Chengdu Ebyte Electronic Technology Co.,Ltd

Wireless Modem

User Manual



Profinet Gateway SMD Module
PN1-S25&PN1-S25-TB

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Revision History

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Chapter 1:Product Overview

1.1 Product Introduction

The PN1-S25 is a Profinet to Modbus RTU gateway module designed for industrial communication. It maps Modbus data to Profinet, allowing for easy integration using GSD files. The module supports code-free reading and writing of Modbus devices, enabling quick data setup and transmission to PLCs. It supports Modbus RTU (Master/Slave) protocols and features a compact 1.27mm stamp hole interface for easy system integration.

The PN1-S25-TB test kit includes a Type-C interface for power supply, two independent RS485 serial ports, and one Ethernet port, meeting diverse communication needs. All LED indicators, functional pins, and reset pins are exposed for easy operation and status monitoring.

1.2 Features

- Industrial-grade design with metal shielding
- Supports 3.3V power supply
- Compact 1.27mm stamp hole interface
- Standard Profinet protocol communication, compatible with PLCs, SCADA systems, and PCs
- Supports Siemens PLC 200/300/1200/1500 series
- Compatible with TIA Portal and STEP 7 configuration software
- Standard Modbus RTU protocol, can be used as Modbus RTU Master or Slave
- Dual serial ports, each configurable independently
- Profinet and Modbus RTU protocol conversion
- Supports 10/100M Ethernet interface, auto-negotiation for crossover or straight-through connection
- GSD file provided for easy configuration without the need for upper-level software
- Firmware upgrade support
- Widely used for data acquisition and control of Modbus RTU devices in industrial settings

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Chapter 2:Technical Specifications

2.1 Product Model List

Product Model	Type
PN1-S25	SMD Module
PN1-S25-TB	Test Kit（with PN1-S25）

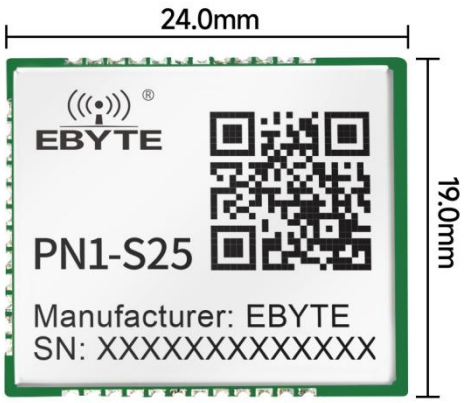
2.2 Specifications

category	Name	Parameters
Power	Operating Voltage	3.3V±0.2V
	Operating Current	Peak:125mA Standby:93mA
	Communication Level	3.3V
Package	Package Type	1.27mm Stamp Hole
Network Parameters	Communication Protocol	Standard Profinet Protocol (RT)
	Maximum Communication Cycle	4ms
	Communication Bandwidth	10/100M Auto-negotiation
Serial Port Parameters	Communication Protocol	Standard Modbus RTU Protocol
	Baud Rate	1200 ~ 3.9M bps
	Communication Format	Data Bits:7/8 Bits (Default: 8) Stop Bits: 1/2 Bits (Default: 1) Parity: None/Odd/Even (Default: None)
Operating Environment	Operating Temperature and Humidity	-40°C to +85°C, 5% to 95% RH (Non-condensing)
	Storage Temperature and Humidity	-40°C to +105°C, 5% to 95% RH (Non-condensing)
Other	Product Dimensions	24.0mm * 19.0mm * 3.2mm (L*W*H)
	Product Weight	3 ± 1 g
	Installation	Standard Industrial 35mm Rail

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2.3 Dimensions Picture



24.0mm * 19.0mm * 3.2mm (L*W*H)

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2.4 Pin Definitions

NO.	Pin Label	Description
1	NC	No Connection
2	TXD2	Serial Port 2 Transmit Data, TTL Level (3.3V only)
3	RXD2	Serial Port 2 Receive Data, TTL Level (3.3V only)
4	RXD2_LED	Serial Port 2 Data Receive Indicator (Fast Blink when Data is Received)
5	TX2_EN	Serial Port 2 Enable (RS485 Enable Control Pin when External 485 Chip is Used)
6	TXD2_LED	Serial Port 2 Data Transmit Indicator (Fast Blink when Data is Transmitted)
7	RXD1_LED	Serial Port 1 Data Receive Indicator (Fast Blink when Data is Received)
8	TXD1_LED	Serial Port 1 Data Transmit Indicator (Fast Blink when Data is Transmitted)
9	ERR_LED	Modbus Communication Error Indicator (Low: Modbus Communication Error, High: Modbus Communication Normal)
10	SYS_LED	System (PN Connection) Indicator (Low: Profinet Connection Established, High: Profinet Connection Not Established)
11	NC	No Connection
12	GND	Ground (Power Negative Input)
13	GND	Ground (Power Negative Input)
14	VCC	Power Positive Input (3.3V)
15	VCC	Power Positive Input (3.3V)
16	NC	No Connection
17	NC	No Connection
18	NRST	Reset Pin (Default: Internal Pull-up, Low: Restart)
19	RELOAD	Factory Reset Pin (Low for 5-10s: Factory Reset, Low for <2s: Restart)
20	NC	No Connection
21	LINK_LED	10M PHY Indicator (Low: PHY Negotiation Successful, Blink: Data Transmission)
22	SPD_LED	100M PHY Indicator (Low: PHY Negotiation Successful, Blink: Data Transmission)
23	GND	Ground (Power Negative Input)
24	GND	Ground (Power Negative Input)
25	RX_N	Ethernet Receive RX- Signal
26	RX_P	Ethernet Receive RX+ Signal
27	TX_N	Ethernet Transmit TX- Signal
28	TX_P	Ethernet Transmit TX+ Signal
29	NC	No Connection
30	WDI	Watchdog Circuit Input Pin (Receives Signal from MCU)
31	TXD1	Serial Port 1 Transmit Data, TTL Level (3.3V only)
32	RXD1	Serial Port 1 Receive Data, TTL Level (3.3V only)
33	NC	No Connection
34	TX1_EN	Serial Port 1 Enable (RS485 Enable Control Pin when External 485 Chip is Used)

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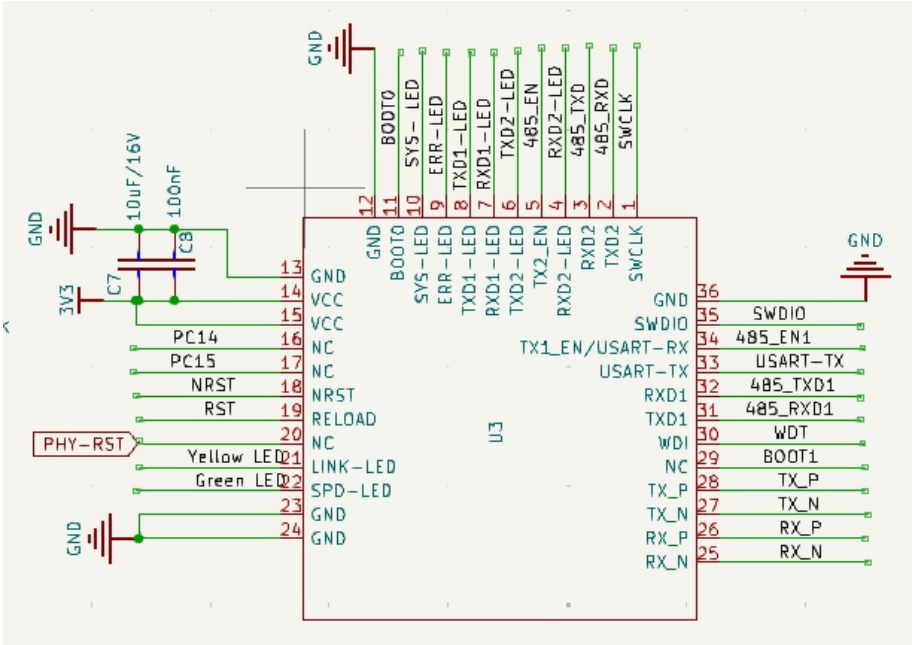
35	NC	No Connection
36	GND	Ground (Power Negative Input)

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2.5 Hardware Reference Design

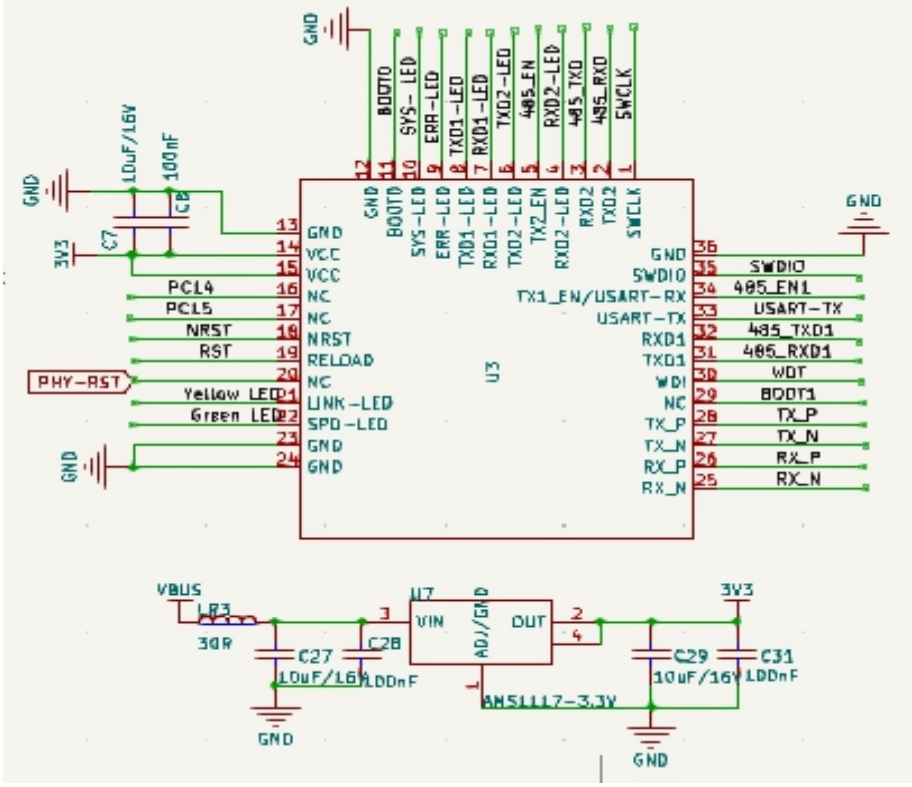
2.5.1. Typical Application Reference Connection



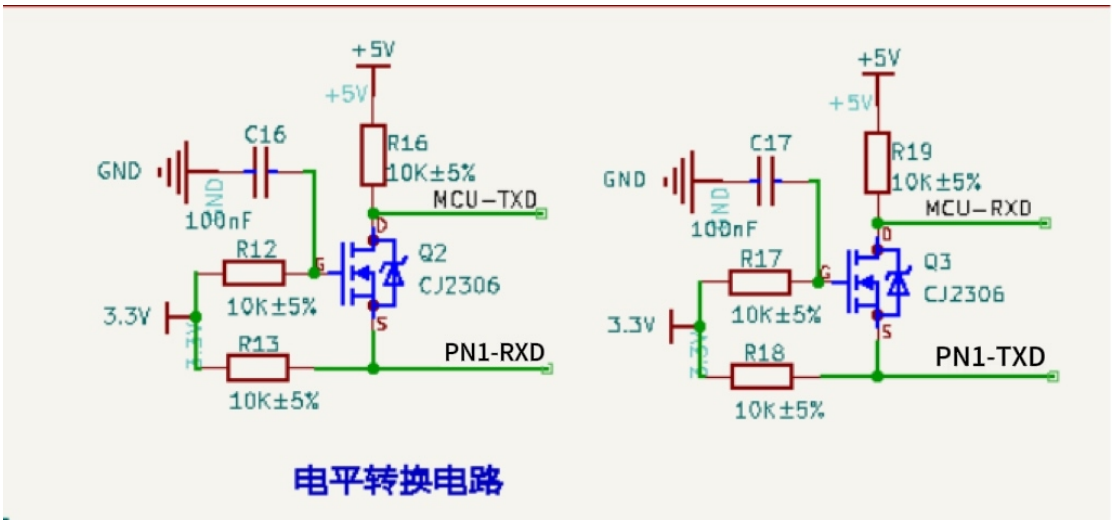
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2.5.2. Power Circuit Reference Connection

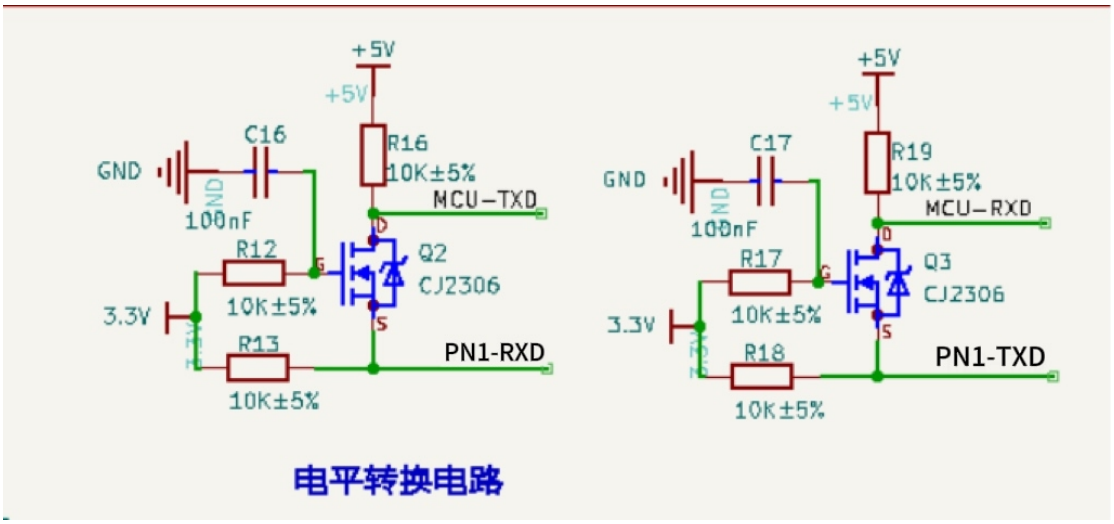


2.5.3. 1.8V Serial Circuit Reference Connection 3.3V

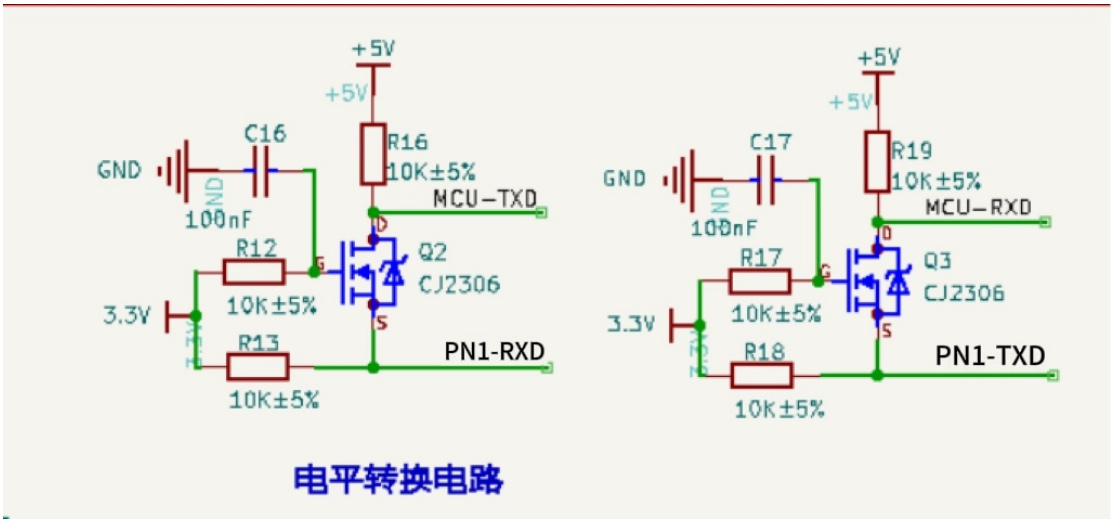


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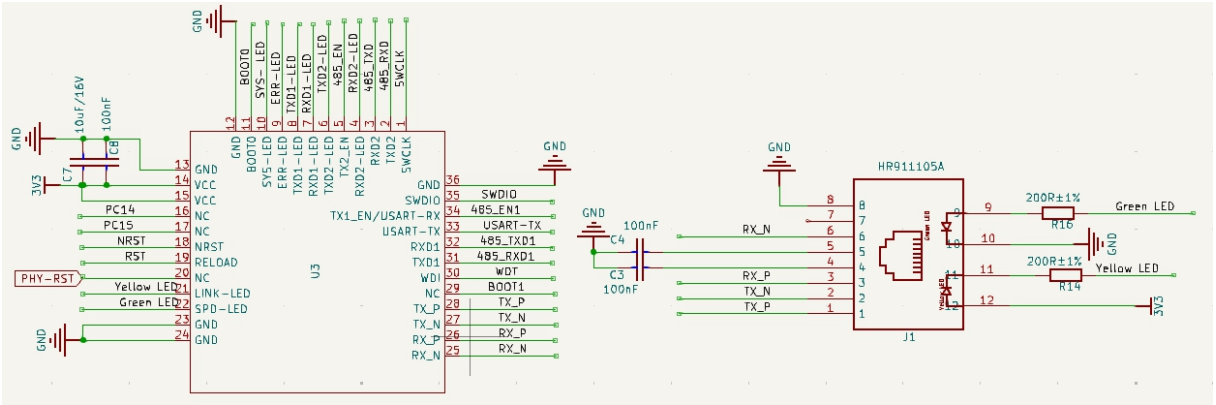
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2.5.4. 5V Serial Circuit Reference Connection



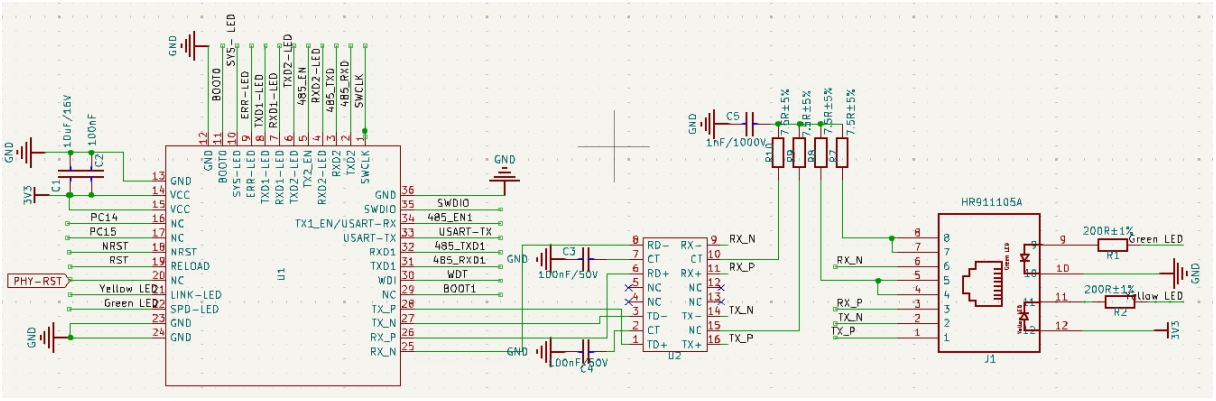
2.5.5. Ethernet Port with Built-in Transformer Reference Connection



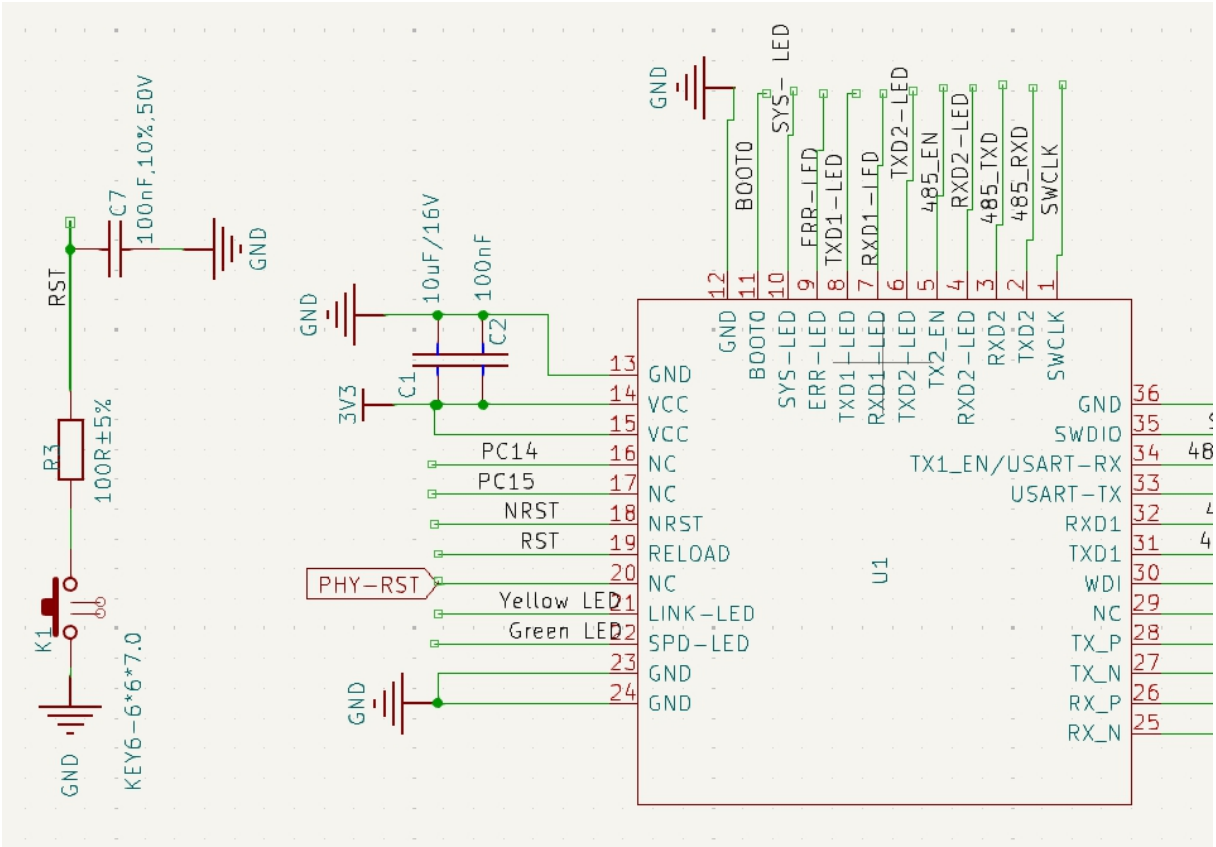
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2.5.6. Ethernet Port with External Transformer Reference Connection



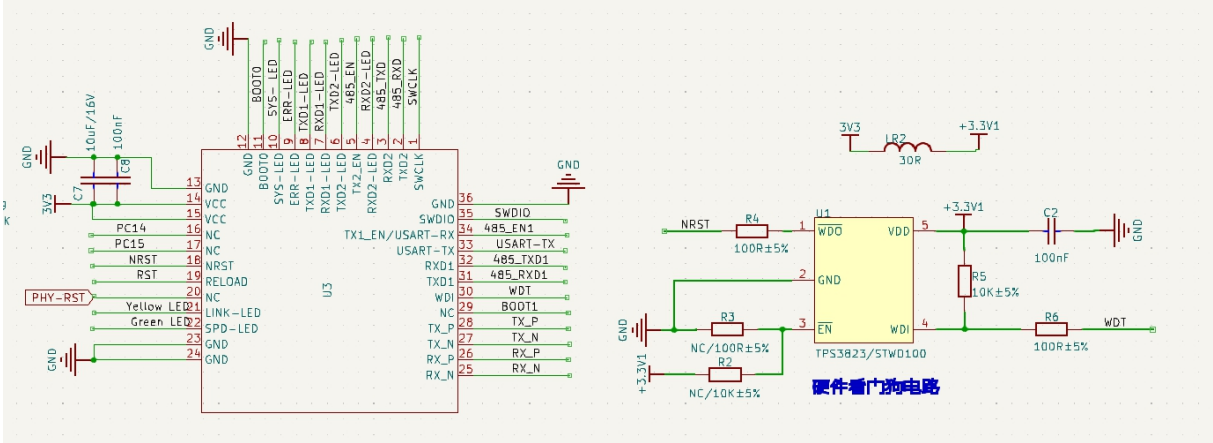
2.5.7. Reset Circuit Reference Connection



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2.5.8. Watchdog Circuit Reference Connection



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Chapter 3:Product Function Description

3.1 PN1-S25 Series Function Overview

The PN1-S25 module supports up to 64 Modbus RTU commands, divided into Master and Slave commands. Each command can be configured with type, length, and communication interface. When using the Modbus RTU Master function, the write function call interval should not be less than twice the polling cycle to avoid data refresh issues.

3.2 Modifying IP Address

The IP address of the module can be modified using TIA Portal or STEP 7. For detailed instructions, refer to the usage section.

3.3 Firmware Upgrade

The module supports firmware upgrades. For detailed instructions, refer to the firmware upgrade manual.

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Chapter 4:Device Alarm Information Description

When the PN1-S25 module encounters an error, it sends the specific error information to the PLC via the Profinet alarm mechanism. The ERR LED on the gateway will blink three times, and the PLC's indicator will also blink. The error information can be viewed on the PLC's upper-level software.

The specific error information is explained below:

Error Information	Description
Illegal Fun Code	Slave replies with Modbus standard error: Requested function is not recognized or not supported by the slave device.
Illegal Data Address	Slave replies with Modbus standard error: Data address is not within the accessible range of the device.
Illegal Data Value	Slave replies with Modbus standard error: The requested operation attempts to set an invalid or illegal value.
Slave Device Failure	Slave replies with Modbus standard error: Slave device failure, unknown device fault.
Frame Length Error	Master receives a message with incorrect length (too long, too short, or inconsistent with the correct slave reply data length).
CRC Check Error	Master receives a message with CRC check error.
Register Number Error	Master receives a message with incorrect register number.
SLave Address Error	Master receives a message with incorrect slave address.
MASTER WATING RSP TIMEOUT	Master receives a timeout.
Function Code Different	Master receives a message with a function code that does not match the request.
Register Address Error	Master receives a message with incorrect register address.
Unknown Error	Unknown error.

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Chapter 5:Tutorial for Loading Device in TIA Portal

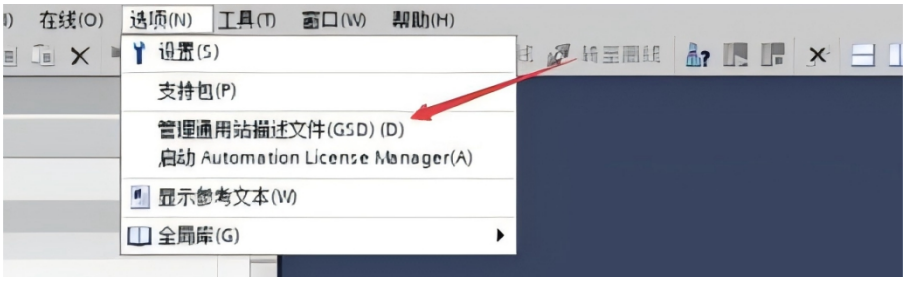
If you encounter any issues during use, please visit the official website link: https://www.ebyte.com/product-class.aspx
Note: The PN1-S25 is the SMD version. For initial use, it is recommended to use the test carrier board (PN1-S25-TB). This section uses the PN1-S25-TB for explanation.

5.1 Preparation before connection

1. Prepare the required XML file as shown below:
   GSDML-V2.3-EBYTE-PN1-S25-20241025.xml (subject to the latest file provided by the official website)
2. Connect the DC 5V external power supply to the module's Type-C interface
3. Connect the module to the PLC's Profinet interface using an Ethernet cable (ensure they are on the same network segment).

5.2 Adding GSDML File in TIA Portal

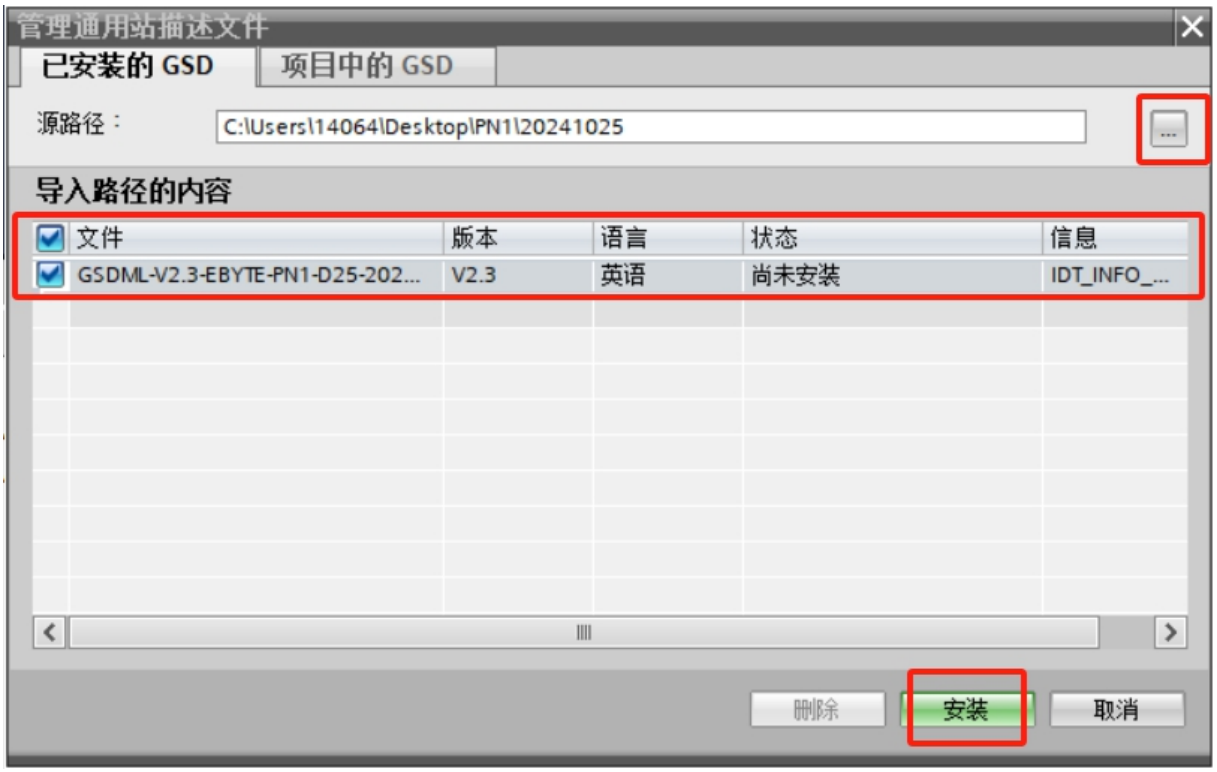
1. Open TIA Portal, click on "Options," and select "Manage General Station Description Files (GSD)."



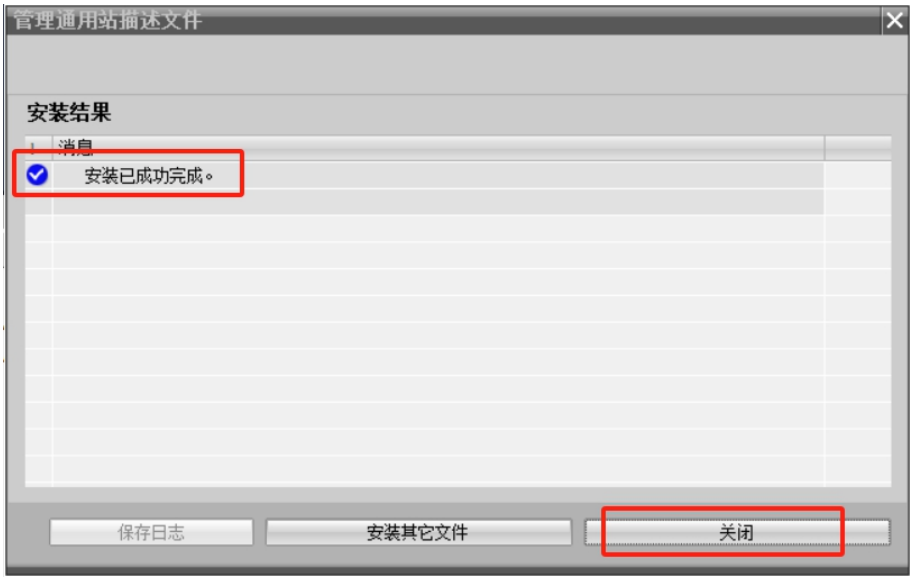
2. Add the GSDML file by selecting the folder where the GSD file is stored. The software will automatically scan and detect the GSD file. Check the file and click "Install."

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3. After installation, click "Close." The device can now be configured.

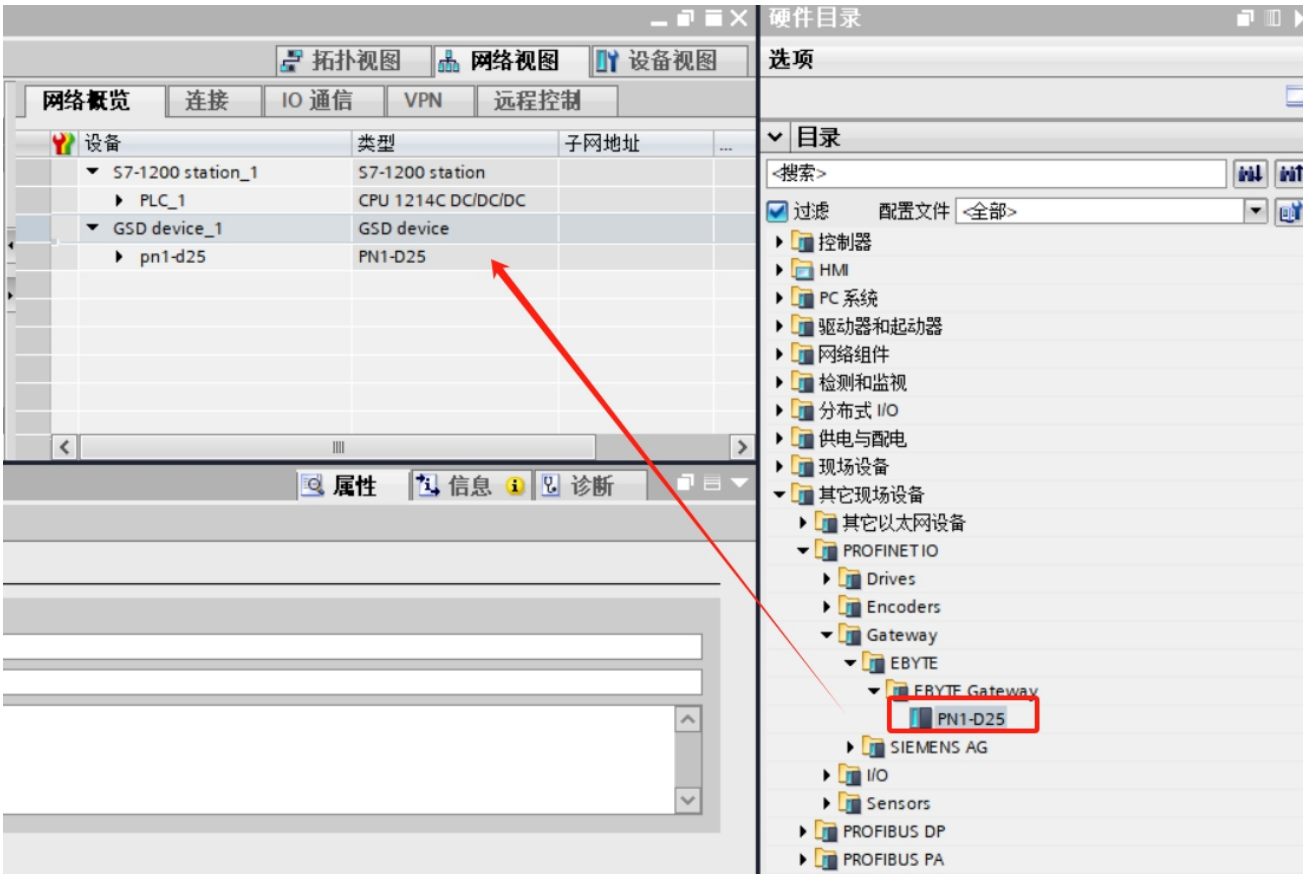


5.3 Adding Profinet Device to Project

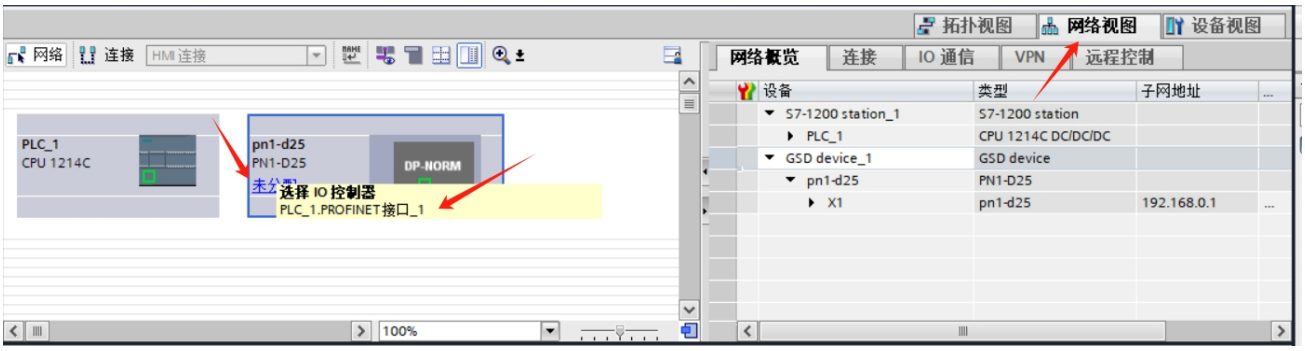
1. Create or open a project. If creating a new project, add the controller device first,then go to the device configuration interface, add the corresponding IO module, double-click the module, and it will be added successfully, as shown in the figure:

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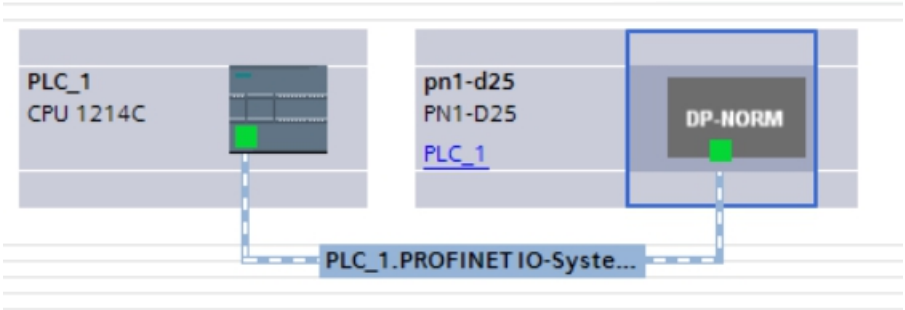
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2. In the network view, configure the device



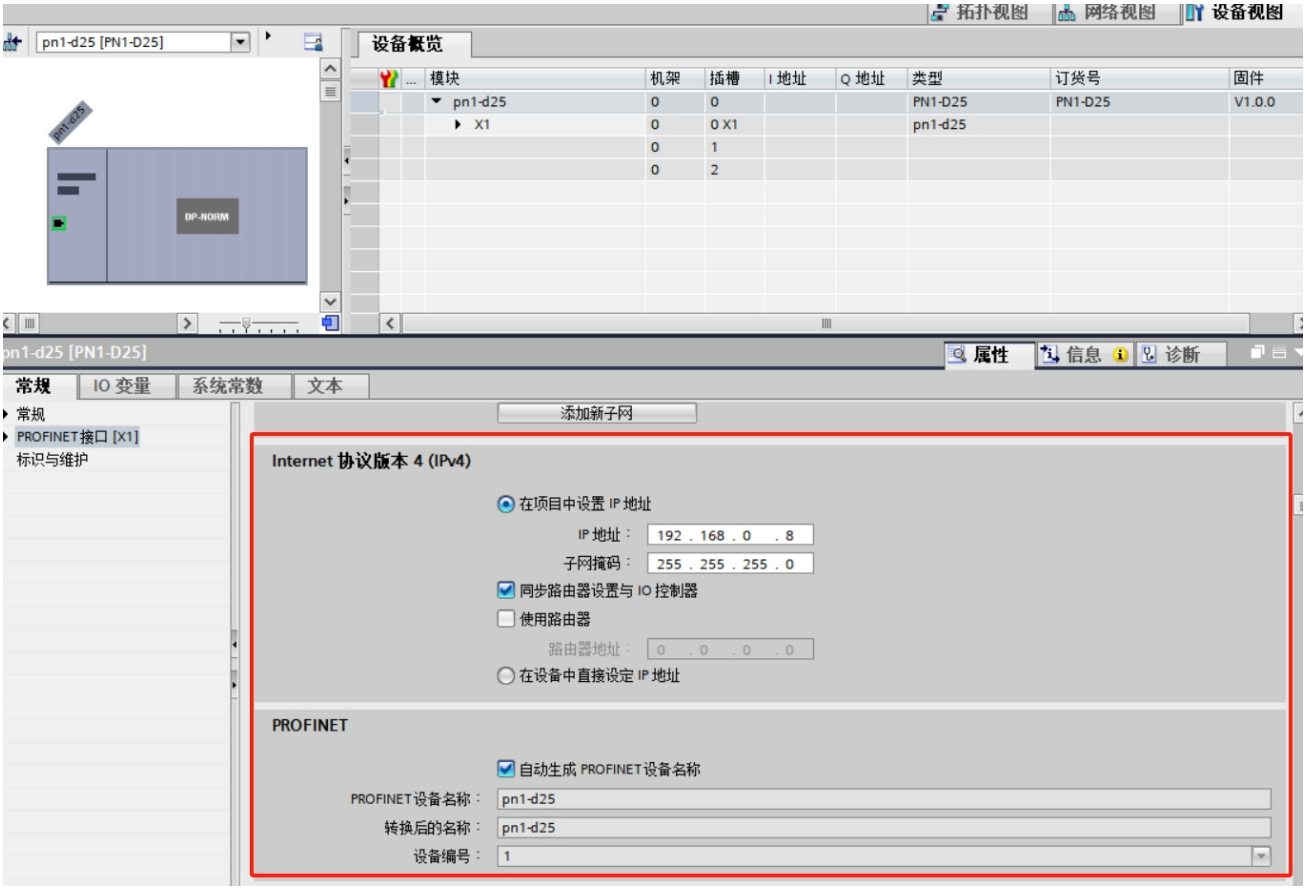
After completion, as shown in the figure:



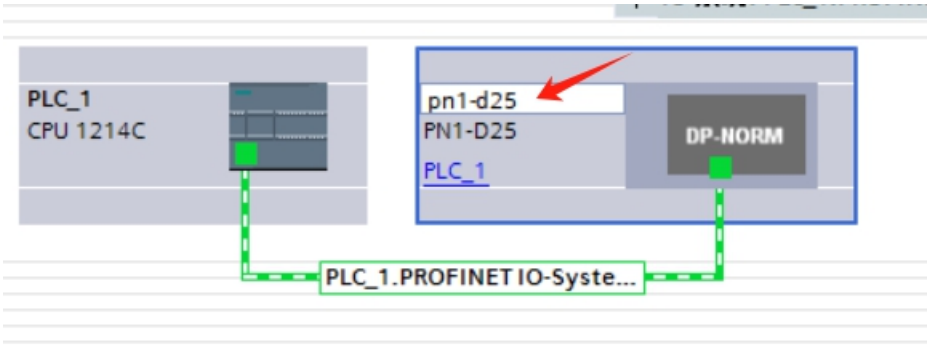
3. In the device view, first locate and select the newly added device, then double-click the module in the diagram. Next, in the general configuration interface, modify the IP address and device name to ensure they match the module's actual settings. Alternatively, you can choose to set the IP address directly on the device itself.

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Click here to directly modify the device name.



5.4 Configuring Modbus Communication Parameters

After completing the setup, enter the device view. The system provides two slots for configuring serial port function modules, each with 32 sub-slots for Modbus command sub-modules. The first sub-slot corresponds to the device's serial port status word and control word (for PNMB Master/PNMB Slave configuration). The status word allows the PLC to monitor the PN1-S25 device's status, while the control word allows the PLC to control the PN1-S25 device.

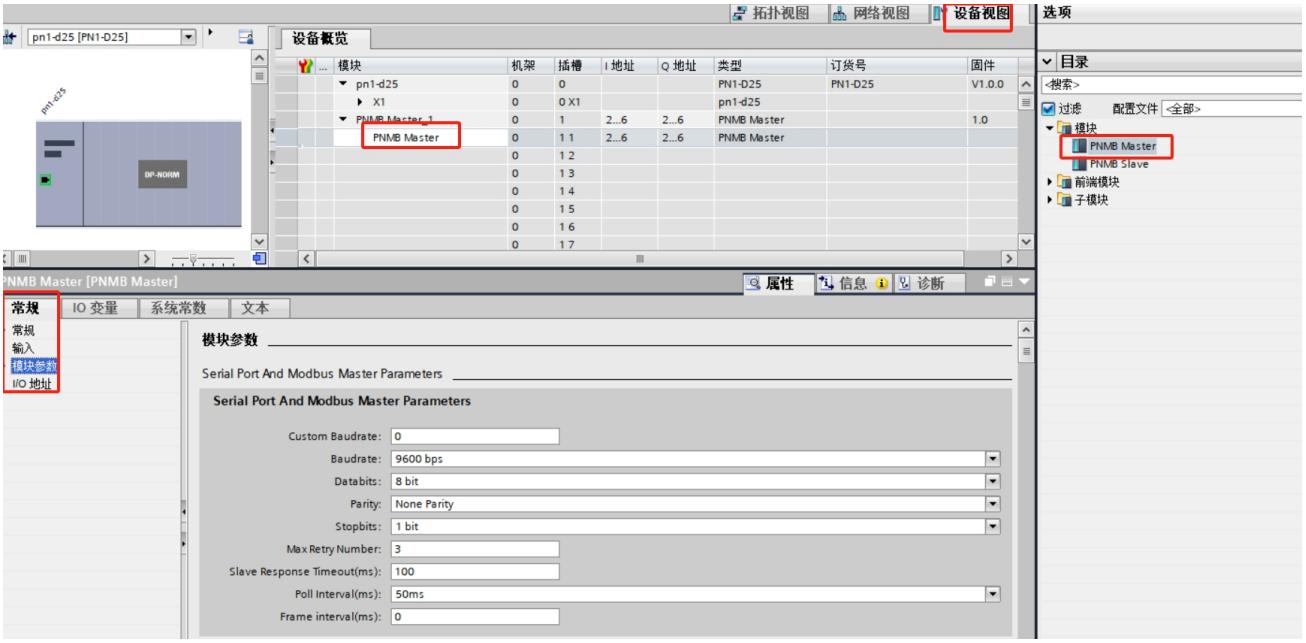
To adjust the Modbus interface parameters for serial port 1 or 2, select the target slot (1 or 2) and choose the "Properties" option. Select the serial port's working mode (PNMB Master/PNMB Slave) — Modbus RTU Master or Slave mode. Note that the PN1-S25 module supports both Modbus RTU Master and Slave modes.

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PN1-S25 module Modbus communication interface parameters:

PNMB Master



Custom Baudrate:

When the serial port is configured in slave mode and a custom baud rate is required, the default setting is 0. In this case, it indicates that the custom baud rate is not enabled. To enable the custom baud rate, set a value between 1200 and 3900000. Under these circumstances, the "Baudrate" option will not take effect.

Baudrate:

Standard baud rate:1200、2400、4800、9600、19200、38400、57600、115200、230400、460800bps，default:9600.

Databits:

Data bits:7、8bit，default:8.

Parity:

Data verification:None Parity（无检验）、Odd Parity（奇检验）、Even Parity（偶检验），default:None Parity（无检验）.

Stopbit:

Data stop bit：1、2bit，default:1.

Max Retry Number:

Number of error retries when the serial port is the master station, range 0-255, where 0 means no retransmission, 255 means infinite retransmission, and 1-254 means retransmission according to the specified number of times.,default:3.

Slave Response Timeout(ms):

When the serial port acts as the master station, the module sends a Modbus message and waits for the response from the Modbus device. If the Modbus device does not respond within the set waiting time, the module stops waiting and

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proceeds to send the next Modbus message or retransmits the current one. The selectable range is 0-65535 ms, default:100 ms.

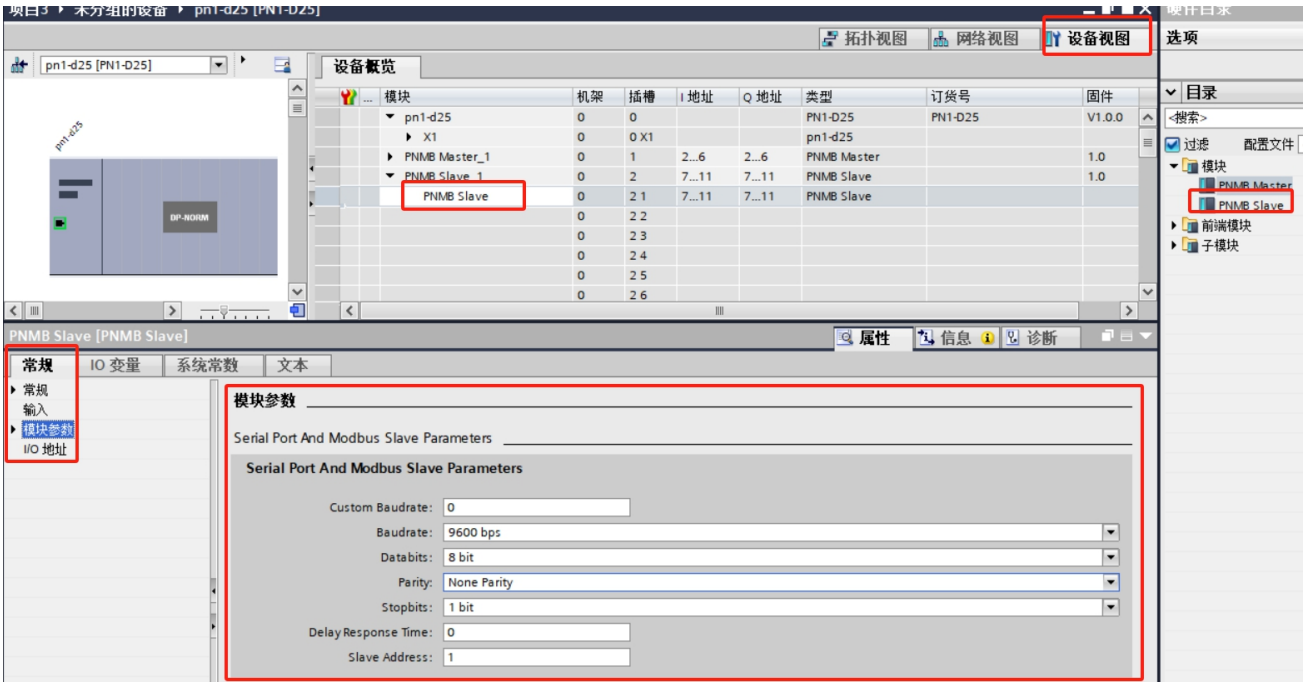
Poll Interval(ms):

When the serial port serves as the master station, the bus conversion module delays the transmission of the Modbus master message after receiving a correct response from the Modbus slave station. If the Modbus slave device responds to the master's message slowly, communication failures may occur if the bus conversion module sends Modbus messages too quickly. In such cases, it may be appropriate to increase the interval between message transmissions. The selectable range includes 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 200, 500, 1000 ms, or no delay (No Delay). default:50ms。

Frame interval(ms):

Data frame break time: 0-65535 ms, where 0 indicates automatic frame breaking.， default:0.

PNMB Slave



Custom Baudrate:

When the serial port is configured in slave mode and a custom baud rate is required, the default setting is 0. In this case, it indicates that the custom baud rate is not enabled. To enable a custom baud rate, please set a value between 1200 and 3900000. Under these circumstances, the "Baudrate" option will not take effect.

Baudrate:

Standard baud rates:1200、2400、4800、9600、19200、38400、57600、115200、230400、460800bps，default:9600.

Databits:

Data bits:7、8bit，default:8.

Parity:

Data verification: None Parity（无检验）、Odd Parity（奇检验）、Even Parity（偶检验），default:None Parity（无

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检验）.

Stopbit:
Data stop bits: 1、2bit，default:1.

Delay Response Time.
When the serial port is configured as a slave, it specifies the delay time before responding after receiving a polling command from the master station. Range: 0 to 65535, where 0 indicates an immediate response, and the unit is milliseconds (ms).default:0.

Slave Address:
Station address when the serial port is configured as a slave. Range: 1 ~ 247，default: 1.

Note: The configuration of serial port 2 is the same as that of serial port 1.

5.5 Configure Modbus message (function code)

There are 2 slots in the device overview. These 2 slots are used to configure the serial port information and master-slave station selection. The status word and control word are already occupied, and the remaining 64 sub-slots (32 sub-slots for each serial port command) are available for configuring Modbus messages (commands).

Click the module in the hardware directory on the right to provide the serial port with master-slave station selection, which are PNMB Master (serial port related parameters need to be configured because the status word and control word are already occupied) and PNMB Slave (serial port related parameters need to be configured because the status word and control word are already occupied); click the sub-module to select the corresponding Modbus RTU command inside. Simply double-click the message in the hardware directory with the left mouse button to configure the message to the Modbus message queue according to the order of the blank slots.

Modbus RTU Master Commands

Each Modbus RTU master command has five attributes:

Slave Address(1~247):Indicates the address of the Modbus RTU slave device. The selectable range is 1-247.

Function Code:The function code of the Modbus RTU master is automatically generated according to the Modbus command inserted into the slot and cannot be changed.

Start Address :The starting address for Modbus RTU slave data operations. Non-register PLC address, no prefix. Range 0-65535.

XX Quantity :Indicates the number of coils or registers to be read or written. The Modbus command for inserting data into the slot is automatically generated, and the quantity can be changed within the range.

Transmission Type :The following four sending types are provided.

Disable:Indicates that the command is not executed.

Poll trigger(轮询发送): After the master station corresponding to Modbus RTU is enabled, the message will be sent in the order of slot numbers from small to large.

Leve ltrigger(电平发送): After the control sending flag bit corresponding to the slot number changes from 0 to 1: For a read instruction, the message will be sent. For a write instruction, it will be sent only if the data has changed; after the control sending flag bit corresponding to the slot number changes from 1 to 0, both the read message and the write message will stop sending. (Taking the previous section as an example, PLC address QB2-QB5 is the send trigger control bit)

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Rising trigger(上升沿发送): After the trigger control bit corresponding to the slot number changes from 0 to 1, the message will be sent once. (Using the previous section as an example, PLC address QB2-QB5 is the send trigger control bit)

Modbus RTU Slave Commands

Each Modbus RTU slave command is prefixed with Input or Output. Input means data is input into PLC, i.e. the master writes data to the slave, and the slave gives the data to PLC, corresponding to a write type command. Output means data is output from PLC, i.e. the PLC gives the data to the slave, and the master reads the data from the slave, corresponding to a read type command. More specifically, each slave command is marked with the supported function code at the end.

Function code	Function	Operation address area (non-register PLC address)	Operation Type
01H	Read multiple coil output states	0XXXX	Read
02H	Read multiple input coil states	1xxXX	Read
03H	Read multiple holding registers	4xxXX	Read
04H	Read Input Register	3XXXX	Read
05H	Force a single coil	0XXXX	Write
06H	Presetting a Single Holding Register	4XXXX	Write
OFH	Forced multi-coil	0xXXX	Write
10H	Preset multiple holding registers	4XXXX	Write

5.5.1. Example

Set the device serial port 1 as the master station to write 8-bit coils.

Step 1: Drag PNMB Master into slot 1



Step 2: Select the command in the submodule MBRTU Master Coils 0xxxx

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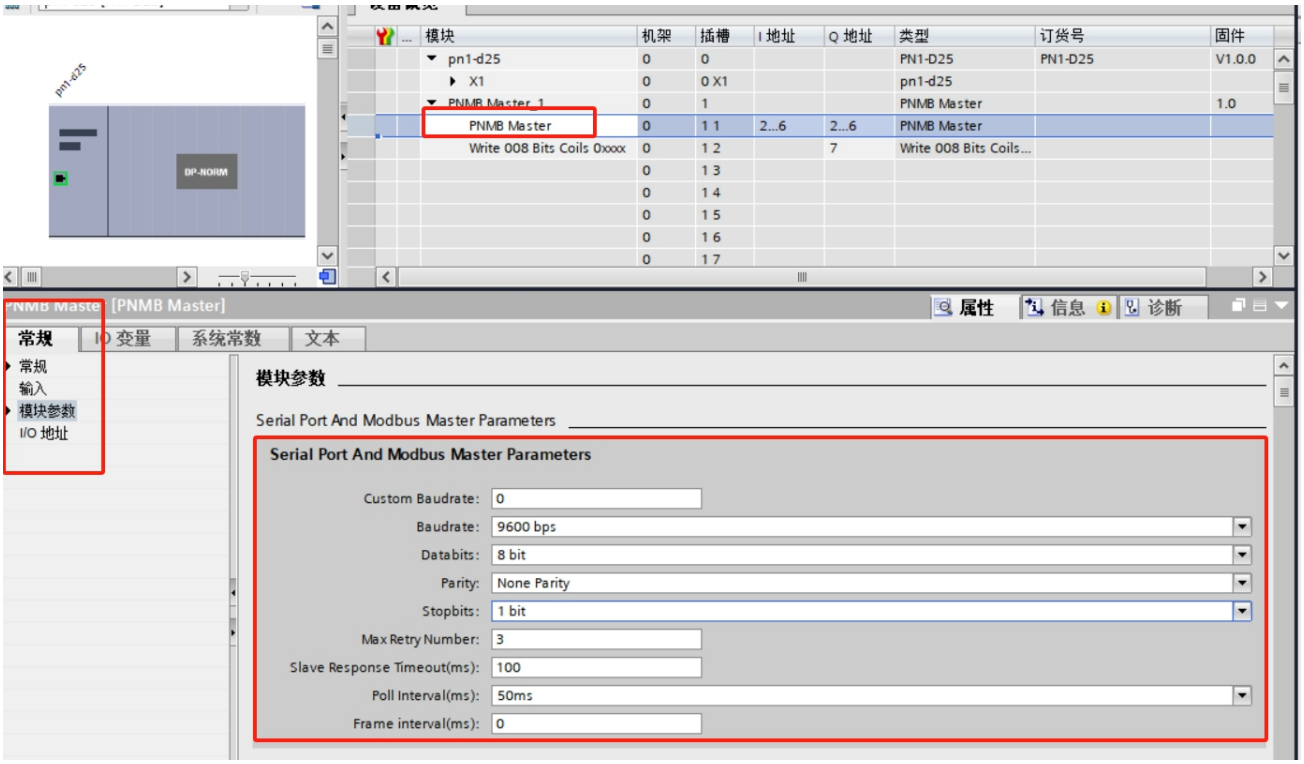
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Step 3: Select MBRTU Write 008 bits 0xxxx



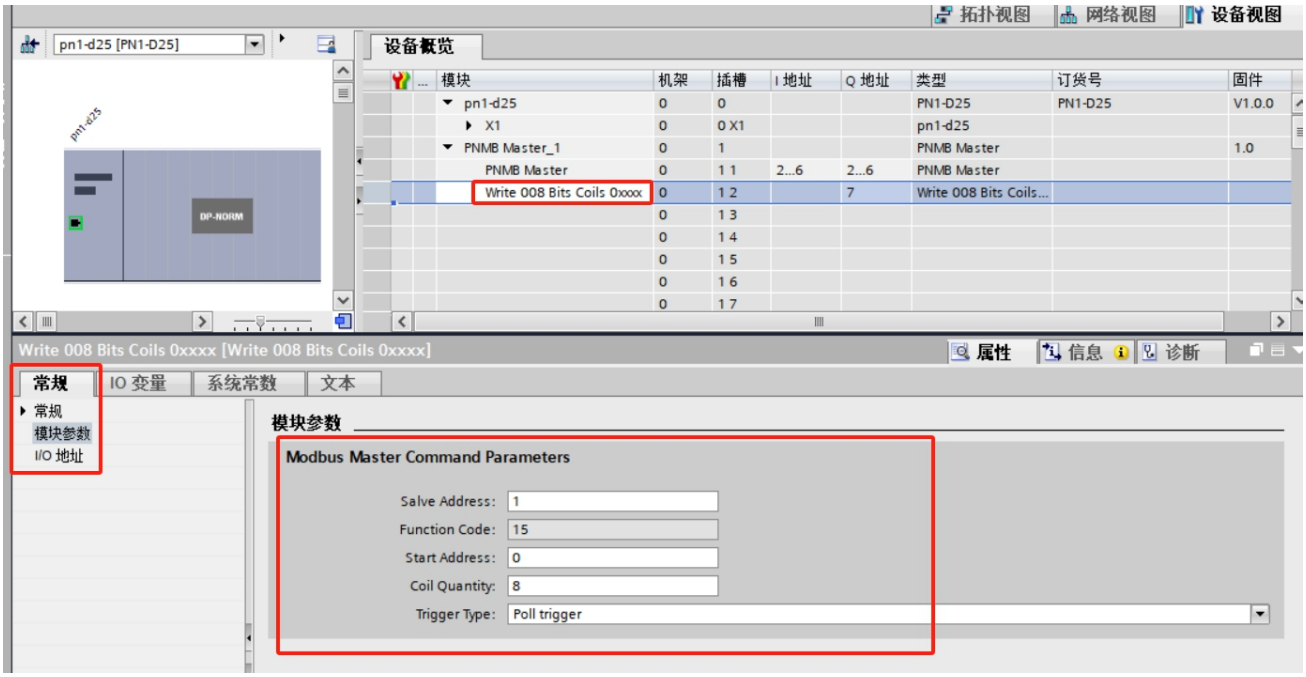
Step 4: Configure the working parameters of the gateway serial port. Select the host module (PNMB Master) just added. Here you need to configure the serial port parameters of the gateway according to the serial port parameters of the RTU.



Configuration register information for communication between Profinet gateway and RTU;

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5.6 Configure status word and control word

From the device overview configuration, we can see that slot number 1 can only be used to select PNMB Master/PNMB Slave. In the I address column, the corresponding Profinet input address IB2-6 is the communication status monitoring bit. In the Q address column, the corresponding Profinet output address QB2-6, QB2 is the communication control word (control) of this bus conversion module, and QB3-6 is the control bit sent for each message.

Communication status monitoring:

1st byte : The slot number of serial port 1 where the error occurred

2nd byte : Serial port 1 error code

The other bytes are reserved.

Error Code	Description
1	The slave device returned a Modbus standard error:ILLEGAL FUNCTION
2	The slave device returned a Modbus standard error:ILLEGAL DATA ADDRESS
3	The slave device returned a Modbus standard error:ILLEGAL DATA VALUE
4	The slave device returned a Modbus standard error:SLAVE DEVICE FAILURE
10	The length of the message received by the master station is incorrect—it is either too long, too short, or does not match the expected length of the correct response from the slave device.
11	The CRC check of the message received by the master station is incorrect.
12	The number of registers in the message received by the master station is incorrect.
13	The slave address in the message received by the master station is incorrect.
14	The master station has experienced a reception timeout.
15	The function code in the message received by the master station does not match the one in the request.
16	The register address in the message received by the master station is incorrect.

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17	Unknown error

Communication Control Bits:

Bit 0: Enables or disables the Modbus function on the serial port interface. 1 = Enabled, 0 = Disabled.

Bit 1: Clears fault codes when a rising edge (0→1) is detected. The communication status monitor is reset to zero.

Bytes 2 to 5:

Each slot corresponds to one bit for the message. The correspondence is as follows in the table below.

When the message is configured to trigger on a rising edge, setting the bit from 0→1 enables the message to be sent once.

When the message is configured to trigger on a level, setting the bit to 1 enables the message for continuous cyclic transmission, and setting it to 0 stops the cyclic transmission of the message.

Byte 2							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Subslot 9	Subslot 8	Subslot 7	Subslot 6	Subslot 5	Subslot 4	Subslot 3	Subslot 2
Byte 3							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Subslot 17	Subslot 16	Subslot 15	Subslot 14	Subslot 13	Subslot 12	Subslot 11	Subslot 10
Byte 4							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Subslot 25	Subslot 24	Subslot 23	Subslot 22	Subslot 21	Subslot 20	Subslot 19	Subslot 18
Byte 5							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Subslot 33	Subslot 32	Subslot 31	Subslot 30	Subslot 29	Subslot 28	Subslot 27	Subslot 26

The configuration status word and control word for Slot 2 are the same as those for Slot 1.

5.6.1. Example

Program segment 1 is used to enable the serial port of Channel 1 of the gateway, and program segment 2 uses the coil extended by the built-in input control of the PLC.



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5.7 Use BoTu to modify the module name and query the IP address

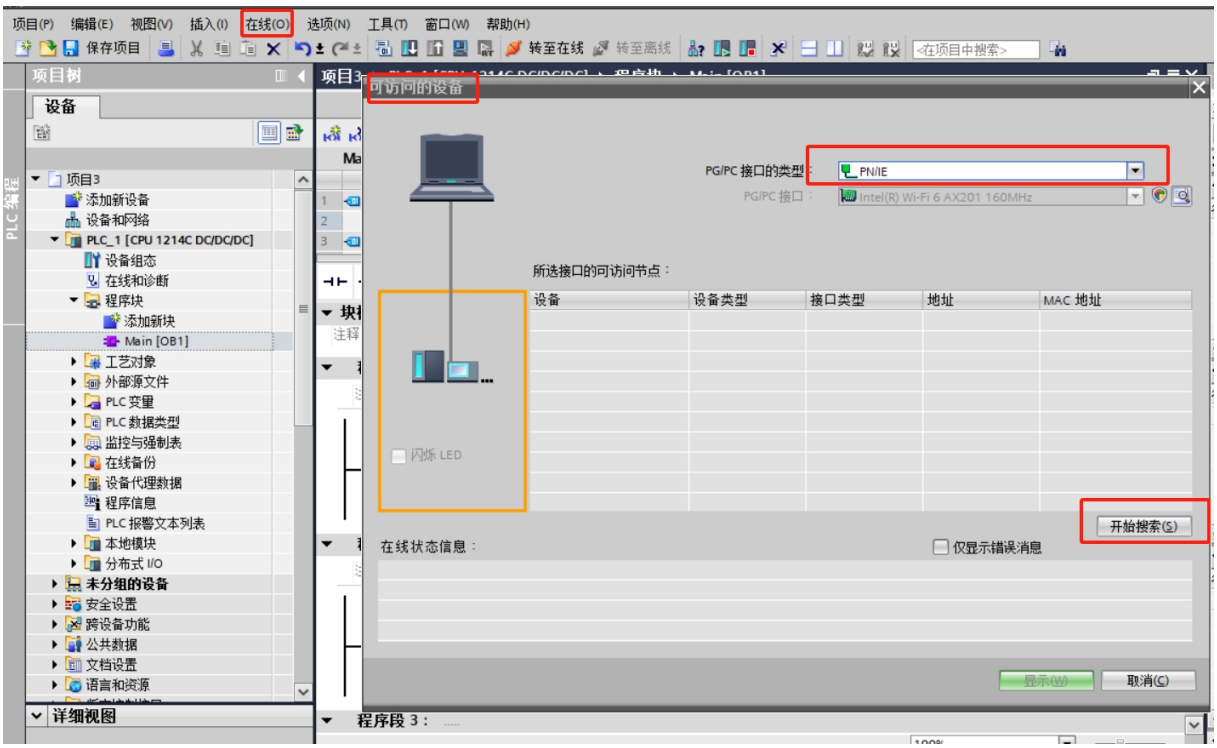
Open the BoTu software and click on the "Online" option in the menu bar.

In the opened Online Access interface, find and select "Accessible Devices."

Perform a device search. After the search is completed, a list of all accessible devices will be displayed.

From the list, select the target device whose IP address and name need to be modified.

Perform the modification of the IP address and name for the selected device.



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Chapter 6:Tutorial for Loading Device in STEP 7

If any issues occur during use, click on the official website link:https://www.ebyte.com/product-class.aspx

Note: The PN1-S25 is the surface-mount version. When using it for the first time, it is recommended to use the test board (PN1-S25-TB). This chapter uses the PN1-S25-TB as an example for explanation.

6.1 Preparation before connection

1. Prepare the required XML files as follows:

   GSDML-V2.3-EBYTE-PN1-S25-20241025.xml （Please refer to the latest documents provided on the official website）
2. Connect the DC 5V external power supply to the module's Type-C interface and power it on.
3. Connect the module to the Profinet interface of the PLC controller using an Ethernet cable. (Ensure they are on the same subnet.)

6.2 Adds GSDML file in STEP 7

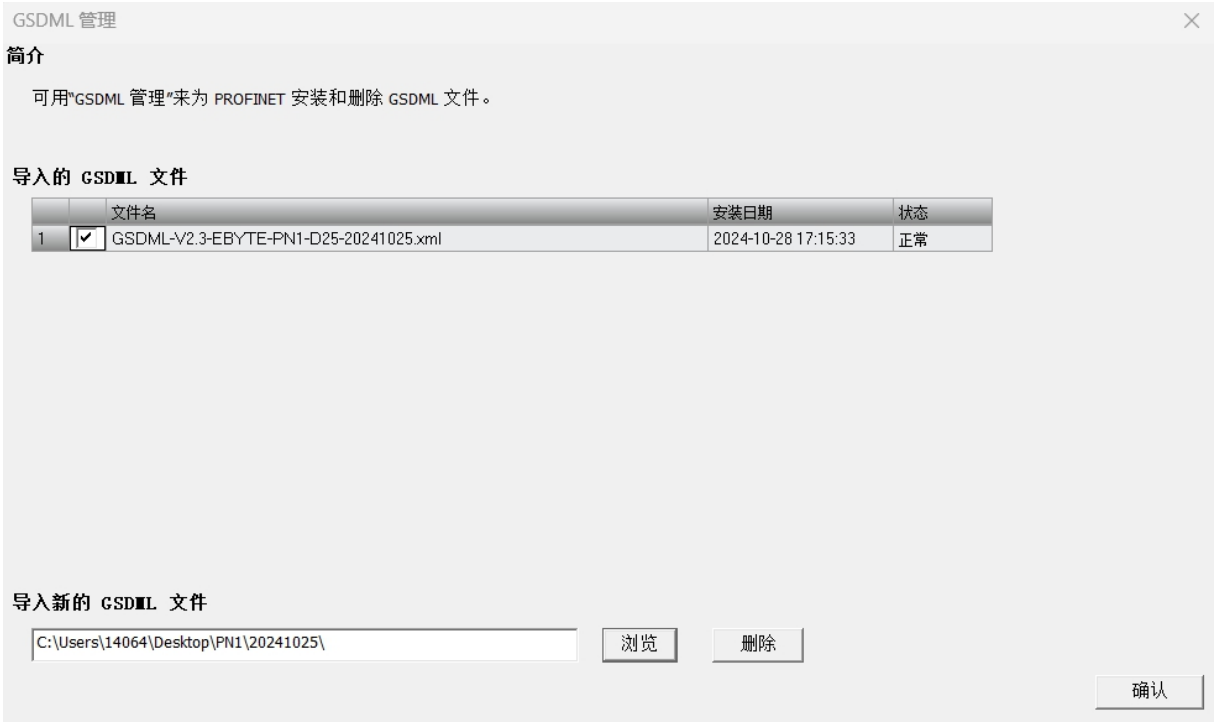
1. Under the File menu, enter GSDML Management



2. Adds GSDML file

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6.3 Add Profinet device to the project

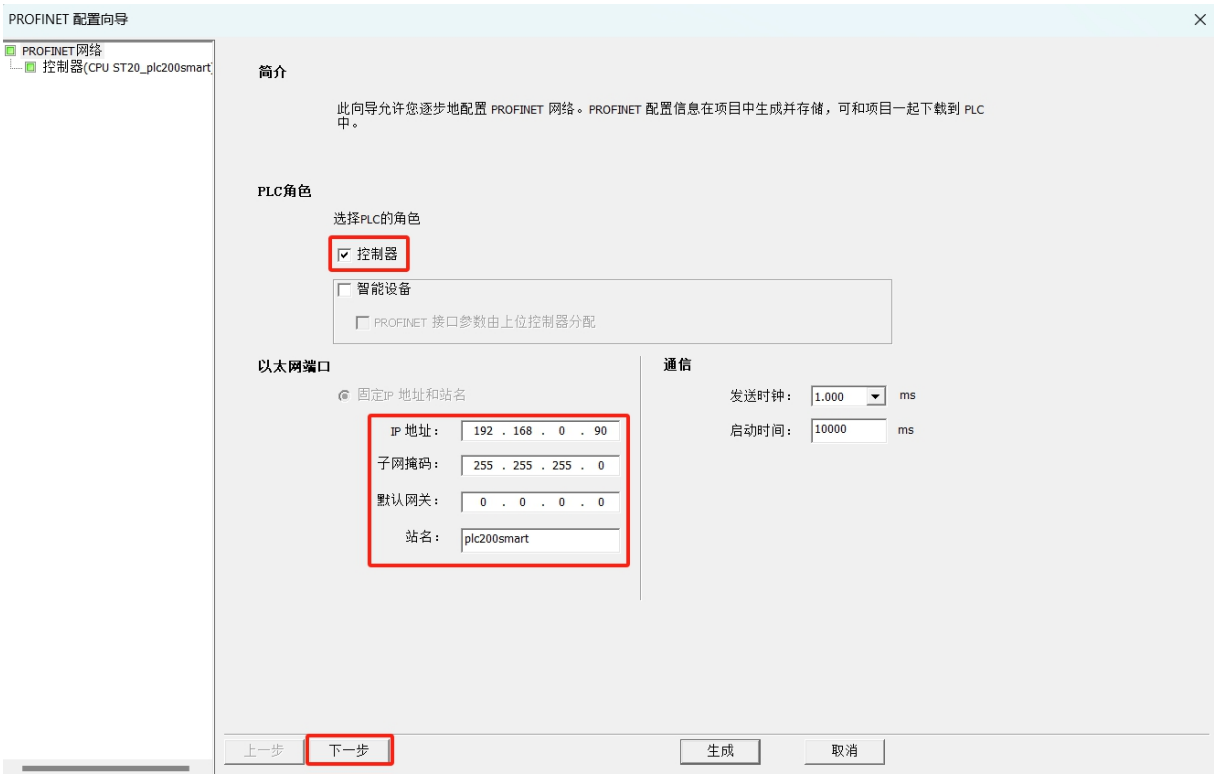
1. Select the PROFINET command under the Tools menu



2. Select the PLC role as PLC controller, and set the corresponding PLC controller IP and other related parameters. Click Next when completed.

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In the right column, click PROFINET-IO→Gateway→EBYTE→TION→EBYTE Gateway→PN1-S25V1.0.0 to select it, then hold down the left button and drag it into the table on the left.



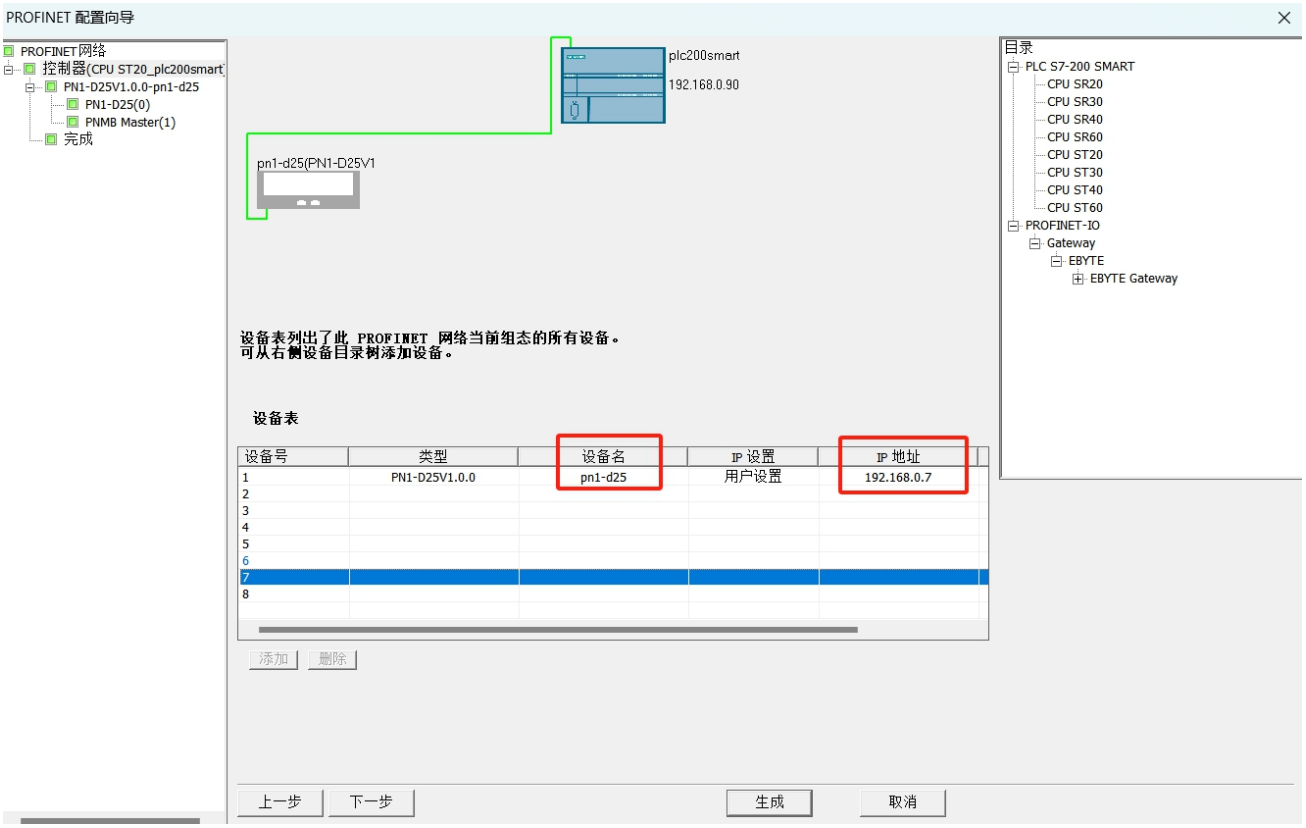
Double-click the device name column and fill in the corresponding device name. There cannot be the same device name in the same project. Similarly, set the IP address and keep it in the same network segment as the PLC controller. Finally, click Generate.

Note: The device name configured at this point needs to match the actual device. If the device name is unclear, you can

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set it arbitrarily first, and then change the module's device name to match later. The IP address set here will be applied to the module with the same device name during configuration. For instructions on modifying the device name, please refer to the chapter "STEP 7 Modify Module Name and Query Module IP Address."



6.4 Configure Modbus communication parameters

After completing the relevant settings, click to enter the device view operation interface. In the device overview area, the system provides two slot positions for configuring serial port function modules. Each slot can accommodate 32 sub-slots for configuring Modbus instruction sub-modules. Specifically, Sub-slot 1 corresponds to the serial port status word and serial port control word of the device (applicable for PNMB Master/PNMB Slave configurations). Through the status word, the PLC can obtain the operating status of the PN1-S25 device, while through the control word, the PLC can control the PN1-S25 device.

If you need to adjust the Modbus interface parameters of Serial Port 1 or Serial Port 2 on the PN1-S25 device, first select the target slot (Slot 1 or Slot 2), then choose the "Properties" option. During this process, you must pre-select the working mode of the serial port (PNMB Master/PNMB Slave) — either Modbus RTU master or slave mode. Note that the PN1-S25 module supports both Modbus RTU master and slave operating modes.

PN1-S25 module Modbus communication interface parameters:

PNMB Master

Custom Baudrate:

When the serial port is configured as a slave mode and a custom baud rate is required, the default setting is 0, which indicates that the custom baud rate is not enabled. To enable the custom baud rate, set a value between 1200 and 3900000. In this case, the "Baudrate" option will not take effect.

Baudrate:

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Standard baud rates:1200、2400、4800、9600、19200、38400、57600、115200、230400、460800bps，default:9600.

Databits:
Data bits:7、8bit，default:8.

Parity:
Data verification:None Parity（无检验）、Odd Parity（奇检验）、Even Parity（偶检验），default:None Parity（无检验）.

Stopbit:
Data stop bits: 1、2bit，default: 1.

Max Retry Number:
The number of error retries when the serial port is configured as a master station ranges from 0 to 255，0 No retry，255 Unlimited retries，1-254 Retries based on the specified count,default: 3.

Slave Response Timeout(ms):
When the serial port is configured as a master station, this setting defines the time the module waits for a response from the Modbus device after sending a Modbus message. If the Modbus device does not respond within the specified waiting time, the module stops waiting and proceeds to send the next Modbus message or retries the current one.The selection range is 0-65535 ms,default:100ms.

Poll Interval(ms):
When the serial port is configured as a master station, this setting defines the delay time for sending Modbus master messages after the bus conversion module receives correct responses from the Modbus slave. If the Modbus slave device responds to the master message slowly and the bus conversion module sends Modbus messages too quickly, communication failures may occur. In such cases, the message transmission interval can be appropriately increased to avoid issues.The available options for the delay time are: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 200, 500, 1000 ms, or No Delay (no waiting). default:50ms.

Frame interval(ms)：
Data frame break time:0-65535ms，0 means automatic frame breaking，default: 0.

PNMB Slave
Custom Baudrate:
When the serial port is configured in slave mode and a custom baud rate is required, the default setting is 0, which indicates that the custom baud rate is not enabled. To enable the custom baud rate, set a value between 1200 and 3900000. In this case, the "Baudrate" option will not take effect.

Baudrate:
Standard baud rates:1200、2400、4800、9600、19200、38400、57600、115200、230400、460800bps，default:9600.

Databits:

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Data bits:7、8bit，default: 8.

Parity:
Data verification:None Parity（无检验）、Odd Parity（奇检验）、Even Parity（偶检验），default:None Parity（无检验）。

Stopbit:
Data stop bits: 1、2bit，default: 1.

Delay Response Time.
When the serial port is configured as a slave, this setting defines the delay time before responding to a polling command received from the master station. The range is 0 to 65535, where 0 indicates an immediate response, and the unit is in milliseconds (ms).default: 0.

Slave Address:
The station address when the serial port is in slave mode. Range: 1 ~ 247，default: 1.

Note: The configuration of Serial Port 2 is the same as that of Serial Port 1.

6.5 Configure Modbus message (Function Code)

In the device overview, there are a total of 2 slots. These 2 slots are used to configure serial port information and master/slave station selection. Since the status word and control word are already occupied, the remaining 64 sub-slots (32 sub-slots for each serial port command) are available for configuring Modbus messages (commands).

Click on the module in the hardware catalog on the right to provide the master/slave station selection for the serial port. The options are PNMB Master (where the status word and control word are already occupied, requiring configuration of serial port parameters) and PNMB Slave (where the status word and control word are already occupied, requiring configuration of serial port parameters). Click on the sub-module to select the corresponding Modbus RTU command. By double-clicking the message in the hardware catalog with the left mouse button, the message can be configured into the Modbus message queue according to the order of the empty slots.

Modbus RTU Master Command

Each Modbus RTU master command has five attributes:

Slave Address(1~247):Represents the address of the Modbus RTU slave device. The selectable range is 1-247.

Function Code:The function code of the Modbus RTU master. It is automatically generated based on the Modbus command inserted into the slot and cannot be modified.

Start Address :The starting address for operating on the Modbus RTU slave data. This is not a register PLC address and has no prefix. The range is 0-65535.

XX Quantity :Indicates the number of coils or registers to read or write. This is automatically generated based on the Modbus command inserted into the slot and can be modified within the allowed range.

Transmission Type :The following four transmission types are provided.

Disable:Indicates that the command is not executed.

Poll trigger(轮询发送): After the corresponding Modbus RTU master station is enabled, the messages will be sent in ascending order according to the slot numbers.

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Leve ltrigger(电平发送): When the control send flag corresponding to the slot number changes from 0 to 1:For read commands, the message will be sent.For write commands, the message will only be sent if the data has changed.When the control send flag corresponding to the slot number changes from 1 to 0, both read and write messages will stop being sent.(As in the previous section, the PLC addresses QB2-QB5 represent the send trigger control bits.)

Rising trigger(上升沿发送): When the trigger control bit corresponding to the slot number changes from 0 to 1, the message will be sent once.(As in the previous section, the PLC addresses QB2-QB5 represent the send trigger control bits.)

Modbus RTU Slave Command

Each Modbus RTU slave command is prefixed with either Input or Output. Input indicates that data is being input into the PLC, meaning the master writes data to the slave, and then the slave passes the data to the PLC, corresponding to write-type commands. Output indicates that data is output from the PLC, meaning the PLC sends data to the slave, and then the master reads the data from the slave, corresponding to read-type commands. More specifically, each slave command specifies the supported function codes at the end.

Function Code	Function	Operation address area (non-register PLC address)	Operation Type
01H	Read multiple coil output states	0XXXX	Read
02H	Read multiple input coil states	1xxXX	Read
03H	Read multiple holding registers	4xxXX	Read
04H	Read Input Register	3XXXX	Read
05H	Force a single coil	0XXXX	Write
06H	Presetting a Single Holding Register	4XXXX	Write
OFH	Forced multi-coil	0xXXX	Write
10H	Preset multiple holding registers	4XXXX	Write

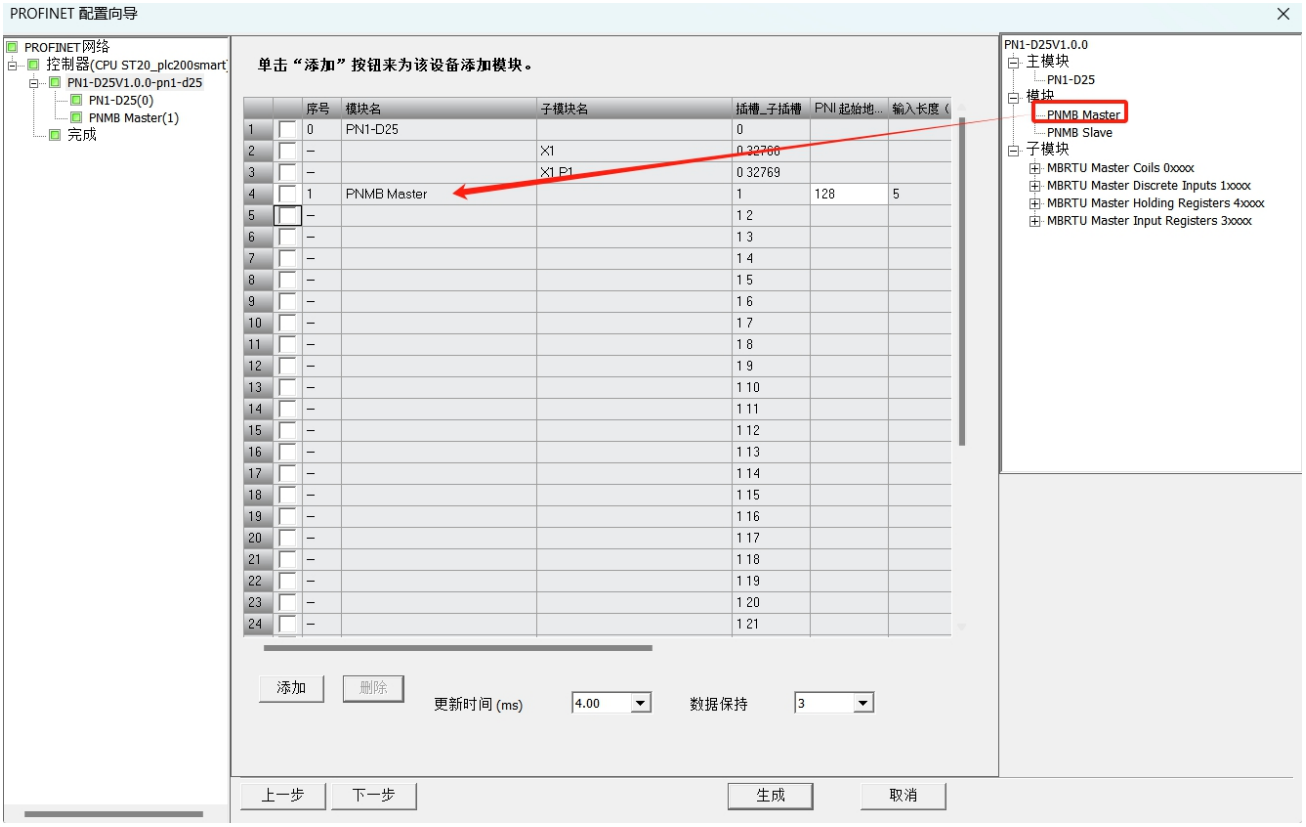
6.5.1. Example

Set the device's serial port 1 as the master to write to an 8-bit coil.

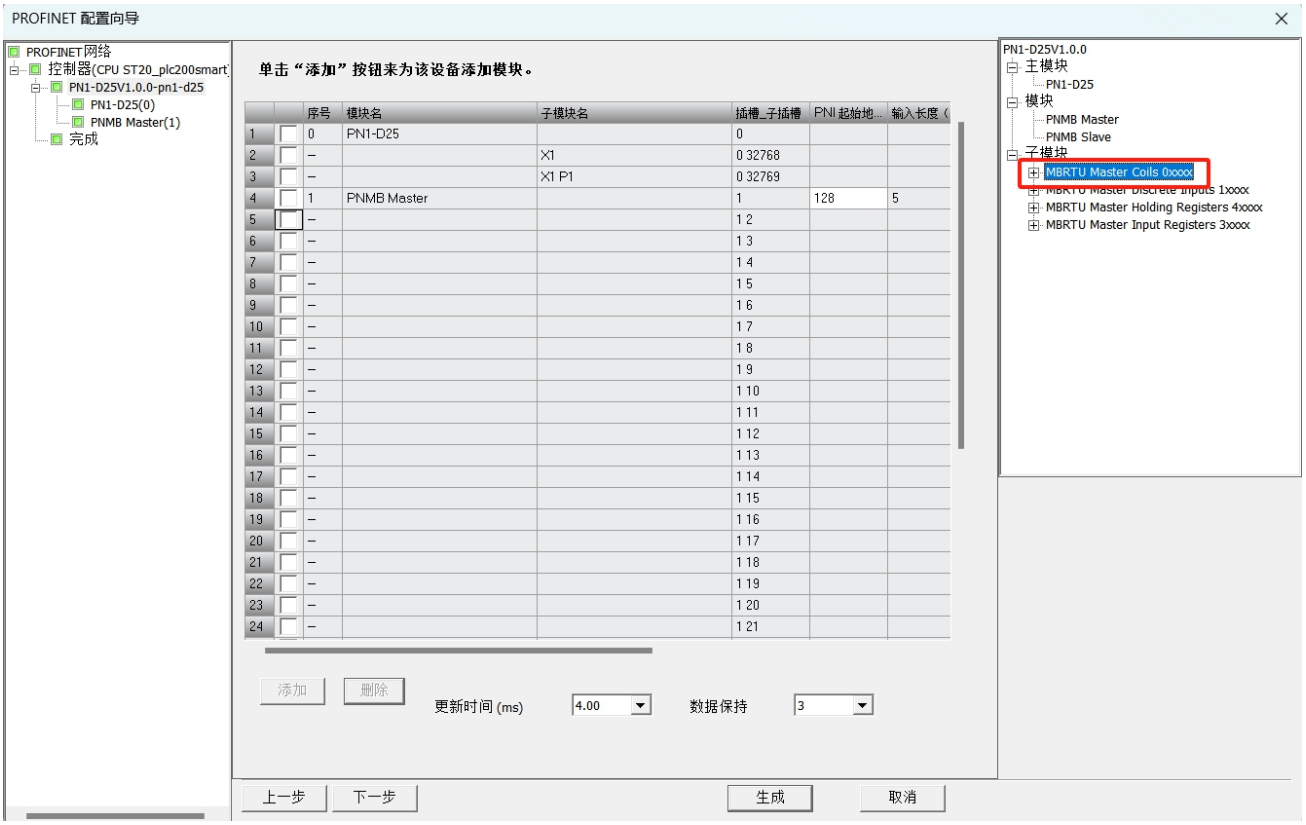
Step 1: Drag the PNMB Master into Slot 1.

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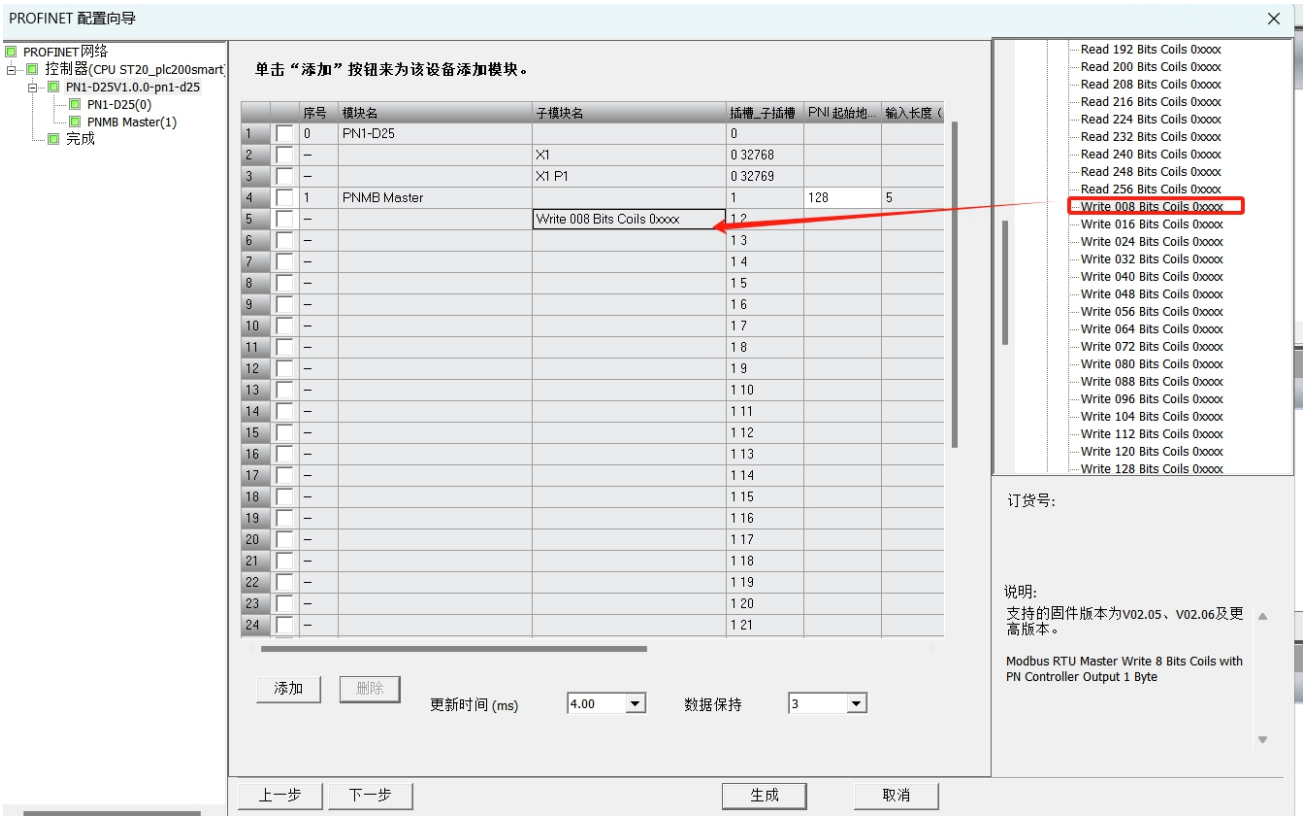
Step 2: Select the command within the sub-module MBRTU Master Coils 0xxxx.



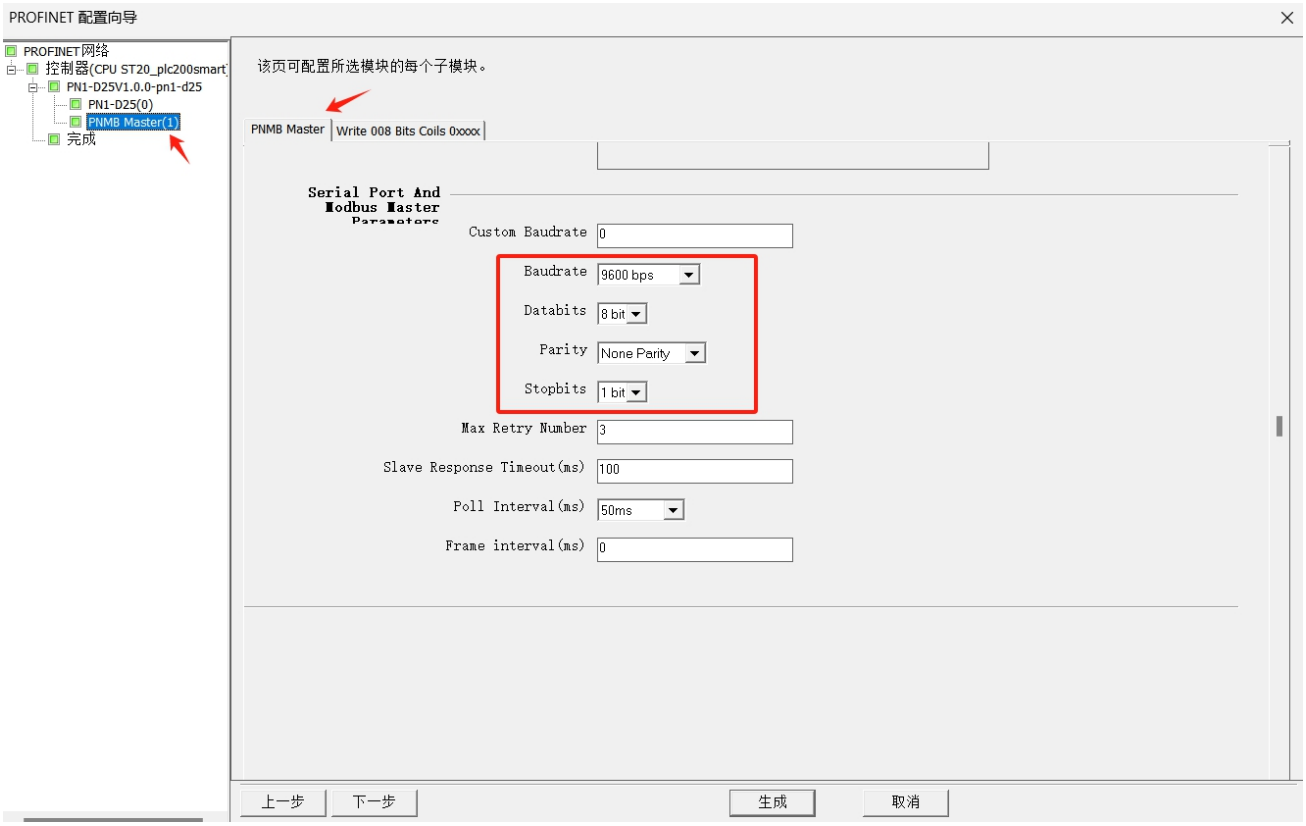
Step 3: Select MBRTU Write 008 bits 0xxxx

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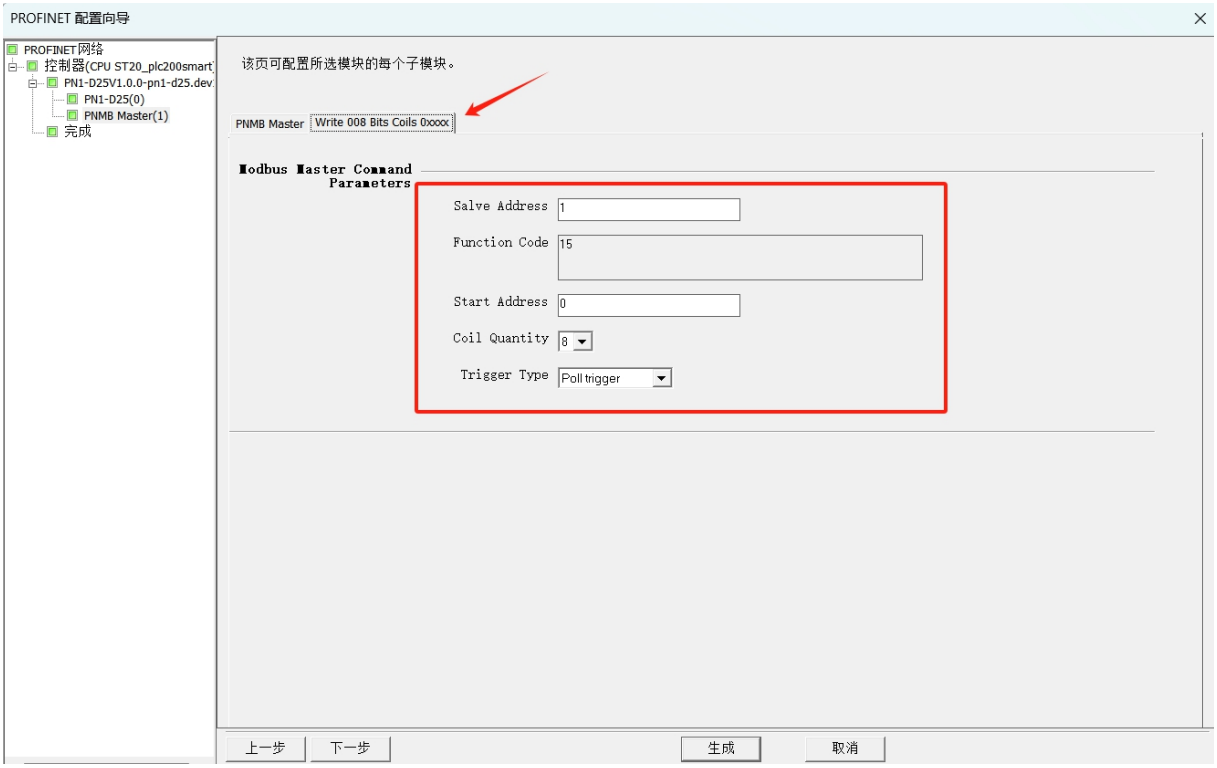
Step 4: Configure the working parameters of the gateway serial port. Select the master module (PNMB Master) added earlier. Here, you need to configure the serial port parameters of the gateway based on the RTU serial port parameters.



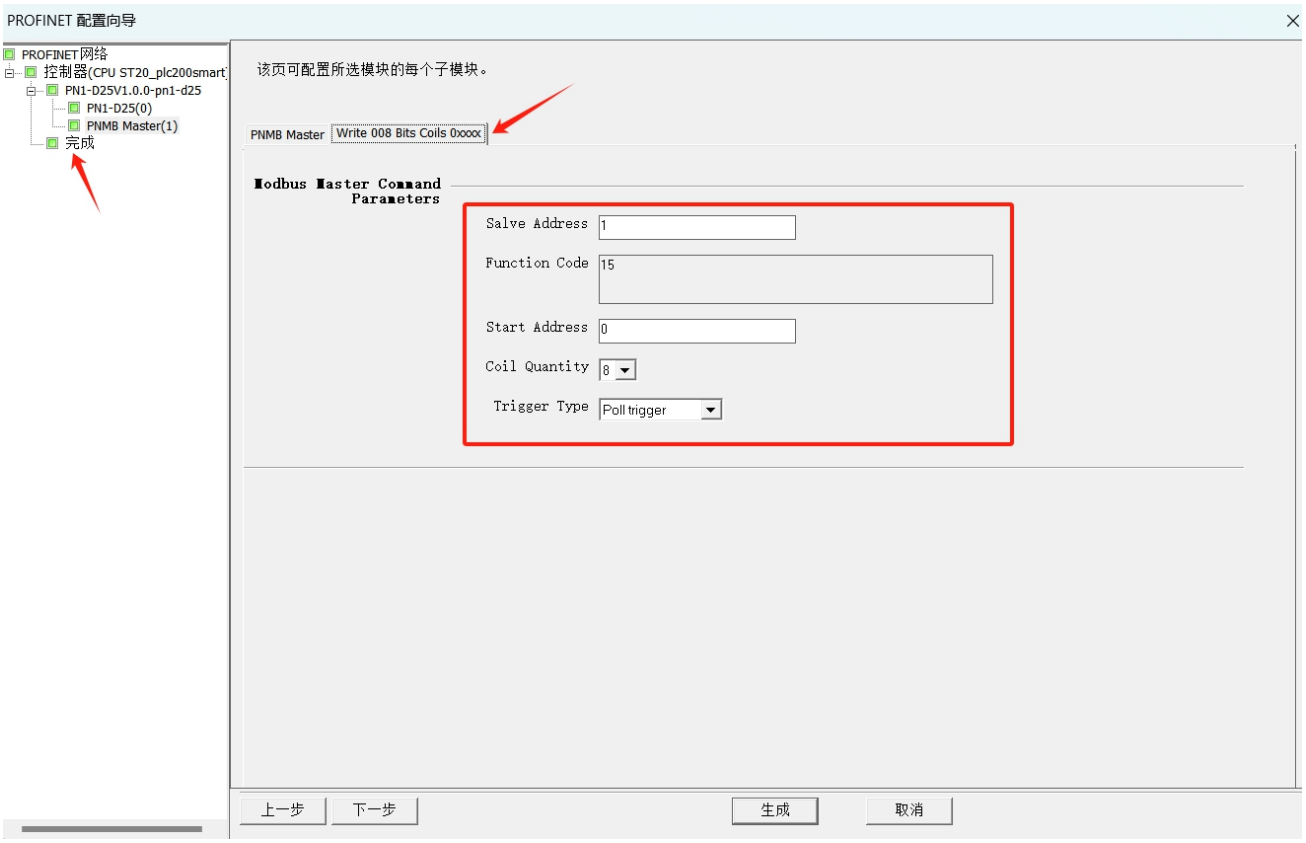
Configure the register information for communication between the Profinet gateway and RTU.

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Then click Finish, check the address corresponding to the device, and finally click Generate



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6.6 Configure status words and control words.

From the device overview configuration, you can see that slot 1 can only be used to select PNMB Master/PNMB Slave. In the I (input) quantity column, the corresponding Profinet input address IB128-132 is for communication status monitoring. In the Q (output) address column, the corresponding Profinet output address QB128-132 is as follows: QB128 is the communication control word (control) for this bus conversion module, and QB129-132 are the control bits for each message transmission.

Communication status monitoring:

Byte 1: The slot number of the serial port 1 where the error occurred

Byte 2: Serial port 1 error code

The other bytes are reserved.

Error Code	Description
1	The slave responds with a Modbus standard error:ILLEGAL FUNCTION
2	The slave responds with a Modbus standard error:ILLEGAL DATA ADDRESS
3	The slave responds with a Modbus standard error:ILLEGAL DATA VALUE
4	The slave responds with a Modbus standard error:SLAVE DEVICE FAILURE
10	The master station receives a message with an incorrect length, either too long, too short, or not matching the expected data length of a correct slave response.
11	The master station receives a message with a CRC check error.
12	The number of registers in the message received by the master station is incorrect.
13	The slave address in the message received by the master station is incorrect.
14	The master station receives a timeout.
15	The function code in the message received by the master station does not match the one in the request.
16	The master station receives a message with an incorrect register address.
17	Unknown error

Communication Control Bits:

Bit 0: Indicates whether the Modbus function serial port interface is enabled. 1 = Enabled, 0 = Disabled.

Bit 1: Clears fault codes when a rising edge (0 → 1) is detected. This resets the communication status monitoring.

Other bits are reserved.

Byte 2 to Byte 5:

Each slot's message corresponds to one bit, as shown in the table below.

When the message is configured for rising edge triggering, setting the bit from 0 → 1 enables the message to be sent once.

When the message is configured for level triggering, setting the bit to 1 enables the message for continuous cyclic transmission, and setting it to 0 stops the cyclic transmission.

Byte 2							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Subslot 9	Subslot 8	Subslot 7	Subslot 6	Subslot 5	Subslot 4	Subslot 3	Subslot 2
Byte 3							

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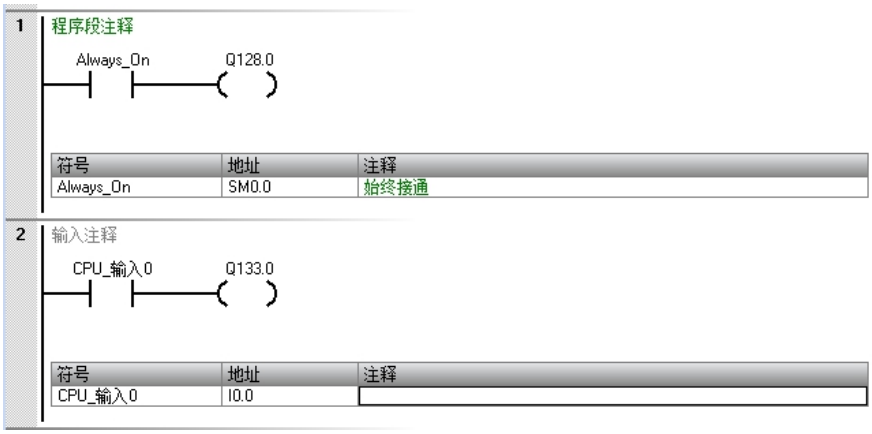
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Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Subslot 17	Subslot 16	Subslot 15	Subslot 14	Subslot 13	Subslot 12	Subslot 11	Subslot 10
Byte 4							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Subslot 25	Subslot 24	Subslot 23	Subslot 22	Subslot 21	Subslot 20	Subslot 19	Subslot 18
Byte 5							
Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Subslot 33	Subslot 32	Subslot 31	Subslot 30	Subslot 29	Subslot 28	Subslot 27	Subslot 26

The configuration of status words and control words for Slot 2 is the same as for Slot 1.

6.6.1. Example

Program segment 1 is used to enable serial port channel 1 of the gateway. Program segment 2 uses the coils of the extended PLC input for control.



6.7 Modify Module Name and Query IP Address in STEP 7

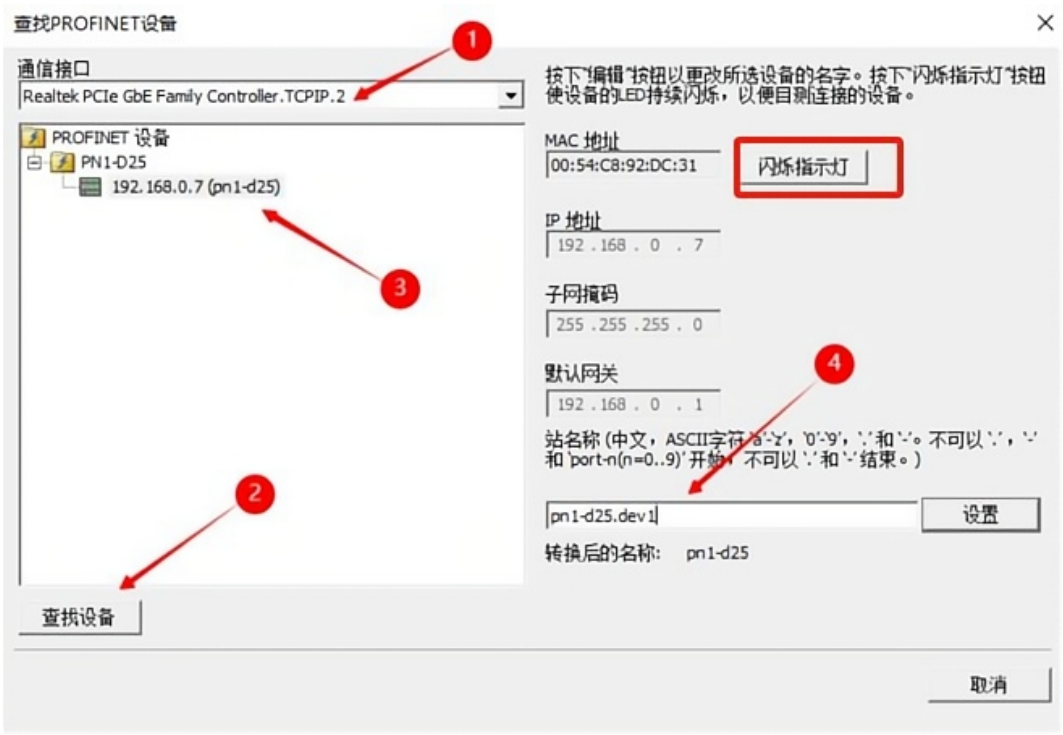
Use the Profinet tool in STEP 7-MicroWIN SMART to search for the gateway device and configure a unique "station name" for the gateway. This station name is used for communication between the PLC and the corresponding gateway.



Open the tool and select the network card on the computer that is connected to the gateway. Choose the "station name" for the gateway configuration. If there are multiple modules, you can use the flashing indicator lights to locate the specific gateway device that needs to be configured.

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Revision History

Version	Revision Date	Revision Notes	Maintainer
1.0	2025-2-11	Initial release	LT

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