

# IO-Link Master

## IOL7A-PN01B-8A

### User Manual




Nanjing Solidot Electronic Technology Co., Ltd.

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# 1 Product Overview

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## 1.1 Product Introduction

The IOL7A-PN01B-8A is an IP67 master module in the IOL7A series, a standard IO-Link master device with an IO architecture. The device supports the PROFINET industrial Ethernet bus interface on the bus side and the IO-Link protocol on the user side, serving as a gateway device for both bus slaves and IO-Link masters. Both the bus and IO-Link interfaces are compatible with devices from multiple manufacturers, offering high compatibility and providing various options for user data acquisition, system configuration optimization, simplified field wiring, and improved system reliability.

## 1.2 Product Features

- **Up to IP67 protection rating**  
Suitable for harsh industrial environments.
- **Standardization**  
Based on the IO-Link standard V1.1.3, it can remotely control IO-Link slave devices and is easy to operate.
- **IO-Link communication**  
It has 8 IO-Link ports, allowing connection of up to 8 IO-Link devices.(Class-A type).
- **Parameter settings**  
Device parameter backup: Automatically restores the parameters of connected IO-Link devices;  
Port parameter backup: When enabled, the system automatically backs up the configuration parameters of the slave station when the port is first connected, and all subsequent slave stations connected to this port will run according to these backed-up parameters.
- **Short circuit overcurrent protection**  
Pin2 (DO mode) and Pin4 (DO mode) have short-circuit overcurrent protection.
- **Pin2 supports overcurrent recovery.**  
Supports both automatic and manual recovery.
- **High compatibility**  
Supports slave devices with special process data lengths.

- **Small size**  
Suitable for applications with limited space.
- **Easy to diagnose**  
The innovative channel indicator light design is placed close to the channel, making the communication status of Pin2 and Pin4 clear at a glance, and facilitating detection and maintenance.
- **Easy configuration**  
It is easy to configure and supports all major mainstream PLCs.
- **Simple and quick wiring**  
Using standard cables simplifies wiring.

# 2 Naming Rules

## 2.1 Naming Rules

**IOL 7A - PN 01 B - 8A**  
**(1) (2) (3) (4) (5) (6)**

Serial Number	Meaning	Value description
(1)	Product Technology	IOL: Short for IO-Link
(2)	Protection level	7A: IP67
(3)	Bus Protocol	EC: EtherCAT PN: PROFINET
(4)	Product serial number	01: Product Series Number
(5)	signal type	A: NPN B: PNP
(6)	I/O interface	8A: 8 x Class-A ports

## 2.2 Model List

Model	Product Description
IOL7A-PN01B-8A	PROFINET bus protocol 8 x Class-A port IO-Link master

# 3 Product Parameters

## 3.1 General parameters

<b>Interface parameters</b>	
Bus Protocol	PROFINET
Bus interface	2xM12-D, 4Pin, Hole End
Electrical isolation	500VAC
Number of I/O stations	According to the main site
Data transmission medium	UTP or STP of Category 5 or higher (STP recommended)
Transmission distance	≤100m (distance between stations)
Transmission rate	100Mbps
<b>Technical parameters</b>	
Configuration method	via the main site
Power interface	2xM12-L, 5-pin, pin tip & hole tip
Power supply	24VDC (18V ~ 30V)
US total current	Max: 9A
US consumes current	≤100mA
UA total current	Max: 9A
UA consumes current	0mA
Power supply reverse polarity protection	support
Weight	660g
Size	225.5×62.5×32.6mm
Operating temperature	-25°C ~ +70°C
Storage temperature	-40°C ~ +85°C
Relative humidity	95%, no condensation
Protection level	IP67

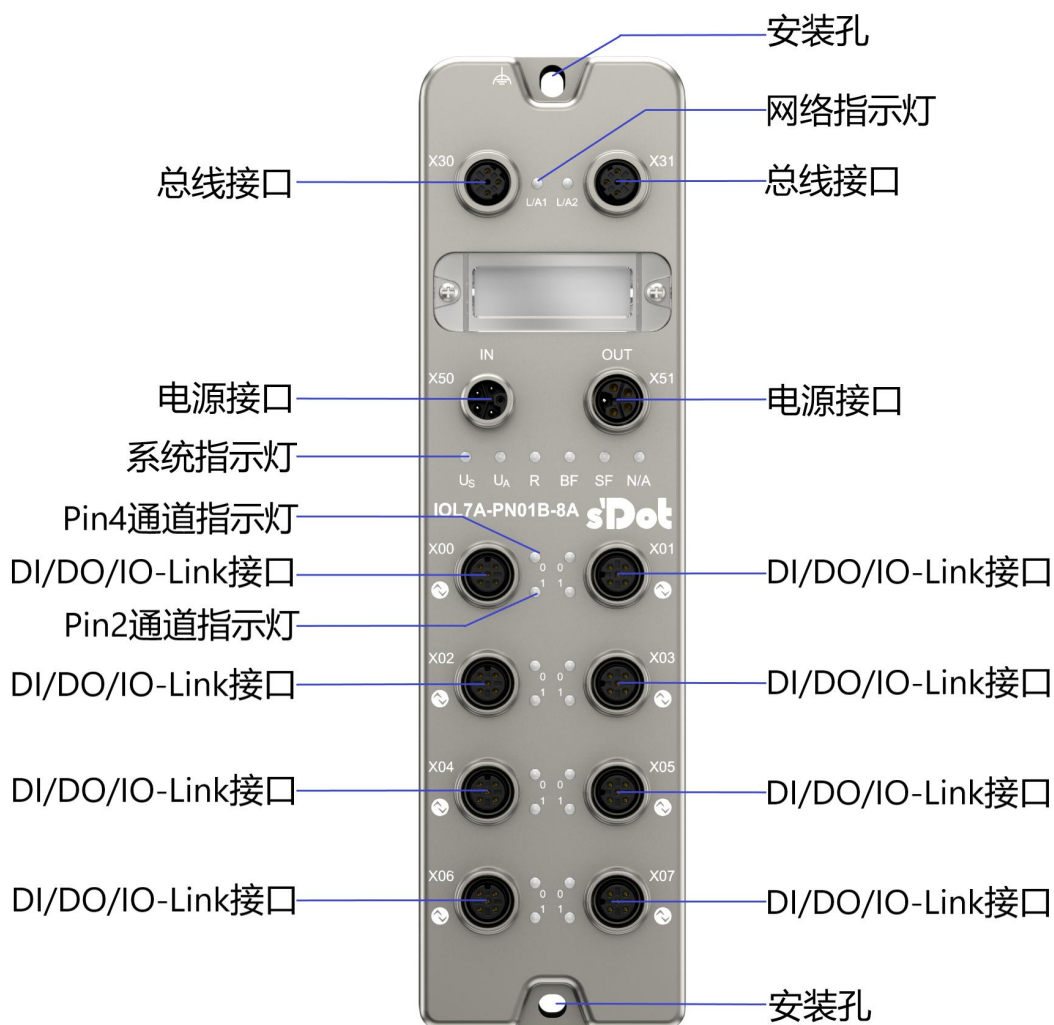
## 3.2 Digital parameters

Product Model	IOL7A-PN01B-8A
Bus Protocol	PROFINET
Rated voltage	24VDC (18V ~ 30V)
DI/DO/IO-Link interface	8xM12-A, 5Pin, Hole End
IO-Link channel count	8
IO-Link version	V1.1.3
IO-Link transmission rate	COM1 (4.8kbps), COM2 (38.4kbps), COM3 (230.4kbps)
Number of input channels	Maximum 16
Input signal type	PNP
Input filtering	Supported, fixed configuration is 3ms
Input current	200 mA
Output maximum number of channels	Maximum 16
Maximum output current of single channel	Pin4: 0.5A
	Pin2: 2A
Output signal type	PNP
Load type	Resistive load, inductive load
Total output current	US, UA maximum 9 A
Port protection	Overcurrent protection
Isolation methods	US and UA are not isolated.
Channel indicator lights	Support

# 4 Panel

## 4.1 Product Structure

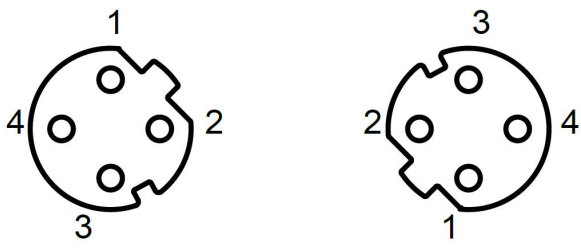
**Product Parts Names**



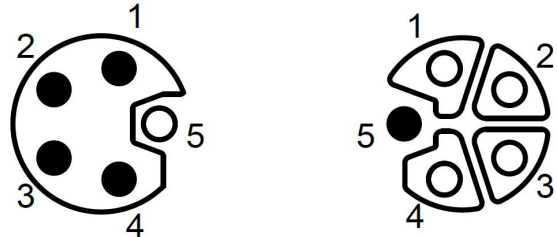
## 4.2 Indicator light function

Name	Logo	Color	State	Status Description
Network indicator IN	L/A1	green	ON	Establish network connection
			blinking	Network connection and data exchange
			Extinguish	No data interaction or anomaly
Network indicator light OUT	L/A2	green	ON	Establish network connection
			blinking	Network connection and data exchange
			Extinguish	No data interaction or anomaly
System power indicator	US	Green /Red	Green	Power supply is normal
			Red flashing	The system power supply is greater than 11V and less than 18V.
			Extinguish	The product is not powered on or the power supply is abnormal.
Auxiliary power indicator	UA	Green /Red	Green	Power supply is normal
			Red flashing	Auxiliary power supply greater than 11V and less than 18V
			Red	Auxiliary power supply is not powered on or the voltage is less than 11V
			Extinguish	The product is not powered on or the power supply is abnormal.
Operating status indicator	R	green	ON	The system is running normally.
			Extinguish	Work abnormality
System error indicator	SF	red	ON	The PROFINET master system is malfunctioning.
			Extinguish	PROFINET master system is running normally or not powered on
Bus fault indicator	BF	red	ON	No network connection
			blinking	No PROFINET connection established with the controller
			Extinguish	Establish PROFINET connection with controller
Pin4 Channel Indicator	0	Yellow /Red/ Green	Yellow	Pin4 is in a state of input or output of 1.
			Red	Pin4 overcurrent
			Red flashing	IO-Link error
			Green	IO-Link communication connection successful
		Green flashing	IO-Link communication not connected	
		Extinguish	The state of Pin4 input or output is 0.	
Pin2 Channel Indicator	1	Yellow /Red	Yellow	Pin2 input or output state is 1.
			Red	Pin2 overcurrent
			Red flashing	Pin1 overcurrent (LED1 and LED0 flash simultaneously)
			Extinguish	The state of Pin2 input or output is 0.


### 4.3 Bus interface definition

Bus interface connection view (M12-D, hole end)	Definitions										
 <p style="text-align: center; margin-top: 10px;">Bus</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th style="text-align: center; padding: 5px;">Pin</th> <th style="text-align: center; padding: 5px;">Function</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">TX+, send data+</td> </tr> <tr> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">RX+, receiving data+</td> </tr> <tr> <td style="text-align: center; padding: 5px;">3</td> <td style="text-align: center; padding: 5px;">TX - Send data -</td> </tr> <tr> <td style="text-align: center; padding: 5px;">4</td> <td style="text-align: center; padding: 5px;">RX-, Data Receiver-</td> </tr> </tbody> </table>	Pin	Function	1	TX+, send data+	2	RX+, receiving data+	3	TX - Send data -	4	RX-, Data Receiver-
Pin	Function										
1	TX+, send data+										
2	RX+, receiving data+										
3	TX - Send data -										
4	RX-, Data Receiver-										

### 4.4 Power interface definition

Power interface connection view (M12-L, pin end & hole end)	Definitions																		
 <p style="text-align: center; margin-top: 10px;">IN      Power      OUT</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th style="text-align: center; padding: 5px;">Pin</th> <th style="text-align: center; padding: 5px;">Function</th> <th style="text-align: center; padding: 5px;">Wire core color</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">+24V US</td> <td style="text-align: center; padding: 5px;">BROWN</td> </tr> <tr> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">0V GNDA</td> <td style="text-align: center; padding: 5px;">WHITE</td> </tr> <tr> <td style="text-align: center; padding: 5px;">3</td> <td style="text-align: center; padding: 5px;">0V GNDS</td> <td style="text-align: center; padding: 5px;">BLUE</td> </tr> <tr> <td style="text-align: center; padding: 5px;">4</td> <td style="text-align: center; padding: 5px;">+24V UA</td> <td style="text-align: center; padding: 5px;">BLACK</td> </tr> <tr> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">PE</td> <td style="text-align: center; padding: 5px;">ASH</td> </tr> </tbody> </table>	Pin	Function	Wire core color	1	+24V US	BROWN	2	0V GNDA	WHITE	3	0V GNDS	BLUE	4	+24V UA	BLACK	5	PE	ASH
Pin	Function	Wire core color																	
1	+24V US	BROWN																	
2	0V GNDA	WHITE																	
3	0V GNDS	BLUE																	
4	+24V UA	BLACK																	
5	PE	ASH																	

### 4.5 I/O interface definition

I/O interface connection view (M12-A, hole end)	Definitions																		
 <p style="text-align: center; margin-top: 10px;">IO-Link</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr style="background-color: #cccccc;"> <th style="text-align: center; padding: 5px;">Pin</th> <th style="text-align: center; padding: 5px;">Function</th> <th style="text-align: center; padding: 5px;">Wire core color</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">1</td> <td style="text-align: center; padding: 5px;">+24V US</td> <td style="text-align: center; padding: 5px;">Brown</td> </tr> <tr> <td style="text-align: center; padding: 5px;">2</td> <td style="text-align: center; padding: 5px;">DI/DO</td> <td style="text-align: center; padding: 5px;">white</td> </tr> <tr> <td style="text-align: center; padding: 5px;">3</td> <td style="text-align: center; padding: 5px;">0V GNDS</td> <td style="text-align: center; padding: 5px;">blue</td> </tr> <tr> <td style="text-align: center; padding: 5px;">4</td> <td style="text-align: center; padding: 5px;">DI/DO/IO-Link</td> <td style="text-align: center; padding: 5px;">black</td> </tr> <tr> <td style="text-align: center; padding: 5px;">5</td> <td style="text-align: center; padding: 5px;">PE</td> <td style="text-align: center; padding: 5px;">Ash</td> </tr> </tbody> </table>	Pin	Function	Wire core color	1	+24V US	Brown	2	DI/DO	white	3	0V GNDS	blue	4	DI/DO/IO-Link	black	5	PE	Ash
Pin	Function	Wire core color																	
1	+24V US	Brown																	
2	DI/DO	white																	
3	0V GNDS	blue																	
4	DI/DO/IO-Link	black																	
5	PE	Ash																	

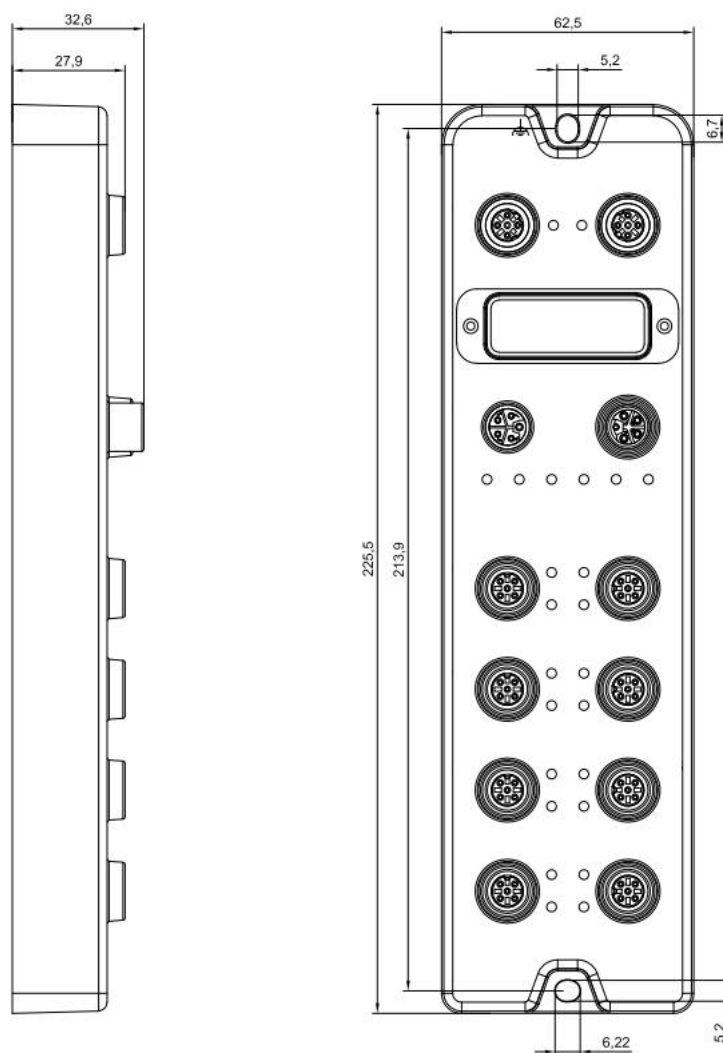
**⚠ Precautions**

- Pin1 and Pin3 are powered by the system power supply US, and Pin4 signal output is also powered by US.
- Pin2 power comes from UA. If the Pin2 output function is not used, UA can be left unconnected.

# 5 Installation and Wiring

## 5.1 Outline dimension drawing

External dimensions (unit: mm)



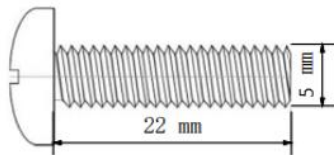
## 5.2 Installation environment requirements

To fully utilize the performance and improve the reliability of the IOL7A module, please avoid installing it in the following locations:

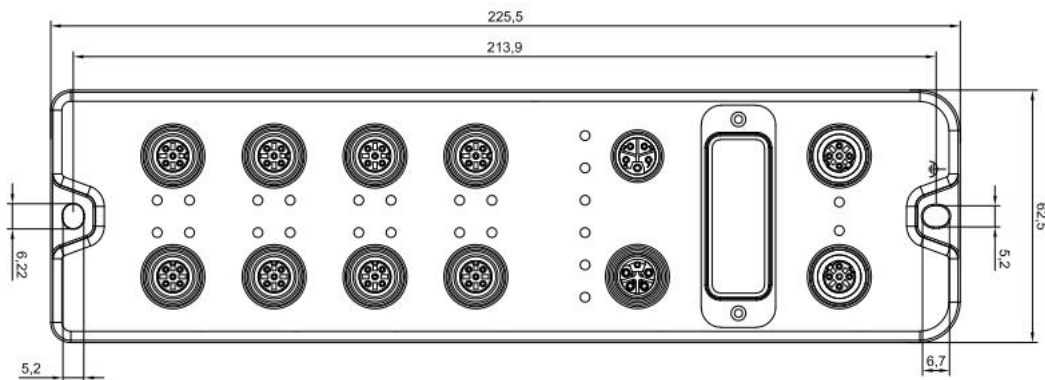
- Places with direct sunlight
- Locations where ambient temperature or relative humidity exceeds module specifications
- Places containing corrosive or flammable gases
- Places where there are droplets of acid, oil, or chemicals
- Places with dust, iron filings, and flying sparks
- Locations where the module body is directly subjected to impact or vibration
- Places with strong electric fields, magnetic fields, radiation, and electrostatic interference.
- There are power lines and AC high-voltage power lines nearby.

## 5.3 Module installation

- ◆ Please use screws of M5\*22mm or larger to secure the module body.



- ◆ The dimensions of the mounting holes for the module are shown in the figure below.

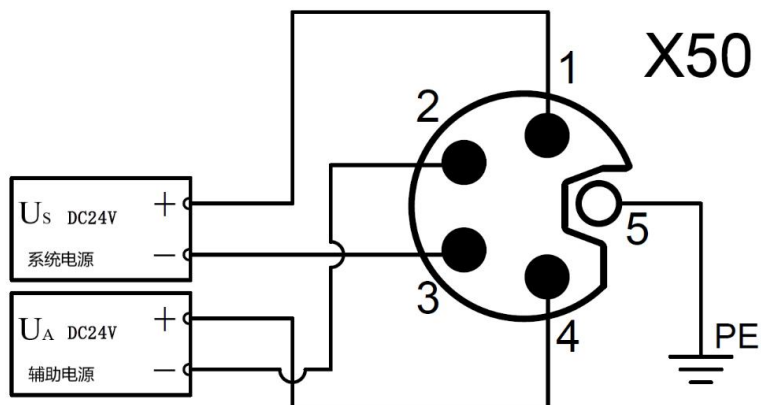


### ⚠ Precautions

- The transparent cover on the module is a pre-installed cover for the rotary switch. The cover is already secured at the factory. Please do not disassemble it at will to avoid damaging the IP67 protection rating.
- Please secure the module properly. If it is not securely fixed, vibration may cause a malfunction.

## 5.4 Wiring instructions

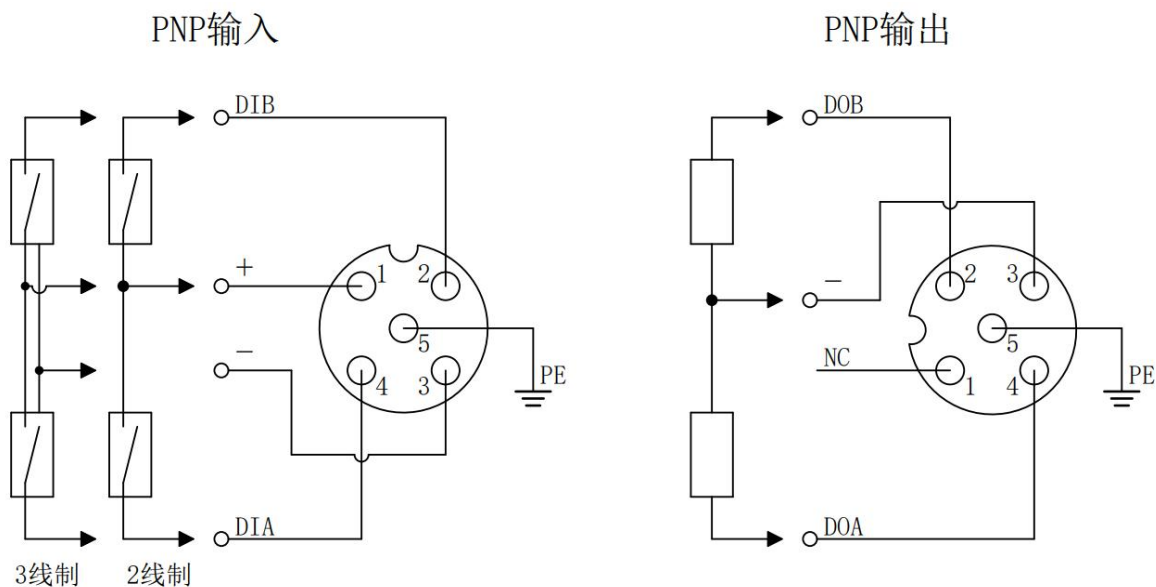
### 5.4.1 Power interface wiring diagram



#### Precautions

- It is recommended that the system power supply and auxiliary power supply use different switching power supplies to ensure operational stability.
- Please refer to the power supply rules. [Power supply rules](#) chapter.

### 5.4.2 I/O Interface Wiring Diagram



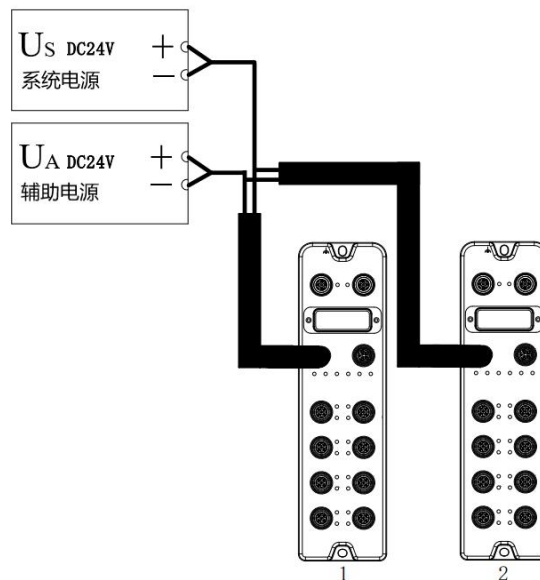
#### Precautions

- Install the module's waterproof cap on unused connector interfaces and tighten it to avoid compromising the IP67 protection rating.

# 6 Power supply rules

## 6.1 Direct power supply rules

Each module is powered directly from the switching power supply, without using the OUT interface. The total current consumed by each module's US pin should be  $\leq 9A$ , and the total current consumed by each module's UA pin should be  $\leq 9A$ .



The voltage drop in the power cable varies depending on the total current consumed by the module power supply and the cable material. The table below shows the voltage drop when using our standard cable.

Total current consumed by the power supply (A)	Voltage drop (V) at different cable lengths			
	1m	3m	5m	10m
8	0.64	1.12	1.60	2.72
7	0.56	0.98	1.40	2.38
6	0.48	0.84	1.20	2.04
5	0.40	0.70	1.00	1.70
4	0.32	0.56	0.80	1.36

3	0.24	0.42	0.60	1.02
2	0.16	0.28	0.40	0.68
1	0.08	0.14	0.20	0.34

■ **Example of calculating the total current consumption of the module when directly powered**

For example, if both modules are IOL7A-PN01B-8A, the usage of each module is shown in the table below:

Module Name	I/O ports			External connection devices	
	port name	Pin Name	I/O mode	Product Name	Specification
Module 1	Ports 1-8	Pin4	DI (Input current 4mA)	3-wire sensor	Current consumption: 30mA
		Pin2	DI (Input current 4mA)		Current consumption: 30mA
Module 2	Ports 1-8	Pin4	DO	Solenoid valve	Load current: 500mA
		Pin2	DO	Solenoid valve	Load current: 2A

The total current consumption is calculated, and the current consumption of a single module is calculated as shown in the table below:

Module Name	Power type	Total current consumption calculation items	Calculation results
Module 1	System power US	System current consumption	Module system-side power consumption 35mA
	System power US	Module input current and sensor current consumption	For all ports (Sensor current consumption) + (Channel input current * Number of input points) = (30mA*16) + (4mA*16) =544mA
Module 2	System power US	System current consumption	Module system-side power consumption 35mA
	System power US	Pin4 Load Output Current	For ports 1~8 Pin4 Channel output current * number of output points =500mA*8 =4A
	Auxiliary power supply UA	Pin2 load output current	For ports 1~8 Pin2 Channel output current * number of output points

			$=500\text{mA} \times 8$ $=4\text{A}$
--	--	--	--

In summary, the current consumption of each module is as follows:

- For the system power supply US, each module consumes 35mA of current.

The system power supply US of module 1 (IOL7A-PN01B-8A) consumes a current of  $35\text{mA} + 544\text{mA} = 579\text{mA}$ , which is less than the maximum current of the module's system power supply US of 9A.

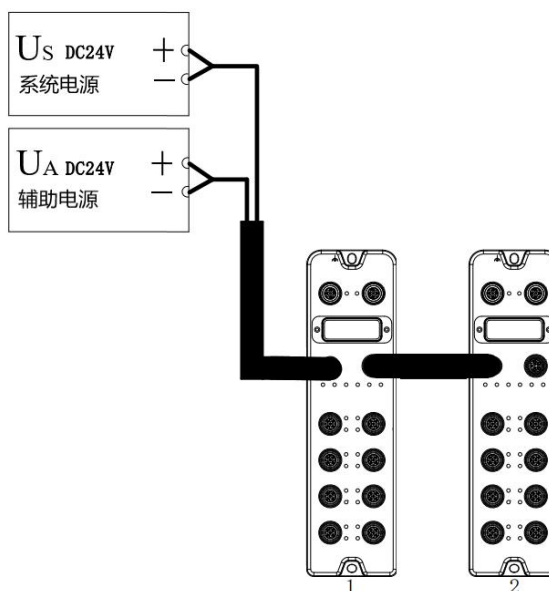
The system power supply US of module 2 (IOL7A-PN01B-8A) consumes a current of  $35\text{mA} + 4\text{A} = 4.035\text{A}$ , which is less than the maximum current of the module's system power supply US of 9A.

The auxiliary power supply UA of module 2 (IOL7A-PN01B-8A) consumes 4A of current, which is less than the maximum current of 9A of the module's auxiliary power supply UA.

In this example, the requirement is met because the total current consumed by each module (US) is  $\leq 9\text{A}$  and the total current consumed by each module (UA) is  $\leq 9\text{A}$ .

## 6.2 Series power supply rules

The modules are connected in series via the OUT interface. The total current consumed by the US of each module should be  $\leq 9A$ , the total current consumed by the UA should be  $\leq 9A$ , and the total current consumed by the US and UA of all modules should be  $\leq 9A$ .



When powered in series, the current consumed by the modules connected in series flows through the module, resulting in a voltage drop in the internal circuit of the module. The voltage drop in the power cable varies depending on the total current consumed by the module power supply and the cable material. The table below shows the voltage drop when using our standard cables.

Total current consumed by the power supply (A)	Voltage drop (V) in the internal circuit of the module	Voltage drop (V) at different cable lengths			
		1m	3m	5m	10m
9	0.36	0.72	1.26	1.80	3.06
8	0.32	0.64	1.12	1.60	2.72
7	0.28	0.56	0.98	1.40	2.38
6	0.24	0.48	0.84	1.20	2.04
5	0.20	0.40	0.70	1.00	1.70
4	0.16	0.32	0.56	0.80	1.36
3	0.12	0.24	0.42	0.60	1.02
2	0.08	0.16	0.28	0.40	0.68
1	0.04	0.08	0.14	0.20	0.34

### ⚠ Precautions

- The total current consumed by each module's US should be  $\leq 9A$ , and the total current consumed by each module's UA should be  $\leq 9A$ .
- As shown in the figure above, when powered in series, the total current consumed by US and UA of all modules should meet the rule that "module 1 + module 2"  $\leq 9A$ .

### ■ Example of calculating the total current consumption of the module when powered in series

For example, both modules are IOL7A-PN01B-8A, and the usage of each module is similar to...[Example of calculating the total current consumption of the module when directly powered](#)"same.

Calculate the total current consumption:

$$US=579\text{mA}+4.035\text{A}=4.614\text{A}, UA=4\text{A}.$$

In this example, the requirement is met because the total current consumed by US and UA of all modules satisfies the rule "module 1 + module 2"  $\leq 9\text{A}$ .

# 7 Use

---

## 7.1 Parameter and process data description

### 7.1.1 Output clear and hold function

The clear/hold function applies to the output signals of each port. This function allows configuration of the module's output action in abnormal bus conditions. Three types of operations are supported:

Low-level output (Clear 0): When communication is interrupted, the module output channel outputs a low level.

High-level output (Clear 1): When communication is disconnected, the module output channel outputs a high level.

Hold last value: When communication is lost, the module output channel maintains the last state level.

### 7.1.2 Pin2 circuit overcurrent recovery mode function

When an overcurrent fault occurs in Pin2, automatic recovery and manual recovery are supported. The settings can be configured in the main station module parameters, with automatic recovery being the default.

- **PROFINET Master**The parameter function is described using TIA Portal V17 software as an example to illustrate the configuration method. See details for specific steps.[Main site parameter configuration in section 7.2.1.](#)

### 7.1.3 ISDU remote configuration function

The PROFINET master station only supports ISDU write operations before configuration. Before operation, the slave station ISDU information should be obtained. For details, please refer to Chapter 6 of the "IOL7A Series Hub User Manual\_Vx.xx.pdf".

The IOL7A-16CB-M12 slave station supports configuration of port direction, input filtering, and factory reset functions. The following example demonstrates how to configure these three functions, with port 1 connected to the IOL7A-16CB-M12 and port 1 status displaying 3 (IO-Link OP status).

#### 1、PROFINET Master Configuration ISDU Parameters

Due to the limitations of the agreement, PROFINET master stations do not support ISDU read operations; they only support ISDU write operations before configuration. For multiple write operations, configuration operations can be issued multiple times. Slave stations typically support saving configurations, and the configuration is not lost even after power failure. The PROFINET master station's Index, Subindex, and Length fields can only contain decimal (DEC) values and do not require a Control field.

**Example 1** Configure the IOL7A-16CB-M12 with the first 8 channels as inputs and the last 8 channels as outputs. (Reference) **IOL7A Series Hub User Manual\_Vx.xx.pdf** in section 6.5.2, Index is set to 66 (0x0042), Subindex is set to 0 (0x00), Length is set to 2 (0x02), and Data is set to 00FF.

**Example 2** Configure the IOL7A-16CB-M12 to have 2ms input filtering on the first 8 channels and input filtering disabled on the last 8 channels. (Reference) **IOL7A Series Hub User Manual\_Vx.xx.pdf** in section 6.5.5, Index is set to 73 (0x0049), Subindex is set to 0 (0x00), Length is set to 16 (0x10), and Data is set to 01010101010101010000000000000000.

**Example 3** Restore IOL7A-16CB-M12 to factory settings. (Reference) **IOL7A Series Hub User Manual\_Vx.xx.pdf** in section 6.3, Index is set to 2 (0x0002), Subindex is set to 0 (0x00) 0x00, Length is set to 1 (0x01), and Data is set to 82.

- **PROFINET Master** The ISDU configuration function is illustrated using TIA Portal V17 software as an example to introduce the configuration method. See details for specific steps. [ISDU parameter configuration in section 7.2.1.](#)

## 7.1.4 DI/DO/IO-Link mode functionality

### 1、 Port DI/DO mode

- ◆ The 01 series PROFINET master station supports standard DI/DO modes on all ports, Pin2 and Pin4. Simply select the corresponding standard DI or standard DO mode in the module; the default is standard DI mode.

### 2、 Port IO-Link mode

- ◆ The 01 series PROFINET master station supports IO-Link mode on all its pin 4 ports.
- ◆ Normally, the length of the slave process data should be consistent with the configured module data length, but compatibility is also acceptable. For example, if the slave process data input is 2 bytes, the module can also choose to input more than 2 bytes, such as 4 bytes; however, it cannot choose to input less than 2 bytes, as the device status will indicate an input length mismatch.

Reference value for slave data length [Appendix C](#) If no corresponding slave data length module exists, a module with a length value greater than the slave data length can be selected; or based on...[7.3 Custom Data Length Module](#) Select the slave data length module.

- **PROFINET Master**The configuration method for DI/DO/IO-Link mode is introduced using TIA Portal V17 software as an example. See details for specific steps.[DI/DO/IO-Link settings in section 7.2.1.](#)

## 7.1.5 Uplink and downlink process data

Slot0 data definition table for PROFINET master station model IOL7A-PN01B-8A:

Type	Byte offset	Length	Describe
Input process data (12 bytes)	0	1 byte	Pin 2 Standard Input Mode Input Value
	1	1 byte	Pin 4 Standard Input Mode Input Value
	2	1 byte	Port 0 Device Status
	3	1 byte	Port 1 Device Status
	4	1 byte	Port 2 Device Status
	5	1 byte	Port 3 Device Status
	6	1 byte	Port 4 Device Status
	7	1 byte	Port 5 Device Status
	8	1 byte	Port 6 Device Status
	9	1 byte	Port 7 Device Status
	10	1 byte	Main site status
	11	1 byte	Input data validity, default 0xFF, reserved
Output process data (2 bytes)	0	1 byte	Port Pin2 Standard Output Mode Output Value
	1	1 byte	Port Pin 4 Standard Output Mode Output Value

Note: For port status details, please refer to [link/reference].[Appendix B.](#)

## 7.2 PROFINET MasterConfiguration application

### 7.2.1 Application in the TIA Portal V17 software environment

#### 1、Preparation

- **Hardware environment**

- **Taking the module model IOL7A-PN01B-8A as an example**  
Port X01 connects to IOL7A slave module IOL7A-16CB-M12
- **One computer, pre-installed with TIA Portal V17 software.**
- **PROFINET dedicated shielded cable**
- **One Siemens PLC is required. This instruction manual uses the Siemens S7-1500 CPU 1511-1 PN as an example.**
- **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 wiring](#) "Required Operation"

#### 2、New construction projects

- a. Open the TIA Portal V17 software, click "Create New Project", enter all the information and click "Create", 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

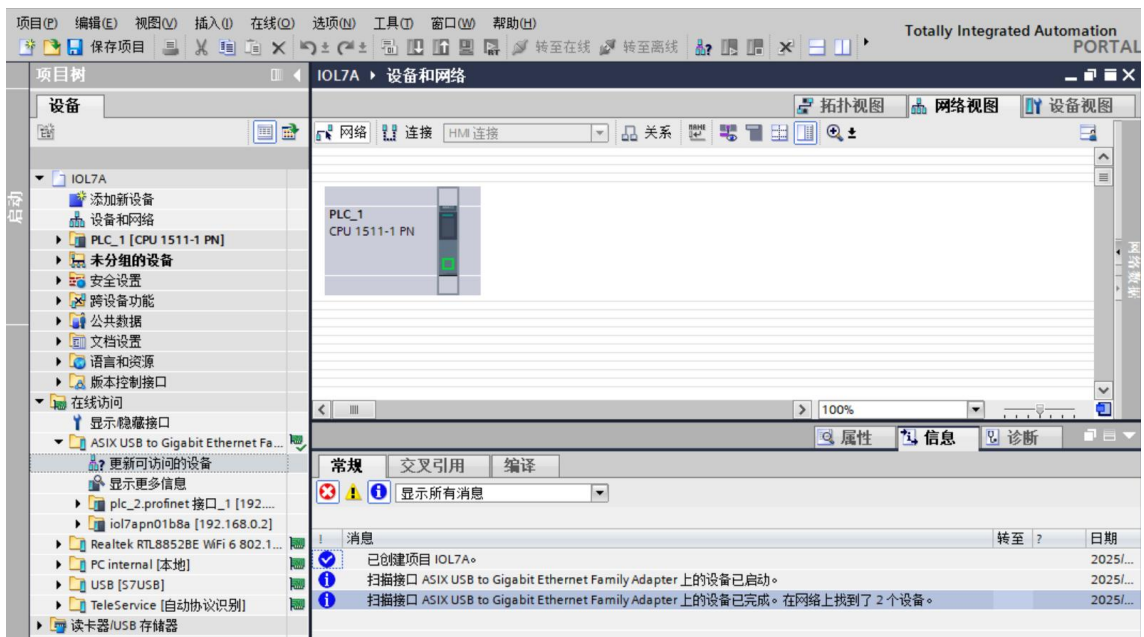


#### 4. Scan connection device

- a. Click "Online Access -> Update Accessible Devices" in the left navigation tree, as shown in the image below.



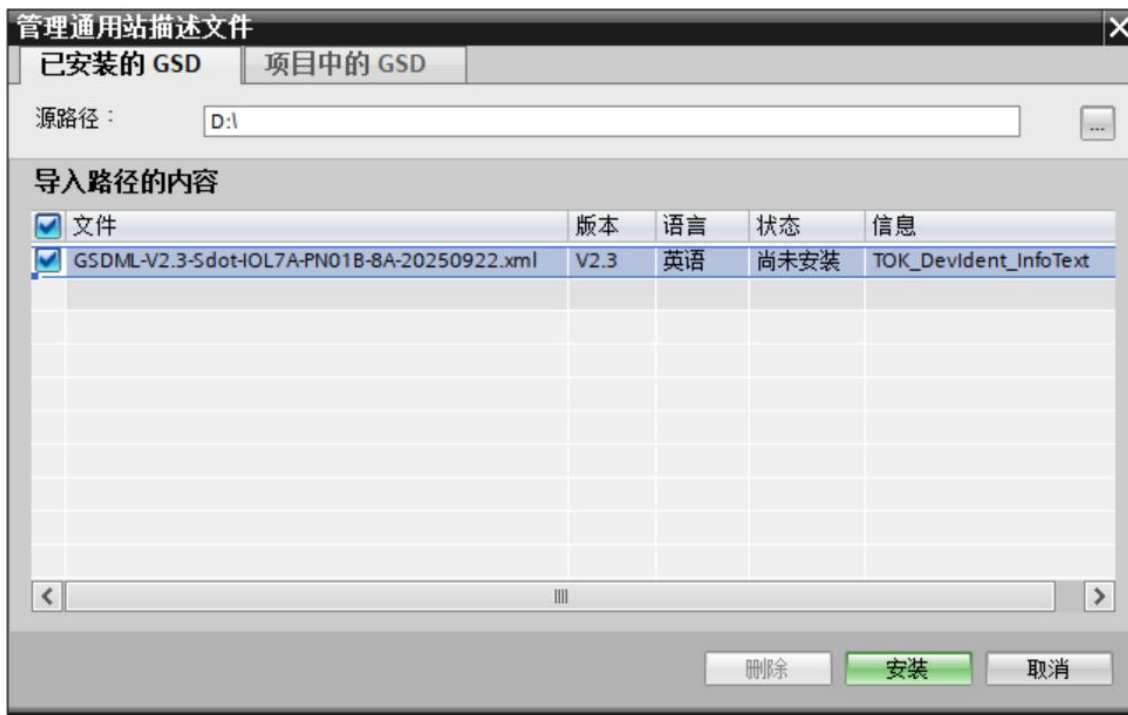
- b. The update is complete, and the connected slave devices are displayed, as shown in the figure below.



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.

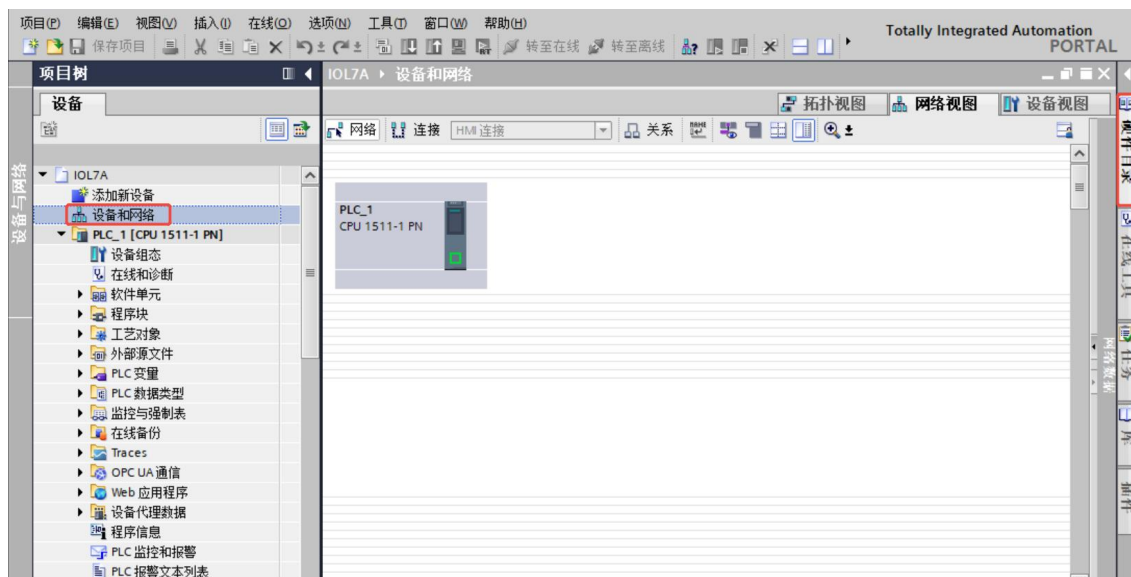
### 5. Add GSD configuration file

- a. In the menu bar, select "Options -> Manage General Station Description Files (GSDML)(D)".
- b. Click "Source Path" Select the folder where the GSD files are stored..
- c. Check if the status of the GSD file to be added is "Not installed". If not, click "Install". If already installed, click "Cancel" to skip the installation steps.

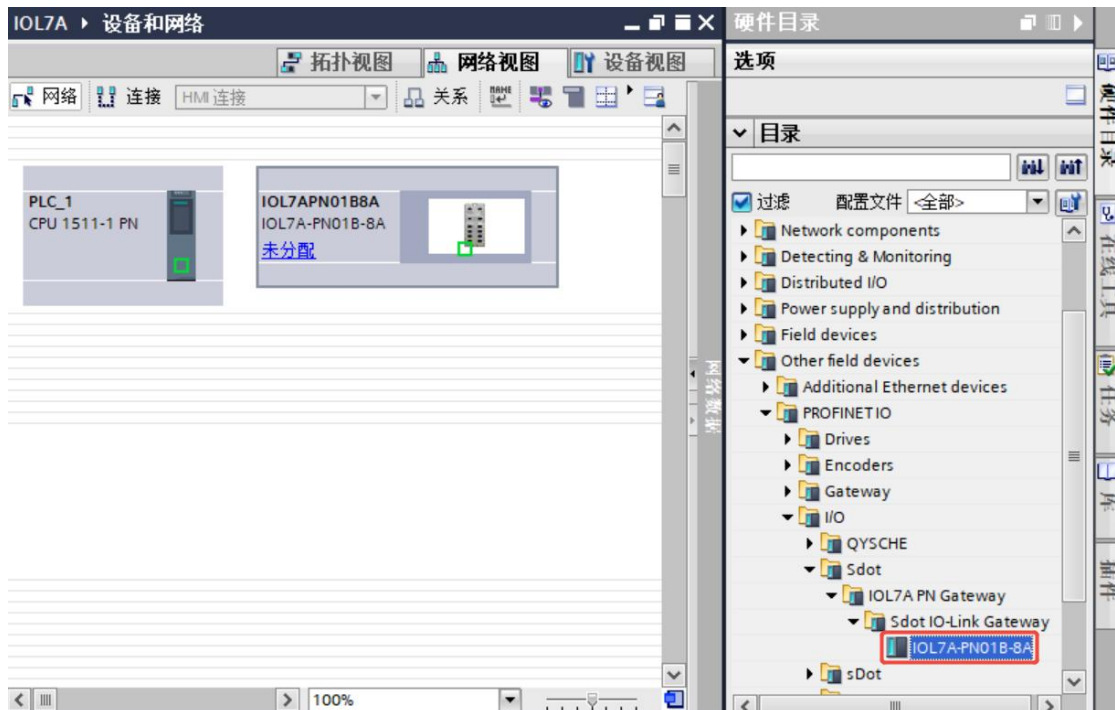


### 6. Add slave device

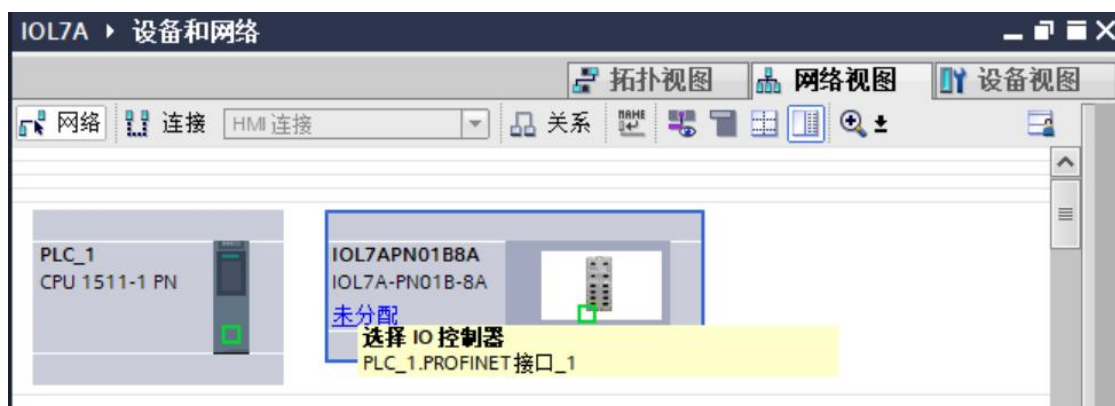
- a. Double-click "Devices and Networks" in the left navigation tree.
- b. Click the vertical "Hardware Catalog" button on the right, and the catalog will be displayed as shown in the image below.



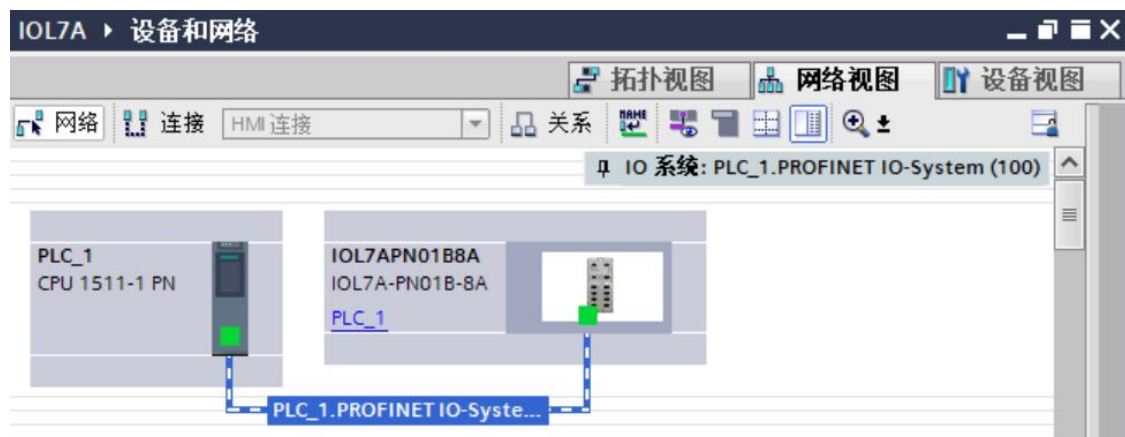
- c. Locate the "IOL7A-PN01B-8A" module in the hardware directory, and drag or double-click "IOL7A-PN01B-8A" to the "Network View," as shown in the image below. To connect multiple modules, add them sequentially according to the actual topology in the "Hardware Directory" on the right.



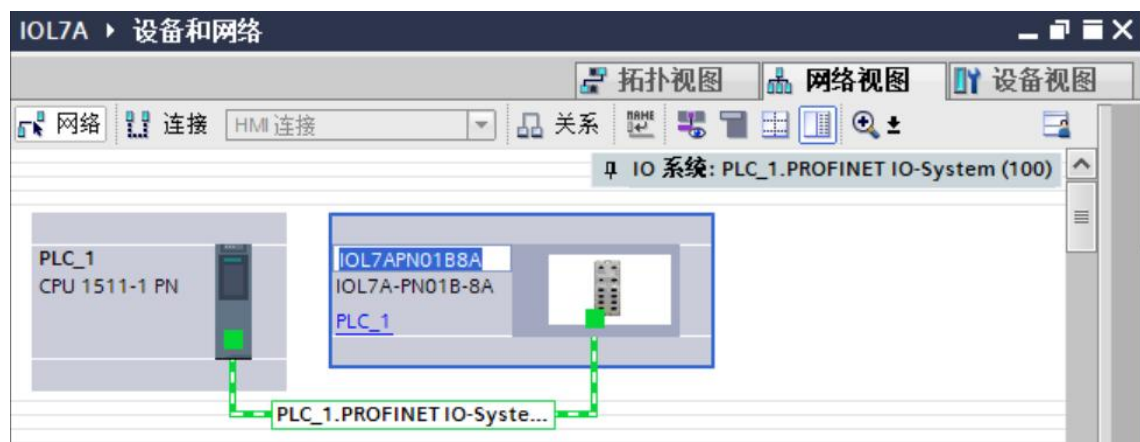
- d. Click "Unassigned (blue text)" on the slave device, and select "PLC\_1.PROFINET Interface\_1", as shown in the figure below.



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



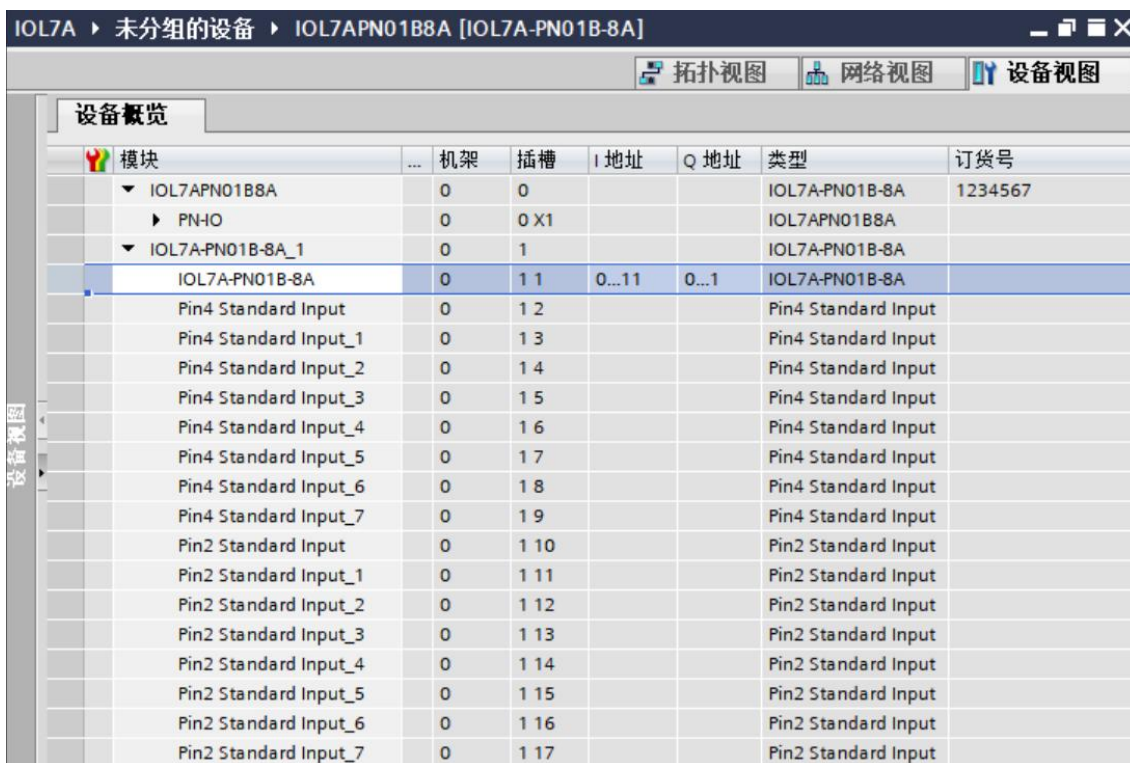
- f. Click the device name to rename the device, as shown in the image below.



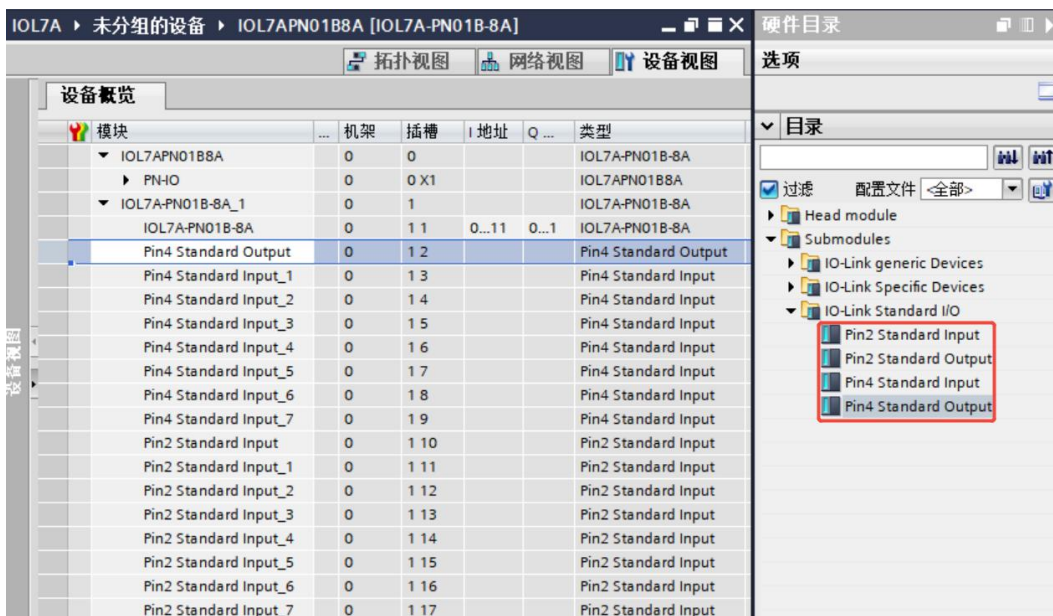
## 7、DI/DO/IO-Link settings

- a. Click "Device View" to enter the device overview, where you can see the topology configuration information, including the I/O addresses automatically assigned by the system. The I/O addresses can be changed manually, as shown in the figure below. Pin4 Standard Input~Pin4 Standard Input7. Configurable DI/DO/IO-LinkPin2 Standard Input~Pin2 Standard Input7. Configurable

DI/DO.

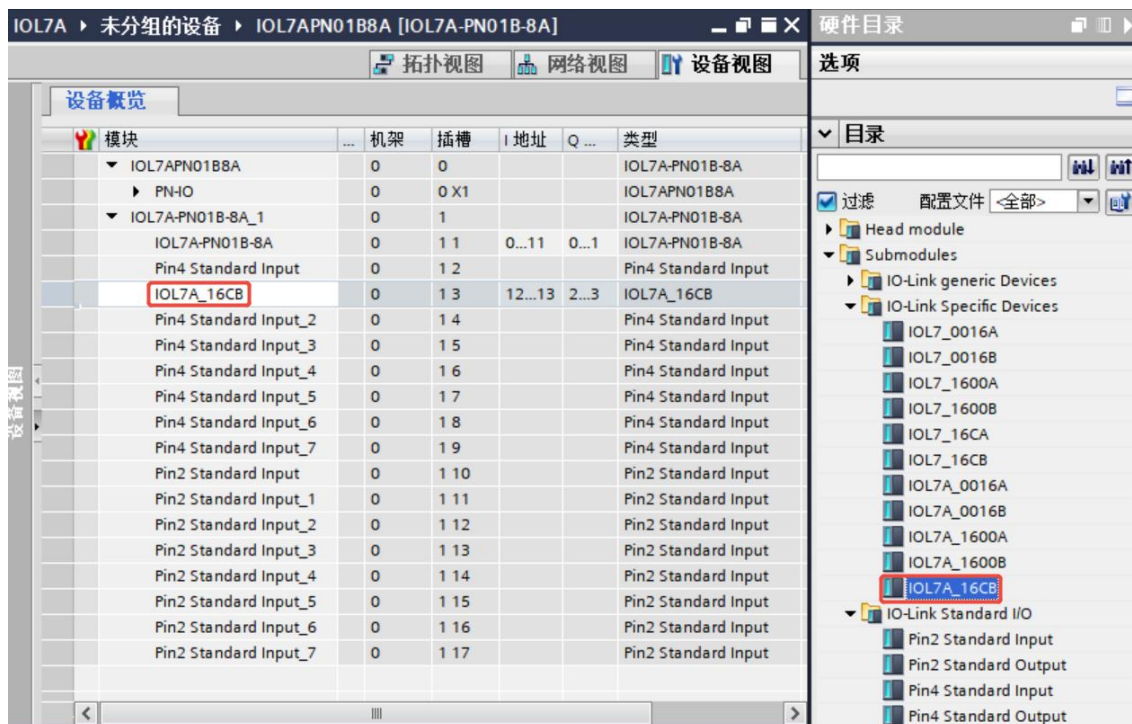


- b. When configuring DI/DO on the master module IOL7A-PN01B-8A, select the corresponding Pin4/Pin2 Standard Input for ports X00~X07.~Pin4/Pin2 Standard Input7. After right-clicking and deleting, inDouble-click to add Pin4/Pin2 Standard Input/Standard Output under the "Hardware Directory" on the right, as shown in the figure below.



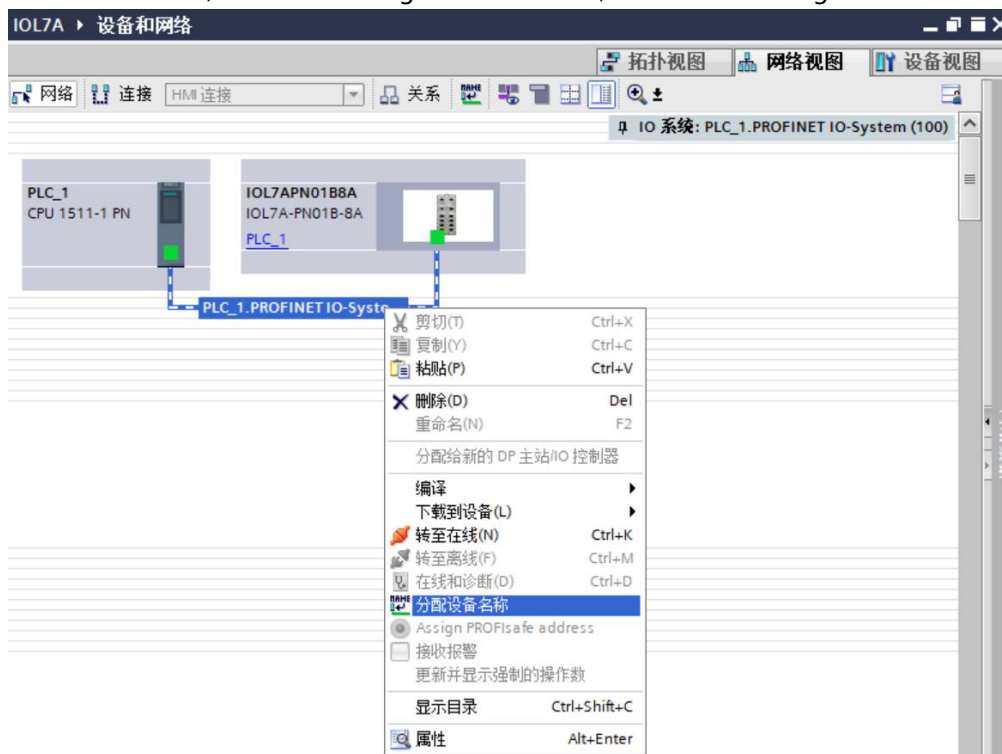
- c. The IOL7A-PN01B-8A master module's X01 port Pin4 is connected to the IOL7A-16CB-M12 module. Locate the module in the "Hardware Directory" on the right, right-click "Pin4 Standard

Input 1" and select "Delete". Then double-click "IOL7A\_16CB" to add the IOL7A slave module to the configuration, as shown in the figure below.

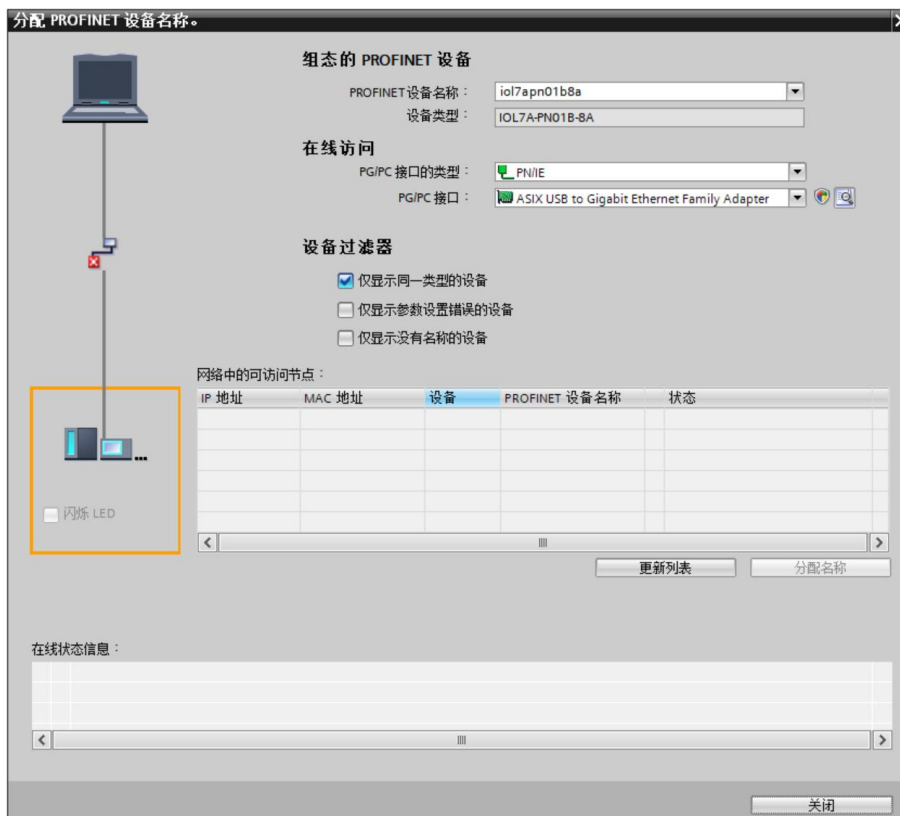


### 8. Assign device name

- a. Switch to "Network View", right-click the connection cable between the PLC and module IOL7A-PN01B-8A, and select "Assign Device Name", as shown in the figure below.



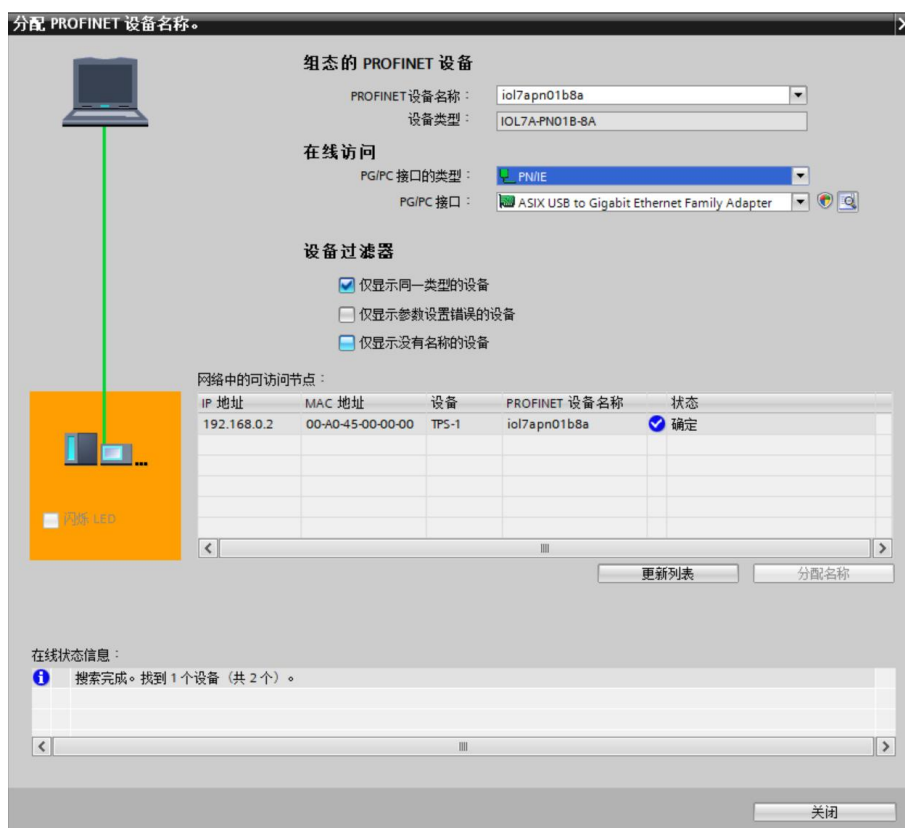
- b. A "Assign PROFINET Device Name" window will pop up, as shown in the figure below.



Check if the MAC address on the module silkscreen is the same as the MAC address of the assigned device name.


- ◆ PROFINET device name: Assign the name set in "PROFINET device name".
- ◆ PG/PC interface type: PN/IE.
- ◆ PG/PC interface: The actual network adapter used.

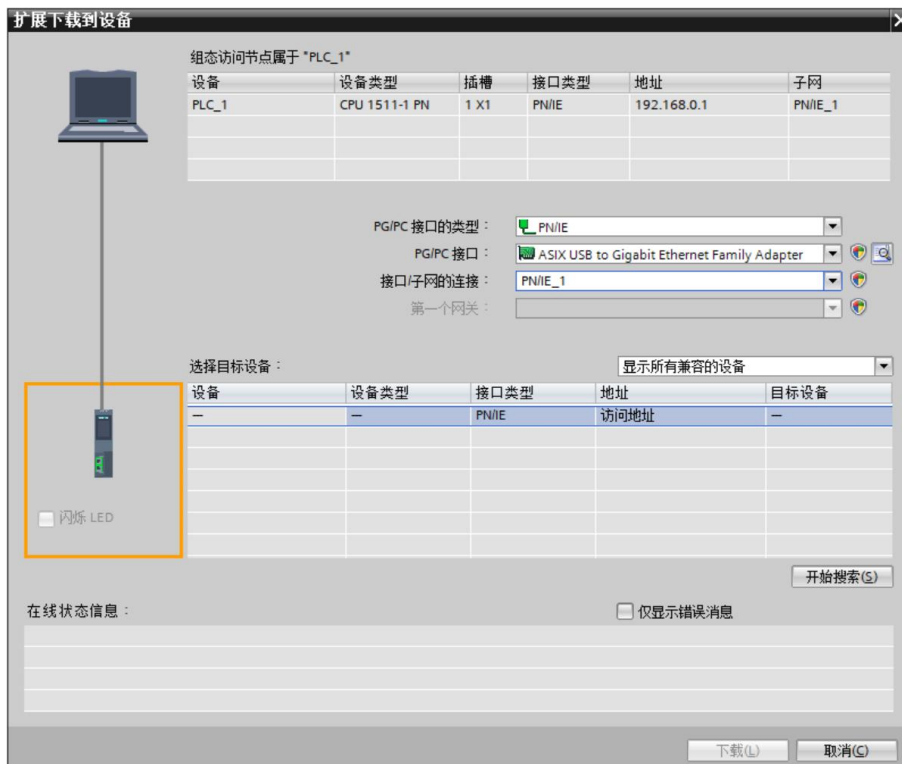
- c. Select the slave devices in sequence, click "Update List", and then click "Assign Name". Check whether the status of the node in "Accessible Nodes in the Network" is "OK", as shown in the figure below.



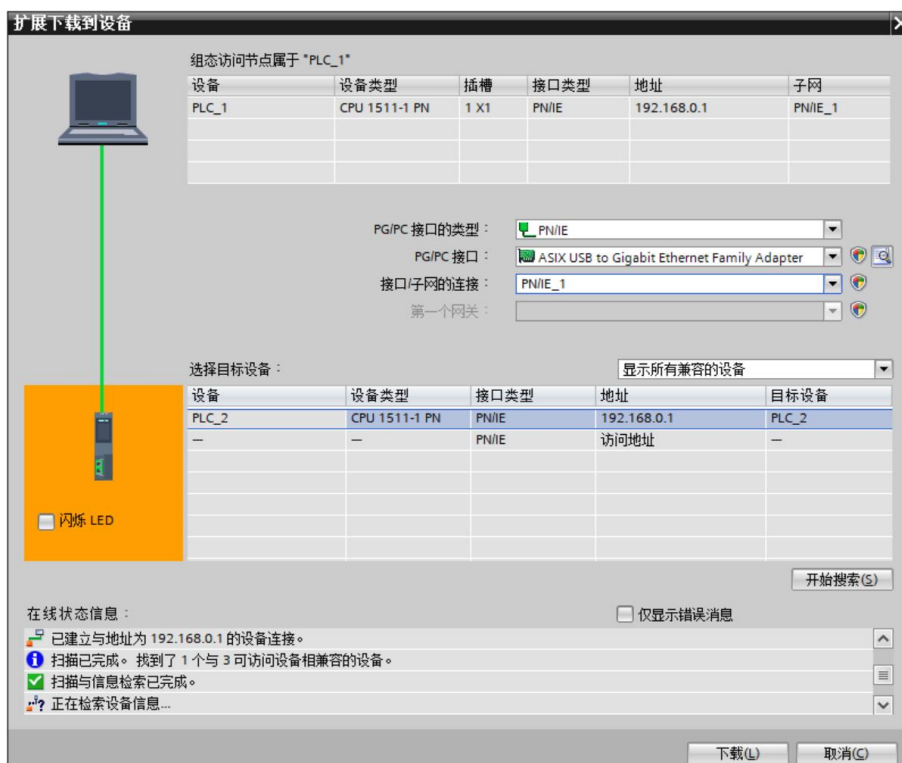
d. Click "Close".

### 9、Download configuration structure

- a. In the "Network View", select PLC.
- b. Click the  button in the menu bar to download the current configuration to the PLC.
- c. In the pop-up "Download extension to device" interface, configure as shown in the image below.



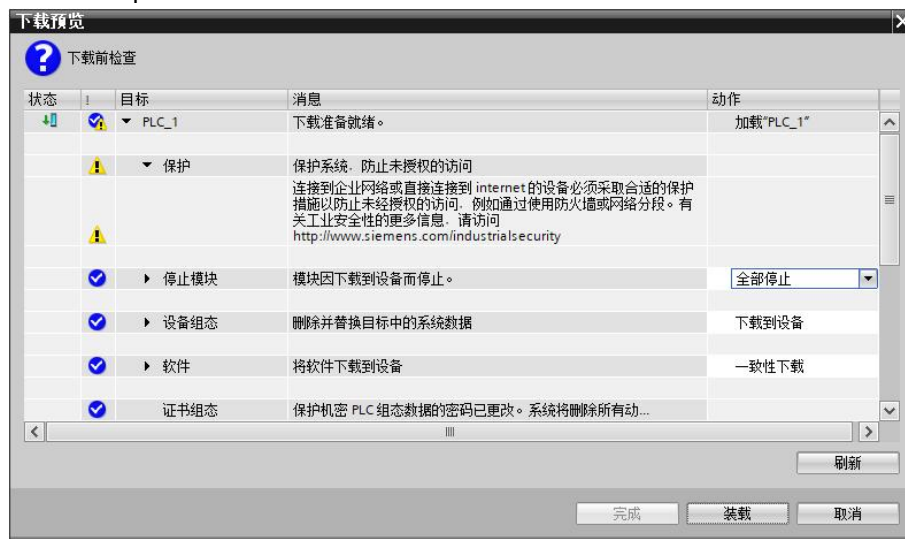
- d. Click "Start Search", as shown in the image below.



- e. Click "Download".
- f. Select "Continue without stepping", as shown in the image below.



- g. Select "Stop All".

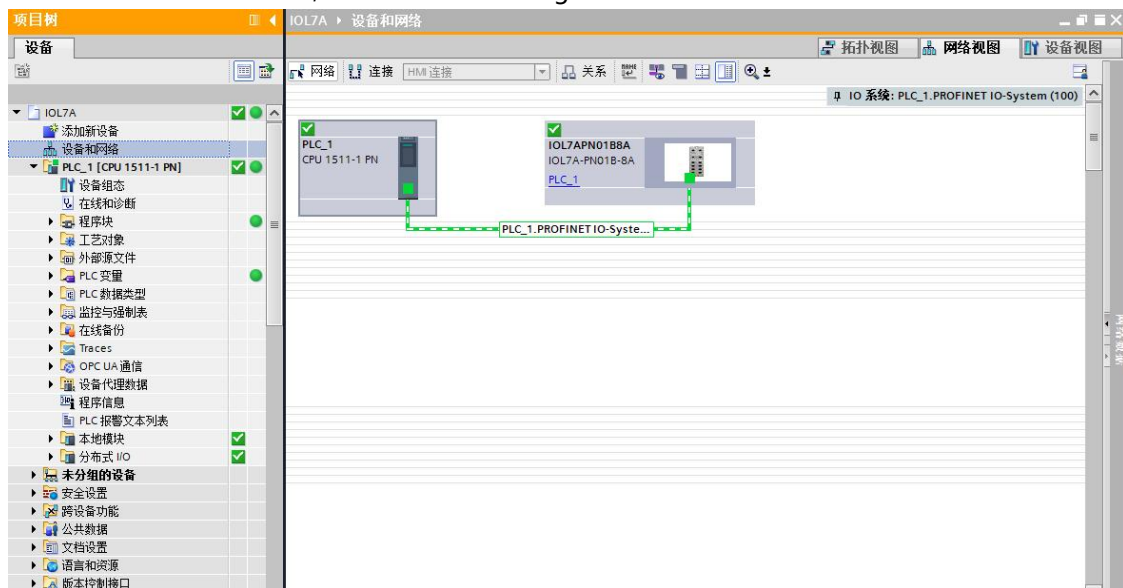


- h. Click "Load".
- i. Click "Finish".
- j. Power on the device again.

## 10、 Communication connection

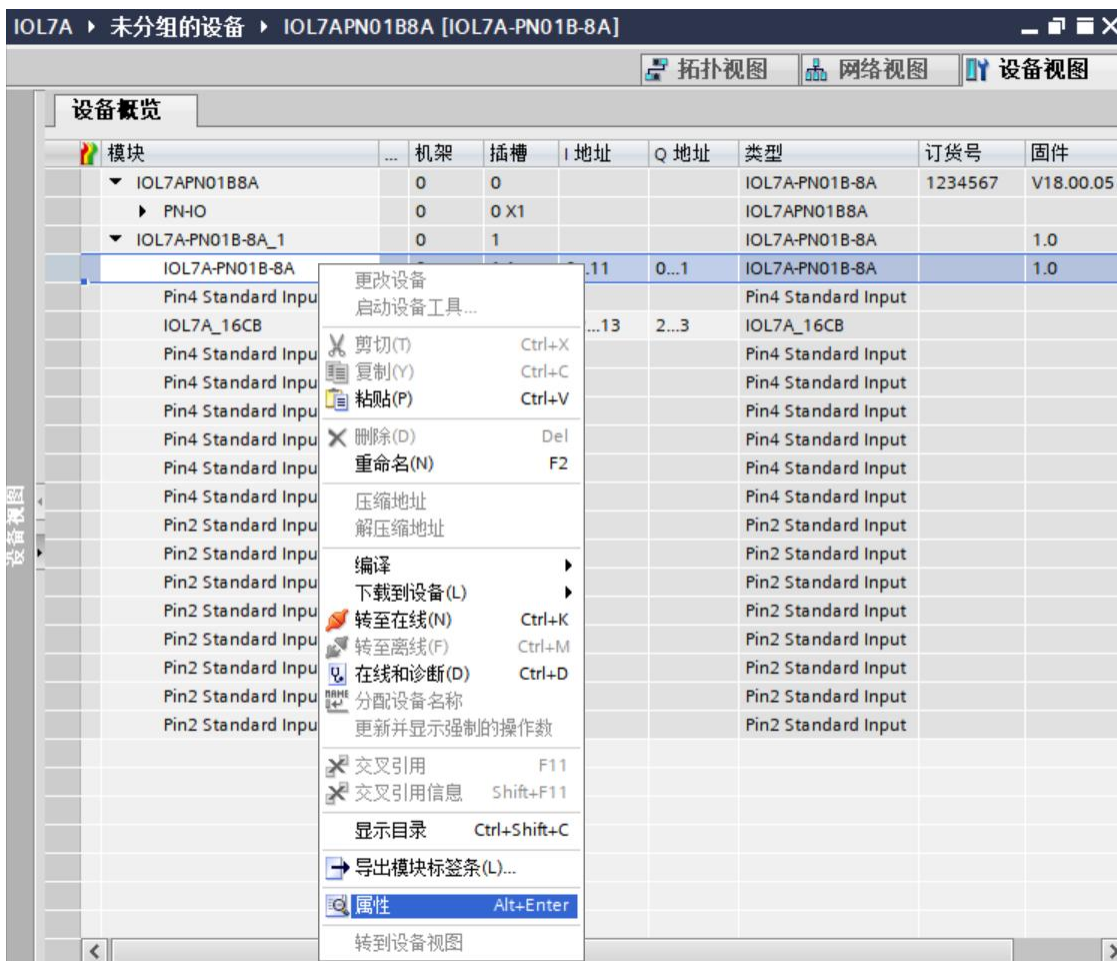


- a. Click the button, then click "Go to Online". When all icons are green, the connection is successful, as shown in the image below.

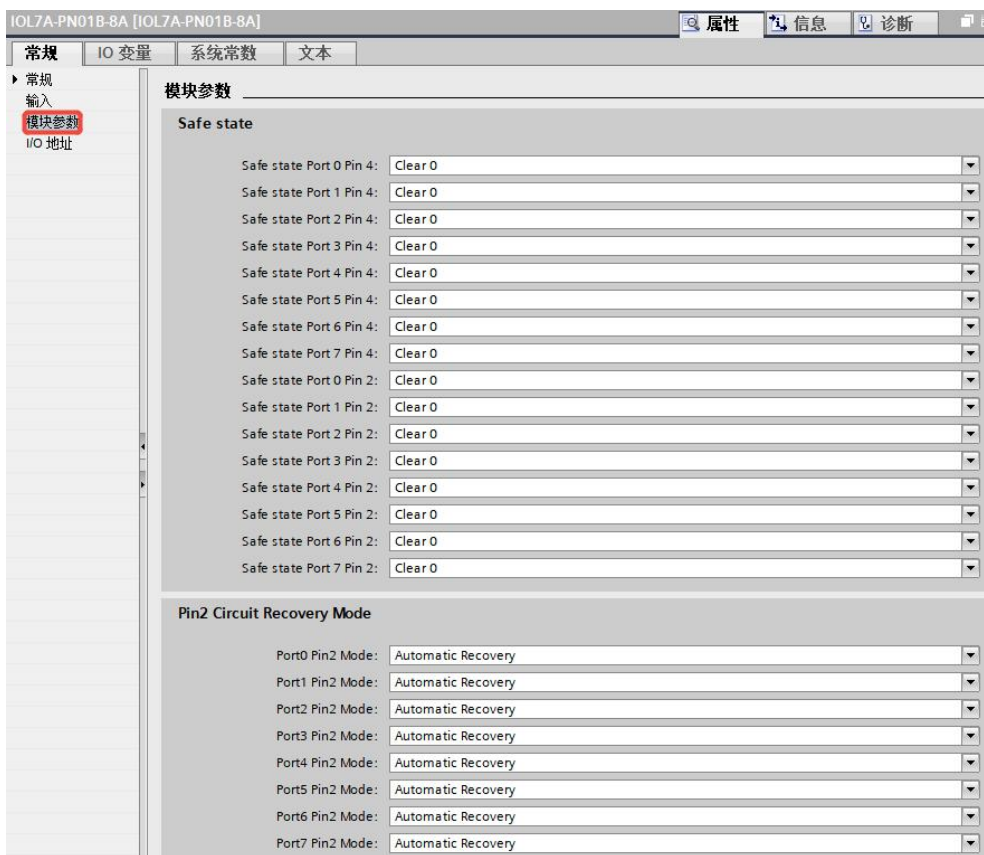


## 11、 Main site parameter configuration

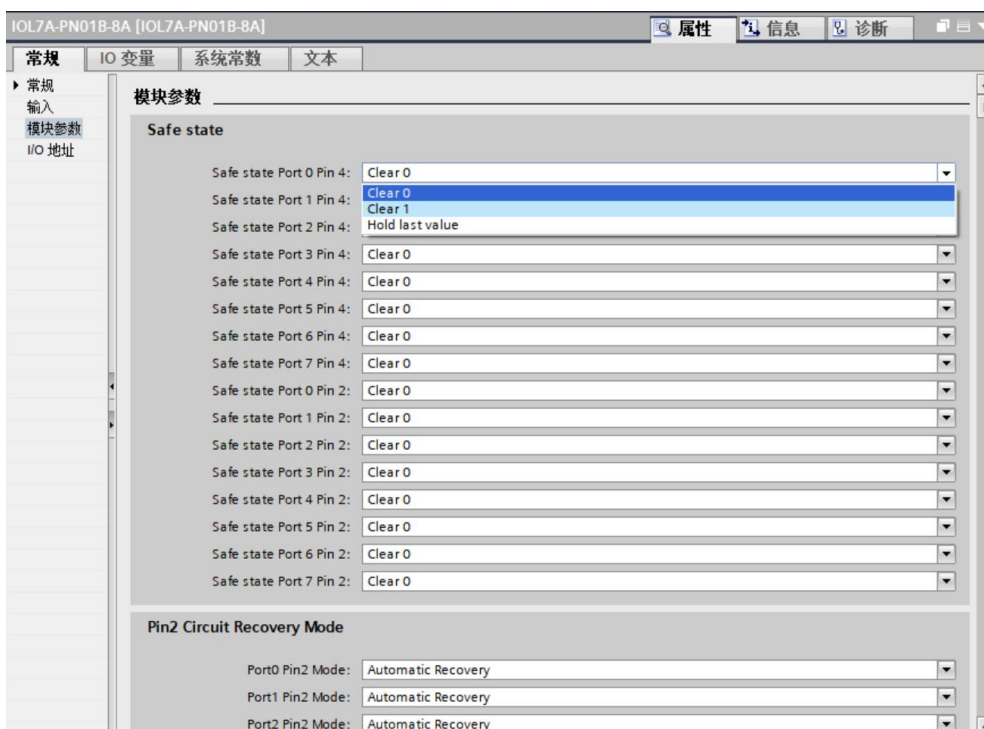
- a. Open "Device View". In offline mode, right-click the module name "IOL7A-PN01B-8A" and click "Properties", as shown in the figure below.



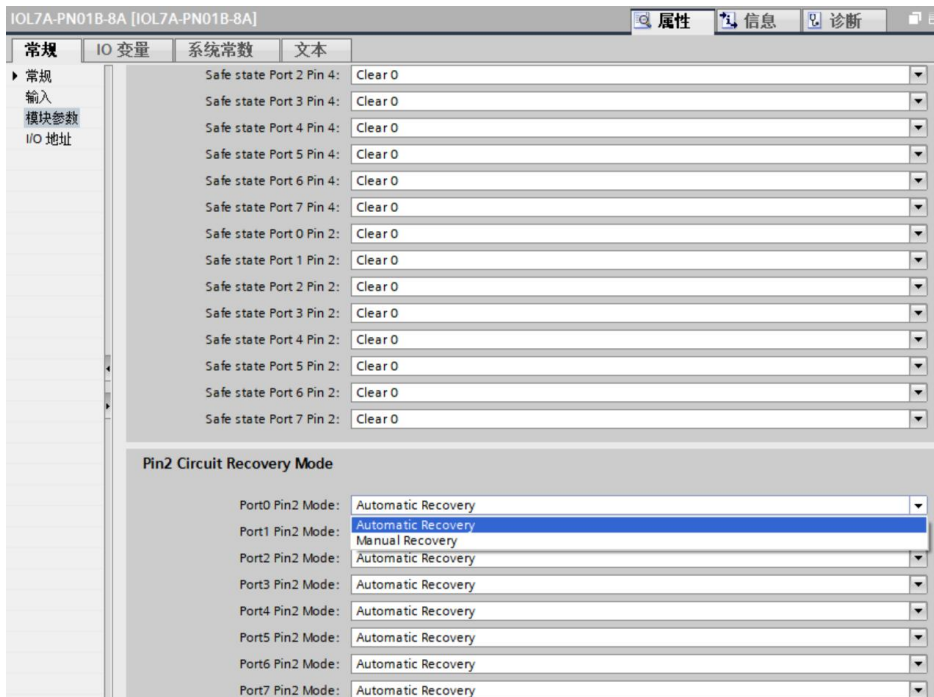
- b. On the properties page, click "Module Parameters," as shown in the image below. The parameters can be configured according to actual usage needs. After configuration, re-download the program to the PLC, and then power on both the PLC and the module.



- c. To clear the hold function settings: Taking Port 0 Pin 4 as an example, on the parameter page of module IOL7A-PN01B-8A, click the radio button to the right of "Safe state Port 0 Pin 4" to make the setting selection, as shown in the figure below. After configuration, re-download the program to the PLC, and both the PLC and the module need to be powered on again.

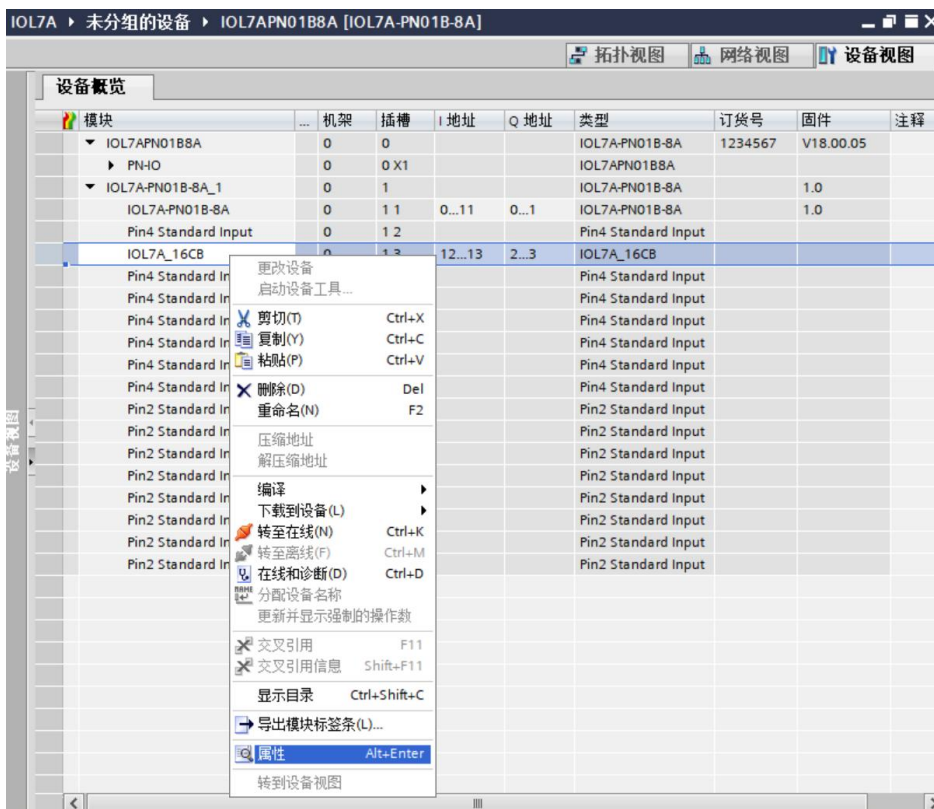


- d. Pin2 overcurrent recovery function setup method: Taking Port 0 Pin2 as an example, on the parameter page of module IOL7A-PN01B-8A, click the radio button to the right of "Port0 Pin2 Mode" in Pin2 Circuit Recovery Mode to make the setting selection, as shown in the figure below. After configuration, re-download the program to the PLC, and the PLC and module need to be powered on again.

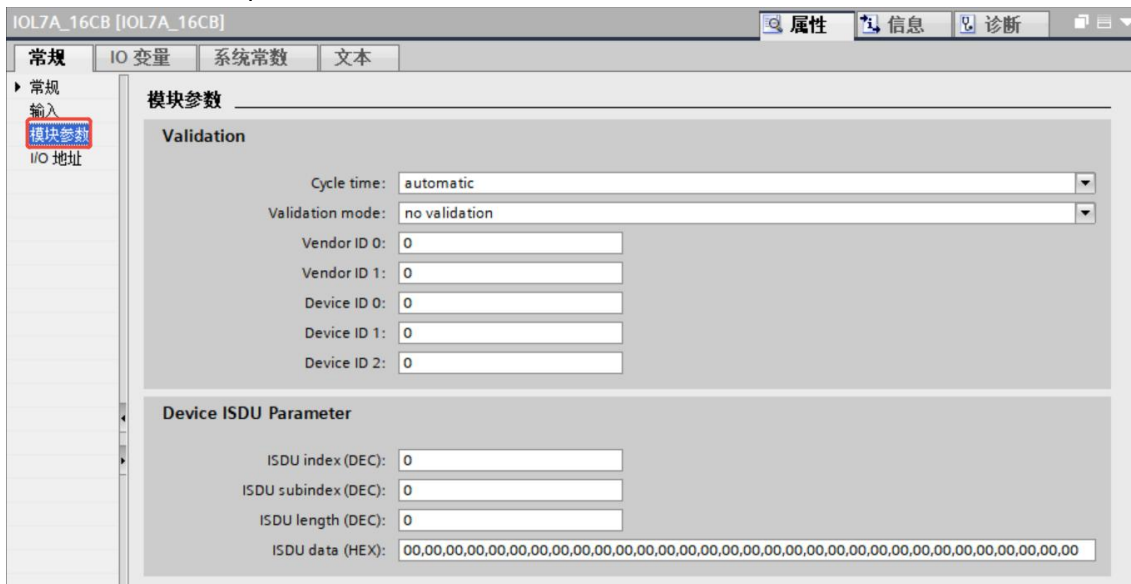


## 12. Slave ISDU parameter configuration

- a. On the "Device View" page, in offline mode, right-click the slave module name "IOL7A\_16CB" and click "Properties", as shown in the figure below.



- b. On the 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.

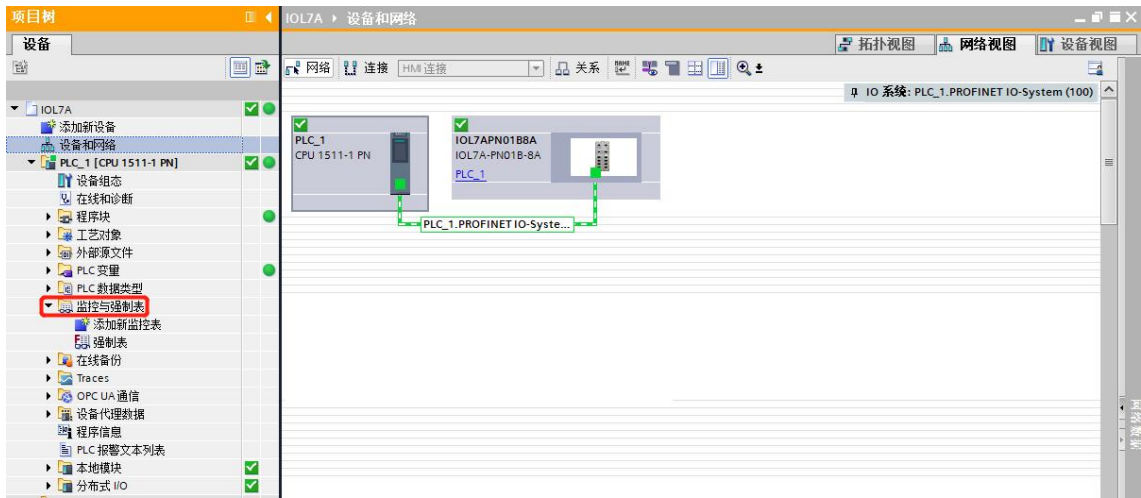


- c. Taking the configuration of the IOL7A-16CB-M12 with the first 8 channels as input and the last 8 channels as output as an example, refer to...**IOL7A Series Hub User Manual\_Vx.xx.pdf**Section 6.5.2 requires setting Index to 66 (0x0042), Subindex to 0 (0x00), Length to 2 (0x02), and Data to 00FF, as shown in the figure below. After configuration, re-download the program to the PLC, and then power on both the PLC and the module.

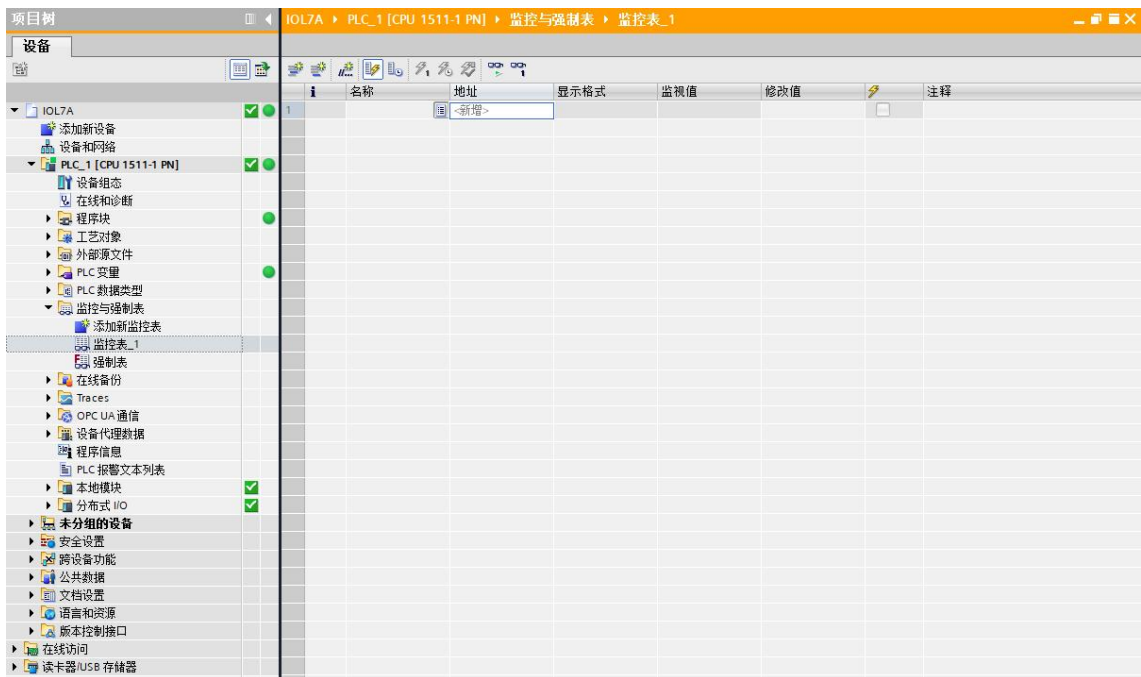


### 13、 Functional verification

- a. Expand the project navigation on the left and select "Monitoring and Enforcement Tables", as shown in the image below.



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




- c. Open "Device View" and view the channel Q address (channel address of output signal) and I address (channel address of input signal) of the master module IOL7A-PN01B-8A, and the channel Q address (channel address of output signal) and I address (channel address of input signal) of the slave module IOL7A\_16CB in the device overview.

For example, the "Q address" of the IOL7A-PN01B-8A module is 0~1 and the "I address" is 0~11; the "Q address" of the slave module IOL7A\_16CB is 2~3 and the "I address" is 12~13, 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
IOL7APN01B8A	0	0			IOL7A-PN01B-8A	1234567	V18.00.05
PN-IO	0	0 X1			IOL7APN01B8A		
IOL7A-PN01B-8A_1	0	1			IOL7A-PN01B-8A		1.0
IOL7A-PN01B-8A	0	1 1	0...11	0...1	IOL7A-PN01B-8A		1.0
Pin4 Standard Input	0	1 2			Pin4 Standard Input		
IOL7A_16CB	0	1 3	12...13	2...3	IOL7A_16CB		
Pin4 Standard Input_2	0	1 4			Pin4 Standard Input		
Pin4 Standard Input_3	0	1 5			Pin4 Standard Input		
Pin4 Standard Output	0	1 6			Pin4 Standard Outp...		
Pin4 Standard Output_1	0	1 7			Pin4 Standard Outp...		
Pin4 Standard Output_2	0	1 8			Pin4 Standard Outp...		
Pin4 Standard Output_3	0	1 9			Pin4 Standard Outp...		
Pin2 Standard Output	0	1 10			Pin2 Standard Outp...		
Pin2 Standard Output_1	0	1 11			Pin2 Standard Outp...		
Pin2 Standard Output_2	0	1 12			Pin2 Standard Outp...		
Pin2 Standard Output_3	0	1 13			Pin2 Standard Outp...		
Pin2 Standard Input_4	0	1 14			Pin2 Standard Input		
Pin2 Standard Input_5	0	1 15			Pin2 Standard Input		
Pin2 Standard Input_6	0	1 16			Pin2 Standard Input		
Pin2 Standard Input_7	0	1 17			Pin2 Standard Input		

In the master station module IOL7A-PN01B-8A, IB0 represents the monitored value of the Pin2 input signal of X00~X07, IB1 represents the monitored value of the Pin4 input signal of X00~X07, and IB2~IB11 represent the module status information. By default, all I/O interfaces of the master station module are input channels. When an interface of the master station module is configured as an output channel, QB0 represents the Pin2 output signal of X00~X07, and QB1 represents the Pin4 output signal of X00~X07.

- d. Enter the input/output channel address in the address cell of the monitoring table, press "Enter", and after completing all the fields, click [link to table].  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
1	%IB0	十六进制	16#00		X00~X07的Pin2输入信号
2	%IB1	十六进制	16#00		X00~X07的Pin4输入信号
3	%IB2	十六进制	16#03		
4	%IB3	十六进制	16#01		
5	%IB4	十六进制	16#01		
6	%IB5	十六进制	16#01		
7	%IB6	十六进制	16#02		
8	%IB7	十六进制	16#02		
9	%IB8	十六进制	16#02		
10	%IB9	十六进制	16#02		
11	%IB10	十六进制	16#00		
12	%IB11	十六进制	16#FF		
13	%QB0	十六进制	16#00		X00~X07的Pin2输出信号
14	%QB1	十六进制	16#00		X00~X07的Pin4输出信号
15	%IB12	十六进制	16#00		
16	%IB13	十六进制	16#00		
17	%QB2	十六进制	16#00		
18	%QB3	十六进制	16#00		

- e. Taking the configuration of IOL7A-16CB-M12 with the first 8 channels as inputs and the last 8 channels as outputs as an example, IB12 represents the input signal values of slave modules X00~X03, and QB3 represents the output signal values of slave modules X04~X07. Enter "FF" in the "Modify Value" cell of QB3, and click... Press the write button, and you will see the indicator lights of the 8 channels of the slave module X04~X07 light up, as shown in the figure below.

名称	地址	显示格式	监视值	修改值	注释
1	%IB0	十六进制	16#00		X00~X07的Pin2输入信号
2	%IB1	十六进制	16#00		X00~X07的Pin4输入信号
3	%IB2	十六进制	16#03		
4	%IB3	十六进制	16#01		
5	%IB4	十六进制	16#01		
6	%IB5	十六进制	16#01		
7	%IB6	十六进制	16#02		
8	%IB7	十六进制	16#02		
9	%IB8	十六进制	16#02		
10	%IB9	十六进制	16#02		
11	%IB10	十六进制	16#00		
12	%IB11	十六进制	16#FF		
13	%QB0	十六进制	16#00		X00~X07的Pin2输出信号
14	%QB1	十六进制	16#00		X00~X07的Pin4输出信号
15	%IB12	十六进制	16#00		
16	%IB13	十六进制	16#00		
17	%QB2	十六进制	16#00		
18	%QB3	十六进制	16#FF	16#FF	

- f. When the slave module X00 receives an effective voltage, the input value "16#C0" can be monitored in IB12, which is "2#11000000", as shown in the figure below.

名称	地址	显示格式	监视值	修改值		注释
1	%IB0	十六进制	16#00			X00~X07的Pin2输入信号
2	%IB1	十六进制	16#00			X00~X07的Pin4输入信号
3	%IB2	十六进制	16#03			
4	%IB3	十六进制	16#01			
5	%IB4	十六进制	16#01			
6	%IB5	十六进制	16#01			
7	%IB6	十六进制	16#02			
8	%IB7	十六进制	16#02			
9	%IB8	十六进制	16#02			
10	%IB9	十六进制	16#02			
11	%IB10	十六进制	16#00			
12	%IB11	十六进制	16#FF			
13	%QB0	十六进制	16#00			X00~X07的Pin2输出信号
14	%QB1	十六进制	16#00			X00~X07的Pin4输出信号
15	%IB12	十六进制	16#C0			
16	%IB13	十六进制	16#00			
17	%QB2	十六进制	16#00			
18	%QB3	十六进制	16#FF	16#FF		
19	<新增>					

- g. Output signal 1 at Pin2 of X00~X03 and output signal 1 at Pin4 of X04~X07 of IOL7A, i.e., input “0F” at QB0 and “F0” at QB1, then click. Press the button to write, and you will see the indicator lights for the corresponding 8 channels of the module light up, as shown in the figure below.

名称	地址	显示格式	监视值	修改值		注释
1	%IB0	十六进制	16#00			X00~X07的Pin2输入信号
2	%IB1	十六进制	16#00			X00~X07的Pin4输入信号
3	%IB2	十六进制	16#03			
4	%IB3	十六进制	16#01			
5	%IB4	十六进制	16#01			
6	%IB5	十六进制	16#01			
7	%IB6	十六进制	16#02			
8	%IB7	十六进制	16#02			
9	%IB8	十六进制	16#02			
10	%IB9	十六进制	16#02			
11	%IB10	十六进制	16#00			
12	%IB11	十六进制	16#FF			
13	%QB0	十六进制	16#0F	16#0F	<input checked="" type="checkbox"/>	X00~X07的Pin2输出信号
14	%QB1	十六进制	16#F0	16#F0	<input checked="" type="checkbox"/>	X00~X07的Pin4输出信号
15	%IB12	十六进制	16#00			
16	%IB13	十六进制	16#00			
17	%QB2	十六进制	16#00			
18	%QB3	十六进制	16#FF	16#FF	<input checked="" type="checkbox"/>	
19	<新增>					

- h. When a valid signal is input to Pin2 of X04~X07 and Pin4 of X01~X03 of IOL7A-PN01B-8A, the input value “16#F0” (which is “2#11110000” ) can be monitored in IB0, and the input value “16#0E” (which is “2#00001110” ) can be monitored in IB1, as shown in the figure below.

IOL7A ▶ PLC\_1 [CPU 1511-1 PN] ▶ 监控与强制表 ▶ 监控表\_1

	名称	地址	显示格式	监视值	修改值		注释
1		%IB0	十六进制	16#F0		<input type="checkbox"/>	X00~X07的Pin2输入信号
2		%IB1	十六进制	16#0E		<input type="checkbox"/>	X00~X07的Pin4输入信号
3		%IB2	十六进制	16#03		<input type="checkbox"/>	
4		%IB3	十六进制	16#01		<input type="checkbox"/>	
5		%IB4	十六进制	16#01		<input type="checkbox"/>	
6		%IB5	十六进制	16#01		<input type="checkbox"/>	
7		%IB6	十六进制	16#02		<input type="checkbox"/>	
8		%IB7	十六进制	16#02		<input type="checkbox"/>	
9		%IB8	十六进制	16#02		<input type="checkbox"/>	
10		%IB9	十六进制	16#02		<input type="checkbox"/>	
11		%IB10	十六进制	16#00		<input type="checkbox"/>	
12		%IB11	十六进制	16#FF		<input type="checkbox"/>	
13		%QB0	十六进制	16#0F	16#0F	<input checked="" type="checkbox"/> !	X00~X07的Pin2输出信号
14		%QB1	十六进制	16#F0	16#F0	<input checked="" type="checkbox"/> !	X00~X07的Pin4输出信号
15		%IB12	十六进制	16#00		<input type="checkbox"/>	
16		%IB13	十六进制	16#00		<input type="checkbox"/>	
17		%QB2	十六进制	16#00		<input type="checkbox"/>	
18		%QB3	十六进制	16#FF	16#FF	<input checked="" type="checkbox"/> !	
19		<新增>				<input type="checkbox"/>	

## 7.3 Custom data length module

[Appendix A](#) Different protocol master stations define process data modules with different byte lengths. These modules generally meet the interfacing needs of mainstream slave devices in the market. However, in actual use, there are still instances where the process data length used by some slave devices cannot match that of the modules. For example, a slave device may have an input process data length of 16 bytes and an output process data length of 32 bytes. Using an input process data length of 32 bytes and an output process data length of 32 bytes is compatible, or the process data length can be customized. This section describes how to customize the process data length.

### 7.3.1 PROFINET Master Custom Module

In the PROFINET master station device configuration file, "module" is called a submodule. To add a custom submodule, you can obtain information such as the submodule ID and process data length from the submodule product manual, modify the configuration file, and update the host computer GSD file.

#### Precautions

- 
- If you are unsure how to implement a custom data length module or modify the configuration file, please consult technical support first and do not attempt any actions without authorization.
-

# 8 FAQ

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## 8.1 When updating accessible devices, no device can be found.

1. Confirm that the TIA Portal software is installed correctly.
2. Confirm that no other software is using the network adapter used by the TIA Portal software.
3. Confirm that the network cable, network card, and network port are working properly.
4. Check for IP address or MAC address conflicts.

## 8.2 The load button is grayed out when downloading configuration.

1. Confirm that there are no forced values in the PLC.
2. Confirm that the PLC is in a stopped state.

# 9 Appendix

## 9.1 Appendix A

The IOL7A series PROFINET master station configuration file defines modules for different byte lengths of input process data, output process data, and combined input/output process data, as listed in the table below:

<b>name</b>	<b>describe</b>
Std Input	Standard Input
Std Output	Standard output
IOL_I_01 Byte	InputProcess data length 1 byte
IOL_I_02 Byte	InputProcess data length 2 bytes
IOL_I_04 Byte	InputProcess data length 4 bytes
IOL_I_06 Byte	InputProcess data length 6 bytes
IOL_I_08 Byte	InputProcess data length 8 bytes
IOL_I_10 Byte	InputProcess data length 10 bytes
IOL_I_16 Byte	InputProcess data length 16 bytes
IOL_I_24 Byte	InputProcess data length 24 bytes
IOL_I_32 Byte	InputProcess data length 32 bytes
IOL_O_01 Byte	OutputProcess data length 1 byte
IOL_O_02 Byte	OutputProcess data length 2 bytes
IOL_O_04 Byte	OutputProcess data length 4 bytes
IOL_O_06 Byte	OutputProcess data length 6 bytes
IOL_O_08 Byte	OutputProcess data length 8 bytes
IOL_O_10 Byte	OutputProcess data length 10 bytes
IOL_O_16 Byte	OutputProcess data length 16 bytes
IOL_O_24 Byte	OutputProcess data length 24 bytes
IOL_O_32 Byte	OutputProcess data length 32 bytes
IOL_I/O_01/01 Byte	InputProcess data length 1 byte, output process data length 1 byte
IOL_I/O_02/02 Byte	InputProcess data length 2 bytes, output process data length 2 bytes
IOL_I/O_02/04 Byte	InputProcess data length 2 bytes, output process data length 4 bytes

IOL_I/O_02/08 Byte	InputProcess data length 2 bytes, output process data length 8 bytes
IOL_I/O_04/02 Byte	InputProcess data length 4 bytes, output process data length 2 bytes
IOL_I/O_04/04 Byte	InputProcess data length 4 bytes, output process data length 4 bytes
IOL_I/O_04/08 Byte	InputProcess data length 4 bytes, output process data length 8 bytes
IOL_I/O_04/16 Byte	InputProcess data length is 4 bytes, and the output process data length is 16 bytes.
IOL_I/O_04/32 Byte	InputProcess data length is 4 bytes, and the output process data length is 32 bytes.
IOL_I/O_08/02 Byte	InputProcess data length 8 bytes, output process data length 2 bytes
IOL_I/O_08/04 Byte	InputProcess data length is 8 bytes, and the output process data length is 4 bytes.
IOL_I/O_08/08 Byte	InputProcess data length 8 bytes, output process data length 8 bytes
IOL_I/O_10/10 Byte	InputProcess data length 10 bytes, output process data length 10 bytes
IOL_I/O_16/04 Byte	InputProcess data length is 16 bytes, and the output process data length is 4 bytes.
IOL_I/O_16/16 Byte	InputProcess data length 16 bytes, output process data length 16 bytes
IOL_I/O_24/24 Byte	InputProcess data length 24 bytes, output process data length 24 bytes
IOL_I/O_32/04 Byte	InputProcess data length is 32 bytes, and the output process data length is 4 bytes.
IOL_I/O_32/32 Byte	InputProcess data length 32 bytes, output process data length 32 bytes

## 9.2 Appendix B

The IO-Link port status is represented by 1 byte, where Bits 0...3 indicate the IO-Link port status and Bits 4...7 indicate IO-Link port error messages.

**Bit0...3 is defined as follows:**

Value (DEC)	describe
0	Port not activated
1	The port is in input mode.
2	The port is in output mode.
3	The port is in IO-Link mode and communication is normal.
4	The port is in IO-Link mode, and communication is abnormal.

**Bit4...7 is defined as follows:**

Value (DEC)	describe
0	No errors
1	Watchdog Abnormal
2	Cache overflow
3	Invalid device ID
4	Invalid vendor ID
5	Invalid IO-Link version
6	Invalid frame capability
7	Ineffective cycle time
8	Invalid input process data length
9	Invalid output process data length
10	No device detected
11	PreOP status error

For example: If a port is configured in IO-Link mode but no slave device is actually connected, the status will be 0xA4. If a port is configured in IO-Link mode but the input data length does not match, the status will be 0x84.

The IO-Link master status is represented by 1 byte, as defined below:

Value (DEC)	describe
0	No errors
1	undervoltage
2	overvoltage
3	Overcurrent, overload
4...255	reserve

## 9.3 Appendix C

The 1-byte process data length defined in the IO-Link standard has different meanings represented by different bits. See Appendix B.1.6 of "IOL-Interface-Spec\_10002\_V113\_Jun19.pdf".

Bit	describe
0...4	length
5	reserve
6	Does it support standard input or standard output mode?
7	The byte flag bit, when set, indicates a data length of 0...4 plus 1; when not set, the length value of 0...4 represents the bit length.

Ignoring Bit6, the simple correspondence between its value and the length of the process data is as follows:

byte	describe
0x01	The process data length is 1 bit, typically used for standard input or standard output.
0x08	Process data length 1 byte
0x10	Process data length 2 bytes
0x18	Process data length 3 bytes
0x83	Process data length 4 bytes
0x84	Process data length 5 bytes
0x85	Process data length 6 bytes
0x86	Process data length 7 bytes
0x87	Process data length 8 bytes
0x88	Process data length 9 bytes
0x89	Process data length 10 bytes
0x8A	Process data length 11 bytes
0x8B	Process data length 12 bytes
0x8C	Process data length 13 bytes
0x8D	Process data length 14 bytes
0x8E	Process data length 15 bytes
0x8F	Process data length 16 bytes
0x90	Process data length 17 bytes
0x91	Process data length 18 bytes
0x92	Process data length 19 bytes
0x93	Process data length 20 bytes
0x94	Process data length 21 bytes
0x95	Process data length 22 bytes
0x96	Process data length 23 bytes
0x97	Process data length 24 bytes
0x98	Process data length 25 bytes
0x99	Process data length 26 bytes
0x9A	Process data length 27 bytes

0x9B	Process data length 28 bytes
0x9C	Process data length 29 bytes
0x9D	Process data length 30 bytes
0x9E	Process data length 31 bytes
0x9F	Process data length 32 bytes

## 9.4 Appendix D

The slave ISDU may return an error, and the error codes are defined as follows. Please refer to Appendix C ErrorTypes of "IOL-Interface-Spec\_10002\_V113\_Jun19.pdf".

<b>Error code</b>	<b>describe</b>
0x8000	Device application layer error
0x8011	Unreachable index
0x8012	Unreachable sub-index
0x8020	Service temporarily unavailable
0x8021	Local control services are temporarily unavailable.
0x8022	Equipment control services are temporarily unavailable.
0x8023	Permission error
0x8030	Parameters out of range
0x8031	Parameter exceeds limit value
0x8032	Parameters below the limit
0x8033	The parameter length is too long
0x8034	Insufficient parameter length
0x8035	Function unavailable
0x8036	Functionality temporarily unavailable
0x8040	Invalid parameter set
0x8041	Inconsistent parameter sets
0x8082	Application not ready
0x81xx	Manufacturer Customization