SPA/Profibus-DP Gateway

PS-121

User Manual

REV 1.1

Shanghai Sibotech Automation Co., Ltd

Technical Support: 021-5102 8348
E-mail:support@sibotech.net

Catalog

1 INSTRUCTION MANUAL 2
1.1 APPLICATION AND UPDATE 2
1.2 TERM 2
2 PRODUCT OVERVIEW 3
2.1 PRODUCT FUNCTION 3
2.2 FEATURES 3
2.3 TECHNICAL SPECIFICATIONS 3
2.4 ELECTROMAGNETIC COMPATIBILITY 4
2.4.1 High-frequency interference Test (GB/T15153.1 classⅢ) *4*
2.4.2 Fast Transient Pulse Burst Test (GB/T17626.4 classⅢ) *4*
2.4.3 Electrostatic discharge interference (GB/T 17626.2 classⅢ) *4*
2.4.4 Radiate electromagnetic field (GB/T 17626.3 classⅢ) *4*
3 HARDWARE DESCRIPTION 5
3.1 PRODUCT APPEARANCE 5
3.2 INDICATOR 6
3.3 CONFIGURATION SWITCH 6
3.4 INTERFACE 7
3.4.1 Power Interface *7*
3.4.2 SPA Interface *7*
3.4.3 Profibus-DP Interface *7*
4 APPLICATION METHOD 9
4.1 QUICK START GUIDE 9
4.2 HARDWARE CONNECTION 9
4.3 SOFTWARE CONFIGURATION 9
4.4 RUN 10
4.4.1 Typical applications *10*
4.4.2 Data exchange mode *10*
4.4.3 Terminal resistance *11*
5 INSTALLATION 12
5.1 MECHANICAL DIMENSION 12
5.2 INSTALLATION 13
6 MAINTENANCE AND MATTERS NEEDING ATTENTION 14
APPENDIX A: USING STEP 7 TO SET PROFIBUS- DP 15

1 Instruction Manual

1.1 Application and Update

This manual applies to PS-121. It provides the parameters of the product, the specific application method and attention, and facilitates the operation of engineering staff. Before using the gateway, please read the manual carefully.

With the improvement of the product, this manual will be continuously updated, if you need the latest version, please contact with the product distributor.

1.2 Term

SPA: A serial data communication protocol which being developed by ABB and used in Distribution Automation. Its message is based on the ASCII, the communication interface can be RS232, RS485 or TTL, the communication medium can be twisted pair or fiber, and the communication baud rate can be up to 19.2Kbps.。

2 Product Overview

2.1 Product Function

Connect single device with SPA interface to Profibus-DP (V0), i.e. SPA network device can be converted to Profibus network device.

2.2 Features

- Support one SPA interface (RS485/RS232);
- SPA interface has 1KV photoelectric isolation;
- Act as SPA master at the side of SPA;
- Act as PROFIBUS-DP slave at the side of PROFIBUS-DP, baud rate is self-adaptive, and maximum baud rate : 6M；
- PROFIBUS-DP input-byte and output-byte number can be selected:

  ①Max Input Bytes ≤108 Bytes

  ②Max Output Bytes ≤108Bytes

2.3 Technical Specifications

[1] Communication rate:

- SPA interface supports: 300bit/s,1200bit/s,2400bit/s,4800bit/s,9600bit/s,19200bit/s,38400bit/s;
- PROFIBUS-DP baud rate is self-adaptive, and maximum baud rate : 6M；

[2] SPA Interface only supports one SPA slave device;

[3] In accordance with SPA communication protocol V2.5:

- Support 400 AI, AO, DI and DO commands;
- Support I, O, V, S and L Data Category;
- SPA interface supports RS232 and RS485;

[4] Environmental Conditions:

- Humidity: 5% to 95% (No Condensing);
- Operating temperature: -20℃--60℃, and 24-hour average does not exceed 45 ℃ (except special orders);
- Installation site altitude: Not more than 2000 m ;
- Pollution level: Ⅲ ;

[5] Power: 24VDC (11V~ 30V), 90mA;

[6] Mechanical Dimension: 130mm(H) × 38mm(W) × 104mm(D);

[7] Installation: 35mm rail;

2.4 Electromagnetic Compatibility

2.4.1 High-frequency interference Test (GB/T15153.1 classⅢ)

Imposed Place	Power input circuit - GND Between the power input circuits AC input circuit - GND	
Imposed waveform	The first value of peak Oscillation frequency 1/2 Decay time The frequency of duplicate Impedance outputted by the test equipment	2.5～3kV 1.0～1.5MHz ≥6μs More than 50 /s 150～200Ω

2.4.2 Fast Transient Pulse Burst Test (GB/T17626.4 classⅢ)

Voltage peak	Power input and AC input circuit: 2kV Weak current circuit: 1kV
Repetition rate	5 kHz

2.4.3 Electrostatic discharge interference (GB/T 17626.2 classⅢ)

Imposed Place	Usual use ,the parts touched by the operator
Voltage, current	6kV contact discharge, the first peak of discharge current is 22.5A
Times	More than 10 times with the space more than 1 second in every part
Polarity	Positive

2.4.4 Radiate electromagnetic field (GB/T 17626.3 classⅢ)

Radio frequency	150MHz, 400MHz, 900MHz
Test field strength	10 V/m
Radiation method	Make the front of antenna touch devices, or near terminal, intermittently radiate radio wave

3 Hardware description

3.1 Product appearance

3.2 Indicator

Indicator		Indicator Status	Meaning
Profibus Status	**PBF**	Always Red	Profibus-DP communication fails.
		Close	Communication is ok.
	STA	Green Blinking	Profibus-DP is communicating.
		Close	Profibus-DP is abnormal.
SPA Status	**MS**	Always Red	Module PS-121 is not configured any order.
		Always Green	Module PS-121 is normal.
		Orange Blinking	Configuration status
	SCS	Green Blinking	SPA Communication is normal.
		Red Blinking	SPA Communication is abnormal.
		Orange Blinking	Configuration status

Configuration status: MS and SCS orange lights blink alternately;

Running: If the PS-121 module is not configured to any command, the MS light always red, and SCS light close; if the PS-121 module is normal, then the MS light always green, SCS light green blinking under normal communication status and SCS light red blinking when SPA communication is not normal.

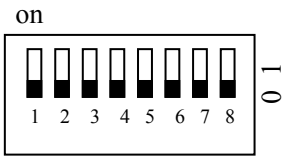
SPA abnormal communication caused by reasons: SPA baud rate does not match, slave device time-out, SPA calibration error, slave device does not properly respond or there is no data that SPA commands want.

3.3 Configuration Switch

PROFIBUS-DP Address is configured by DIP switch.

Remark: When the gateway is configured, or running, the DIP switch value can not be 00.

DIP switch functions: Switch operation and configuration status of the module, and select the communication interface.

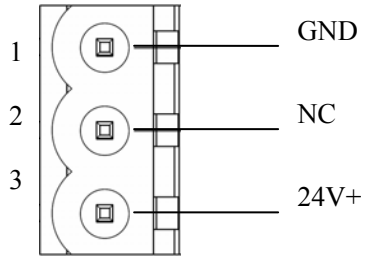


Bit1	Bit 2	Bit 3	Bit 4	Bit 5	Bit 6	Bit 7	Bit 8	Description
0	0	0	X	1	1	1	1	Configuration mode（config）,RS232 interface
1	0	0	X	1	1	1	0	Running mode ,RS232 interface
1	1	1	X	0	0	0	0	Running mode ,RS485 interface

Remark: Bit2 and Bit7 can not switch to "1" at the same time!

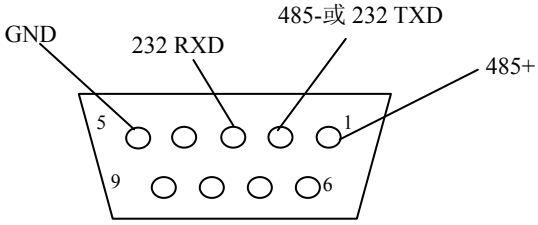
3.4 Interface

3.4.1 Power Interface



Pin	Function
1	GND
2	NC(No Connect)
3	24V+, DC plus 24V

3.4.2 SPA Interface



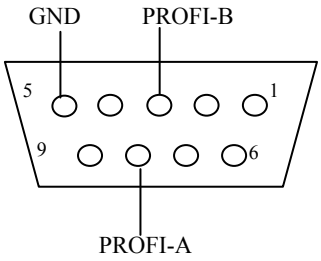
SPA interface uses DB9 female connector, and the pins are defined as follow:

Pin	Signal Description
1	RS485 data positive（A+）
2	RS485 data negative （B-）or RS232 TXD（Connect to RXD of other devices）*
3	RS232 RXD (Connect to TXD of other devices)
4	Undefined
5	GND（RS232）
6	Undefined
7	Undefined
8	Undefined
9	Undefined

*** Remark: Pin 2 is the multiplex pin of RS485's B- and RS232's TXD, and can not choose the RS232 and RS485 interface at the same time. For details, please see 3.3.**

3.4.3 Profibus-DP Interface

DB9 female connector



DB9 Pin	Function
3	PROFI_B, Data positive
5	GND
8	PROFI_A, Data negative

4 Application method

4.1 Quick start guide

1. Set SPA interface is RS232, and connect to the serial port of PC through straight over. Switch the "config bit" to "on" state, and PS-121 is in configuration state, then power on the module, properly configurate SPA commands, then power off the module.

2. Configuration is completed, set the module to run mode, choose SPA Interface (see Section 3.3 and 3.42), choose Profibus address through rotary code switch, power on the module, then PS-121 is in normal operation.

4.2 Hardware Connection

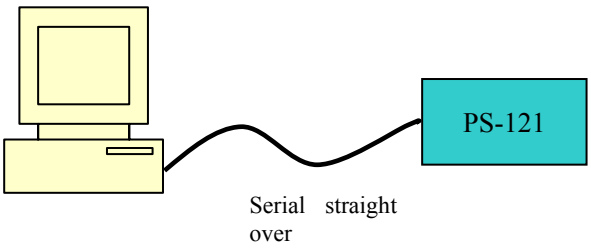
1. Connect SPA interface correctly.
2. Connect Profibus interface correctly.
3. Check the wiring connection.
4. Set configuration switches correctly.

4.3 Software Configuration

User can connect PS-121 to the PC through RS-232 interface, and configurate parameters through PS-123 software, including SPA baud rate.

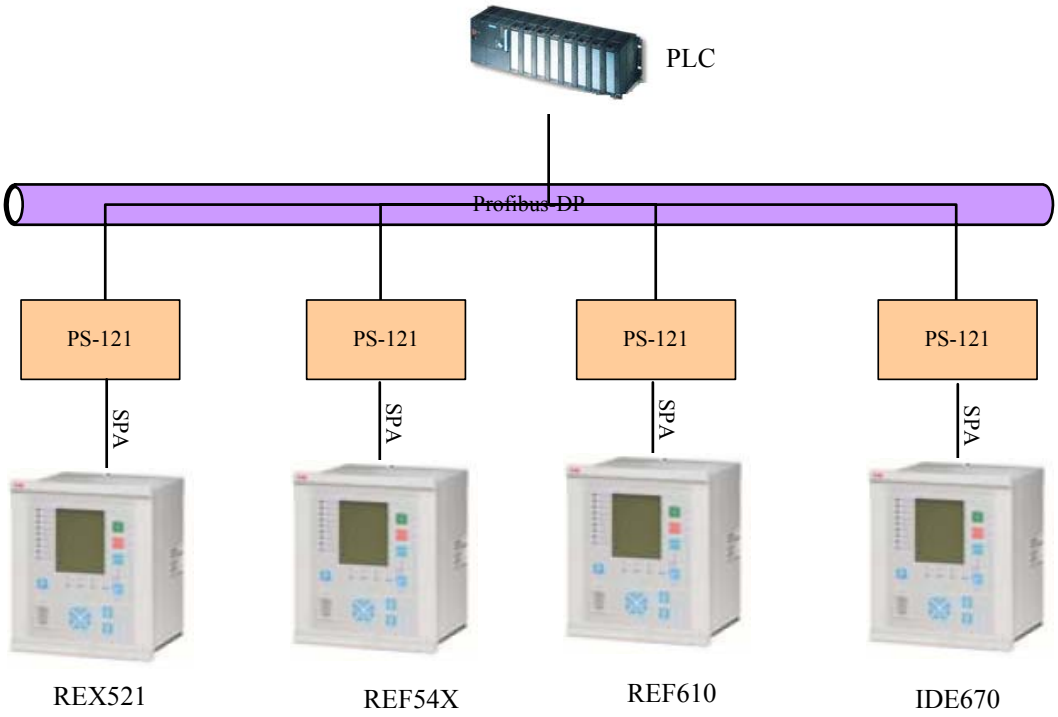
Configuration steps:

Specifically refer to PS-123 software manual.



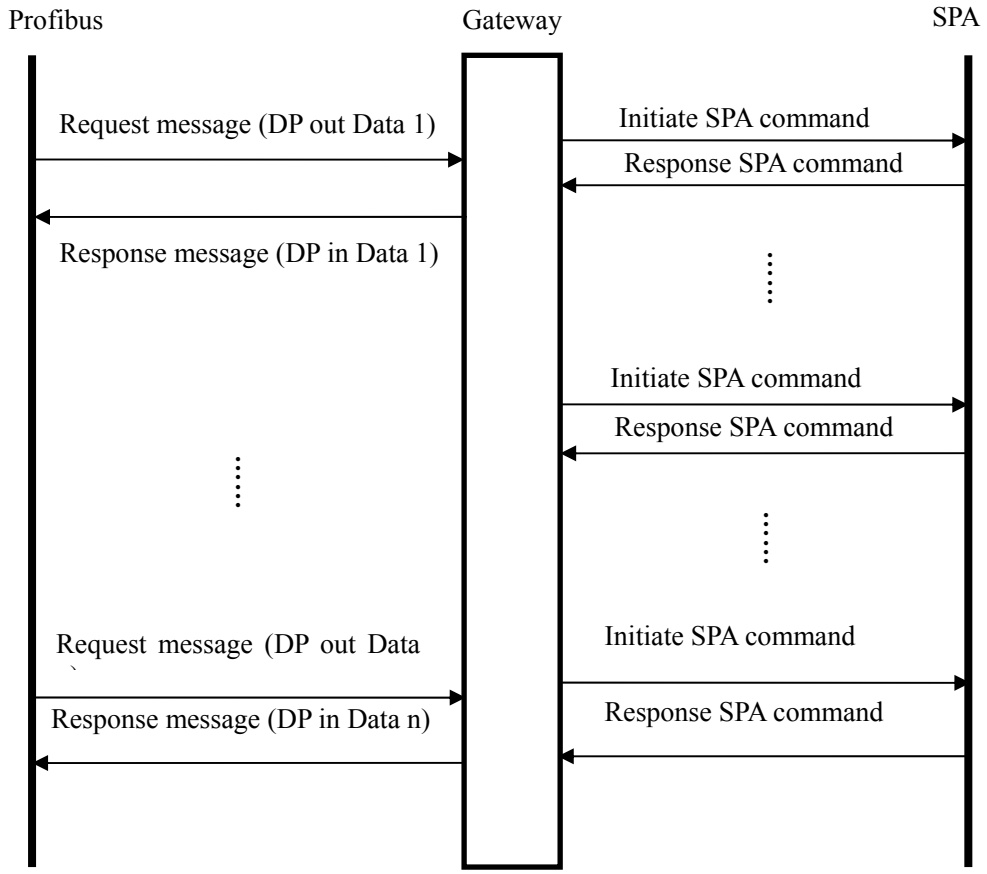
4.4 Run

4.4.1 Typical applications



4.4.2 Data exchange mode

SPA communication and the PROFIBUS communication use asynchronous mode, as shown below:



"DP out Data 1" shows data transfer process from PROFIBUS to SPA; "DP in Data 1" show data transfer process from SPA to PROFIBUS.

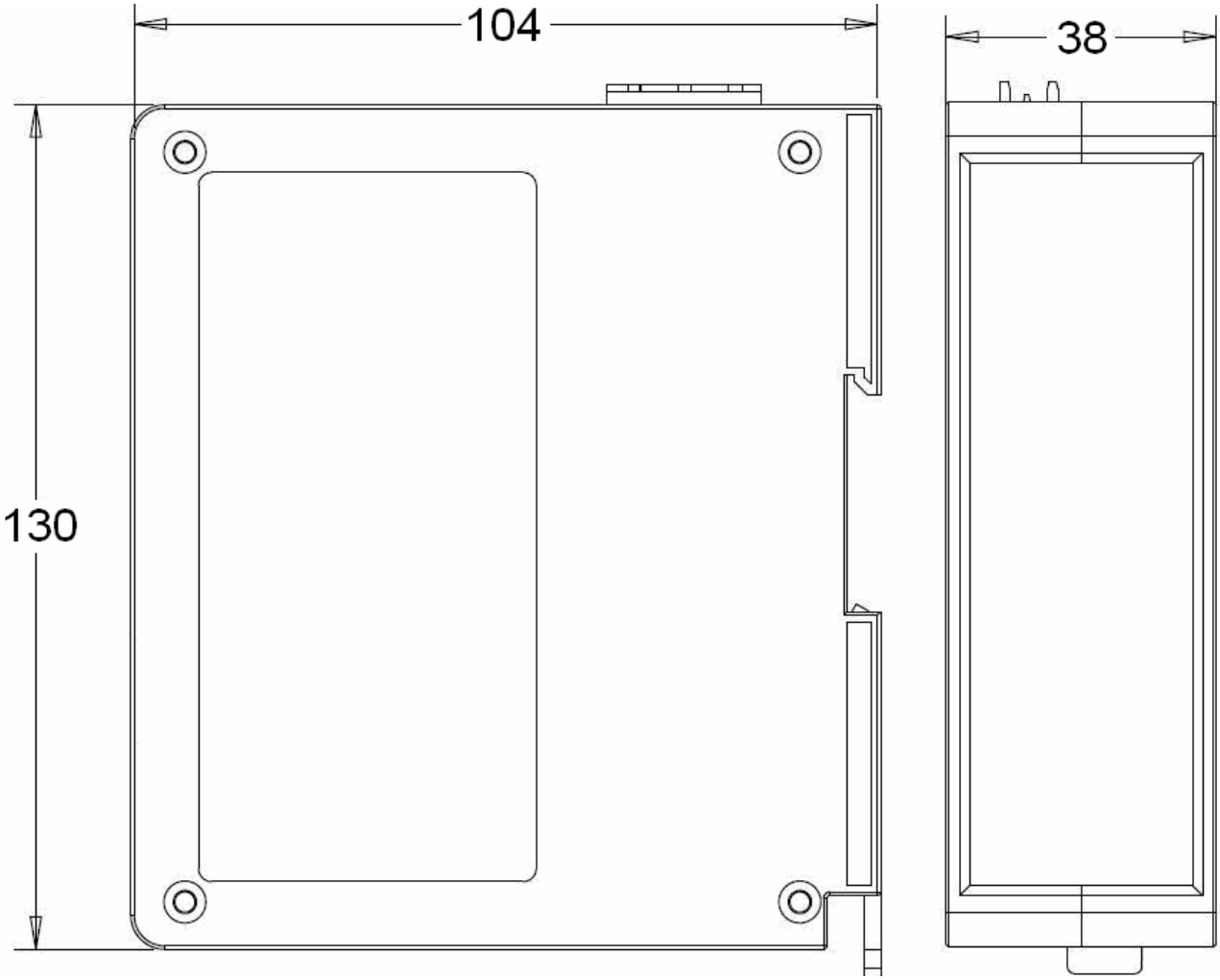
4.4.3 Terminal resistance

When the SPA interface is RS485, users need connect a 120ohm resistor in each side of network.

5 Installation

5.1 Mechanical Dimension

Mechanical Dimension: 130mm(H) * 38mm(W) * 104mm(D);



5.2 Installation

35mm DIN rail installation

6 Maintenance and matters needing attention

- To prevent stress, prevent module panel damage;
- To prevent bump, module may damage internal components;
- Power supply voltage control in the prospectus, within the scope of the requirements to burn module;
- To prevent water, water module will affect the normal work;
- Please check the wiring, before any wrong or short circuit.

Appendix A: Using STEP 7 to Set Profibus- DP

The following show how to use STEP7 to configure PM-160:
First of all, copy *. gsd file to the following path: ***Step7\S7data\gsd***

1. Open SIMATIC Manager ; Figure 1:

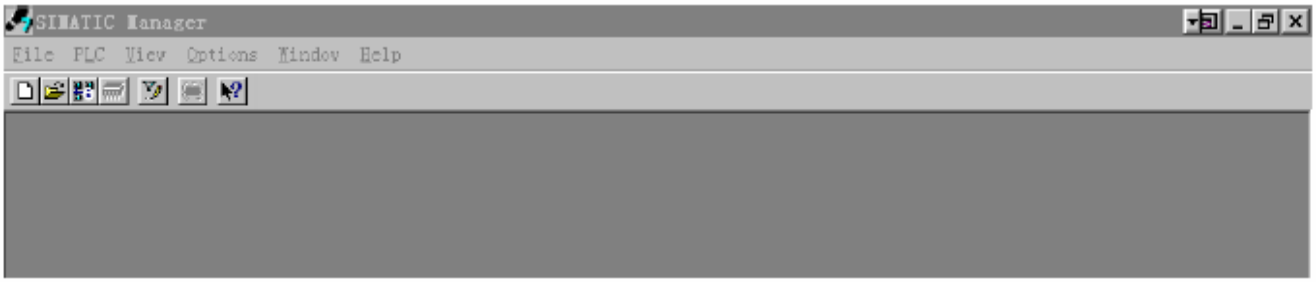


Figure 1

2. Open File, and then New, create a new project; Figure 2:

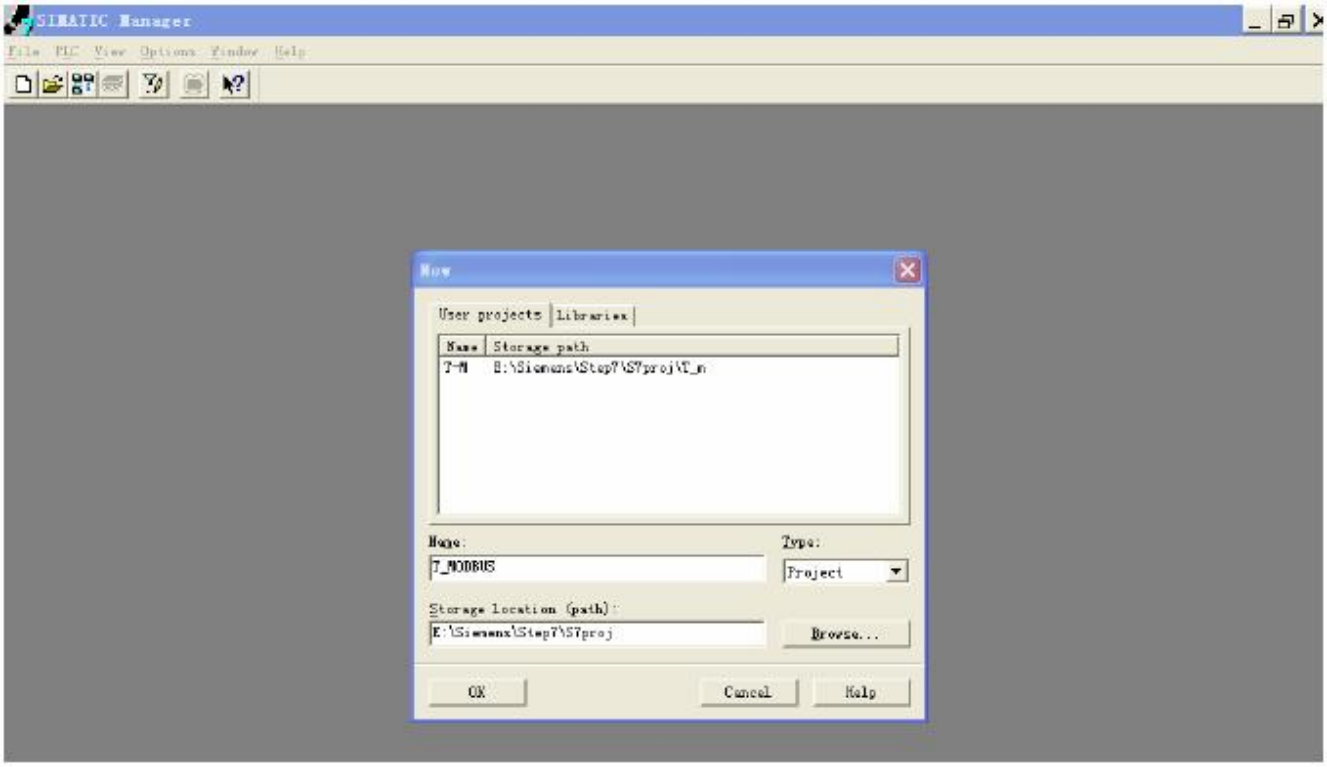


Figure 2

3. Click Insert, Station and then SIMATIC 300 Station; Figure 3:

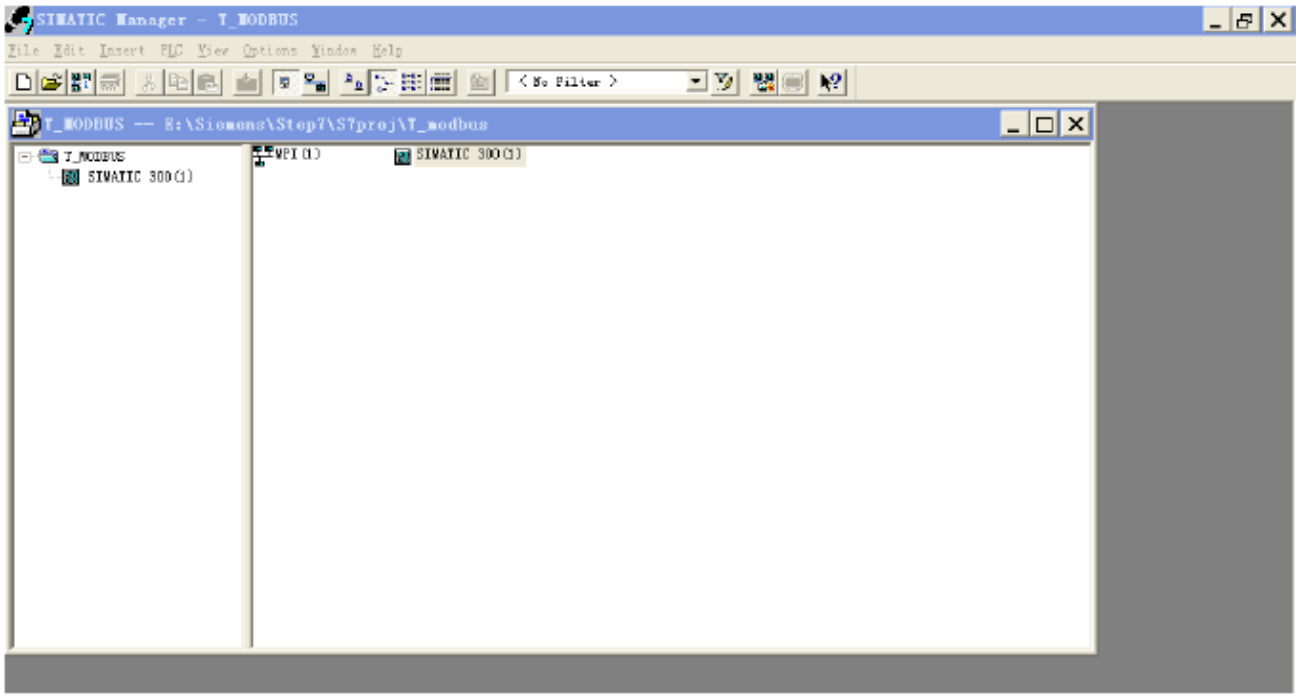


Figure 3

4. Open S7 PLC hardware configuration
   Open SIMATIC 300(1) and then double-click Hardware; Figure 4

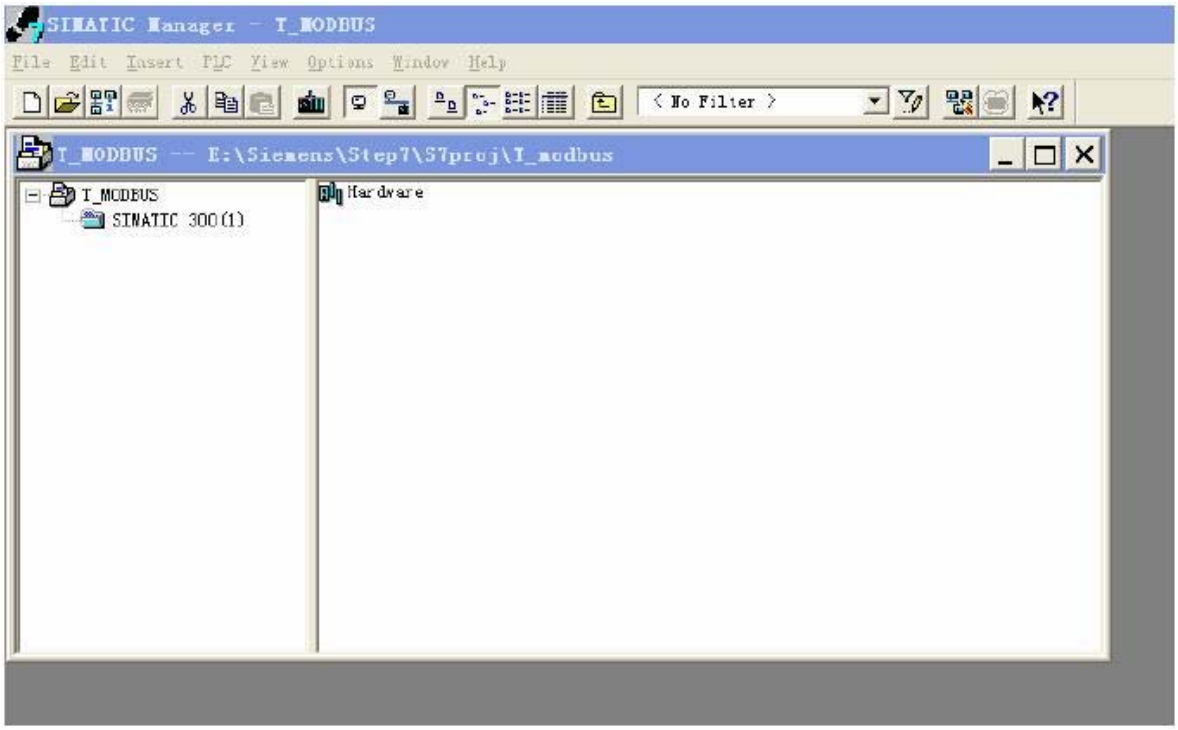


Figure 4

5. In the menu, select Options and Install GSD file, Update GSD in the device catalog

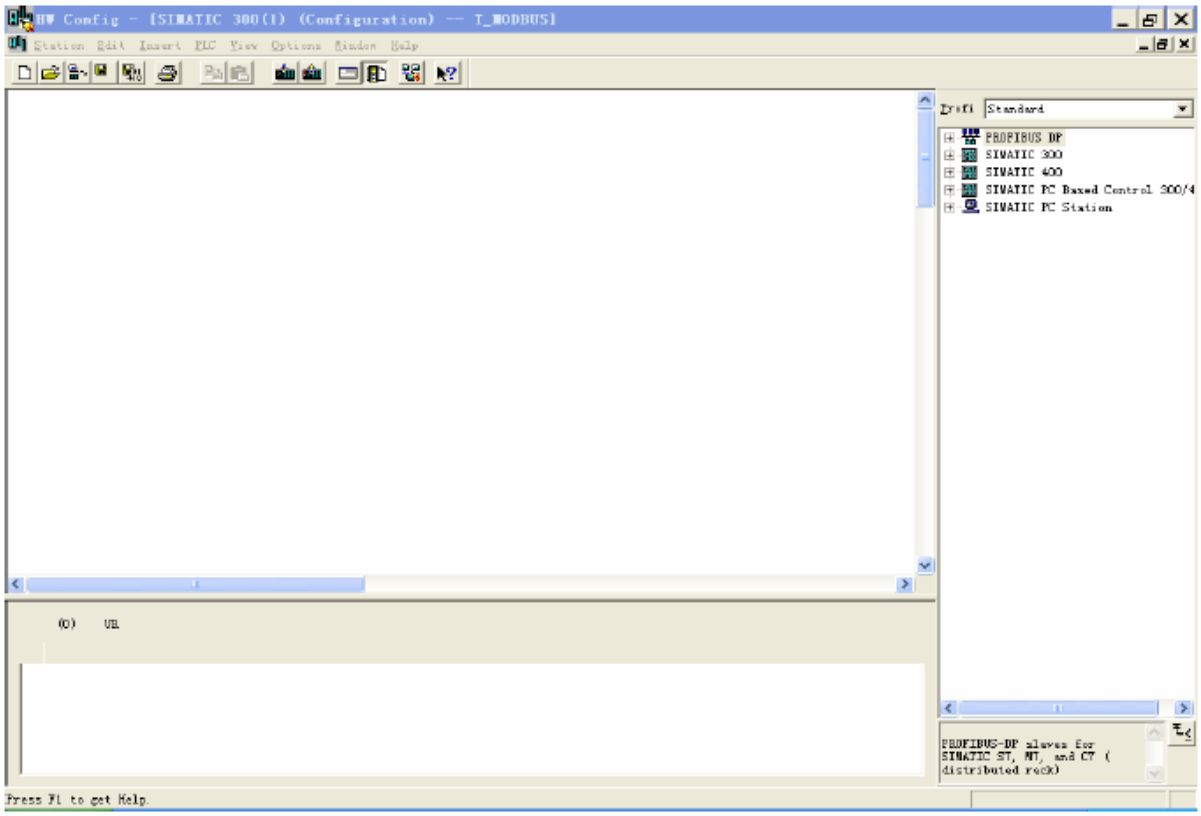


Figure 5

6. Here you can find your equipment in the right side of the window ; Figure 6

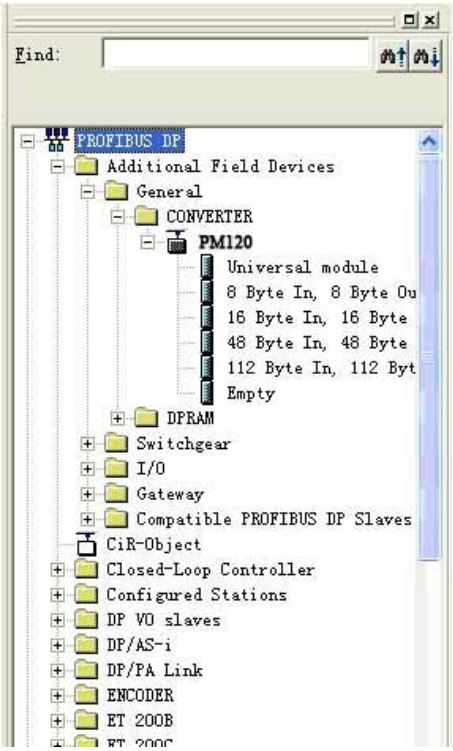


Figure 6

7. Set PLC rack, click the "Hardware Catalog \ SIMATIC 300 \ RACK-300 \ Rail"; Figure 7

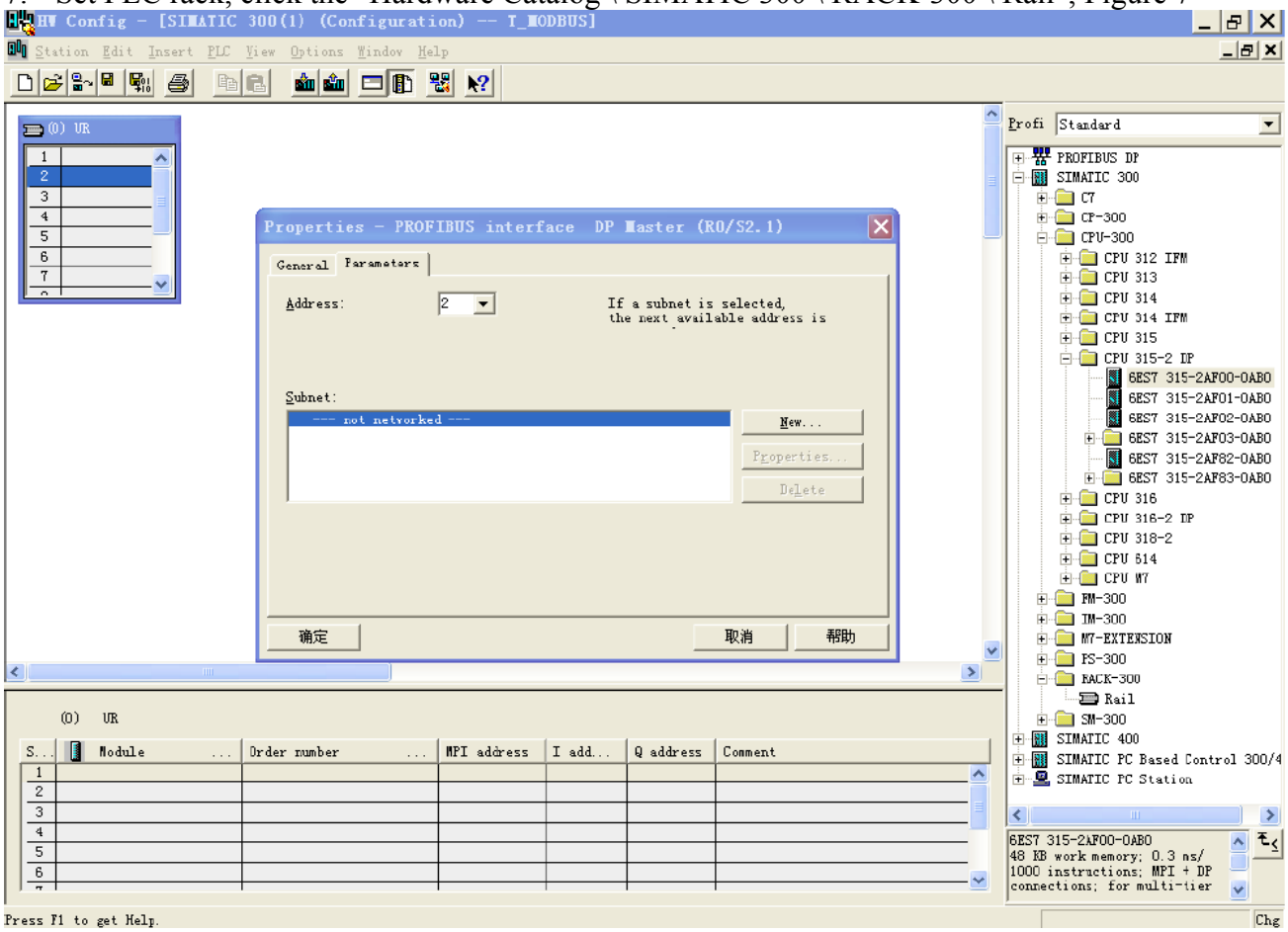


Figure 7

8. Set CPU module and select the corresponding device type and the occupied slots.
9. Create Profibus-DP network and set up Profibus-DP: Click New and then Network settings, select DP; select a baud rate such as 187.5Kbps, then "OK". Double-click it;

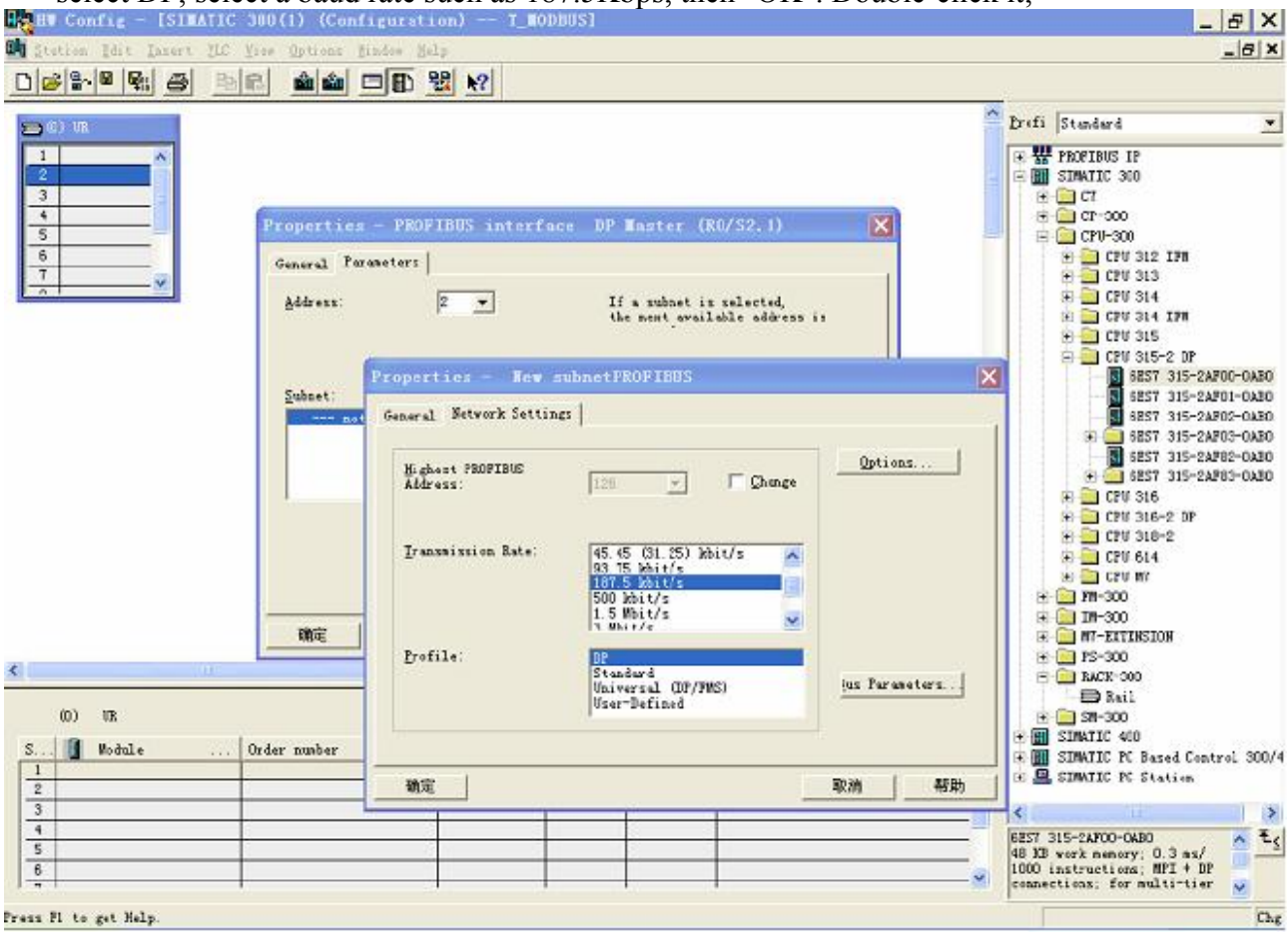


Figure 8

10. Select Profibus-DP Master address; Figure 9:

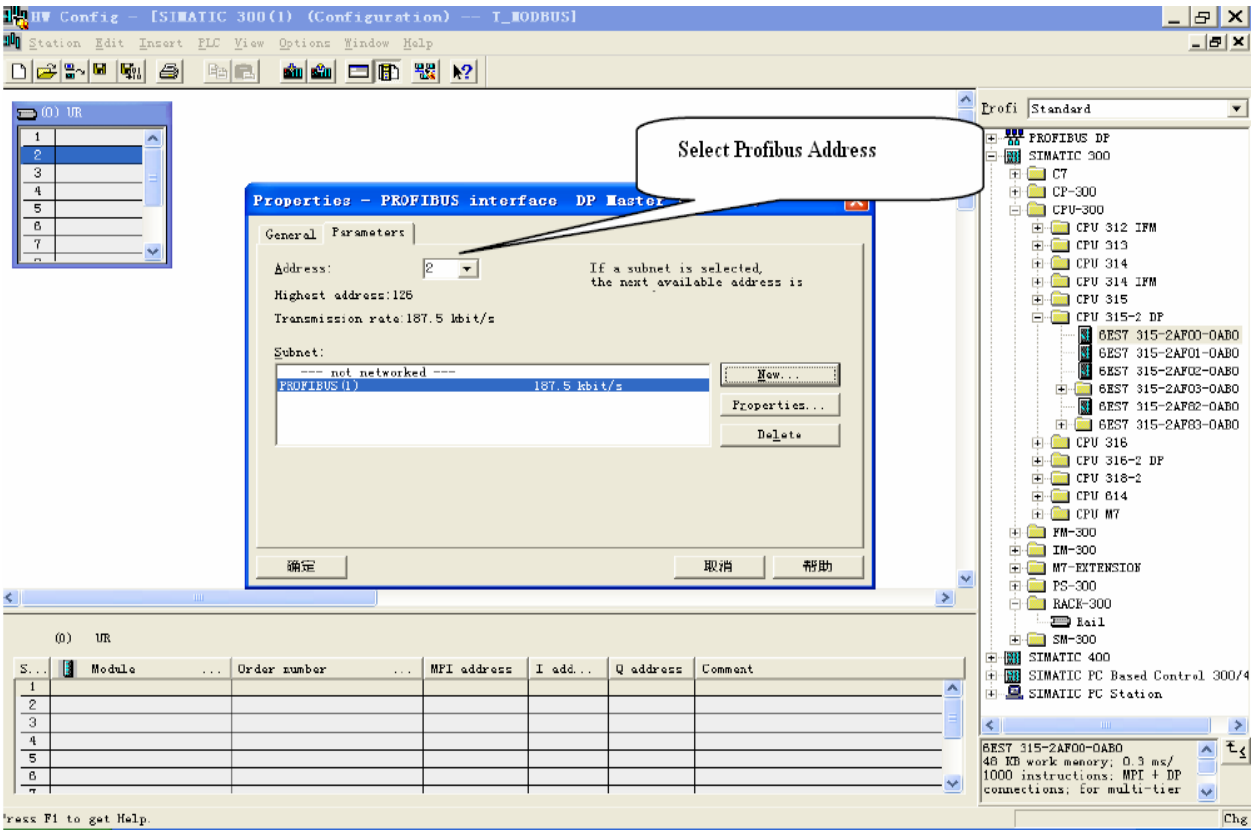


Figure 9

11. Put configuration into Profibus-DP network, and map the input and output data block into other controller's memory;

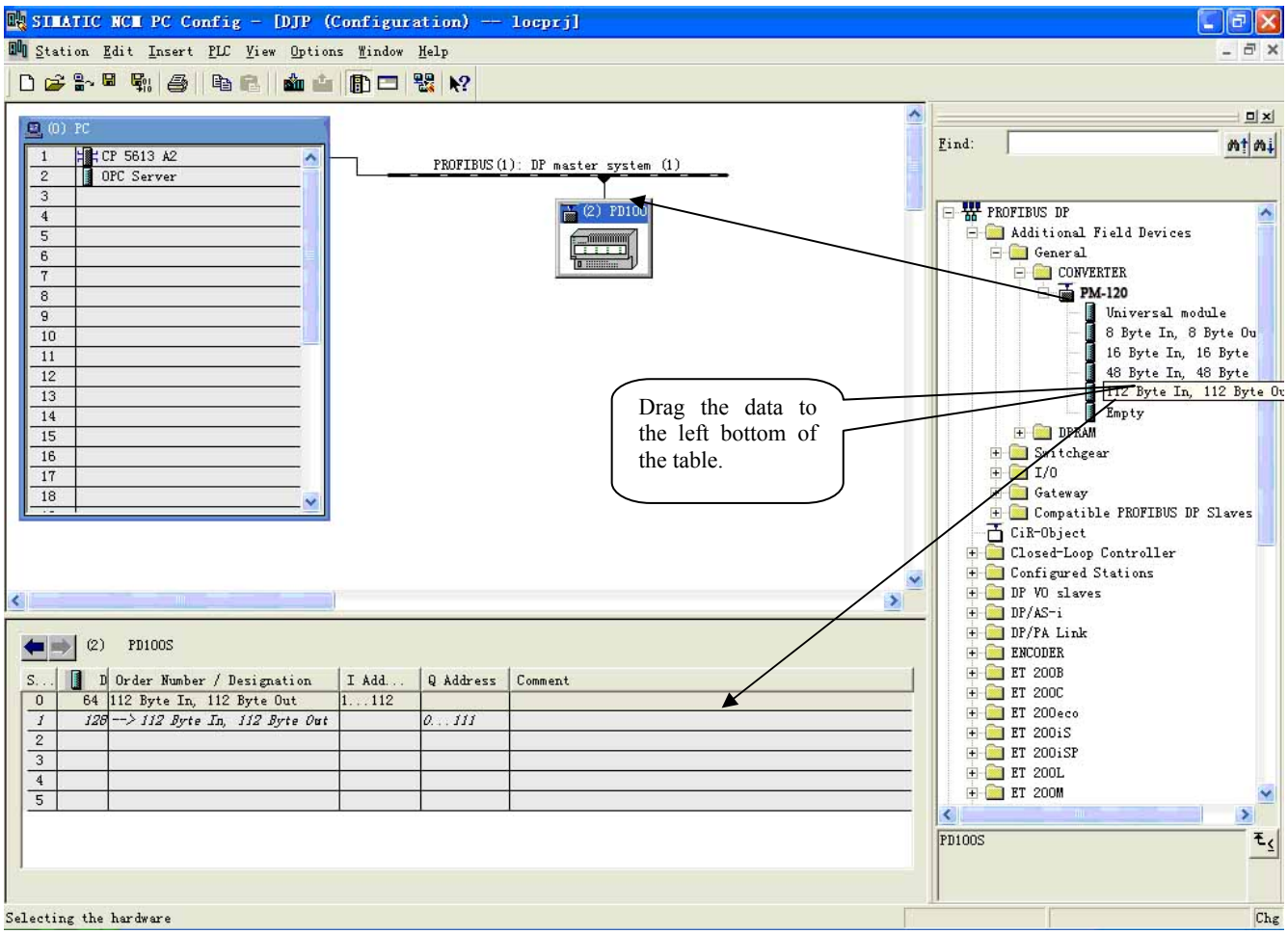


Figure 10

Operation is divided into two steps, the first step is dragging PM-160 into the network configuration on the upper left , the mouse will change shape, and that is to say, it can be placed. The second step is dragging data block into the data mapping table at the bottom left, mapping to the PLC memory.

Remark: PM-160 is configured via RS232 interface, if the configuration is 48-byte input / output then drag"48 Byte In, 48 Byte Out" into the data mapping table. If the data blocks of the configuration do not match the gateway configuration, Profibus-DP will fail to be connected.

If you do not change the default configuration, the configuration is the biggest "112 Byte In, 112 Byte Out".

Remark: The address must be in line with the settings of module switch!

12. Compiler and download into PLC.