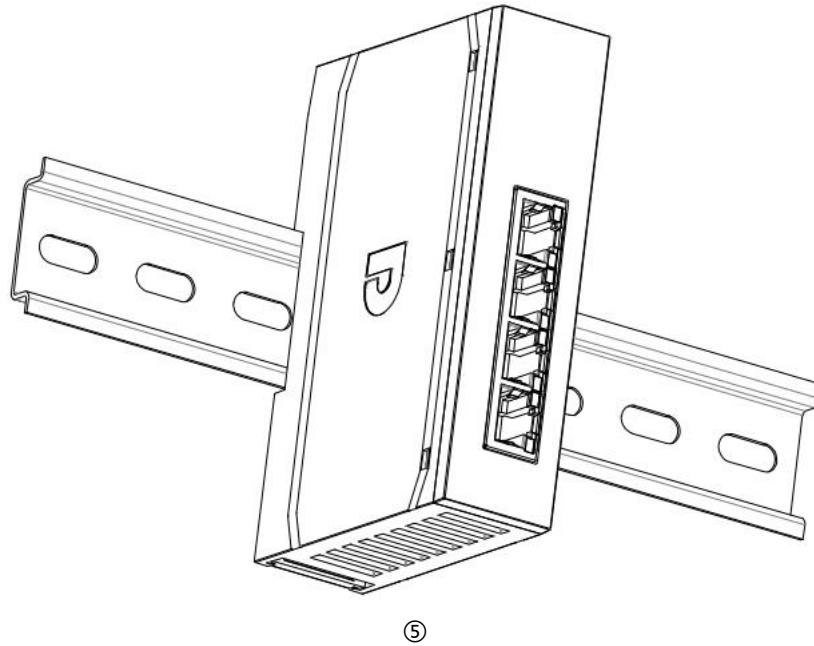
- First, install the coupler module on the fixed guide rail. Align the upper edge of the coupler module slot with the upper edge of the guide rail and place the module into the guide rail, as shown in Figures ② and ③ below.





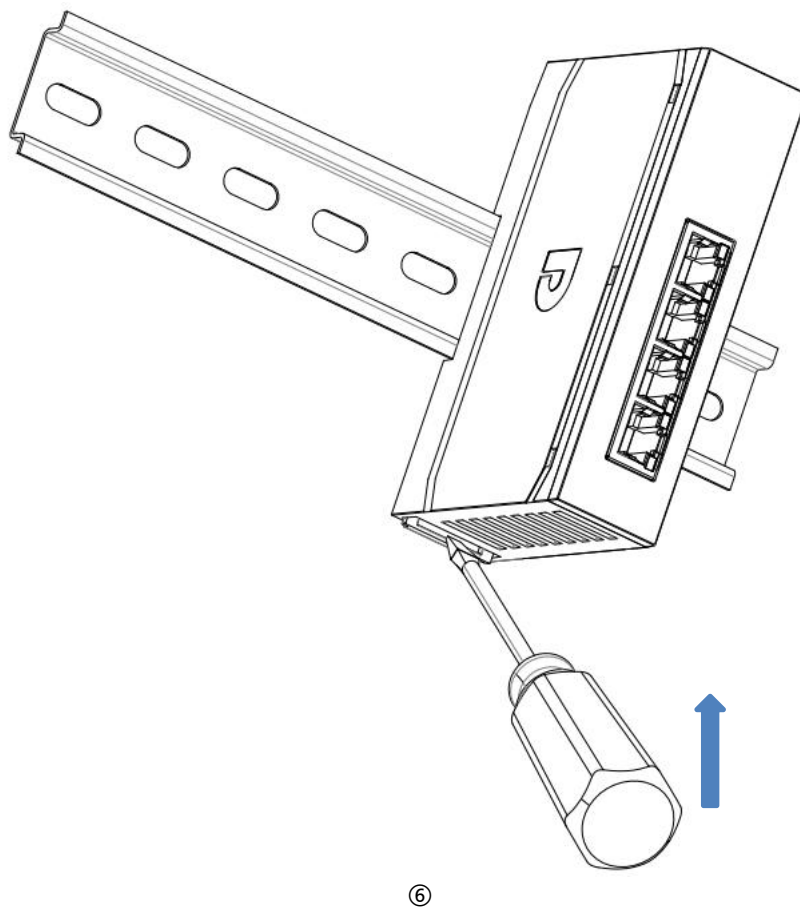
- Place the lower edge of the module slot against the lower edge of the guide rail, and push the buckle upwards until you hear a click. This completes the module installation, as shown in Figures ④ and ⑤ below.

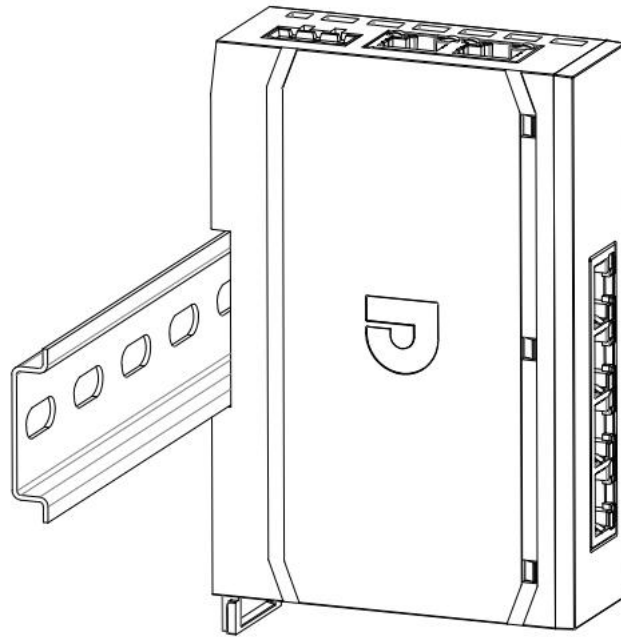




Coupler disassembly

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



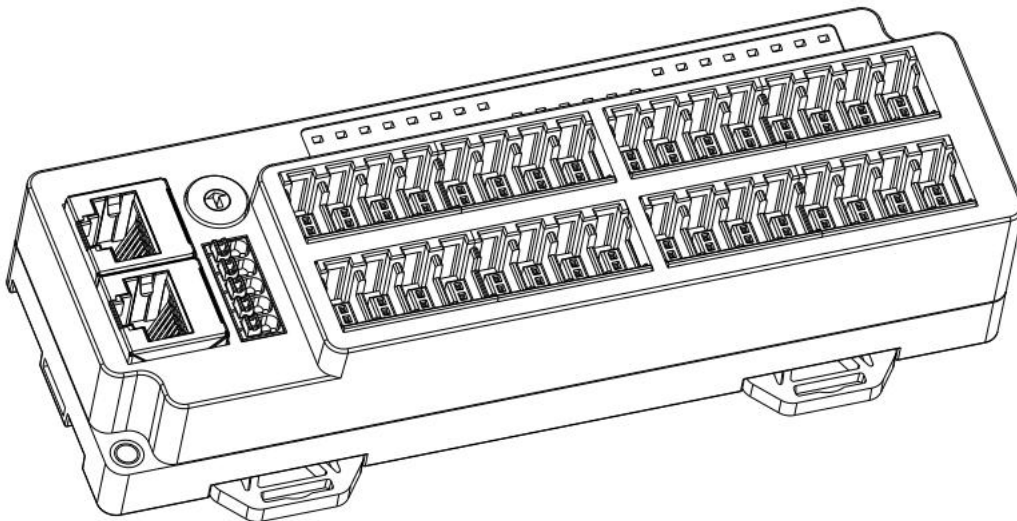


⑦

4.3.2 I/O module installation and removal diagram

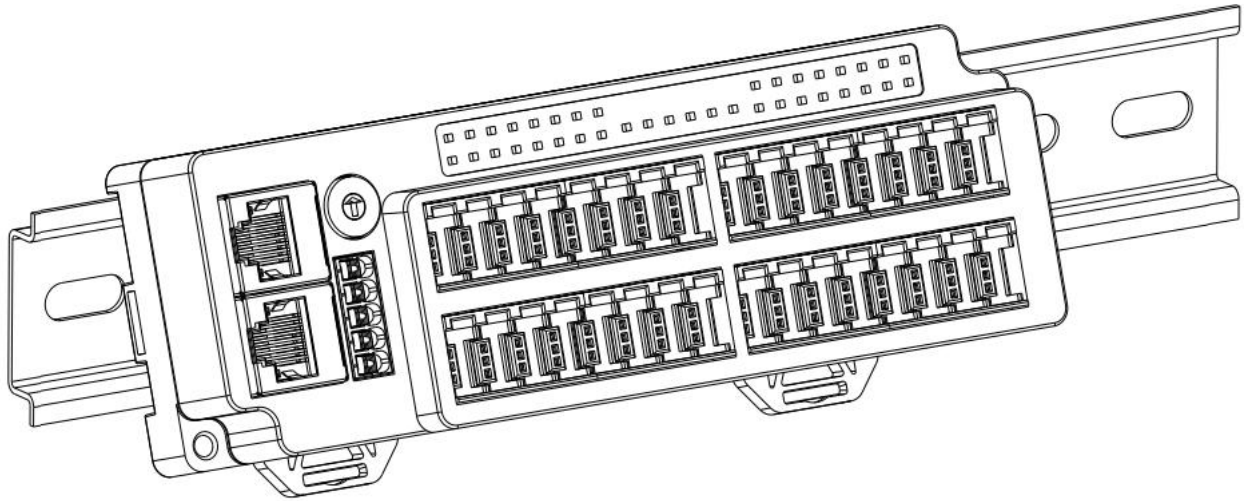
I/O module installation

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

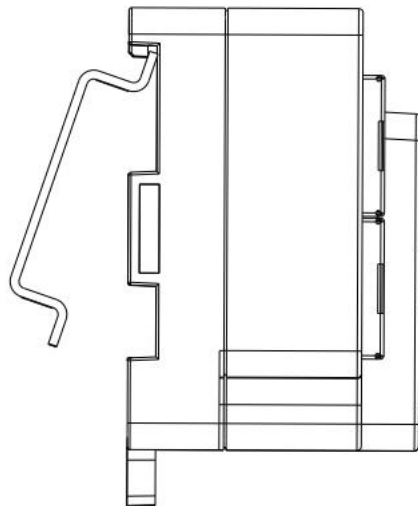


①

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

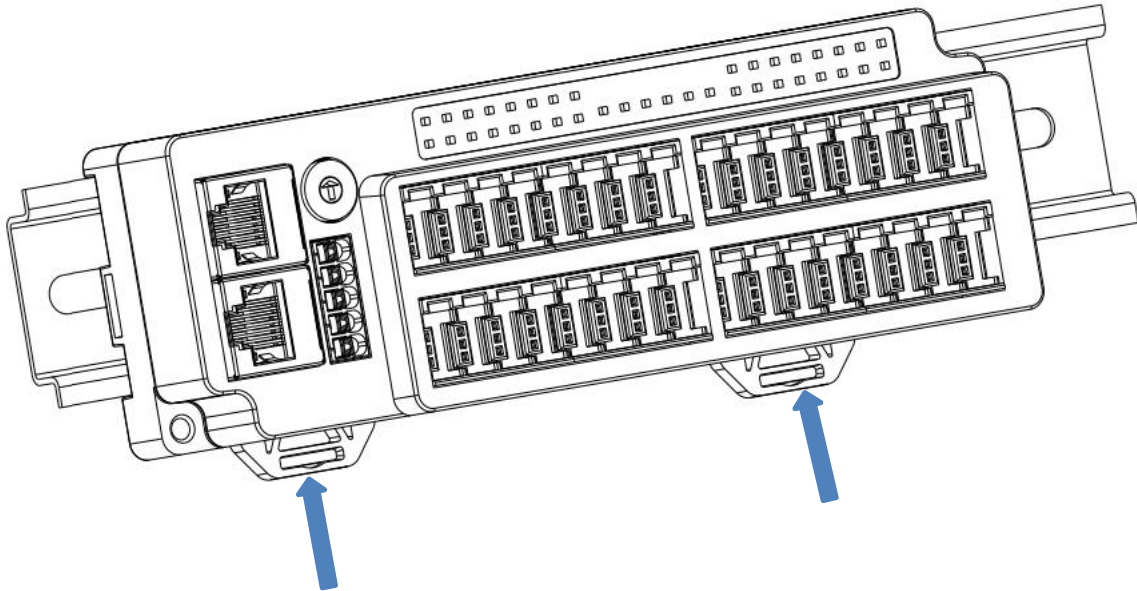


②

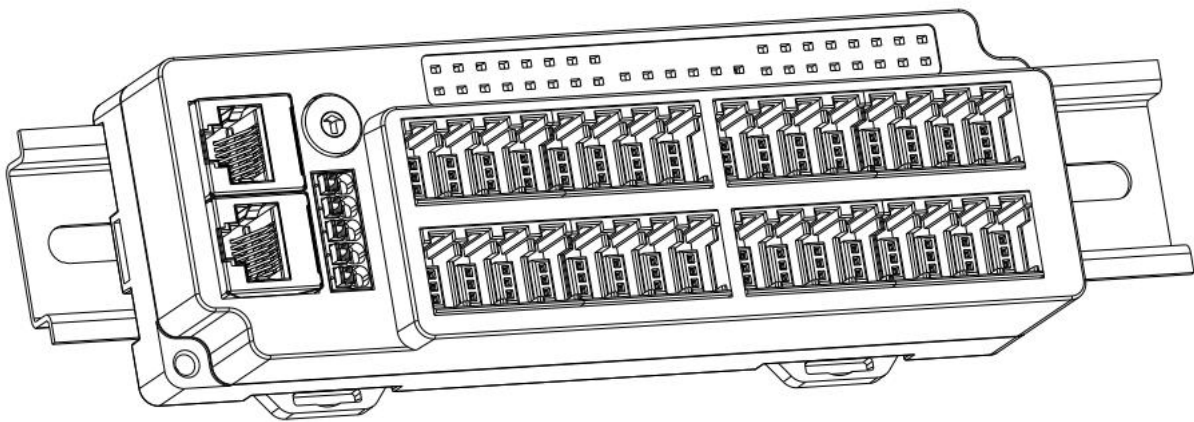


③

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



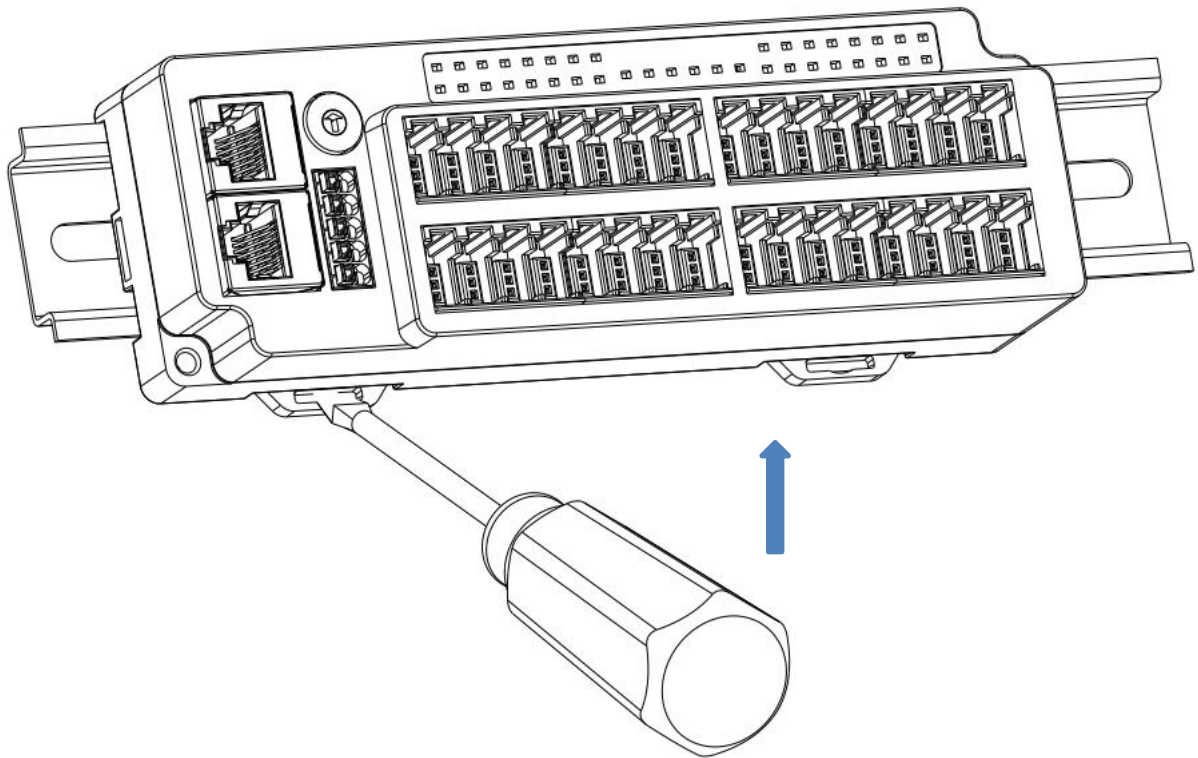
④



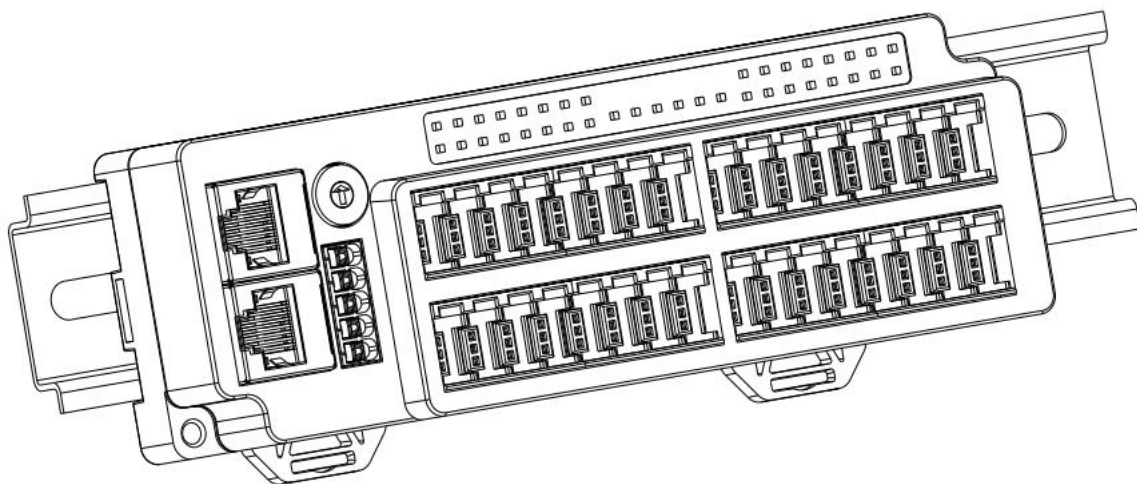
⑤

I/O module disassembly

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



⑥



⑦

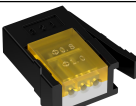
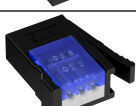
5 Wiring

5.1 Terminal blocks



Terminal blocks		
XBF4-EC04/XBF4-EC04A/XBF4-PN04 Power Terminals	Rated voltage	320V
	Rated current	20A
	Extreme number	3P
	wire diameter	22~16 AWG 0.3~1.5 mm ²
XBF5/5A/5B/5C Series Power Terminals	Rated voltage	300V
	Rated current	7A
	Extreme number	5P
	wire diameter	28~18 AWG 0.2~0.75 mm ²
XBF5/5B series I/O signal line terminals (i.e., input/output terminals)	Rated voltage	250V
	Rated current	3A
	Extreme number	32×3P
	wire diameter	See details 5.2 E-CON Terminal Usage Specification Table
XBF5A/5C series I/O signal line terminals (i.e., input/output terminals)	Rated voltage	300V
	Rated current	8A
	Extreme number	32×3P/16×3P
	wire diameter	22~16 AWG 0.3~1.5 mm ²
Discrete I/O interface	2×RJ45	UTP or STP of Category 5 or higher (STP recommended)
	2×M8	A-code, 4-pin, hole end
Coupler Expansion Module Interface	4×RJ45	UTP or STP of Category 5 or higher (STP recommended)

5.2 E-CON Terminal Usage Specifications

male connector	model	Color of the top cap	Number of PINs	outer diameter of wire	Conductor specifications
	XBF5-AWG24-VT	Purple	3PIN	Φ0.6~0.8	AWG24~26 0.13~0.21mm ²
	XBF5-AWG24-RD	Red	3PIN	Φ0.8~1.0	
	XBF5-AWG24-GN	Green	3PIN	Φ1.0~1.2	
	XBF5-AWG24-OE	Orange	3PIN	Φ1.2~1.6	
	XBF5-AWG20-YE	Yellow	3PIN	Φ1.2~1.6	AWG20~22 0.3~0.5mm ²
	XBF5-AWG20-BU	Blue	3PIN	Φ1.2~1.6	
	XBF5-AWG20-GY	Grey	3PIN	Φ1.6~2.0	

5.3 M8 Communication Interface Dedicated Cable Specifications

type	model	length	Specifications
M8-RJ45	KZG/R-0.5CS-XBF	0.5m	M8 straight connector/RJ45, A-Code, 4-pin male connector, green with shield, PVC.
	KZG/R-1.0CS-XBF	1m	
	KZG/R-2.0CS-XBF	2m	
	KZG/R-3.0CS-XBF	3m	
	KZG/R-5.0CS-XBF	5m	
	KZG/R-10.0CS-XBF	10m	
M8-M8	KZG/KZG-0.5CS-XBF	0.5m	M8 straight connector, A-Code, 4-pin male, green with shield, PVC.
	KZG/KZG-1.0CS-XBF	1m	
	KZG/KZG-2.0CS-XBF	2m	
	KZG/KZG-3.0CS-XBF	3m	
	KZG/KZG-5.0CS-XBF	5m	
	KZG/KZG-10.0CS-XBF	10m	

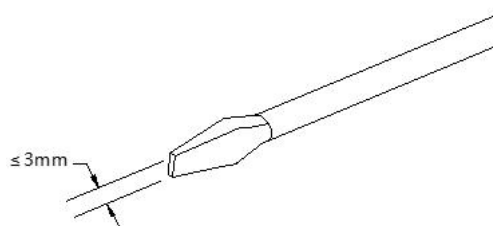
5.4 Wiring instructions and requirements

Power connection precautions

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

Wiring tool requirements

The power terminals and signal terminals feature a screwless design, allowing for cable installation and removal using a flathead screwdriver (size: $\leq 3\text{mm}$).



Stripping length requirements

For XBF5/5A/5B/5C series power supplies and XBF5/5B series signal line terminals, a stripping length of 8~10 mm is recommended. The recommended cable stripping length for XBF5A/5C series signal line terminals is 9~10 mm.



Wiring method

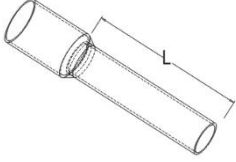
For a single-strand rigid wire, after stripping the wire to the corresponding length, press the button and insert the single-strand wire directly into the corresponding end hole.



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



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 terminals L The length is 8~10mm	E0308	0.3
	E0508	0.5
	E7508	0.75
	E1008	1.0
	E1508	1.5
	E0310	0.3
	E0510	0.5
	E7510	0.75
	E1010	1.0
	E1510	1.5

! Warn

- Only copper wires can be used for wiring.

! Warn

- Cable temperature: 80°C.

6 Use

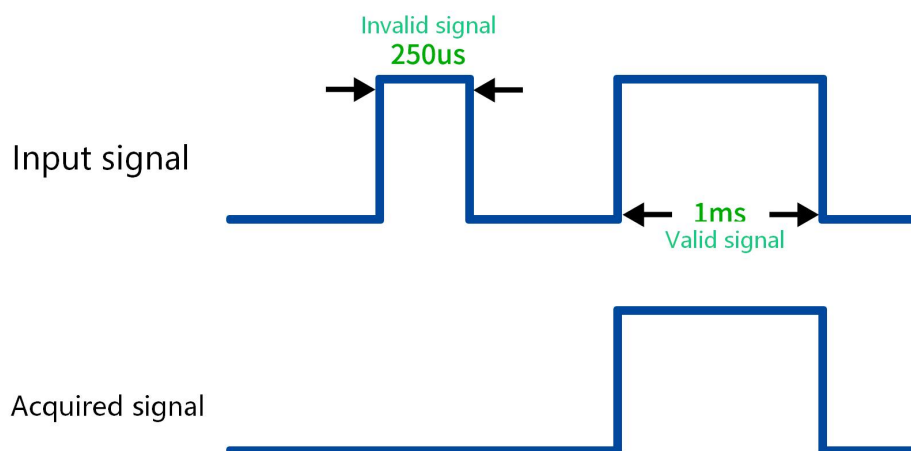
6.1 Parameter Description

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 FilterTime 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 or with the coupler network cable disconnected). This parameter supports the following output states:

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

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

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

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

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

This manual uses TwinCAT3 and TIA Portal V17 as examples to introduce the parameter configuration method of the XBF4-EC4/XBF4-PN04 coupler + I/O module combination. For detailed steps, please refer to [link/reference].[Parameter configuration in section 6.3.1](#) and [Parameter settings in section 6.4.1](#). After making the modifications, be sure to power it on again.

6.2 Fault code information

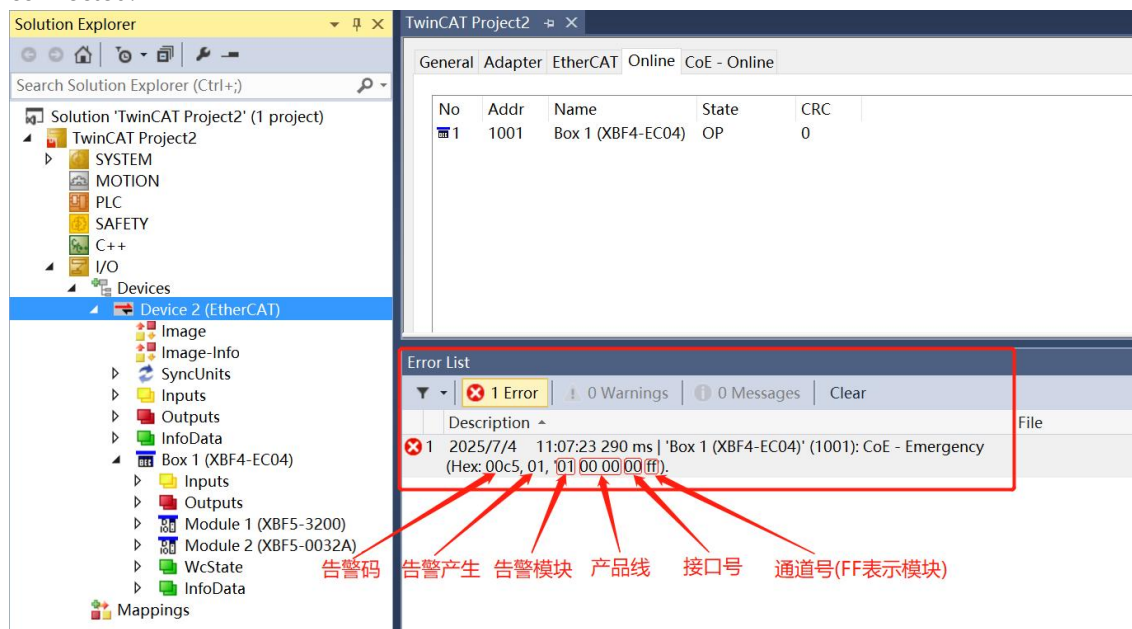
6.2.1 Coupler general fault codes

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 whether 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.
	7	Parameter error	0	Parameter setting error	0000000111000000	448	0x01C0	Check module parameter settings
	63	Communication error	1	Initialization failed	0000111111000001	4033	0x0FC1	Check if the module connection is normal.
			2	Communication timeout	0000111111000010	4034	0x0FC2	Check if the module has any abnormalities or interference.
			3	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	DIP switch conflict	0000000001000101	69	0x0045	Check if the module DIP switches under the

								corresponding expansion interface of the coupler are duplicated.
--	--	--	--	--	--	--	--	--

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	Alarm module	Product Line		Interface number	Channel number
		For example, 0x01: Event generated. 0x00: Event disappears	For example, 0~F: module DIP switches 0xFF: Coupler			Interface 0 Interface 1 Interface 2 Interface 3	For example, 0xFF: module-level event. 0x00: Channel number

6.3 EtherCAT coupler configuration application

6.3.1 Application in the TwinCAT3 software environment

1、Preparation

- **Hardware environment**

- **Module preparation:** This instruction uses the XBF4-EC04 + {Coupler Interface 0: XBF5-3200 + XBF5-0032A} + {Coupler Interface 1: XBF5-3200} + {Coupler Interface 2: XBF5-0032B} + {Coupler Interface 3: XBF5-0032B} 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**

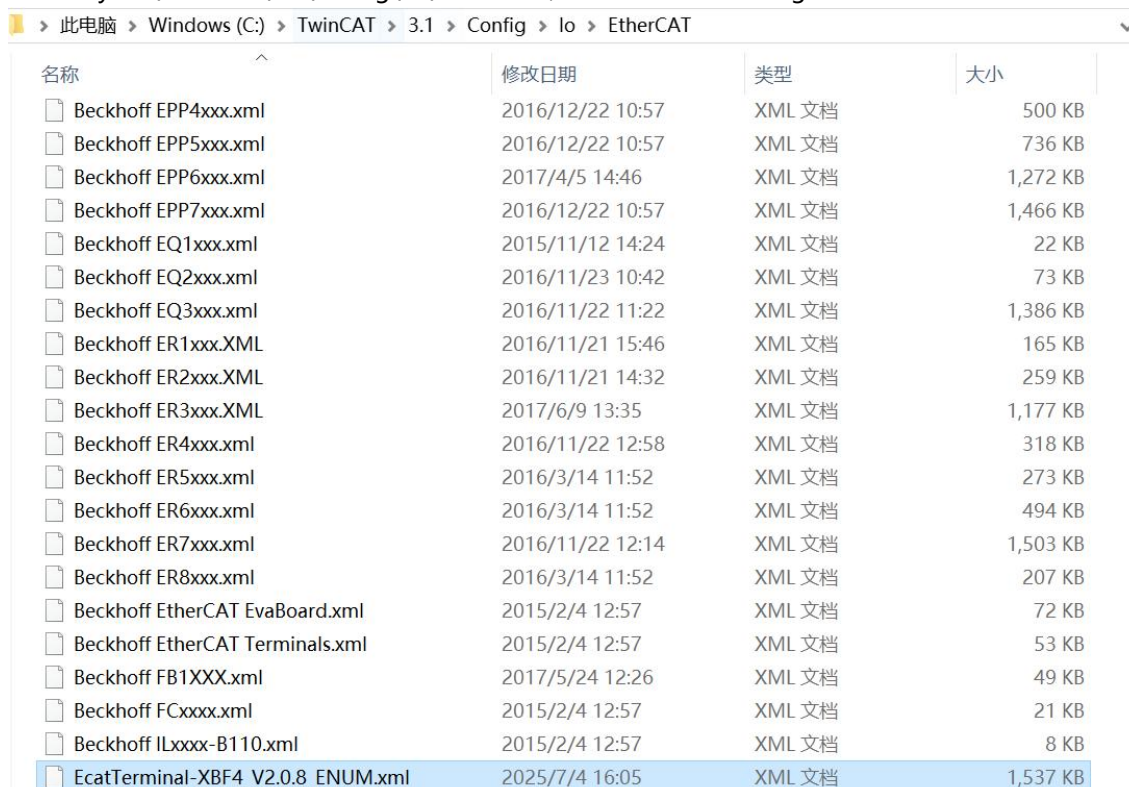
Please follow the instructions [4 Installation and Removal](#) and [5. Wiring](#) "Required Operation"

- **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

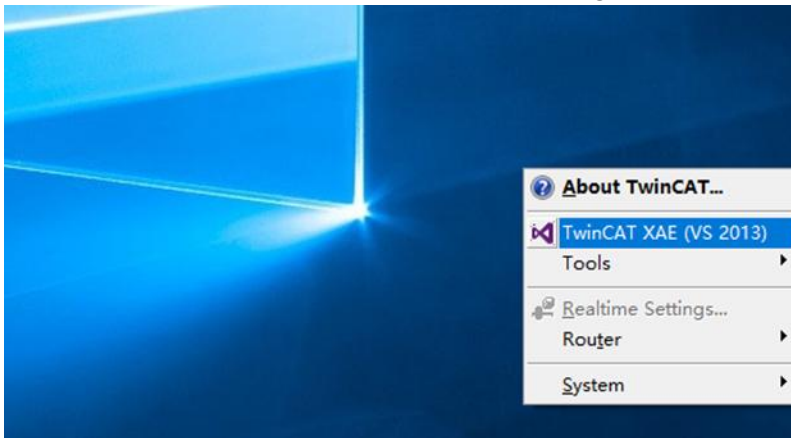
Place the ESI configuration file (EcatTerminal-XBF4_V2.0.8_ENUM.xml) in the TwinCAT installation directory "C:\TwinCAT\3.1\Config\Io\EtherCAT", as shown in the image below.



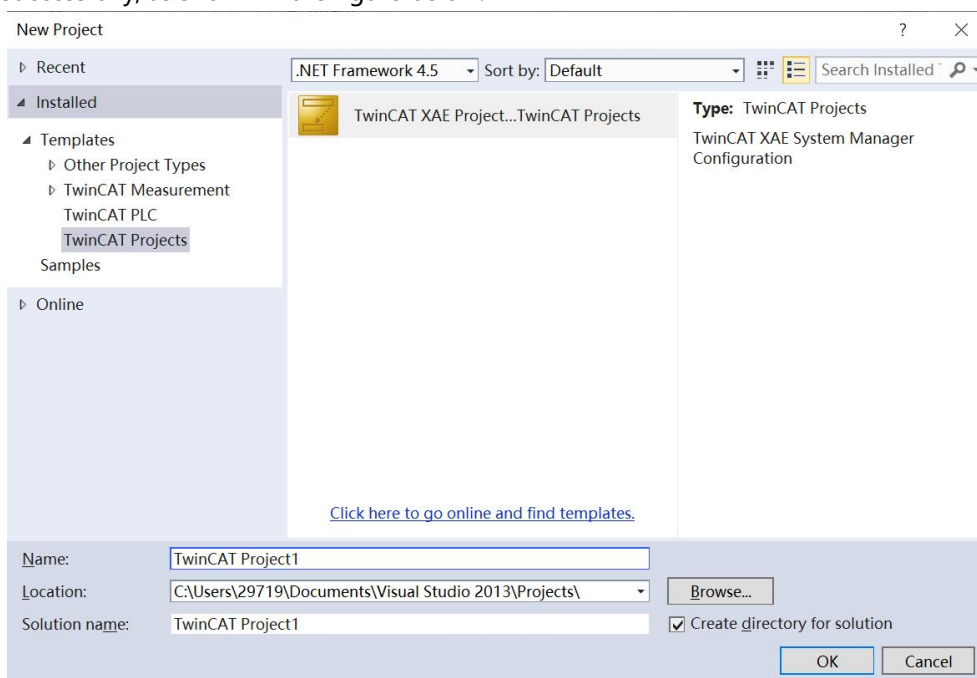
名称	修改日期	类型	大小
Beckhoff EPP4xxx.xml	2016/12/22 10:57	XML 文档	500 KB
Beckhoff EPP5xxx.xml	2016/12/22 10:57	XML 文档	736 KB
Beckhoff EPP6xxx.xml	2017/4/5 14:46	XML 文档	1,272 KB
Beckhoff EPP7xxx.xml	2016/12/22 10:57	XML 文档	1,466 KB
Beckhoff EQ1xxx.xml	2015/11/12 14:24	XML 文档	22 KB
Beckhoff EQ2xxx.xml	2016/11/23 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-XBF4_V2.0.8_ENUM.xml	2025/7/4 16:05	XML 文档	1,537 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.

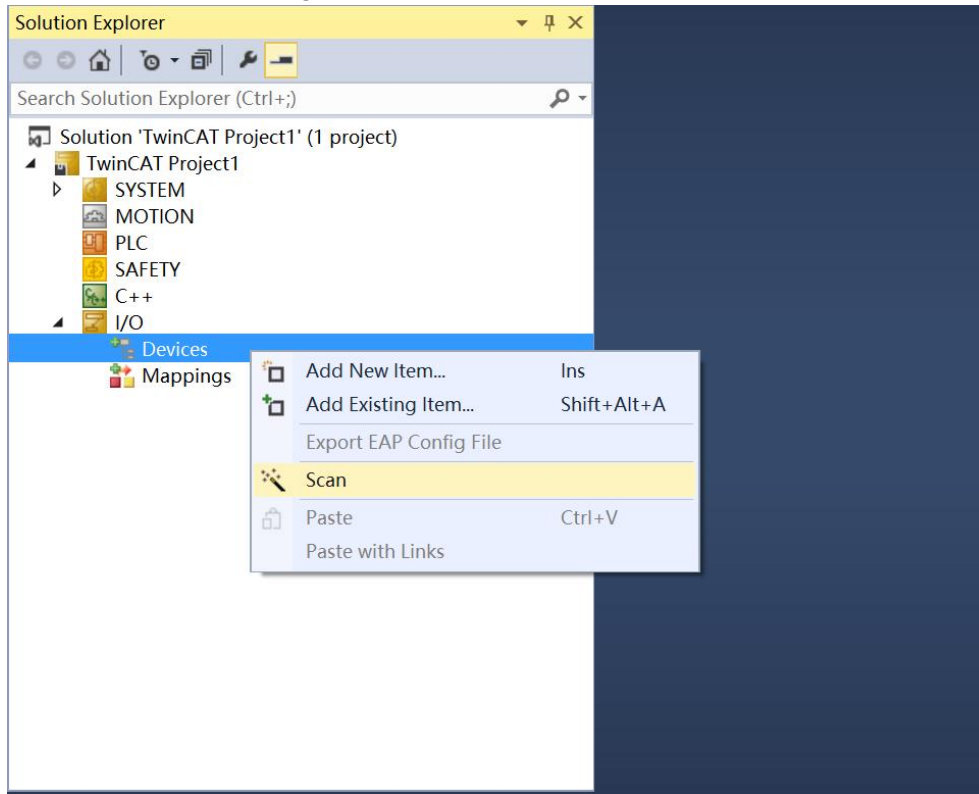


4. Add device

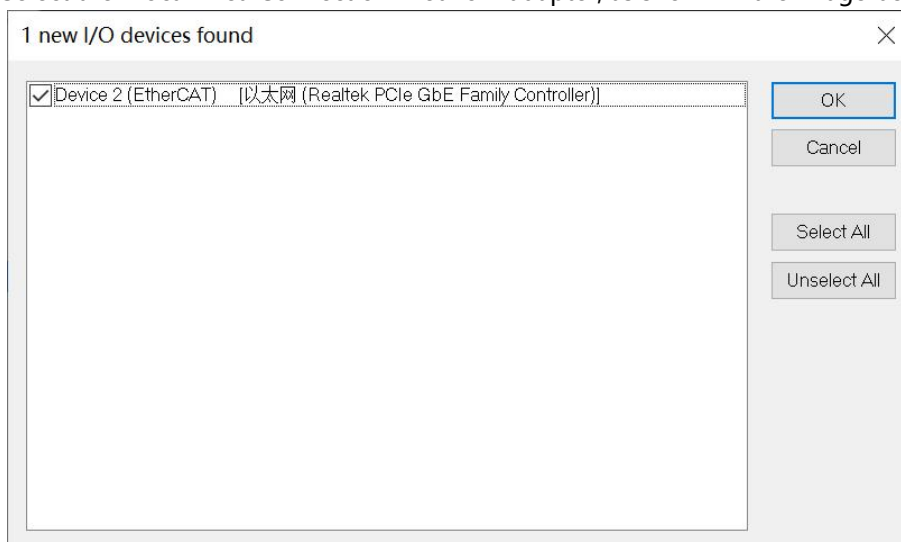
There are two ways to add a device: scanning the device or adding it manually.

➤ Scanning equipment

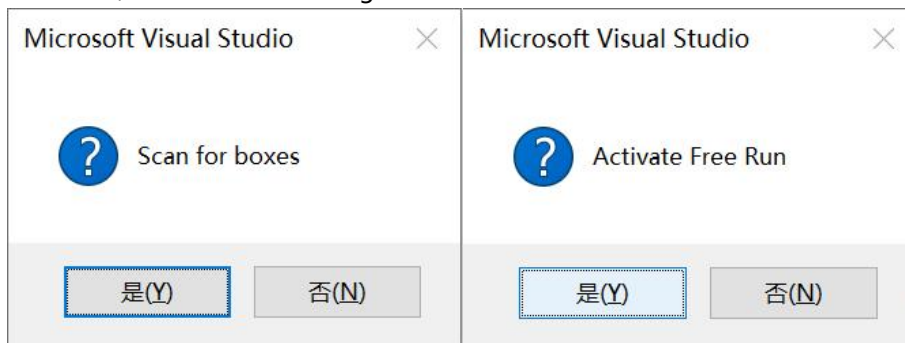
- a. After creating the project, right-click the "Scan" option under "I/O -> Devices" to scan for slave devices, as shown in the figure below.



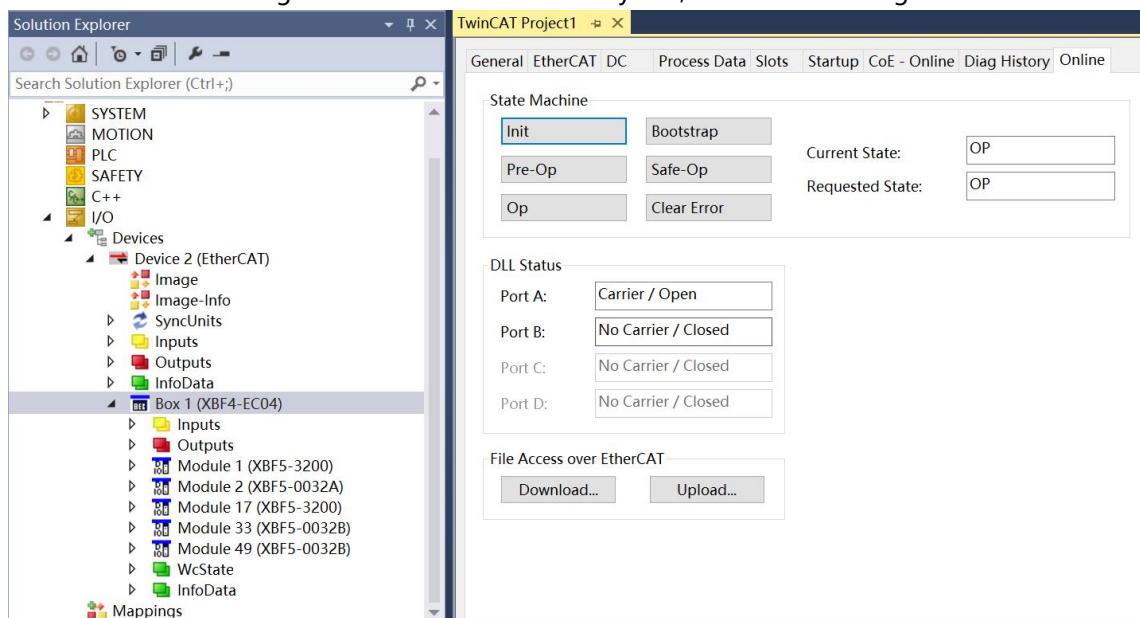
- b. Select the "Local Area Connection" network adapter, as shown in the image below.



- 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.

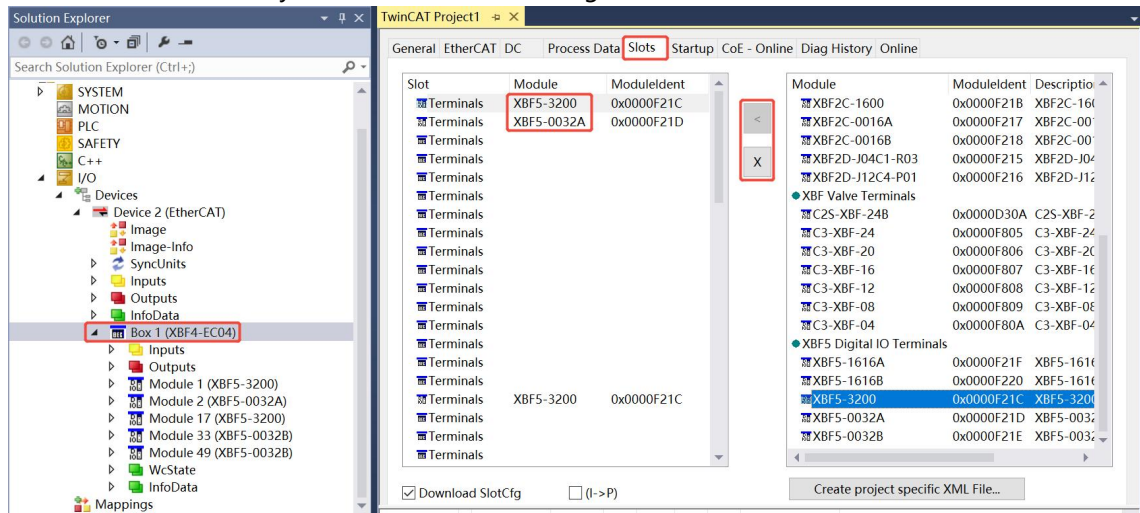


- d. After the device is scanned, you can see Box1 (XBF4-EC04), Module1 (XBF5-3200), Module2 (XBF5-0032A), Module17 (XBF5-3200), Module33 (XBF5-0032B), and Module49 (XBF5-0032B) in the left navigation tree. Under "Online", you can see that TwinCAT is in "OP" state, and you can observe that the RUN light 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.



Note: Slave module slot location: the expansion interface number corresponding to the slave module connected to the coupler $\times 16$ + slave module DIP switch number.

For example: (Module 1) XBF5-3200: $0 \times 16 + 0 = 0$ -- Terminals 0;

(Module 2) XBF5-0032A: $0 \times 16 + 1 = 1$ -- Terminals 1;

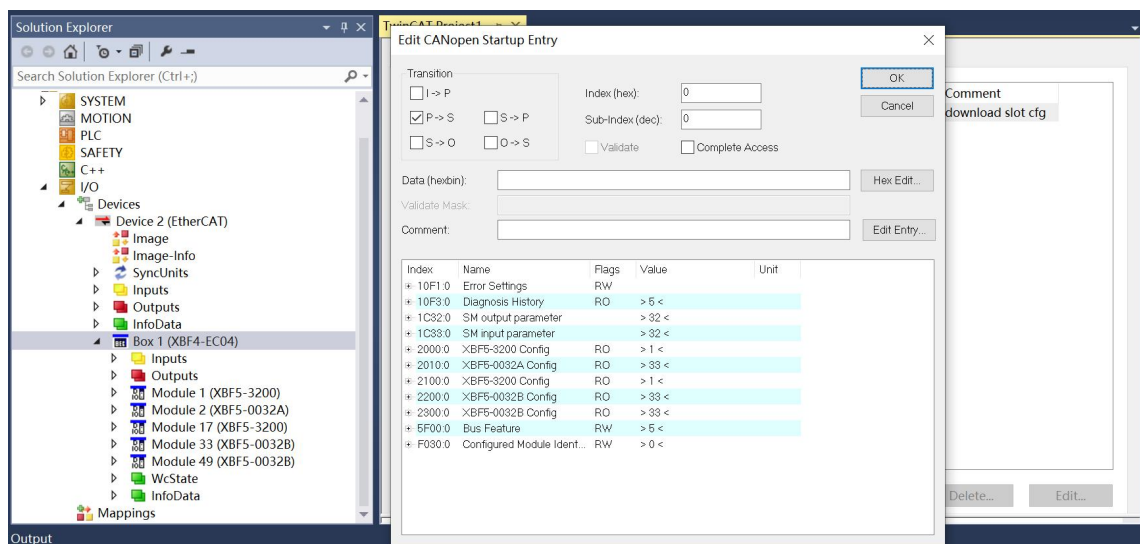
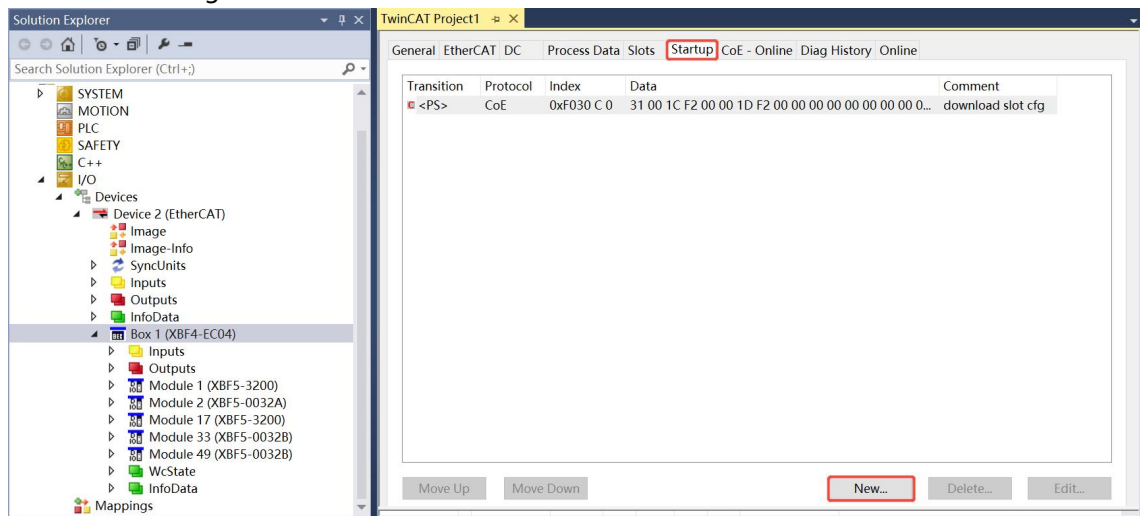
(Module 17) XBF5-3200: $1 \times 16 + 0 = 16$ -- Terminals 16;

(Module 33) XBF5-0032B: $2 \times 16 + 0 = 32$ -- Terminals 32;

(Module 49) XBF5-0032B: $3 \times 16 + 0 = 48$ -- Terminals 48.

5. Parameter configuration

- Clicking "Box1 -> 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.



- b. For example, to modify the configuration parameters of Module1 (XBF5-3200), click the "+" in front of Index 2000:0 to expand the configuration parameter menu and configure the digital input filtering; the output signal clear/hold function parameters of Module2 (XBF5-0032A) are shown in the figure below.

Edit CANopen Startup Entry

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

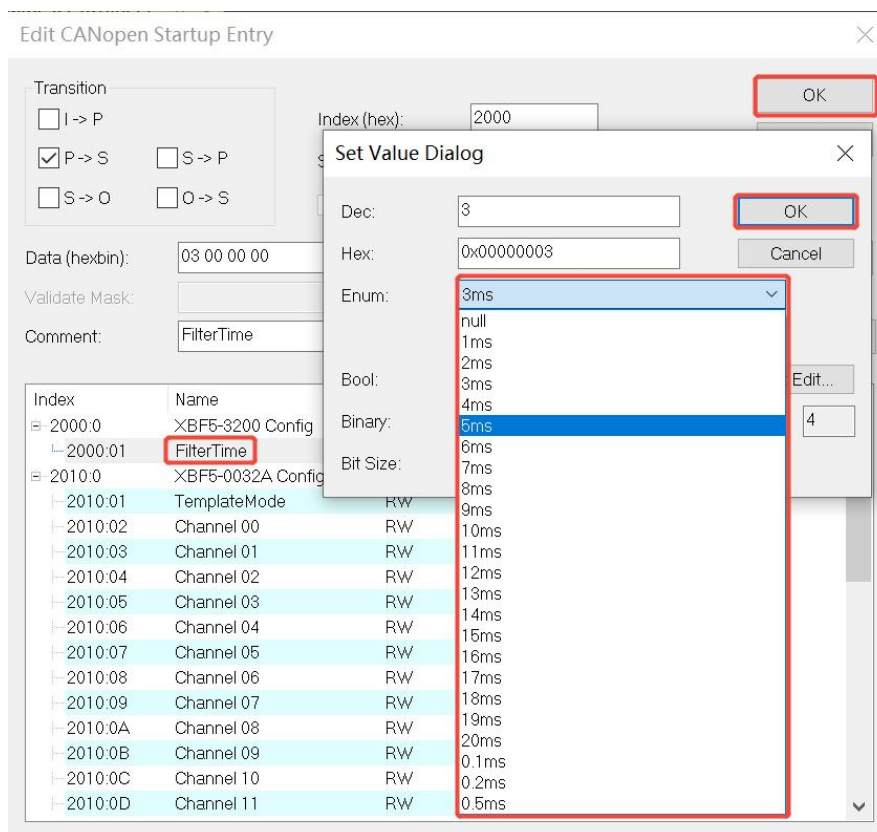
Index (hex):
 Sub-Index (dec):
☐ Validate ☐ Complete Access

Data (hexbin):
 Validate Mask:
 Comment:

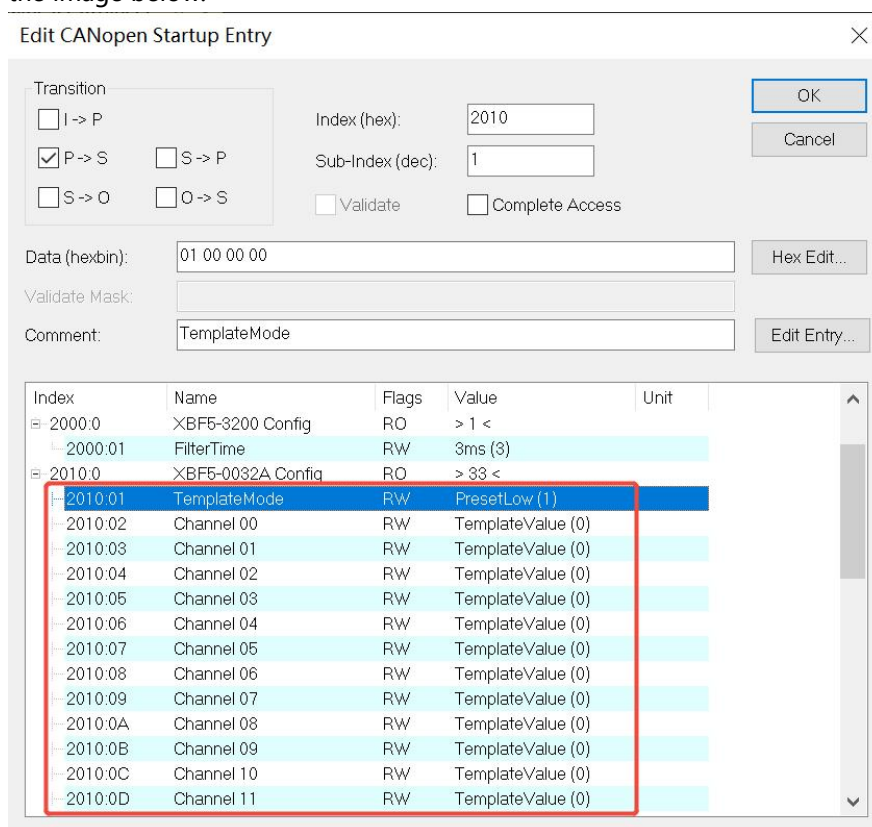
OK Cancel Hex Edit... Edit Entry...

Index	Name	Flags	Value	Unit
2000:0	XBF5-3200 Config	RO	> 1 <	
2000:01	FilterTime	RW	3ms (3)	
2010:0	XBF5-0032A Config	RO	> 33 <	
2010:01	TemplateMode	RW	PresetLow (1)	
2010:02	Channel 00	RW	TemplateValue (0)	
2010:03	Channel 01	RW	TemplateValue (0)	
2010:04	Channel 02	RW	TemplateValue (0)	
2010:05	Channel 03	RW	TemplateValue (0)	
2010:06	Channel 04	RW	TemplateValue (0)	
2010:07	Channel 05	RW	TemplateValue (0)	
2010:08	Channel 06	RW	TemplateValue (0)	
2010:09	Channel 07	RW	TemplateValue (0)	
2010:0A	Channel 08	RW	TemplateValue (0)	
2010:0B	Channel 09	RW	TemplateValue (0)	
2010:0C	Channel 10	RW	TemplateValue (0)	
2010:0D	Channel 11	RW	TemplateValue (0)	

- c. 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.



- 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 "OK", as shown in the image below.



- e. For example, to modify the baud rate configuration parameter, click the "+" in front of Index 5F00:0 to expand the configuration parameter menu, as shown in the figure below.

Transition

☐ I → P

☒ P → S ☐ S → P

☐ S → O ☐ O → S

Index (hex): 2010

Sub-Index (dec): 1

☐ Validate ☐ Complete Access

Data (hexbin): 01 00 00 00

Validate Mask:

Comment: TemplateMode

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	XBF5-3200 Config	RO	> 1 <	
2010:0	XBF5-0032A Config	RO	> 33 <	
2100:0	XBF5-3200 Config	RO	> 1 <	
2200:0	XBF5-0032B Config	RO	> 33 <	
2300:0	XBF5-0032B Config	RO	> 33 <	
5F00:0	Bus Feature	RW	> 5 <	
5F00:01	BusFault Communication Configuration	RW	0x00000000 (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 <	

- f. The Bus Baud Rate can be set to 6MHz, 3MHz, 1MHz, or 115200Hz. Double-click "Bus Baud Rate" and modify the parameter value in the drop-down box, as shown in the figure below.

Transition

☐ I → P

☒ P → S ☐ S → P

☐ S → O ☐ O → S

Index (hex): 5f00

Sub-Index (dec): 5

Data (hexbin): 80 8D 5B 00

Validate Mask:

Comment: Bus Baud Rate

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	XBF5-3200 Config	RO	> 1 <	
2010:0	XBF5-0032A Config	RO	> 33 <	
2100:0	XBF5-3200 Config	RO	> 1 <	
2200:0	XBF5-0032B Config	RO	> 33 <	
2300:0	XBF5-0032B Config	RO	> 33 <	
5F00:0	Bus Feature	RW	> 5 <	
5F00:01	BusFault Communication Configuration	RW	0x00000000 (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 <	

Set Value Dialog

Dec: 6000000

Hex: 0x005B8D80

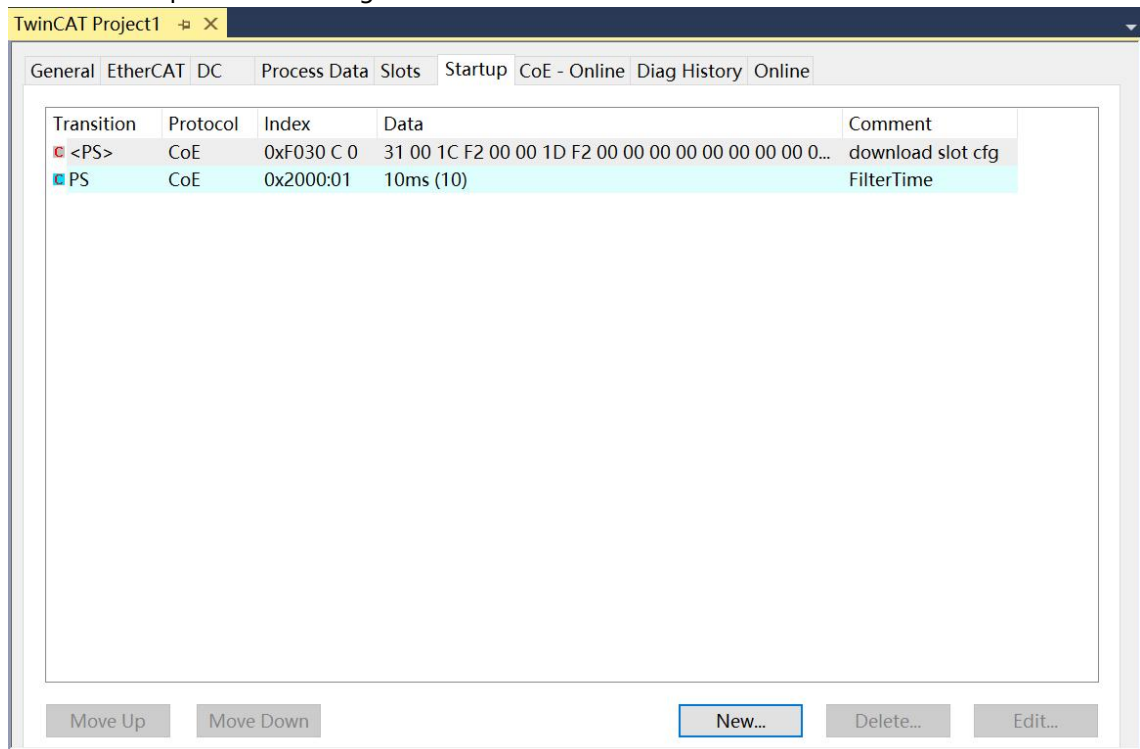
Enum: 6MHz (selected)

Bool:

Binary: 80 8D 5B 00

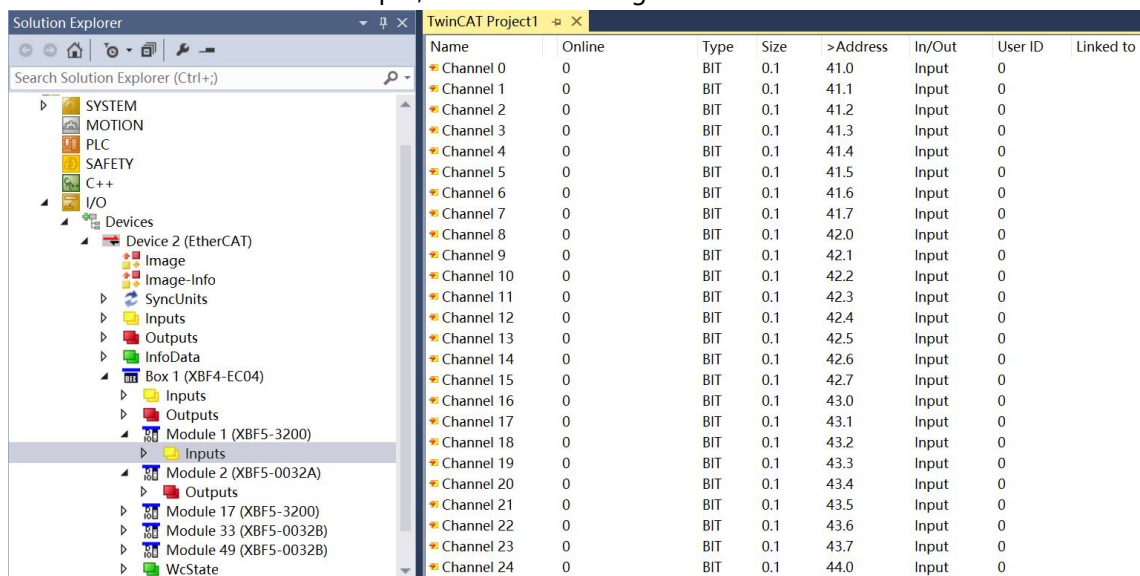
Bit Size: ☐ 1 ☐ 8 ☐ 16 ☒ 32 ☐ 64 ☐ ?

- g. 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.

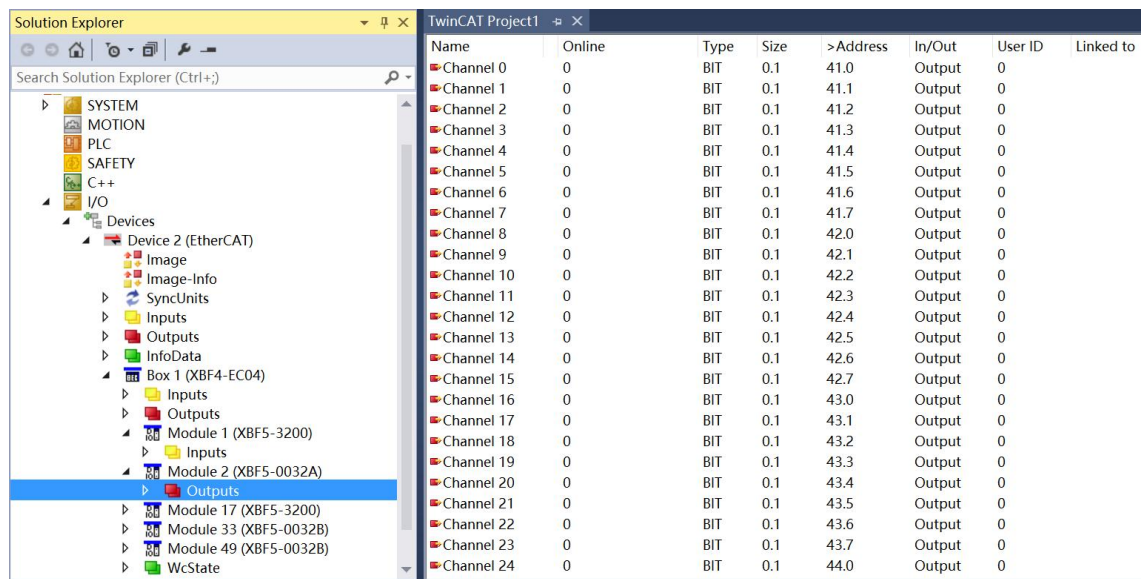


6. Verify basic functions

- a. The left-hand navigation tree "Module1 -> Inputs" displays the upstream data of the module, used to monitor the module's input, as shown in the figure below.

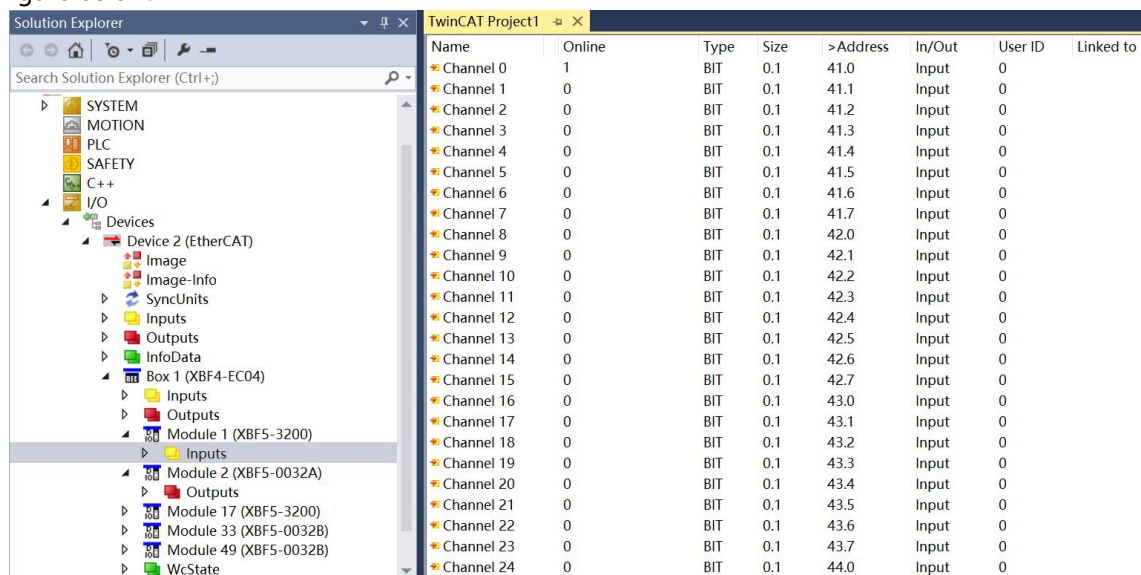


- b. The left-hand navigation tree "Module2 -> Outputs" displays the module's downstream data, which is used to control the module's output, as shown in the figure below.



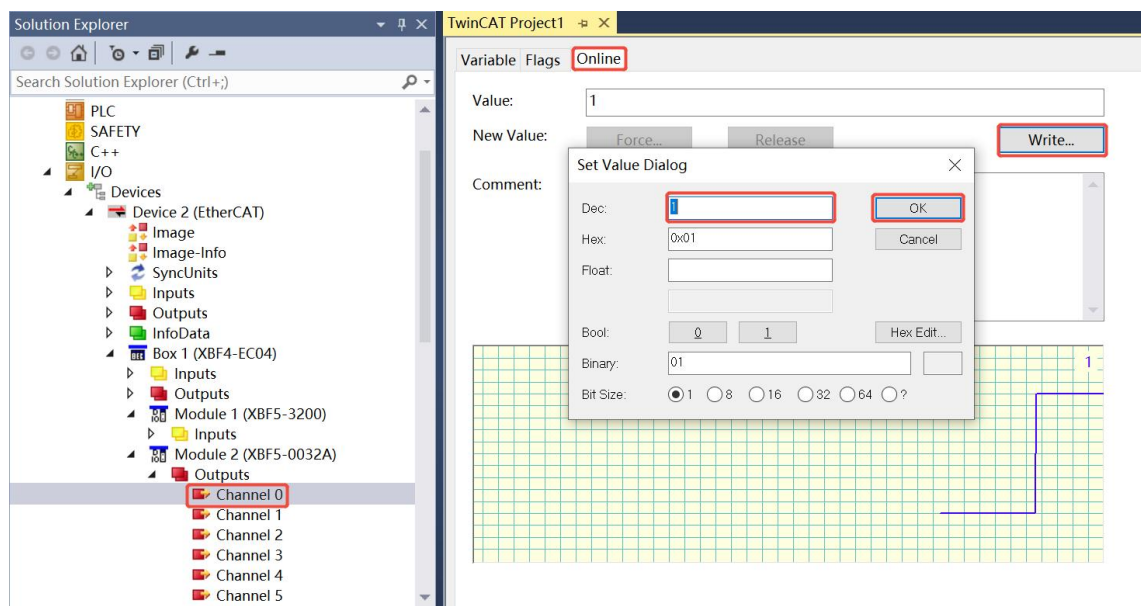
Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Channel 0	0	BIT	0.1	41.0	Output	0	
Channel 1	0	BIT	0.1	41.1	Output	0	
Channel 2	0	BIT	0.1	41.2	Output	0	
Channel 3	0	BIT	0.1	41.3	Output	0	
Channel 4	0	BIT	0.1	41.4	Output	0	
Channel 5	0	BIT	0.1	41.5	Output	0	
Channel 6	0	BIT	0.1	41.6	Output	0	
Channel 7	0	BIT	0.1	41.7	Output	0	
Channel 8	0	BIT	0.1	42.0	Output	0	
Channel 9	0	BIT	0.1	42.1	Output	0	
Channel 10	0	BIT	0.1	42.2	Output	0	
Channel 11	0	BIT	0.1	42.3	Output	0	
Channel 12	0	BIT	0.1	42.4	Output	0	
Channel 13	0	BIT	0.1	42.5	Output	0	
Channel 14	0	BIT	0.1	42.6	Output	0	
Channel 15	0	BIT	0.1	42.7	Output	0	
Channel 16	0	BIT	0.1	43.0	Output	0	
Channel 17	0	BIT	0.1	43.1	Output	0	
Channel 18	0	BIT	0.1	43.2	Output	0	
Channel 19	0	BIT	0.1	43.3	Output	0	
Channel 20	0	BIT	0.1	43.4	Output	0	
Channel 21	0	BIT	0.1	43.5	Output	0	
Channel 22	0	BIT	0.1	43.6	Output	0	
Channel 23	0	BIT	0.1	43.7	Output	0	
Channel 24	0	BIT	0.1	44.0	Output	0	

- c. Taking channel 0 of Module1 (XBF5-3200) 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.



Name	Online	Type	Size	>Address	In/Out	User ID	Linked to
Channel 0	1	BIT	0.1	41.0	Input	0	
Channel 1	0	BIT	0.1	41.1	Input	0	
Channel 2	0	BIT	0.1	41.2	Input	0	
Channel 3	0	BIT	0.1	41.3	Input	0	
Channel 4	0	BIT	0.1	41.4	Input	0	
Channel 5	0	BIT	0.1	41.5	Input	0	
Channel 6	0	BIT	0.1	41.6	Input	0	
Channel 7	0	BIT	0.1	41.7	Input	0	
Channel 8	0	BIT	0.1	42.0	Input	0	
Channel 9	0	BIT	0.1	42.1	Input	0	
Channel 10	0	BIT	0.1	42.2	Input	0	
Channel 11	0	BIT	0.1	42.3	Input	0	
Channel 12	0	BIT	0.1	42.4	Input	0	
Channel 13	0	BIT	0.1	42.5	Input	0	
Channel 14	0	BIT	0.1	42.6	Input	0	
Channel 15	0	BIT	0.1	42.7	Input	0	
Channel 16	0	BIT	0.1	43.0	Input	0	
Channel 17	0	BIT	0.1	43.1	Input	0	
Channel 18	0	BIT	0.1	43.2	Input	0	
Channel 19	0	BIT	0.1	43.3	Input	0	
Channel 20	0	BIT	0.1	43.4	Input	0	
Channel 21	0	BIT	0.1	43.5	Input	0	
Channel 22	0	BIT	0.1	43.6	Input	0	
Channel 23	0	BIT	0.1	43.7	Input	0	
Channel 24	0	BIT	0.1	44.0	Input	0	

- d. Taking channel 0 of Module2 (XBF5-0032A) as an example, if you want the digital output channel 0 of this module to output, you can click Channel 0 in "Module2 -> Outputs", click "Write" in the corresponding "Online" field, and enter the value "1" in the "Dec" field of the corresponding dialog box. You can then see the corresponding channel light on the module, as shown in the figure below.



6.4 PROFINET Coupler Configuration Application

6.4.1 Application in the TIA Portal V17 software environment

1、Preparation

- **Hardware environment**

- **Module preparation:** This instruction uses the XBF4-PN04+{Coupler Interface 0: XBF5-3200+XBF5-0032A}+{Coupler Interface 1: XBF5-3200}+{Coupler Interface 2: XBF5-0032B}+{Coupler Interface 3: XBF5-0032B} topology as an example.
- **One computer, pre-installed with TIA Portal V17 software.**
- **One Siemens PLC is required.** This instruction manual uses the Siemens S7-1500 CPU 1511-1 PN as an example.
- **Special shielded cable**
- **One switching power supply**
- **Device configuration file**
Configuration file retrieval

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

- **Hardware configuration and wiring**

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

2、New construction projects

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



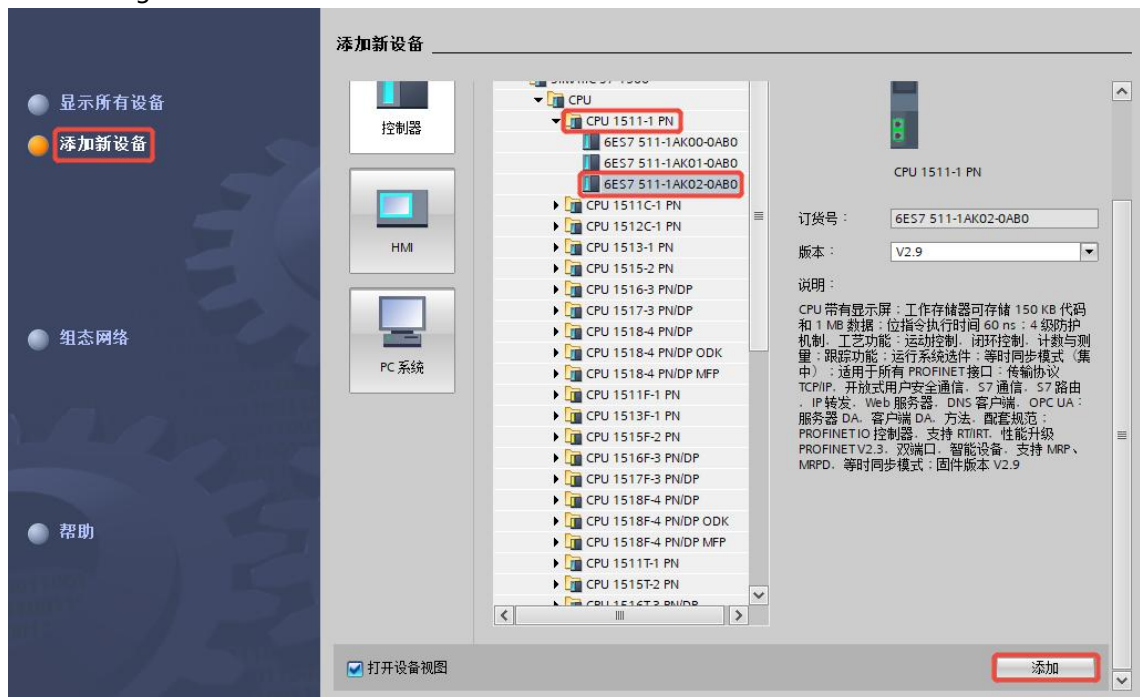
- ◆ Project name: Custom, you can keep the default.
- ◆ Path: The path where the project is saved. You can keep the default path.
- ◆ Version: You can keep the default.
- ◆ Author: You can keep the default setting.
- ◆ Note: This is customizable and can be left blank.

3. Add PLC controller

- a. Click "Configure Devices", as shown in the figure below.

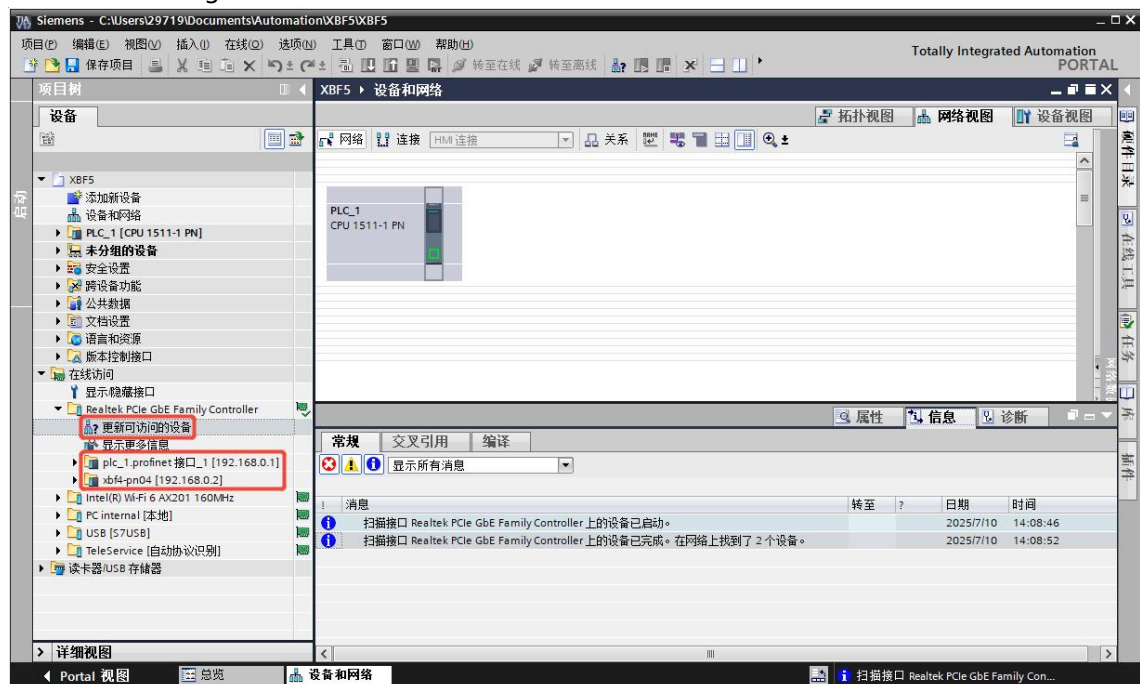


- b. Click "Add New Device", select the PLC model you are currently using, and click "Add", as shown in the image below. After adding, you can see that the PLC has been added to the device navigation tree.



4. Scan connection device

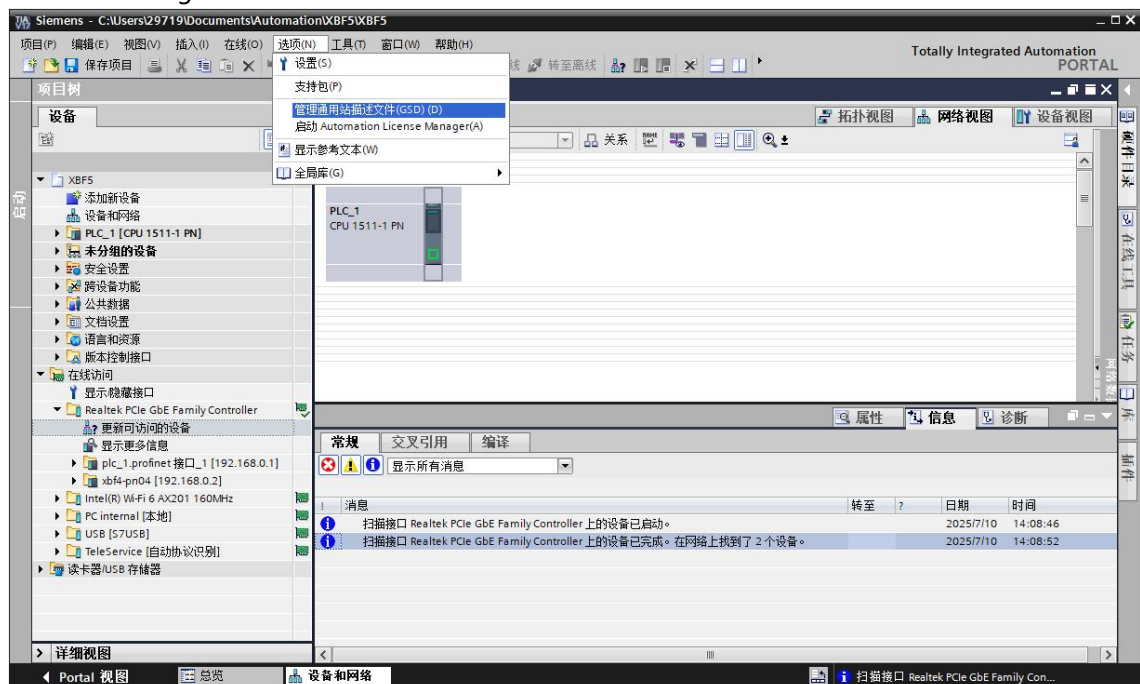
- Click "Online Access -> Update Accessible Devices" in the left navigation tree, as shown in the image below. Once the update is complete, the connected slave devices will be displayed, as shown in the image below.



The computer's IP address must be on the same network segment as the PLC. If they are not on the same network segment, change the computer's IP address and repeat the above steps.

5. Add GSD configuration file

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

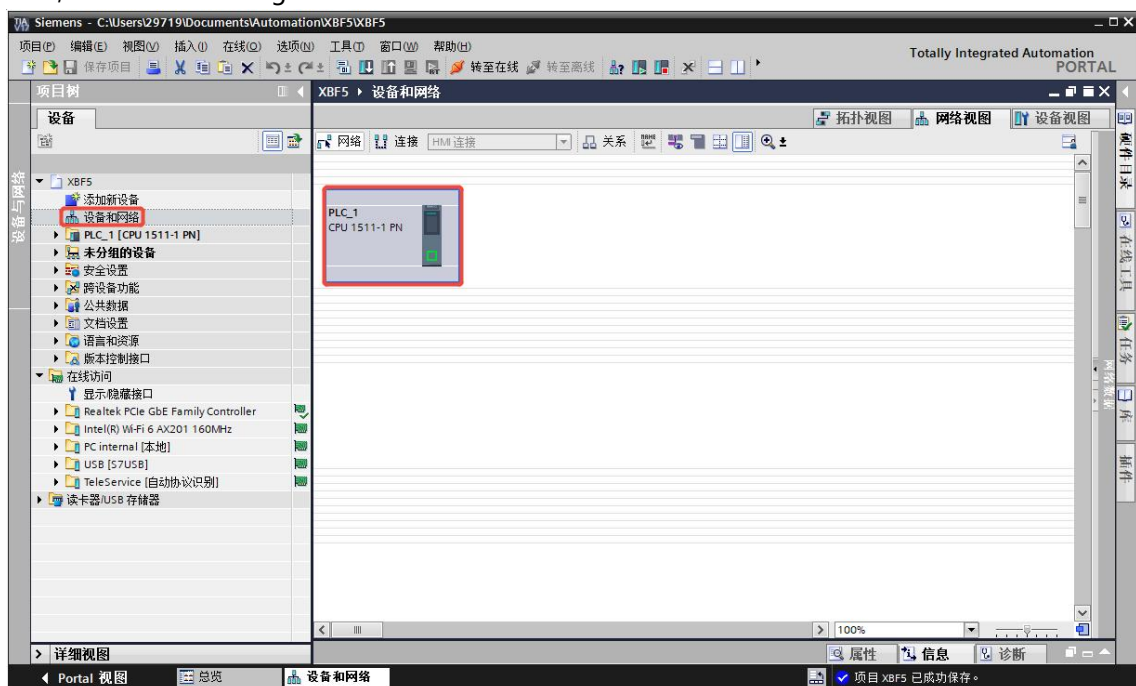


- b. Click "Source Path" to select the folder, and check if the status of the GSD file to be added is "Not Installed". If not, click the "Install" button; if already installed, click "Cancel" to skip the installation steps. As shown in the figure below.

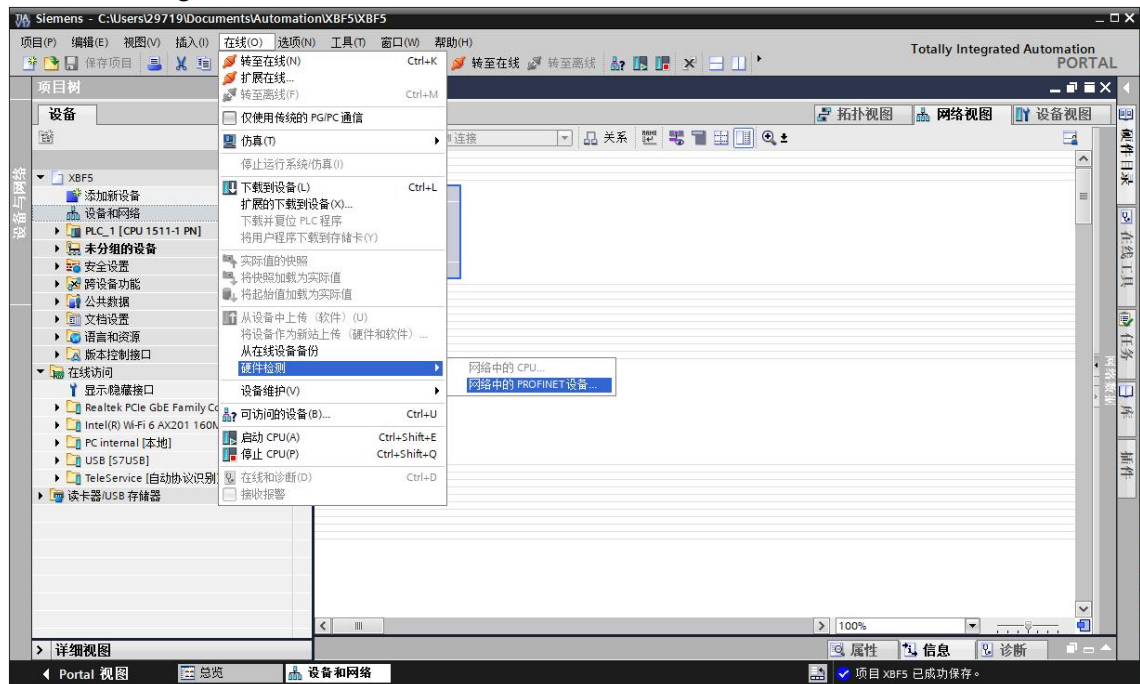


6、Hardware detection and device addition

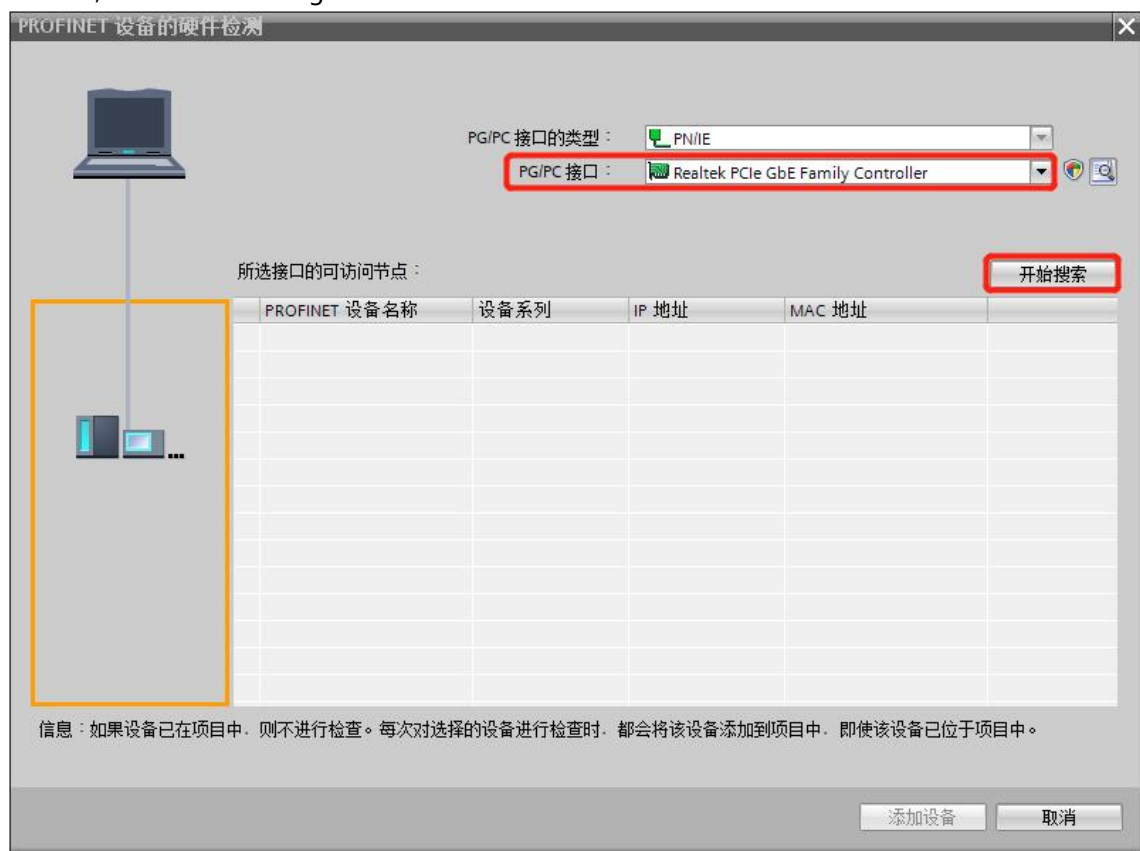
- a. Double-click "Device and Network" in the left navigation tree, and select PLC in the network view, as shown in the figure below.



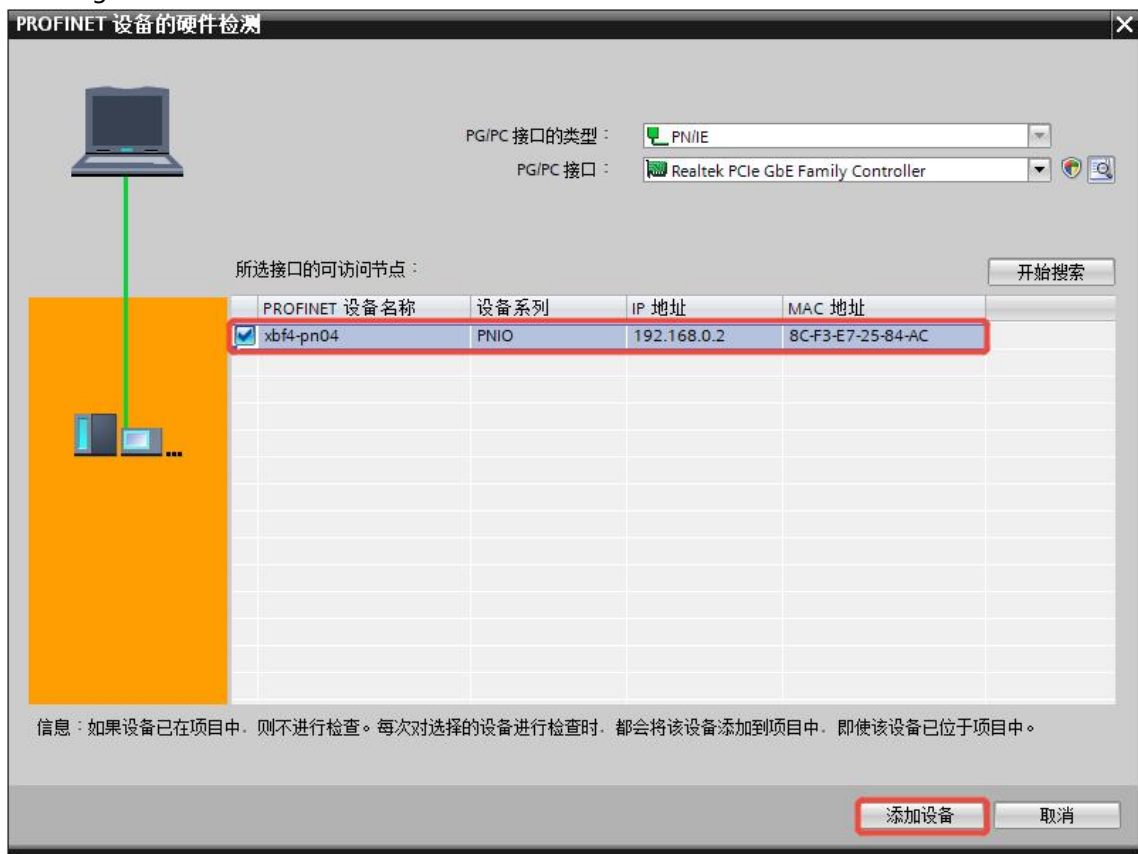
- b. In the menu bar, select "Online -> Hardware Detection -> PROFINET Devices in Network", as shown in the figure below.



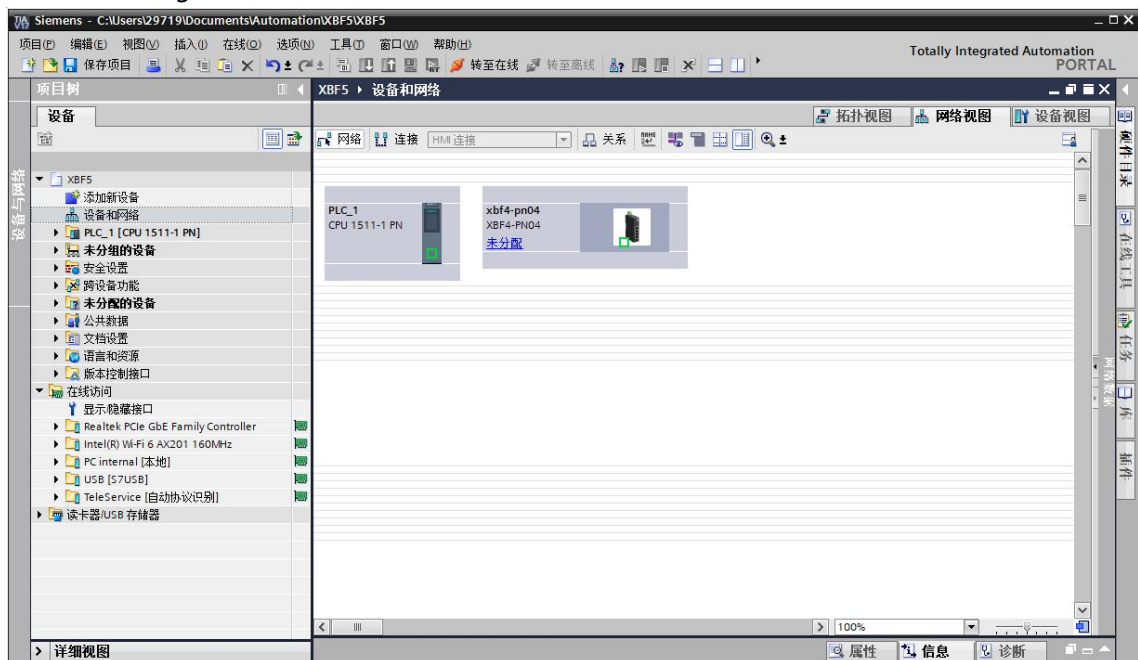
- c. A hardware detection window will pop up. Select the correct PG/PC interface and click "Start Search", as shown in the figure below.



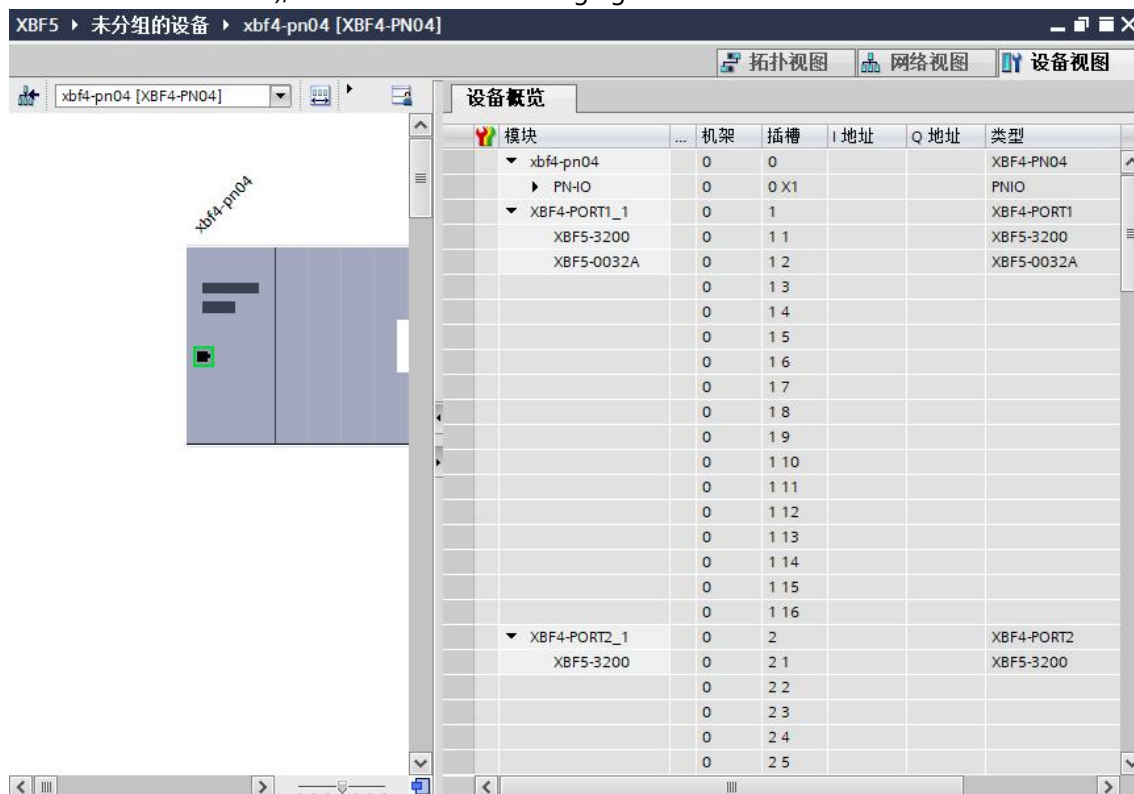
- d. To detect coupler devices in the network, select the coupler and click "Add Device," as shown in the image below.



- e. After the coupler is successfully added, you can see the coupler icon in the network view, as shown in the figure below.



- f. Select the coupler icon, switch to the device view, and add the I/O modules manually. In the "Hardware Directory" on the right, drag and drop the coupler interface and I/O modules according to the actual topology (the order must match the actual topology, otherwise communication will fail), as shown in the following figure.

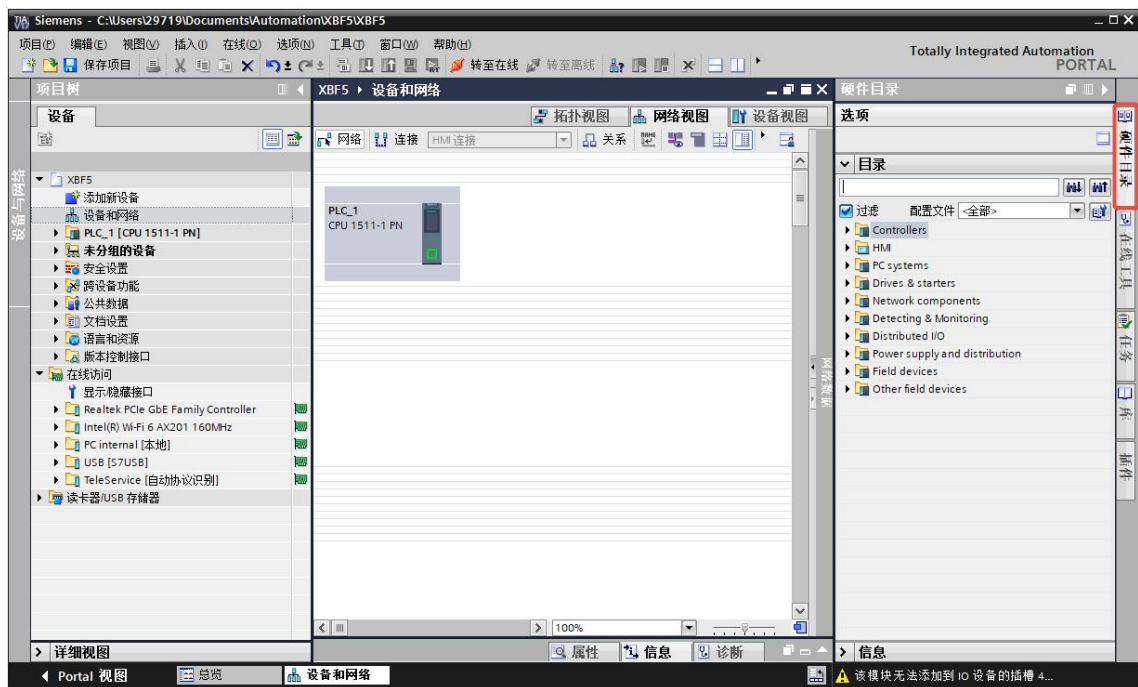


Note: The I/O module DIP switch station number must be consistent with the slot number set in the diagram. The DIP switch station numbers 0~F correspond to slots 1~16 of the four coupler interfaces respectively.

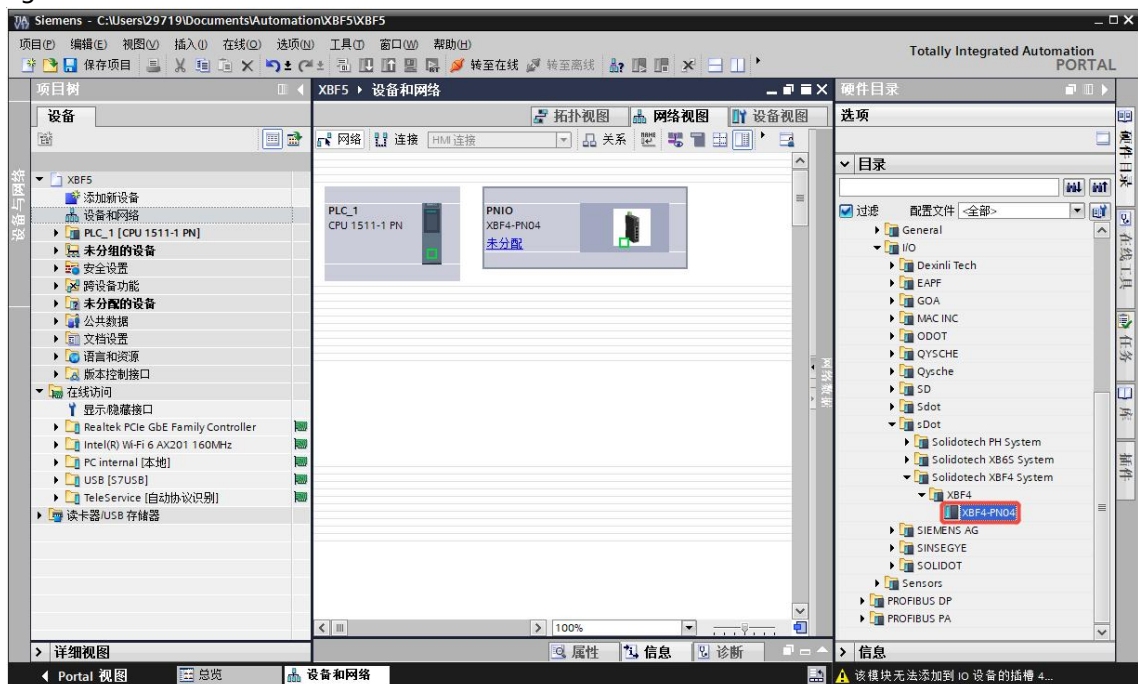
7、Manually add slave devices

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

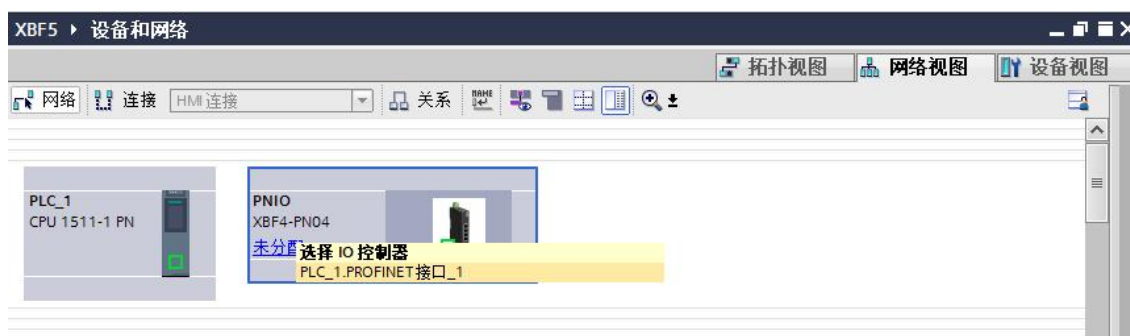
- Double-click "Devices and Networks" in the left navigation bar.
- Click the vertical "Hardware Catalog" button on the right, and the catalog will be displayed as shown in the image below.



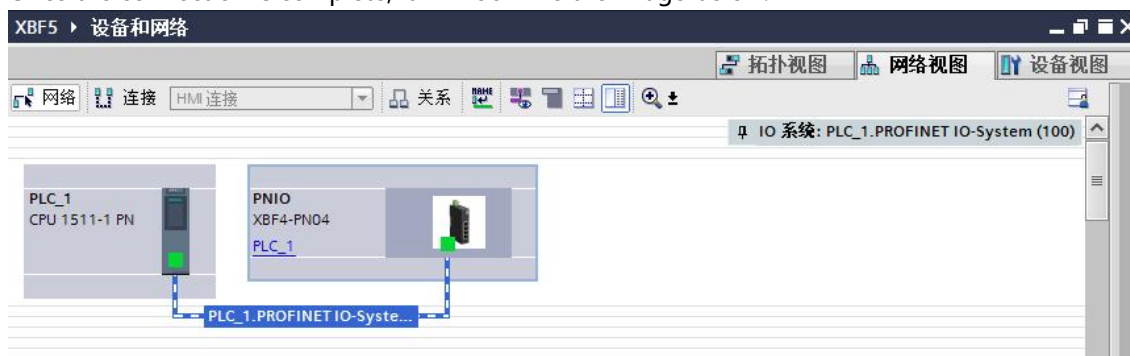
- c. Select "Other field devices -> PROFINET IO -> I/O -> sDot -> Solidotech XBF4 System -> XBF4 -> XBF4-PN04", then drag or double-click XBF4-PN04 to the "Network View", as shown in the figure below.



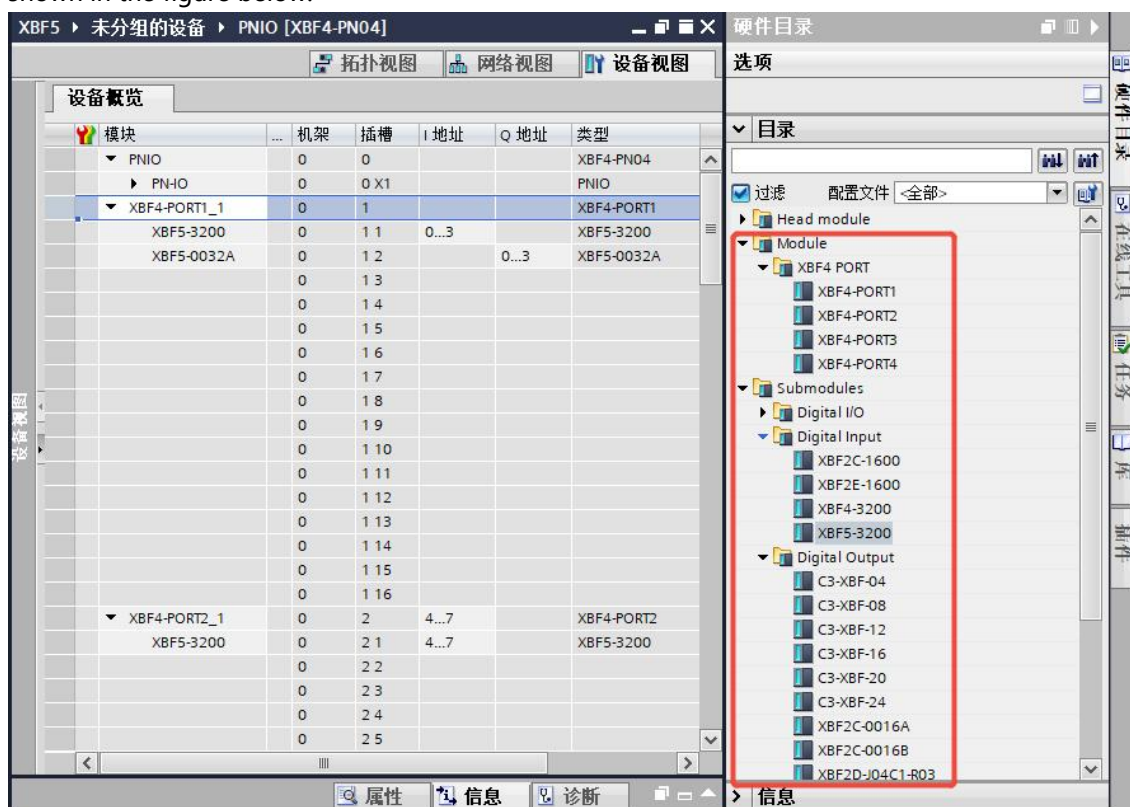
- d. Switch to network view, click "Unassigned (blue text)" on the coupler (slave) device, and select "PLC_1.PROFINET Interface_1", as shown in the figure below.



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



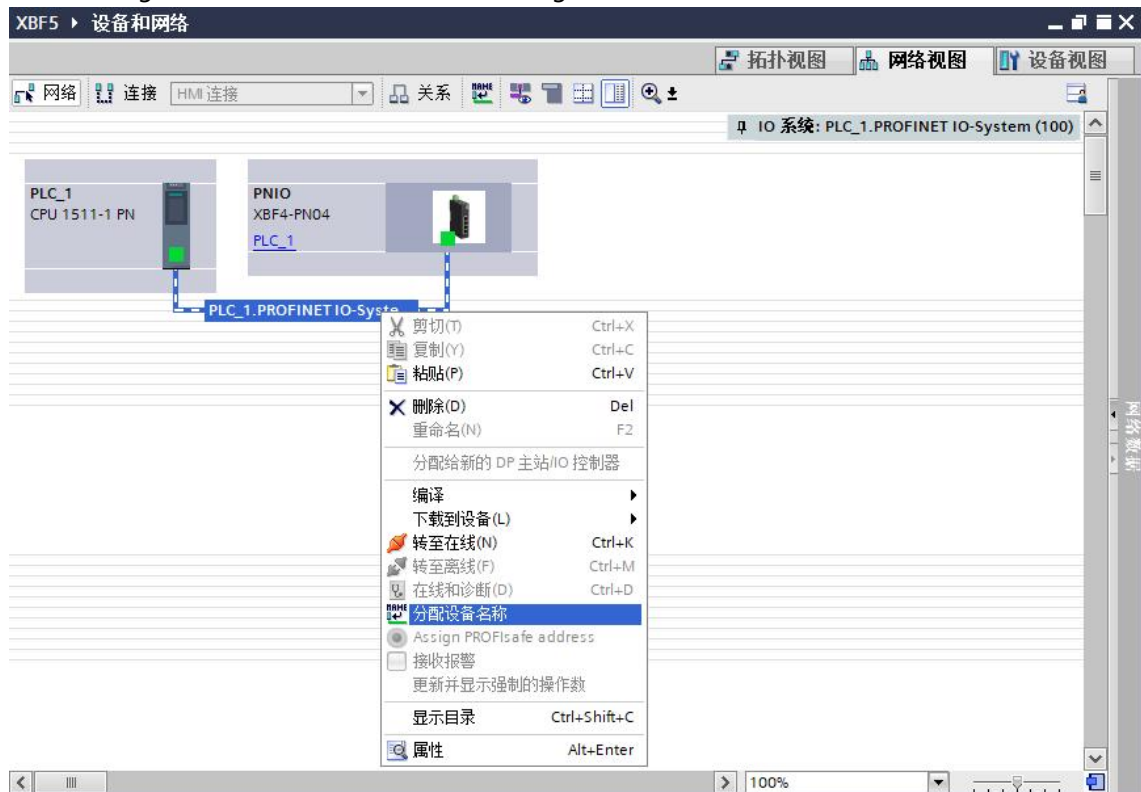
- f. Click "Device View" to enter the coupler's device overview. Under "Hardware Catalog" on the right, drag and drop to add couplers according to the actual topology. The interface and I/O modules (the order must match the actual topology, otherwise communication will fail) are shown in the figure below.



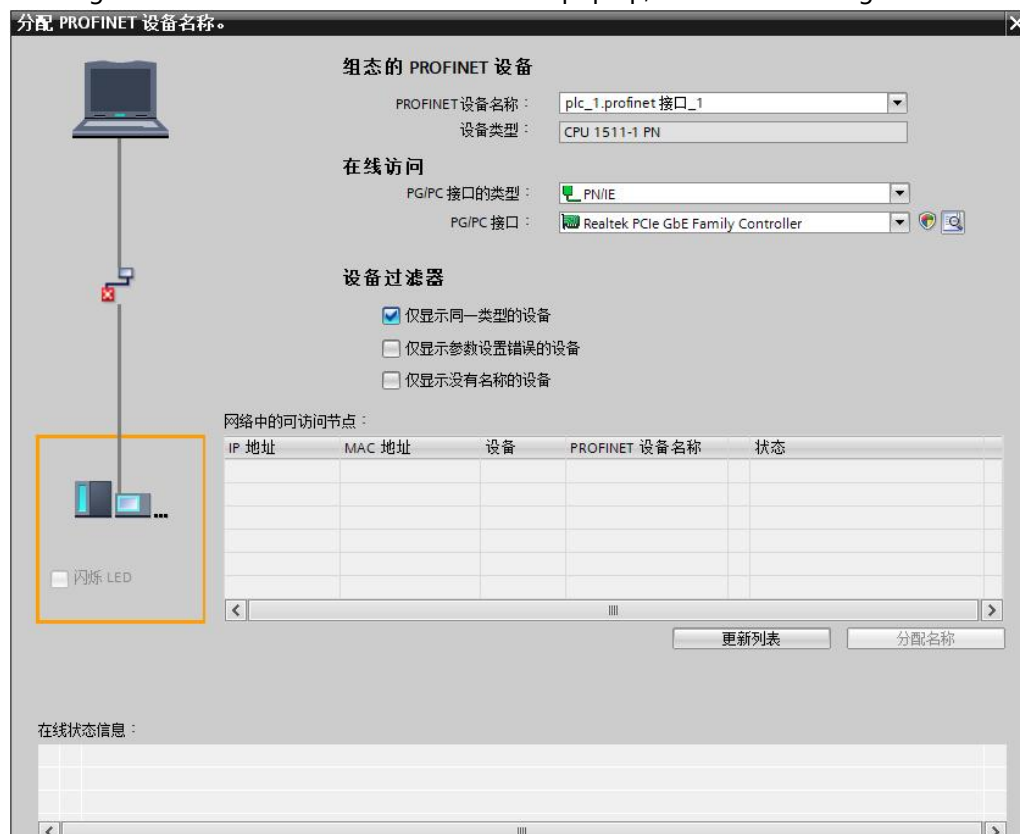
Note: The I/O module DIP switch station number must be consistent with the slot number set in the diagram. The DIP switch station numbers 0~F correspond to slots 1~16 of the four coupler interfaces respectively.

8. Assign device name

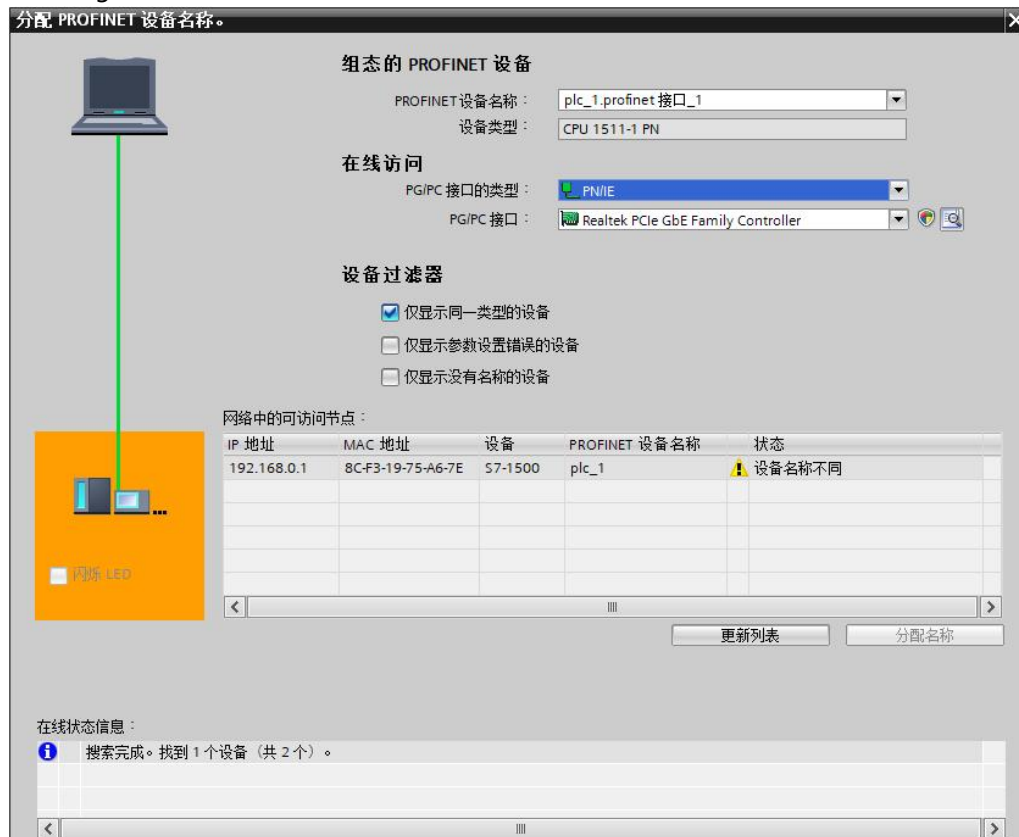
- In the network view, right-click the connection cable between the PLC and the coupler, and select "Assign Device Name", as shown in the figure below.



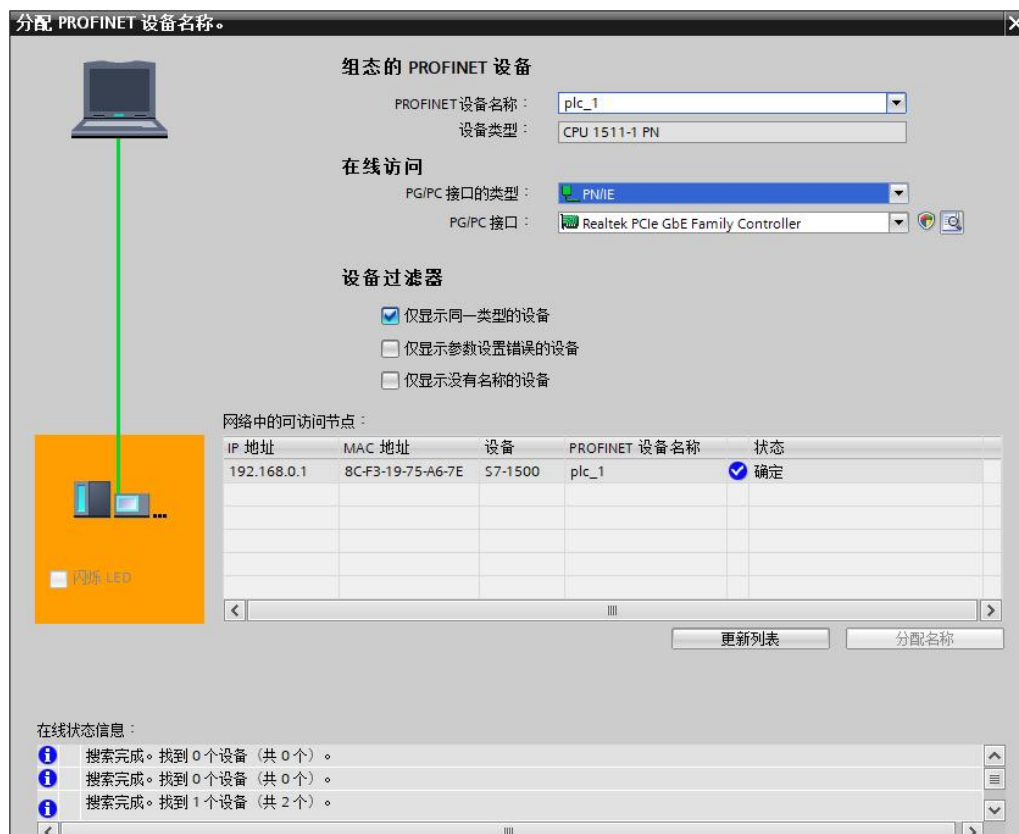
- A "Assign PROFINET Device Name" window will pop up, as shown in the figure below.



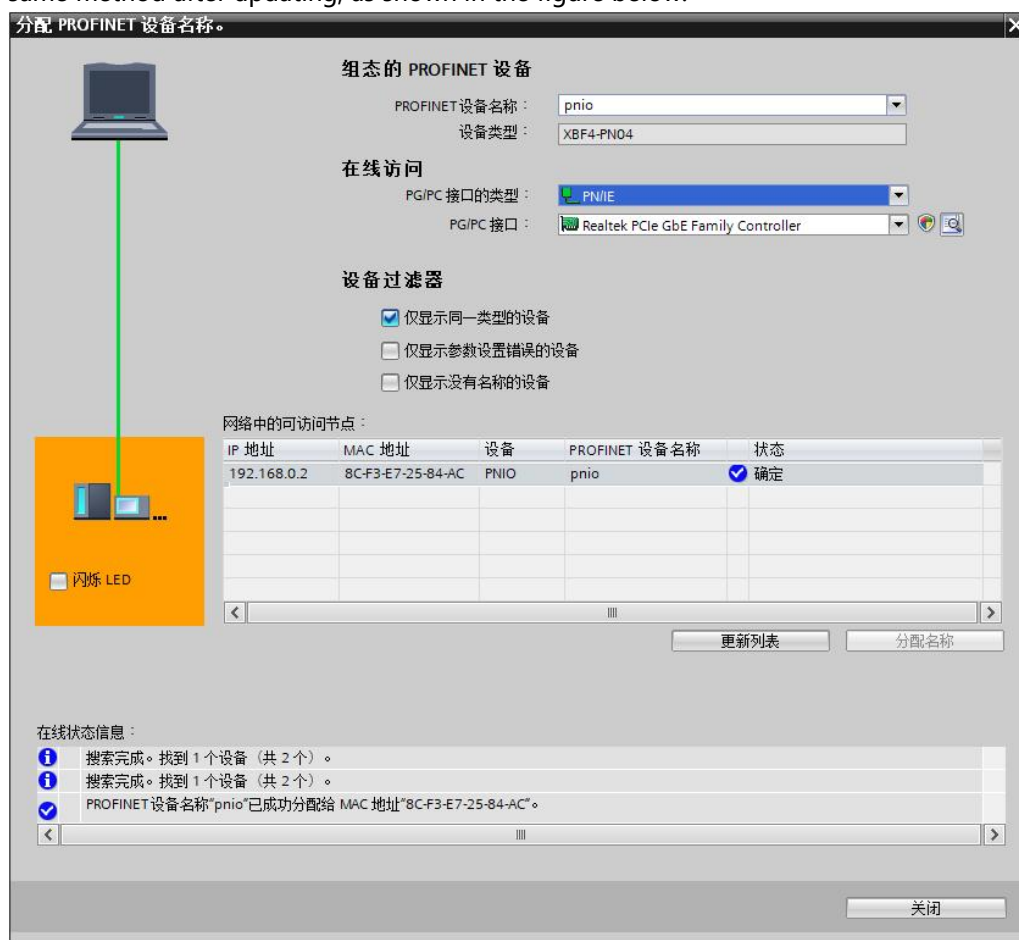
- c. Select PLC as the device name, click "Update List", and the update will be completed as shown in the figure below.



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



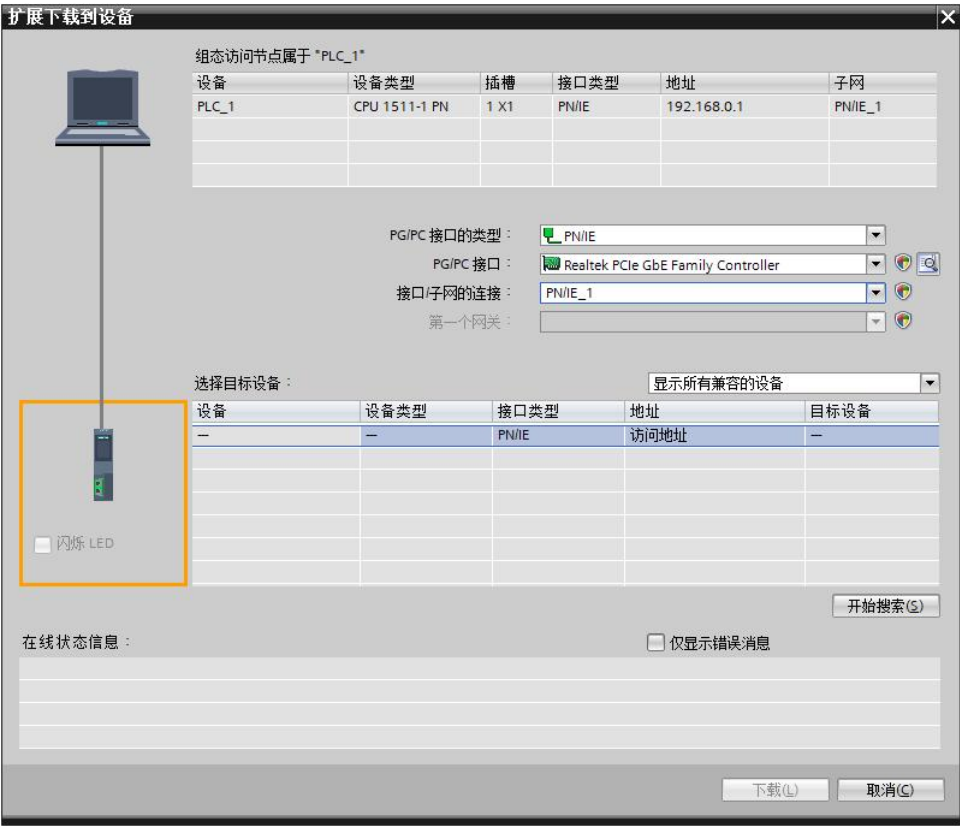
- e. Select "Coupler" as the device name, click "Update List," and then assign a name using the same method after updating, as shown in the figure below.



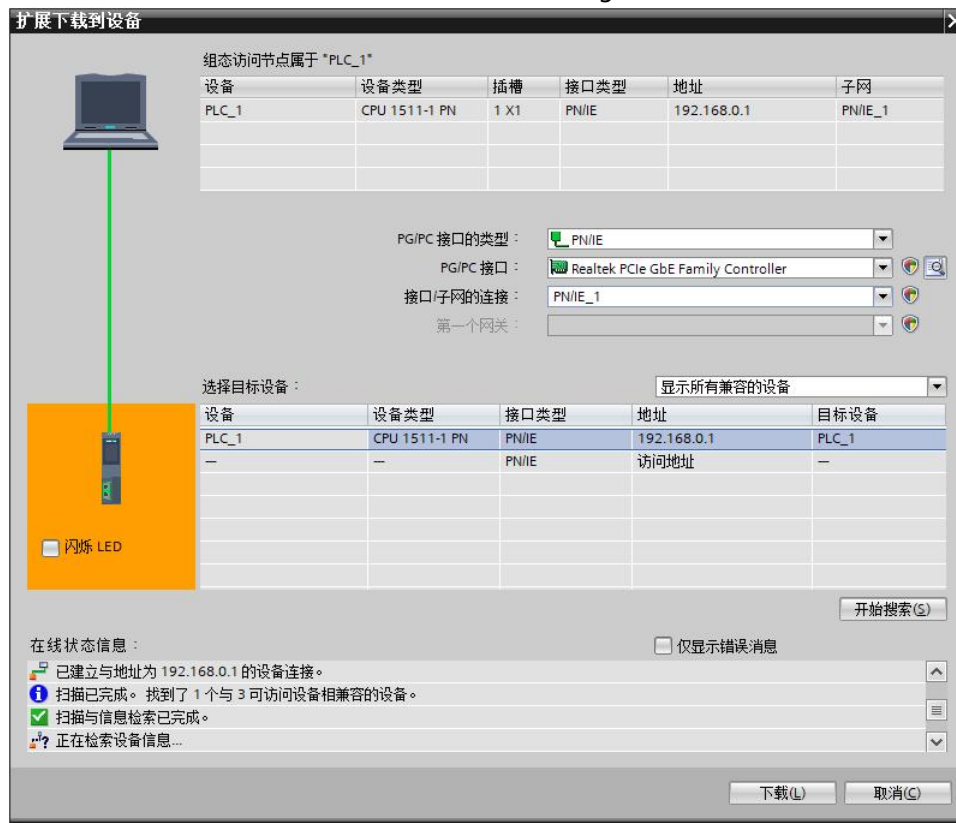
- f. Check if the MAC address on the module's silkscreen matches the MAC address of the assigned device name. Click "Close".

9、Download configuration structure

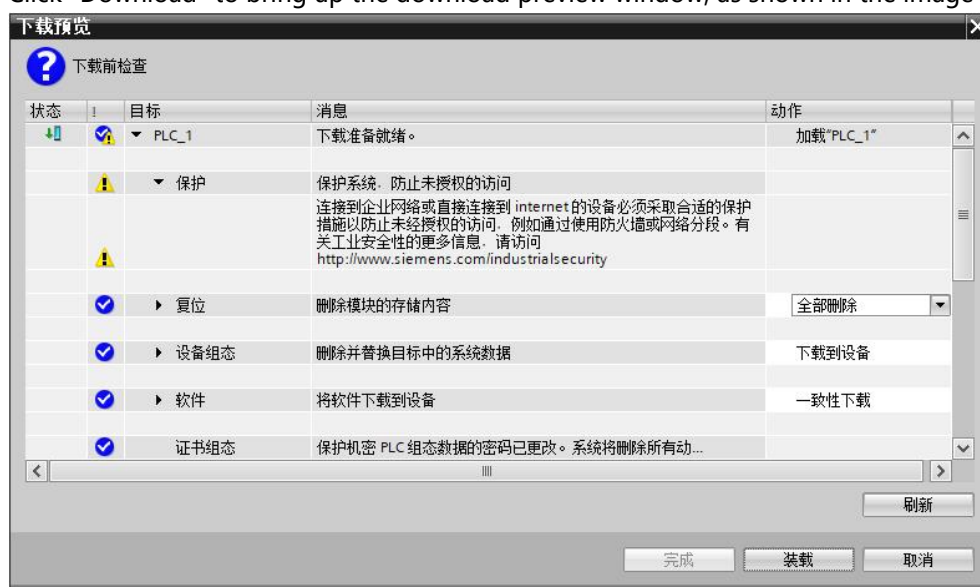
- a. In the network view, select the PLC. First, click the Compile button in the menu bar, then click the Download button to download the current configuration to the PLC.
- b. In the pop-up "Download extension to device" interface, configure as shown in the image below.



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



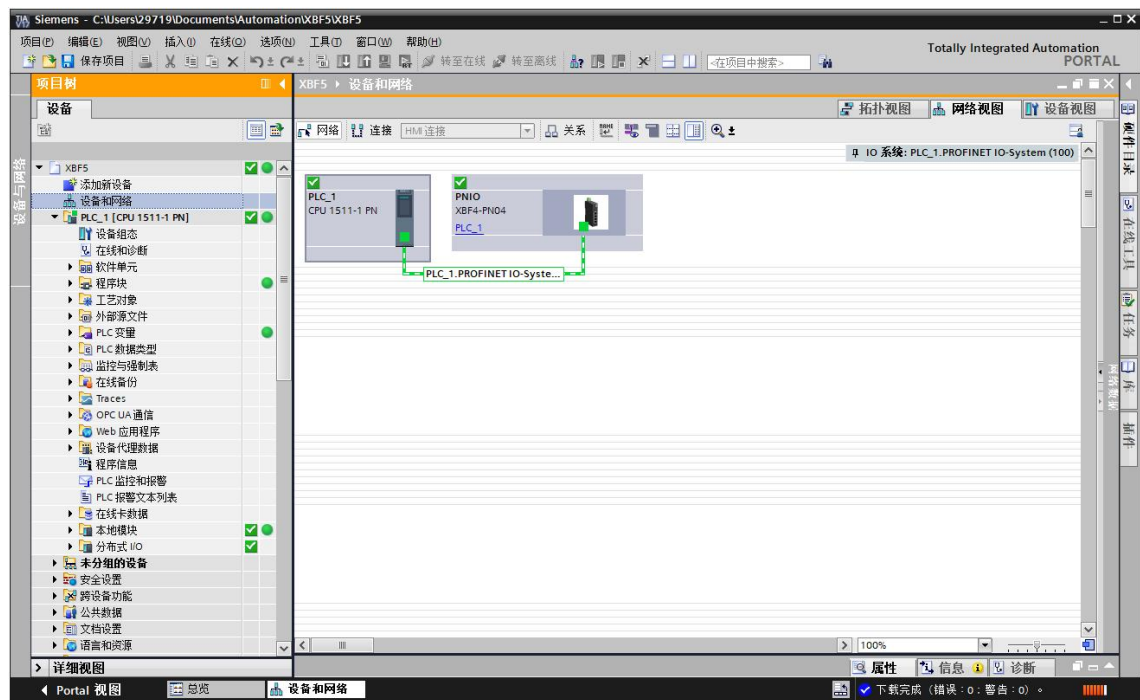
- d. Click "Download" to bring up the download preview window, as shown in the image below.



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

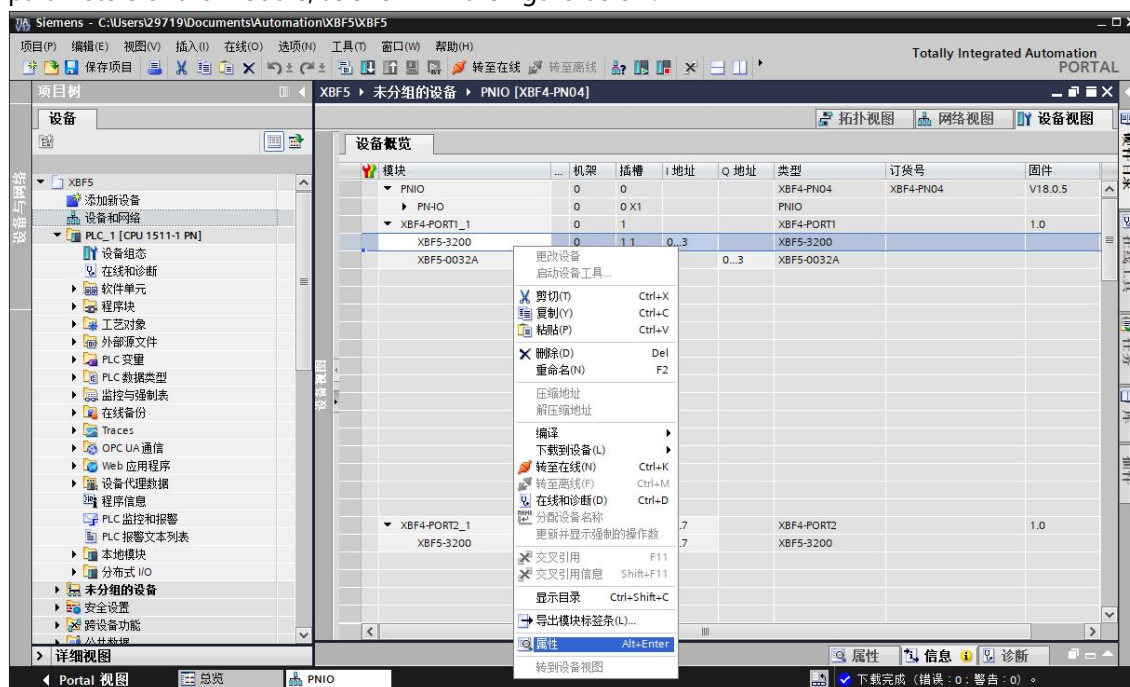
10、Communication connection

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

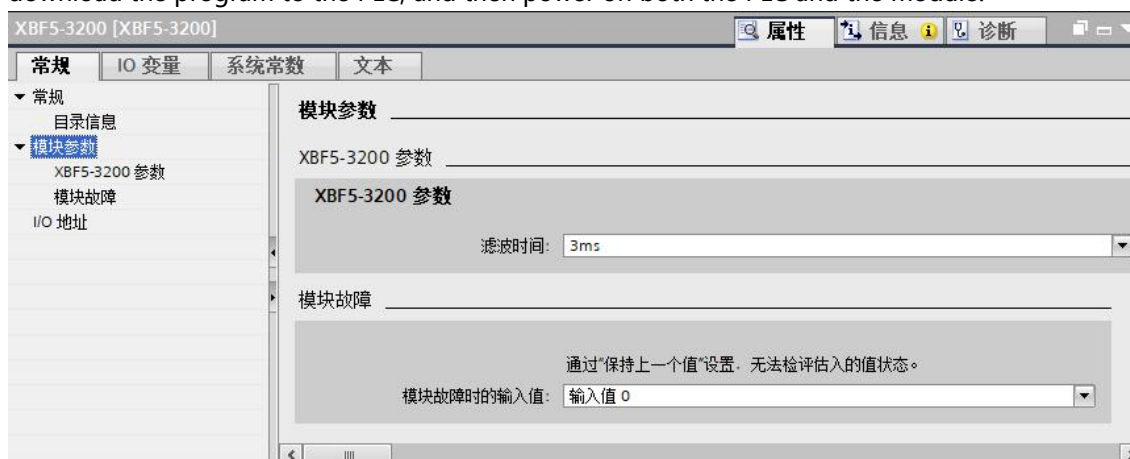


11、Parameter settings

- In offline mode, open "Network View", select the coupler module, switch to device view, right-click the XBF5-3200 module, and click the "Properties" button to view and set various parameters of the module, as shown in the figure below.



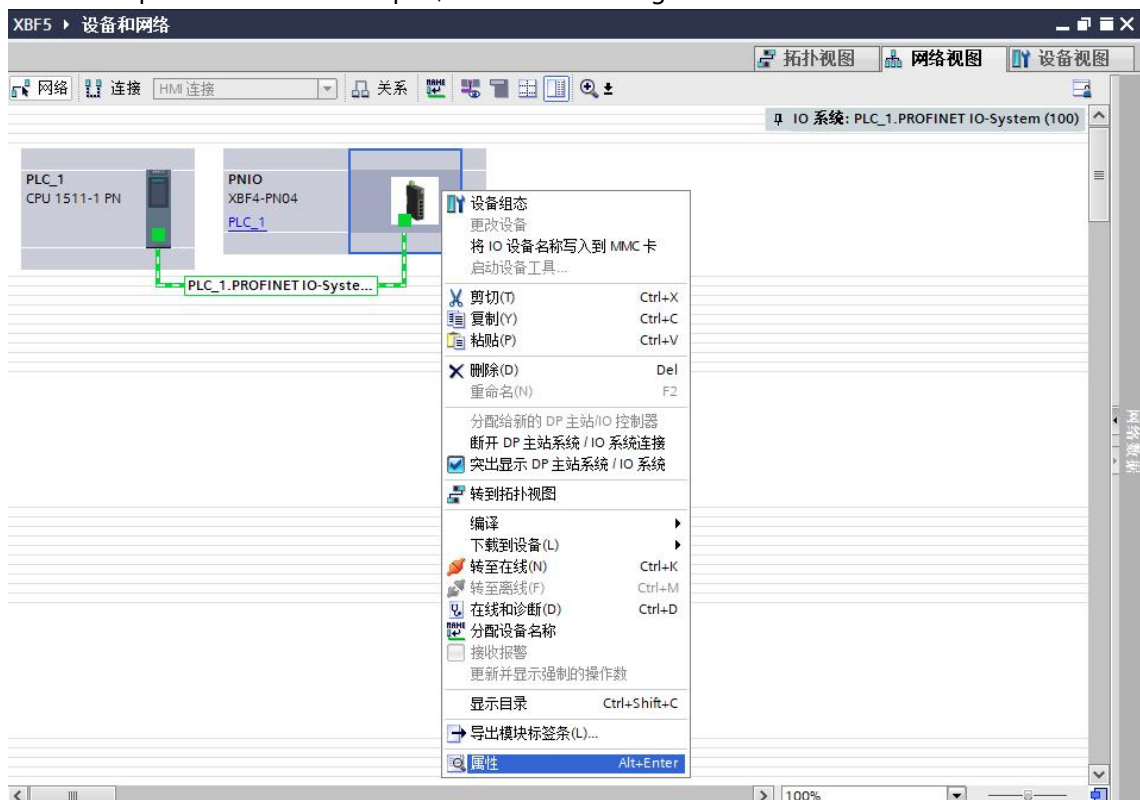
- On the XBF5-3200 properties page, click "Module Parameters," as shown in the image below. The parameters can be configured according to actual usage needs. After configuration, re-download the program to the PLC, and then power on both the PLC and the module.



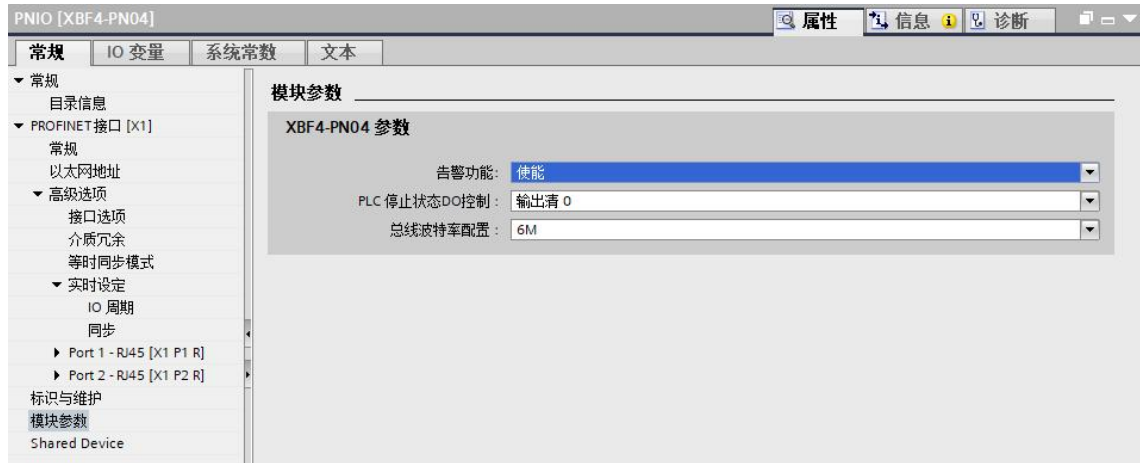
- c. On the XBF5-0032A properties page, click "Module Parameters," as shown in the image below. The parameters can be configured according to actual usage needs. After configuration, re-download the program to the PLC, and then power on both the PLC and the module.



- d. Right-click the coupler icon in the network view and click the "Properties" button to view and set various parameters of the coupler, as shown in the figure below.

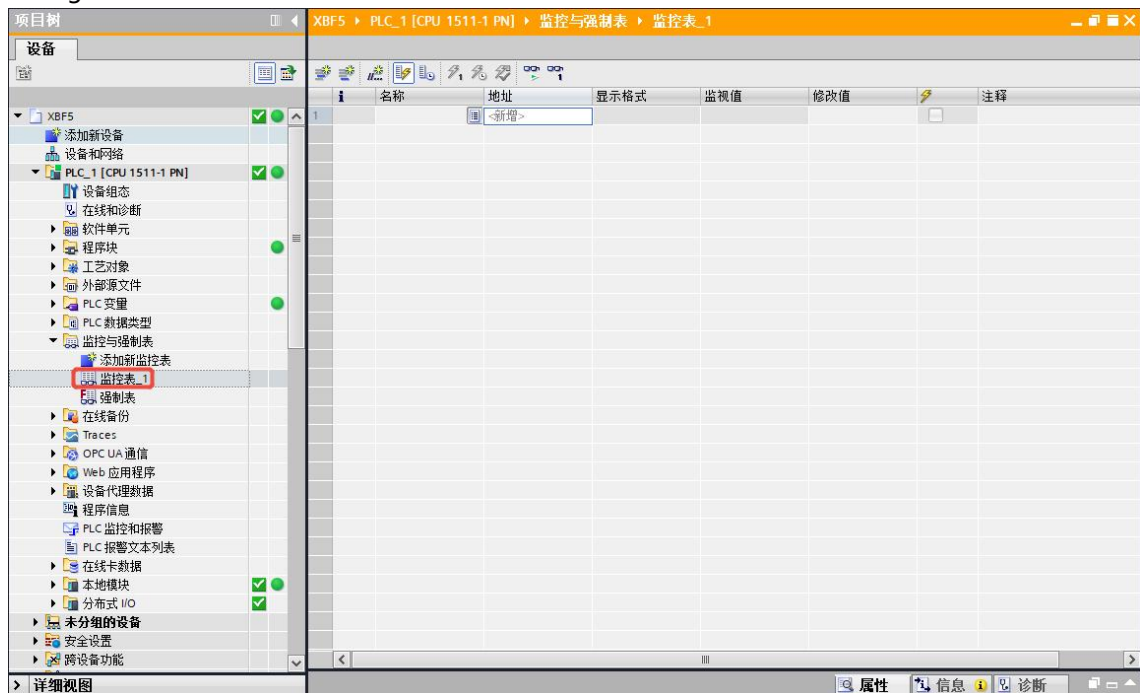


- e. On the coupler properties page, click "Module Parameters," as shown in the image below. The alarm function enable/disable, PLC stop status DO output control, and baud rate configuration are three parameters that can be configured according to actual usage needs. After configuration, re-download the program to the PLC, and then power on both the PLC and the module.



12. Functional verification

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



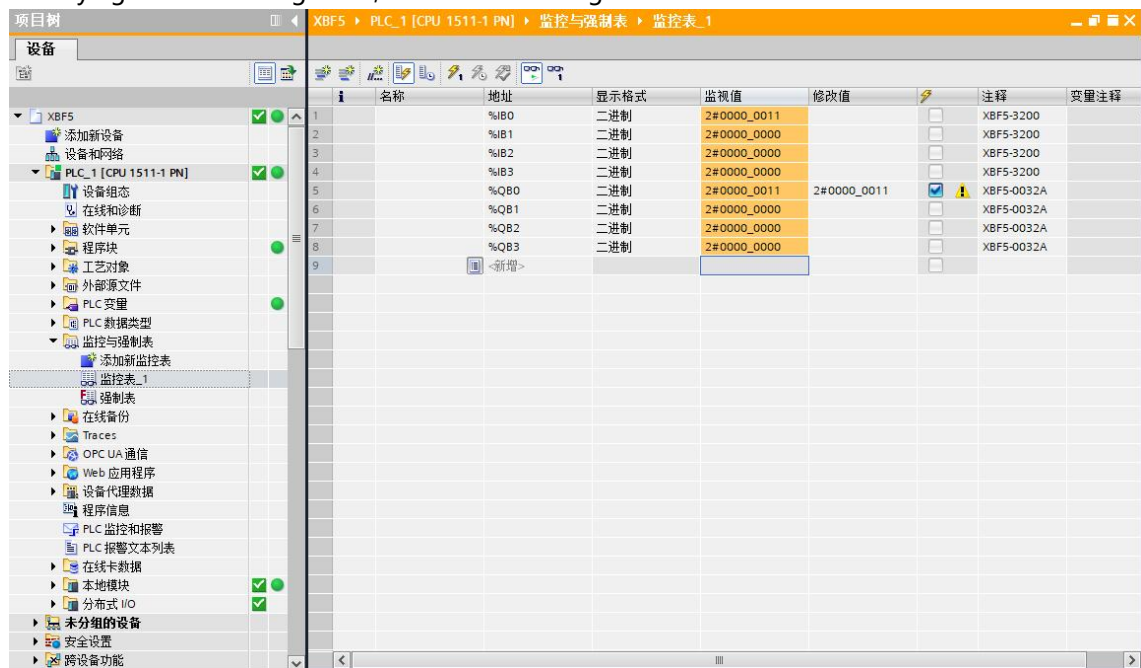
- b. Open "Device View" to view the channel I address (channel address of input signal) and Q address (channel address of output signal) of each module in the device overview.
- For example, the "I address" of the XBF5-3200 module is 0 to 3, and the "Q address" of the XBF5-0032A module is 0 to 3, as shown in the figure below.

模块	机架	插槽	I 地址	Q 地址	类型	订货号	固件	注释
PNIO	0	0			XBF4-PN04	XBF4-PN04	V18.0.5	
PNIO	0	0 X1			PNIO			
XBF4-PORT1_1	0	1			XBF4-PORT1		1.0	
XBF5-3200	0	1 1	0...3		XBF5-3200			
XBF5-0032A	0	1 2		0...3	XBF5-0032A			
	0	1 3						
	0	1 4						
	0	1 5						
	0	1 6						
	0	1 7						
	0	1 8						
	0	1 9						
	0	1 10						
	0	1 11						
	0	1 12						
	0	1 13						
	0	1 14						
	0	1 15						
	0	1 16						
XBF4-PORT2_1	0	2	4...7		XBF4-PORT2		1.0	
XBF5-3200	0	2 1	4...7		XBF5-3200			

- c. In the address cells of the monitoring table, enter the input/output channel addresses, such as "IB0" to "IB3", "QB0" to "QB3", and press "Enter". After completing all the entries, click [the command/button]. The button allows you to monitor the data, as shown in the image below.

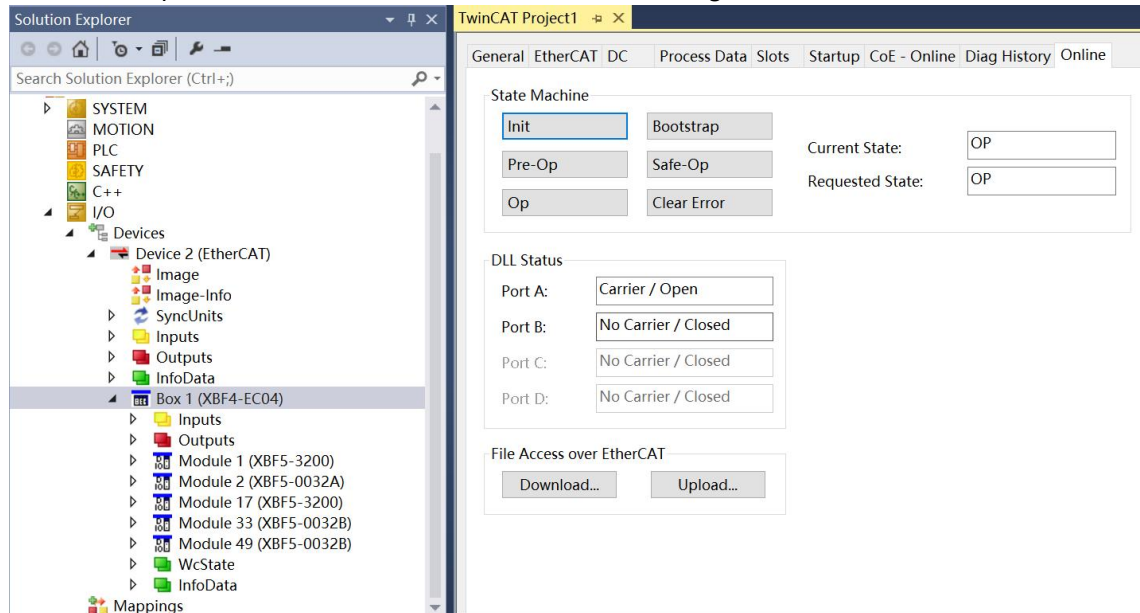
名称	地址	显示格式	监视值	修改值	注释	变量注释
1	%IB0	二进制	2#0000_0000		XBF5-3200	
2	%IB1	二进制	2#0000_0000		XBF5-3200	
3	%IB2	二进制	2#0000_0000		XBF5-3200	
4	%IB3	二进制	2#0000_0000		XBF5-3200	
5	%QB0	二进制	2#0000_0000		XBF5-0032A	
6	%QB1	二进制	2#0000_0000		XBF5-0032A	
7	%QB2	二进制	2#0000_0000		XBF5-0032A	
8	%QB3	二进制	2#0000_0000		XBF5-0032A	
9	<新增>					

- d. Taking input channels 0 and 1 of the XBF5-3200 module as an example, when there is a valid voltage input to input channels 0 and 1, it can be observed in the monitoring value cell of the monitoring table; the output channels of the XBF5-0032A module can be forcibly controlled by modifying the monitoring value, as shown in the figure below.

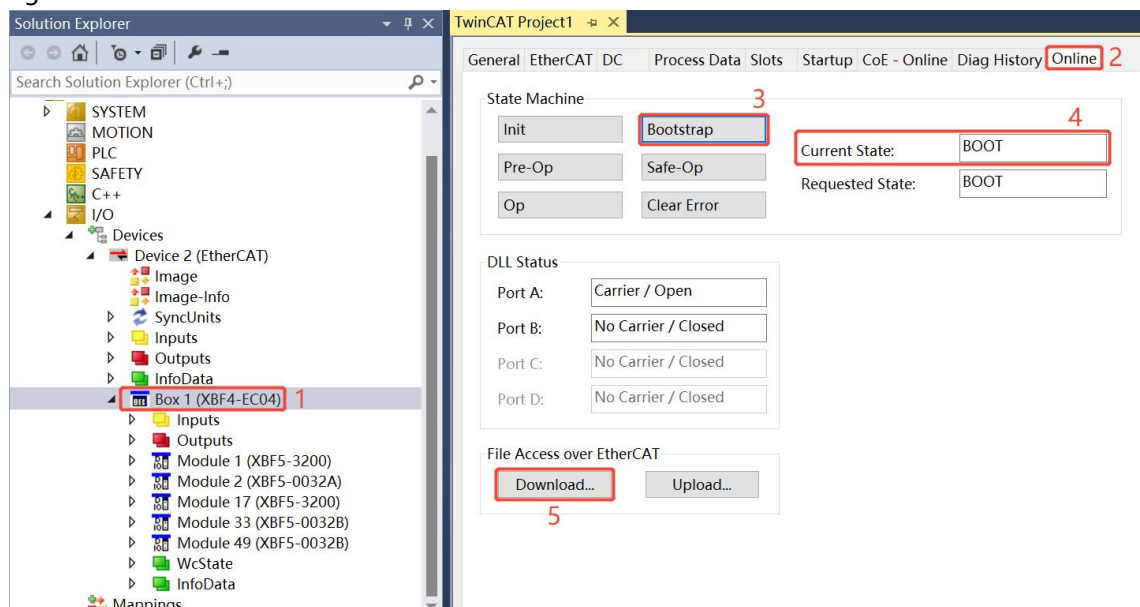


6.5 Firmware online upgrade

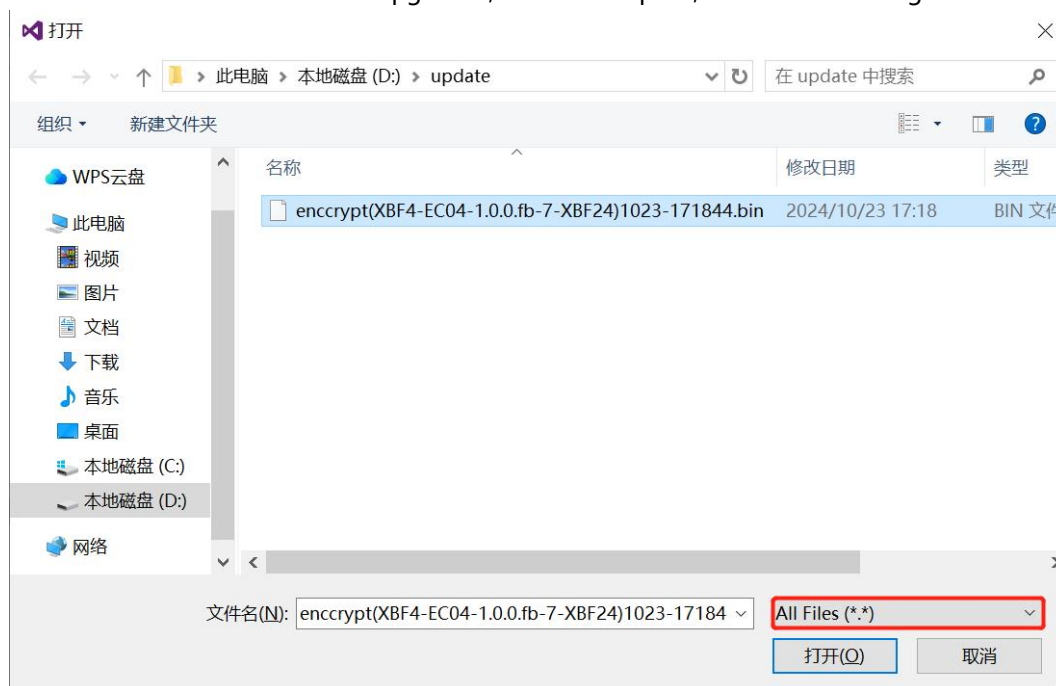
- 1、Taking TwinCAT3 software as an example, the topology is XBF4-EC04+{Coupler Interface 0: XBF5-3200+XBF5-0032A}+{Coupler Interface 1: XBF5-3200}+{Coupler Interface 2: XBF5-0032B}+{Coupler Interface 3: XBF5-0032B}, as shown in the figure below.



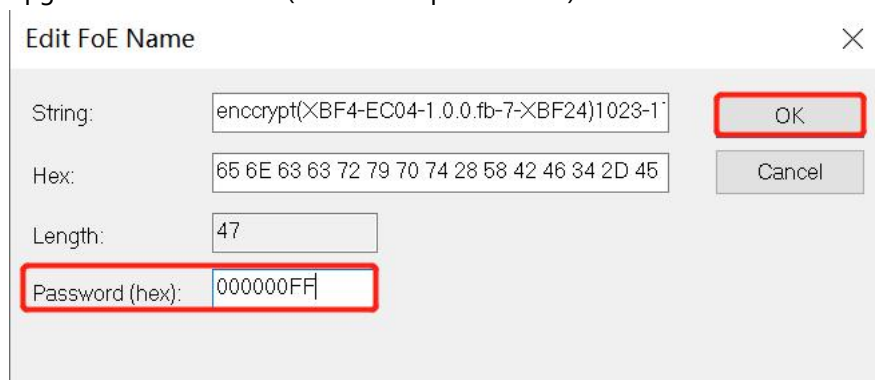
- 2、Click the coupler "XBF4-EC04" in the left navigation tree, click the "Online" option in the right menu, click the "Bootstrap" option in State Machine, wait for Current State to display "BOOT" status, and then click the "Download" option in File Access over EtherCAT below, as shown in the figure below.



- 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 0xff indicates an upgrade for the coupler. Click "OK" to proceed with the upgrade, as shown in the image below. After confirming the upgrade, observe the progress bar and module behavior to confirm whether the upgrade was successful (see next step for details).



Note: 1) Coupler upgrade password: 0xFF.

2) Password for upgrading the slave module: the extension interface number (0~3) corresponding to the slave module access coupler + the slave module DIP switch number (00~0F);

For example, the expansion interface number of Module 1 (XBF5-3200) is 0, and the DIP switch number is 00, so the Password is 0x000;

The extension interface number of Module 2 (XBF5-0032A) is 0, and the DIP switch number is 01, so the password is 0x001.

The extension interface number of Module 17 (XBF5-3200) is 1, and the DIP switch number is 00, so the password is 0x100.

The extension interface number of Module 33 (XBF5-0032B) is 2, and the DIP switch number is 00, so the Password is 0x200.

The extension interface number of Module 49 (XBF5-0032B) is 3, and the DIP switch number is 00, so the password is 0x300.

5、 Successful upgrade process for different modules

EtherCAT coupler online upgrade:

- 1) Once the progress bar is full, the RUN and ERR indicators on the coupler will flash briefly and then turn off, indicating a successful upgrade.
- 2) After a successful online upgrade, you need to manually switch to OP mode before you can re-establish the connection.
- 3) If you need to upgrade again, you need to switch the OP state back to the BOOT state.

Online upgrade of I/O modules:

- 1) The discrete I/O module interface operation indicator P_n (n: 0~3, green light) and ERR light (red light) will flash sequentially. After the flashing ends, the upgrade is successful (after the upgrade is completed, you need to power it on and off to connect normally).
- 2) Other modules can be upgraded without interrupting power.