



Chongqing Longway Control System Co.,Ltd.



LW Series PROFINET Integrated I/O and Gateway Module User Manual V1.2

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Loway literature

Revision History

V1.0 – Initial release (Mar. 28, 2023)

V1.1 – Removed standard 24V ext. power supply terminal function from all-in-one I/O & gateways; merged manuals (Sep. 9, 2023). Note: Power terminal function equivalent to 24V power module.

V1.2 – Updated DI module wiring diagrams (Jan. 2, 2024)

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Disclaimer

The contents of this document have been reviewed and are believed to accurately reflect the described software and hardware. Nevertheless, minor discrepancies may occur, and thus complete accuracy cannot be warranted. This documentation is regularly reviewed and updated in later editions. We welcome your comments and suggestions for improvement.

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Safety Information

This manual contains safety instructions that must be observed during operation to ensure personal safety and to protect the product and connected equipment from damage. These instructions are highlighted by a triangular warning symbol preceding the text. They are classified into the following categories according to the degree of hazard:



DANGER:

Indicates an imminently hazardous situation. Failure to avoid will result in death, serious personal injury, or major property damage.



WARNING:

Indicates a potentially hazardous situation. Failure to avoid could result in death, serious personal injury, or major property damage.



CAUTION:

Used in conjunction with the safety alert symbol, indicates a potentially hazardous situation. Failure to avoid could result in minor or moderate personal injury or property damage.

NOTICE:

Used without the safety alert symbol, indicates a potentially hazardous situation. Failure to avoid could result in property damage.

NOTE:

Indicates important information related to the product or content that requires special attention within the document.

Qualified Personnel

Only qualified personnel are permitted to install, commission, and operate the system. In the context of this manual, "qualified personnel" refers to individuals who are authorized and, based on the relevant safety regulations and requirements, are competent to perform installation, commissioning, grounding, and labeling of equipment, systems, and circuits.

Scope of Application Please note the following:



WARNING:

This device shall be used exclusively in the applications specified in the catalog or technical documentation. It may be used in conjunction with equipment, components, and devices manufactured by other companies only upon the recommendation or with the express permission of our company.

To ensure product safety and reliability, the product must be transported, stored, and installed in accordance with the applicable requirements, and must be operated with due care and maintained thoroughly.

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1 System Overview

The LW Series Profinet protocol all-in-one I/O module is a bus-universal remote I/O module independently developed by Chongqing Longway Networked Intelligent Control System Co., Ltd. It is designed to reduce costs for users, simplify wiring, and improve system reliability.

Product Composition

The LW Series all-in-one remote I/O modules adopt a building-block approach for module combination. Each complete module set consists of one communication board, with the option to configure up to two I/O boards. For standard modules, our company offers pre-assembled complete models. For customers requiring special combinations, we can provide customized models upon request. Customized models must be coordinated with our company in advance. Models that have not been confirmed with us prior to ordering may result in extended delivery lead times.

1.1 Communication Board Model

Communication Board Model	Bus Protocol	Remarks
LW-IO-001	Profinet	The communication board model is an auxiliary module identifier for module configuration reference only. It is not sold separately as an ordering code. One protocol must be selected.
LW-IO-002	EtherCAT	
LW-IO-003	ModbusTCP	

1.2 I/O Board / Power Board Selection

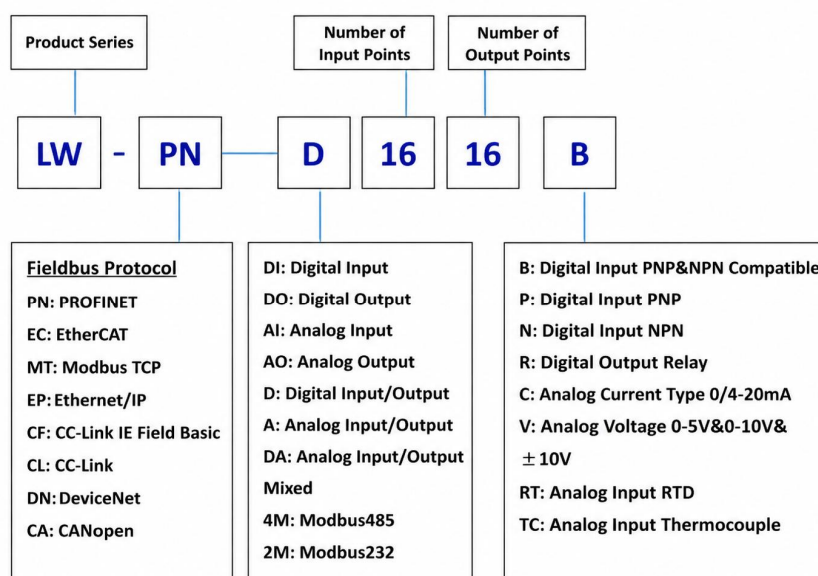
I/O Board Model	Module Type	Remarks
LW-1016	16-point digital input (PNP & NPN)	I/O board models are auxiliary module identifiers for module configuration reference only. They are not sold separately as ordering codes. A complete module can accommodate up to two communication boards, and each model of communication board can be used up to twice to form one
LW-2016	16-point digital output (PNP) 0.5A	
LW-2116	16-point digital output (NPN) 0.5A	
LW-2012	12-point digital output (PNP) 4A	
LW-2205	5-point relay output	
LW-3305	5-point analog input RTD	
LW-3408	8-point analog input TC	
LW-3008	8-point analog input 0-10V & $\pm 10V$	
LW-3108	8-point analog input 0/4-20mA	
LW-4008	8-point analog output 0-10V & $\pm 10V$	
LW-4108	8-point analog output 0/4-20mA	
LW-1288P	8DI PNP&NPN+8DO PNP	
LW-1288P4	8DI PNP&NPN+8DO PNP+485*1	

LW-1288N	8DI PNP&NPN+8DO NPN	complete module.
LW-3473V	7AI+3AO 0-10V&±10V	
LW-3444C	4AI+4AO 0/4-20mA	
LW-3444V	4AI+4AO 0-10V&±10V	
LW-5403	3-channel Modbus RTU master communication board	
LW-5406	6-channel Modbus RTU master communication board	

1.3 Example of Complete I/O Module Ordering Model Combinations

Communication Board Model (Select One)	I/O Board (Two or One Optional; Same Model May Be Selected Twice)	Complete Model	Product Description
LW-IO-001	LW1016/ LW2016 各一只	LW-PN-DI1616P	Profinet protocol: 16DI (PNP & NPN) + 16DO PNP
LW-IO-002	LW1016 一只	LW-EC-DI160B	EtherCAT protocol: 16DI (PNP & NPN)
LW-IO-003	LW1016/ LW3008 各一只	LW-MT-DA1680BV	Modbus TCP protocol: 16DI (PNP & NPN) + 8AI (0-5V & 0-10V & ±10V)

1.4 Complete I/O Module Naming Convention



1.5 Standard Ordering Codes for Complete I/O Modules

No.	Model	Description
1	LW-PN-DI16B	16DI PNP/NPN
2	LW-PN-DI32B	32DI PNP/NPN
3	LW-PN-DI64B	64DI PNP/NPN
4	LW-PN-DO16P	16DO PNP 0.5A
5	LW-PN-DO16N	16DO NPN 0.5A
6	LW-PN-DO05R	5DO RLY
7	LW-PN-DO10R	10DO RLY
8	LW-PN-DO24P	24DO PNP 4A (Direct solenoid valve drive)
9	LW-PN-DO32P	32DO PNP 0.5A
10	LW-PN-DO32N	32DO NPN 0.5A
11	LW-PN-DO64P	64DO PNP 0.5A
12	LW-PN-DO64N	64DO NPN 0.5A
13	LW-PN-D88BP	8DI PNP/NPN+8DO PNP 0.5A
14	LW-PN-D88BN	8DI PNP/NPN+8DO NPN 0.5A
15	LW-PN-D1616BP	16DI PNP/NPN+16DO PNP 0.5A
16	LW-PN-D1616BN	16DI PNP/NPN+16DO NPN 0.5A
17	LW-PN-D3232BP	32DI PNP/NPN+32DO PNP 0.5A
18	LW-PN-D3232BN	32DI PNP/NPN+32DO NPN 0.5A
19	LW-PN-AI08C	8AI Current 0/4–20mA
20	LW-PN-AI08V	8AI Voltage 0–10V / $\pm 10V$
21	LW-PN-AI16C	16AI Current 0/4–20mA
22	LW-PN-AI16V	16AI Voltage 0–10V / $\pm 10V$
23	LW-PN-AO08C	8AO Current 0/4–20mA
24	LW-PN-AO08V	8AO Voltage 0–10V / $\pm 10V$
25	LW-PN-AO16C	16AO Current 0/4–20mA
26	LW-PN-AO16V	16AO Voltage 0–10V / $\pm 10V$
27	LW-PN-A44C	4AI + 4AO Current 0/4–20mA
28	LW-PN-A44V	4AI + 4AO Voltage 0–10V / $\pm 10V$
29	LW-PN-A88C	8AI + 8AO Current 0/4–20mA
30	LW-PN-A88V	8AI + 8AO Voltage 0–10V / $\pm 10V$
31	LW-PN-05RT	5AI RTD (Resistance Temperature Detector)
32	LW-PN-10RT	10AI RTD (Resistance Temperature Detector)
33	LW-PN-08TC	8AI TC (Thermocouple)
34	LW-PN-16TC	16AI TC (Thermocouple)
35	LW-PN-DA8844PC	8DI PNP/NPN+8DO PNP, 4AI+4AO 0/4-20mA
36	LW-PN-DA8844PV	8DI PNP/NPN+8DO PNP, 4AI+4AO 0-10V/ $\pm 10V$
37	LW-PN-DA8844NC	8DI PNP/NPN+8DO NPN, 4AI+4AO 0/4-20mA
38	LW-PN-DA8844NV	8DI PNP/NPN+8DO NPN, 4AI+4AO 0-10V/ $\pm 10V$

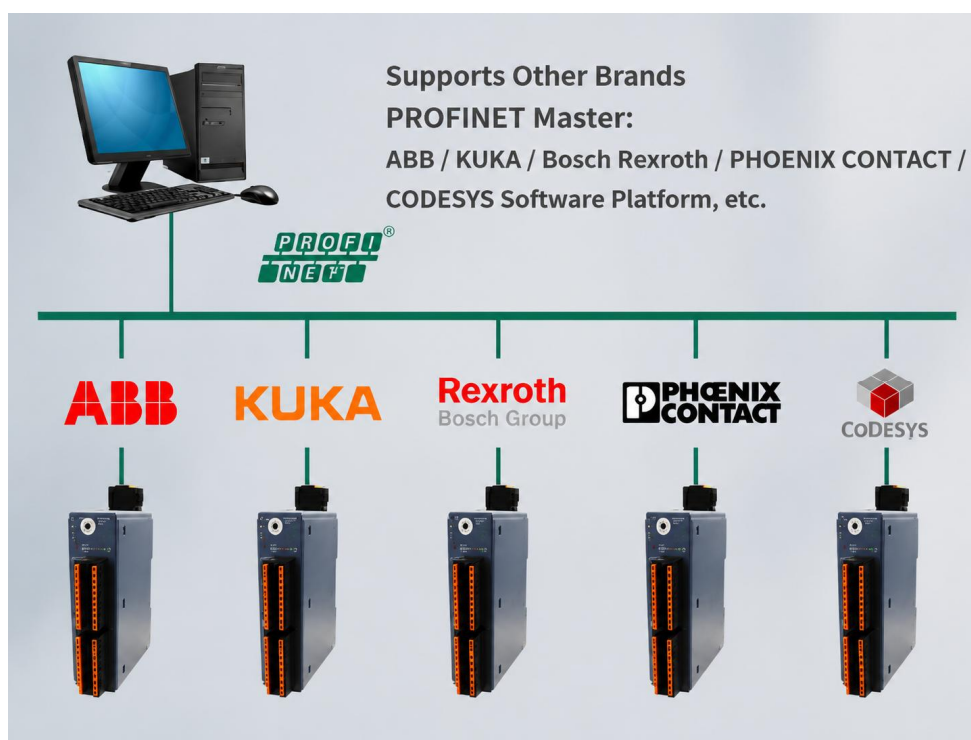
39	LW-PN-4MB3	3-Channel RS485 to PROFINET Gateway
40	LW-PN-4MB6	6-Channel RS485 to PROFINET Gateway
41	LW-PN-4MB12	12-Channel RS485 to PROFINET Gateway

1.6 System Architecture

The LW-PN series all-in-one I/O modules support the Profinet industrial bus and are compatible with Siemens PLC application architectures. The system architecture is illustrated in the figure below:



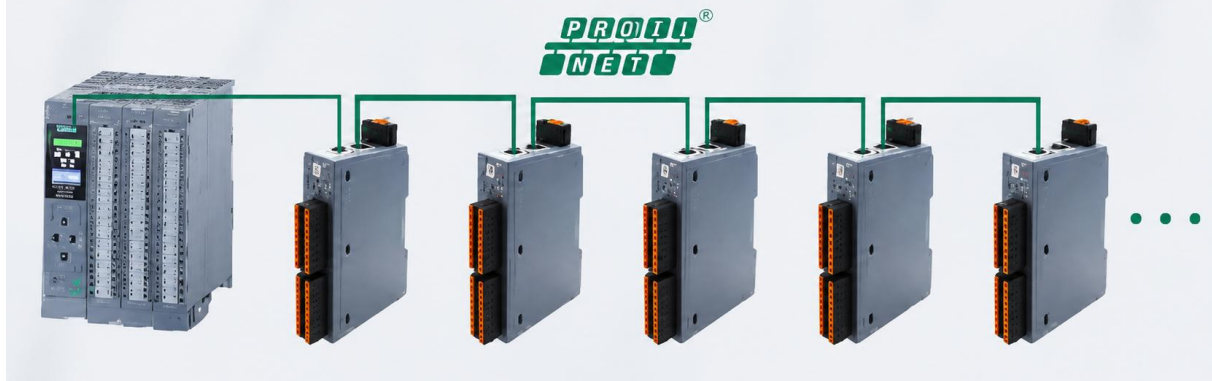
In addition to Siemens, the modules also support other Profinet masters, such as Bosch Rexroth, Phoenix Contact, CODESYS, KUKA robots, ABB robots, etc.



The communication bus protocol adopts the standard PROFINET bus, enabling seamless connectivity with corresponding controllers. The communication interface features two RJ45 100 Mbps Ethernet ports with an integrated internal switch function, eliminating the need for an external switch and allowing easy daisy-chaining of multiple slave stations.

Dual Ethernet Ports for Module Networking, Enabling Advanced Networking Functions

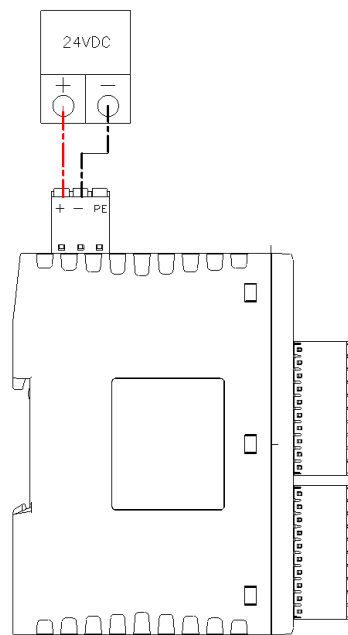
Each module is equipped with 2 RJ45 ports, enabling advanced networking.
Different master stations can expand different numbers of slave stations.
For detailed module parameters, please refer to the module specifications.



2 Wiring

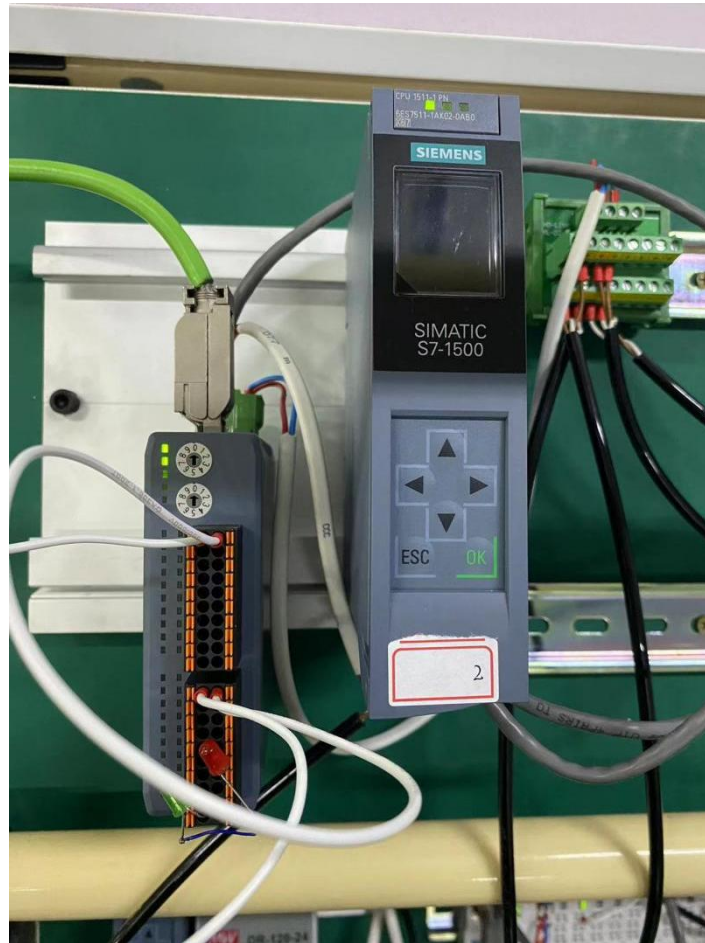
2.1 Power Supply Wiring

NOTE: The power supply wire shall be cut to an appropriate length so that no bare conductor is visible after termination.



2.2 Wiring to the Controller

For wiring to the PROFINET master, it is recommended to use Longway Automation's PROFINET dedicated connectors and cables. Standard RJ45 Ethernet cables may also be used. The module is equipped with two Ethernet ports with built-in switch functionality. Simply connect one end of the Ethernet cable to the CPU and the other end to either Ethernet port on the I/O module. The physical wiring diagram is shown below:



2.3 Signal Wiring

The terminal blocks of the LW-PN series all-in-one I/O modules feature a tool-less (spring-cage) connection design. Operation requires only a flat-blade screwdriver. Cables of 14 AWG are recommended. To terminate a wire, first strip the insulation to an appropriate length, then press down the orange actuating lever with the screwdriver, insert the stripped wire into the opened round hole, and release the screwdriver. The wire will be automatically clamped by the spring contact.

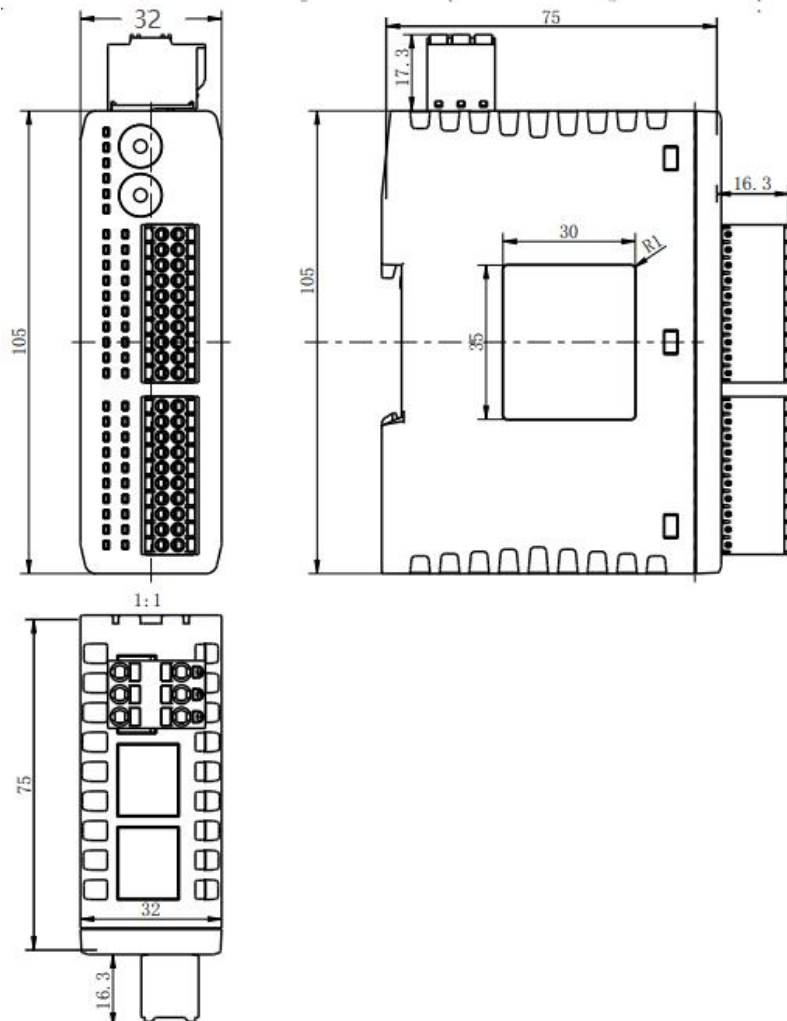
Signal wires should not be overly thick; it is recommended to use wires with a cross-section of 0.75 mm² or less.

The recommended stripping length is 10 mm. A stripping length of less than 9 mm may result in improper clamping of the signal wire.

NOTE: Ensure that the polarity of the power supply is not reversed, as doing so may cause the module to malfunction or become damaged. Do not insert or remove modules or signal wires while the system is powered on.

3 Installation, Removal and Dimensions

The LW series all-in-one remote I/O modules feature a DIN-rail mounting design and can be easily installed onto a standard 35 mm DIN rail. The terminal blocks are designed with tool-less (spring-cage) connection technology, which significantly reduces installation and wiring effort while improving connection reliability. All terminal blocks are pluggable, allowing modules to be replaced without rewiring—simply detach the terminal block and reattach it to the replacement module.



3.1 Module Installation

Hang the module onto the upper edge of the DIN rail and position it properly on the rail. Then press firmly on the lower section of the module to snap it securely onto the DIN rail.

3.2 Removal

3.2.1 First, unplug all terminal blocks from the module. Then insert a flat-blade screwdriver into the DIN-rail retaining clip, pry it gently, and lift the module off the rail.

3.2.2 The module features pluggable terminal blocks. If only the module needs to be replaced, simply unplug the terminal blocks, insert the screwdriver into the DIN-rail retaining clip, and remove the module.

4 Module Description

4.1 PROFINET Interface and General Parameters

4.1.1 Parameter Specifications

Parameter	PROFINET Interface
Interface Parameters	
Supported Slave Stations	Depends on the master station (Siemens SMART 200 supports up to 8 extensions, S7-1200 supports up to 16 extensions, S7-1500 supports up to 128 extensions). Also supports other PROFINET masters such as Bosch Rexroth, Phoenix Contact, CODESYS, KUKA robots, ABB robots, etc
Data Transmission Medium	Ethernet CAT5 cable
Connection Method	2*RJ45
Transmission Rate	100Mb/s
Transmission Distance	100 m (station-to-station distance)
Electrical Isolation	YES
Technical Parameters	
DIP Switch	Firmware upgrade; default position is 0. To upgrade the X1 module, set DIP switch to position 1.
Rated Voltage	24VDC
Ring Network Redundancy	Supported
Dual-Module Redundancy	Not supported
Scan Cycle	<3ms
Number of PN Ports	2
PN Port Function	Ethernet switch
Network Failure Auto-Recovery	3S
Channel Status Indicator	Green LED

Dimensions	93 × 32 × 122 mm (W × H × D)
Weight	Approx. 150 g
Protection Rating	IP20
Operating Temperature	-10~70°C
Storage Temperature	-20~80°C
Relative Humidity	95 %, non-condensing
Certification	CE

4.1.2 Status LEDs

No.	LED	Color	Description	Operating Status
1	PW	Green	System power	Steady on
2	PN	Green	Run indicator	Steady on
3	ER	Red	Error indicator	Off
4	MT	Green	System maintenance	Off

4.1.3 Fault Diagnosis

If the PW power LED is not illuminated, check whether the power supply wiring is properly connected.

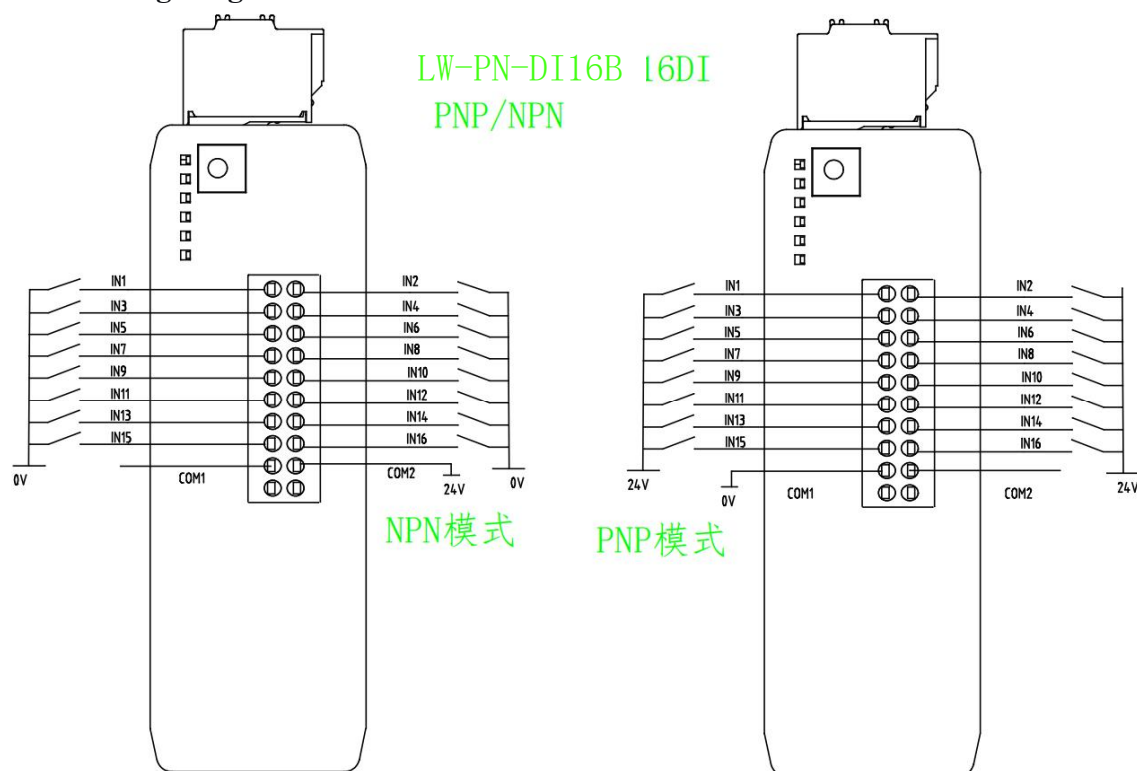
If the PN LED is flashing, this indicates normal communication. If it is off, a communication fault has occurred. At the same time, if the ER LED is lit, this indicates that the slave module has not established a successful connection with the master station. If this occurs during initial startup, verify that the configuration software project topology matches the actual physical topology. If this occurs during normal operation, check whether the communication cables are intact and properly connected.

4.2 Digital Input Module

4.2.1 LW-PN-DI16B Parameter Specifications

Model	LW-PN-DI16B	
Name	Digital Input Module (PNP/NPN compatible)	
Number of Channels	16	
Input Signal Type	PNP	NPN
Rated Input Voltage	24V DC ($\pm 20\%$)	0V DC ($\pm 3V$)
Logic "1" Signal	15~30V	0~3V
Logic "0" Signal	0~3V	15~30V
Input Current	3mA	
Isolation Withstand Voltage	500V	
Isolation Method	Optocoupler isolation	

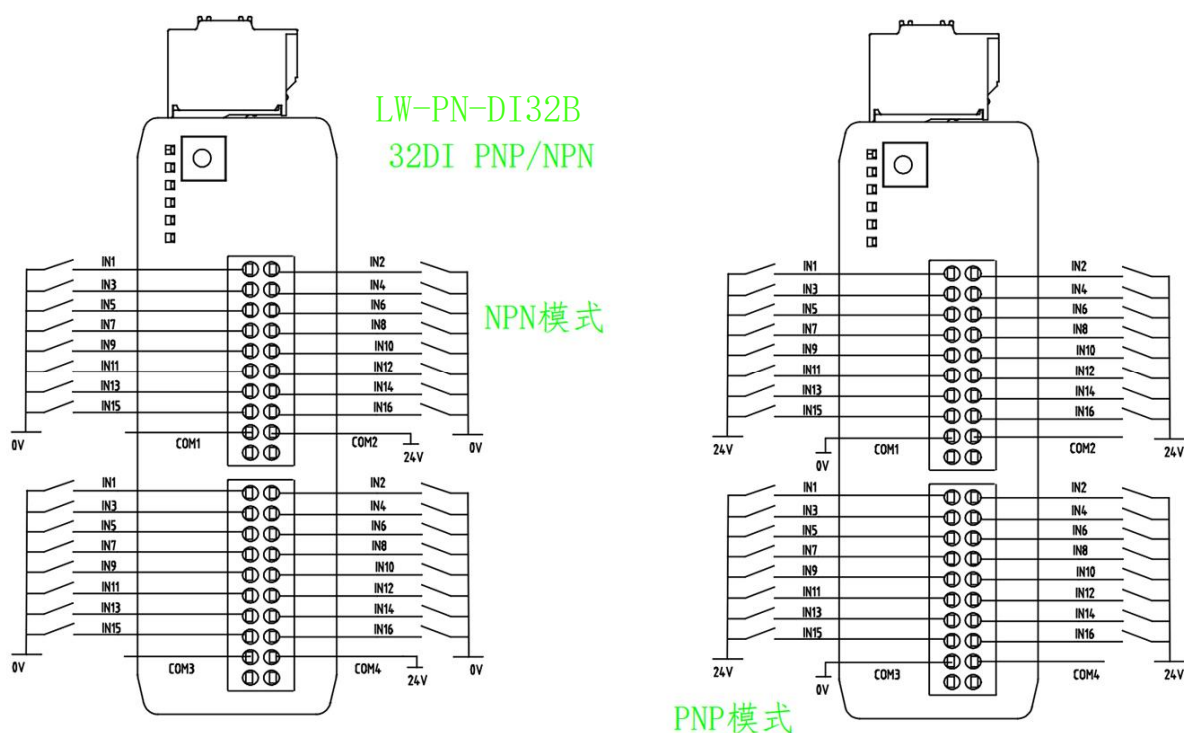
Module Wiring Diagram:



4.2.2 LW-PN-DI32B Parameter

Model	LW-PN-DI32B	
Name	Digital Input Module (PNP/NPN compatible)	
Channels	32	
Input Signal Type	PNP	NPN
Rated Input Voltage	24V DC ($\pm 20\%$)	0V DC ($\pm 3V$)
Logic "1" Signal	15~30V	0~3V
Logic "0" Signal	0~3V	15~30V
Signal Selection	Each group of 16 channels can be independently configured as PNP or NPN input	
Input Current	3mA	
Isolation Withstand Voltage	500V	
Isolation Method	Optocoupler isolation	

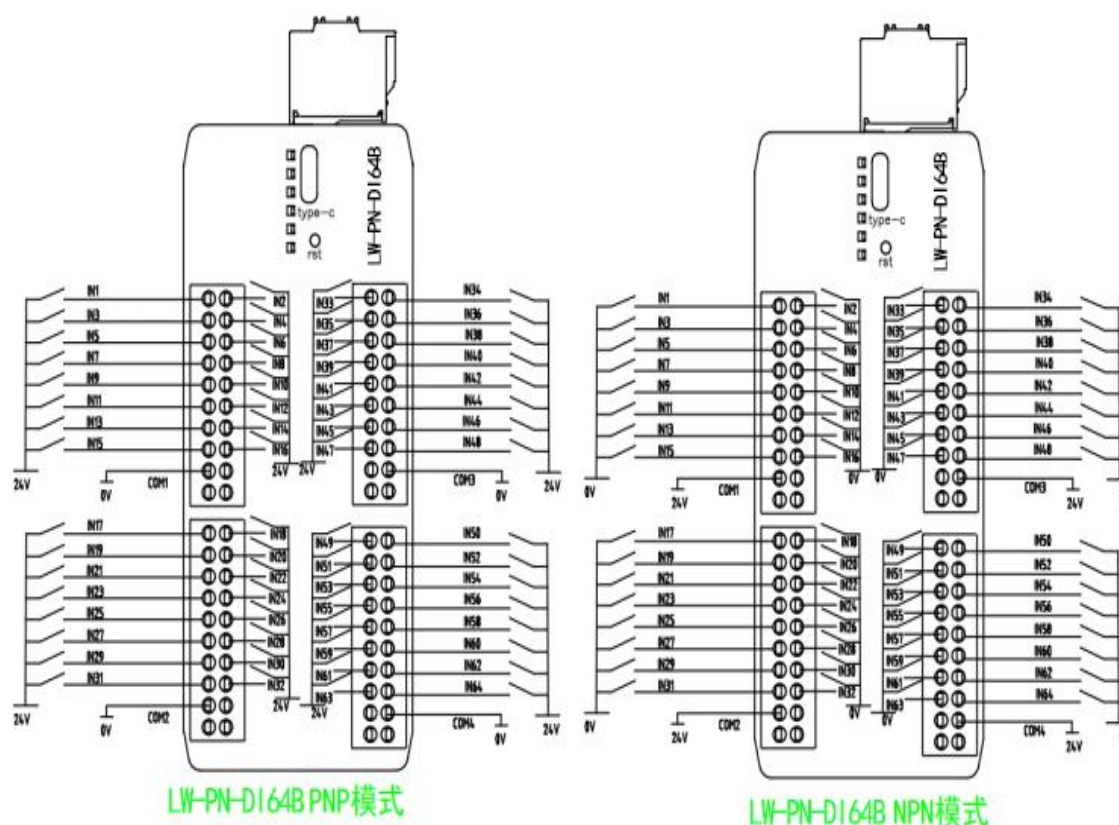
Module Wiring and Physical Diagram:



4.2.3 LW-PN-DI64B Parameter

Model	LW-PN-DI64B	
Name	Digital Input Module (PNP/NPN compatible)	
Channels	64	
Input Signal Type	PNP	NPN
Rated Input Voltage	24V DC ($\pm 20\%$)	0V DC ($\pm 3V$)
Logic "1" Signal	15~30V	0~3V
Logic "0" Signal	0~3V	15~30V
Signal Selection	Each group of 16 channels can be independently configured as PNP or NPN input	
Input Current	3mA	
Isolation Withstand Voltage	500V	
Isolation Method	Optocoupler isolation	

Module Wiring and Physical Diagram:

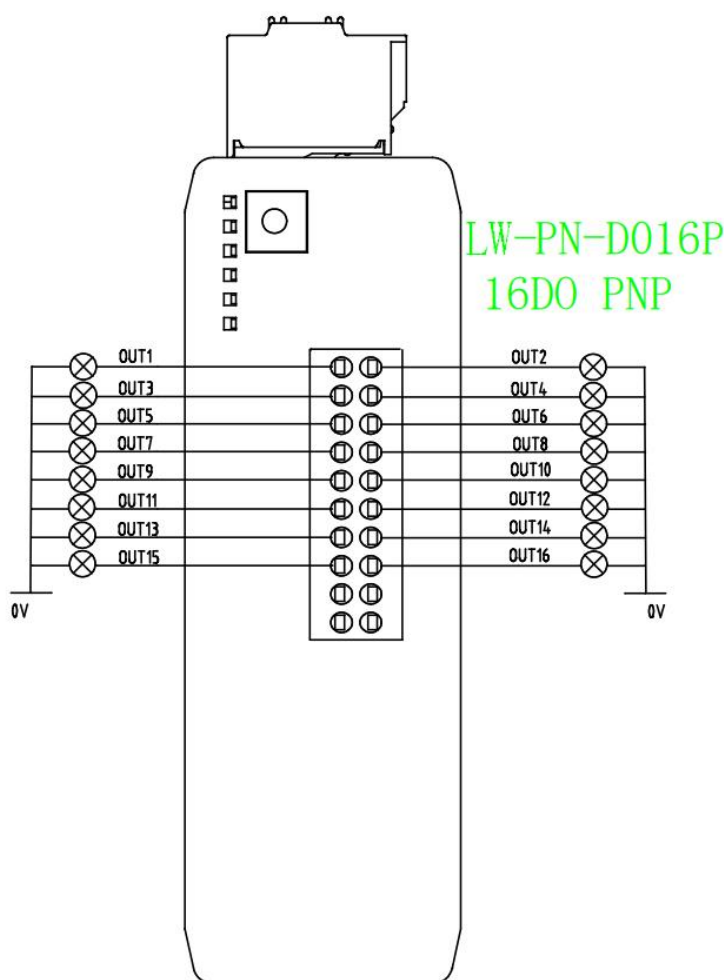


4.3 Digital Output Module

4.3.1 LW-PN-D016P Parameter

Model	LW-PN-D016P
Name	Digital Output Module
Channels	16
Output Signal Type	PNP
Rated Output Voltage	24V DC ($\pm 20\%$)
Drive Current	500mA
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation

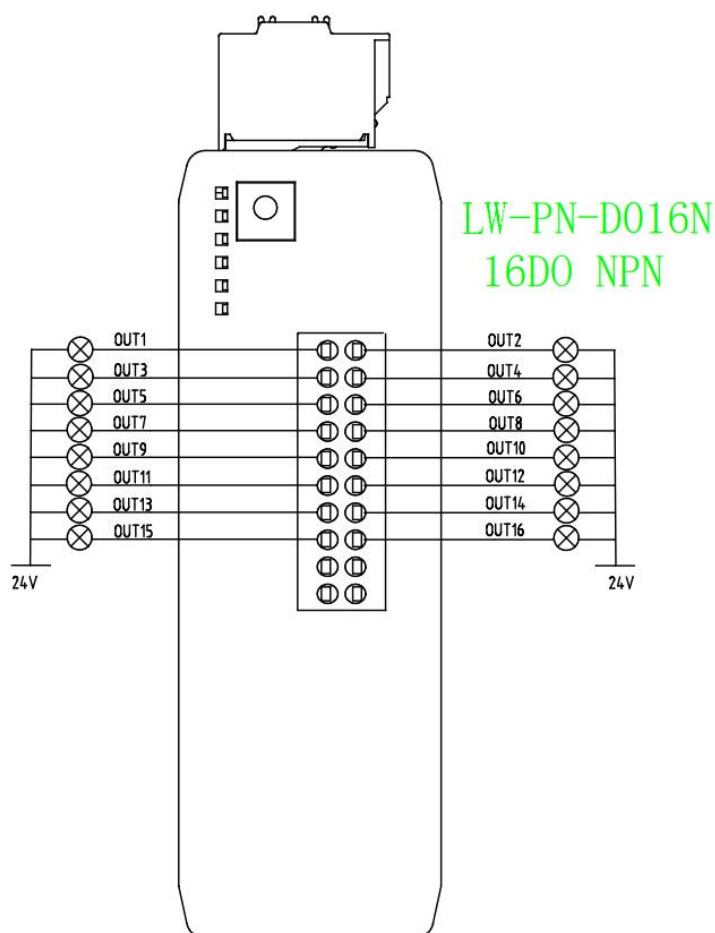
Module Wiring Diagram:



4.3.2 LW-PN-D016N Parameter

Model	LW-PN-D016N
Name	Digital Output Module
Channels	16
Output Signal Type	NPN
Rated Output Voltage	0V DC ($\pm 3V$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation

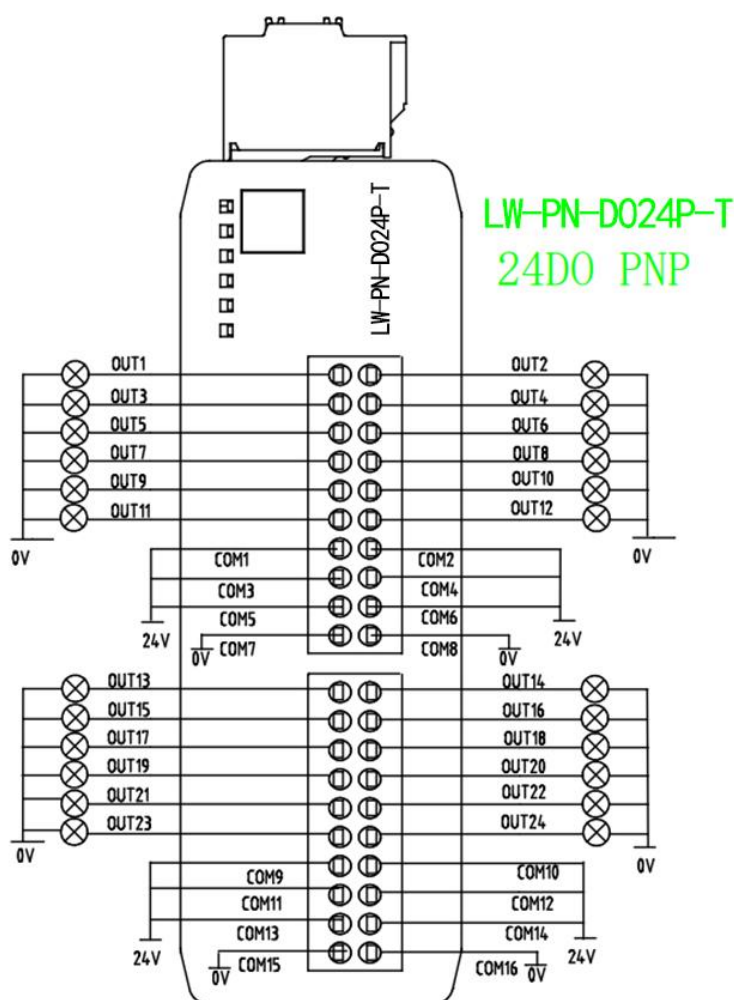
Module Wiring Diagram:



4.3.3 LW-PN-D024-T Parameter

Model	LW-PN-D024P-T
Name	Digital Output Module
Channels	24
Output Signal Type	PNP
Rated Output Voltage	24V DC ($\pm 20\%$)
Drive Current	4A
Fault Protection	Short-circuit protection
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation

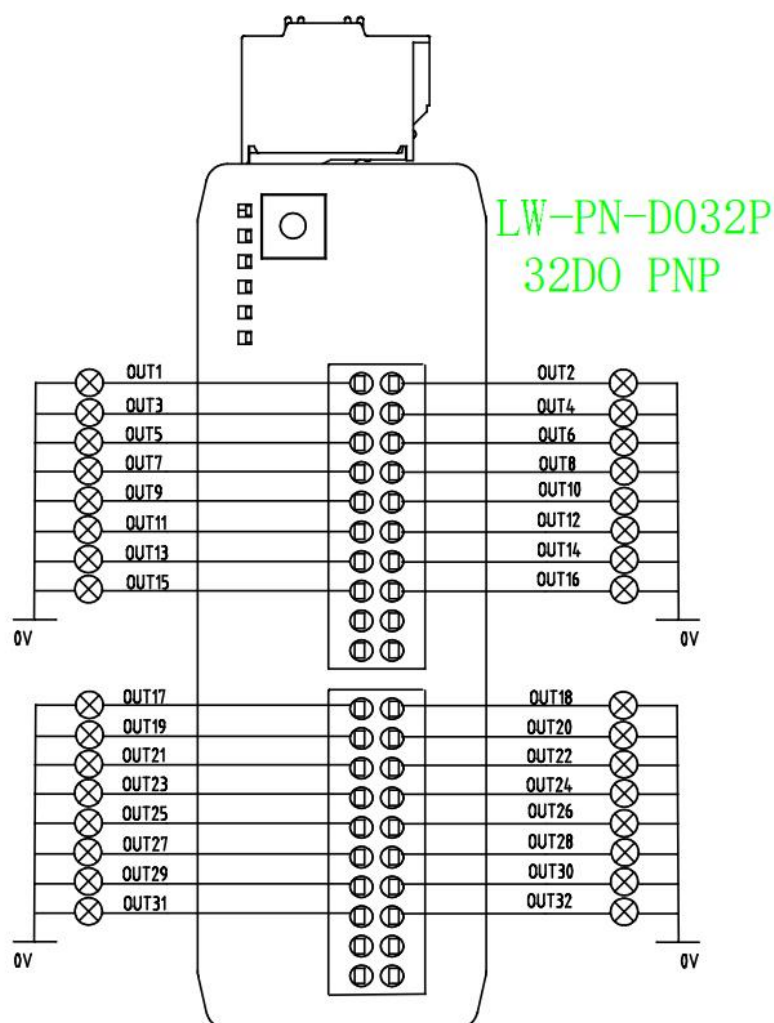
Module Wiring Diagram:



4.3.4 LW-PN-D032P Parameter

Model	LW-PN-D032P
Name	Digital Output Module
Channels	32
Output Signal Type	PNP
Rated Output Voltage	24V DC ($\pm 20\%$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation

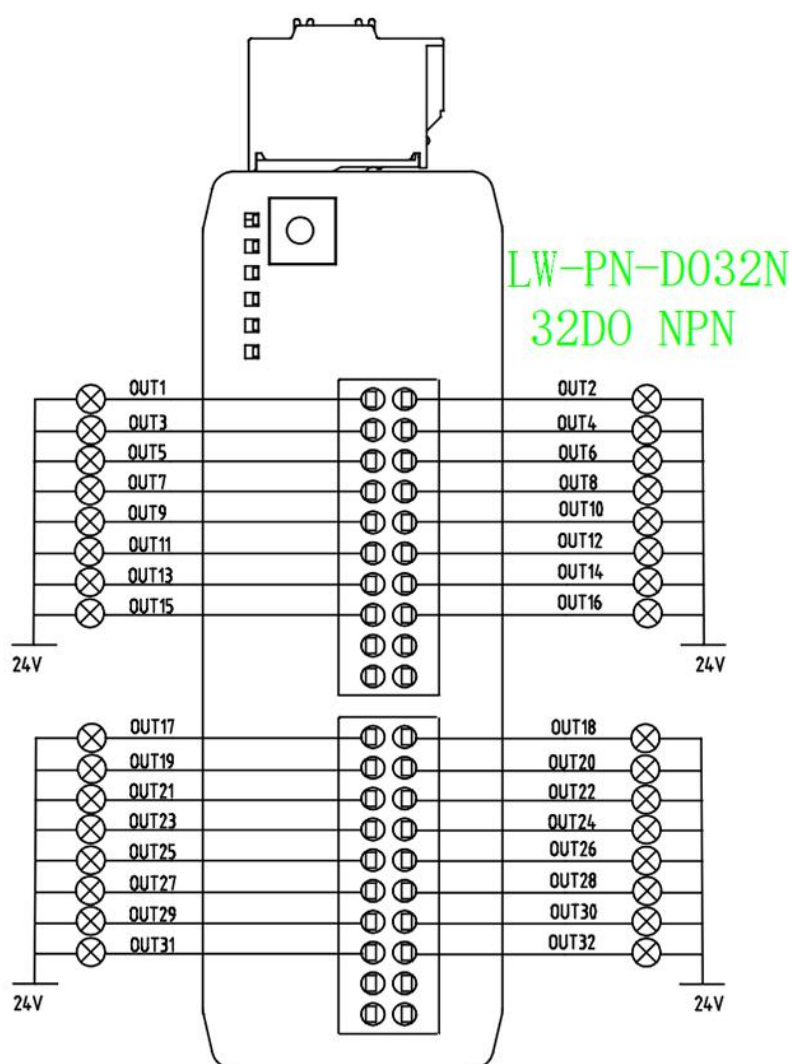
Module Wiring Diagram:



4.3.5 LW-PN-D032N Parameter

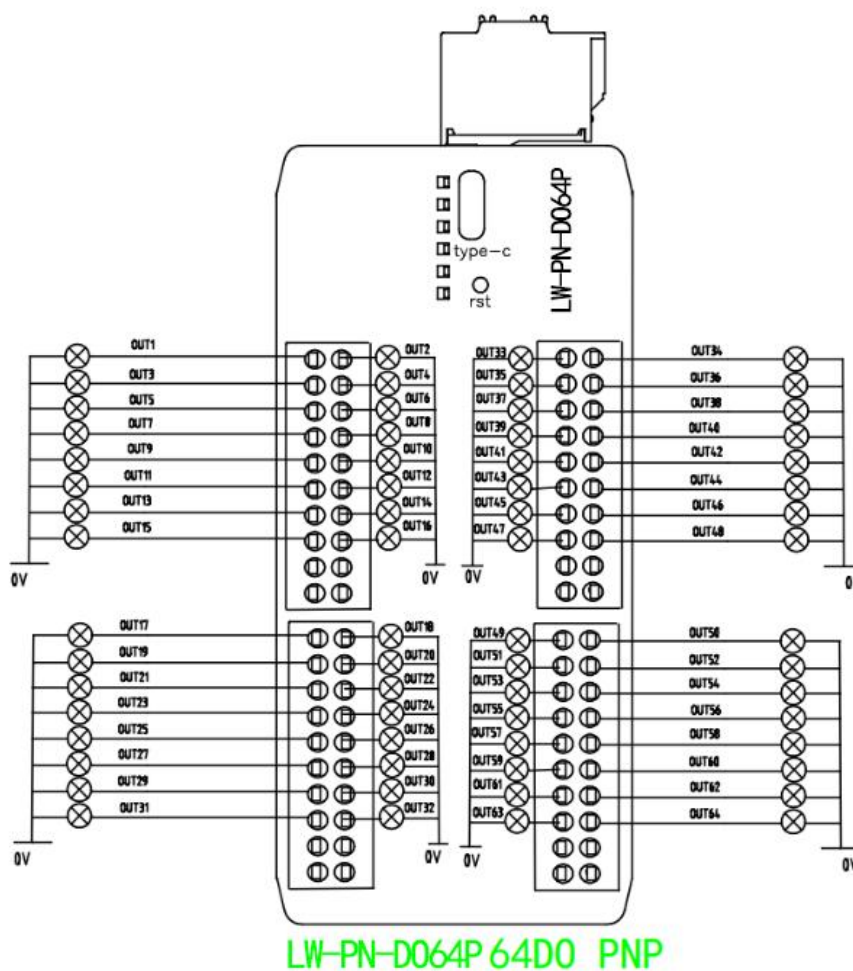
Model	LW-PN-D032N
Name	Digital Output Module
Channels	32
Output Signal Type	NPN
Rated Output Voltage	0V DC ($\pm 3V$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation

Module Wiring Diagram:



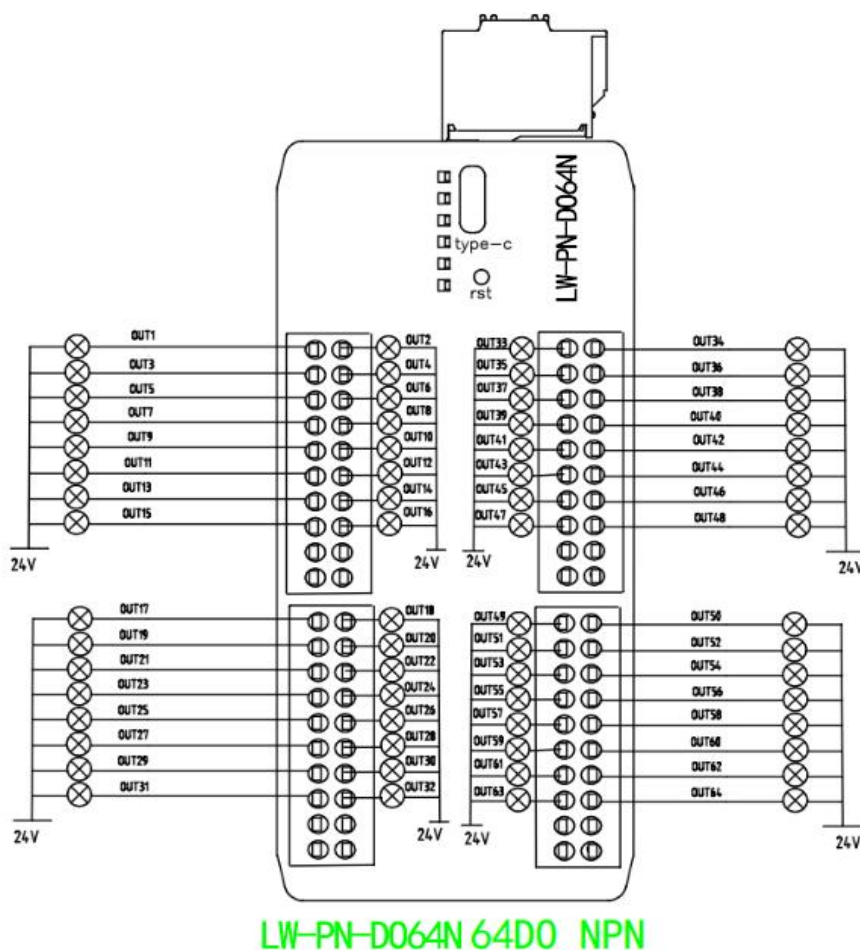
4.3.6 LW-PN-D064P Parameter

Model	LW-PN-D064P
Name	Digital Output Module
Channels	64
Output Signal Type	PNP
Rated Output Voltage	24V DC ($\pm 20\%$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation



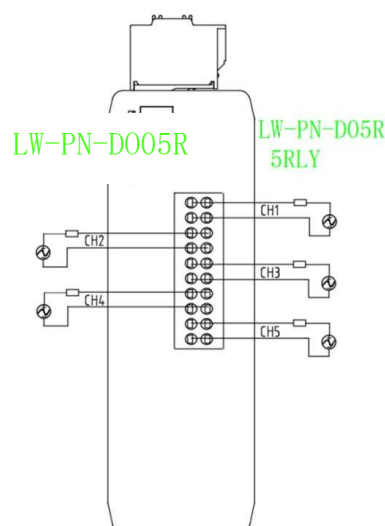
4.3.7 LW-PN-D064N Parameter

Model	LW-PN-D064N
Name	Digital Output Module
Channels	64
Output Signal Type	NPN
Rated Output Voltage	0V DC ($\pm 3V$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation



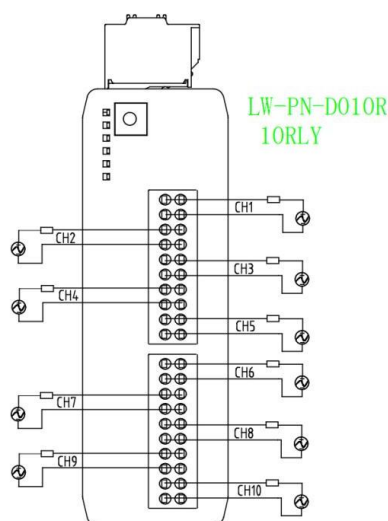
4.3.8 LW-PN-DO05R Parameter

Model	LW-PN-DO05R
Name	Digital Output Module
Channels	5
Output Signal Type	Relay
Contact Form	1H
Contact Resistance	$\leq 100 \text{ m}\Omega$ (1A 6VDC)
Contact Material	AgSnO ₂ , AgNi
Contact Load (Resistive)	5A 250VAC/30VDC
Max. Switching Voltage	250VAC/125VDC(at0.3A)
Max. Switching Current	5A
Max. Switching Power	1250VA/150W
Minimum Load	5VDC 10mA
Mechanical Endurance	2x10 ⁷ 次
Electrical Endurance	1×10^5 operations (AgNi, 3A 250VAC/30VDC, resistive load, 85°C, 1s ON / 9s OFF) 5×10^4 operations (AgNi, 5A 250VAC/30VDC, resistive load, room temperature, 1s ON / 9s OFF)
Load Type	Resistive load, inductive load, lamp load
Isolation Withstand	500V
Isolation Method	Optocoupler isolation

Module Wiring Diagram:

4.3.9 LW-PN-DO10R Parameter

Model	LW-PN-DO10R
Name	Digital Output Module
Channels	10
Output Signal Type	Relay
Contact Form	1H (SPST-NO)
Contact Resistance	$\leq 100 \text{ m}\Omega$ (at 1A 6VDC)
Contact Material	AgSnO ₂ , AgNi
Contact Load	5A 250VAC / 30VDC
Max. Switching	250VAC / 125VDC (at 0.3A)
Max. Switching	5A
Max. Switching Power	1250VA / 150W
Minimum Load	5VDC 10mA
Mechanical Endurance	2×10^7 operations
Electrical Endurance	1×10^5 operations (AgNi, 3A 250VAC/30VDC, resistive load, 85°C, 1s ON / 9s OFF) 5×10^4 operations (AgNi, 5A 250VAC/30VDC, resistive load, room temperature, 1s ON / 9s OFF)
Load Type	Resistive load, inductive load, lamp load
Isolation Withstand	500V
Isolation Method	Optocoupler isolation

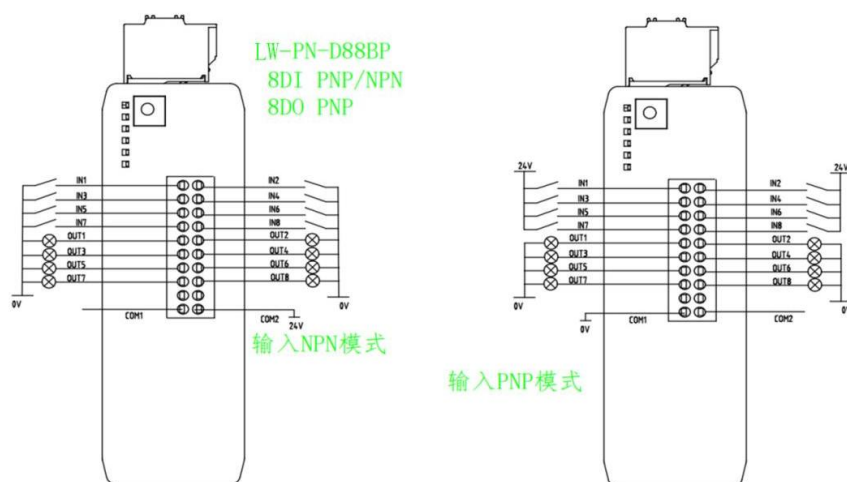
Module Wiring Diagram:

4.4 Digital Input/Output Module

4.4.1 LW-PN-D88BP Parameter

Model	LW-PN-D88BP
Name	Digital Input/Output Module (8DI + 8DO)
Channels of Input	8
Input Signal Type	PNP/NPN
Rated Input Voltage	24V DC ($\pm 20\%$)
Logic "1" Signal	15–30V
Logic "0" Signal	0–3V
Input Current	3mA
Isolation Withstand	500V
Isolation Method	Optocoupler isolation
Channels of Output	8
Output Signal Type	PNP
Rated Output Voltage	24V DC ($\pm 20\%$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand	500V
Isolation Method	Optocoupler isolation

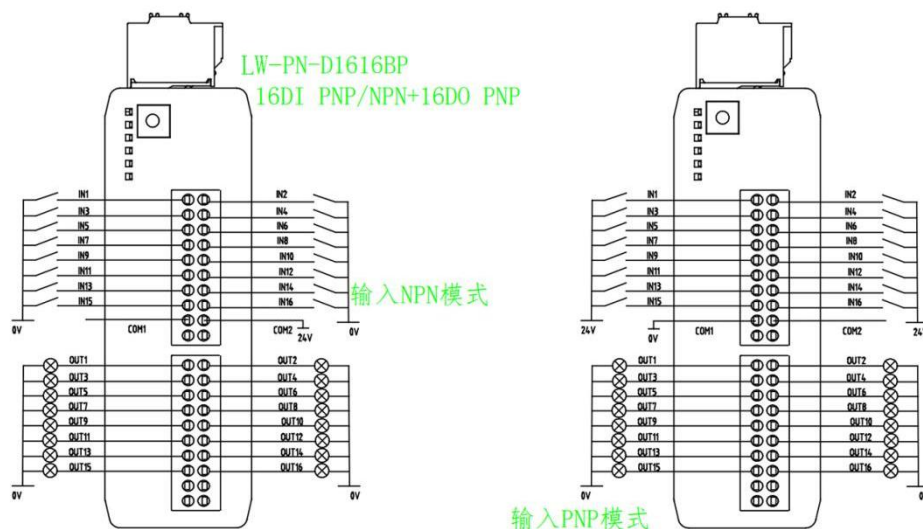
Module Wiring Diagram:



4.4.2 LW-PN-D1616BP Parameters

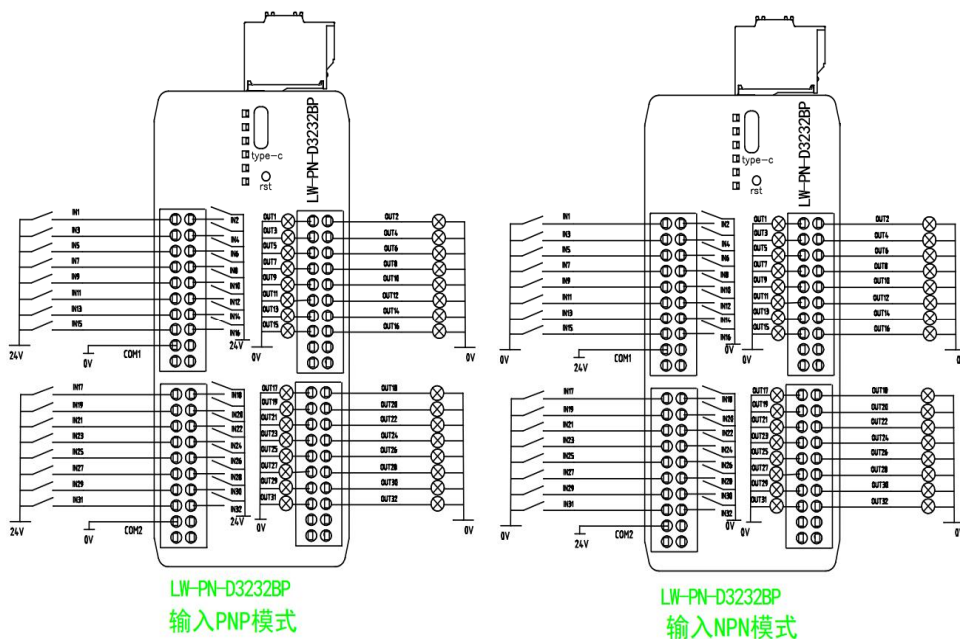
Model	LW-PN-D1616BP
Name	Digital Input/Output Module (16DI + 16DO)
Number of Input Channels	16
Input Signal Type	PNP/NPN
Rated Input Voltage	24V DC ($\pm 20\%$)
Logic "1" Signal	15–30V
Logic "0" Signal	0–3V
Input Current	3mA
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Number of Output Channels	16
Output Signal Type	PNP
Rated Output Voltage	24V DC ($\pm 20\%$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation

Module Wiring Diagram:



4.4.3 LW-PN-D3232BP Parameters

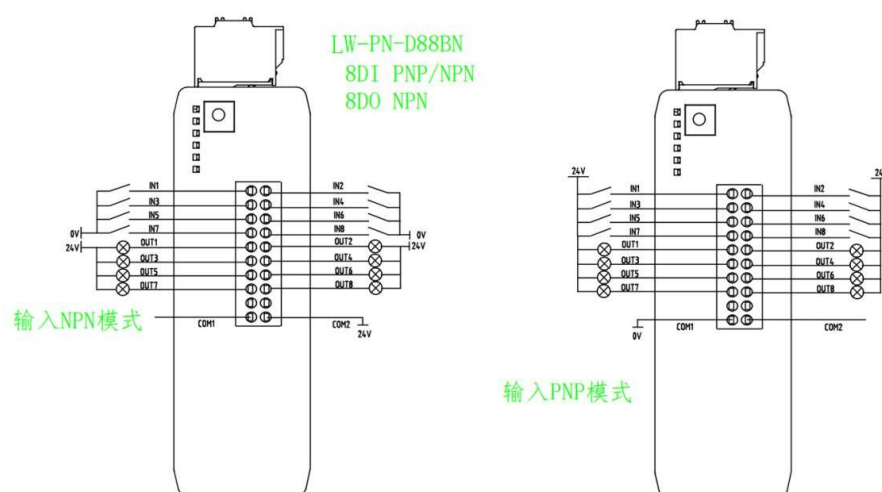
Model	LW-PN-D3232BP
Name	Digital Input/Output Module (32DI+32DO)
Number of Input	32
Input Signal Type	PNP/NPN
Rated Input	24V DC ($\pm 20\%$)
Logic "1" Signal	15~30V
Logic "0" Signal	0~3V
Input Current	3mA
Isolation Withstand	500V
Isolation Method	Optocoupler isolation
Number of Output	32
Output Signal	PNP
Rated Output	24V DC ($\pm 20\%$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand	500V
Isolation Method	Optocoupler isolation



4.4.4 LW-PN-D88BN Parameters

Model	LW-PN-D88BN
Name	Digital Input/Output Module (8DI+8DO)
Number of Input	8
Input Signal Type	PNP/NPN
Rated Input	24V DC ($\pm 20\%$)
Logic "1" Signal	15~30V
Logic "0" Signal	0~3V
Input Current	3mA
Isolation	500V
Isolation Method	Optocoupler isolation
Number of	8
Output Signal	NPN
Rated Output	0V DC ($\pm 3V$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation	500V
Isolation Method	Optocoupler isolation

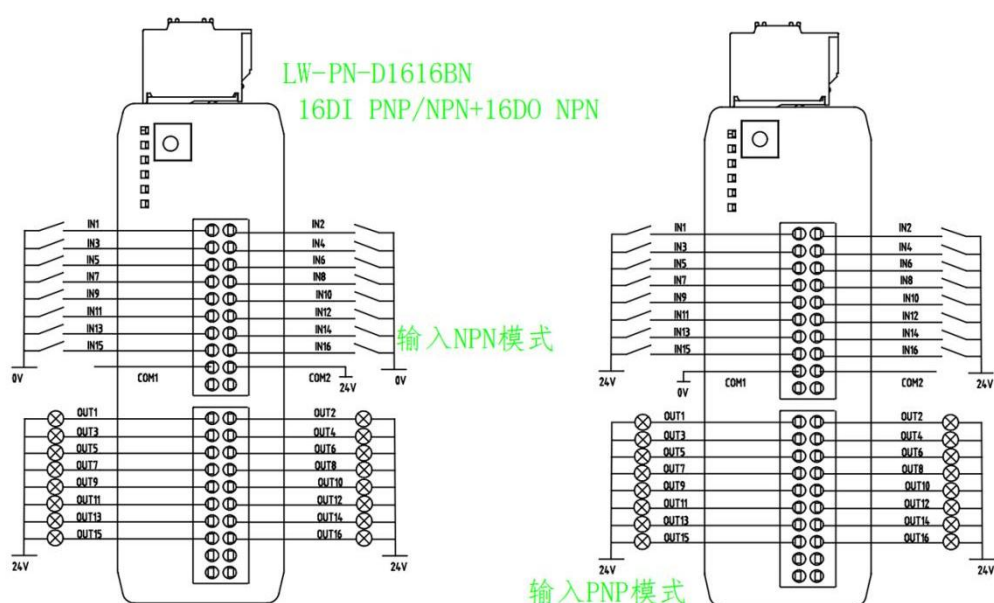
Module Wiring Diagram:



4.4.5 LW-PN-D1616BN Parameters

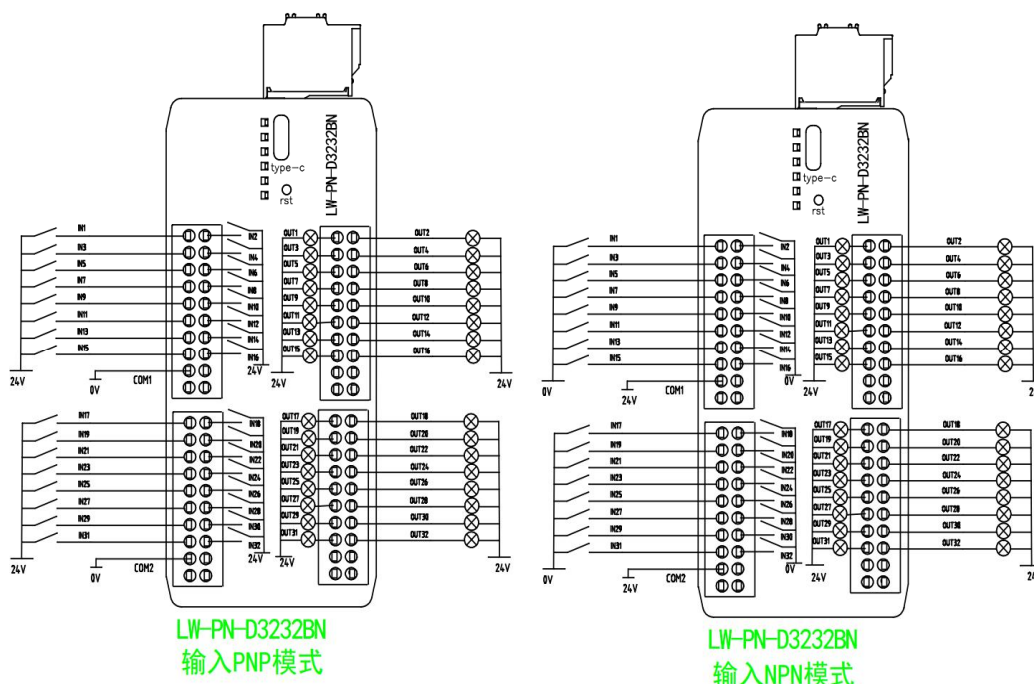
Model	LW-PN-D1616BN
Name	Digital Input/Output Module (16DI+16DO)
Number of Input	16
Input Signal Type	PNP/NPN
Rated Input	24V DC ($\pm 20\%$)
Logic "1" Signal	15~30V
Logic "0" Signal	0~3V
Input Current	3mA
Isolation	500V
Isolation Method	Optocoupler isolation
Number of	16
Output Signal	NPN
Rated Output	0V DC ($\pm 3V$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation	500V
Isolation Method	Optocoupler isolation

Module Wiring Diagram:



4.4.6 LW-PN-D3232BN Parameters

Model	LW-PN-D3232BN
Name	Digital Input/Output Module (32DI+32DO)
Number of Input	32
Input Signal Type	PNP/NPN
Rated Input	24V DC ($\pm 20\%$)
Logic "1" Signal	15~30V
Logic "0" Signal	0~3V
Input Current	3mA
Isolation Withstand	500V
Isolation Method	Optocoupler isolation
Number of Output	32
Output Signal	PNP
Rated Output	24V DC ($\pm 20\%$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand	500V
Isolation Method	Optocoupler isolation

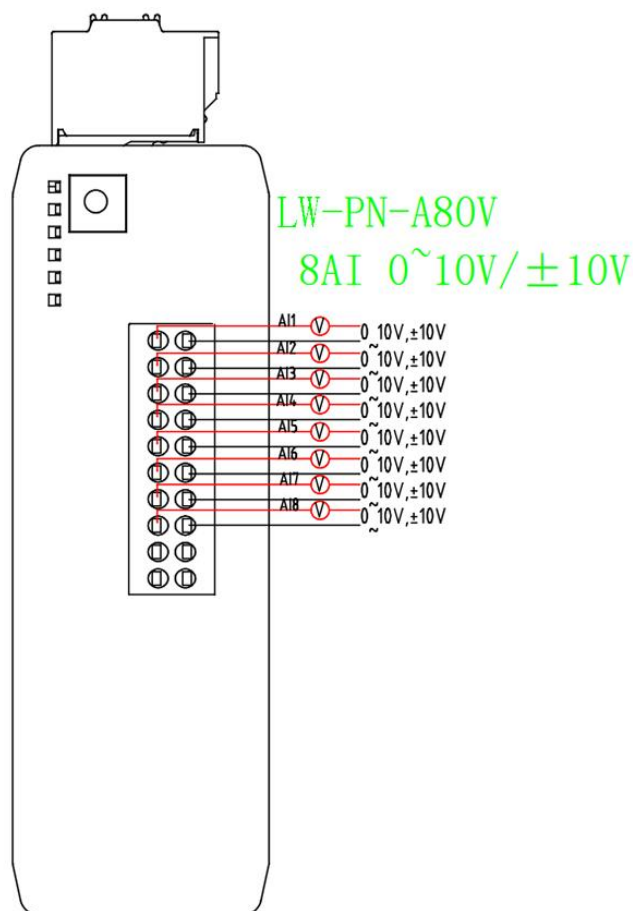


4.5 Analog Input Module

4.5.1 LW-PN-AI08V Parameters

Model	LW-PN-AI08V
Name	Voltage Input Module
Number of Channels	8
Input Type	0–10V / ± 10 V
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data)	–27648 to +27648
Input Signal Accuracy	$\pm 0.1\%$

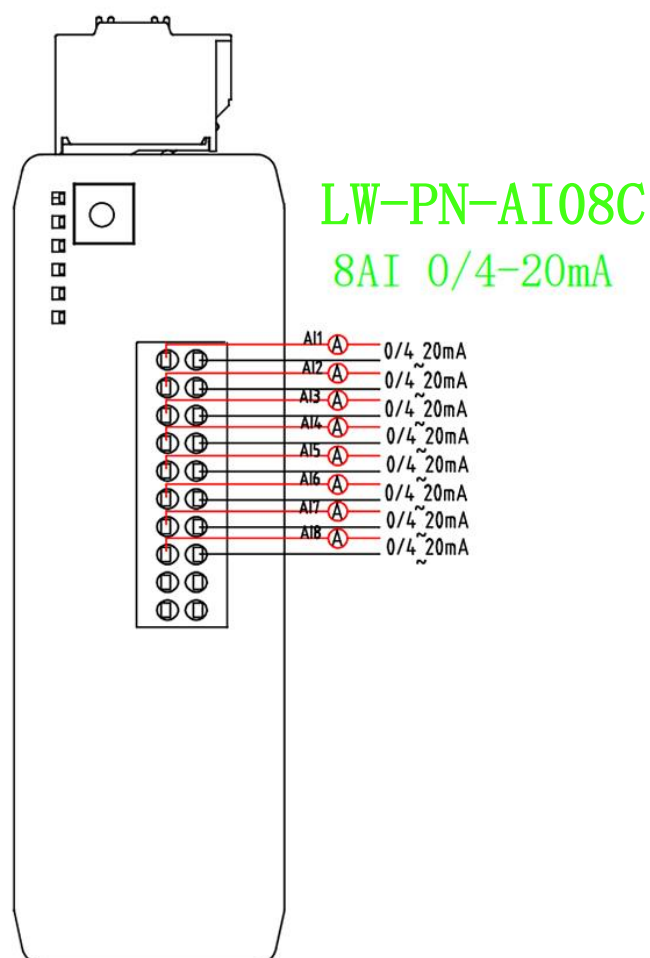
Module Wiring Diagram:



4.5.2 LW-PN-AI08C Parameters

Model	LW-PN-AI08C
Name	Current Input Module
Number of Channels	8
Input Type	0/4-20mA
Resolution	16-bit
Conversion Time	1ms
Full-Scale Range (Data Word)	0-27648
Input Signal Accuracy	±0.1%
Sensor Connection	Supports 4-wire transmitters; (2-wire transmitters are also supported but require an external DC 24V power supply)

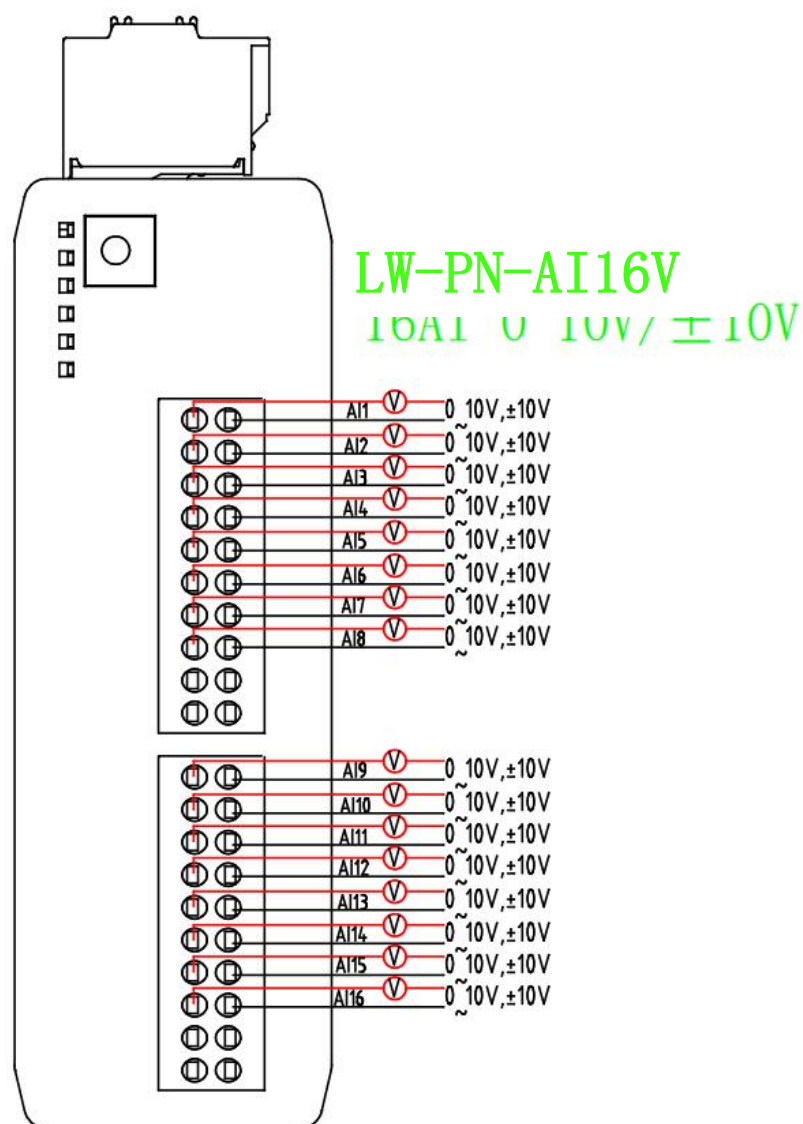
Module Wiring Diagram:



4.5.3 LW-PN-AI16V Parameters

Model	LW-PN-AI16V
Name	Voltage Input Module
Number of Channels	16
Input Type	0~10V/±10V
Resolution	16bit
Conversion Time	1ms
Full-Scale Range (Data)	-27648~+27648
Input Signal Accuracy	±0.1%

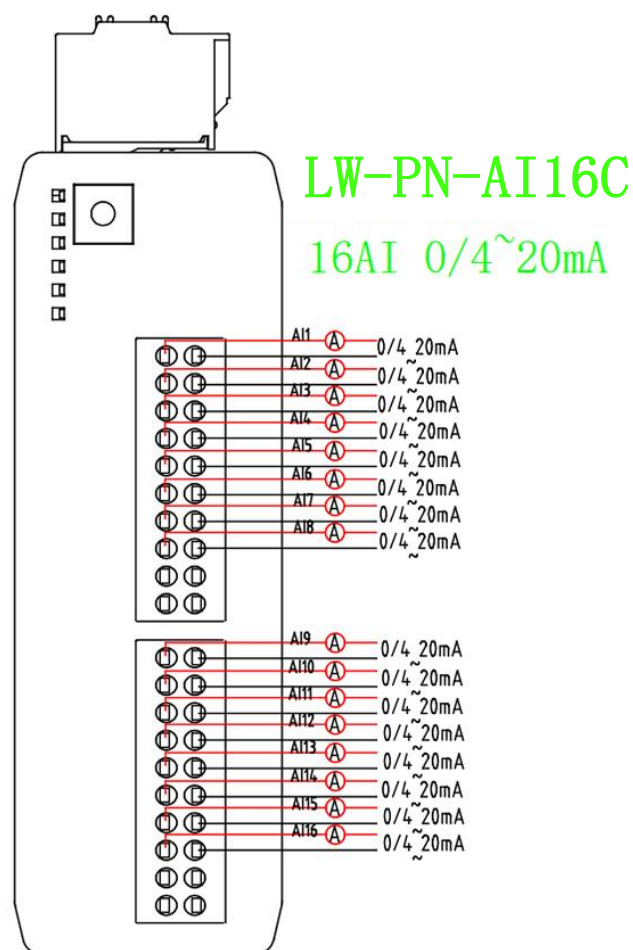
Module Wiring Diagram:



4.5.4 LW-PN-AI16C Parameters

Model	LW-PN-AI16C
Name	Current Input Module
Number of Channels	16
Input Type	0/4~20mA
Resolution	16bit
Conversion Time	1ms
Full-Scale Range (Data)	0-27648
Input Signal Accuracy	±0.1%
Sensor Connection	4-wire supported; 2-wire requires external 24V DC supply.

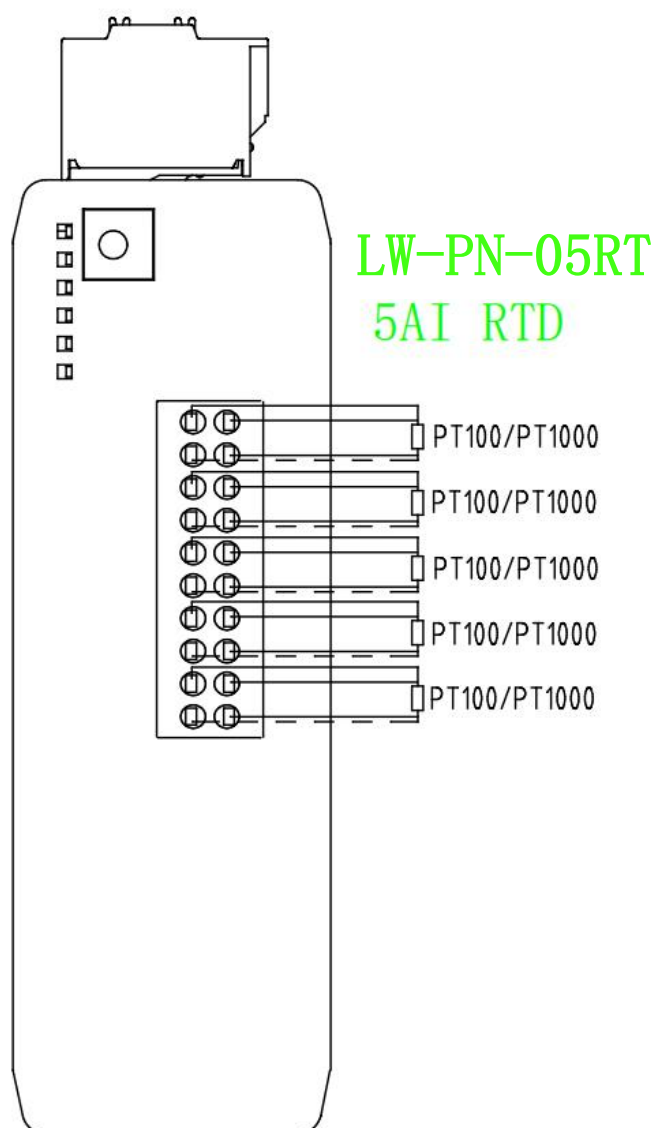
Module Wiring Diagram:



4.5.5 LW-PN-05RT Parameters

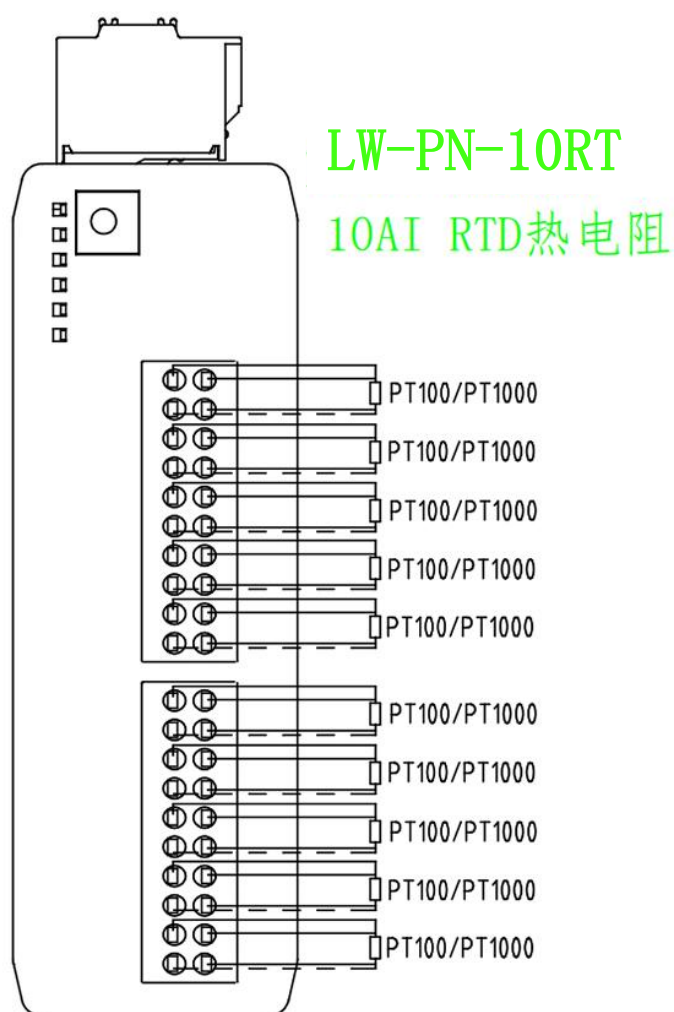
Model	LW-PN-05RT
Name	RTD Input Module (RTD)
Number of Channels	5
Input Type	Cu50, Pt100, etc., or 0–1k Ω signal
Resolution	16bit
Conversion Time	250ms
Input Signal Accuracy	$\pm 0.1\%$
Sensor Connection	3-wire

Module Wiring Diagram:



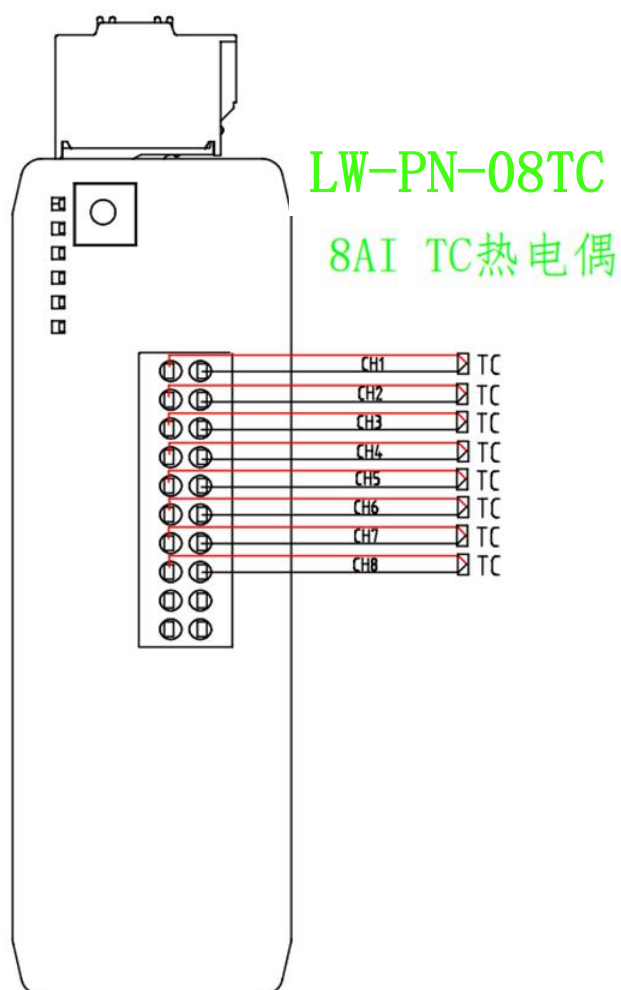
4.5.6 LW-PN-10RT Parameters

Model	LW-PN-10RT
Name	RTD Input Module
Channels	10
Input Type	Cu50, Pt100, etc., or 0–1k Ω signal
Resolution	16-bit
Conversion Time	250 ms
Input Signal Accuracy	$\pm 0.1\%$
Sensor Connection	3-wire

Module Wiring Diagram:

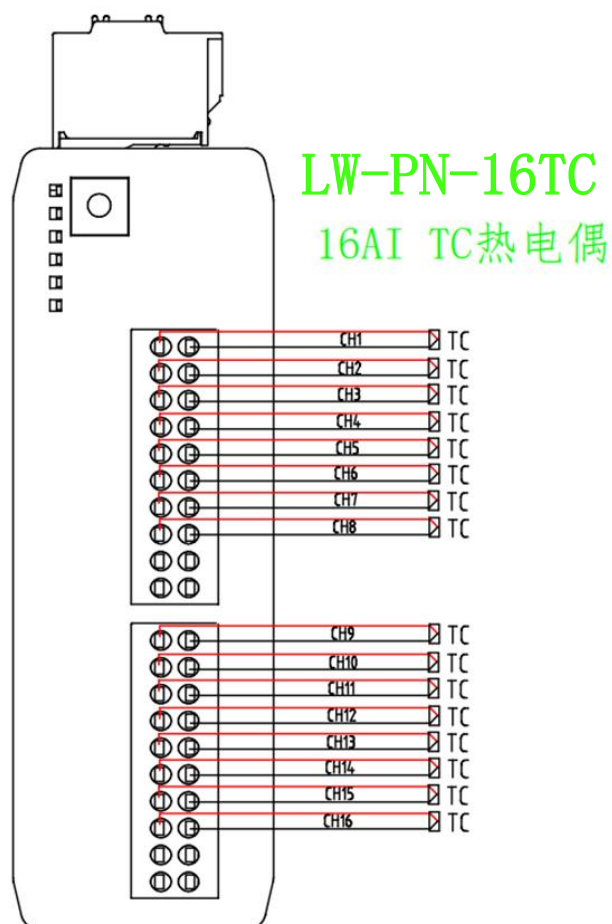
4.5.7 LW-PN-08TC Parameters

Model	LW-PN-08TC
Name	Thermocouple Input Module (TC)
Number of Channels	8
Input Type	K, J, T, E, N, S, R, B
Resolution	16-bit
Conversion Time	250 ms
Input Signal Accuracy	±0.1%
Sensor Connection	2-wire

Module Wiring Diagram:

4.5.8 LW-PN-16TC Parameters

Model	LW-PN-16TC
Name	Thermocouple Input Module (TC)
Number of Channels	16
Input Type	K,J,T,E,N,S,R,B
Resolution	16bit
Conversion Time	250ms
Input Signal Accuracy	±0.1%
Sensor Connection	2-wire

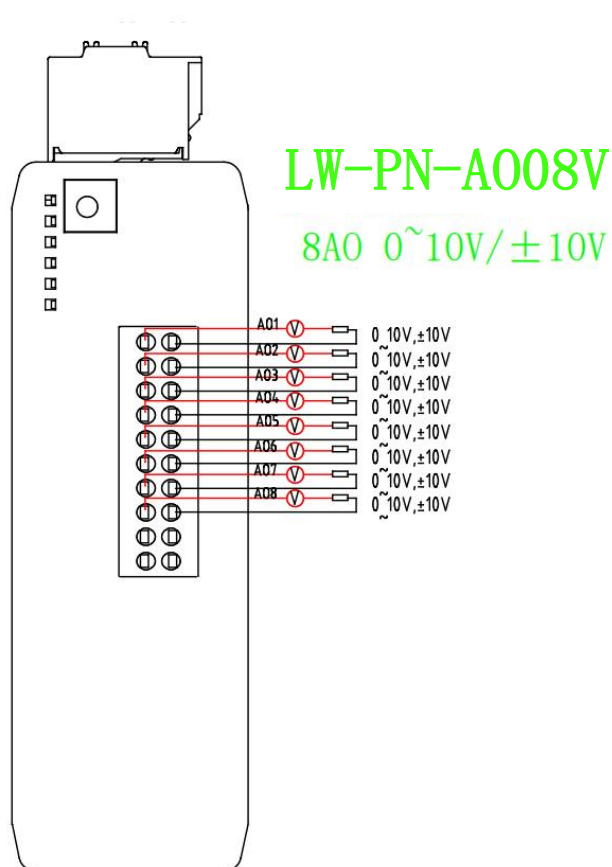
Module Wiring Diagram:

4.6 Analog Output Module

4.6.1 LW-PN-A008V Parameters

Model	LW-PN-AO08V
Name	Voltage Output Module
Number of Channels	8
Output Type	0–10V / ± 10 V
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Output Signal Accuracy	$\pm 0.1\%$

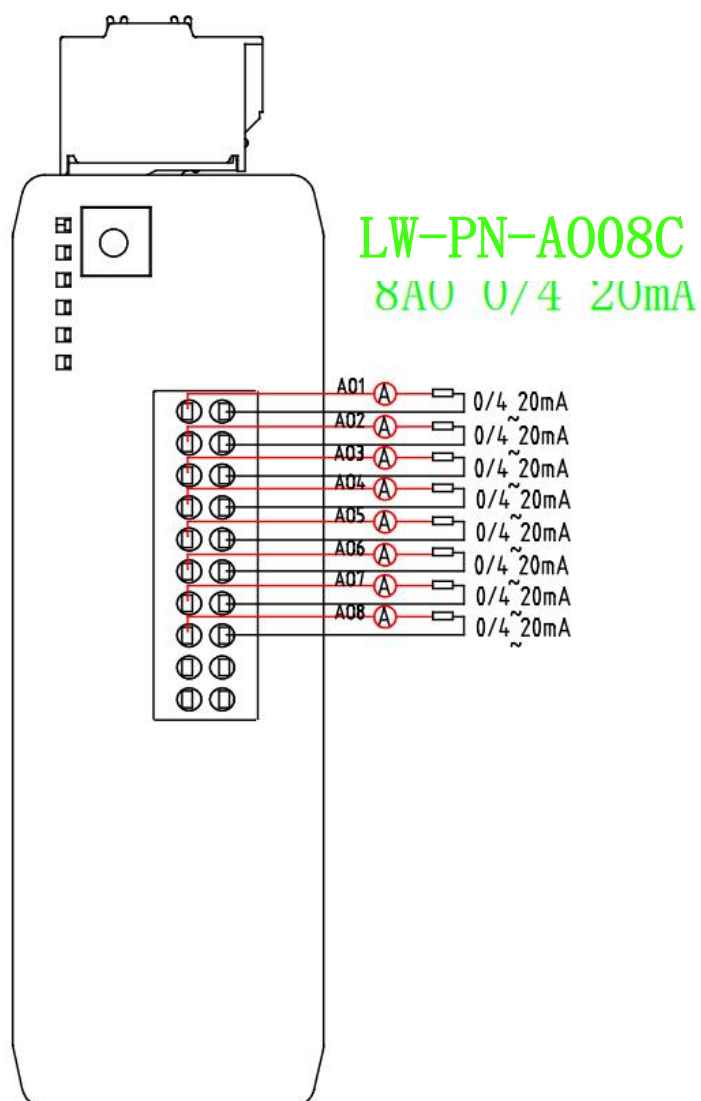
Module Wiring Diagram:



4.6.2 LW-PN-AO08C Parameters

Model	LW-PN-AO08C
Name	Current Output module
Number of Channels	8
Output Type	0/4~20mA
Resolution	16bit
Conversion Time	1ms
Full-Scale Range (Data Word)	0-27648
Output Signal Accuracy	±0.1%

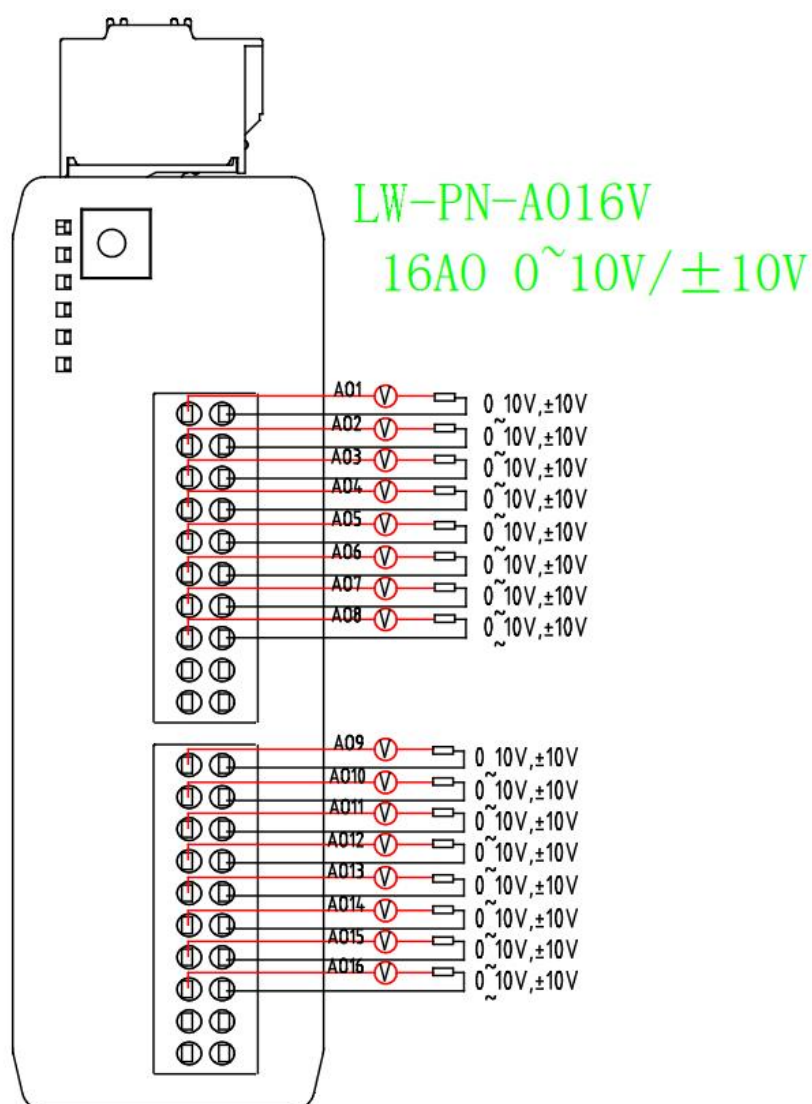
Module Wiring Diagram:



4.6.3 LW-PN-AO16V Parameters

Model	LW-PN-AO16V
Name	Voltage Output Module
Number of Channels	16
Output Type	0~10V/±10V
Resolution	16bit
Conversion Time	1ms
Full-Scale Range (Data Word)	-27648~+27648
Output Signal Accuracy	±0.1%

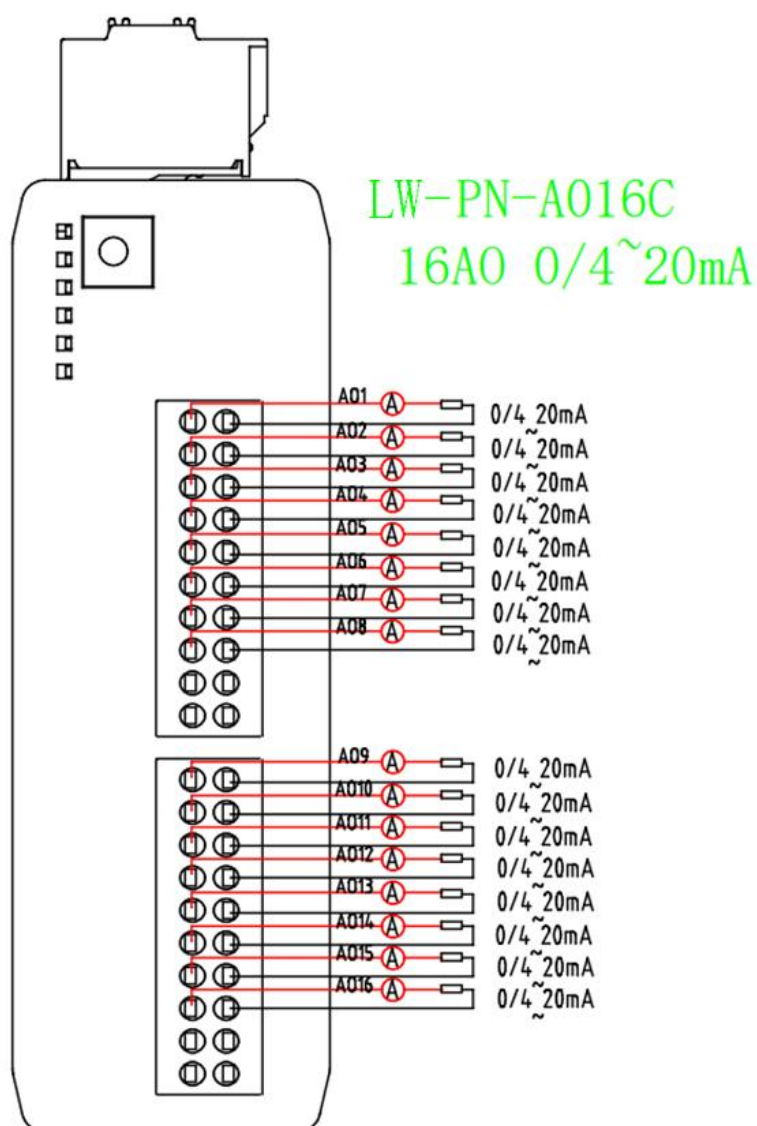
Module Wiring Diagram:



4.6.4 LW-PN-AO16C Parameters

Model	LW-PN-AO16C
Name	Current Output Module
Channels	16
Output Type	0/4~20mA
Resolution	16bit
Conversion time	1ms
Full-Scale Range (Data)	0-27648
Output Signal accuracy	±0.1%

Module Wiring diagram:

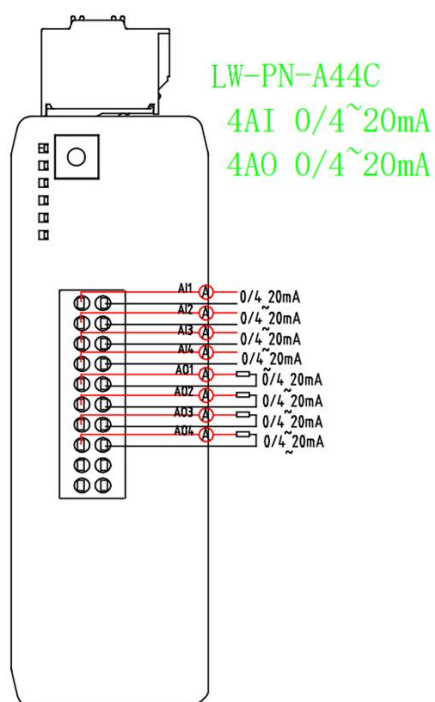


4.7 Analog Input/Output Module

4.7.1 LW-PN-A44C Parameters

Model	LW-PN-A44C
Name	Current Input/Output Module (4AI + 4AO)
Input Channels	4
Input Type	0/4~20mA
Resolution	16bit
Conversion Time	1ms
Full-Scale Range (Data Word)	0-27648
Input Signal Accuracy	±0.1%
Sensor Connection	Supports 4-wire transmitters; (2-wire transmitters are also supported but require an external DC 24V power supply)
Output Channels	4
Output Type	0/4~20mA
Resolution	16bit
Conversion Time	1ms
Full-Scale Range (Data Word)	0-27648
Input Signal Accuracy	±0.1%

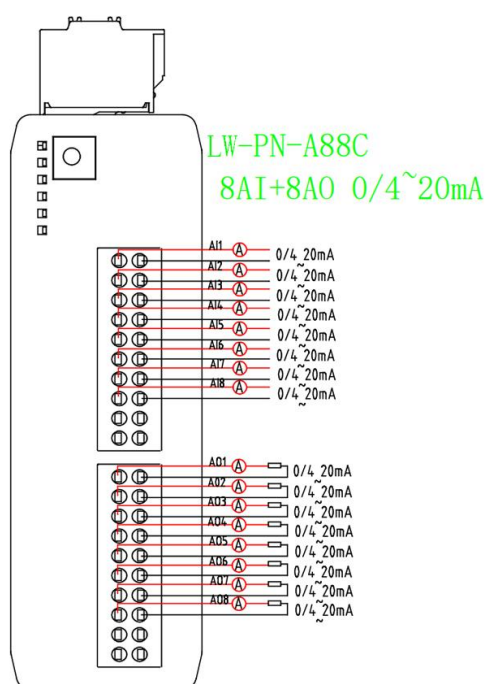
Module Wiring Diagram:



4.7.2 LW-PN-A88C Parameters

Model	LW-PN-A88C
Name	Current Input/Output Module (8AI + 8AO)
Number of Input	8
Input Type	0/4-20mA
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data	0-27648
Input Signal Accuracy	±0.1%
Sensor Connection	Supports 4-wire transmitters; (2-wire transmitters are also supported but require an external DC 24V power supply)
Number of Output	8
Output Type	0/4-20mA
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data	0-27648
Output Signal Accuracy	±0.1%

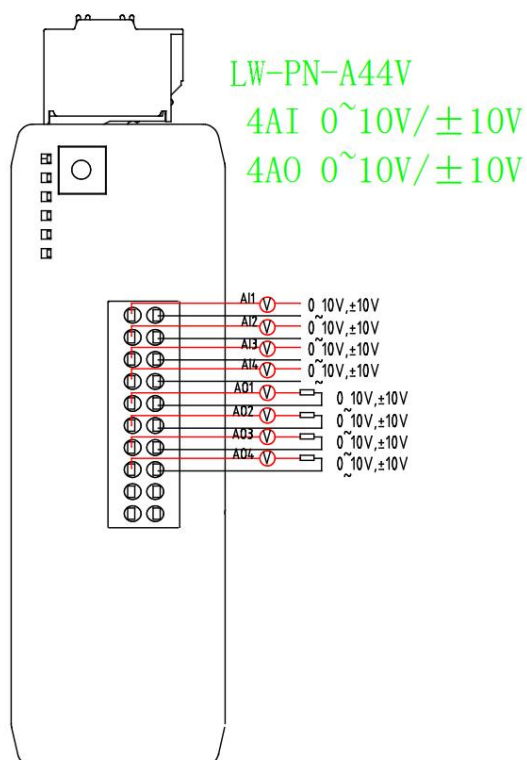
Module Wiring Diagram:



4.7.3 LW-PN-A44V Parameters

Model	LW-PN-A44V
Name	Voltage Input/Output Module (4AI + 4AO)
Number of Input Channels	4
Input Type	0–10V / ± 10 V
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Input Signal Accuracy	$\pm 0.1\%$
Channel Status Indicator	Green LED
Number of Output Channels	4
Output Type	0–10V / ± 10 V
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Output Signal Accuracy	$\pm 0.1\%$

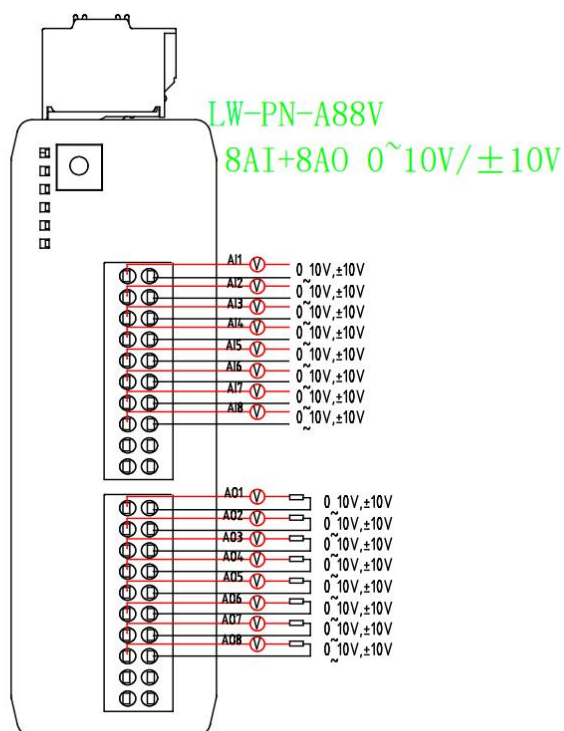
Module Wiring Diagram:



4.7.4 LW-PN-A88V Parameters

Model	LW-PN-A88V
Name	Voltage Input/Output Module (8AI + 8AO)
Number of Input Channels	8
Input Type	0–10V / ± 10 V
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Input Signal Accuracy	$\pm 0.1\%$
Channel Status Indicator	Green LED
Number of Output Channels	8
Output Type	0–10V / ± 10 V
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Output Signal Accuracy	$\pm 0.1\%$

Module Wiring Diagram:

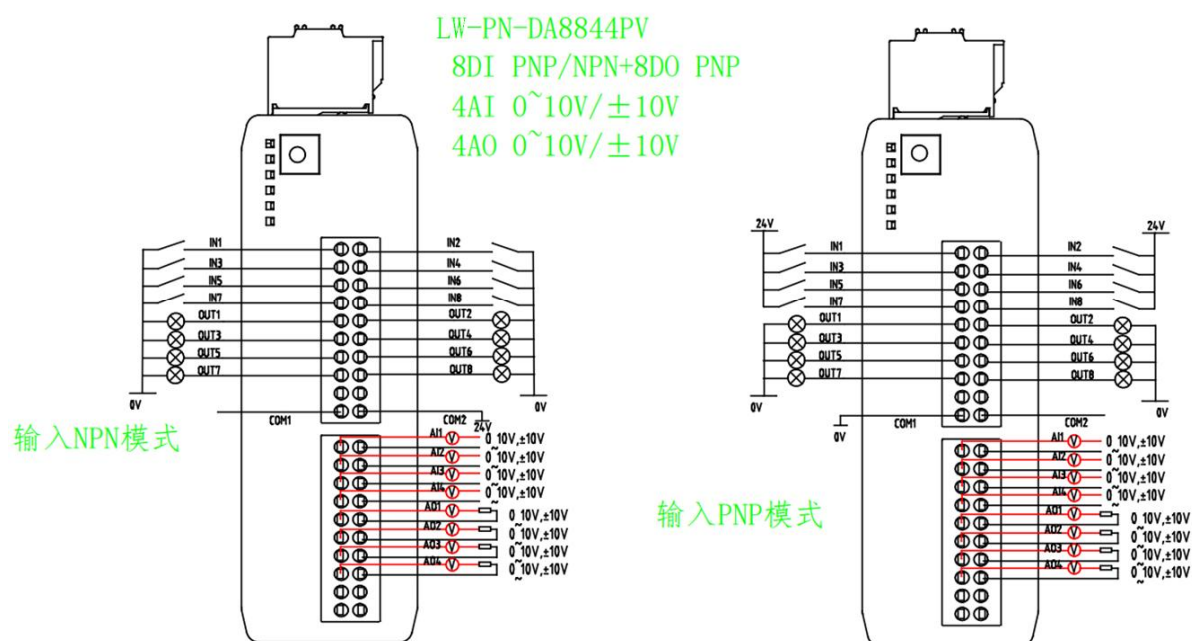


4.8 Digital and Analog Mixed I/O Module

4.8.1 LW-PN-DA8844PV Parameters

Model	LW-PN-DA8844PV
Name	Digital Input/Output Module (8DI + 8DO)
Number of Input Channels	8
Input Signal Type	PNP/NPN
Rated Input Voltage	24V DC ($\pm 20\%$)
Logic "1" Signal	15–30V
Logic "0" Signal	0–3V
Input Current	3mA
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Number of Output Channels	8
Output Signal Type	PNP
Rated Output Voltage	24V DC ($\pm 20\%$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature protection
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Name	Voltage Input/Output Module (4AI + 4AO)
Number of Input Channels	4
Input Type	0–10V / $\pm 10V$
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Input Signal Accuracy	$\pm 0.1\%$
Channel Status Indicator	Green LED
Number of Output Channels	4
Output Type	0–10V / $\pm 10V$
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Output Signal Accuracy	$\pm 0.1\%$

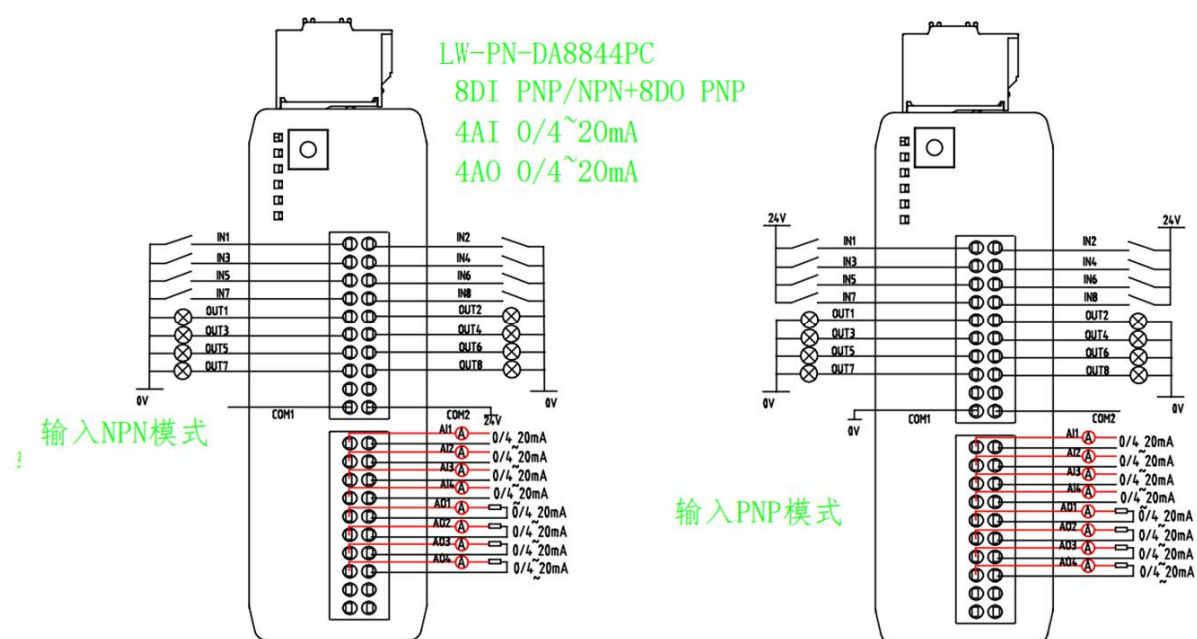
LW-PN-DA8844PV Module Wiring Diagram:



4.8.2 LW-PN-DA8844PC Parameters

Model	LW-PN-DA8844PC
Name	Digital Input/Output Module (8DI + 8DO)
Number of Input Channels	8
Input Signal Type	PNP/NPN
Rated Input Voltage	24V DC ($\pm 20\%$)
Logic "1" Signal	15–30V
Logic "0" Signal	0–3V
Input Current	3mA
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Number of Output Channels	8
Output Signal Type	PNP
Rated Output Voltage	24V DC ($\pm 20\%$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Name	Current Input/Output Module (4AI + 4AO)
Number of Input Channels	4
Input Type	0/4–20mA
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	0–27648
Input Signal Accuracy	$\pm 0.1\%$
Sensor Connection	Supports 4-wire transmitters; (2-wire transmitters are also supported but require an external DC 24V power supply)
Number of Output Channels	4
Output Type	0/4–20mA
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	0–27648
Output Signal Accuracy	$\pm 0.1\%$

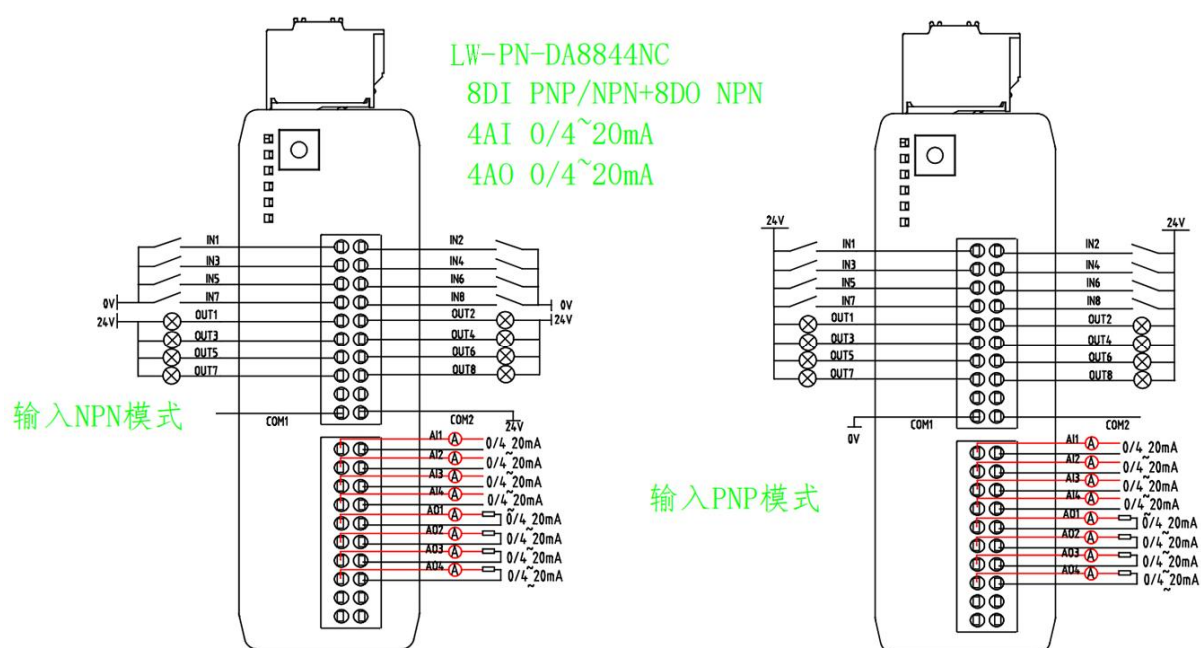
LW-PN-DA8844PC Module Wiring Diagram:



4.8.3 LW-PN-DA8844NC Parameters

Model	LW-PN-DA8844NC
Name	Digital Input/Output Module (8DI + 8DO)
Number of Input Channels	8
Input Signal Type	PNP/NPN
Rated Input Voltage	24V DC ($\pm 20\%$)
Logic "1" Signal	15–30V
Logic "0" Signal	0–3V
Input Current	3mA
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Number of Output Channels	8
Output Signal Type	NPN
Rated Output Voltage	0V DC ($\pm 3V$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Name	Current Input/Output Module (4AI + 4AO)
Number of Input Channels	4
Input Type	0/4–20mA
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	0–27648
Input Signal Accuracy	$\pm 0.1\%$
Sensor Connection	Supports 4-wire transmitters; (2-wire transmitters are also supported but require an external DC 24V power supply)
Number of Output Channels	4
Output Type	0/4–20mA, individually selectable per channel
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	0–27648
Output Signal Accuracy	$\pm 0.1\%$
Storage Temperature	–20 to 80 °C
Relative Humidity	95 %, non-condensing
Certification	CE

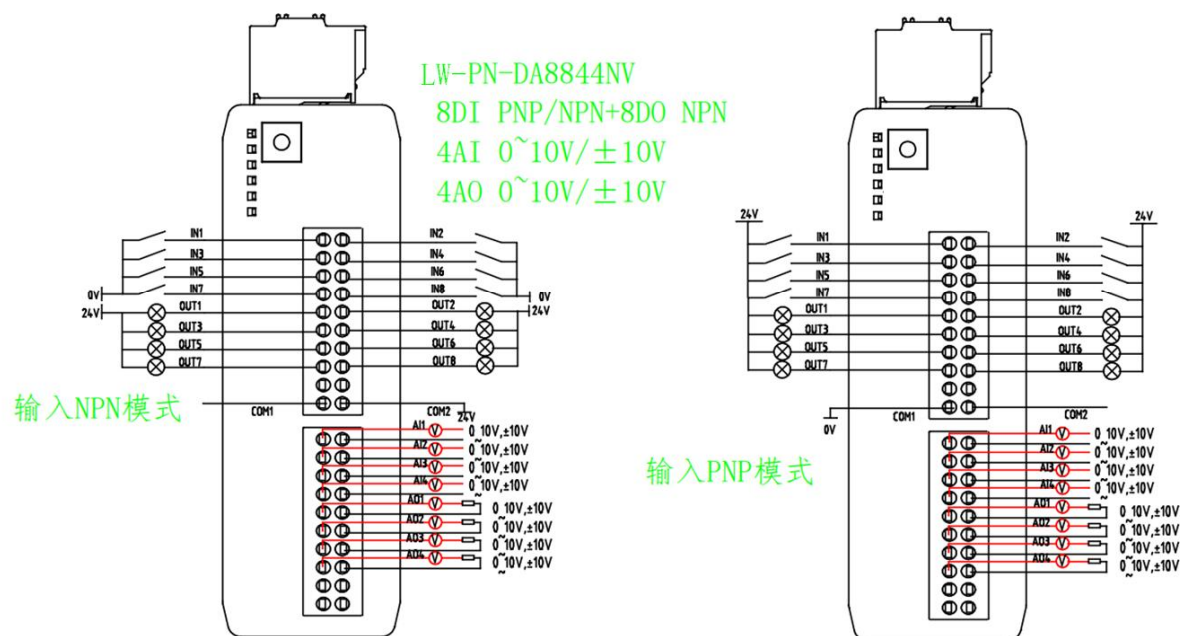
LW-PN-DA8844NC Module Wiring Diagram:



4.8.4 LW-PN-DA8844NV Parameters

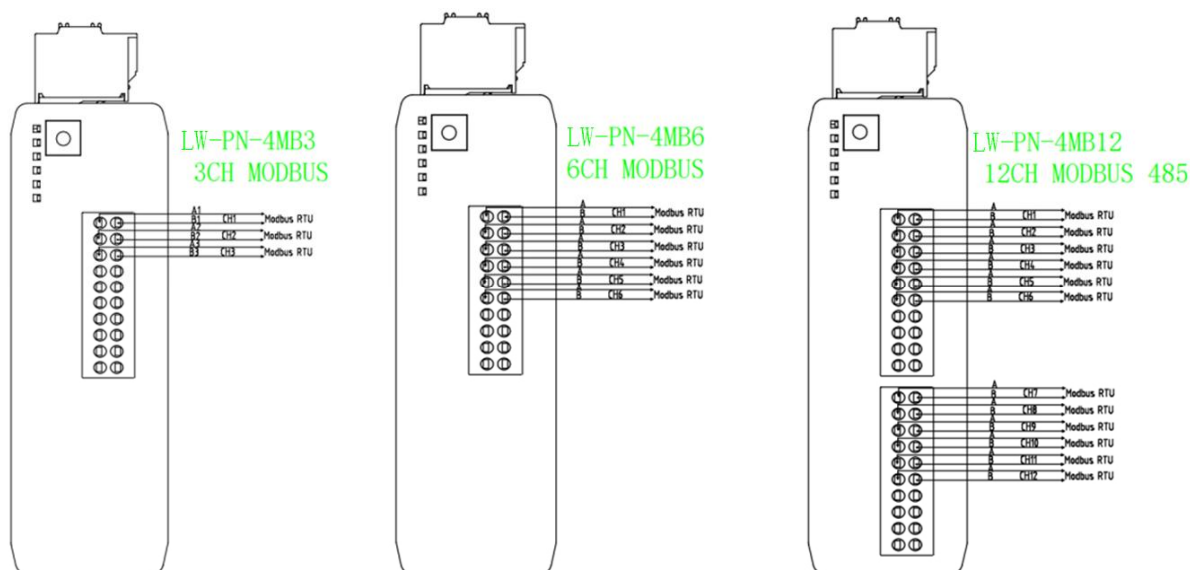
Model	LW-PN-DA8844NV
Name	Digital Input/Output Module (8DI + 8DO)
Number of Input Channels	8
Input Signal Type	PNP/NPN
Rated Input Voltage	24V DC ($\pm 20\%$)
Logic "1" Signal	15–30V
Logic "0" Signal	0–3V
Input Current	3mA
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Number of Output Channels	8
Output Signal Type	NPN
Rated Output Voltage	0V DC ($\pm 3V$)
Drive Current	0.5A
Fault Protection	Short-circuit protection, short-circuit alarm, over-temperature
Load Type	Resistive load, inductive load
Isolation Withstand Voltage	500V
Isolation Method	Optocoupler isolation
Name	Voltage Input/Output Module (4AI + 4AO)
Number of Input Channels	4
Input Type	0–10V / $\pm 10V$
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Input Signal Accuracy	$\pm 0.1\%$
Channel Status Indicator	Green LED
Number of Output Channels	4
Output Type	0–10V / $\pm 10V$
Resolution	16-bit
Conversion Time	1 ms
Full-Scale Range (Data Word)	–27648 to +27648
Output Signal Accuracy	$\pm 0.1\%$

LW-PN-DA8844NV Module Wiring Diagram:



4.8.5 LW-PN-4MB3\4MB6\4MB12 Industrial Gateway Parameters

Model	LW-PN-4MB3	LW-PN-4MB6	LW-PN-4MB12
Name	RS485 to PROFINET Gateway		
Number of Channels	3 independent RS485	6 independent RS485	12 independent RS485
Recommended Max. RS485	8	8	8
Max. RS485 Devices per	64	64	64
Communication Rate	Up to 115200 bps		
Communication Protocol	Modbus		
Configuration Method	Limited to 64 instructions; configured via GSD file		
Channel Status Indicator	Green LED		
Dimensions	93 × 32 × 122 mm (W × H × D)		
Weight	Approx. 150 g		
Protection Rating	IP20		
Operating Temperature	-10 to 70 °C		
Storage Temperature	-20 to 80 °C		
Relative Humidity	95 %, non-condensing		
Certification	CE		



5 Using the LW-PN Series All-in-One I/O Modules in Siemens S7 Series PLC Programming Software

Preliminary Preparations:

Please refer to the wiring instructions in Section 2 to correctly connect the module to the system. Set the IP address of the computer to the same subnet as the PLC's IP address. Prepare the GSDML configuration file for the corresponding module, as shown in the figure below:



Place the configuration file and the device icon in the same directory.

Hardware Configuration:

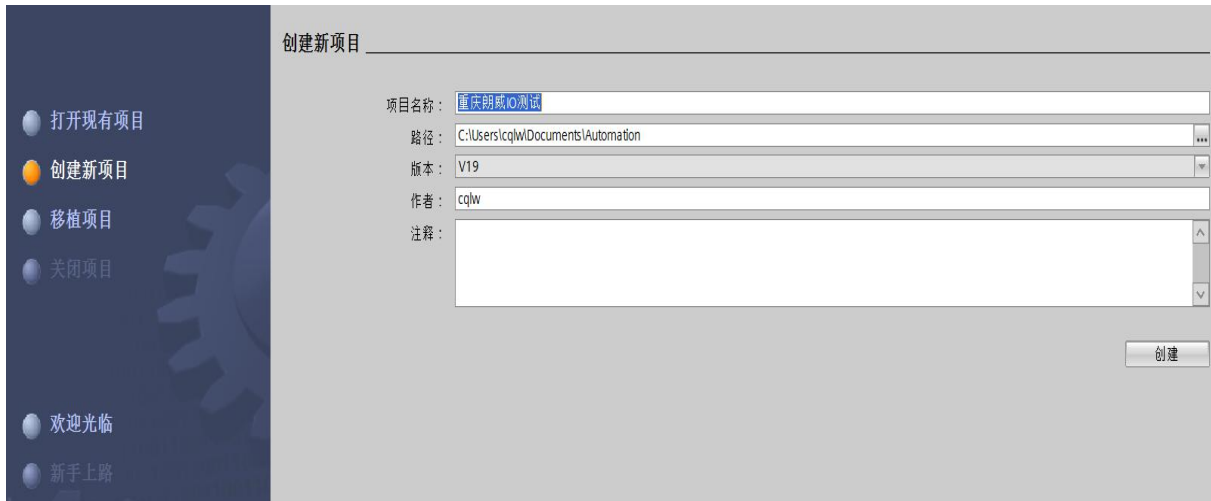
One Siemens S7-1200 CPU 1212C and one LW-PN-DO32P module, as shown in the figure below:



5.1.1 Configuration of Standard Models in TIA Portal V19

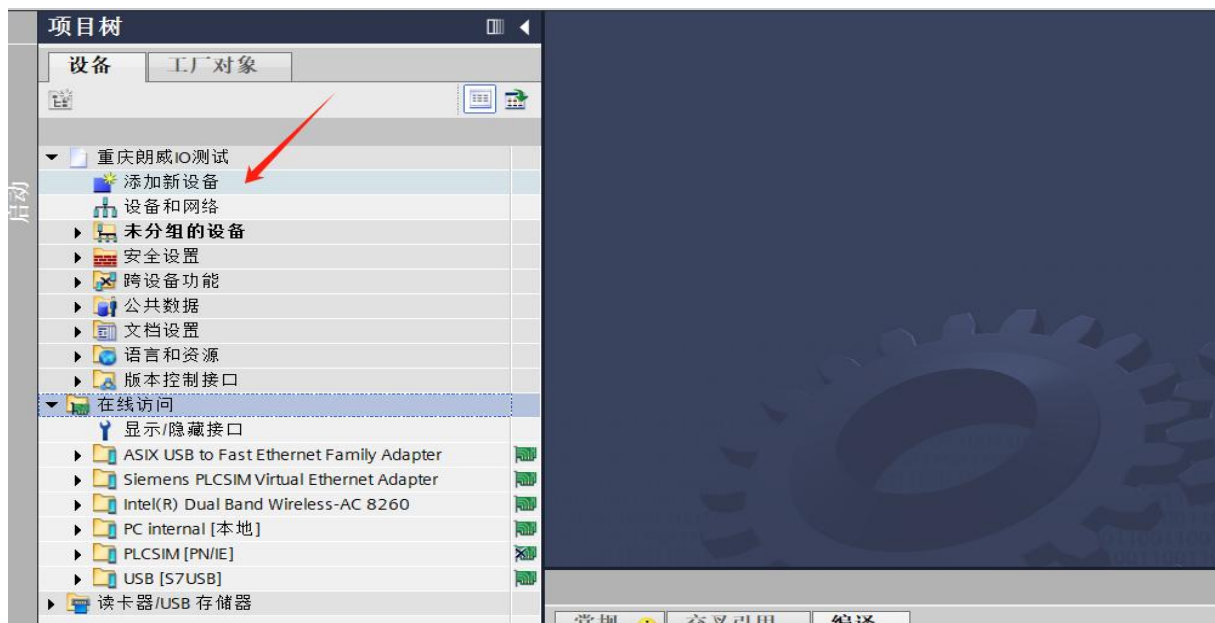
(1) Creating a New Project:

Click "Create new project", enter the "Project name", select the "Path", and click "Create" to complete the project creation.

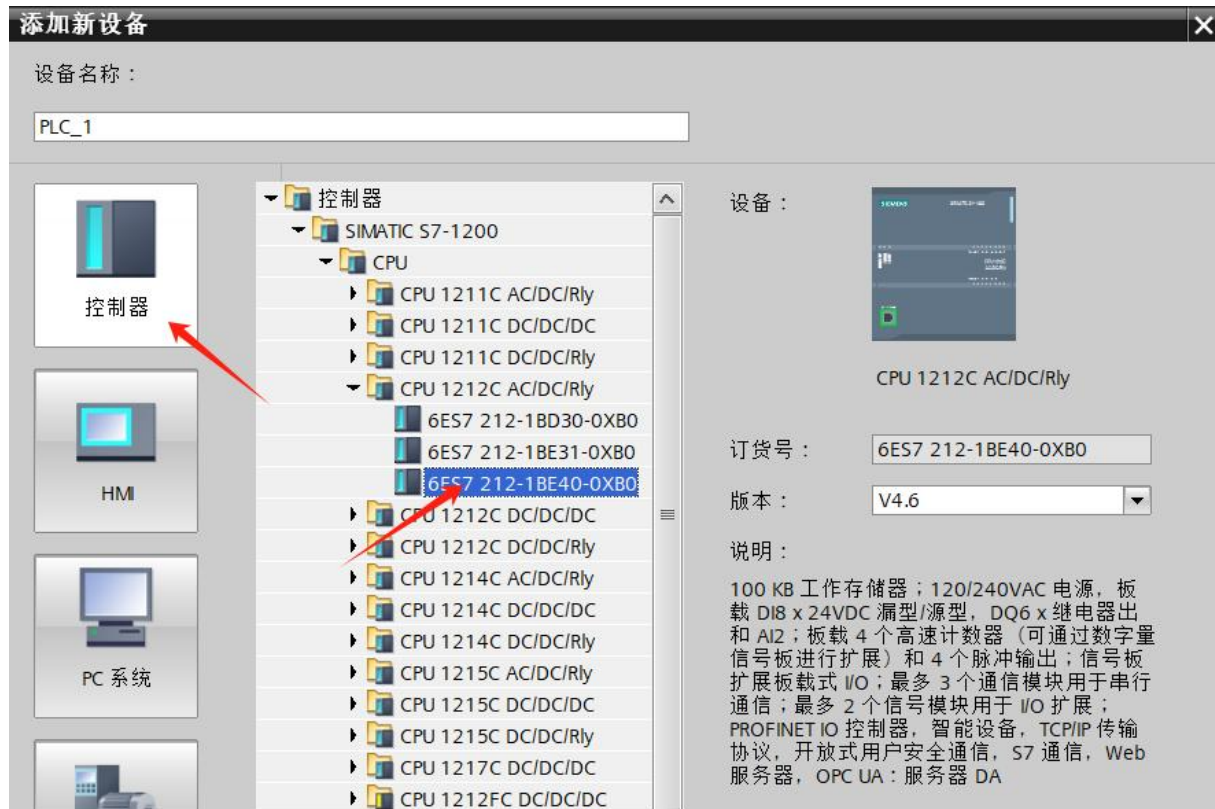


(2) Adding the PLC Controller

In the "Devices & Networks" section under "First Steps", select "Configure a device".

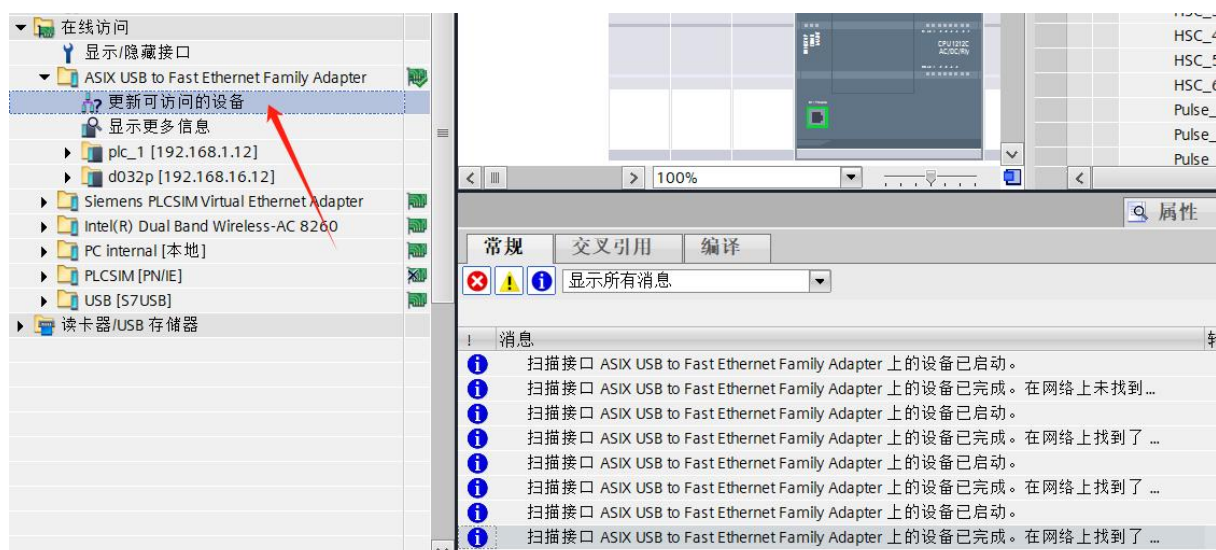


(3) In the "Devices & Networks" window, click "Add new device", select "Controller", choose the PLC model currently in use, and click "Add" to complete the controller addition.



(4) Scanning for Connected Devices

In the "Online access" folder, double-click the network adapter being used, and then double-click "Update accessible devices" under the network adapter. Wait for the update to complete; the slave devices connected via the Ethernet cable will be automatically added. (Generally, the first device is the PLC controller. The IP addresses of the PLC and the computer must be in the same subnet. If they are not in the same subnet, close the project, modify the computer's IP address, and repeat the above steps.)

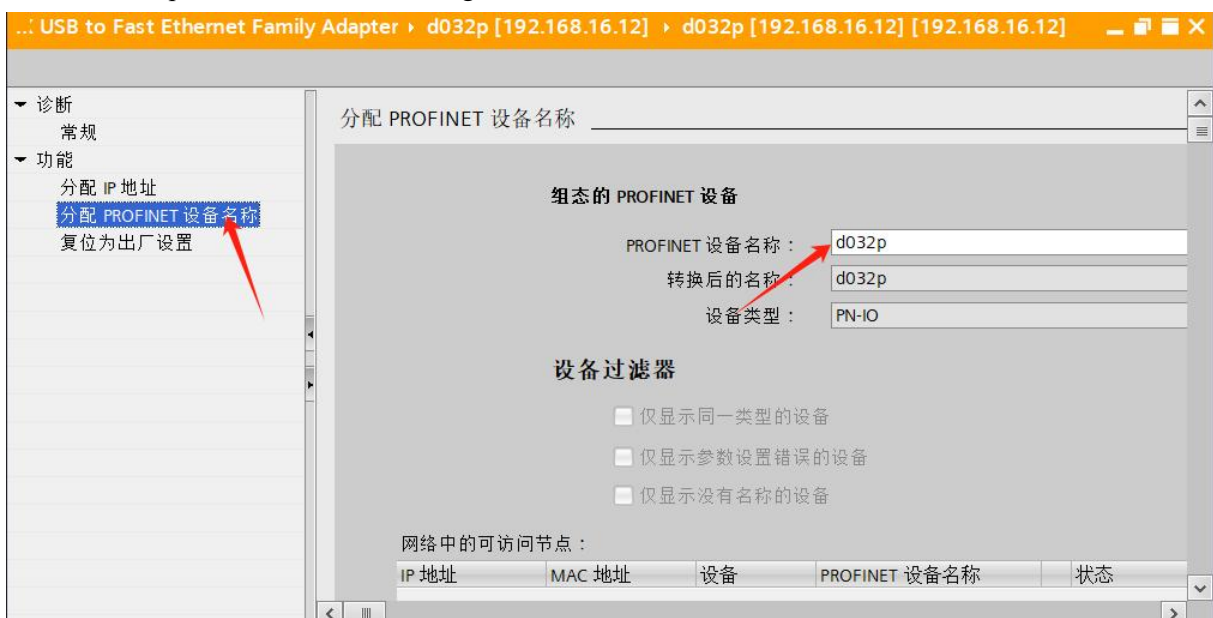


(5) Assigning IP Address and Device Name to the Slave Station

Double-click "Online & Diagnostics" under the slave device. Under the "Functions" menu, you can assign the IP address and device name to the current slave station. Double-click "Assign IP Address", first enter the "Subnet Mask", then enter the "IP Address", and click "Assign IP Address" to complete the IP address assignment.

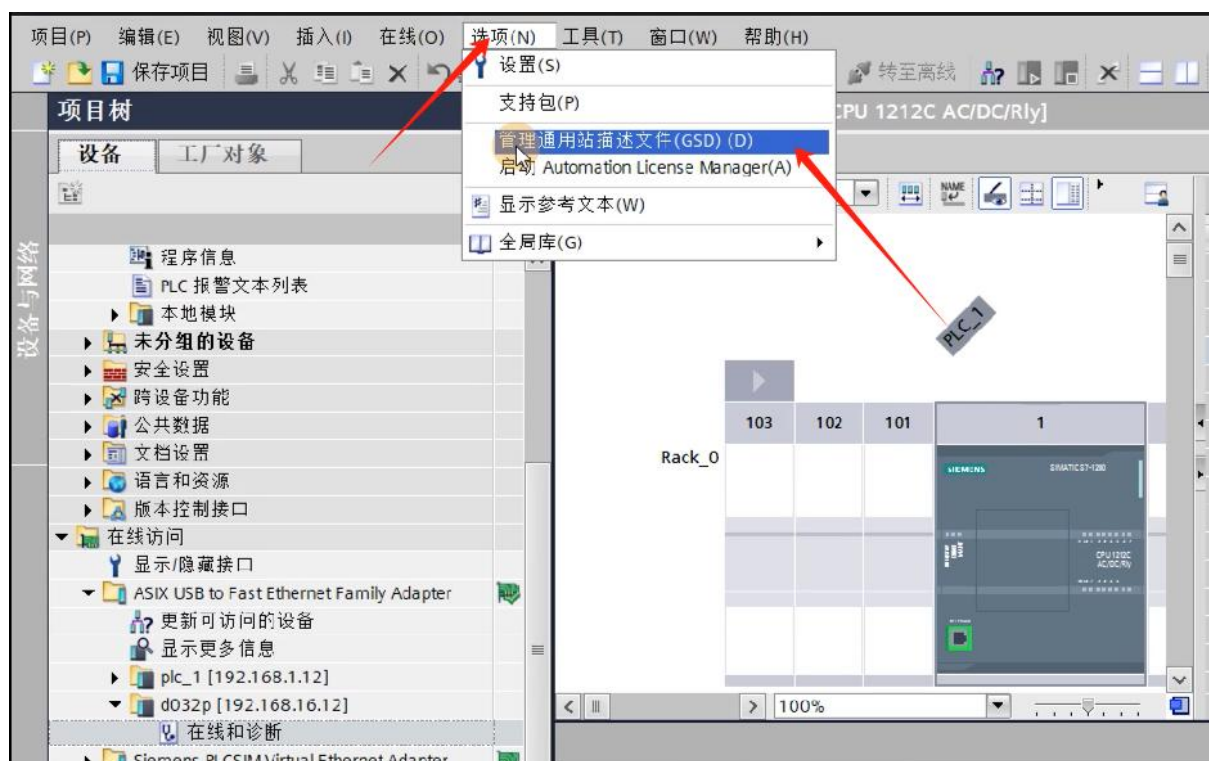


Double-click "Assign PROFINET Device Name", enter the "PROFINET Device Name", and click "Assign Name" to complete the device name assignment.



(6) Adding the GSD Configuration File

In the menu bar, click "Options" and select "Manage general station description files (GSD)".

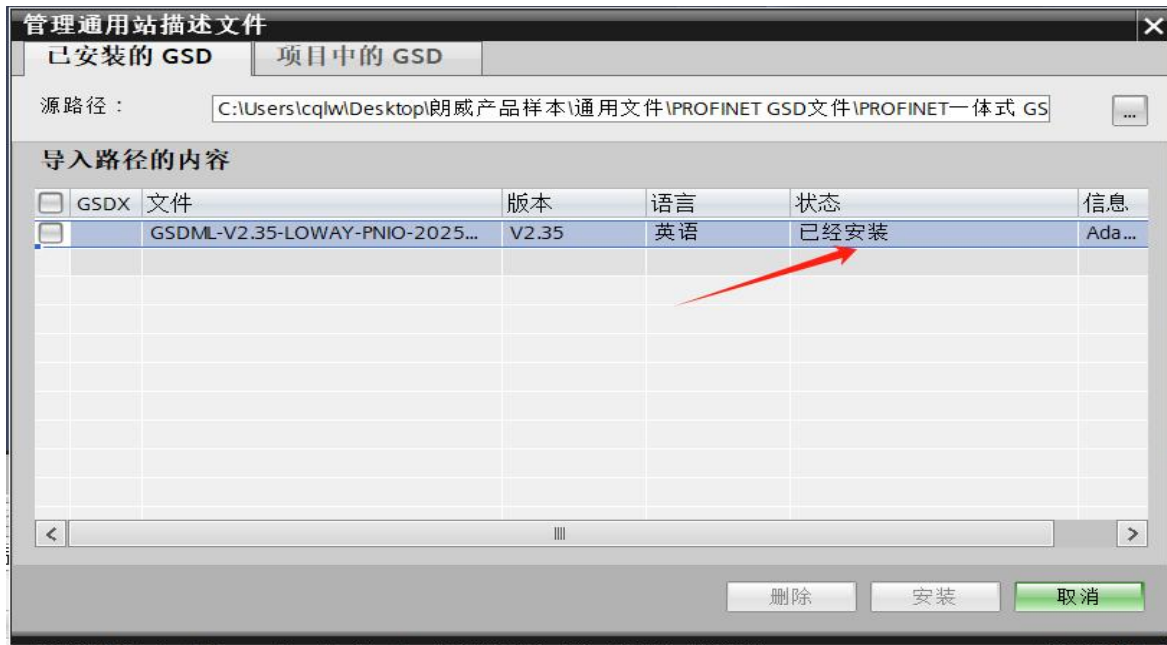


Click the three dots at the end of the "Source path" field, select the folder where the prepared GSD file is stored, and click "OK".



Check the status of the GSD file to be added to see if it is "Not yet installed". If it is not yet installed, select the checkbox in front of the GSD file and click "Install". If it is already installed, click "Cancel" to skip the installation step and proceed to the next operation.

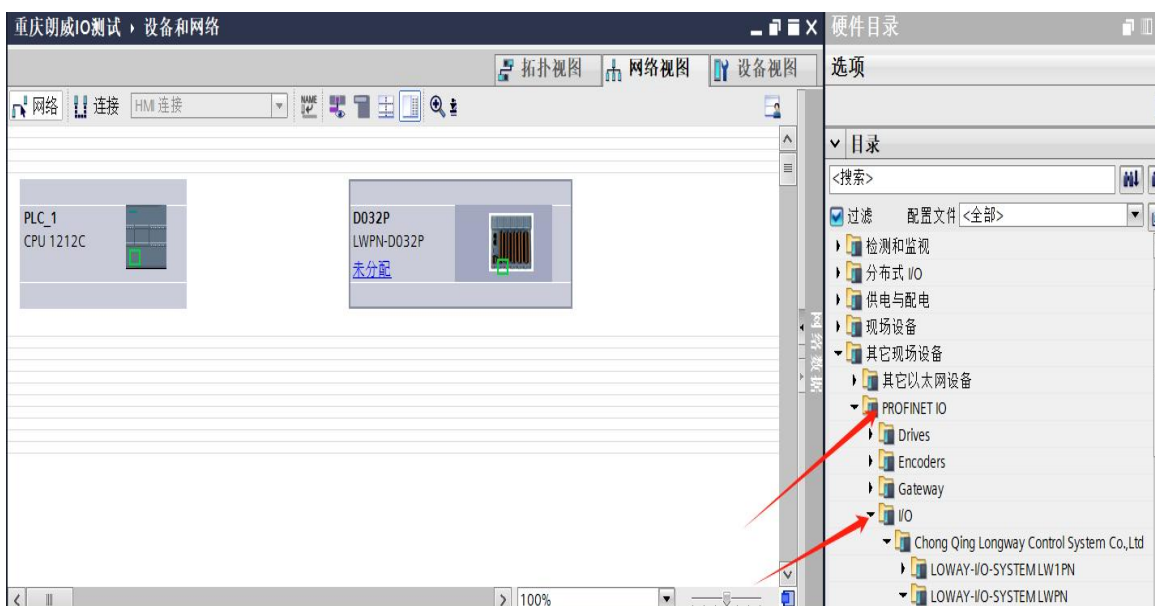
Click "Install".



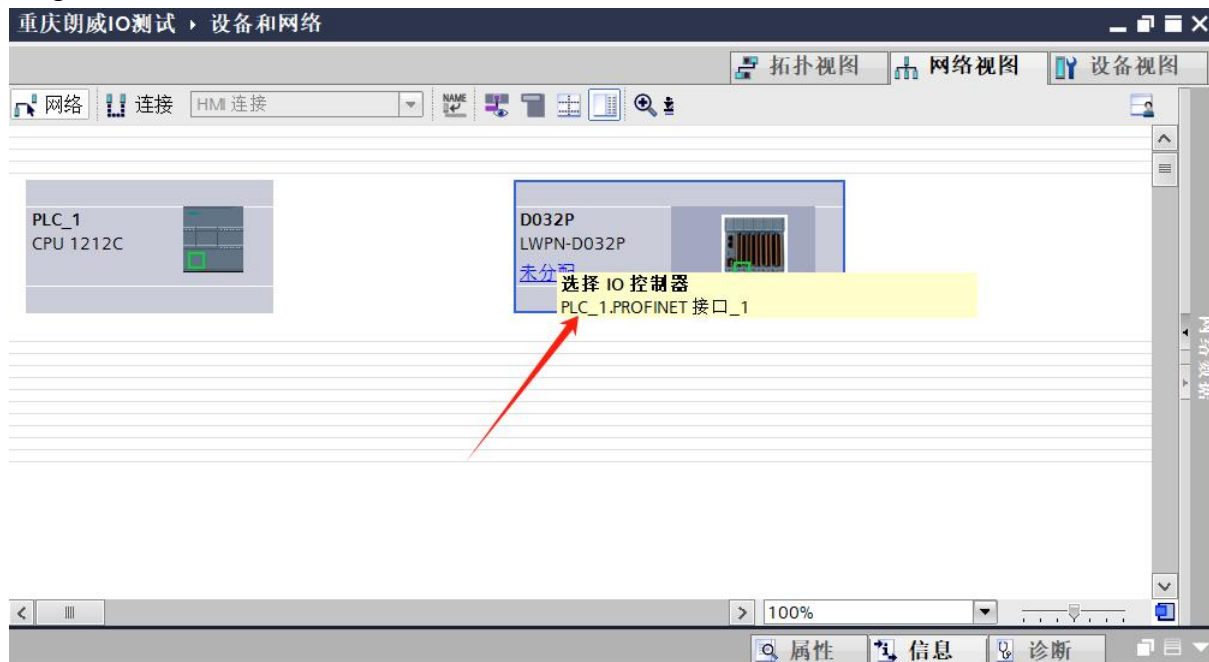
Click "Close" to complete the GSD installation.

(7) Adding the PROFINET All-in-One I/O Module

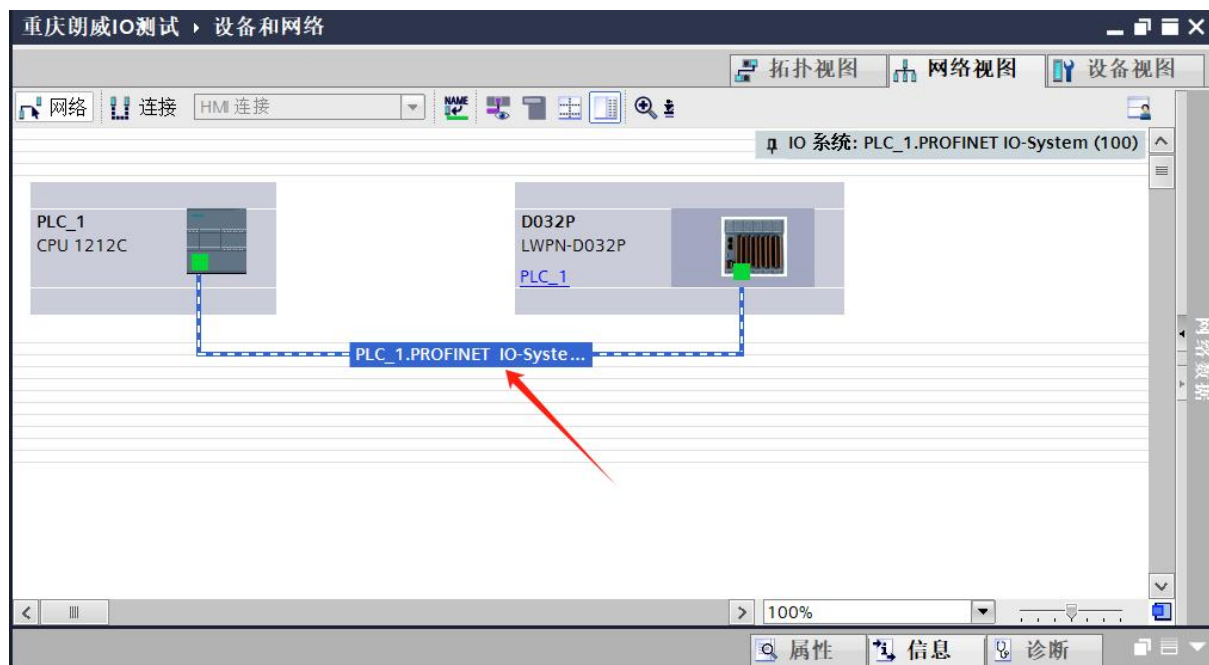
Double-click "Devices & Networks". In the hardware catalog on the far right, locate the product model for which the GSD was installed above. The specific file path is as follows: Other field devices → PROFINET IO → I/O → Chongqing Longway Networked Intelligent Control System Co., Ltd → LOWAY-I/O-SYSTEM LW-PN → DO32P. Drag or double-click DO32P to add it to the "Network view".



In the "Network view", click "Not assigned" (in blue font) on the slave device, then click "PLC_1.PROFINET interface_1" (the actual name may vary) below "Select IO controller" to complete the assignment.

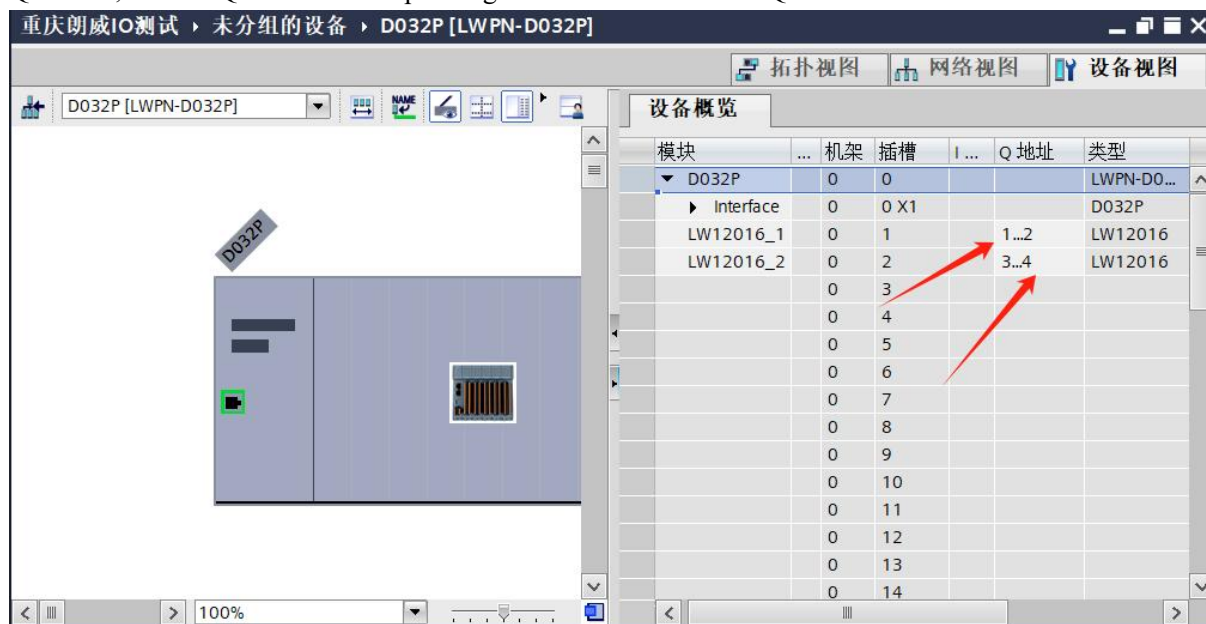


Once connected, the PLC and the TP8001 are linked by a blue-and-white striped line, as shown in the figure below:



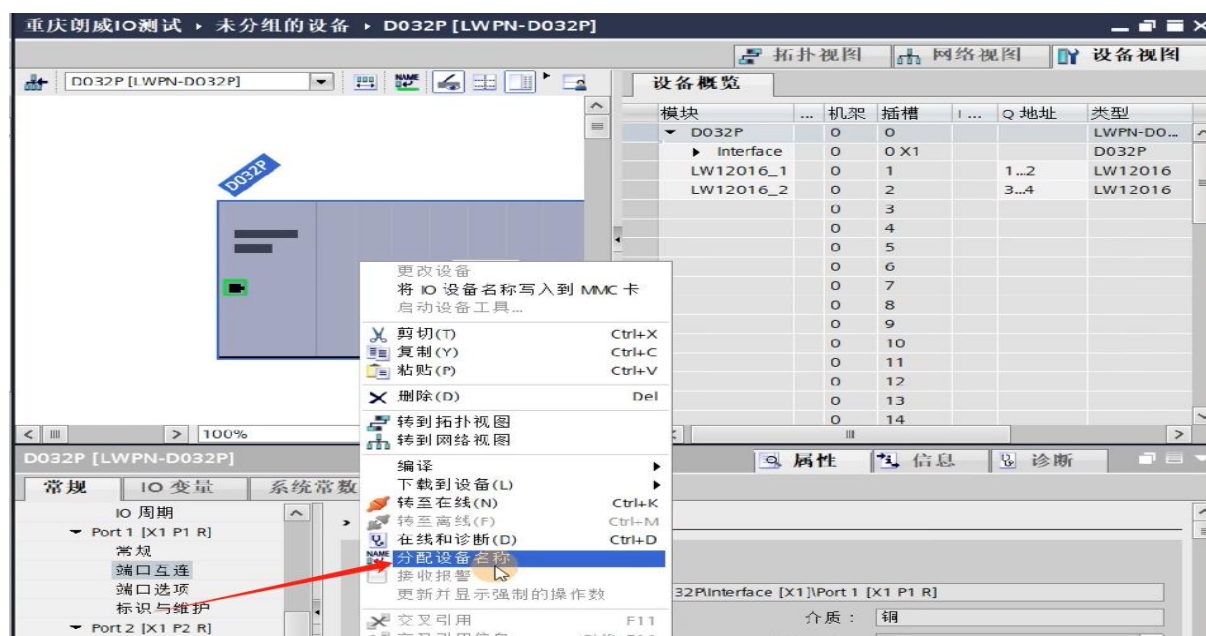
(8) Viewing the I/O Variable Addresses of the Module

Double-click "DO32P" in the "Network view". Since it is an all-in-one I/O module, the detailed addresses of the module will be displayed after double-clicking. The Q address corresponding to LW12016-1 starts at QW%1.0, and the Q address corresponding to LW12016-2 starts at QW%3.0.

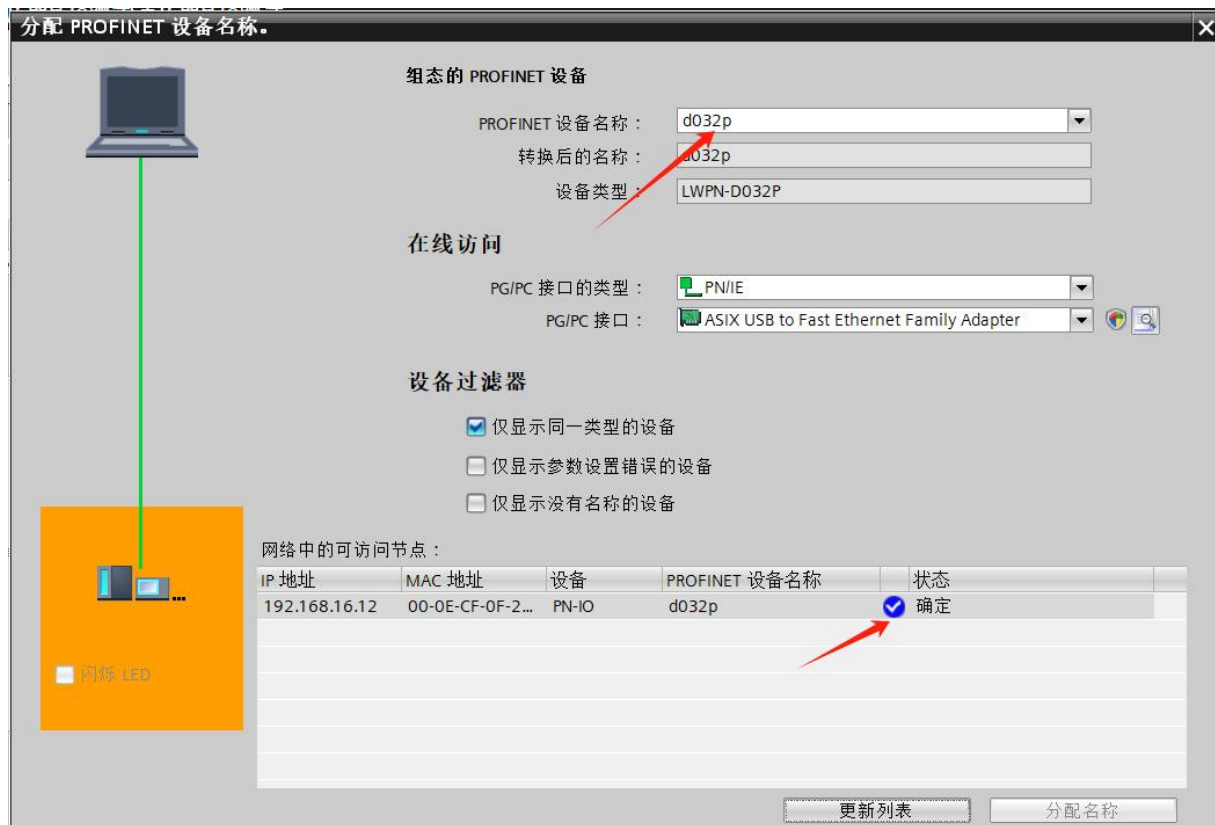


(9) Assigning the Device Name to the Configured Device (for PLC to Identify the Slave Device)

Right-click the connection line between the PLC and the LW-PN-DO32P, and select "Assign device name".

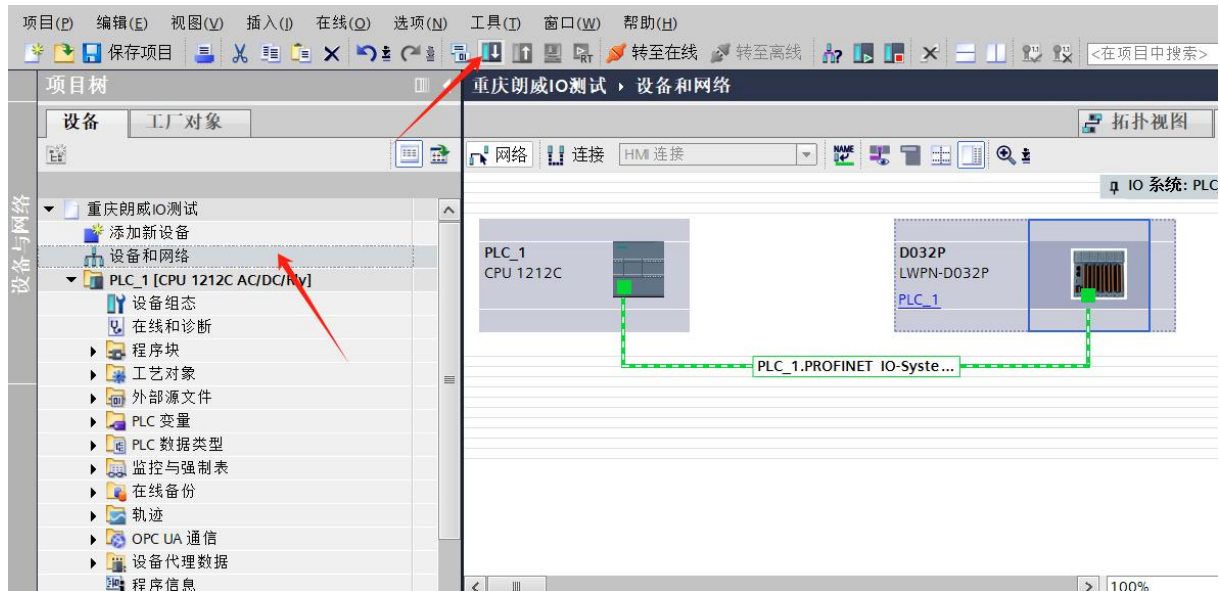


Click the dropdown menu next to "PROFINET device name" and select the name previously assigned to the device. For "Type of the PG/PC interface", select "PN/IE"; for "PG/PC interface", select your network adapter. Click "Update list" and check whether the status of the node in "Accessible nodes in the network" is "OK". If not, select the node and click "Assign name" below to complete the device name assignment. Then click "Close" to close the window.

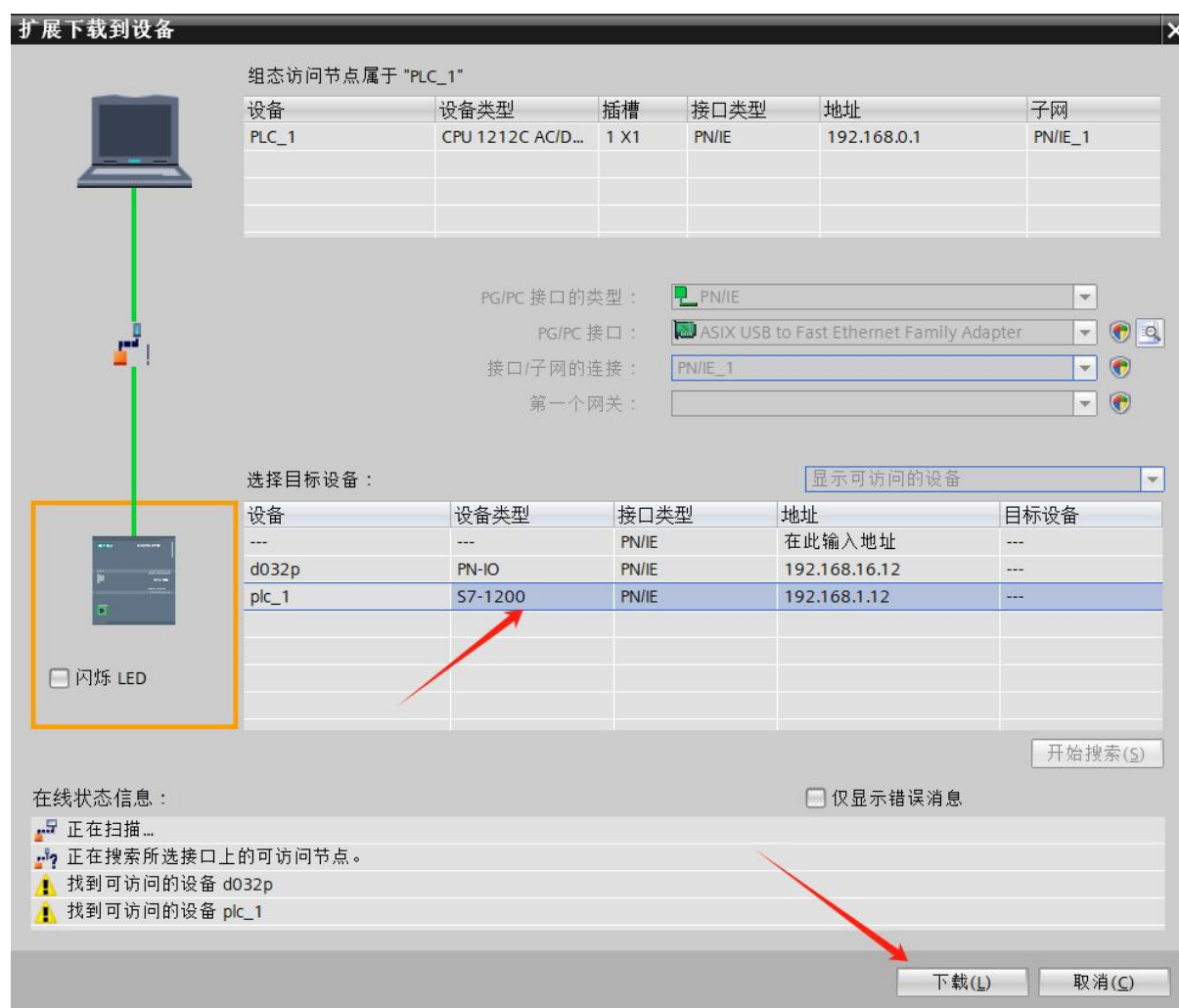


(10) Downloading the Configuration to the Device

Double-click "Devices & Networks" to return to the "Network view". Select the PLC, and then click the "Download to device" button in the menu bar to download the current configuration to the PLC.

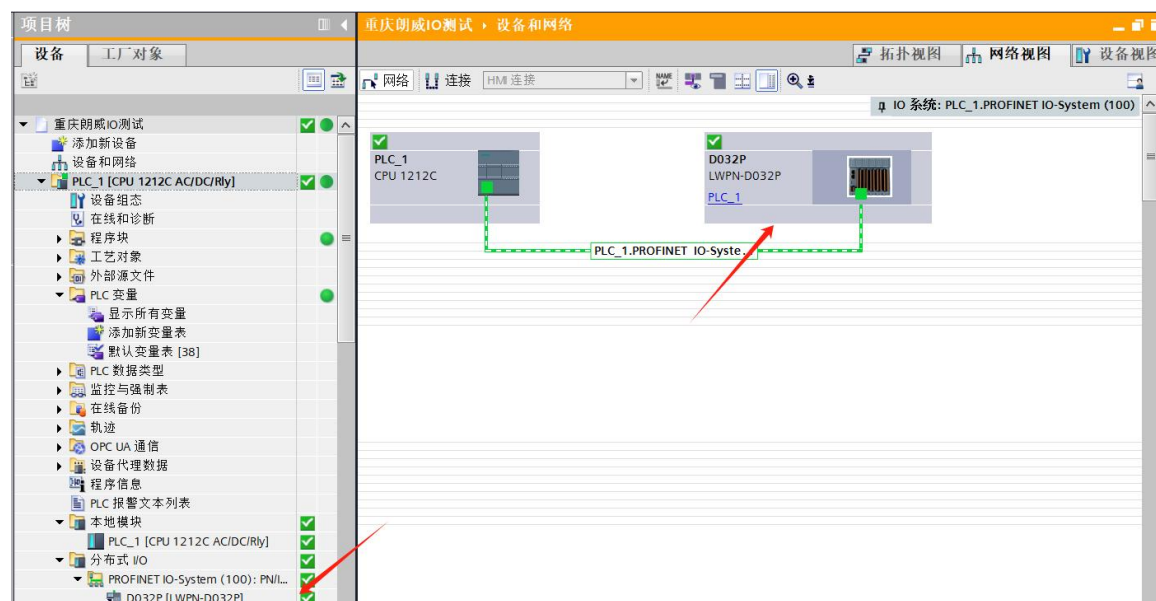


Click the "Download" button.



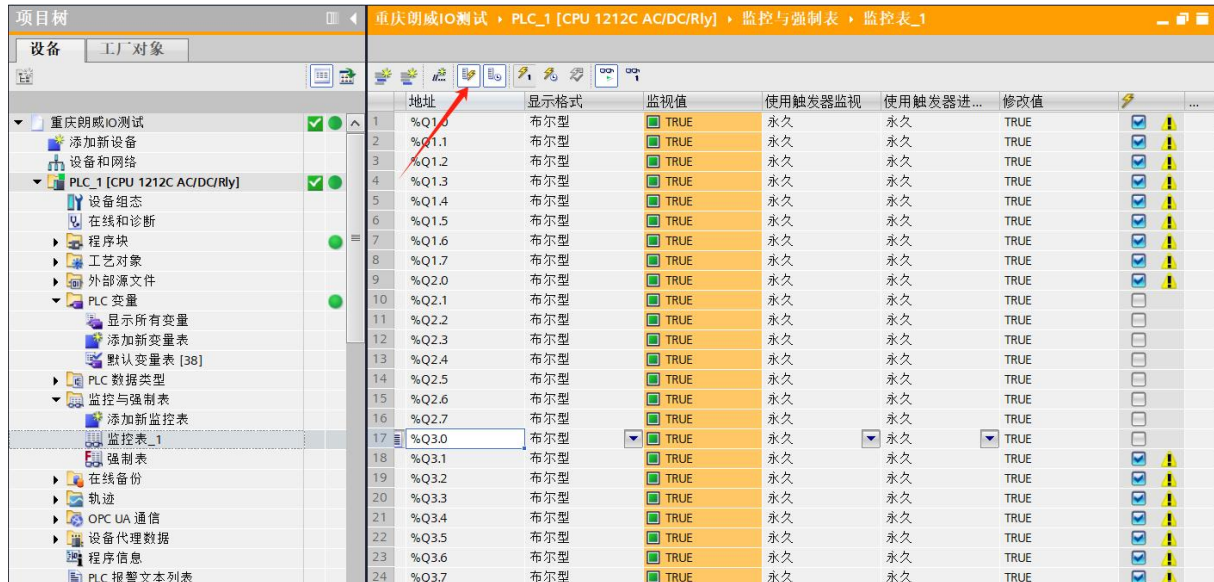
(11) Communication Connection

Select the PLC and click "Go online" in the menu bar. As shown in the figure below, when all indicators are green, the connection is established successfully.



(12) Data Exchange

Click "Force table" and switch the CPU to "RUN" mode in the "CPU operation panel". Enter the output module address into the "Address" field.



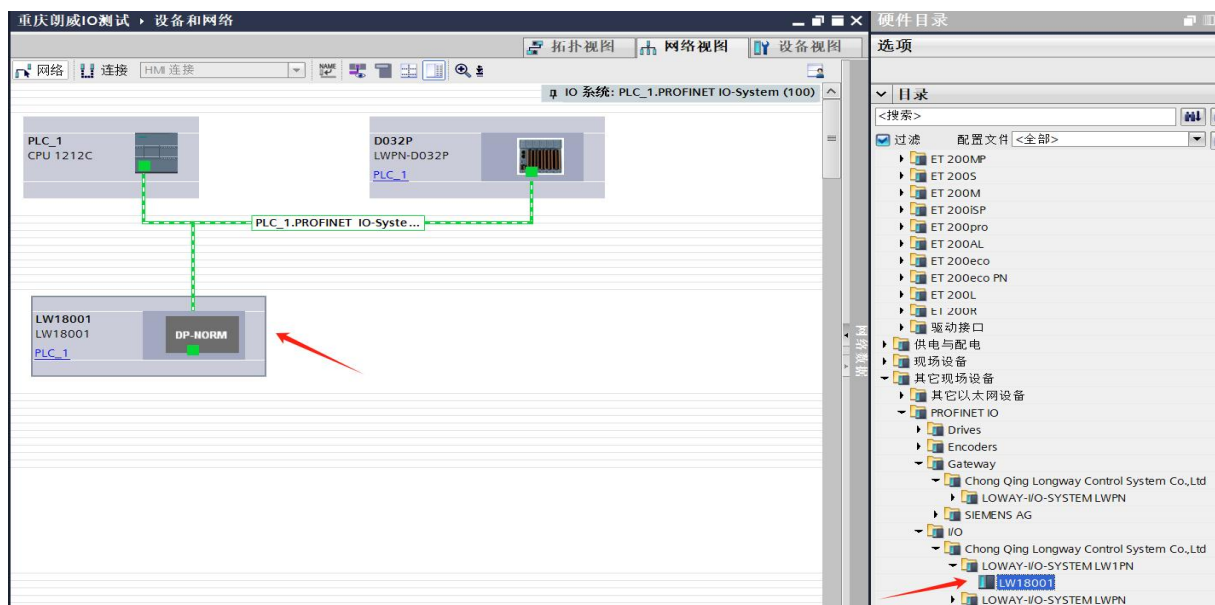
The physical view of the module is shown in the figure below, with all output LEDs illuminated.



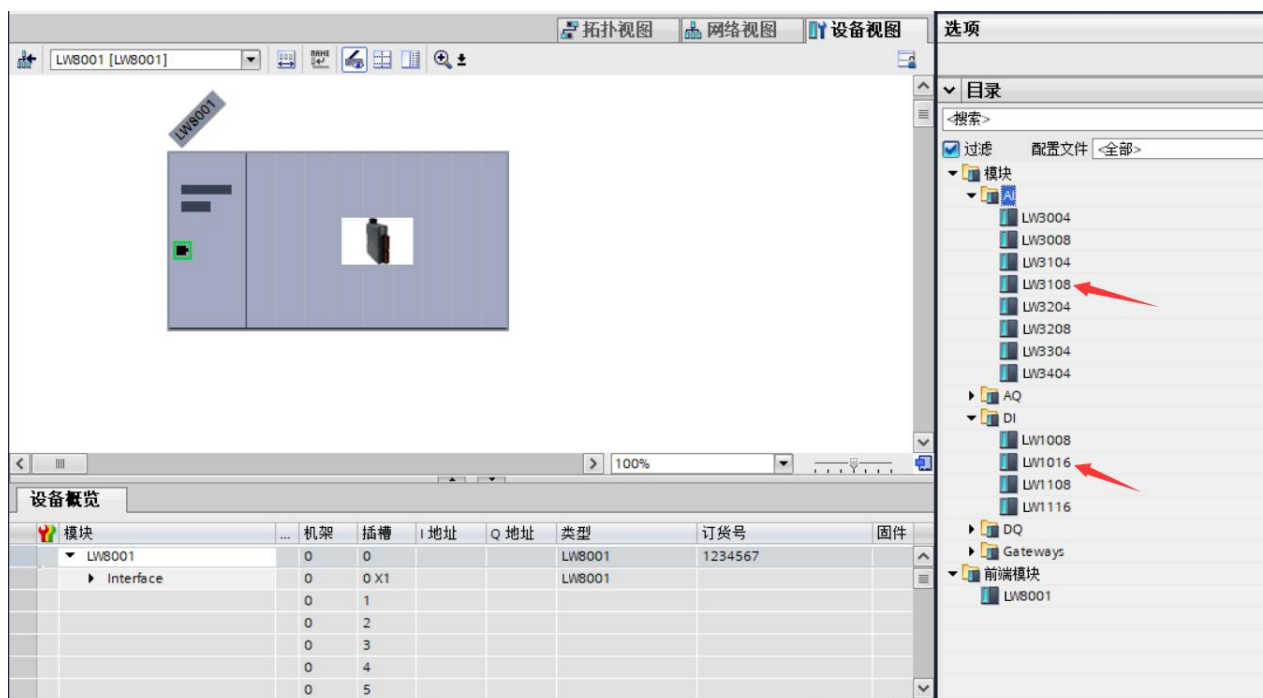
At this point, the S7-1200 is ready for programming. The procedure for the Siemens S7-1500 is similar.

(13) Selection of GSD for Non-Standard Models

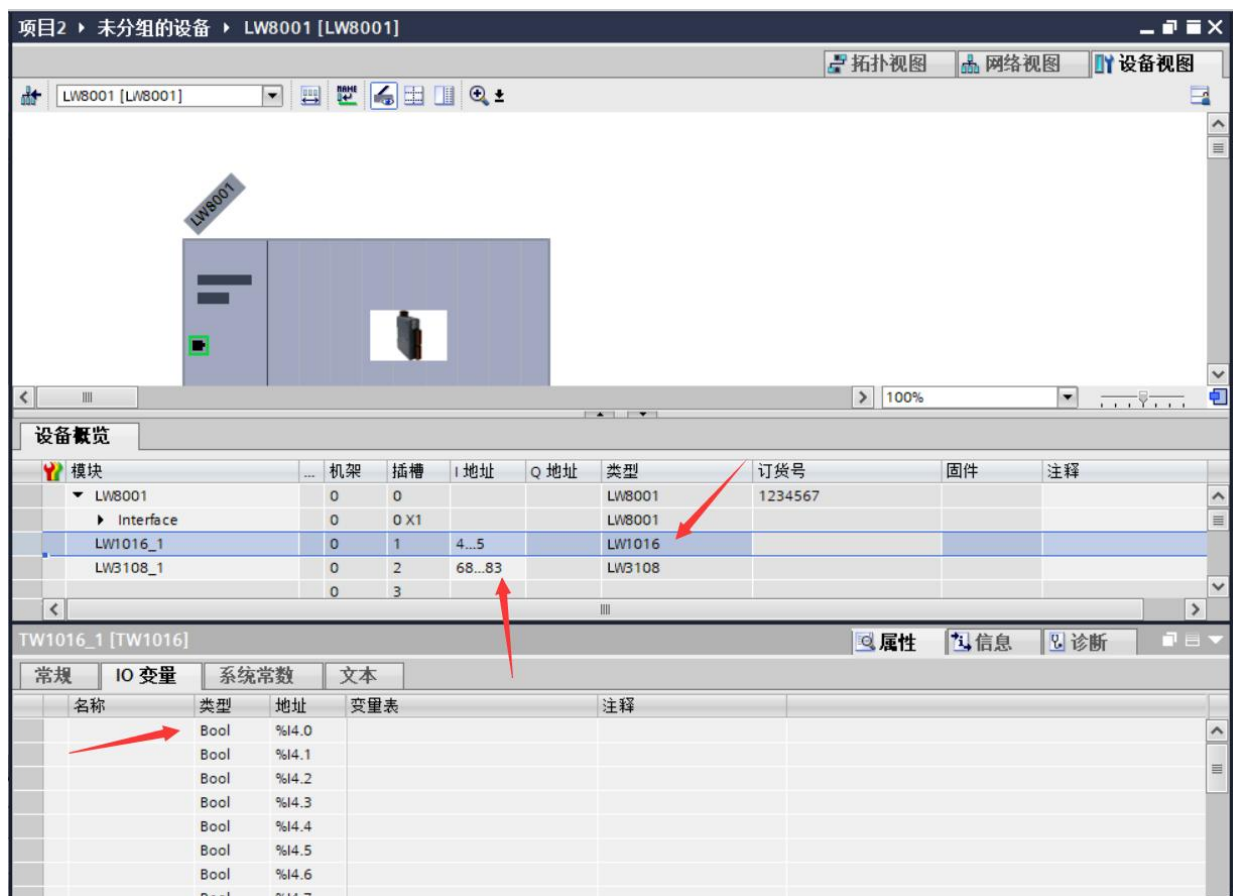
For non-standard models, our company generally follows the principle of selecting auxiliary modules with digital signals first, followed by analog signals; inputs first, followed by outputs. For example, if a customer requires a module with 16DI + 8AI current type, the auxiliary communication board to be selected would be: LW-1016 + LW-3108. The ordering code is: LW-PN-DA16080BC. Under the standard model path, double-click the LW-8001 mode



Then double-click LW-8001 in the Network view, and the following auxiliary module models will appear:



In sequence, double-click LW-1016 and LW-3108 successively.



This will display the module addresses. The programming method is similar to that for the standard models described above.

5.1.2 Configuration of Standard Models in STEP 7-Micro/WIN SMART for S7-200 SMART

Preparations:

One SIMATIC S7-200 SMART CPU, one LW-PN-DO32P, and one LW-PN-AO16C, as shown in the figure below:



(1) Setting the CPU Model



Double-click the tree directory, as shown in the figure above. Select the CPU model: SIMATIC S7-200 SMART \ CPU ST20.

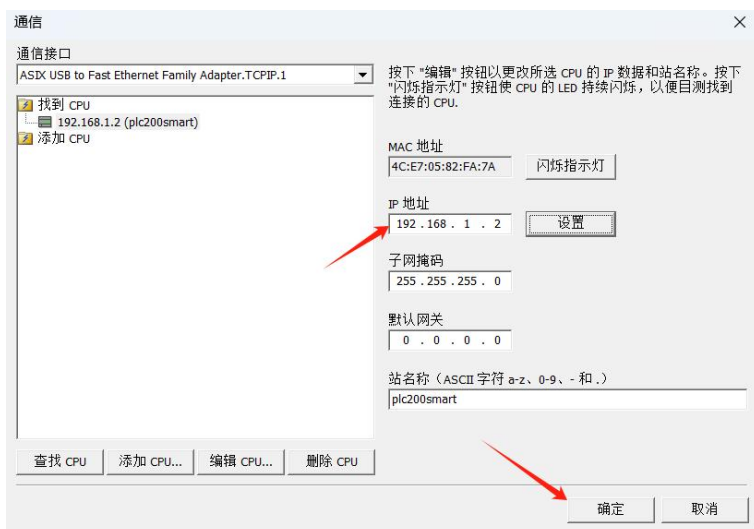
(2) CPU Finding, Adding, and Removing the CPU



Double-click the Communication button, as shown in the figure below.



(3) Assigning the CPU IP Address

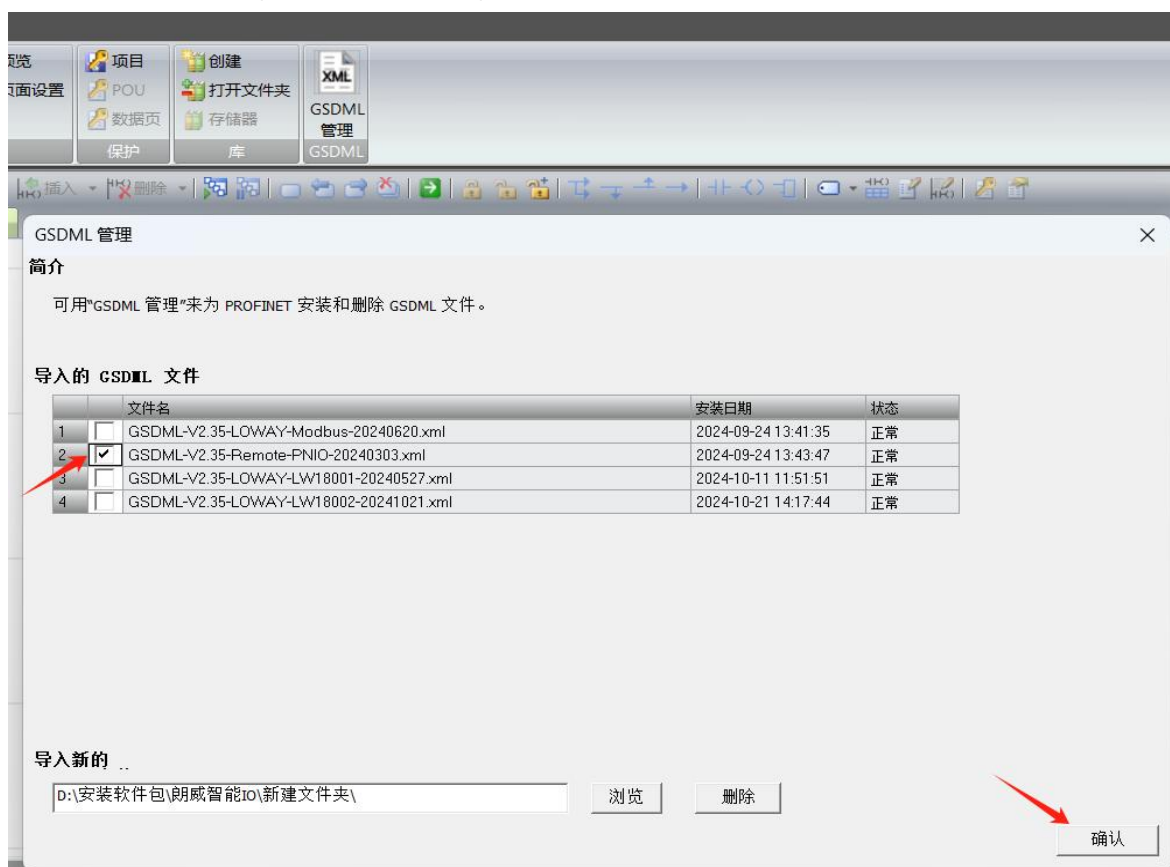


Click the "Set" button. The IP address field becomes active, allowing you to modify the IP address and station name. After making the changes, click the "Set" button again.

(4) Adding the GSD File



Click "GSDML Management" in the navigation bar.



Select the GSDML file to be imported, click "OK", and the GSDML file import will be completed.

(5) Device Naming

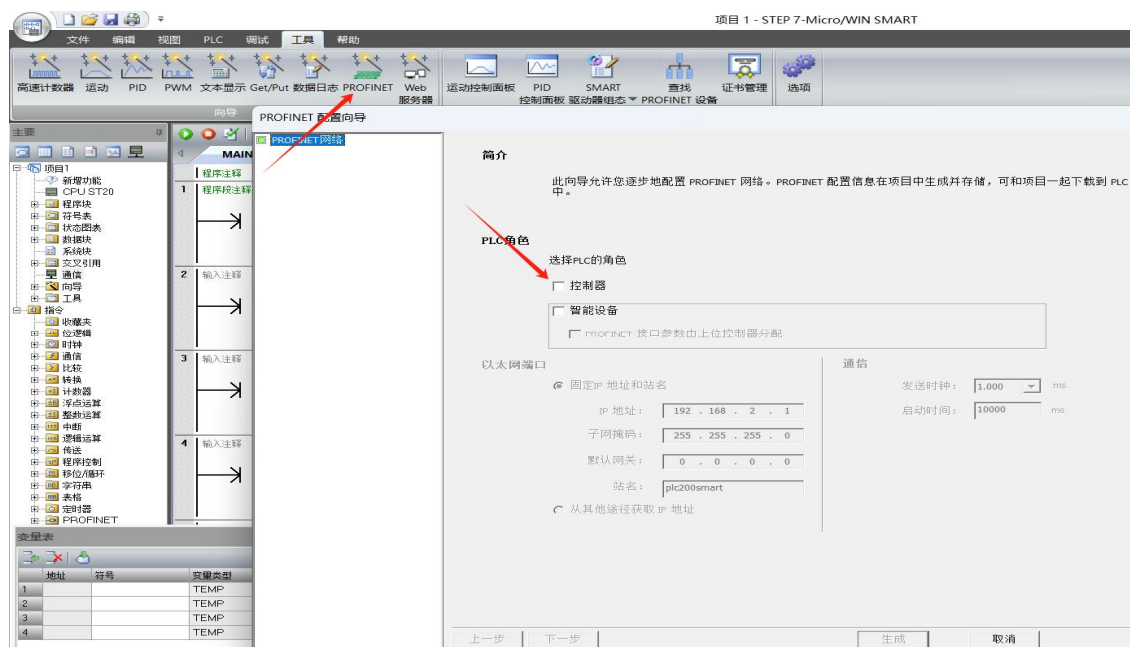


All PROFINET devices must have a device name and an IP address. Use STEP 7-Micro/WIN SMART to define the device name. The device name is assigned via the PROFINET DCP (Discovery and Configuration Protocol). The PROFINET device and the PC must be located in the same subnet. Click the "Find PROFINET Devices" button in the "Tools" area of the "Tools" menu ribbon.

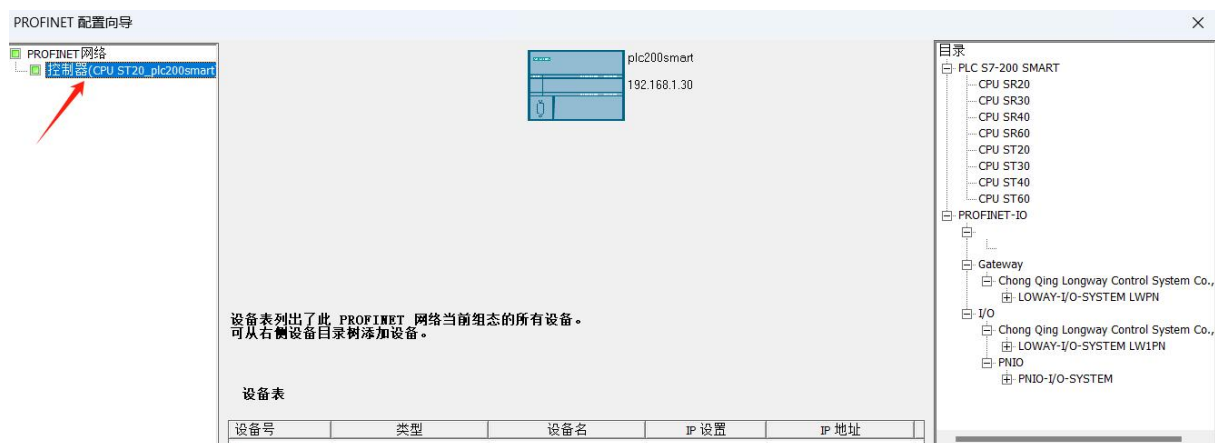


Click "Find Devices" to display the device name, then click "Edit" to modify the device name.

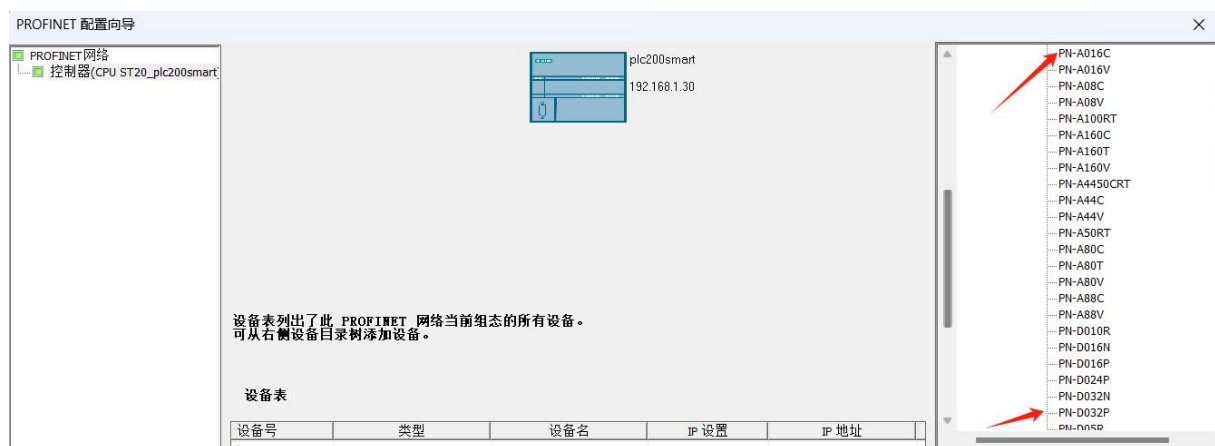
(6) Configuring the PROFINET Network



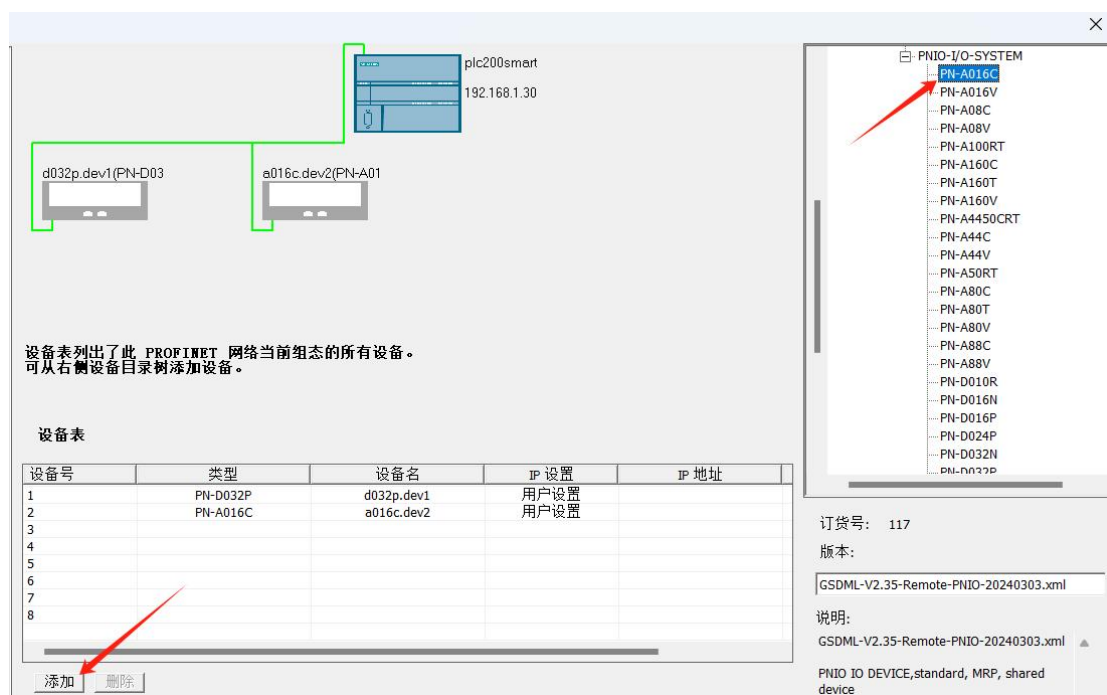
Click the PROFINET button in the Tools menu bar. Select the PLC role as Controller and set the IP address.



Click Controller to add the backend configuration module. Select I/O → PNIO → PNIO-I/O-SYSTEM, and load the corresponding module.



Load the DO32P and AO16C modules and click "Add".



Assign the device name, set the IP address, and click "Generate".

Diagram showing three devices: d032p(PN-D032P), a016c(PN-A016C), and plc200smart. The plc200smart is connected to both d032p and a016c.

设备表列出了此 PROFINET 网络当前组态的所有设备。
可从右侧设备目录树添加设备。

设备表

设备号	类型	设备名	IP 设置	IP 地址
1	PN-D032P	d032p	用户设置	192.168.1.15
2	PN-A016C	a016c	用户设置	192.168.1.16
3				
4				
5				
6				
7				
8				

Click "Find PROFINET Devices" to ensure that the station name matches the name configured in the device table.

项目 1 - STEP 7-Micro/WIN SMART

主要

通信接口: ASIX USB to Fast Ethernet Family Adapter.TCP/IP.Auto.1

按卜"编辑"按钮以更改所选设备的名字。按下"闪烁指示灯"按钮使设备的LED持续闪烁,以便目测连接的设备。

PROFINET 设备

- 192.168.0.227 (a016c)
- 192.168.16.12 (d032p)

MAC 地址: 00:0E:CF:0F:2C:82 闪烁指示灯

IP 地址: 192.168.0.227

子网掩码: 255.255.255.0

默认网关: 192.168.1.6

站名称 (中文, ASCII字符'a-z', '0-9', '!'和'.'。不可以'!'和'port-n(n=0..9)'开始,不可以'!'和'.'结束。)

a016c 编辑

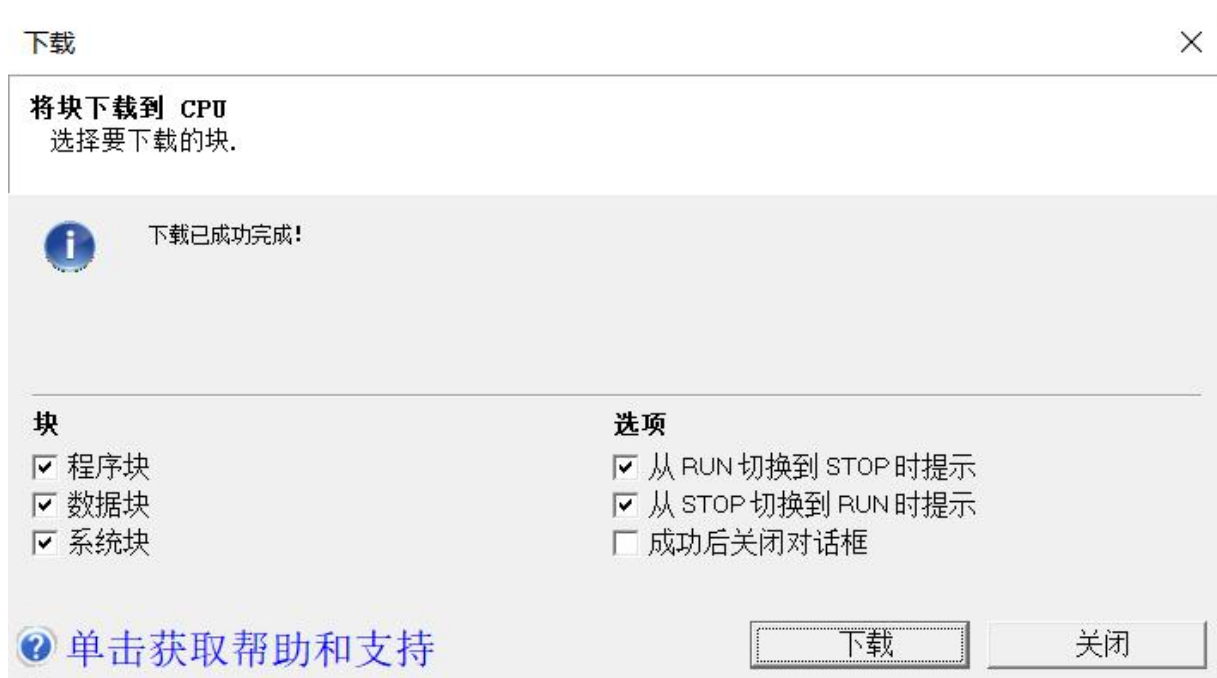
转换后的名称: a016c

查找设备

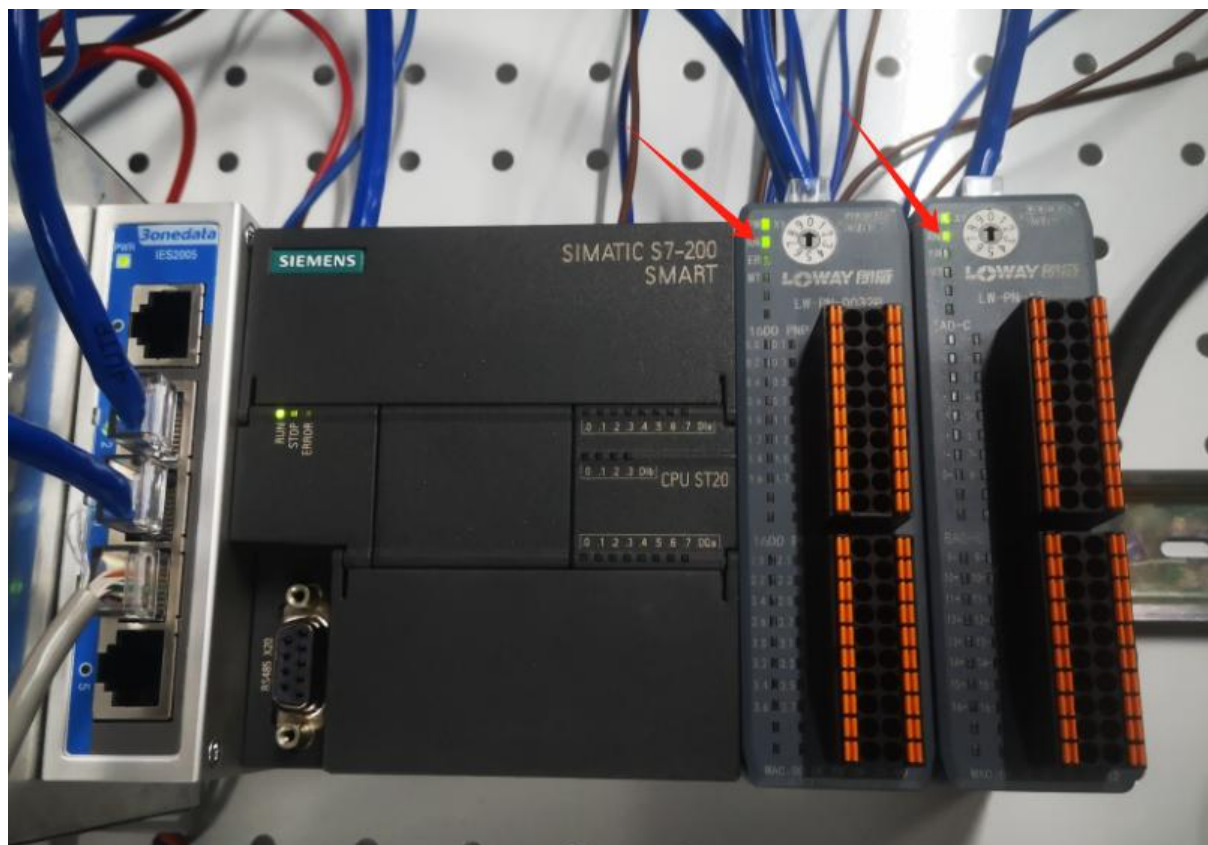
取消

(7) Downloading to the PLC

Click the "Download" button.



Download completed; close the dialog box. At this point, the I/O module is in RN mode, indicating that a connection has been established between the I/O module and the CPU.



(8) Locating the Start Addresses for Digital and Analog Outputs, and Reading/Writing Data Based on the Start Addresses

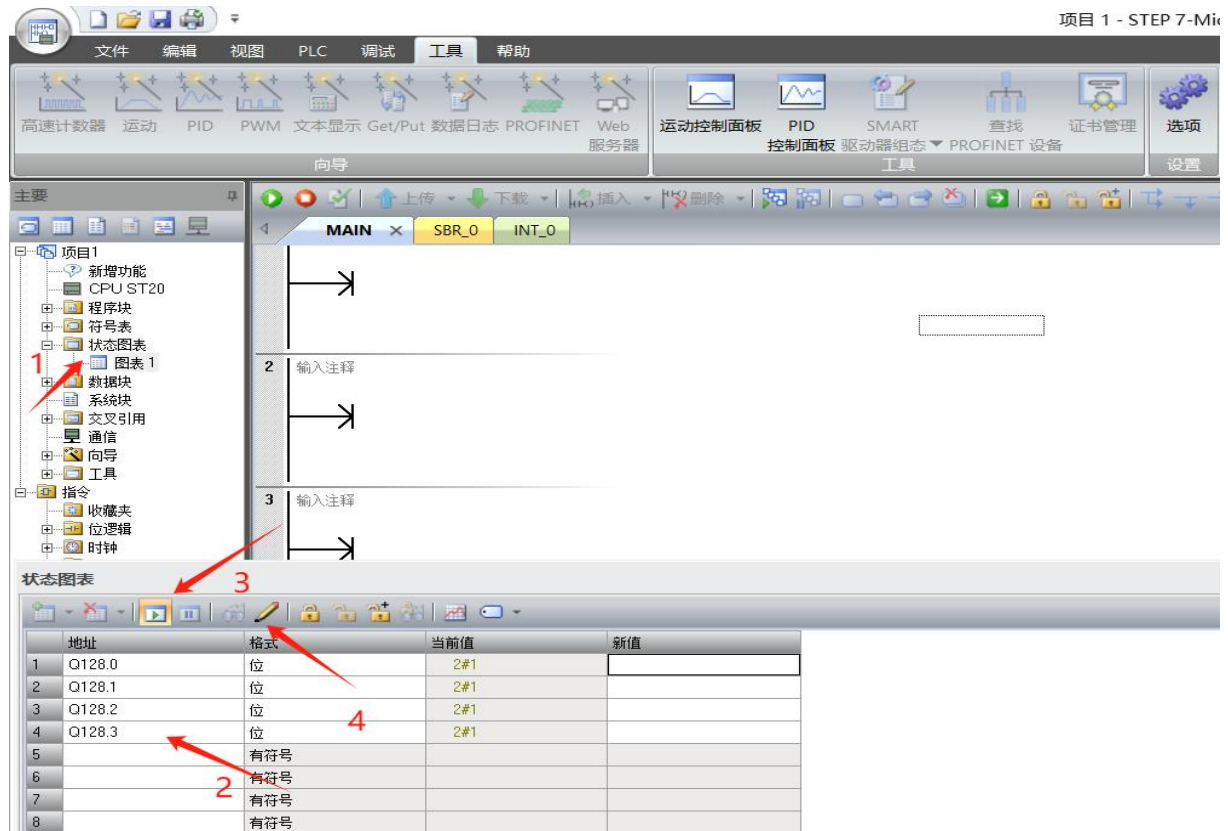
项目 1 - STEP 7-Micro/WIN SMART

PROFINET 配置向导

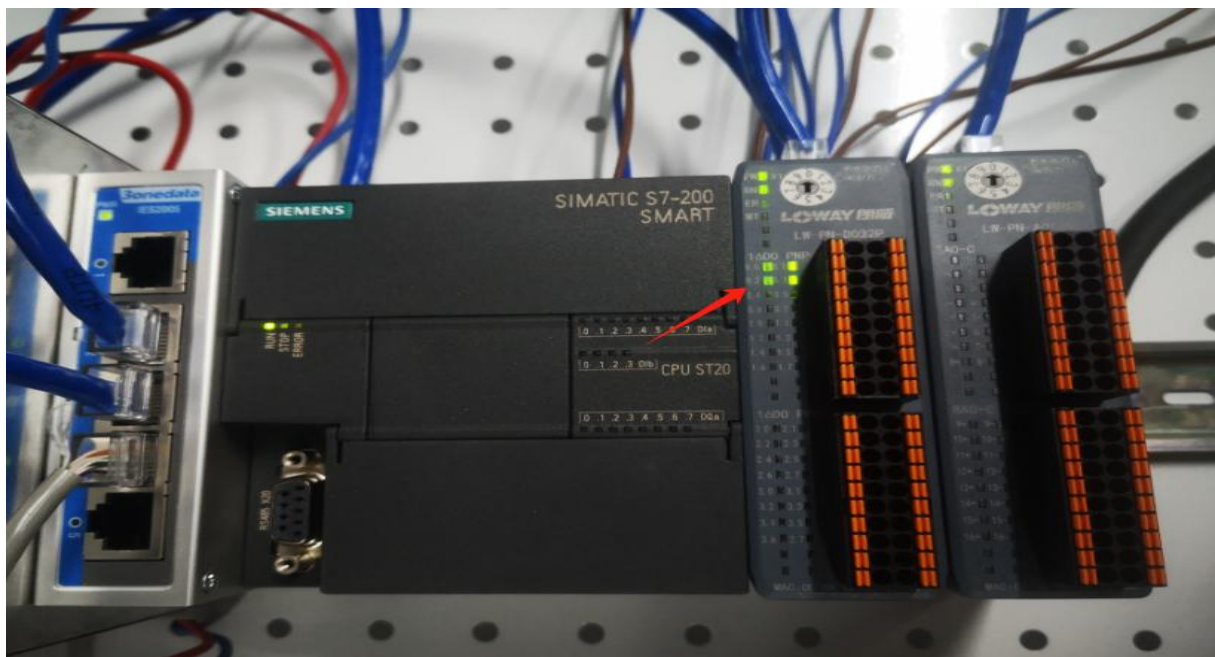
单击“添加”按钮来为该设备添加模块。

模块名	子模块名	插槽_子插槽	PN 起始地址	输入长度 (...	PNQ 起始
1	PN-D032P	0			
2		Interface	0 32768(X1)		
3		Port 1	0 32769(X..)		
4		Port 2	0 32770(X..)		
5	PN2016	1			128
6	PN2016	2			130
7		3			
8		4			
9		5			
10		6			
11		7			
12		8			
13		9			
14		10			
15		11			
16		12			
17		13			
18		14			
19		15			
20		16			
21		17			
22		18			
23		19			
24		20			

Click "Status Chart", and assign values for testing based on the start addresses of the outputs.



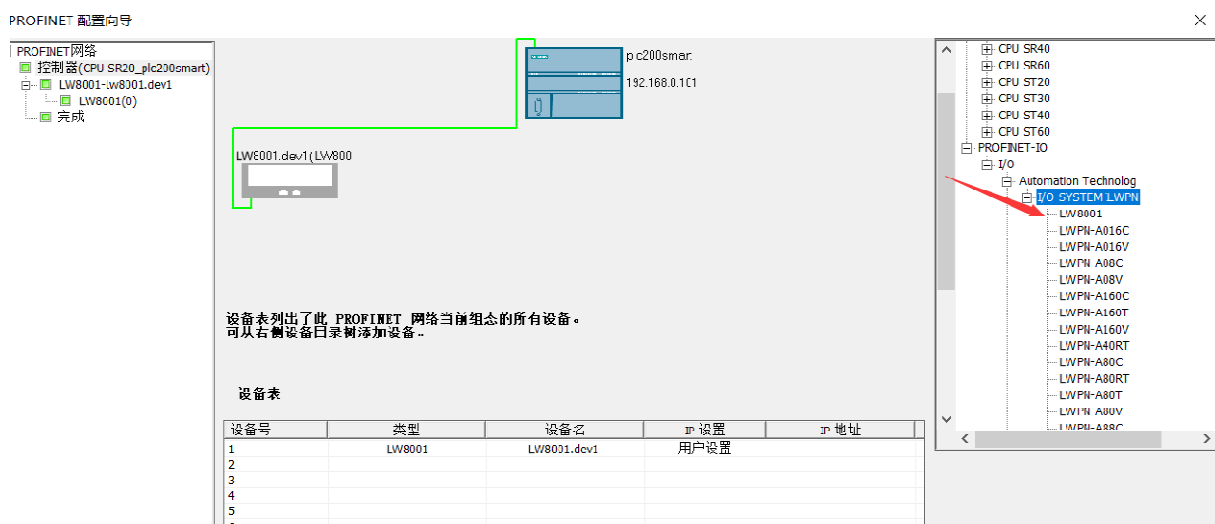
Enter the output module addresses 1–4 into the "Address" field, and click "Write All". The physical view of the module is shown in the figure below: terminals 1–4 are all illuminated.



At this point, the S7-200 SMART PLC is ready for programming.

(13) Selection of GSD for Non-Standard Models

For non-standard models, our company generally follows the principle of selecting auxiliary modules with digital signals first, followed by analog signals; inputs first, followed by outputs. For example, if a customer requires a module with 16DI + 8AI current type, the auxiliary communication board to be selected would be: LW-1016 + LW-3108. The ordering code is: LW-PN-DA16080BC. Under the standard model path, double-click the LW-8001 model.



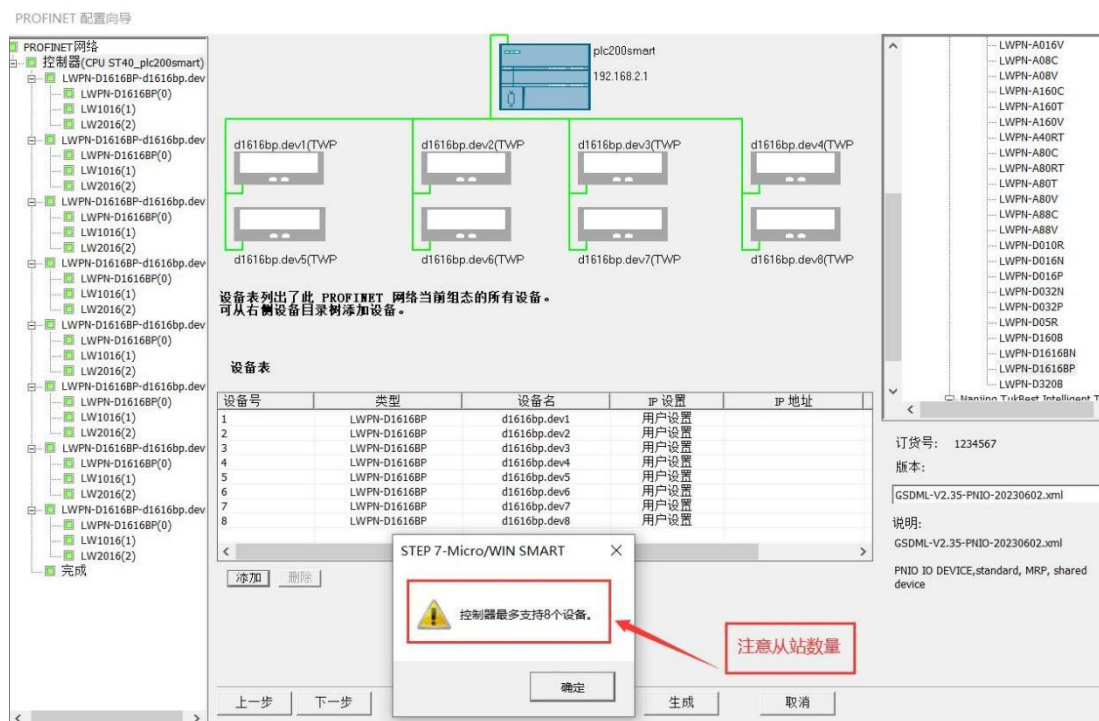
Click LW-1016 and LW-3108 in sequence, and then click "Next".



This will display the module addresses. The programming method is similar to that for the standard models described above.

Due to the limitations of the Siemens S7-200 SMART series PLCs, each CPU can support a maximum of 8

extended slave stations. Since each all-in-one I/O module is equivalent to one slave station, the S7-200 series can support a maximum of 8 Longway Automation all-in-one I/O modules. Please pay attention to the number of slave stations when using this configuration.



6 LW-PN Series RS485 to PROFINET Gateway User Manual

6.1 Product Function

The LW-PN-4MB series gateways realize protocol conversion between Modbus and PROFINET, enabling interconnected communication between different industrial networks. They are easy to install and configure. Users do not need specific expertise in Modbus or PROFINET to connect devices to a PROFINET PLC via the gateway for related applications. The gateways can be used in a wide range of scenarios, including PLC, DCS, distributed I/O modules, variable frequency drives, instruments, and meters.

6.2 Product Features

1) Multiple Independent Channels

The 3, 6, and 12 channels are mutually independent and can be configured with different baud rates. Multiple channels operate without interference, and each channel can adopt a polling method, significantly improving communication efficiency.

2) Wide Application

This product converts the PROFINET Ethernet bus to the Modbus RS485 protocol, allowing connection of any serial-capable devices—such as variable frequency drives, instruments, and various sensors—to the industrial bus.

3) Easy Operation

By connecting the basic hardware and using the configuration software for setup—without complex programming—the device can be quickly put into operation. No in-depth knowledge of PROFINET, Modbus, or internal operating mechanisms is required.

4) Efficient Communication

Users can achieve efficient data exchange between PROFINET and Modbus slave stations by mapping the PROFINET communication data area to the Modbus communication data area.

5) Hardware Advantages

The gateway employs Renesas dedicated PROFINET protocol chips (not software-based protocol stacks), ensuring stable module performance and reliable connectivity. The RS485 interface uses Maxim dedicated RS485 chips for dependable and stable transmission.

6) Remote Upgrade

This product supports remote firmware upgrades. Once deployed, users can receive free upgrades to the latest firmware versions.

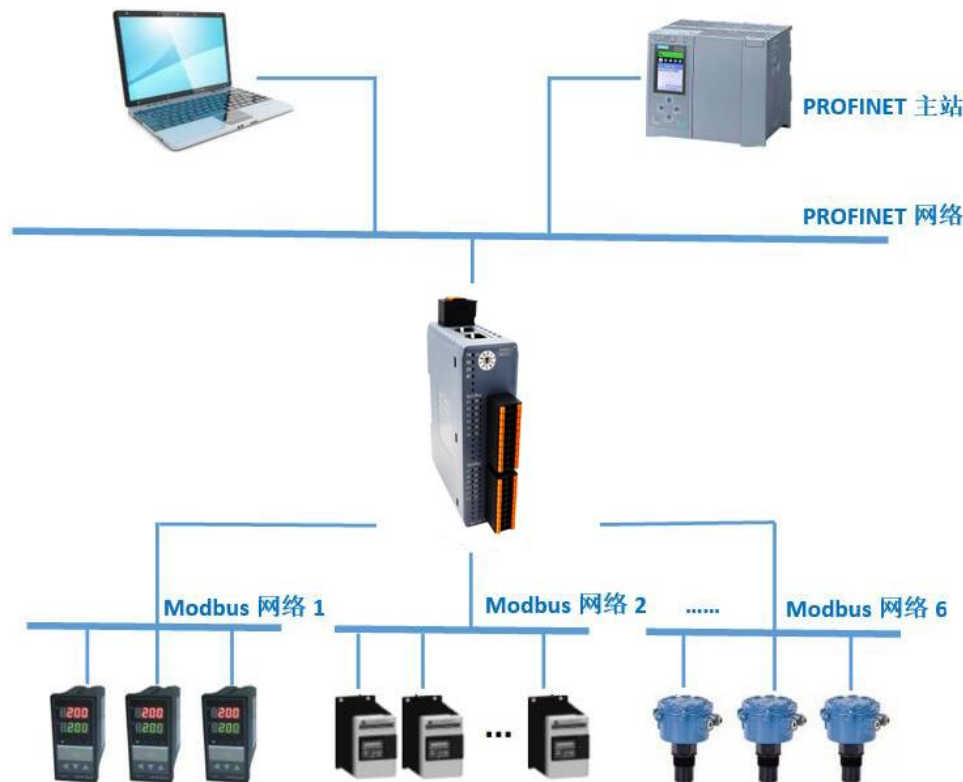
6.3 Technical Specifications

- ◆ Supports standard PROFINET protocol as a slave station
- ◆ PROFINET data area:
 - Input: up to 1440 bytes
 - Output: up to 1440 bytes
- ◆ Serial protocol: Modbus RTU Master
- ◆ Number of Modbus commands: 64
- ◆ Modbus function codes: 01H、02H、03H、04H、05H、06H、0FH、10H
- ◆ Supported baud rates: 300, 600, 1200, 2400, 4800, 9600, 19.2k, 38.4k, 57.6k, 115.2k (selectable)
 - Operating mode: Half-duplex
 - Parity: Odd, Even, None
 - Stop bits: 1 bit, 2 bits
- ◆ Power supply: 24 VDC
- ◆ Dimensions: 93 mm × 32 mm × 122 mm (W × H × D)
- ◆ Mounting: 35 mm DIN rail
- ◆ Protection rating: IP20
- ◆ Operating temperature: –10 to 70 °C
- ◆ Storage temperature: –20 to 80 °C
- ◆ EMC (Electromagnetic Compatibility):
 - Immunity: compliant with IEC 61000-4 standards
 - Radiated emission: compliant with EN55011

7 Application Topology Diagram

Supports PROFINET industrial bus. A typical application architecture is shown in the figure below:

7.1 Network Topology Diagram



8 Product Description

8.1 Power Supply Terminal

- Isolated design
- Power interface pin assignment

No.	Label	Description
1	+	Power positive
2	-	Power negative
3	PE	Protective Earth / Ground



Top View

NOTE: The power supply wire shall be cut to an appropriate length so that no bare conductor is visible after termination

8.2 Status LEDs

No.	LED	Status	Description	
1	PWR	On	24V power supply is normal	
		Off	No power supply	
2	RUN	On	Connected to PLC normally	
		Off	Not connected to PLC	

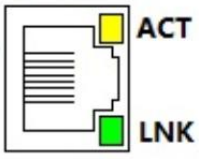
4	ERR	On	PROFINET communication board malfunction	
		Off	PROFINET communication board operates normally	
5	MT	On	RS485 communication board operates normally	
		Off	RS485 communication board malfunction	
6	Others	-	Reserved	

1) If the PWR power LED is not illuminated, check whether the power supply wiring is properly connected.

2) If the RUN LED is illuminated, this indicates normal communication. If it is off, a communication fault has occurred. At the same time, if the ERR LED is lit, this indicates that the gateway has not established a successful connection with the master station. If this occurs during initial startup, verify that the configuration software project topology matches the actual physical topology. If this occurs during normal operation, check whether the communication cables are intact and properly connected.

8.3 PROFINET Interface

- The PN side is equipped with two 100 Mbps RJ45 ports. Both ports provide the same functionality.
- Supports 100BASE-TX, MDI/MDIX auto-detection, and integrates an Ethernet switch for easy daisy-chaining of PROFINET devices.
- Compliant with PROFINET Conformance Class C and supports the PROFINET RT (Real-Time) protocol.

Picture	Item	Pin	Description
	1	Tx+	Data transmit+
	2	Tx-	Data transmit-
	3	RX+	Data receive +
	4	No Singal	Undefined
	5	No Singal	Undefined
	6	Rx-	Data receive-
	7	No Singal	Undefined
	8	No Singal	Undefined

8.4 Serial Communication Interface

- Interface connector: 20-pin pluggable terminal block

Picture	Item	Pin	Description
	1	A1	Channel 1 RS485 +
	2	B1	Channel 1 RS485 –
	3	A2	Channel 2 RS485 +
	4	B2	Channel 2 RS485 –
	5	A3	Channel 3 RS485 +

	6	B3	Channel 3 RS485 –
	7	A4	Channel 4 RS485 +
	8	B4	Channel 4 RS485 –
	9	A5	Channel 5 RS485 +
	10	B5	Channel 5 RS485 –
	11	A6	Channel 6 RS485 +
	12	B6	Channel 6 RS485 –
		A12 B12	Channel 12 RS485

If the RS485 communication distance is long, a 120 Ω terminating resistor should be added.

9 Use in TIA Portal Software

9.1 Installing the GSD File

Step 1: Open the "Install device description file" window according to the path shown in Figure 4-1, and proceed to the interface shown in Figure 4-2.

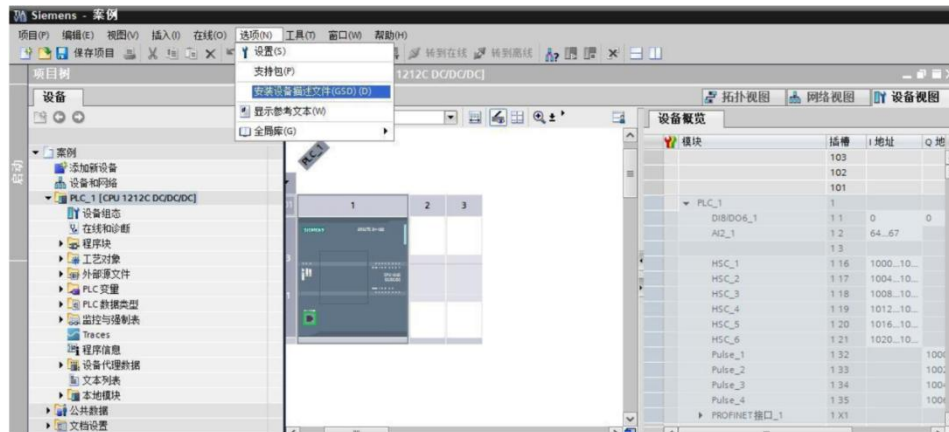


Figure 4-1

Step 2: According to the steps shown in Figure 4-2, select the folder containing the GSD file and click "OK". The GSD file(s) in the folder will then be displayed, as shown in Figure 4-3.

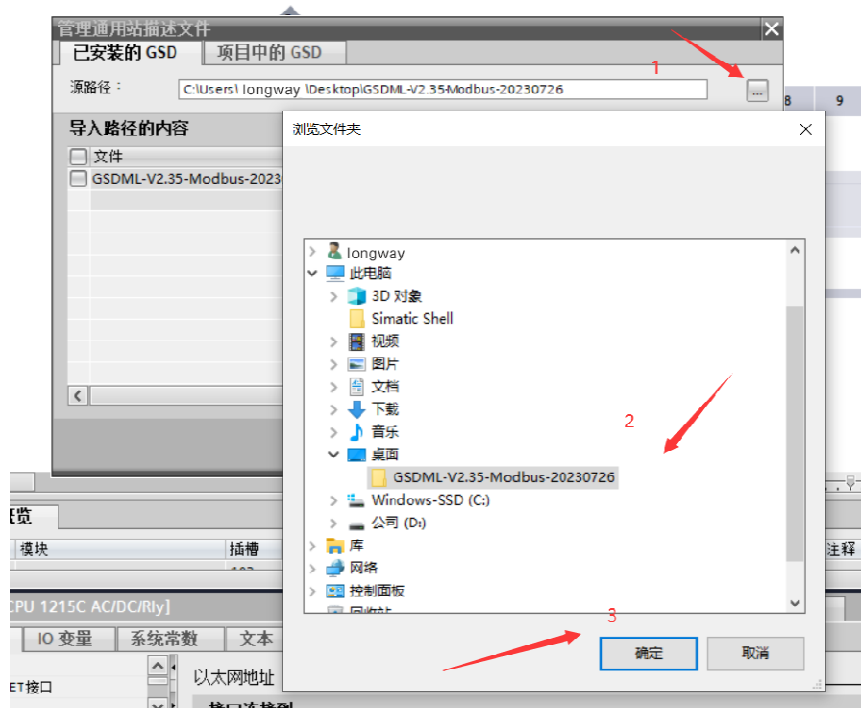


Figure 4-2

Step 3: As indicated in Figure 4-3, locate the correct GSD file, check the box in front of it, and click "Install".

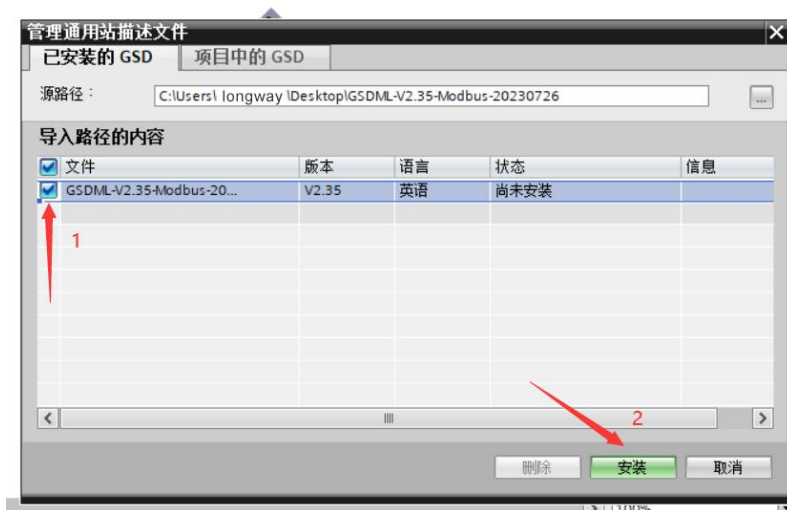
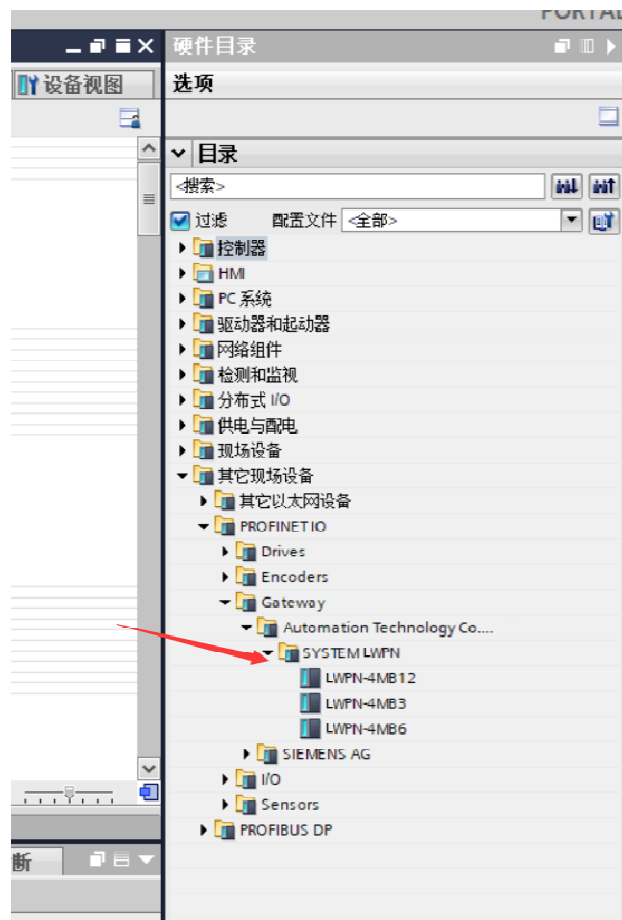


Figure 4-3

9.2 PLC Configuration – Master Function

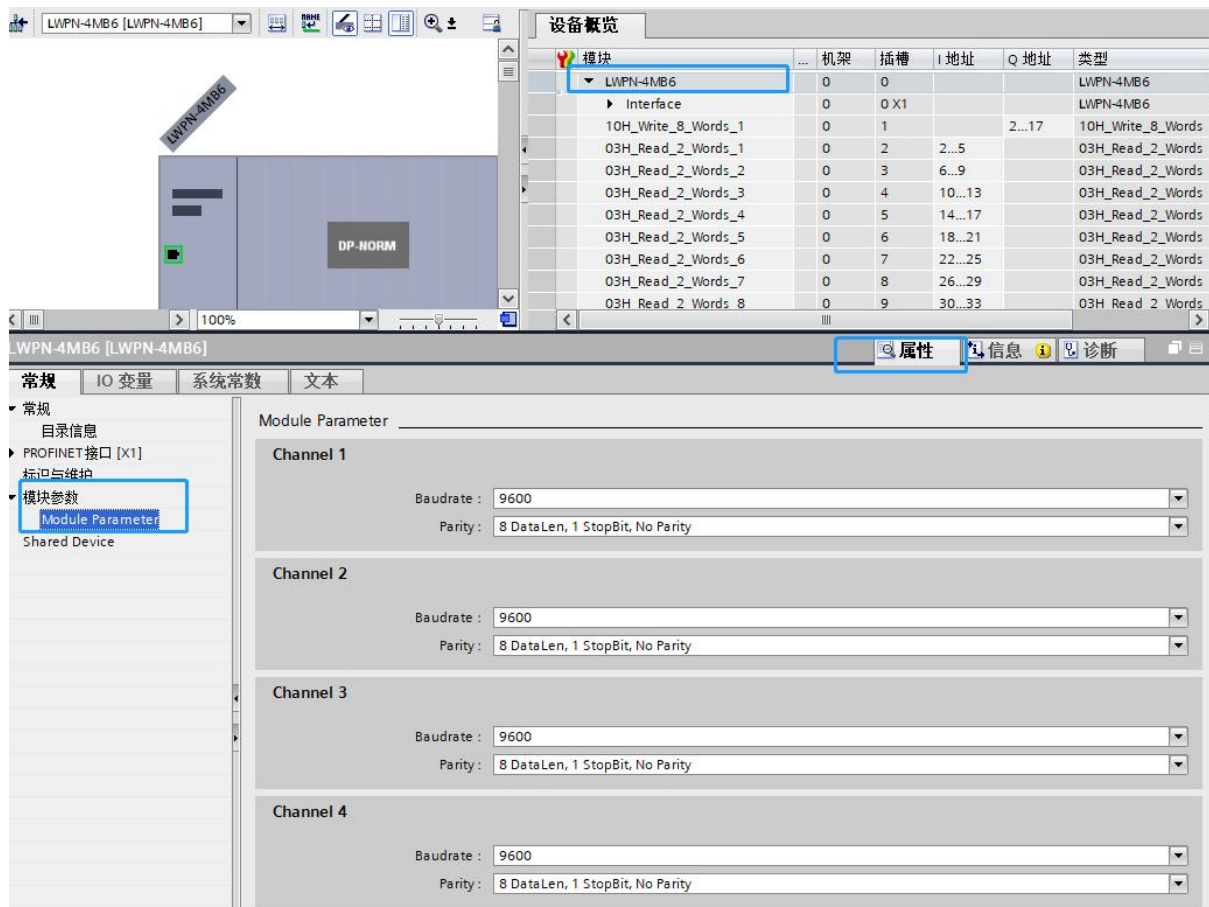
9.2.1 Adding a Device

Configuration path for the gateway: Other field devices → PROFINET IO → Gateway → Automation Technology Co., Ltd → SYSTEM LW-PN.



9.2.2 Configuring RS485 Interface Parameters

Taking the 6-channel RS485 module as an example, add LW-PN-4MB6. In its properties, open the module parameter view, where you can set the baud rate and parity for each of the 6 RS485 channels.



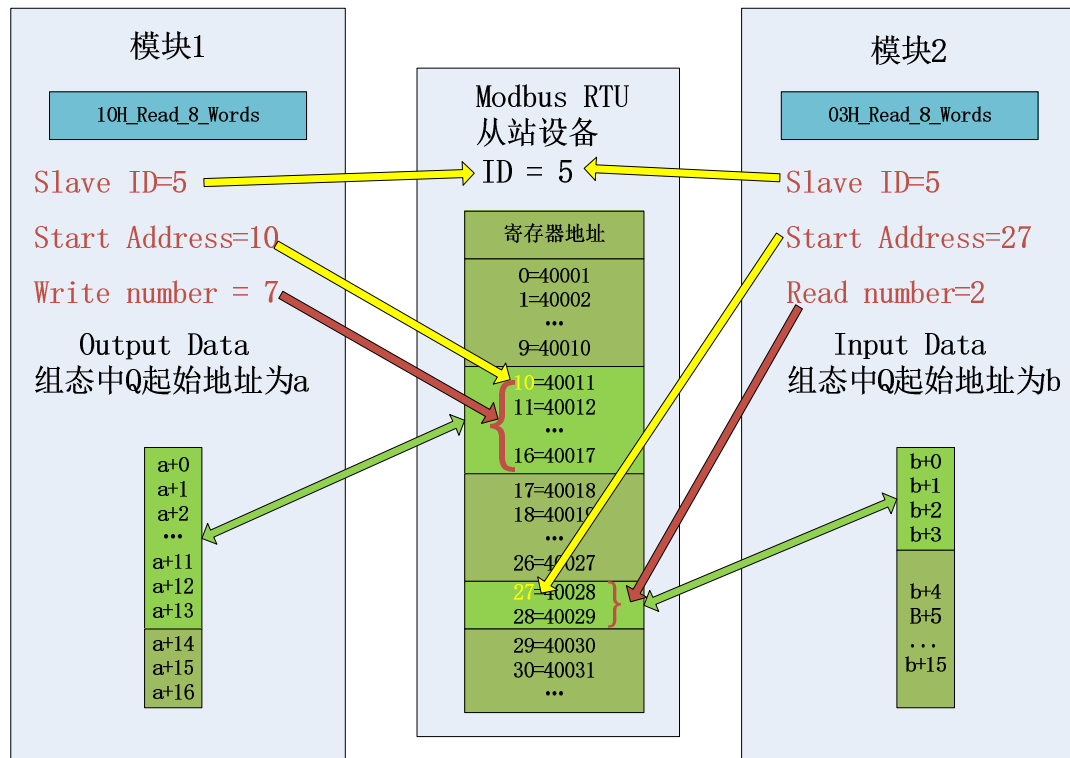
9.2.3 Adding Slave Modules

模块	
01H_Read_128_Bits	读从机线圈寄存器
01H_Read_32_Bits	
02H_Read_128_Bits	读离散输入状态
02H_Read_32_Bits	
03H_Read_32_Words	读保持寄存器
03H_Read_8_Words	
04H_Read_32_Words	读输入寄存器
04H_Read_8_Words	
05H_Force_1_Bit	写单个保持寄存器
06H_Write_1_Words	
0FH_Force_128_Bits	写多个线圈
0FH_Force_32_Bits	
10H_Write_32_Words	写多个保持寄存器
10H_Write_8_Words	

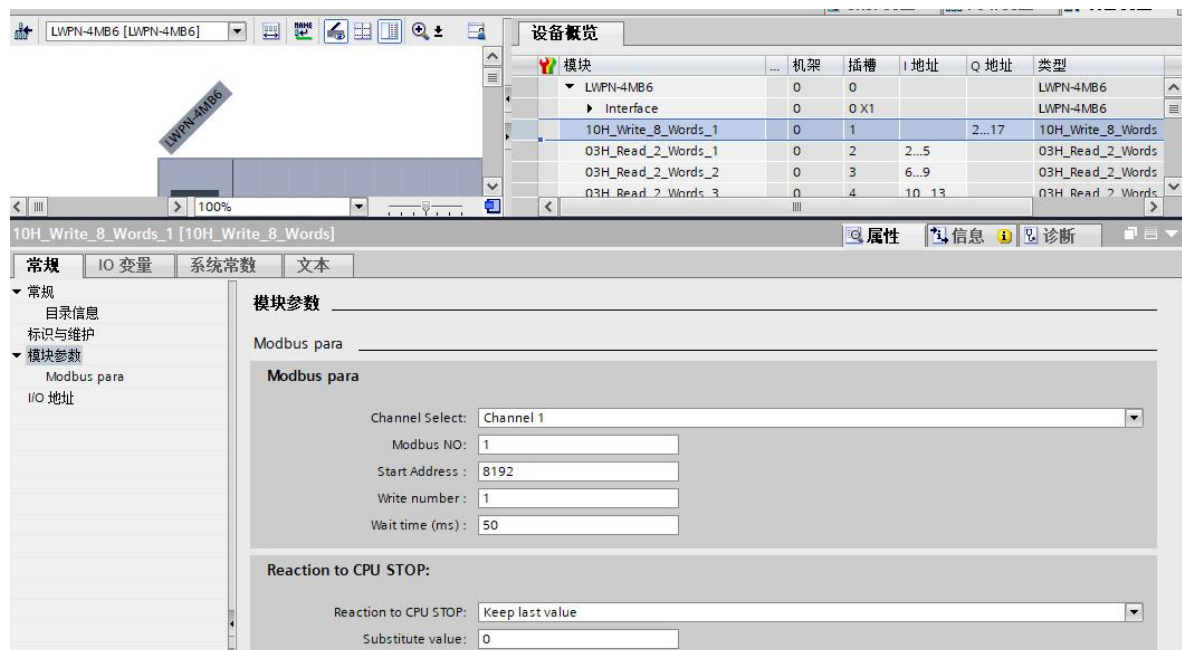
The Modbus function codes are defined as follows: 01H: Read coil registers from the slave; 02H: Read discrete input status; 03H: Read holding registers; 04H: Read input registers; 05H: Write a single coil; 06H:

Write a single holding register;0FH: Write multiple coils;10H: Write multiple holding registers

9.2.4 Module Register Configuration



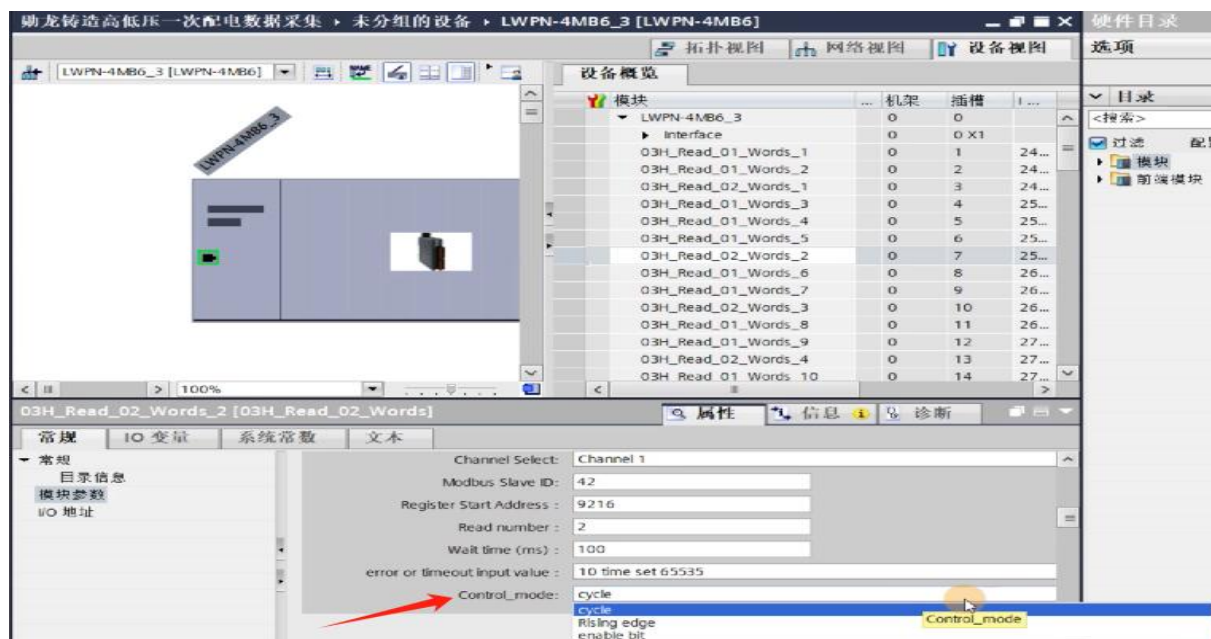
After adding the instruction module, you need to configure the Channel Select, Slave ID, Start Address, Write number, and Wait time.



- Channel Select: Specifies which RS485 channel is used for communication by this instruction.
- Modbus NO: The slave station ID.
- Start Address: The starting address of the register.

- Write number: The number of registers to read or write.
- wait time: The communication wait time for this instruction.
- Reaction to CPU STOP: Defines the behavior when the PLC is in STOP mode or the PROFINET communication is disconnected. Options include writing 0 to the register, holding the last value, or using a specified substitute value.
- Substitute Value: The substitute value to be written when Reaction to CPU STOP is set to use a substitute value and the CPU is in STOP state.

9.2.5 Control Mode

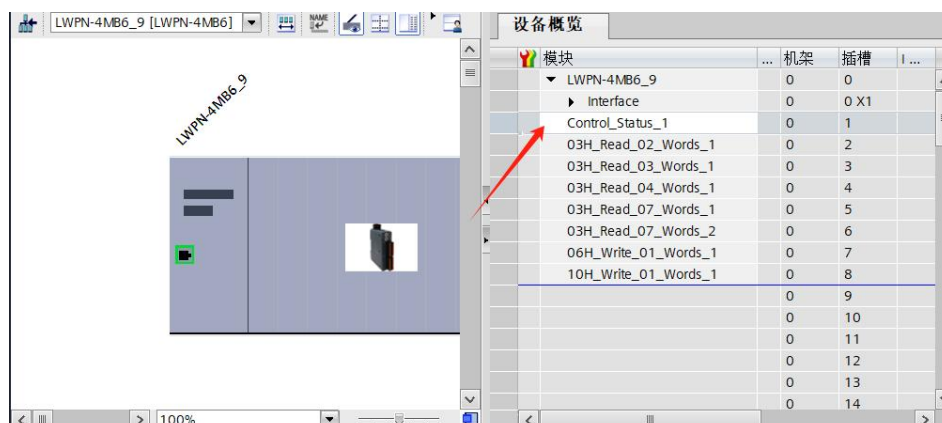


- cycle: Cyclic mode
- Rising edge: Rising-edge triggered
- enable bit: Enable-triggered

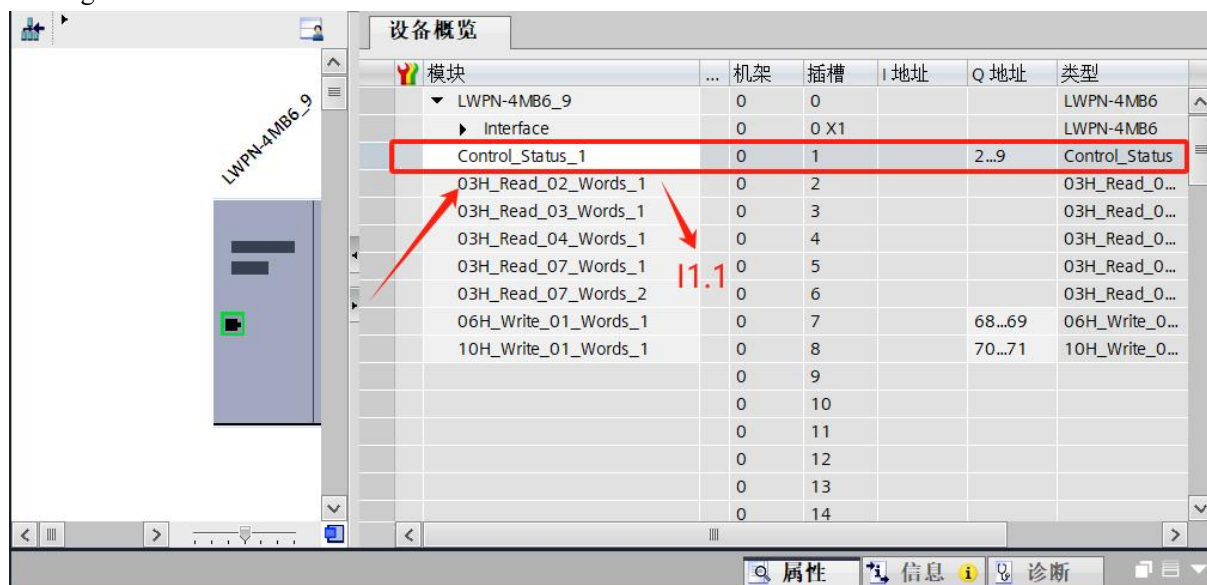
After the settings are completed, refer to the figure above for the register address mapping table. Starting from QB(a+0) and IB(a+0), the addresses correspond in sequence, with each register address occupying 2 bytes of data.

The usage for the 3-channel and 12-channel RS485 modules is similar to that of the 6-channel version.

9.2.6 Control_Status Control and Status Usage



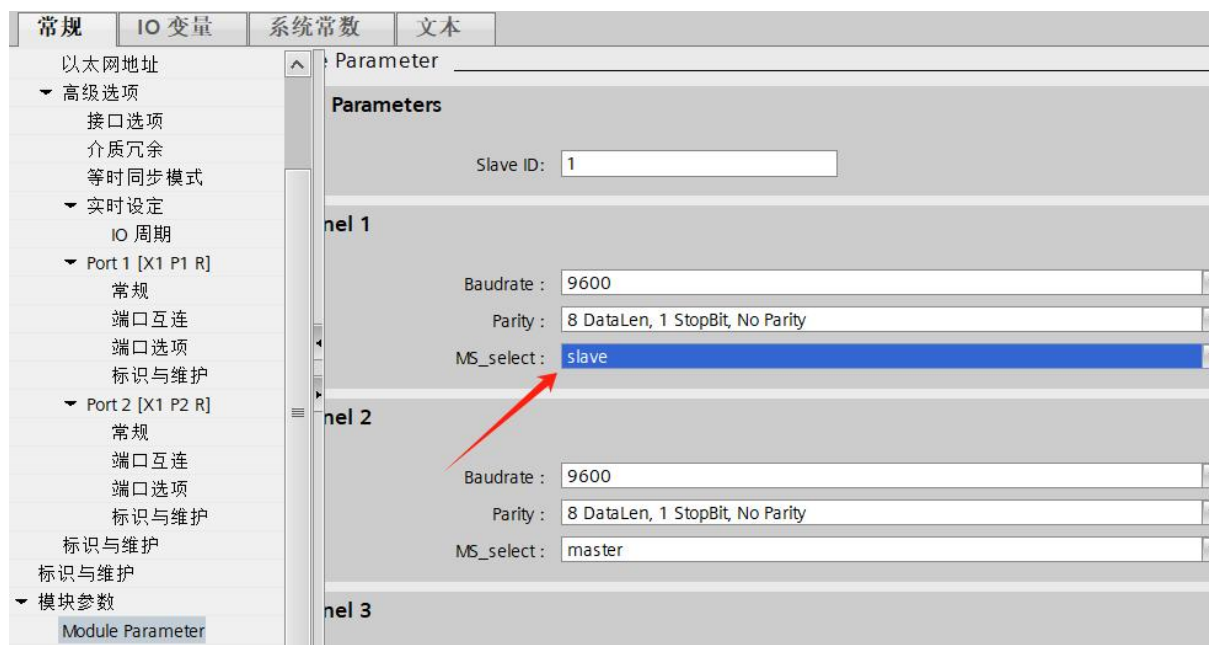
The "Control_Status" instruction can only be added to Slot 1, and is used to monitor and control the remaining 63 slots.



The input is used to monitor the instruction status. If '03H_Read_2_Word_1' fails to read 10 consecutive times, then I1.1 will be set to 1. Under normal communication, I1.1 remains 0.

9.2.7 TIA Portal - MODBUS Slave Function

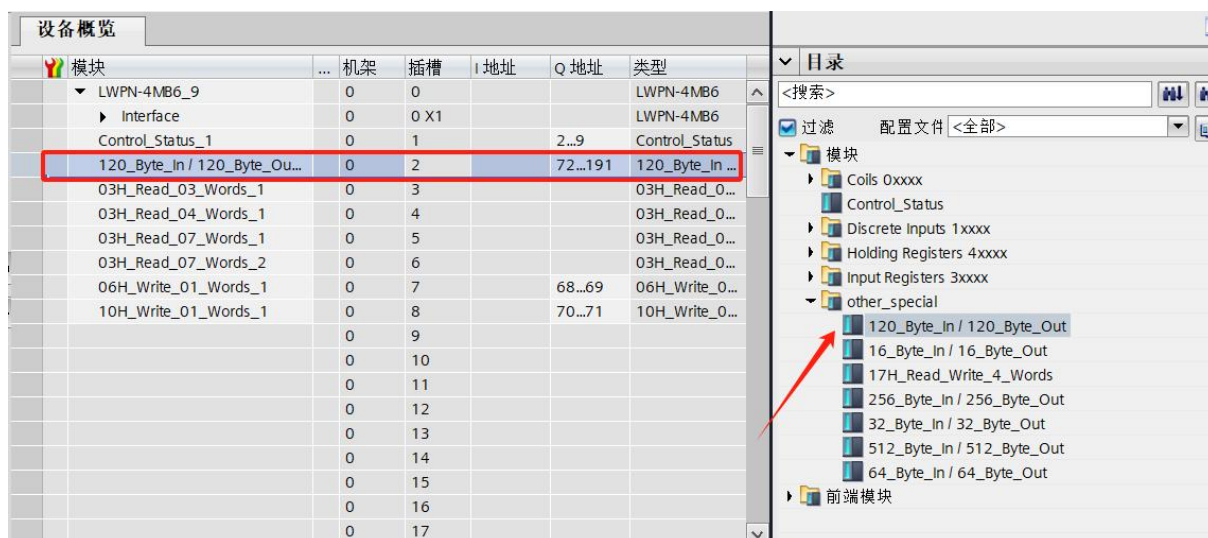
- Step 1: Configure the RS485 channel parameters via MS_select. Set the device as slave for the slave station or master for the master station.



- Step 2: Adding Instructions

Slot 1: Add Control_Status_1 (can only be added to Slot 1, used to monitor the status of subsequent instructions).

Slot 2: Add 120_Byte_In/120_Byte_Out (can only be added to Slot 2, used for data exchange between all slave stations and the PLC).



Slot 3 to Slot 64: Add instructions to read/write data from the field slave stations, such as the 03H instruction.

Step 3: Configure the instruction parameters for Slot 3 to Slot 64 (refer to the previous two examples).



Step 4: Testing the Slave Channels

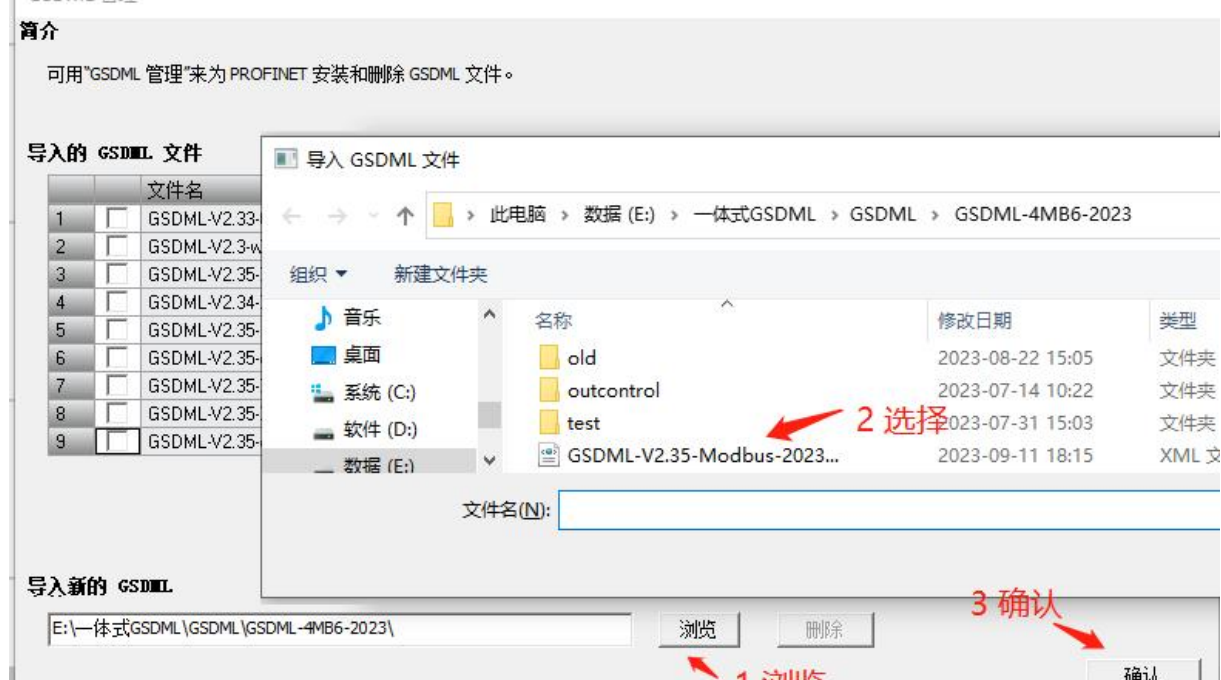
The slave stations on the gateway support the **03H**, **06H**, and **10H** instructions.

10 Use in Siemens S7-200 SMART Programming Software STEP 7-Micro/WIN SMART

10.1.1 Installing the GSDML File

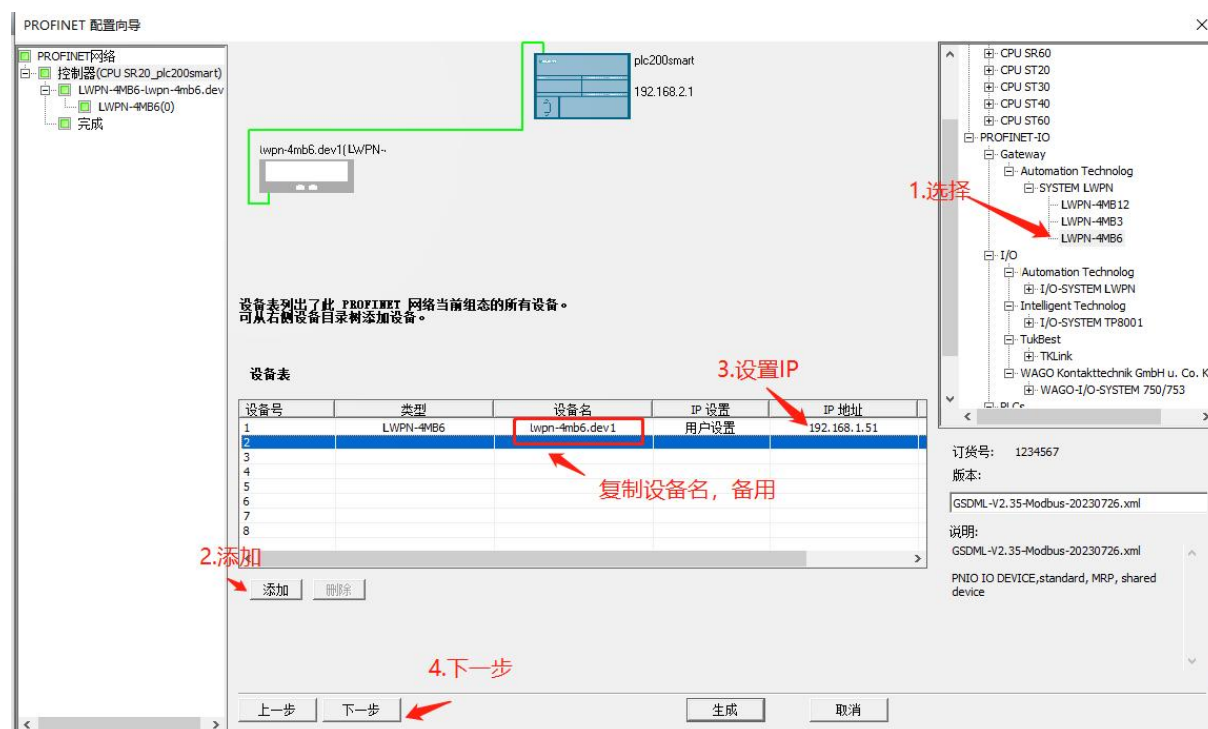


Click "GSDML Management" in the navigation bar.



Select the GSDML file to be imported, click "OK", and the GSDML file import will be completed.

10.1.2 Configuring PROFINET



10.1.3 Configuring Read/Write Instructions for the Variable Frequency Drive

Register Name	Register Address (Hex)	Register Address (Dec)	Description
Register Name	Register Address (Hex)	Register Address (Dec)	Description
Control Word	2000	8192	1 = Forward run, 9 = Reverse run, 3 =

			Stop, 4 = Free stop
Frequency Setpoint	2001	8193	Setpoint value = Frequency × 100
Status Word	D017	53271	Bit 0: Start/Stop status

单击“添加”按钮来为该设备添加模块。

序号	模块名	子模块名	插槽_子插槽	PNI 起始
1	0	LWPN-4MB6	0	
2	--	Interface	0 32768(x1)	
3	--	Port 1	0 32769(x1)	
4	--	Port 2	0 32770(x1)	
5	1	10H_Write_8_Words	1	
6	2	03H_Read_2_Words	2	128
7	3	03H_Read_2_Words	3	132
8	--		4	
9	--		5	
10	--		6	
11	--		7	
12	--		8	
13	--		9	

添加指令

模块

- 01H_Read_128_Bits
- 01H_Read_32_Bits
- 02H_Read_128_Bits
- 02H_Read_32_Bits
- 03H_Read_2_Words
- 03H_Read_32_Words
- 03H_Read_8_Words
- 04H_Read_32_Words
- 04H_Read_8_Words
- 05H_Force_1_Bit
- 06H_Write_1_Words
- 0FH_Force_128_Bits
- 0FH_Force_32_Bits
- 10H_Write_32_Words
- 10H_Write_8_Words
- Control_Status

该页可配置所选模块的每个子模块。

1. 单击进入配置界面

2. 配置通道参数

Module Parameter

Channel 1

Baudrate: 9600

Parity: 8 DataLen, 1 StopBit, No Parity

Channel 2

Baudrate: 9600

Parity: 8 DataLen, 1 StopBit, No Parity

Channel 3

Baudrate: 9600

Parity: 8 DataLen, 1 StopBit, No Parity

Channel 4

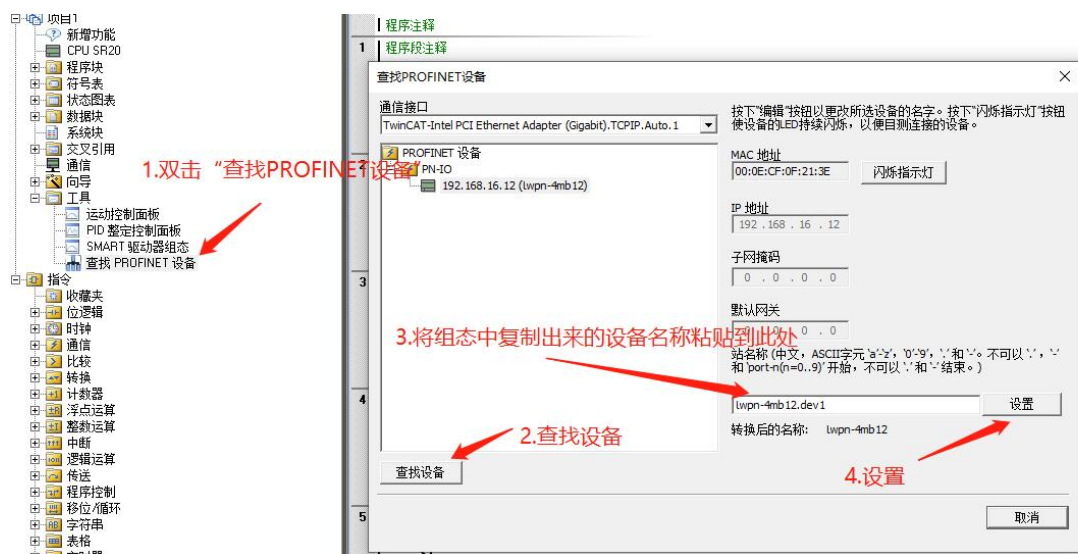
Baudrate: 9600

Parity: 8 DataLen, 1 StopBit, No Parity

Channel 5



10.1.4 Assigning the Device Name



10.1.5 Controlling and Monitoring the Variable Frequency Drive

	序号	模块名	子模块名	插槽_子插槽	PNI 起始地址	输入...	PNQ 起始地址...	输 ^
1	0	Lw/PN-4MB6		0				
2	--		Interface	0 32768(X1)				
3	--		Port 1	0 32769(X1 ...				
4	--		Port 2	0 32770(X1 ...				
5	1	10H_Write_8_Words					128	16
6	2	03H_Read_2_Words				128	4	
7	3	03H_Read_2_Words				132	4	
8	--			4				

控制字映射到QW128
频率映射到QW130
状态映射到IW128
实际频率映射到IW132

Once the above configuration is completed, Modbus RS485 devices can be connected to the S7-200 SMART system.

11 Appendix

11.1 Introduction to the Modbus-RTU Protocol

The commonly used Modbus protocol features four areas corresponding to eight important function codes: four for read operations, two for writing a single bit or register, and two for writing multiple bits or multiple registers.

11.2 Modbus Memory Areas

The memory areas of the controller (or Modbus device) involved in Modbus are identified as 0XXXX, 1XXXX, 3XXXX, and 4XXXX

Memory Area Identifier	Name	Data Type	Read/Write	Memory Address Range
0XXXX	Output Coils	Bit	Read/Write	00001–0XXXX, where XXXX is device-dependent
1XXXX	Discrete Inputs	Bit	Read-only	10001–1XXXX, where XXXX is device-dependent
3XXXX	Input Registers	Word	Read-only	30001–3XXXX, where XXXX is device-dependent
4XXXX	Output/Holding Registers	Word	Read/Write	40001–4XXXX, where XXXX is device-dependent

11.3 Modbus Function Codes

1) Read Output Coil Status

Function Code: 01H

Address	Function Code	Start Address High	Start Address Low	Coil Count High	Coil Count Low	CRC
0x11	0x01	0x00	0x13	0x00	0x25	xxxx

Function: Read the status of the slave's output coils (0XXXX).

Note: For some devices, the coil starting address is 00000, which corresponds to address 00001 in the device, with subsequent addresses following in sequence.

Example: Read the output coils of slave station 0x11. The starting address of the register is 0x13 = 19, and the number of coils is 0x0025H = 37.

Therefore, this query message reads a total of 37 coil statuses from addresses 00019 to 00055 of slave station 0x11 (17).

Slave Response Format:

Address	Function Code	Byte Count	Coil Status 19–26	Coil Status 27–34	Coil Status 35–42	Coil Status 43–50	Coil Status 51–55	CRC
0x11	0x01	0x05	0xCD	0x6B	0xB2	0x0E	0x1B	xxxx

Function: The slave returns the status of the output coils (0XXXX).

2) Read Discrete Input Status

Function Code: 02H

Master Query Message Format:

Address	Function Code	Start Address High	Start Address Low	Coil Count High	Coil Count Low	CRC
0x11	0x02	0x00	0xC4	0x00	0x16	xxxx

Function: Read the status of the slave's discrete inputs (1XXXX).

Note: For some devices, the discrete input starting address is 10000, which corresponds to address 10001 in the device, with subsequent addresses following in sequence.

Example: Read the discrete inputs of slave station 0x11. The starting address is 0x00C4 = 196, and the number of inputs is 0x0016 = 22.

Therefore, this query message reads a total of 22 discrete input statuses from addresses 10196 to 10217 of slave station 0x11 (17).

Slave Response Format:

Address	Function Code	Byte Count	DI 10196–10203	DI 10204–10211	DI 10212–10217	CRC
0x11	0x02	0x03	0xAC	0xDB	0x35	xxxx

Function: The slave returns the status of the discrete inputs (1XXXX).

3) Read Output/Holding Registers

Function Code: 03H

Master Query Message Format:

Address	Function Code	Start Address High	Start Address Low	Register Count High	Register Count Low	CRC
0x11	0x03	0x00	0x6B	0x00	0x03	xxxx

Function: Read the values of the slave's holding registers (4XXXX).

Note: For some devices, the register starting address 40000 corresponds to address 40001 in the device,

with subsequent addresses following in sequence.

Example: Read the holding register values of slave station 0x11. The starting address is 0x006BH = 107, and the number of registers is 0x0003 = 3. Therefore, this query message reads the values of three holding registers 40107 to 40109 from slave station 0x11 (17H).

Slave Response Format:

Address	Function Code	Byte Count	Reg 40107 High	Reg 40107 Low	Reg 40108 High	Reg 40108 Low	Reg 40109 High	Reg 40109 Low	CRC
0x11	0x03	0x06	0x02	0x2B	0x01	0x06	0x2A	0x64	xxxx

Function: The slave returns the values of the holding registers: (40107) = 0x022B, (40108) = 0x0106, (40109) = 0x2A64.

4) Read Input Registers

Function Code:: 04H

Master Query Message Format::

Address	Function Code	Start Address High	Start Address Low	Register Count High	Register Count Low	CRC
0x11	0x04	0x00	0x08	0x00	0x01	xxxx

Function: Read the values of the slave's input registers (3XXXX).

Note: For some devices, the register starting address 30000 corresponds to address 30001 in the device, with subsequent addresses following in sequence.

Example: Read the input register value of slave station 0x11. The starting address is 0x0008H, and the number of registers is 0x0001.

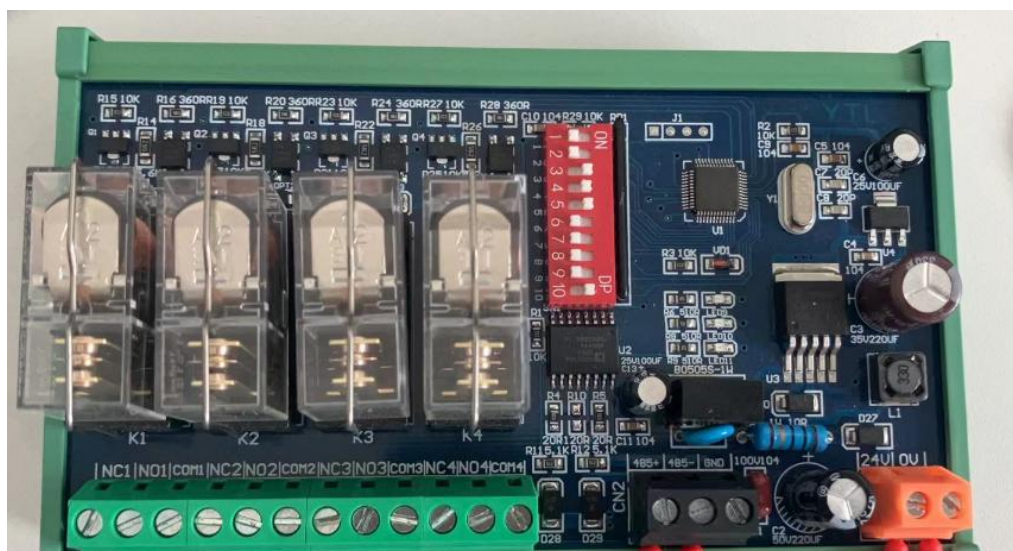
Therefore, this query message reads the value of one input register 30008 from slave station 0x11 (17).

Slave Response Format:

Address	Function Code	Byte Count	Input Reg 30008 High	Input Reg 30008 Low	CRC
0x11	0x04	0x02	0x01	0x01	xxxx

Function: The slave returns the value of input register 30008: (30008) = 0x0101.

Example 1: Monitoring a Variable Frequency Drive with RS485 Interface and an RS485 Relay Module



Step1: Configure the RS485-related parameters of the variable frequency drive (VFD). Set the control and frequency source selection to be given via communication, and record parameters such as the device ID and baud rate.

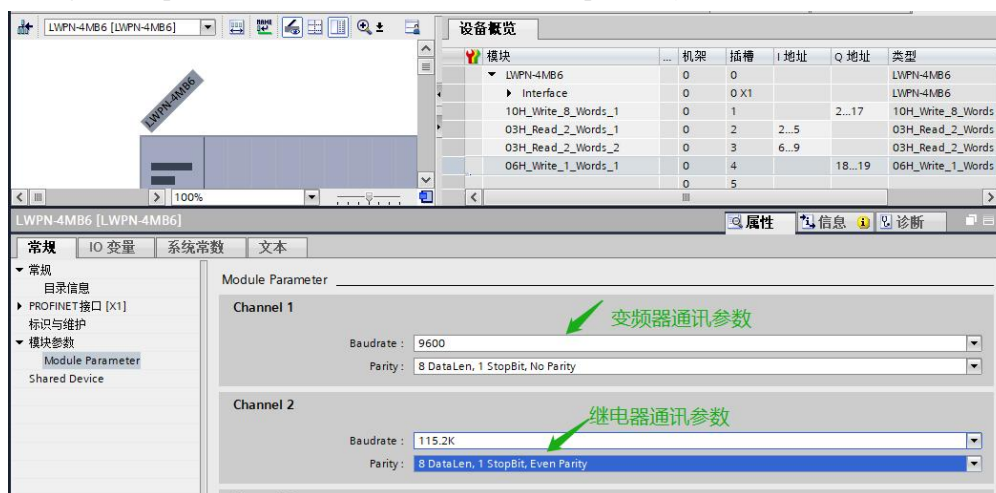
For this VFD, the device ID is 1, the baud rate is set to 9600, and parity is set to None.

Register Name	Register Address (Hex)	Register Address (Dec)	Description
Control Word	2000	8192	1 = Forward run, 9 = Reverse run, 3 = Stop, 4 = Free stop
Frequency Setpoint	2001	8193	Setpoint value = Frequency × 100

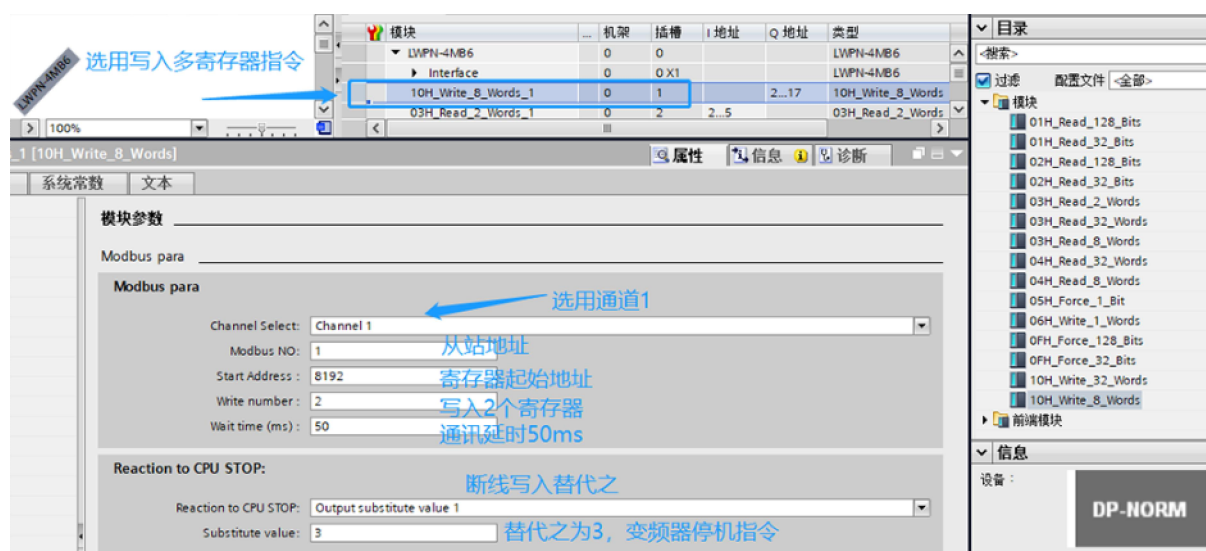
Status Word	D017	53271	Bit 0: Start/Stop status
Actual Frequency	D000	53248	Monitored value = Frequency × 100

Step2: Configure the RS485-related parameters of the relay module. Set the baud rate to 115200, parity to Even, and the register start address to 0.

Step3: Configure the channel baud rates. Since the two modules have different baud rates, use different channels for communication. Use Channel 1 for the variable frequency drive and Channel 2 for the relay module. Configure the parameters for these two channels respectively.



Step4: Adding the VFD Control Instructions

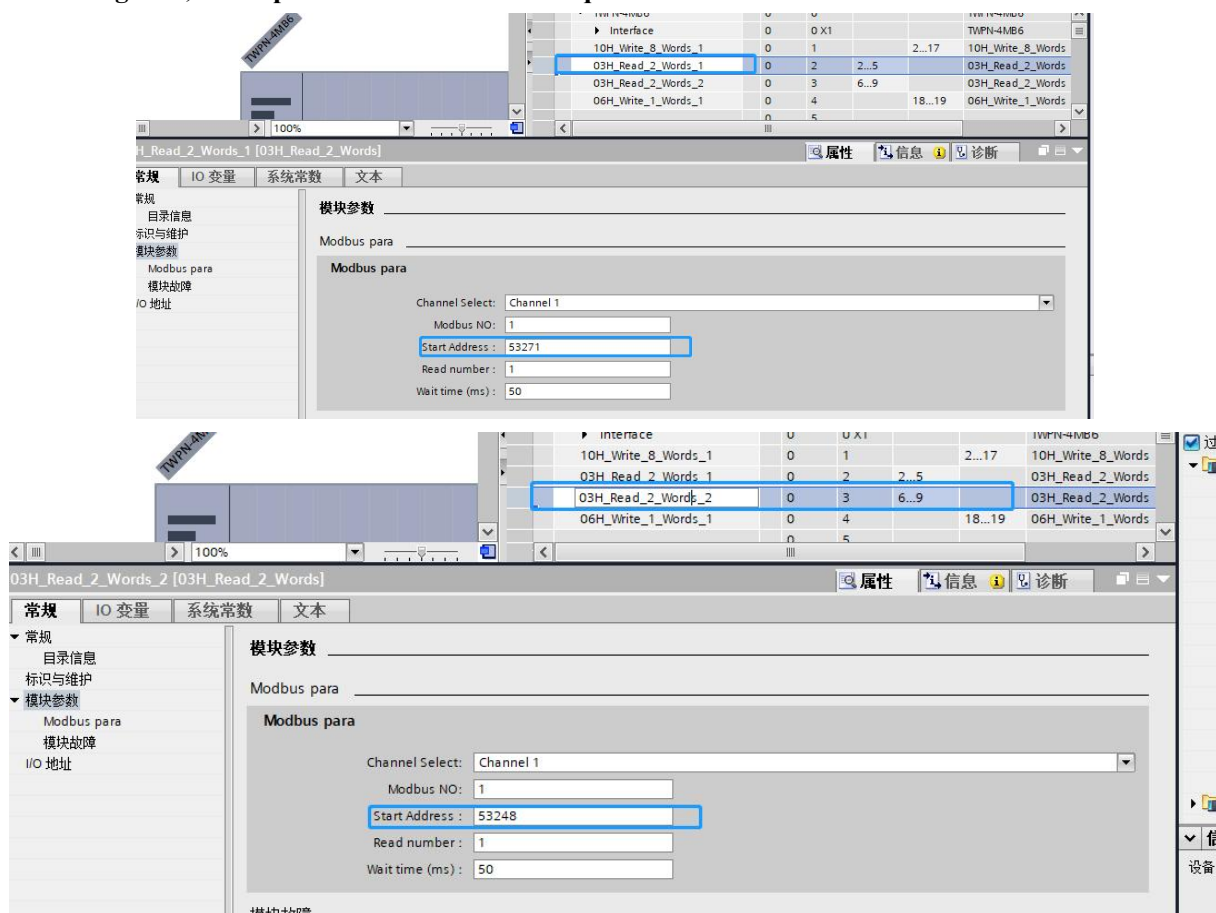


Since the VFD address is 1, set Modbus NO to 1.

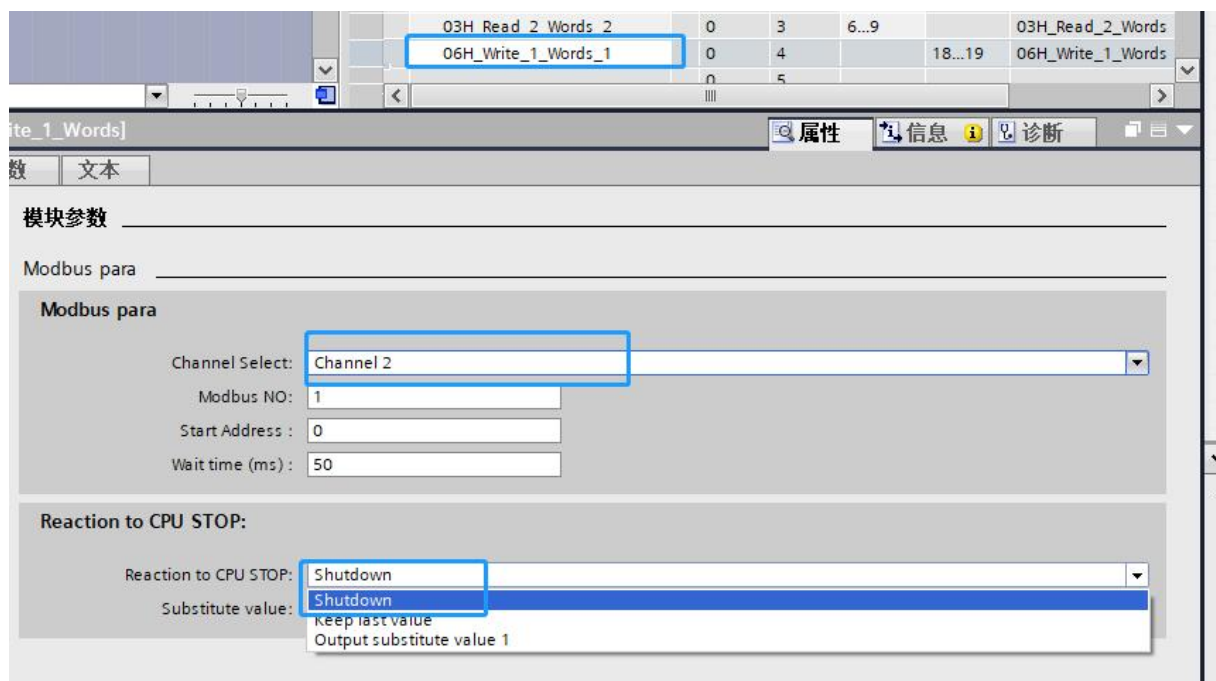
The register addresses are configured according to the VFD register address table, and decimal addresses are to be entered.

For VFD-type devices, if the PLC or network fails, the device is generally required to stop. Therefore, for Stop or offline output value, we selected Substitution value. Since writing 3 to the control word stops the drive, we set the substitute value for the first register to 3 (Substitute value).

Step5: Add VFD read status instructions. Since the status and actual frequency register addresses are not contiguous, two separate instructions are required.



Step 6: Add control instructions for the relay module. The 06H instruction is used to write a single register. Select Channel 2 for communication. In the event of a disconnection, the output should be turned off.

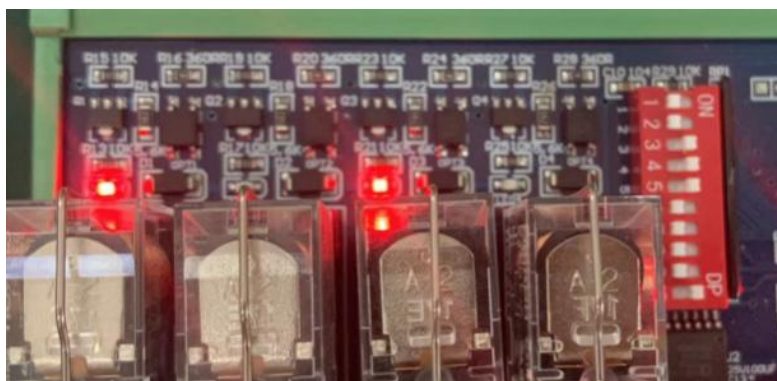


Step 7: Online Testing

Demo 1: Controlling the VFD Start and the Relay Module

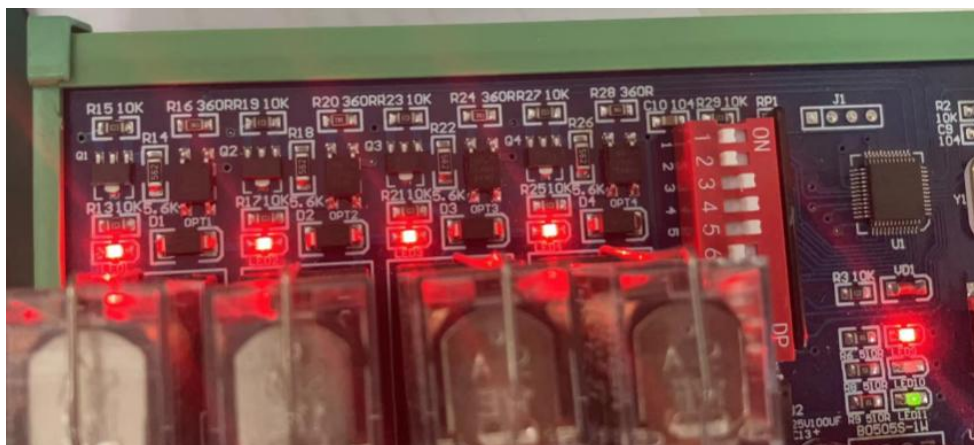
Assign the Control Word a value of 1 (Forward run), set the Frequency Setpoint to 2000 (20 Hz), and energize relays 1 and 3.

名称	地址	数据类型	初始值	目标值	注释
*Tag_35"	%QW2	带符号十进制	1	1	变频器控制字
*Tag_40"	%QW4	带符号十进制	2000	2000	变频器频率给定
*Tag_15"	%QW18	二进制	2#0000_0000_0000_0101	2#0000_0000_0000_0101	继电器模组
*Tag_34"	%IW2	无符号十进制	17		变频器状态字
*Tag_94"	%IW6	带符号十进制	2000		变频器实际频率



It can be observed that Bit 0 of the status word (Start/Stop status) has changed from 0 to 1, the actual frequency has also become 2000, and relays 1 and 3 have been energized.

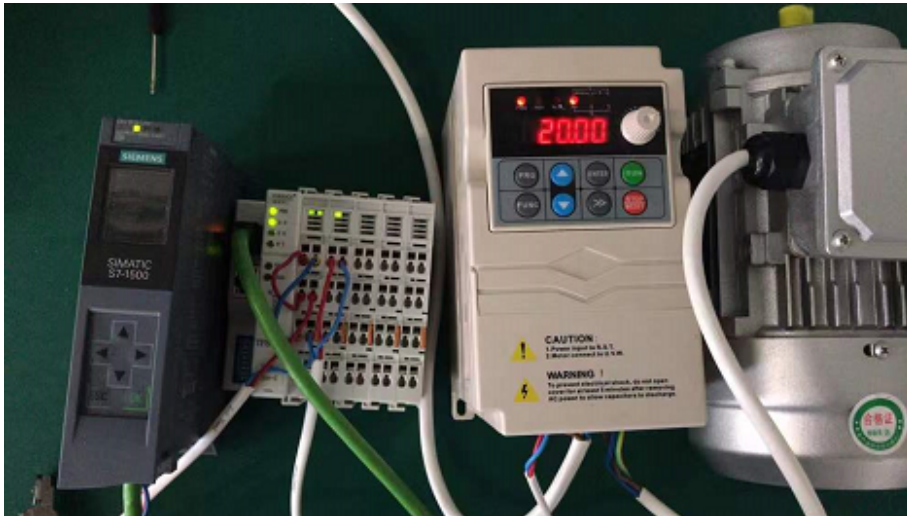
名称	地址	数据类型	初始值	目标值	注释
*Tag_35"	%QW2	带符号十进制	3	3	变频器控制字
*Tag_40"	%QW4	带符号十进制	2000	2000	变频器频率给定
*Tag_15"	%QW18	二进制	2#0000_0000_0000_1111	2#0000_0000_0000_1111	继电器模组
*Tag_34"	%IW2	无符号十进制	64		变频器状态字
*Tag_94"	%IW6	带符号十进制	0		变频器实际频率



Assign the Control Word a value of 3 (Normal stop), and control all 4 relay outputs to be energized.

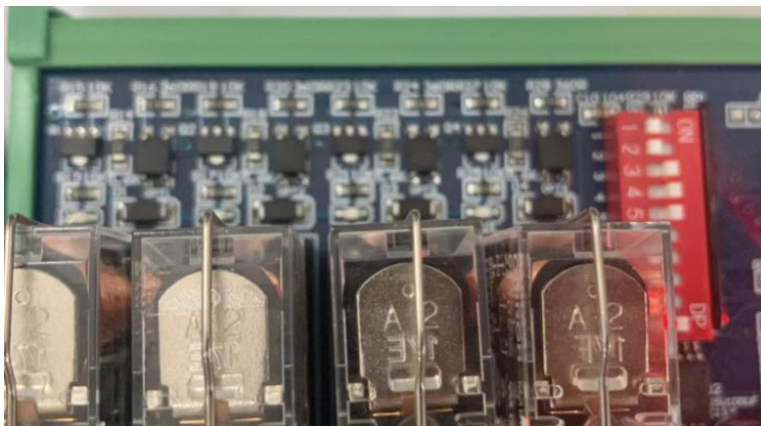
Demo 2: Disconnecting the Network Cable

Control the VFD for forward operation.



The VFD is operating normally at 20 Hz.

Disconnect the network cable between the PLC and the adapter. The VFD will automatically stop, and the frequency will drop to 0.



All relays are de-energized.

Contact Information:

Chongqing Loway Control System Co., Ltd.

Sales Hotline: 023-62603500

Technical Support: 18883272388

Email: sale@cqlwsys.com

Website: <https://lowayinstrument.com/>

Address: Building E, No. 8 Yuma Road, Nan'an District, Chongqing, China