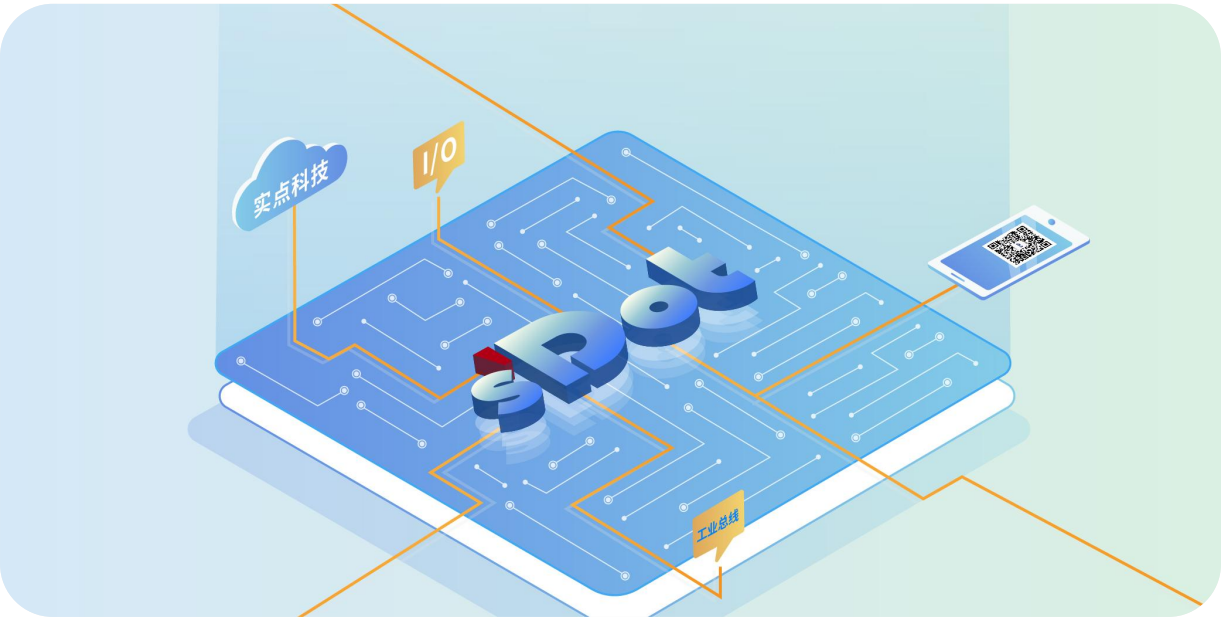

XBF4-SW04

Switch Module

User Manual

Nanjing Solidot Electronic Technology Co., Ltd.

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1 Product Overview

1.1 Product Introduction

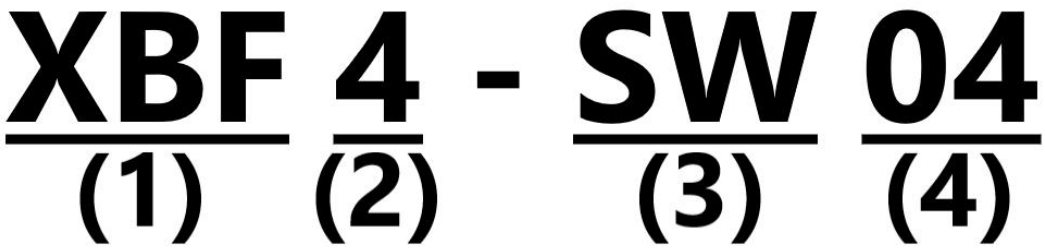
The XBF4-SW04 switch module can be connected in series on any expansion interface branch of discrete couplers, gateways, and discrete I/O modules, with a maximum of one switch module connected to each expansion interface. The switch supports cascading.The discrete slave function allows for the cascading of discrete I/O modules or sensors across all four OUT interfaces, enabling flexible configuration into various topologies to meet diverse application needs.It is widely used in various industrial systems.

1.2 Product Features

- **Four OUT ports**
  RJ45 interface, supports cascading discrete slave function.
- **Supports cascaded sensors**
  The sensor is connected to a separate OUT port of the switch.
- **LED status display**
  Channel protection and diagnostics.
- **Small size**
  Suitable for applications with limited space.
- **Easy to install**
  Mounted on DIN 35 mm standard rails.

2 Naming Rules

2.1 Naming Rules



serial number	meaning	Value description
(1)	Product Type	XBF: Discrete I/O
(2)	Product Series	4: Integrated
(3)	Product Functions	SW: Switch
(4)	Number of ports	04: 4 channels

3 Product Parameters

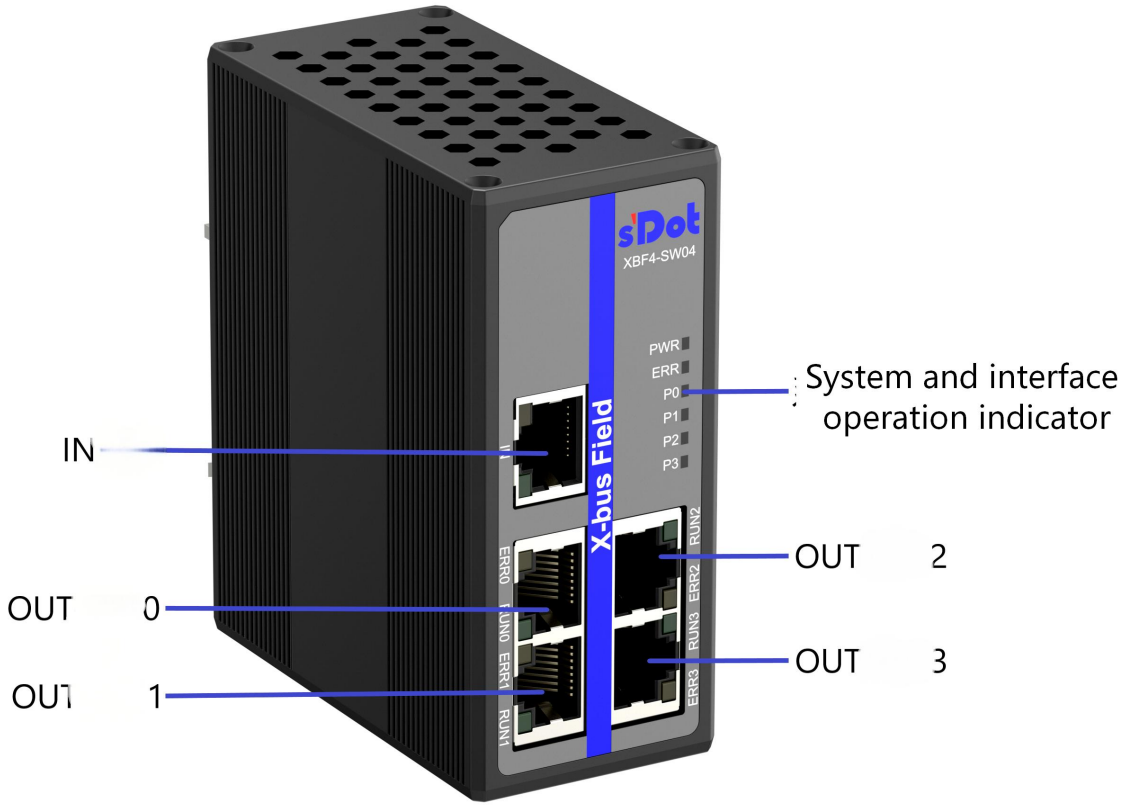
3.1 General parameters

Interface parameters	
Product Name	XBF4-SW04
switch interface	4×RJ45(1 in, 4 out)
Maximum number of discrete slave stations that can be cascaded by a switch	16
Maximum number of discrete slave stations that can be cascaded on a single interface of a switch	4
Electrical isolation	500 VAC
Transmission distance	It can be extended by an additional 50m (based on the 50m transmission distance of the coupler extension interface).
Transmission rate	Maximum 6 Mbps
Technical parameters	
size	40×78.5×90mm
weight	240g
Operating temperature	-25℃ to +70℃
Storage temperature	-40℃~+85℃
relative humidity	95%, no condensation
Protection level	IP20
Altitude	≤2000m
Vibration resistance	IEC 60068-2-6 Sinusoidal vibration 5Hz~8.4Hz, 3.5mm, 8.4Hz~150Hz, 1g X/Y/Z triaxial, 10 cycles/axis (100 min)
Impact resistance	IEC 60068-2-27 Mechanical shock 150m/s², 11ms, in six directions: ±X/Y/Z 3 times/direction, 18 times in total
Pollution level	Level 2
Firmware upgrade	support

4 Panel

4.1 Product Structure

Product Parts Names

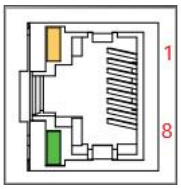


4.2 Indicator light function

name	logo	color	state	Status Description
Power indicator light	PWR	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.
Fault indicator light	ERR	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.
Interface operation indicator light	Pn (n: 0~3)	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.
Operating status indicator	RUN0~3	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.
Fault indicator light	ERR0~3	Orange	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.

4.3 Interface definition

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	B
2	A
3	SGND
4	—
5	—
6	S24V
7	—
8	—

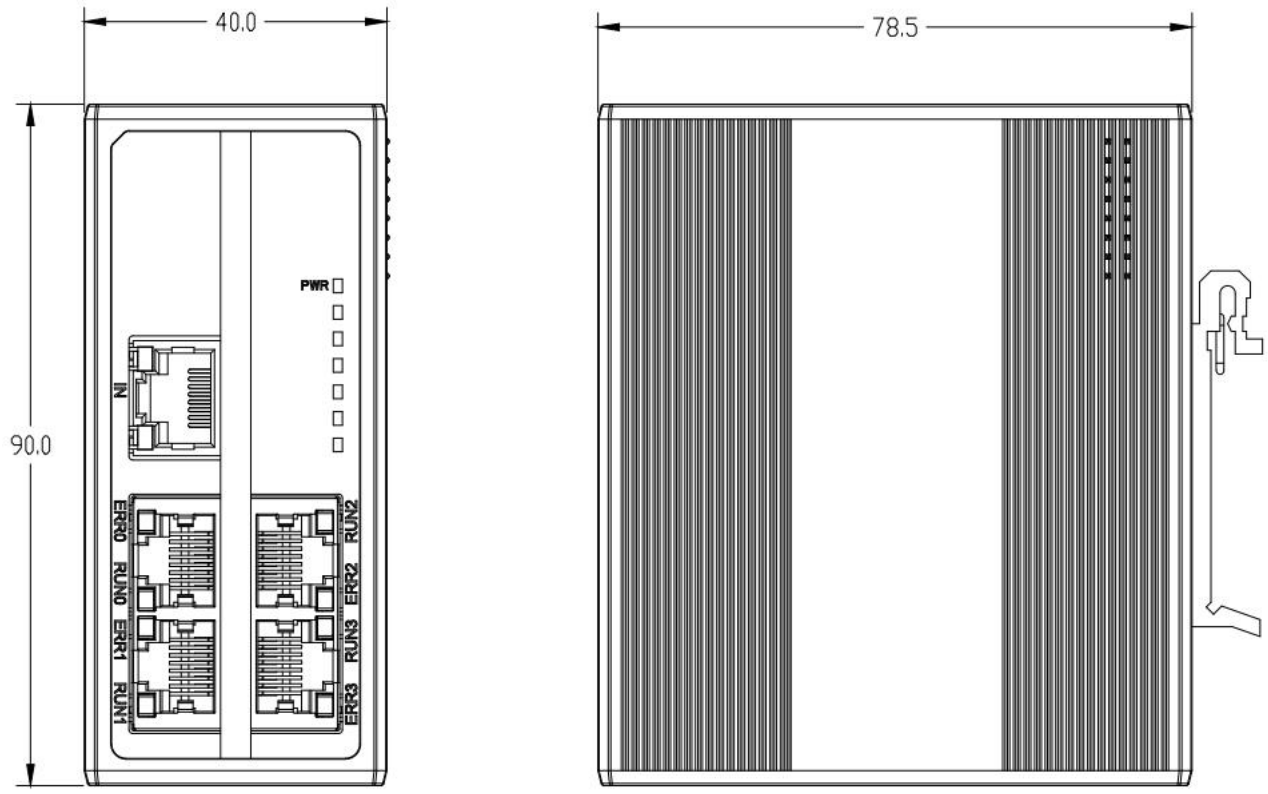
☛ Precautions

- 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.

5 Installation and removal

5.1 Outline dimension drawing

External dimensions (unit: mm)



5.2 Installation and removal

The module is mounted using a DIN 35 mm standard rail. The specific steps are shown in the table below:

Module installation and removal	
Module installation steps	1. Align the upper edge of the buckle on the back of the module with the upper edge of the guide rail, and place the module into the guide rail.
	2. The butterfly spring on the back of the upper pressure module clip moves the lower edge of the module clip to the guide rail.
	3. Push the clip along the guide rail until you hear a click, then the module installation is complete.
Module disassembly steps	1. Apply force downwards to the butterfly spring on the back of the upper pressure module.
	2. After pressing the butterfly spring, remove the lower edge of the module clip from the guide rail, and then remove the upper edge of the module clip from the guide rail.

⚠ Warn

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

6 Wiring instructions

6.1 Wiring instructions

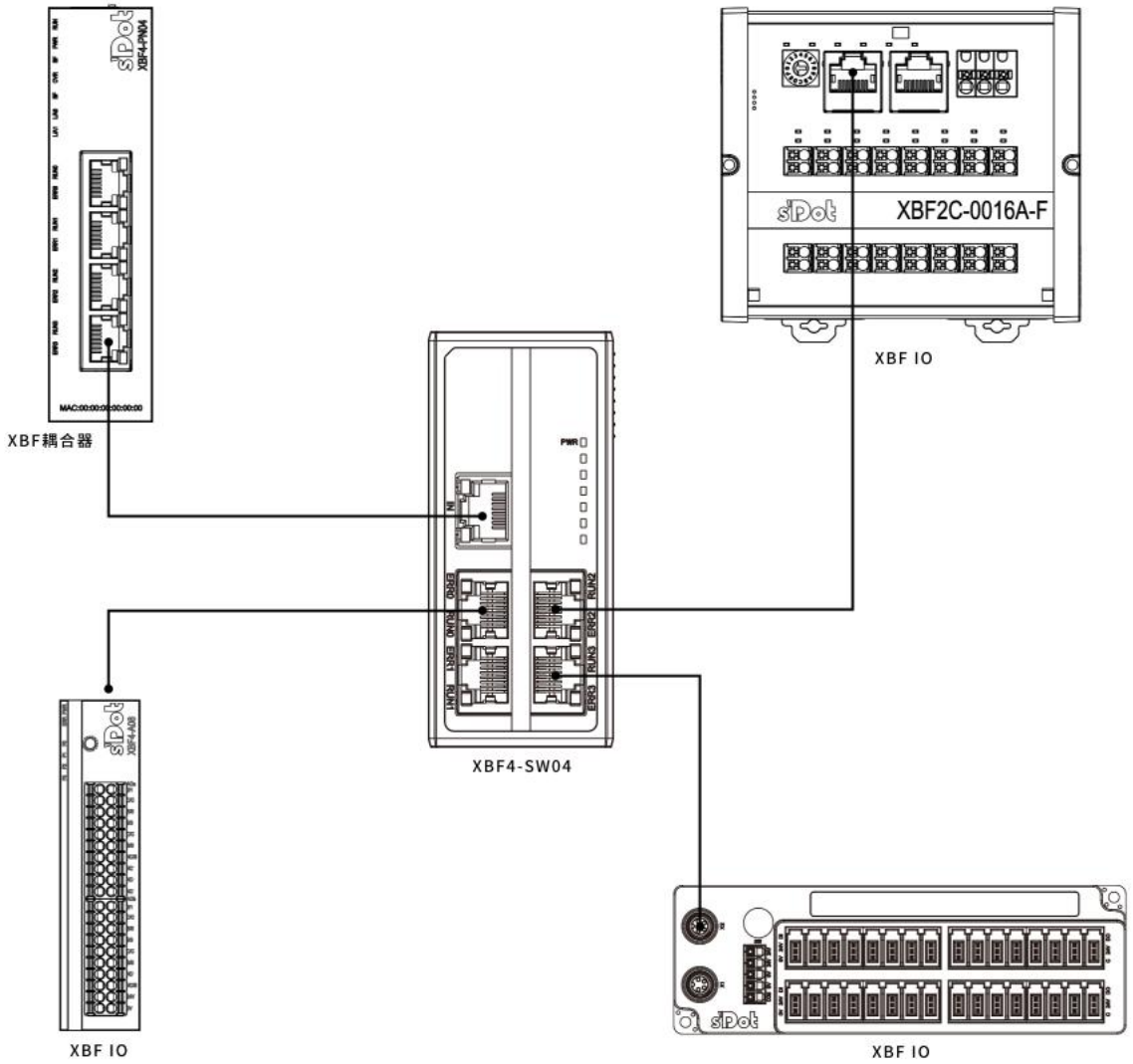
- For personal and equipment safety, it is recommended to disconnect the power supply before performing wiring operations.
- Switch interfaces: Category 5 or higher double-shielded (braided mesh + aluminum foil) STP cables are recommended for communication.

⚠ Warn

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

6.2 Switch topology diagram

Taking our discrete series products as an example, the topology of the switch connection module is shown in the figure below.



7 Use

7.1 Cascaded expansion of discrete device functions

- The XBF4-SW04 switch module can be connected in series on any expansion interface branch of discrete couplers, gateways, and discrete I/O modules, with a maximum of one switch module connected to each expansion interface.
- The switch supports cascading discrete slave devices; each of the four OUT ports can be cascaded with discrete I/O modules or sensors. The DIP switches for all discrete modules connected to different ports on each switch must be unique.
- Discrete scalable coupler each expansion interface can only connect to one of 16 slave stations (DIP switches 0 to F).

7.2 EtherCAT coupler configuration application

7.2.1 Application in the TwinCAT3 software environment

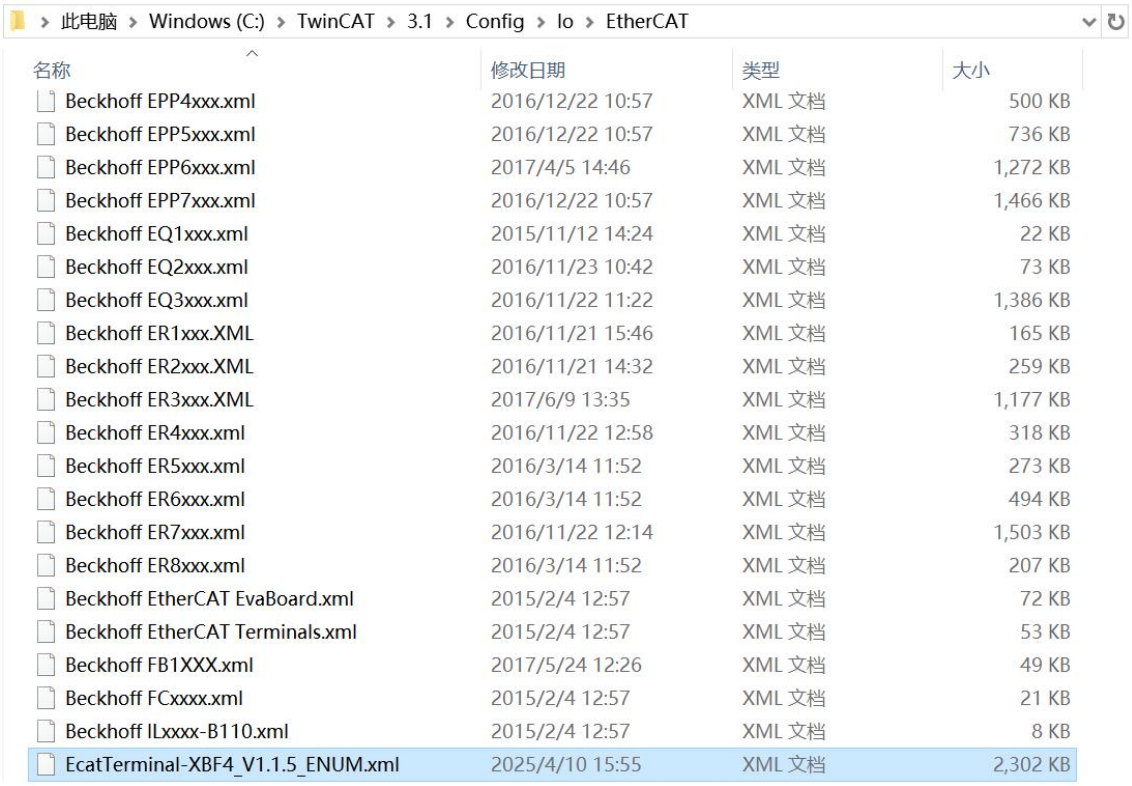
1、 Preparation

- **Hardware environment**
  - **Module preparation: This guide uses an XBF4-EC04 coupler + {Extension Interface 0: 16 XBF4 series IO modules cascaded below an XBF4-SW04 switch module} 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.5 Installation and Removal"and"6 Wiring Instructions"Required Operation"

2、 Pre-configured configuration files

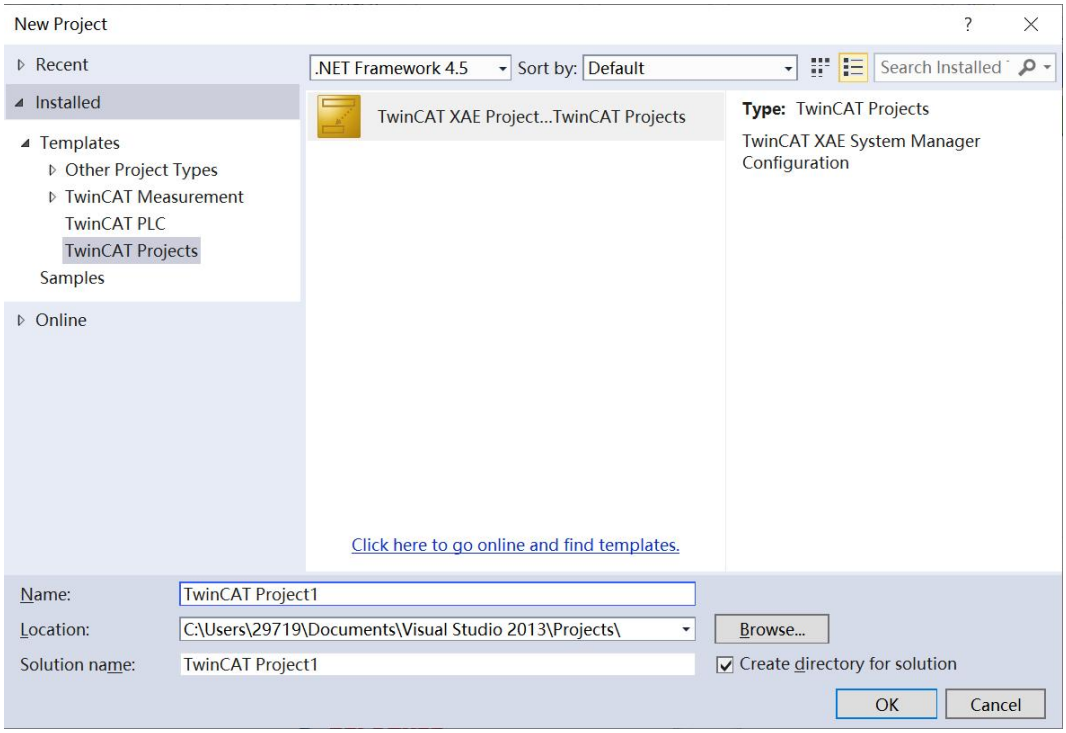
a. Place the ESI configuration file (EcatTerminal-XBF4_V1.1.5_ENUM.xml) in the TwinCAT installation directory "C:\TwinCAT\3.1\Config\Io\EtherCAT", as shown in the image below.



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.

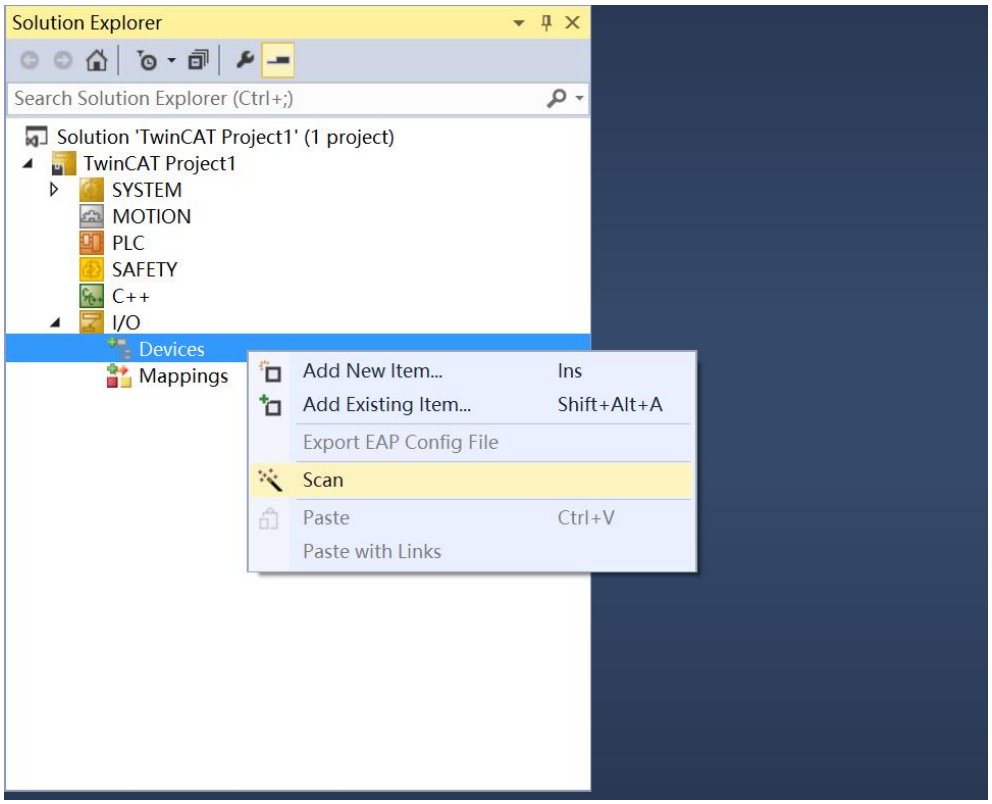


4、Add device

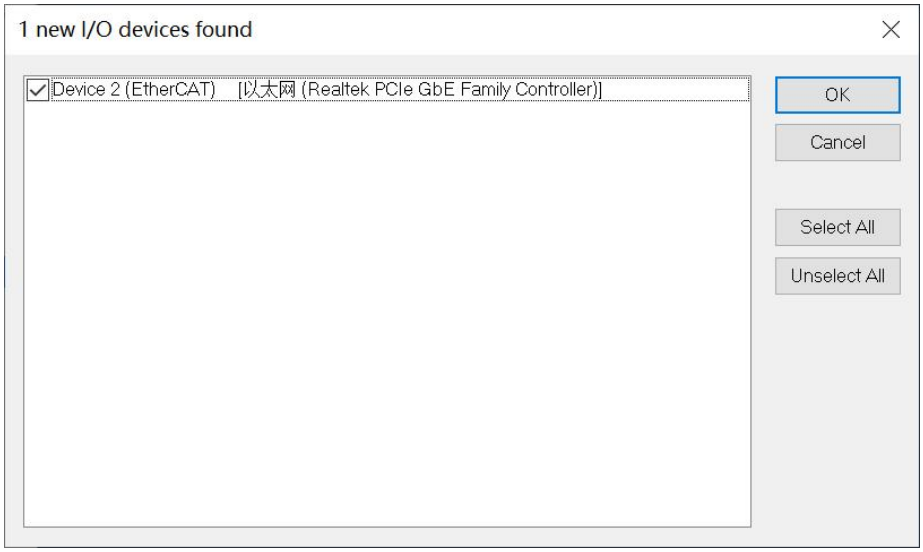
There are two ways to add a device: scanning the device or adding it manually.

➢ **Scanning equipment**

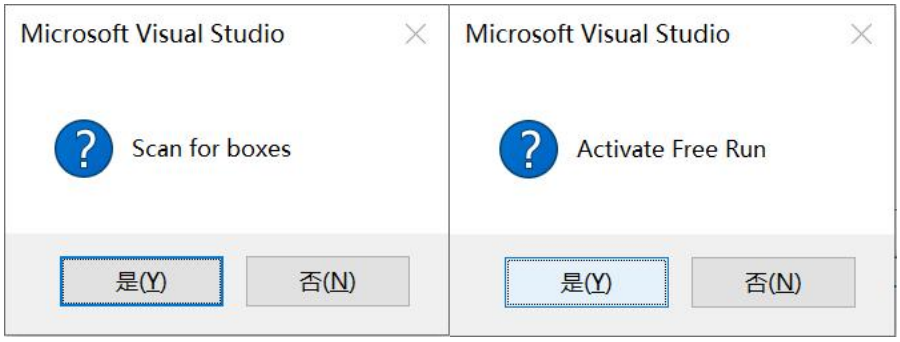
a. After creating the project, right-click the "Scan" option under "I/O -> Devices" to scan for slave devices, as shown in the figure below.



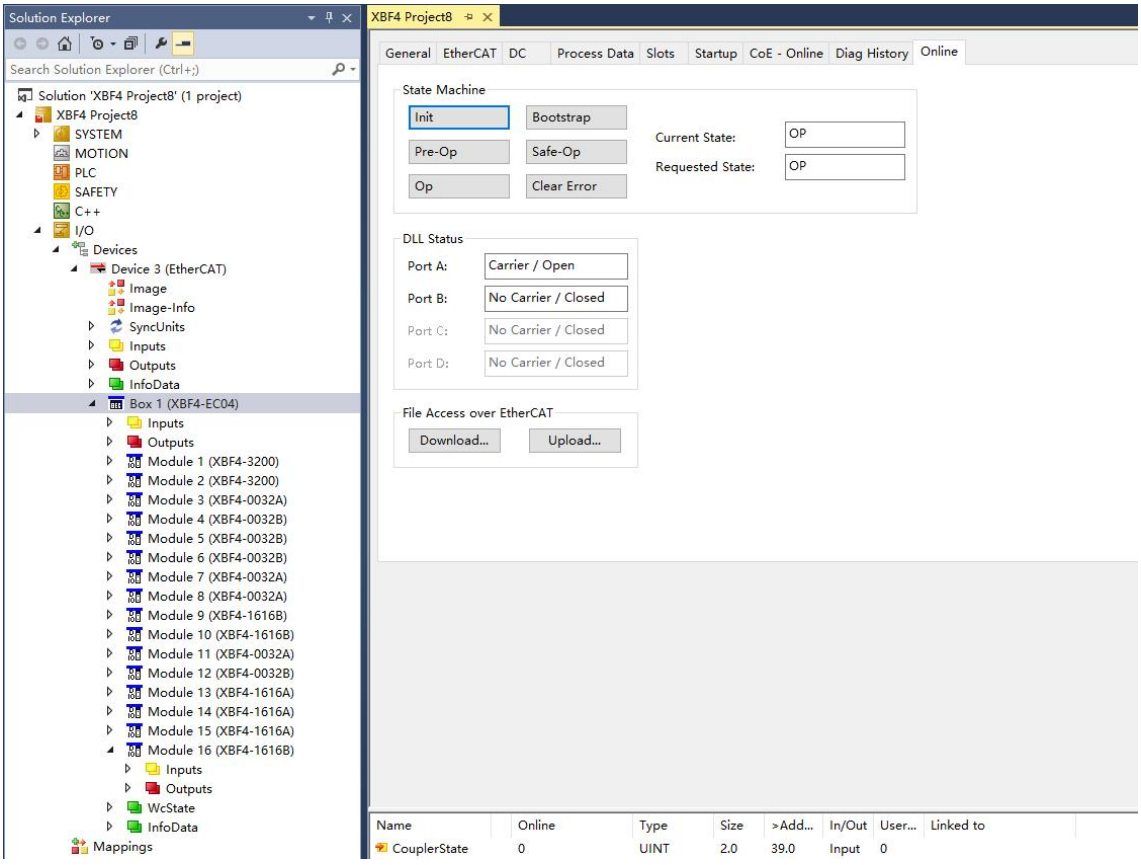
b. Select the "Local Area Connection" network adapter, as shown in the image below.



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.



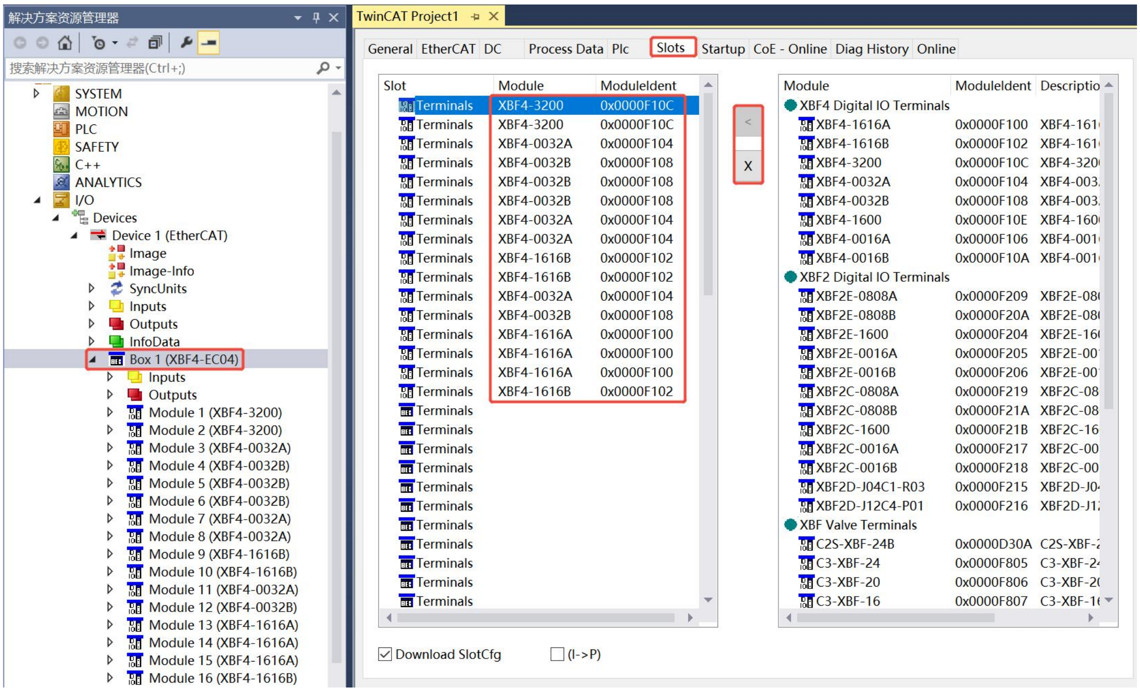
d. After scanning the device, Box 1 contains the XBF4-EC04 coupler, and Modules 1-16 contain the XBF4 series IO modules, consistent with the DIP switch station numbers. At the "Online" setting in Box 1, the coupler is in the "OP" state, and the RUN indicator light on the coupler is constantly lit, as shown in the image below.



e. After the device configuration scan is completed, the relevant modules can be operated according to the actual application needs.

➢ **Add manually**

a. On the "Slots" page, click according to the actual topology. < and x Add the modules one by one, as shown in the image below.

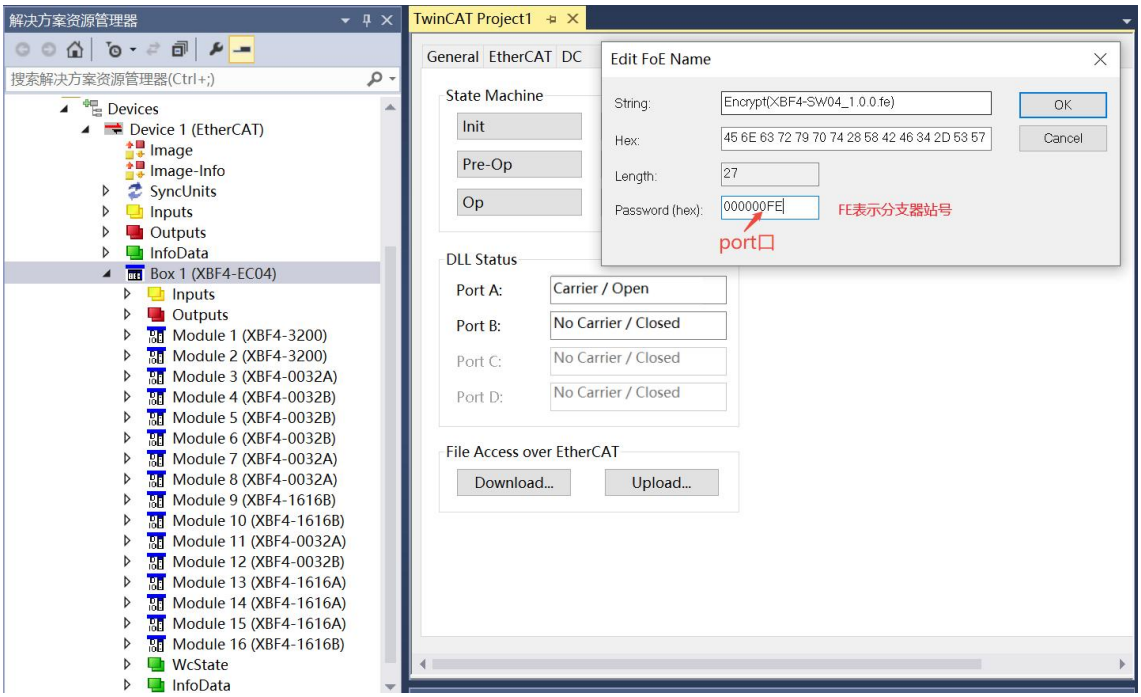


Note: The I/O module DIP switch station number must be consistent with the slot number set in the diagram. DIP switch station numbers 0~F correspond to slots 1~16 of the switch interface, respectively.

b. After the configured devices are added, the relevant modules can be operated according to the actual application needs.

5、Online upgrade function

a. The switch supports online upgrades. On the host computer page, click "Download". Enter the last two digits of the key, FE, to upgrade the switch module online. The third digit from the end represents the nth interface of the coupler. In the figure below, "000000FE" means upgrading the switch on the topology branch of the 0th interface of the coupler, as shown in the figure below.



7.3 PROFINET Coupler Configuration Application

7.3.1 Application in the TIA Portal V17 software environment

1、Preparation

- **Hardware environment**
  - **Module preparation: This guide uses an XBF4-PN04 coupler + {Extension Interface 0: 16 XBF4 series IO modules cascaded below an XBF4-SW04 switch module} 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.5 Installation and Removal"and"6 Wiring Instructions"Required Operation"

2、New construction projects

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

- Project name: Custom, you can keep the default.

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

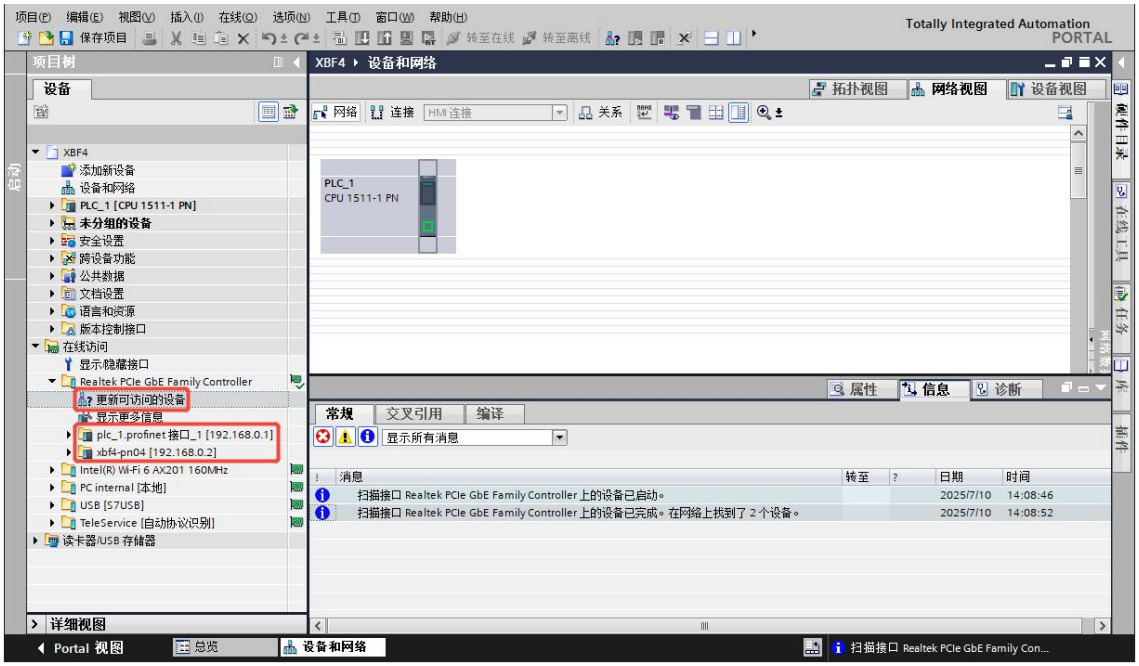
3、Add PLC controller

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

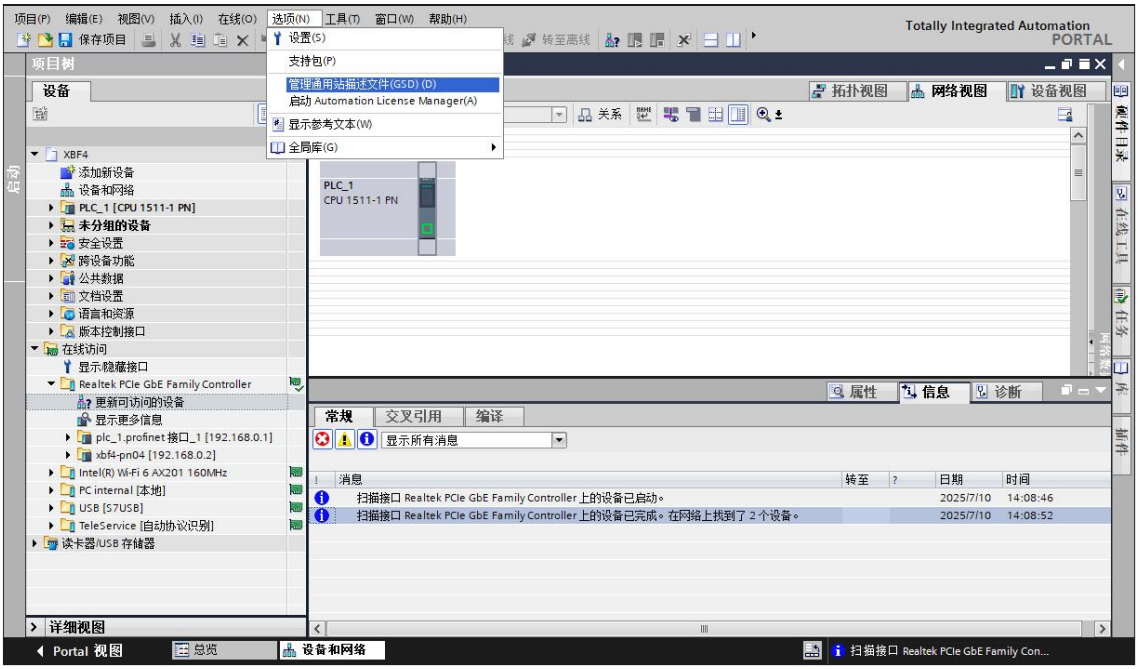
a. Click "Online Access -> Update Accessible Devices" in the left navigation tree, as shown in the image below. Once the update is complete, the connected slave devices will be displayed, as shown in the image below.



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

5、Add GSD configuration file

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

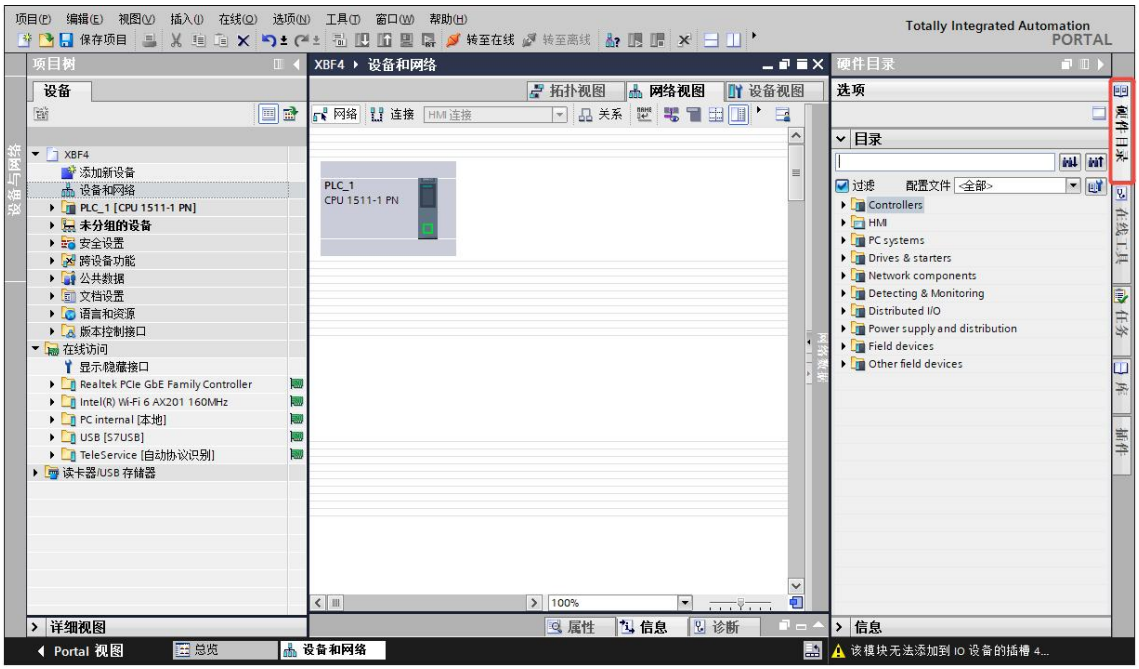


b. Click "Source Path" to select the folder, and check if the status of the GSD file to be added is "Not Installed". If not, click the "Install" button; if already installed, click "Cancel" to skip the installation steps.As shown in the figure below.

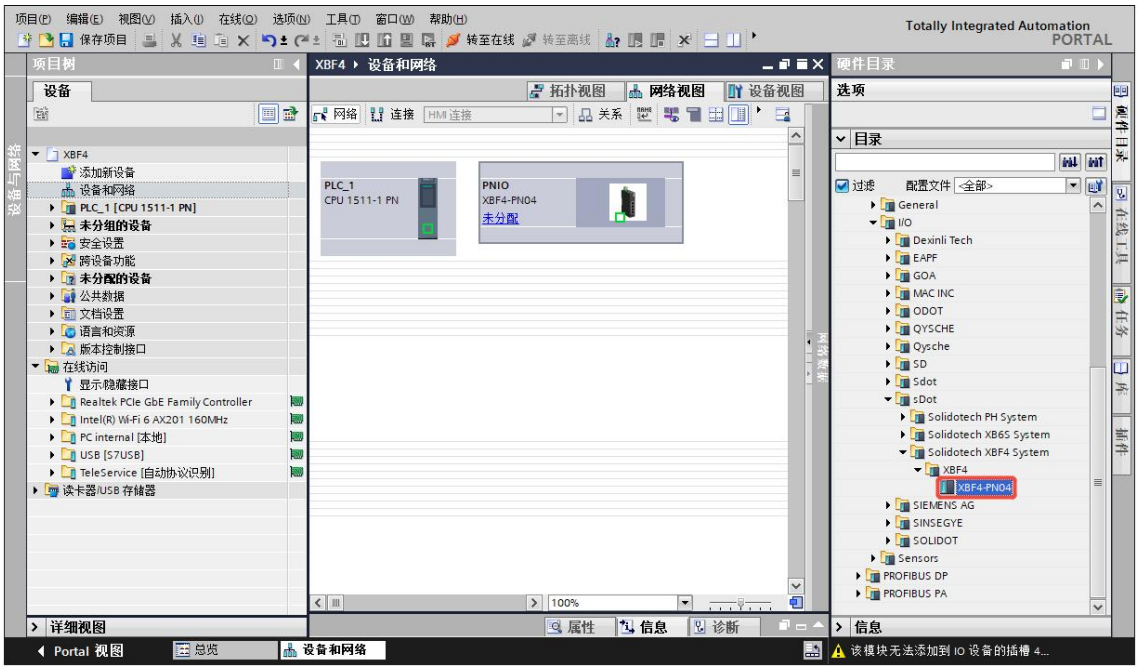
6、Manually add slave devices

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

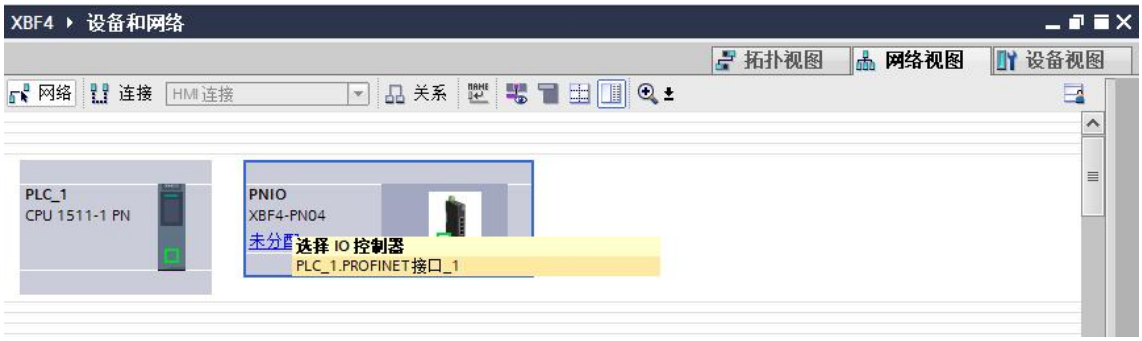
b. Click the vertical "Hardware Catalog" button on the right, and the catalog will be displayed as shown in the image below.



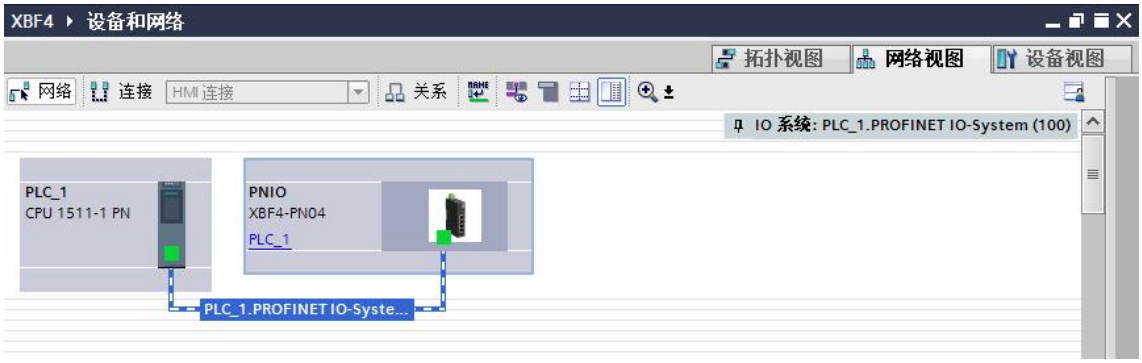
c. Select "Other field devices -> PROFINET IO -> I/O -> sDot -> Solidotech XBF4 System -> XBF4 -> XBF4-PN04", then drag or double-click XBF4-PN04 to the "Network View", as shown in the figure below.



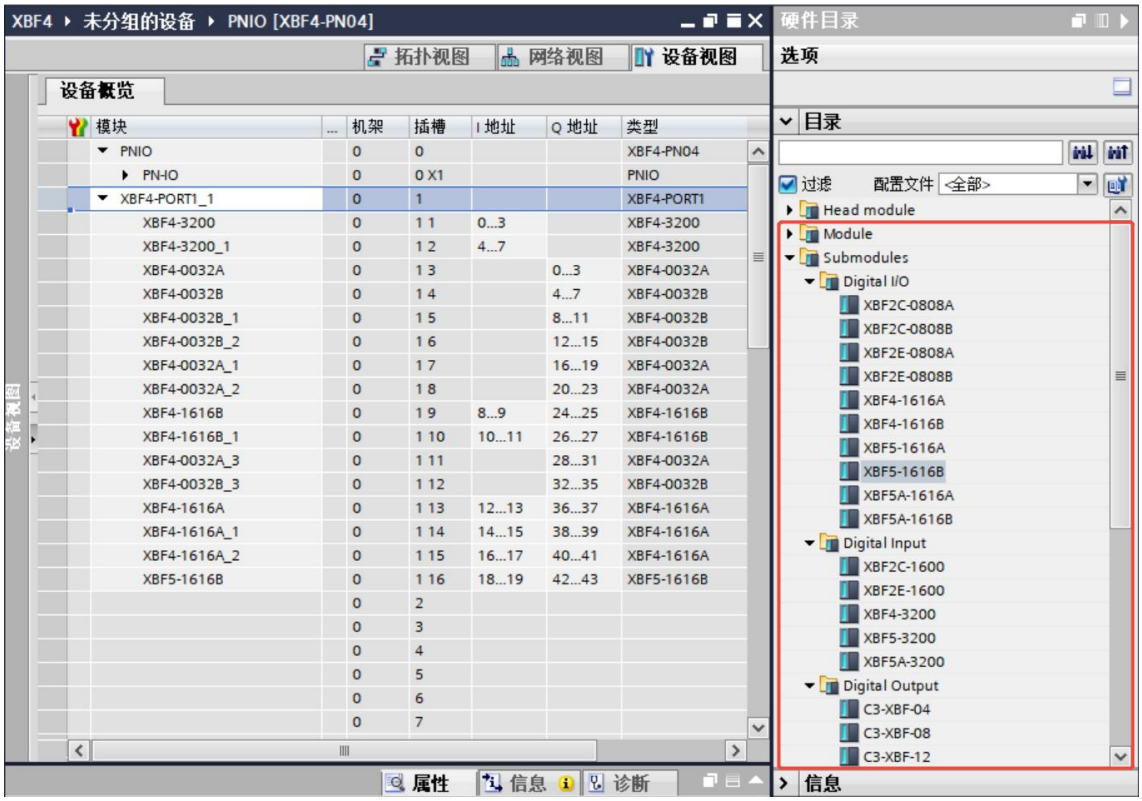
d. Switch to network view, click "Unassigned (blue text)" on the coupler (slave) device, and select "PLC_1.PROFINET Interface_1", as shown in the figure below.



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



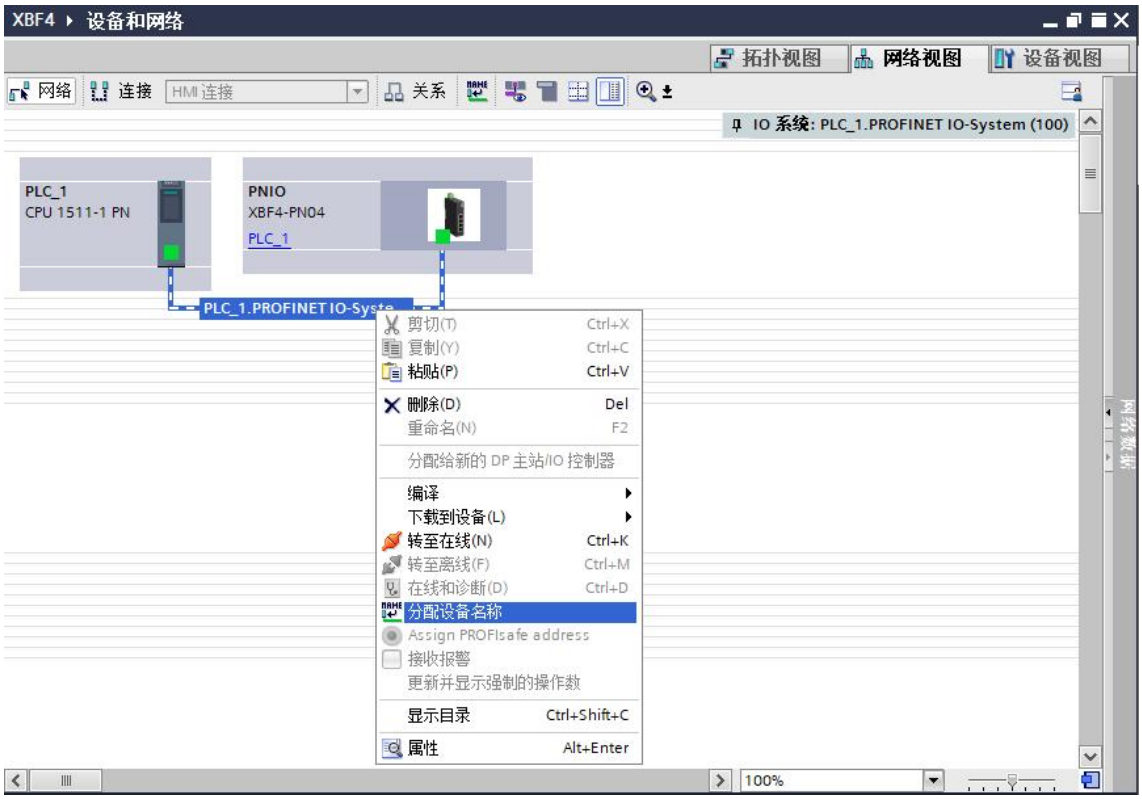
f. Click "Device View" to enter the coupler's device overview. Under "Hardware Catalog" on the right, drag and drop to add couplers according to the actual topology.The interface and I/O modules (the order must match the actual topology, otherwise communication will fail) are shown in the figure below.



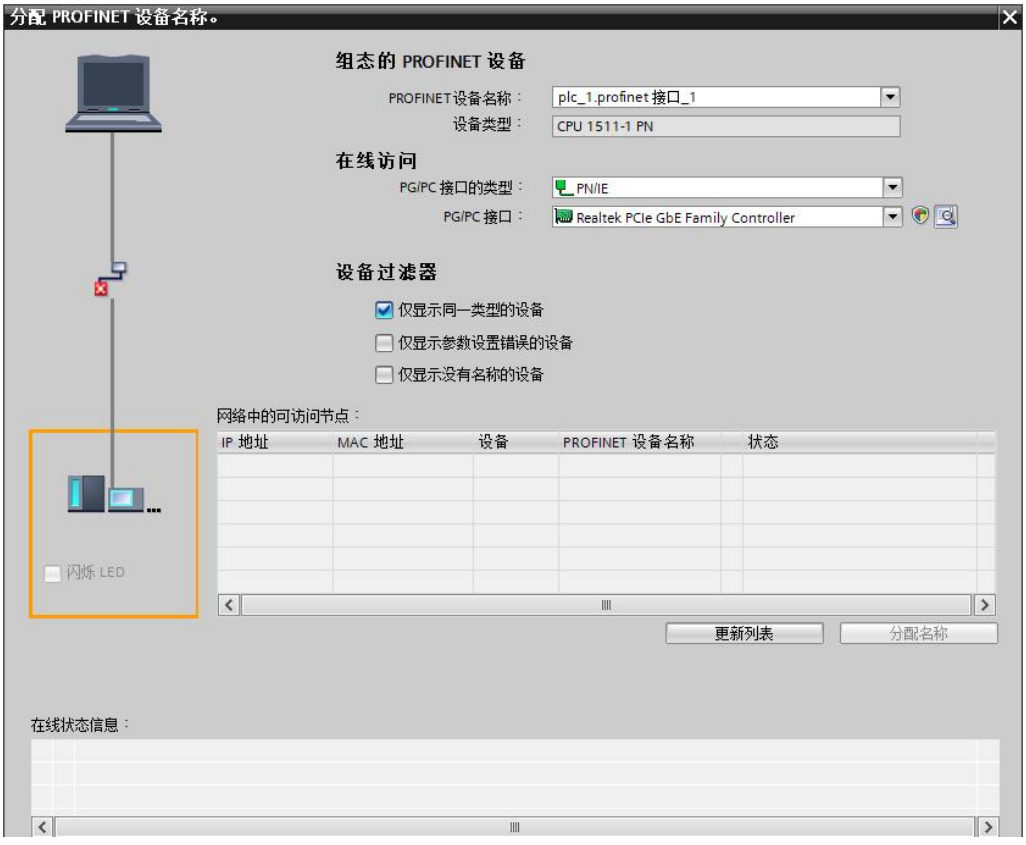
Note: The I/O module DIP switch station number must be consistent with the slot number set in the diagram. DIP switch station numbers 0~F correspond to slots 1~16 of the switch interface, respectively.

7、Assign device name

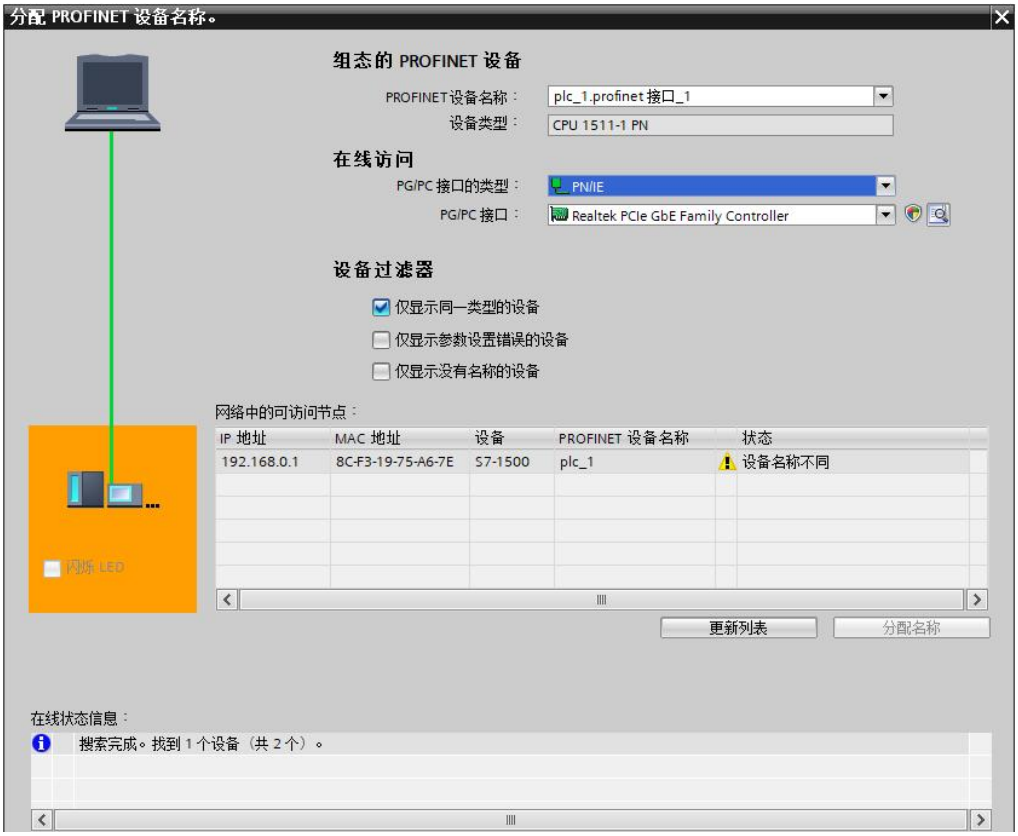
a. In the network view, right-click the connection cable between the PLC and the coupler, and select "Assign Device Name", as shown in the figure below.



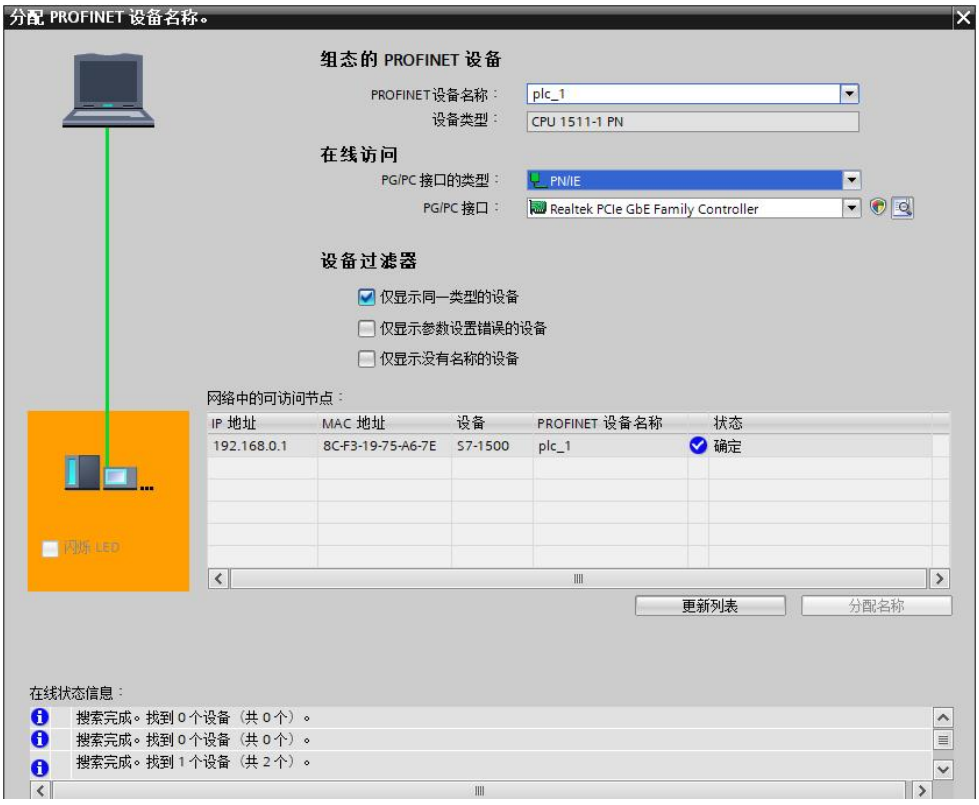
b. A "Assign PROFINET Device Name" window will pop up, as shown in the figure below.



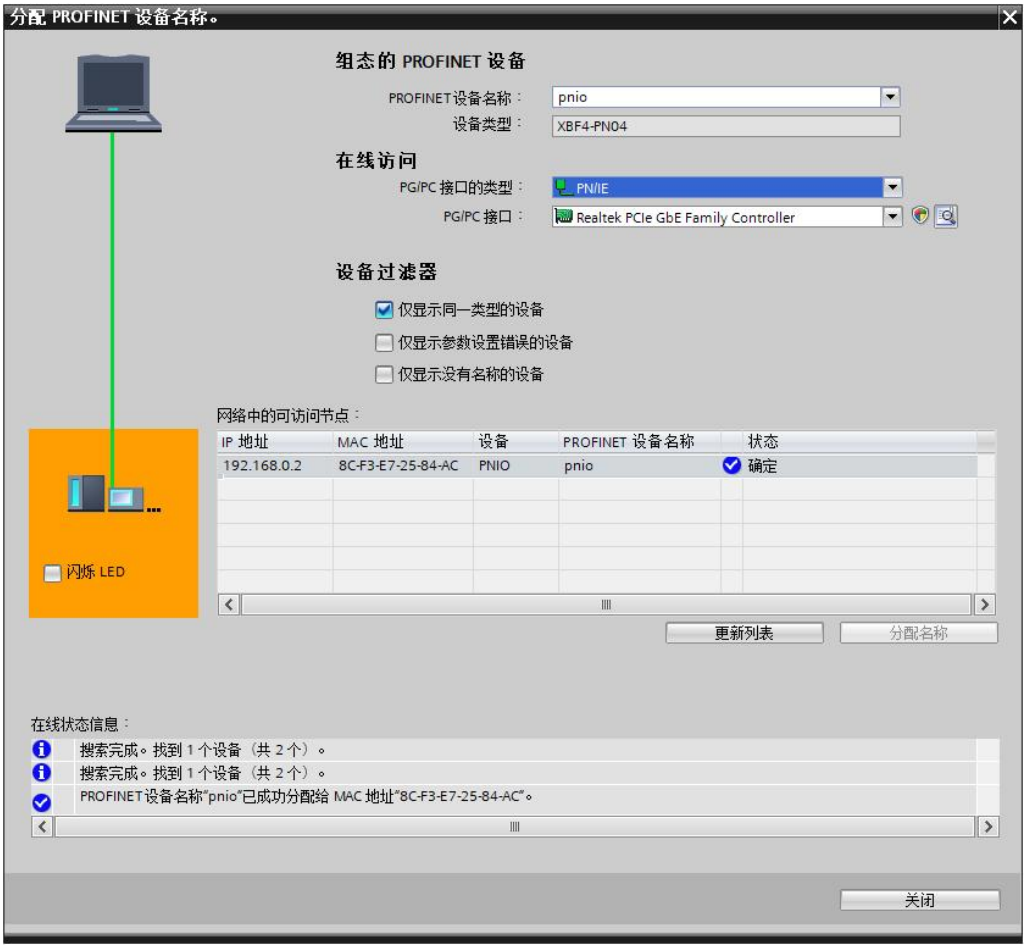
c. Select PLC as the device name, click "Update List", and the update will be completed as shown in the figure below.



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.

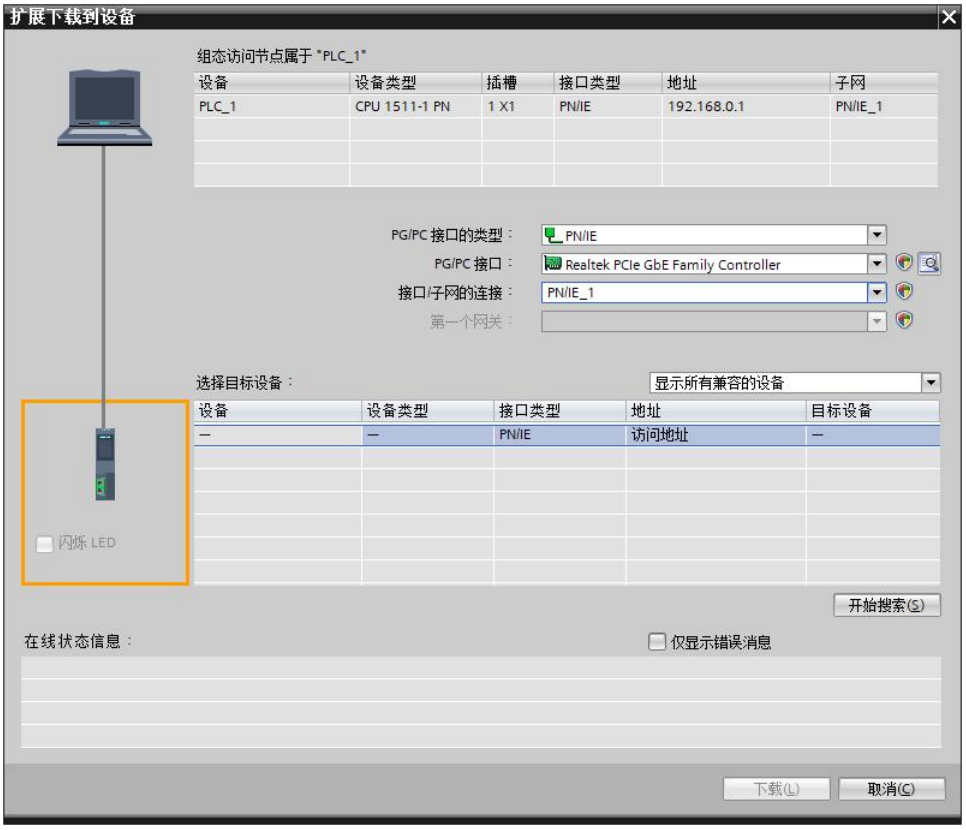


f. Check if the MAC address on the module's silkscreen matches the MAC address of the assigned device name. Click "Close".

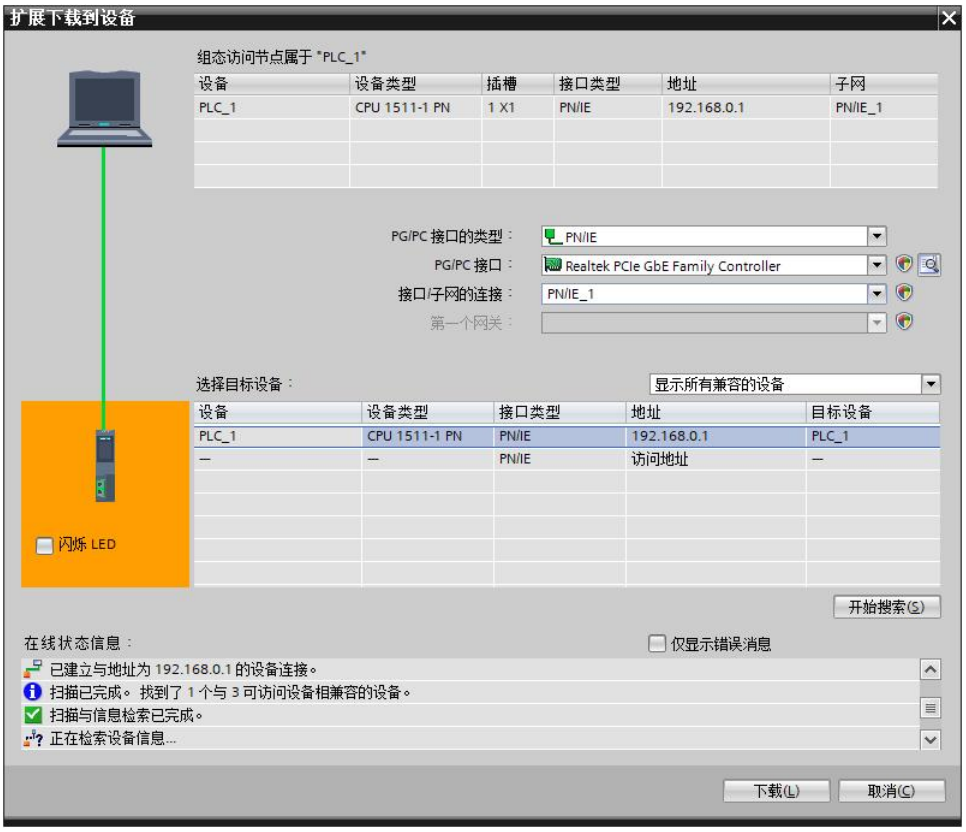
8、Download configuration structure

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.

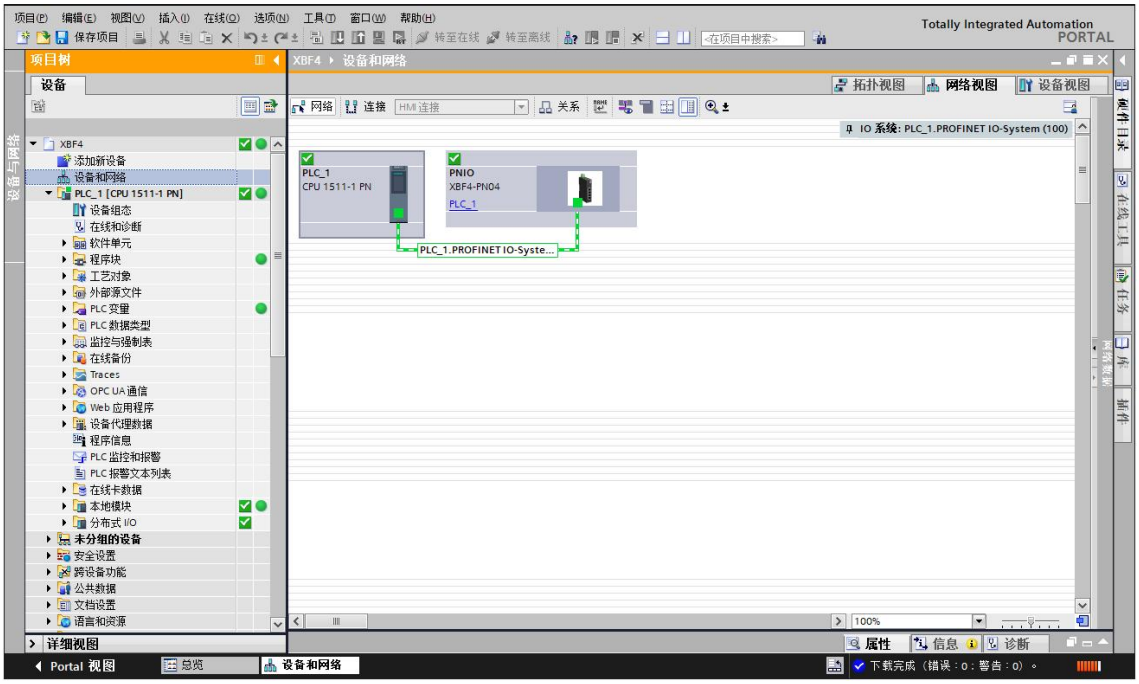
e. Click "Load".

f. Click "Finish".

g. Power on the device again.

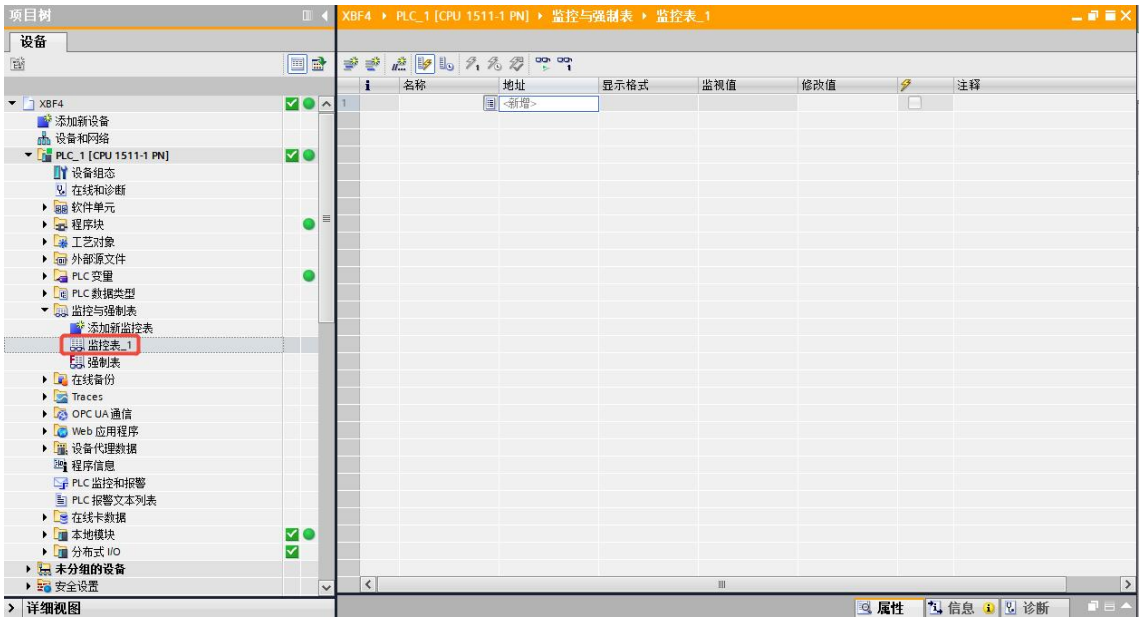
9、Communication connection

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.



10、 Functional verification

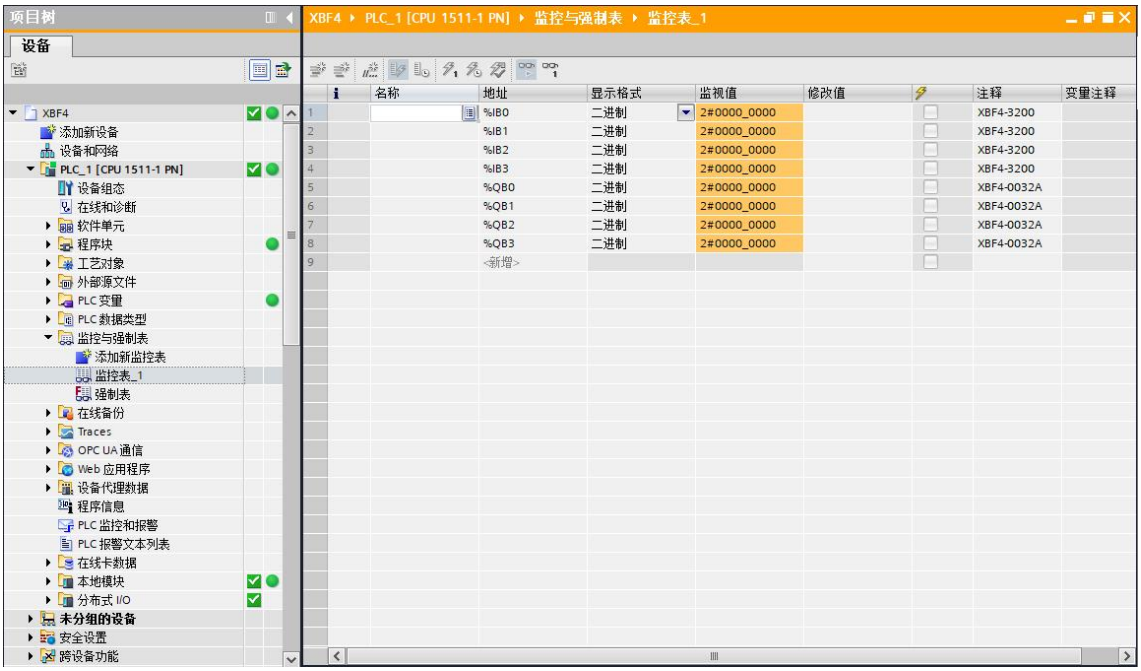
a. Expand the project navigation on the left and select "Monitoring & Enforcement Tables".Double-click "Add New Monitoring Table" to add a new monitoring table, as shown in the figure below.



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 XBF4-3200 module is 0 to 3, and the "Q address" of the XBF4-0032A 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	
PN-IO		0	0 X1			PNIO			
XBF4-PORT1_1		0	1			XBF4-PORT1		1.0	
XBF4-3200		0	1 1	0...3		XBF4-3200			
XBF4-3200_1		0	1 2	4...7		XBF4-3200			
XBF4-0032A		0	1 3		0...3	XBF4-0032A			
XBF4-0032B		0	1 4		4...7	XBF4-0032B			
XBF4-0032B_1		0	1 5		8...11	XBF4-0032B			
XBF4-0032B_2		0	1 6		12...15	XBF4-0032B			
XBF4-0032A_1		0	1 7		16...19	XBF4-0032A			
XBF4-0032A_2		0	1 8		20...23	XBF4-0032A			
XBF4-1616B		0	1 9	8...9	24...25	XBF4-1616B			
XBF4-1616B_1		0	1 10	10...11	26...27	XBF4-1616B			
XBF4-0032A_3		0	1 11		28...31	XBF4-0032A			
XBF4-0032B_3		0	1 12		32...35	XBF4-0032B			
XBF4-1616A		0	1 13	12...13	36...37	XBF4-1616A			
XBF4-1616A_1		0	1 14	14...15	38...39	XBF4-1616A			
XBF4-1616A_2		0	1 15	16...17	40...41	XBF4-1616A			
XBF5-1616B		0	1 16	18...19	42...43	XBF5-1616B			
		0	2						

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			XBF4-3200	
2		%IB1	二进制	2#0000_0000			XBF4-3200	
3		%IB2	二进制	2#0000_0000			XBF4-3200	
4		%IB3	二进制	2#0000_0000			XBF4-3200	
5		%QB0	二进制	2#0000_0000			XBF4-0032A	
6		%QB1	二进制	2#0000_0000			XBF4-0032A	
7		%QB2	二进制	2#0000_0000			XBF4-0032A	
8		%QB3	二进制	2#0000_0000			XBF4-0032A	
9		<新增>						