

NEF-Profibus communication board

User Guide

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1. Product Overview

1.1 Product description

This communication board converts Modbus-RTU to Profibus-DP for NE300/600, the RS485 interface is Modbus Master, and Profibus-DP is slave. When using this module, engineers must also read NE300/600 user guides, specially the Modbus protocol part.

1.2 Basic technical data

1. Supported Modbus function codes:03/06
2. Support Profibus-DP V0
3. Profibus-DP communication rates: adaptive(9.6Kbps-12Mbps)
4. DP data area: 76 bytes input

14 bytes output

The output and input here are relative to PLC, the output 14 bytes(7 words)are outputs from PLC to drive registers, including 0001H~0004H(communication control word, communication reference, digital output setting, analog output setting) and EEPROM operation of address, data, enable bit, EEPROM operation can be used to write drive parameters like acceleration and deceleration time and maximum frequency with non-cycle mode.

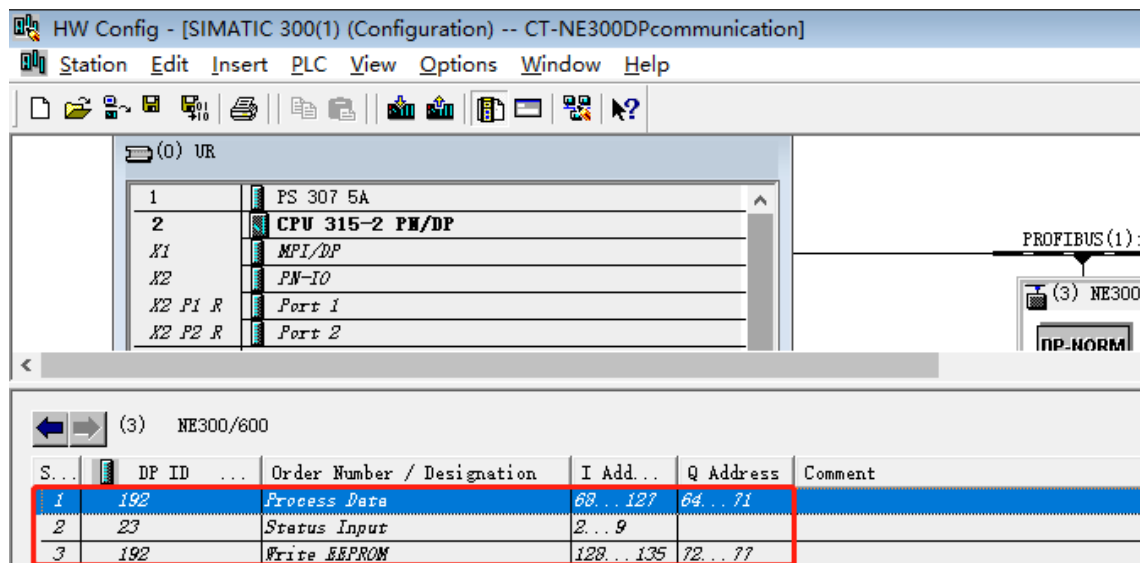
Input 76 bytes are inputs from drive registers to PLC including 0001H~0004H,0020H~002FH,0030H~0039H, 8 bytes of DP communication error codes, and EEPROM operation (address, data, status, and error code).

5. Modbus slave address:1(not modifiable)
6. Modbus baud rate:19200bps (not modifiable)
7. 8 data bits, even parity check,1 stop bit (not modifiable)
8. Working supply:24VDC,5VDC
9. Ambient temperature: -40~85°C, humidity: 5~95% (no condensing)
10. Storage temperature: -55~125°C
11. Installation: fixed to CN3 of NE300/600 control board with 2 screws.
12. Dimension: 90.37*22*182(Length*Width*Height, unit: mm)
13. Protect level: IP20
14. Certification: CE

Note: Drive parameters should be set before using this communication board, see below for details:

Parameters	Name	Value
F0.02	Run command control mode	2
F0.03	Frequency reference 1	4
Fd.00	485 communication enable	1
Fd.01	Communication address	1
Fd.02	Baud rate	4
Fd.03	Parity bit	0

1.3 Address mapping



1. Take above case for example, the I area address of NE300/600 slot 1 is IW68~IW126, and Q area address is QW64~QW70, these addresses are modifiable in PLC software, but the mapping address and order of drive registers are fixed, see below for details:

Slot 1 IW input & QW output address mapping				
	PLC address	Data type	Drive Registers	Description
Process Data	QW64	WORD	Write 0001H	Write control word
	QW66	WORD	Write 0002H	Communication reference
	QW68	WORD	Write 0003H	Digital output setting
	QW70	WORD	Write 0004H	Analog output setting
	IW68	WORD	Read 0001H	Read control word
	IW70	WORD	Read 0002H	Read reference
	IW72	WORD	Read 0003H	Read digital output setting
	IW74	WORD	Read 0004H	Read analog output setting
	IW76	WORD	Read 0020H	Read drive status
	IW78	WORD	Read 0021H	Read fault content
	IW80	WORD	Read 0022H	Read warning content
	IW82	WORD	Read 0023H	Read output frequency
IW84	WORD	Read 0024H	Read frequency reference	

IW86	WORD	Read 0025H	Read DC bus voltage
IW88	WORD	Read 0026H	Read output voltage
IW90	WORD	Read 0027H	Read output current
IW92	WORD	Read 0028H	Read motor speed
IW94	WORD	Read 0029H	Read output power
IW96	WORD	Read 002AH	Read output torque
IW98	WORD	Read 002BH	Read PID reference
IW100	WORD	Read 002CH	Read PID feedback
IW102	WORD	Read 002DH	Read AI1
IW104	WORD	Read 002EH	Read AI2
IW106	WORD	Read 002FH	Reserved
IW108	WORD	Read 0030H	Read terminal status
IW110	WORD	Read 0031H	Reserved
IW112	WORD	Read 0032H	Reserved
IW114	WORD	Read 0033H	Reserved
IW116	WORD	Read 0034H	Read external counts
IW118	WORD	Read 0035H	Read X1 status
IW120	WORD	Read 0036H	Read X2 status
IW122	WORD	Read 0037H	Read X3 status
IW124	WORD	Read 0038H	Read X4 status
IW126	WORD	Read 0039H	Read X5 status

Note:

Please refer to Modbus RTU section of NE user guides for more details.

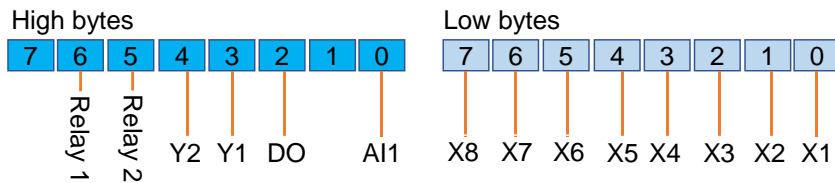
Drive register address and function description(communication control bit 0001H corresponds to above Modbus address 40001)

Function description	Register Address	Data definition and instruction	R/W feature
reserved	0000H	reserved	reserved
Communication control command	0001H	0001H: Forward rotation 0002H: Reverse rotation 0003H: Stop 0004H: Coast to stop 0005H: Fault reset	W
Communication setting value address	0002H	Range:(-10000~10000) Note: Communication Setting is percentage. (-100.00~100.00%) When it is used to frequency setting, It is relative to the maximum frequency. When it is used to torque setting, it is relative to the 2*rated torque. When it is used to PID setting	W

		or feedback, it is relative to the analog input corresponding setup	
Output terminal setting	0003H	Bit0: reserved Bit1:Y1 Bit2: reserved Bit3:relay 1	W
Analog output setting	0004H	AO output communication setting (0~1000 correspond to 0.00~10.00v)	W
reserved	0005H~001FH	reserved	reserved
Drive status	0020H	Bit0---1: run 0: stop Bit1---1: reverse rotation 0:forward rotation Bit2---1: fault 0:no fault Bit3---1: warning 0:no warning Bit4---1: fault resetting 0:no fault resetting	
Fault content	0021H	0:NULL 1: Uu1 bus Under voltage fault 2: OC1 over current in acceleration 3: OC2 over current in deceleration 4: OC3 over current in constant speed 5: Ou1 over voltage in acceleration 6: Ou2 over voltage in deceleration 7: Ou3 over voltage in constant speed 8: GF Ground Fault 9: SC Load Short-Circuit 10: OH1 Radiator over heat 11: OL1 Motor overload 12: OL2 Drive overload 13: EF0 communication fault 14: EF1 external terminal fault 15: SP1 Input phase failure or Unbalance 16: SPO Output phase failure or Unbalance 17: EEP EEPROM Fault 18: CCF Transmission between the drive and keypad cannot be established	

		19: bCE Brake unit fault 20: PCE Parameter copy Error 21: IDE Hall current detection fault 22: ECE PG fault 23: ③LC Fast current limit fault 24: ③EF2 Terminal closing fault 25: ③PIDE PID feedback offline fault 26: ③OLP2 Overload pre-alarm	
Warning Content	0022H	0: No warning 1: uu Bus under voltage warning 2: OLP2Drive overload warning 3: OH2Drive overheat warning 4: SF3 Output Terminal function selection 10 not reach to 3	R
Running/Stop Monitor parameters	0023H	Output frequency	R
	0024H	Frequency reference	R
	0025H	Bus voltage	R
	0026H	Output voltage	R
	0027H	Output current	R
	0028H	Rotate speed of motor	R
	0029H	Output power	R
	002AH	Output torque	R
	002BH	PID reference	R
	002CH	PID feedback	R
	002DH	AI1	R
	002EH	AI2	R
	002FH	High pulse input	R
	0030H	Terminal status	R
	0031H	PLC current steps	R
	0032H	length reference	R
	0033H	Actual length	R
	0034H	External count	R
	0035H	X1 terminal status 0: Invalid 1:Valid	R
	0036H	X2 terminal status 0: Invalid 1:Valid	R
0037H	X3 terminal status 0: Invalid 1:Valid	R	
0038H	X4 terminal status 0: Invalid 1:Valid	R	
0039H	X5 terminal status 0: Invalid 1:Valid	R	

NE300 Terminals status (0030H) definition.



- The I area address of NE300/600 slot 2 is IB2-IB9, these addresses are modifiable in PLC software, this function is for commissioning analyzing, does not mapped to any drive register.

Slot2 IB2 description							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	1: IB9 write fault	1: IB8 write fault	1: IB7 write fault	1: IB6 write fault	1: IB5 read fault	1: IB4 read fault	1: IB3 read fault
Slot2 IB3-IB9 descriptions							
Status input	PLC Address	Data type	Drive registers				Refer to section 1.4 for error codes
	IB3	Byte	Read 0001H~0004H error code				
	IB4	Byte	Read 0020H~002FH error code				
	IB5	Byte	Read 0030H~0039H error code				
	IB6	Byte	Write 0001H error code				
	IB7	Byte	Write 0002H error code				
	IB8	Byte	Write 0003H error code				
IB9	Byte	Write 0004H error code					

- The I area address of NE300/600 slot 3 is IW128-IW134, the Q area address is QW72-QW76, these addresses are modifiable in PLC software
 This function is used to write drive parameters (e.g. acceleration and deceleration time, maximum frequency) directly to drive EEPROM, it is power-off saved. Please be noticed that writing frequently will damage the EEPROM.

Drive parameter address: High 8 bits=81+ parameter menu number, low 8 bits=parameter number, e.g. the address of F0.02 is 8102H, the address of F2.03 is 8303H.

Slot3 IW input & QW output description			
	PLC address	Data type	Description
Write EEPROM	QW72	WORD	Target parameter address
	QW74	WORD	Parameter value
	QW76	WORD	Enable EEPROM operation (1)
	IW128	WORD	Read the parameter address
	IW130	WORD	Read the parameter value
	IW132	WORD	Operation status (1: enable)
	IW134	WORD	Error code (0: no error)

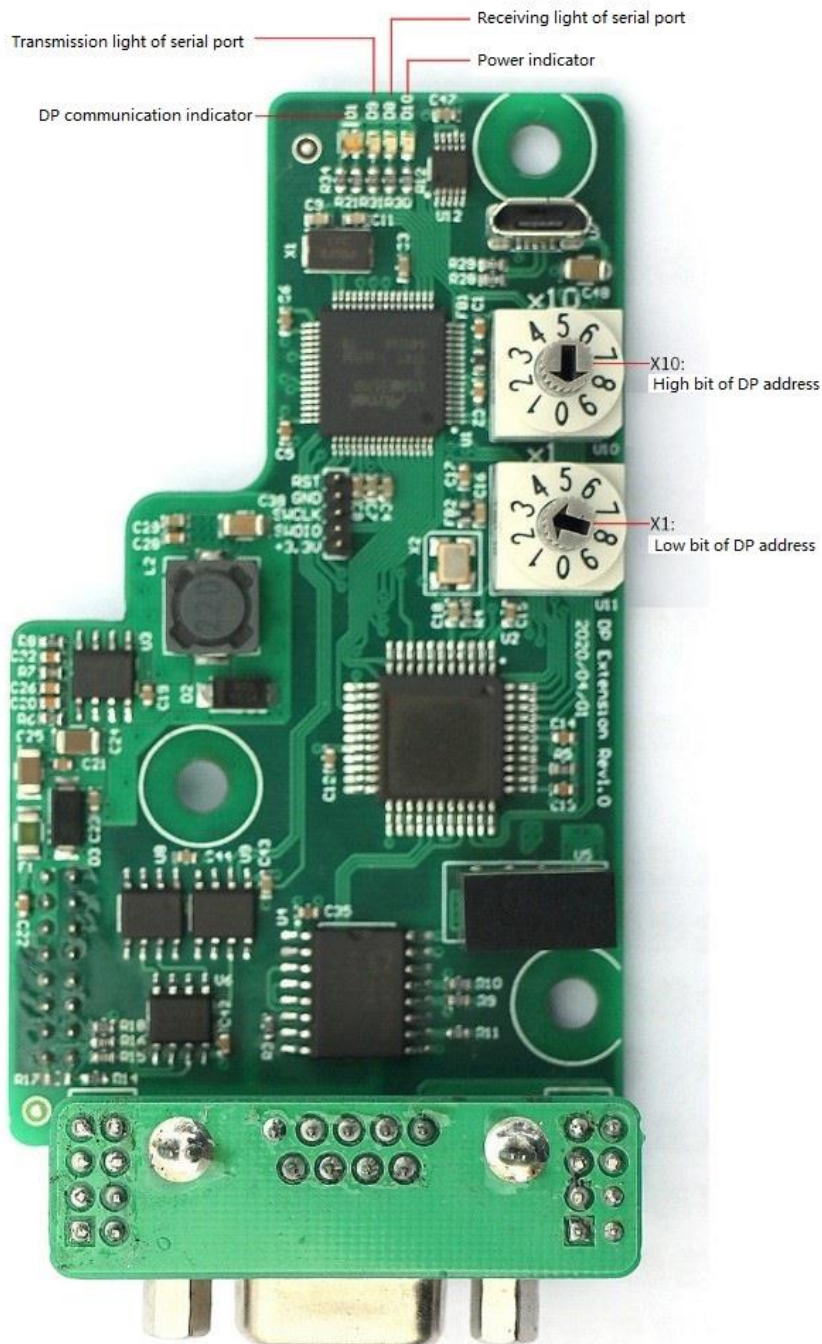
1.4 Error codes

Error Code	Description	Solutions
0x00	No trip	None

0x01	Invalid function code	The function code is not supported by slave, please using another function code.
0x02	Invalid address	The address is out of range.
0x03	Invalid value	Data length error.
0x04	Slave failure	Check the slave.
0x06	Slave busy	Check the slave.
0x07 0x02	Parity error	Check the parity check, baud rate, and stop bit
0x08		
0x09	CRC check error	CRC check from slave error, please check slave status.
0x0B	Slave timeout	Increase timeout detecting time, check the wiring and communication setting.
0x0E	Response message length error	Increase receiving interval.
0x0F	Slave response error when it is written	Check the wiring.

2. Hardware description

2.1 Product appearance

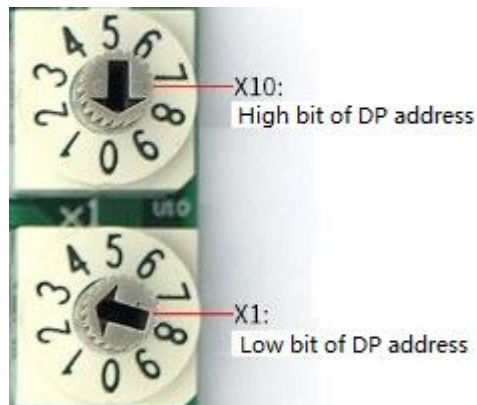


2.2 LED indicators

There are 4 LED status indicators, the descriptions are shown as follow.

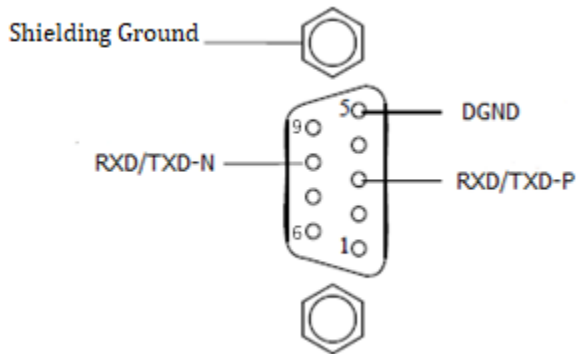
Symbol	Definition	Status	Description
D1	DPcommunication indicator	Red light on	DPcommunication error
		Red light flashing	
		Green light on	DPcommunication is normal
D9	Transmission light of serial port	Green light flashing	Serial port is sending data
		Green light off	Serial port is not sending
D8	Receiving light of serial port	Green light flashing	Serial port is receiving data
		Green light off	Serial port is not receiving
D10	Power indicator	Red light on	Power on
		Red light off	Power off

2.3 Setting Profibus DP address



As shown in the FIG above, DP address of drive = high bit * 10 + low bit, so the drive address here is $0 * 10 + 3 = 3$, the valid address range is 1~99.

2.4 PROFIBUS DPinterface



Pin Number	RS-485	Signal name	description
1		Shield 2)	Shielding ground
2		M24V 2)	-24V output
3	B/B'	RXD/TXD-P	Receiving/Transmission-P
4		CNTR-P 2)	Control-P
5	C/C'	DGND	Data ground
6		VP 1)	+5V supply
7		P 24V 2)	+24V supply
8	A/A'	RXD/TXD-N	Receiving/Transmission-N
9		CNTR-N 2)	Control-N

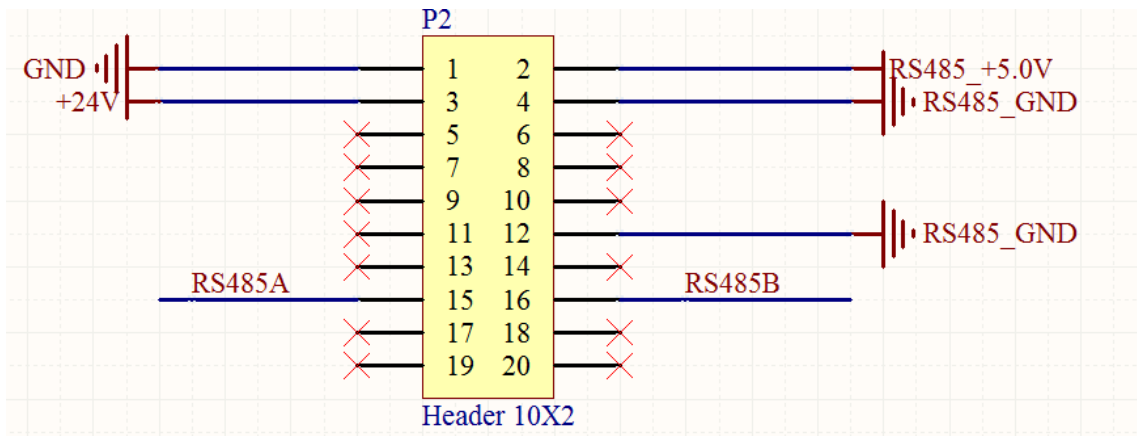
1) This signal is needed at terminal station.
2) These signals are optional.

2.5 Terminal definition

16 pins definition of communication board:

Pin number	Signal name	Description
1	COM	GND of 24V
2	VCC	+5VDC output
3	P24	+24VDC output
4	GND	GND of 5VDC
12	GND	GND of 5VDC
15	485+	485+
16	485-	485-

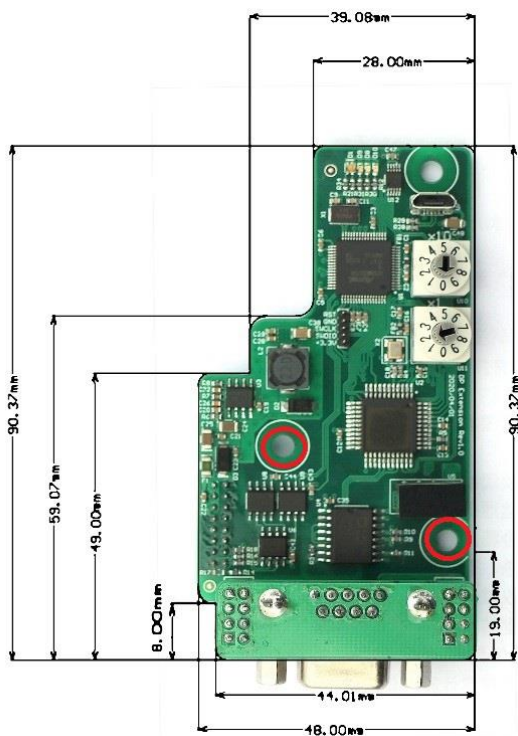
CN3 definition of NE300/600:



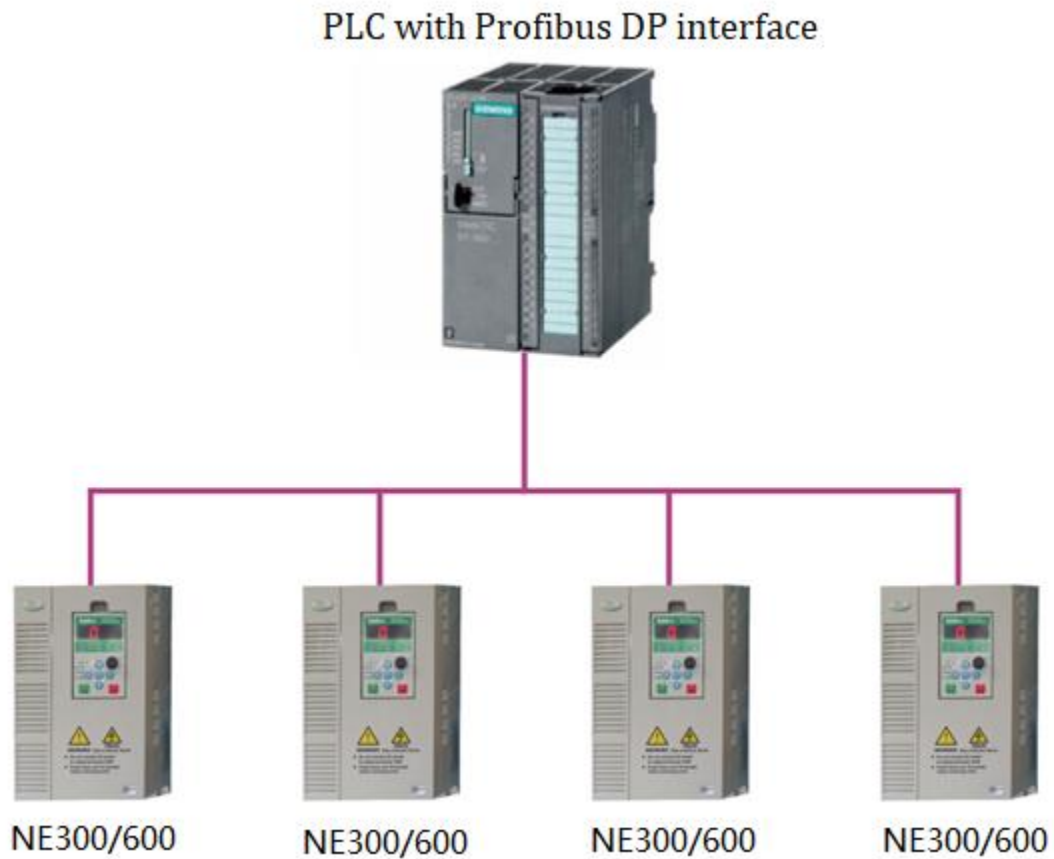
2.6 Installation and dimensions

The dimension of communication board is shown as follow.

Align the two installation holes of communication board and the installation feet of NE300/600 for optional board, plug the communication board into CN3 of control board and use two screws to fix it.



3. Network topology



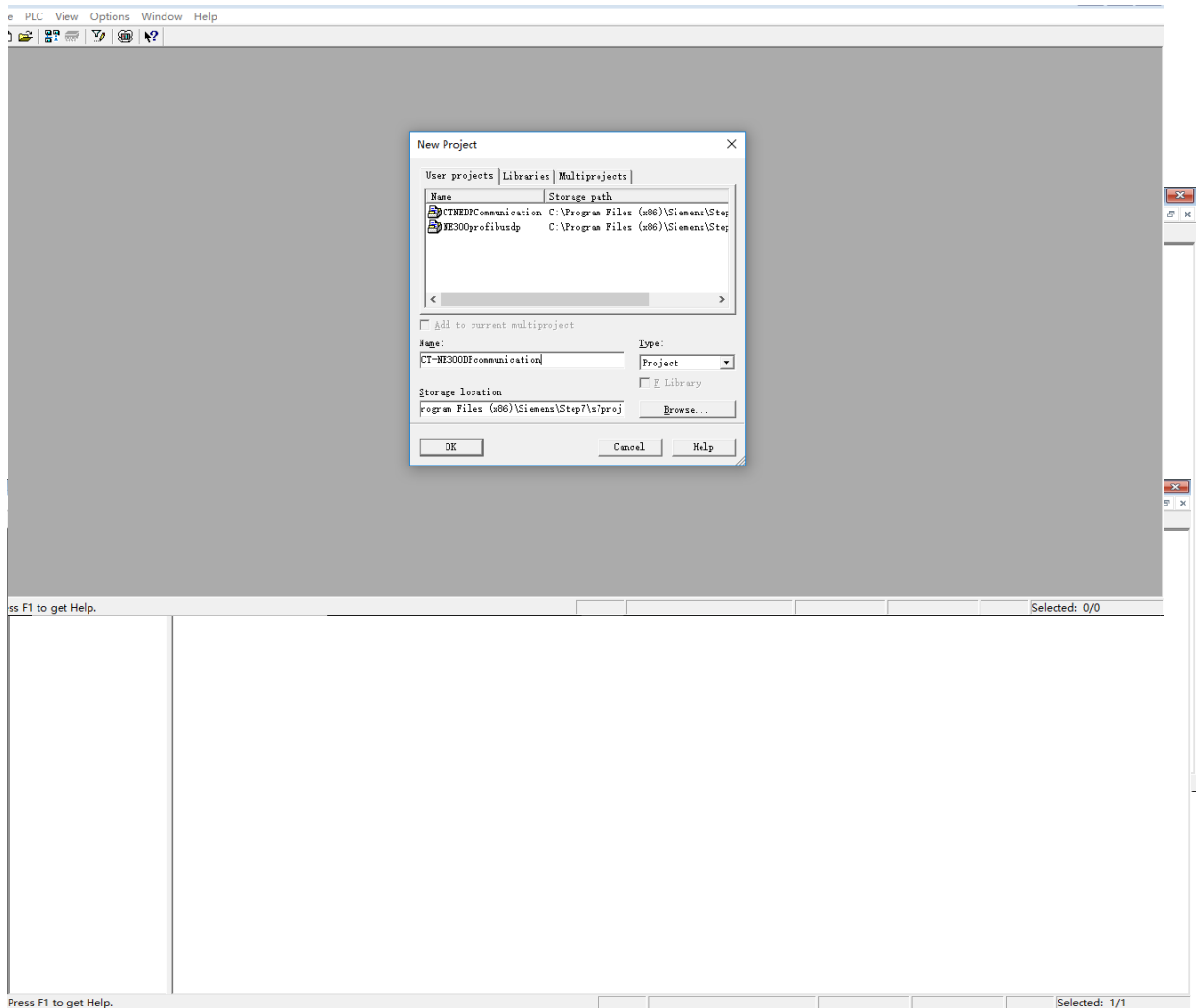
4. Step by step using Siemens Step7

4.1. Get NE300/600 GSD file from drive supplier.



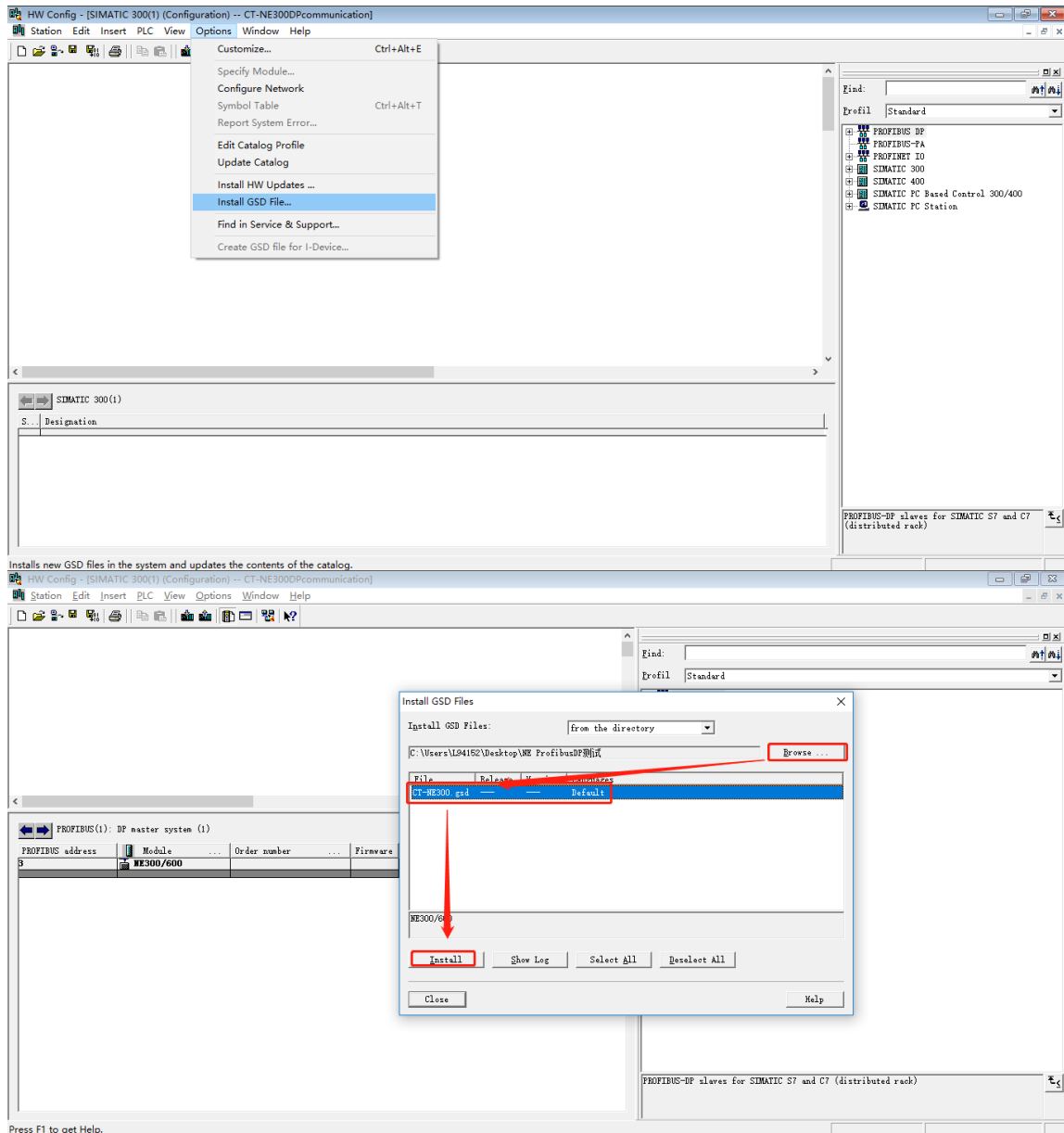
CT-NE300.gsd

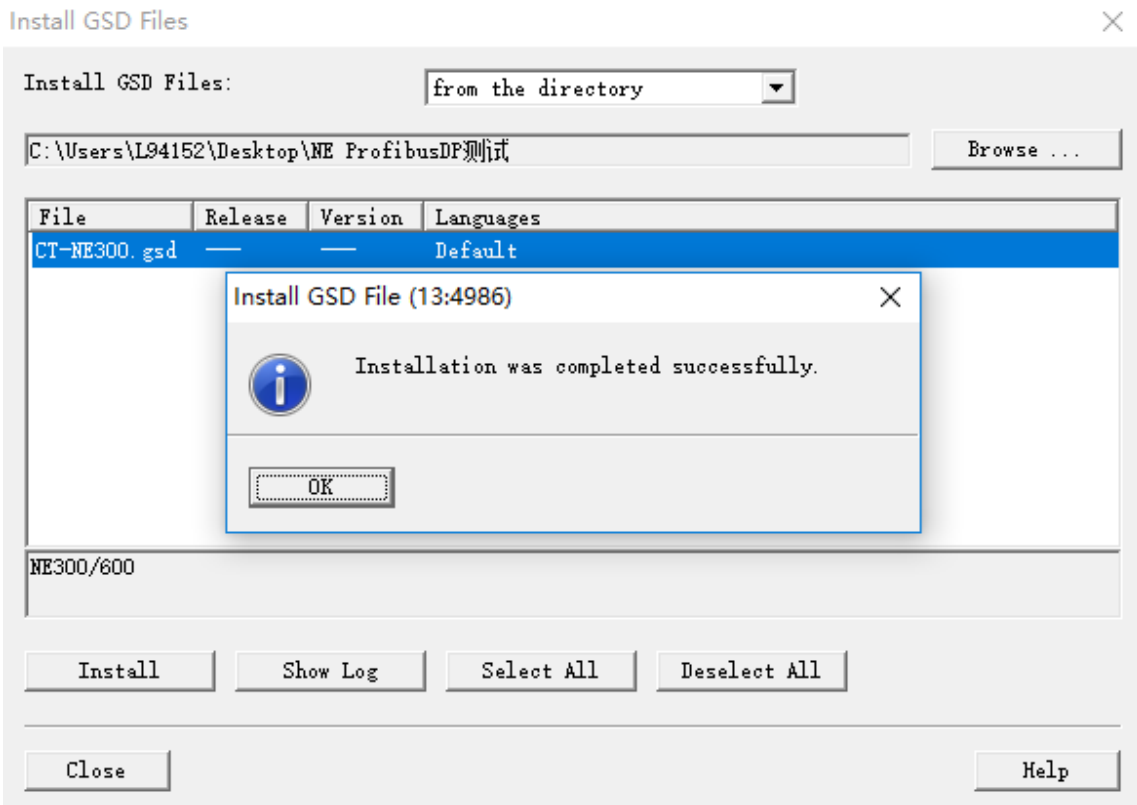
4.2. Open Step7 software, create a new project named CTNEDPCommunication.



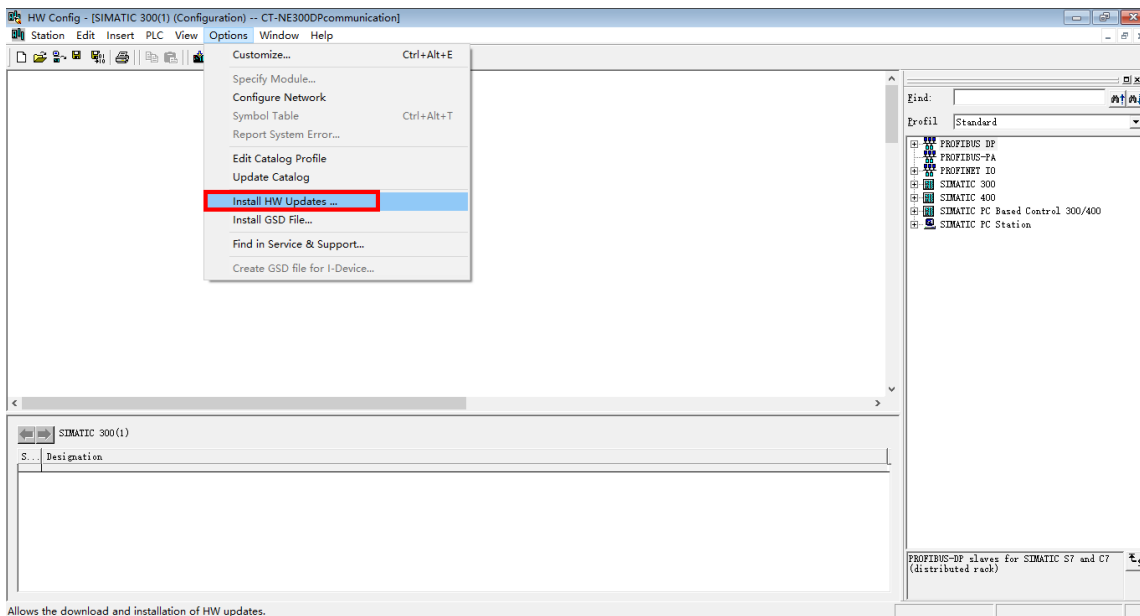
4.3. Right-click on the project name, select "Insert New Object/SIMATIC 300 station ", click "SIMATIC 300", and then double-click " hardware " on the right to enter the hardware configuration interface.

4.4. Before configuring the hardware, click " Options/Install GSD file ", click " Browse ... " in the pop-up box, and then find and select the directory where "CT-NE300.GSD" is located, click " Install " and then click " OK ".

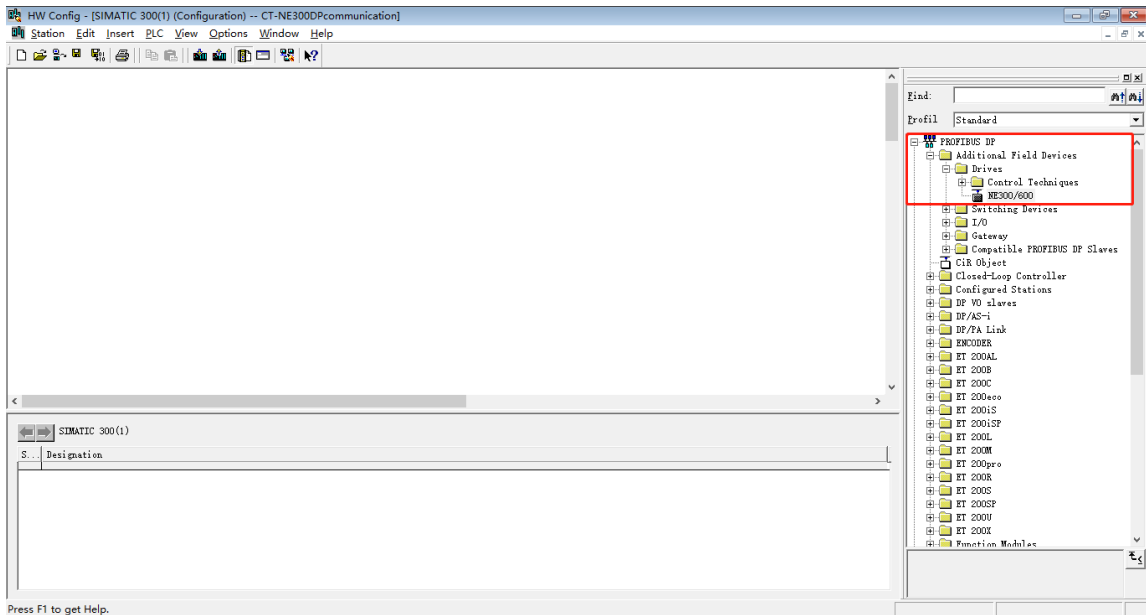




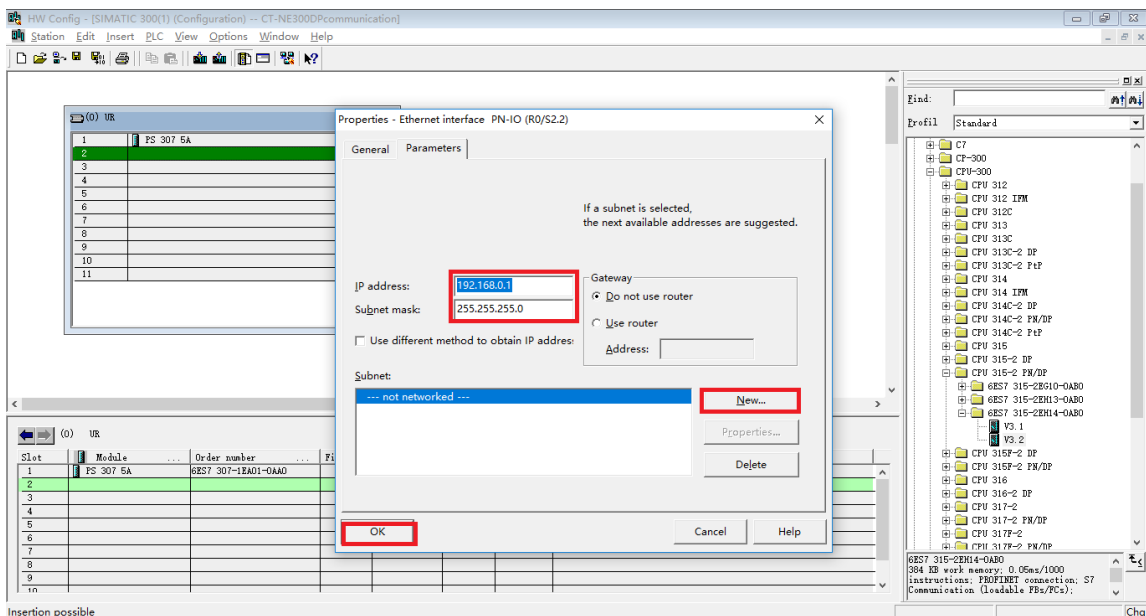
4.5 Click “Options/Install HW Updates”

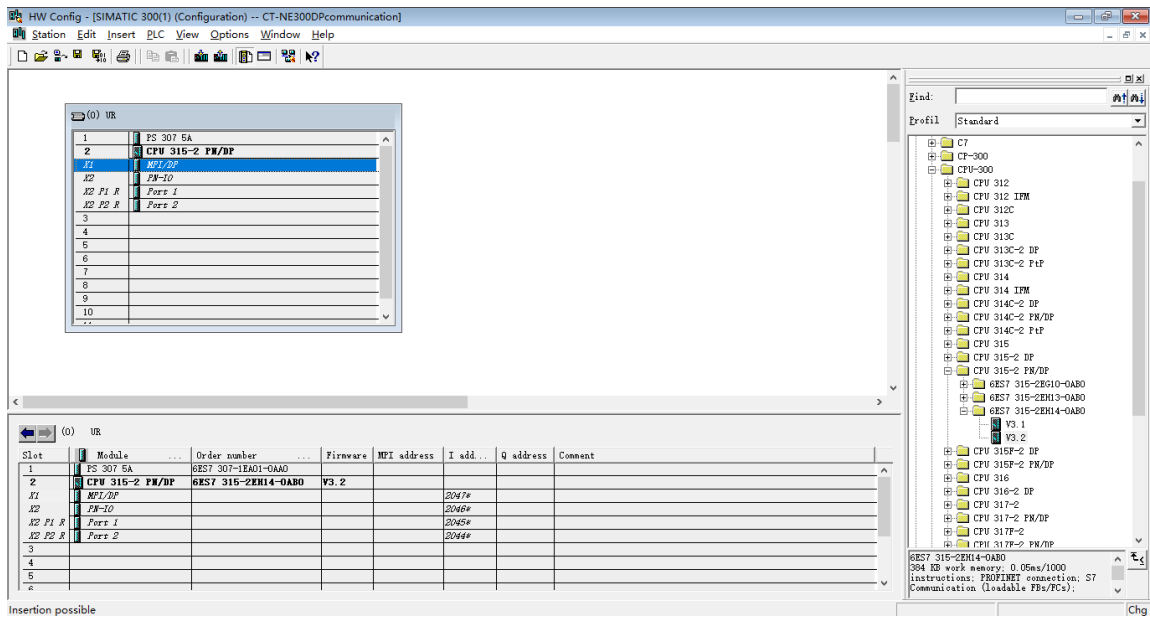


4.6. Now NE300/600 can be found under “Profibus DP/Additional Field Devices/Devices/Control Techniques/NE300/600”.

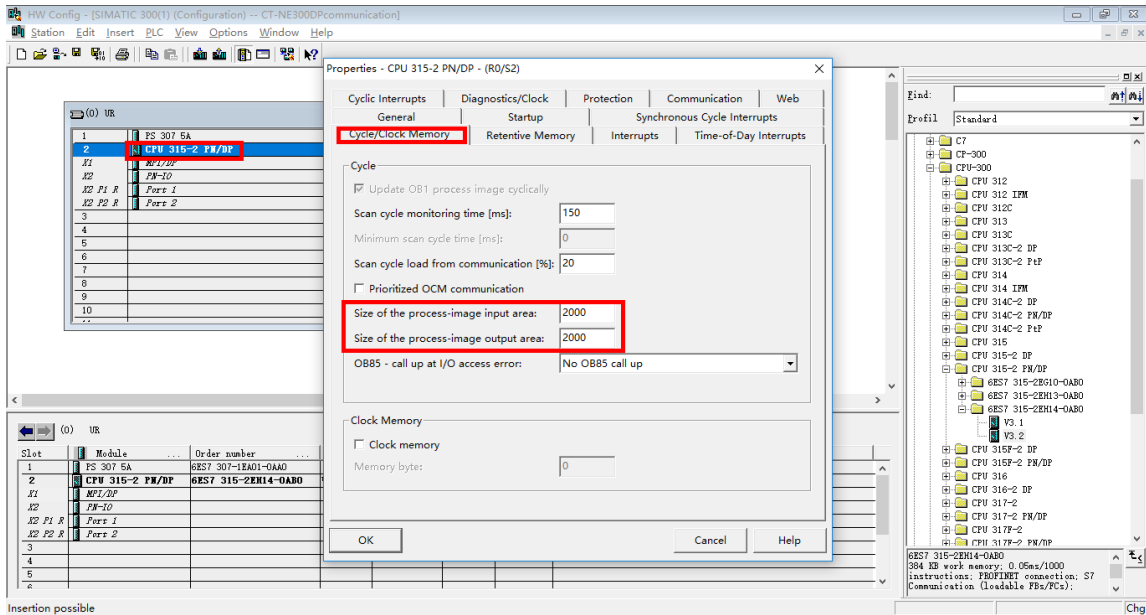


4.7. Hardware configuration, first insert a rail, and then power module and CPU, when adding CPU, the IP address should also be configured.

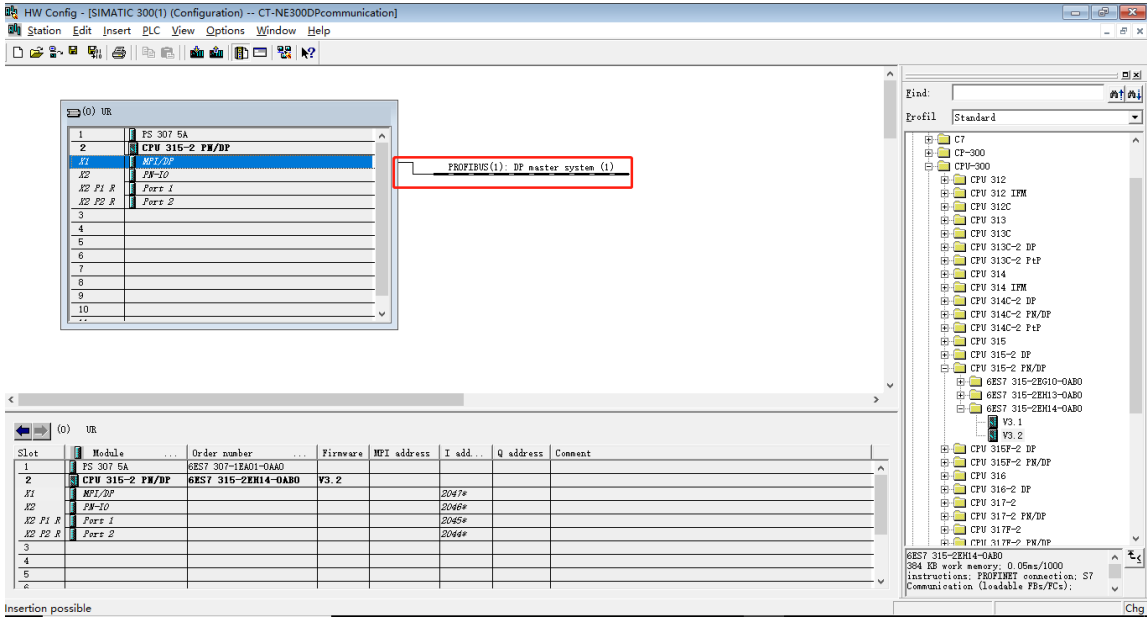
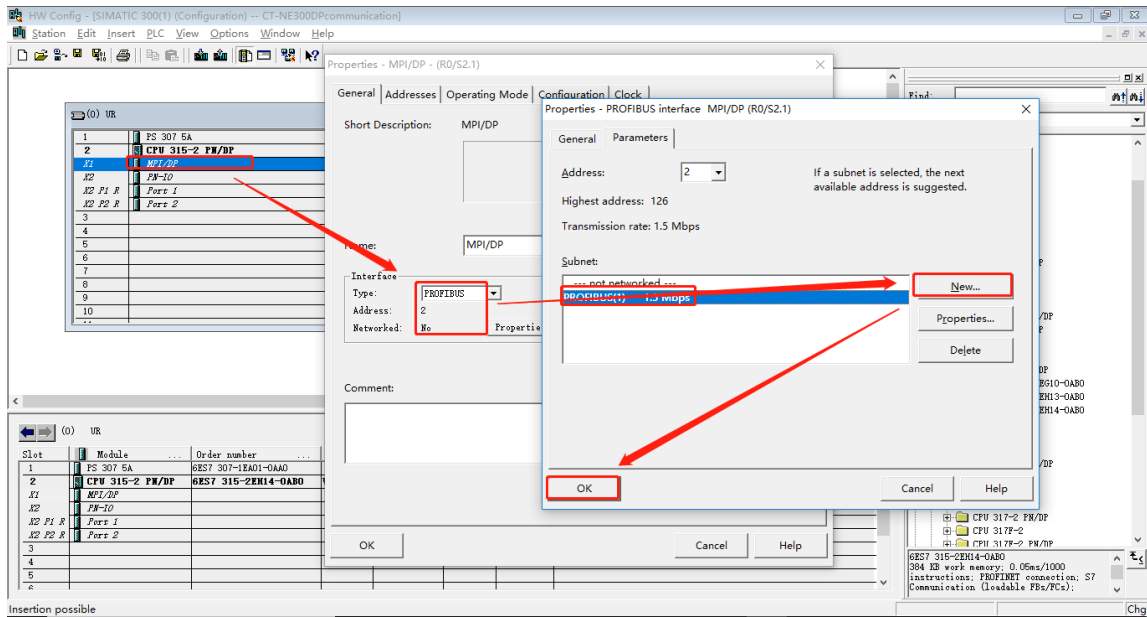




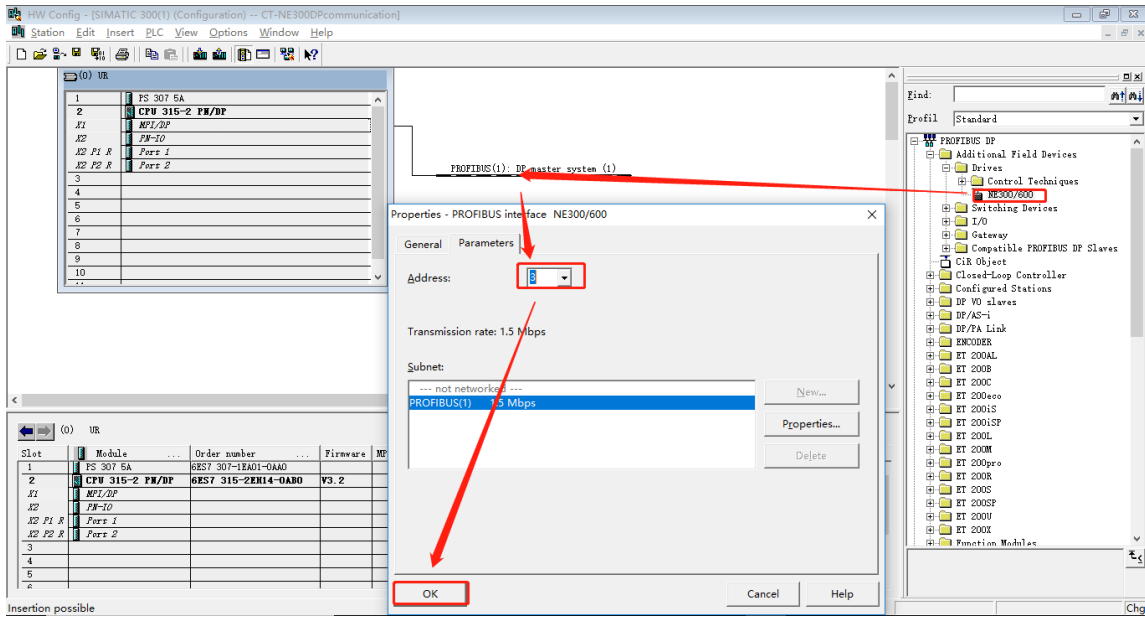
After adding CPU, double-click it, and then go to “Cycle/Clock Memory”, modify the “Size of the process-image input area” and “Size of the process-image output area” from 128 to 2000.



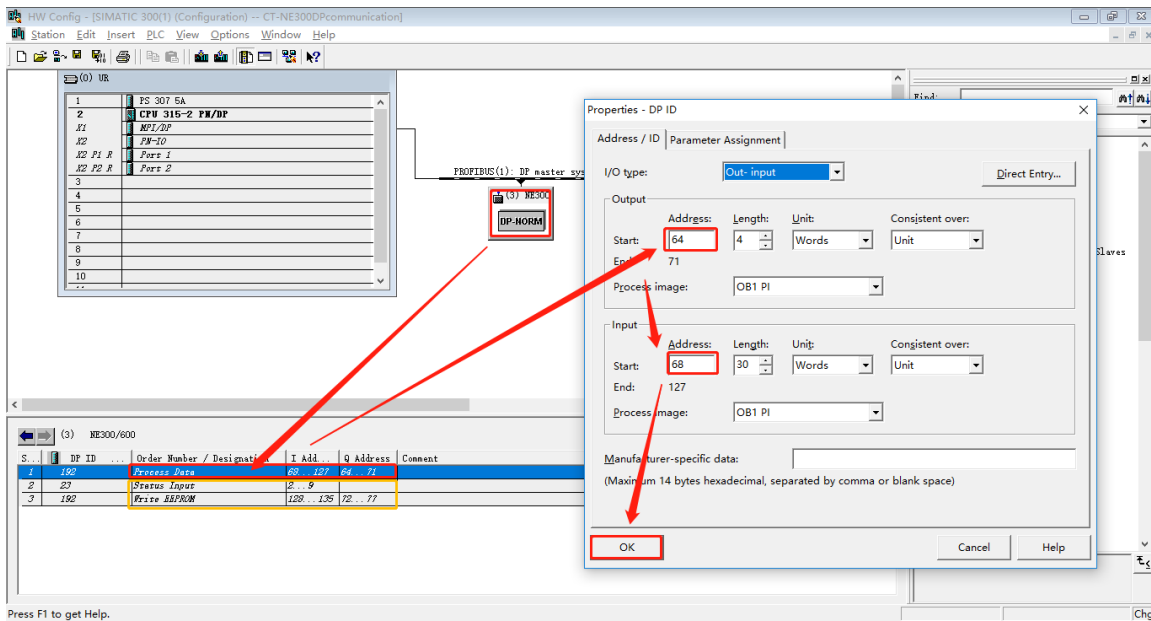
4.8. Double-click “MPI/DP”, select interface type as “PROFIBUS”, and then create a new Profibus network.



4.9. Drag the NE300/600 (see section 4.6) to Profibus-DP bus, configure the Profibus address to the same with the communication board, it is 3 in this case (see section 2.3).

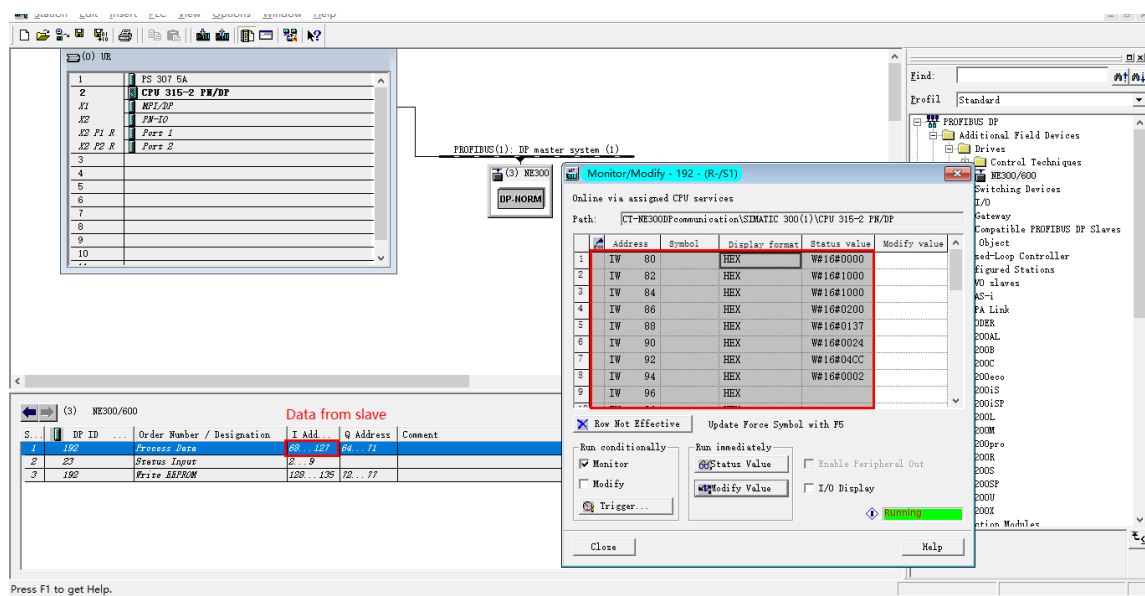
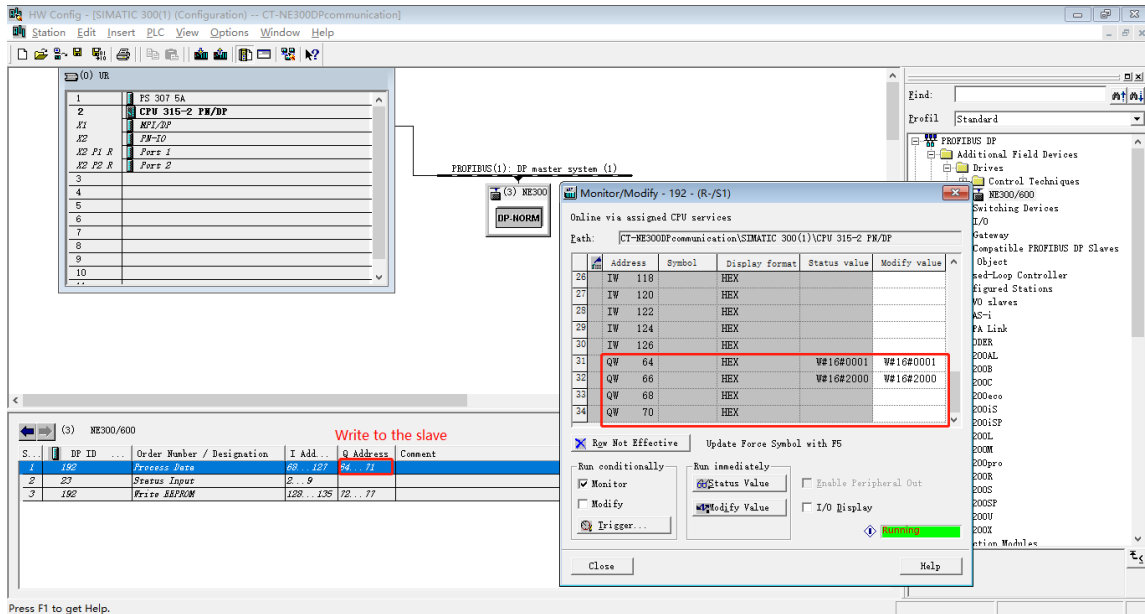


4.10. Select the NE300/600 slave, and then double-click the “Process data” “Status input” and “Write EEPROM” slot to customize the I/O address.



4.11. Click “Save and Compile”, if there is no error, click “Download to Module” to download the configuration.

4.12. Right-click on slot 1 “Process data”, select “Monitor/Modify”, slave data can be monitor and modified here, same with the “Status Input” and “Write EEPROM”.



5. Step by step using Siemens TIA V15

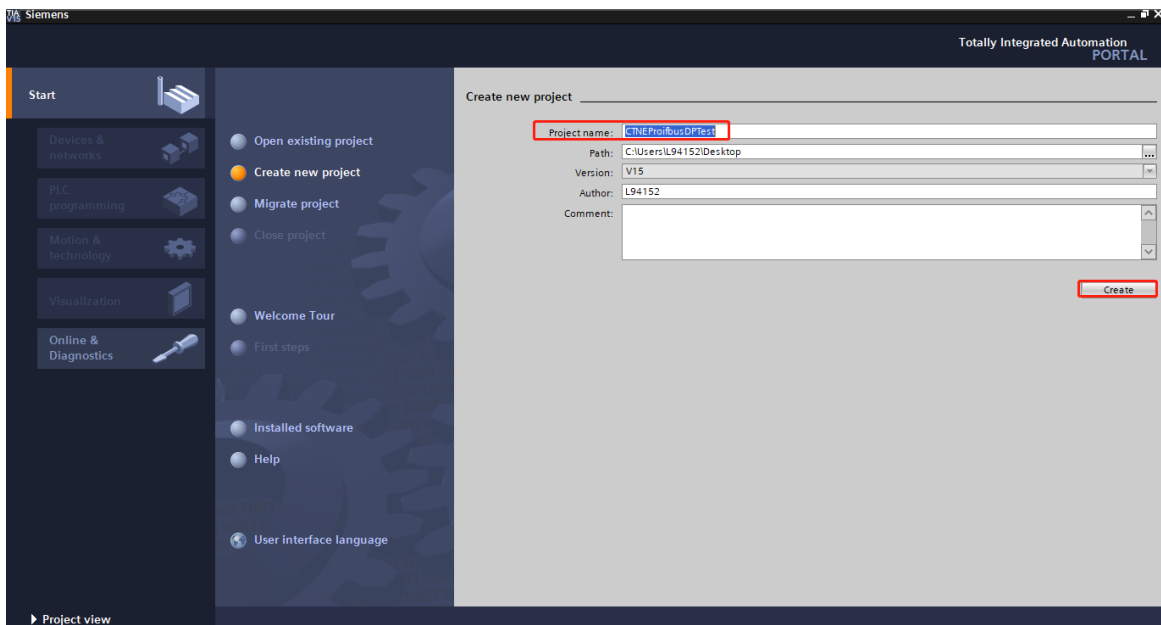
In this chapter, Siemens CPU 1211DC/DC/DC, CM1243-5 communication module and TIA V15 software are used.

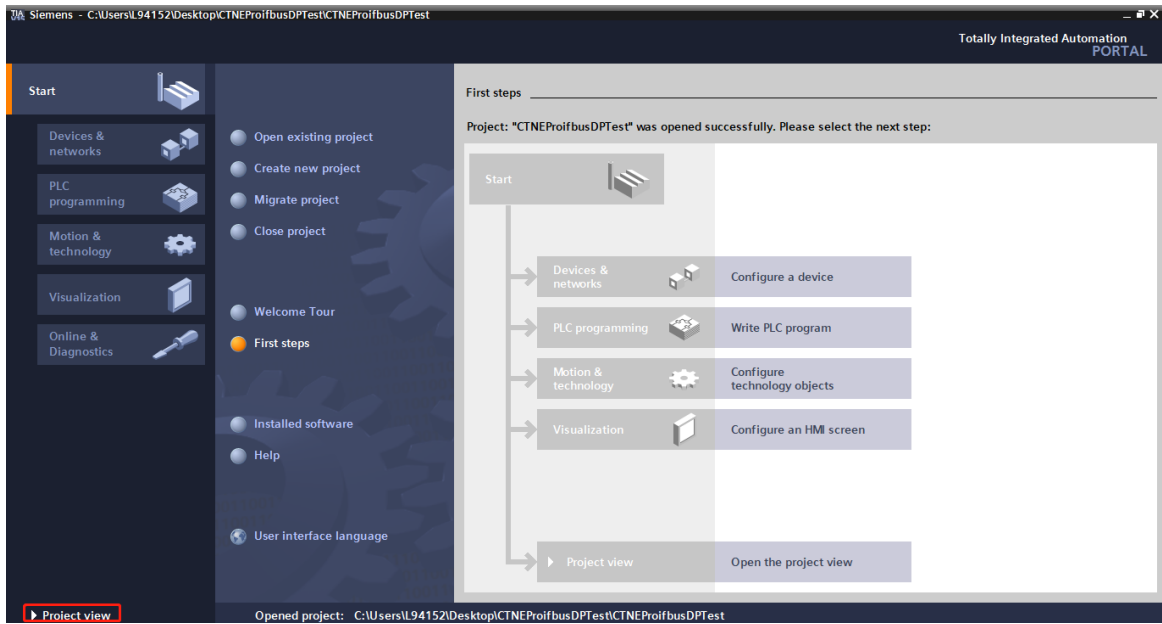
1. Get CT-NE300.gsd file from drive supplier.



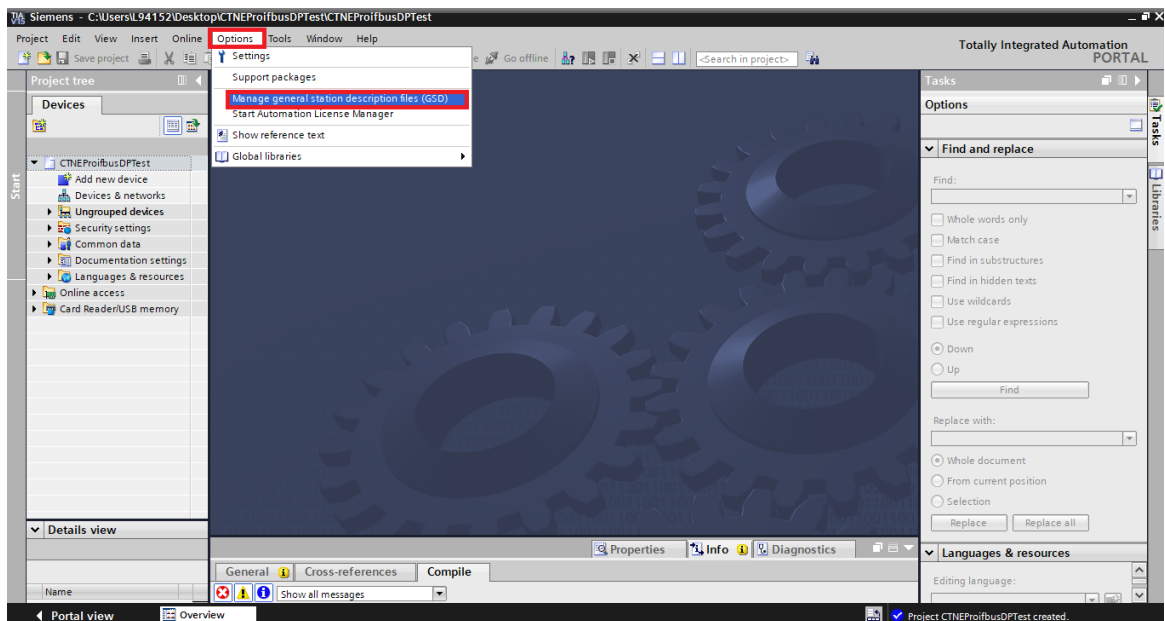
CT-NE300.gsd

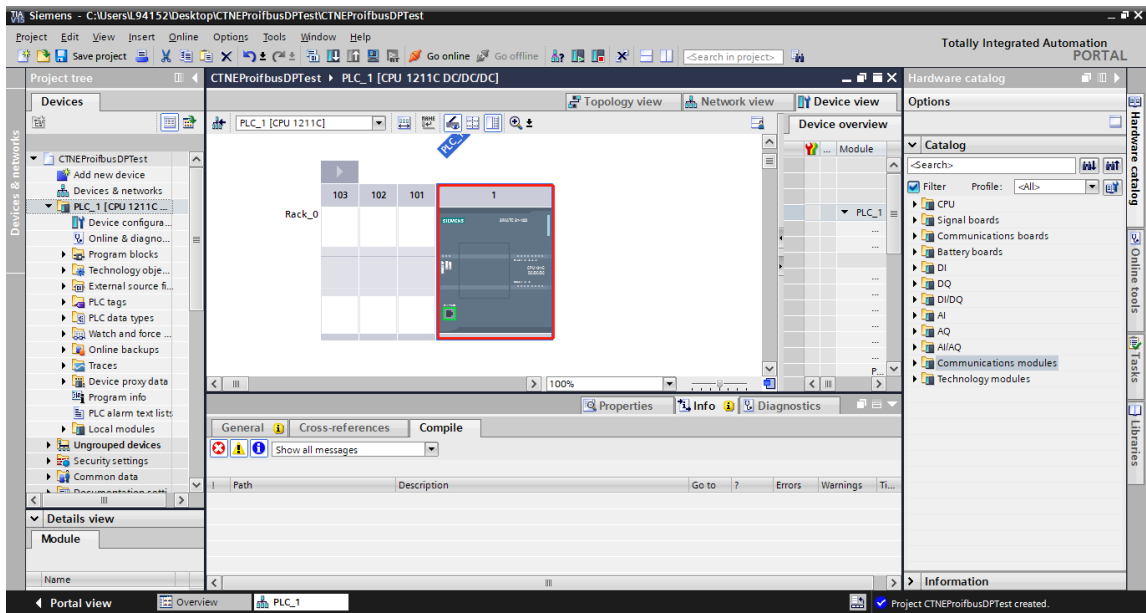
2. Open TIA V15, create a new project named CTNEProfibusDPTTest, and then click “Project view” into next step.



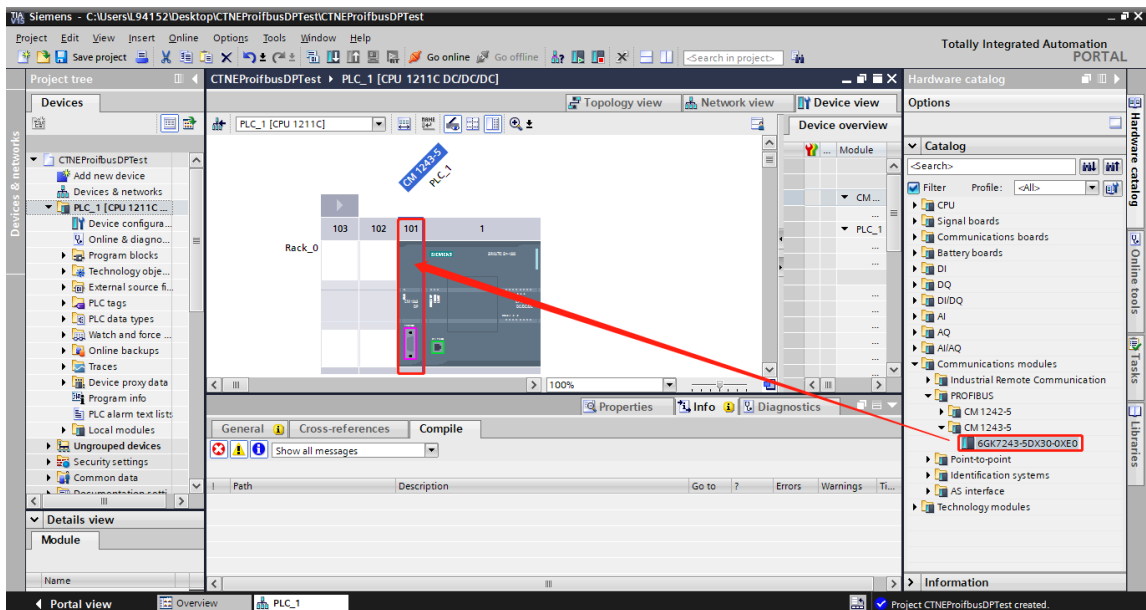


3. Install GSD file: click “Options/Manage general station description files (GSD)”, locate the GSD file, and then click “Install”.

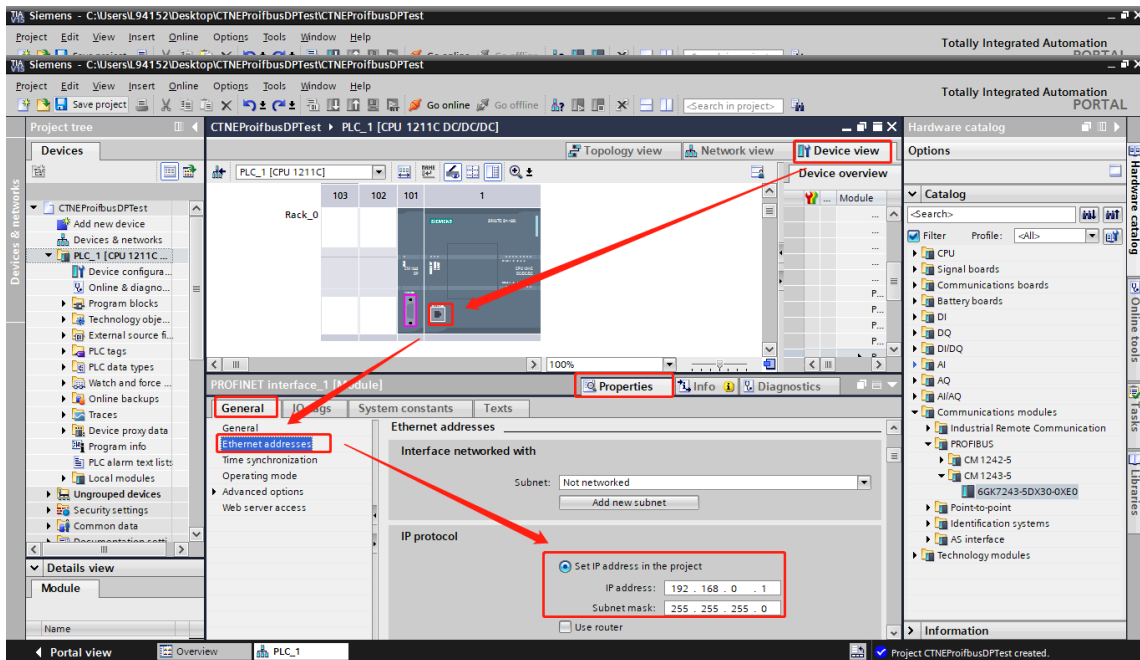




5. Select and drag communication module CM1243-5 to Rack_0 as follow.

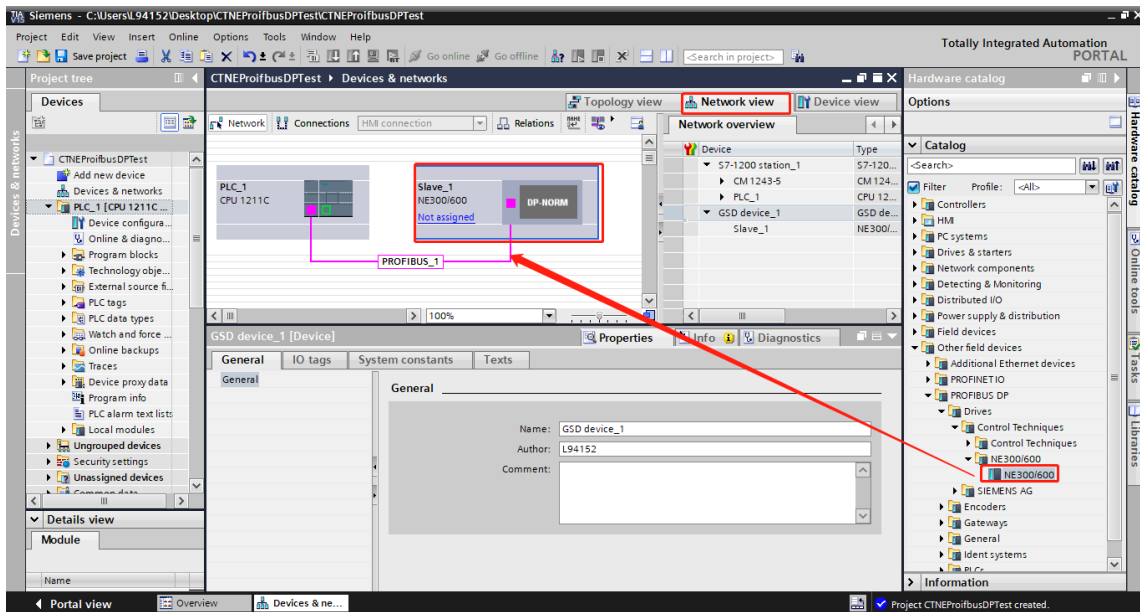


6. Select DP interface in “Device view”, create a new subnet and set the address.

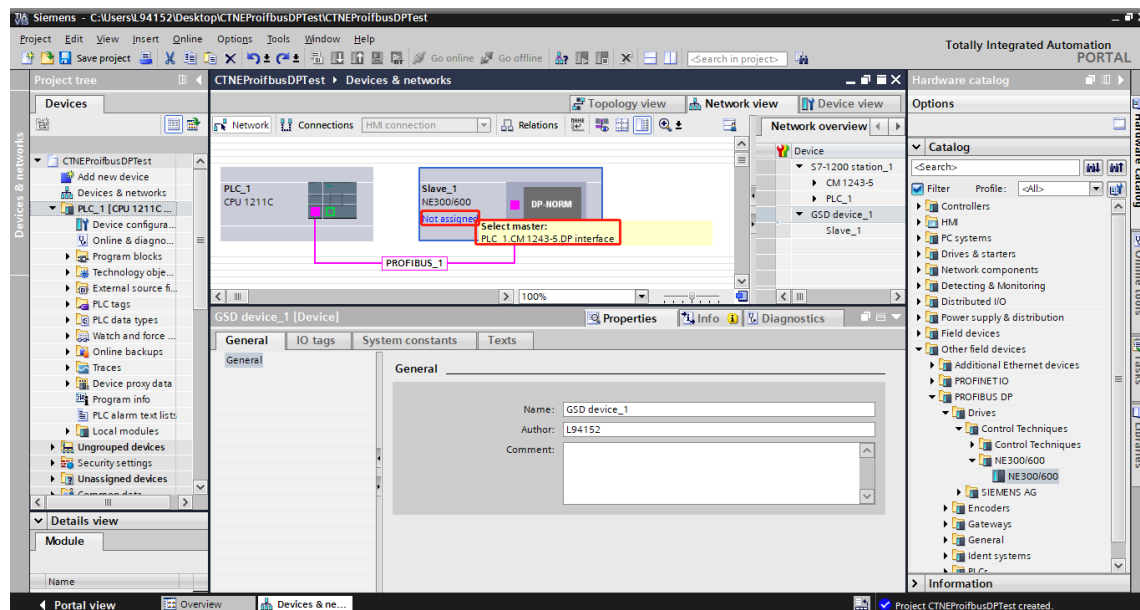


Select Profinet interface on PLC and set the IP address.

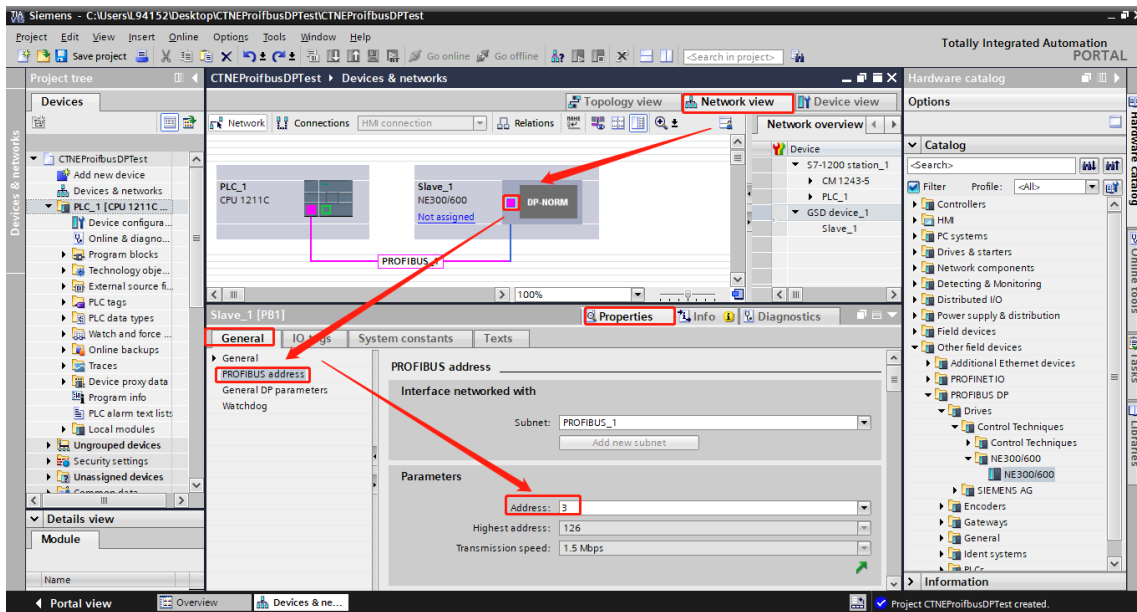
7. Go to “Network view” and drag NE300/600 to Profibus DP bus.



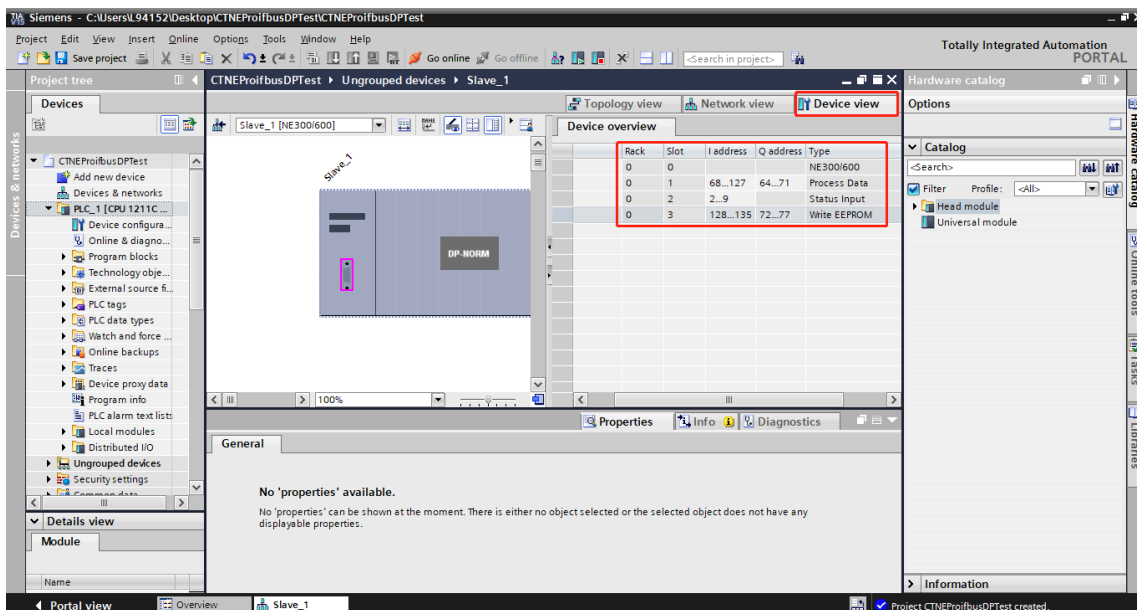
8. Click “Not assigned” and then “Select master: PLC_1.CM1243-5 DP interface”



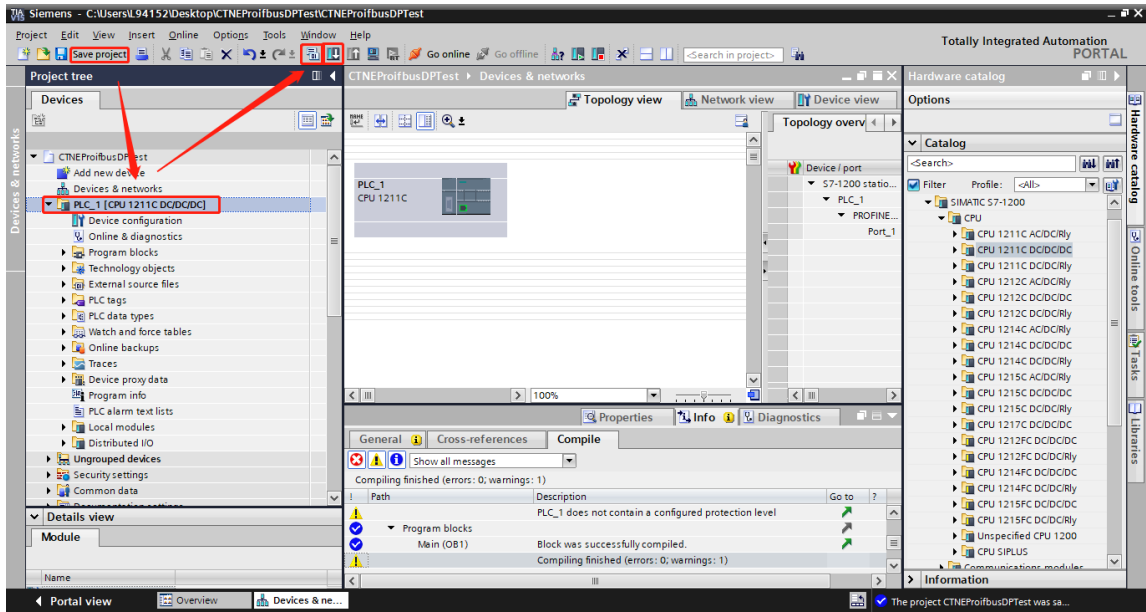
9. Select DP interface on NE300/600 and set the DP address to the same with communication board, it is 3 in this case (see section 2.3).



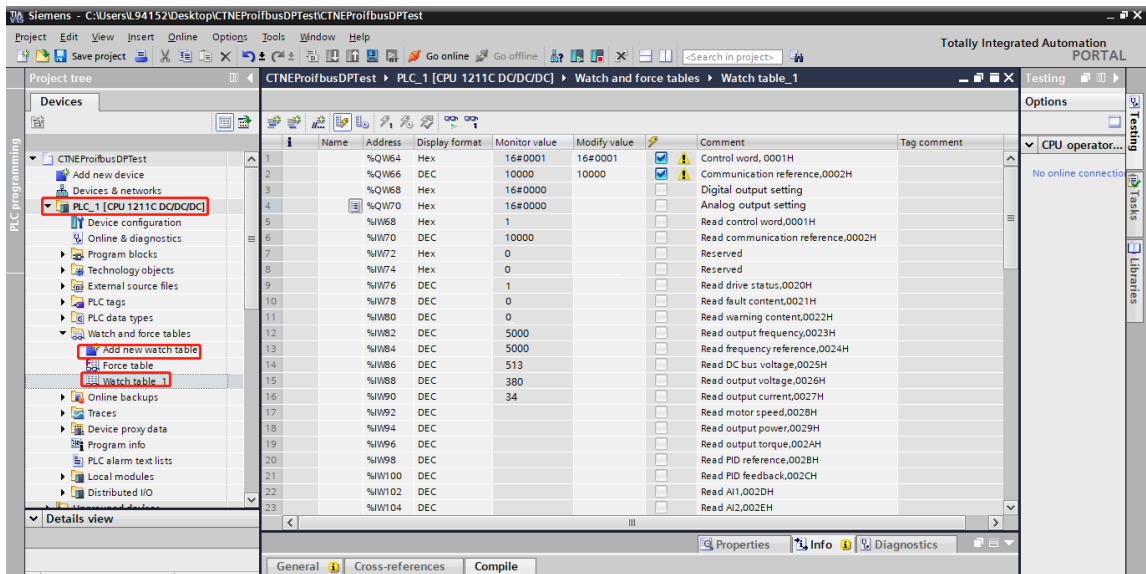
10. Double-click on the NE300/600 station to show the mapping address, those addresses are modifiable.

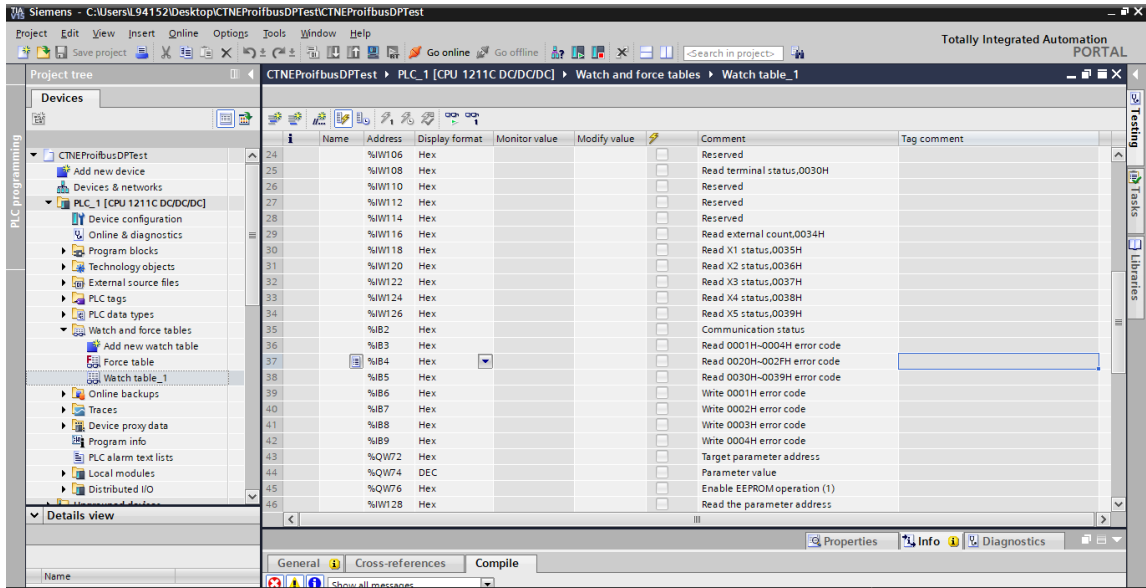


11. Click “Save project”, select “PLC_1[CPU1211 DC/DC/DC]” under project tree, click “Compile”, then “Download to device”



12. Double-click on the “Add new watching table” under project tree, add addresses which needed to be watched and modified. Go online, and then all the addresses can be watched and modified.





EEPROM operation can write value to drive parameters which are saved when power off.

