

Dalian Powtran Technology

**9KDP1(Profibus-DP) Card Instruction Manual**  
**(Instructions for using the Profibus-DP bus**  
**communication expansion card)**

**Version V1.01**



## Repair Record

NO	Modification Date	Modifications Summary	Modifier	Corrected version
1		New	Li Kunhe	
2	2014-6-4	Add step 7 missing steps when setting up communication	Lao Qiuyi	V1.01
3				
4				
5				
6				
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9				
10				
11				
12				
13				
14				

# Overview

Thank you for using the Powtran Technology 9KDP1 (PROFIBUS-DP) fieldbus adapter. PROFIBUS is an internationally developed fieldbus standard and 9KDP1 conforms to the international standard of PROFIBUS. 9KDP1 can be used together with the 9K series inverter of Powtran Technology to realize the inverter becoming a part of the fieldbus and realize the control of the real fieldbus. The functions include: configuration functions, update and adjust parameters, control signal transmission, monitoring and diagnosis.

Using PROFIBUS fieldbus in the system has the following benefits: hardware and installation cost savings, engineering cost savings, and greater manufacturing flexibility. Please read this manual carefully before using this product.

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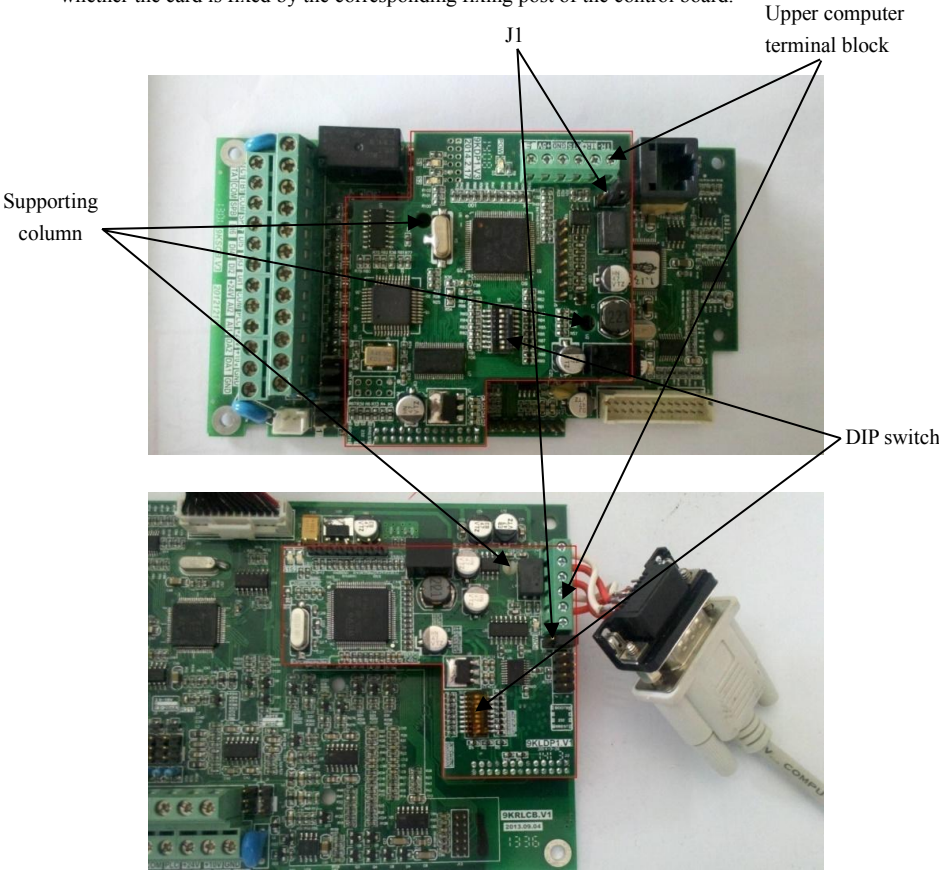
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# Chapter I. Installation and Wiring

The 9KDP1 card can be embedded in the inverter of the 9K series of Powtran Technology. Please turn off the power supply of the inverter before installation, and do not install it until the inverter charging indicator light to be completely extinguished for about 10 minutes. Please refer to the installation diagram in Figure 2-1 for installation.

After inserting the 9KDP1 card into the inverter control board and connecting the pin, check whether the card is fixed by the corresponding fixing post of the control board.



### 1.1 DIP Switch Description

DIP switch item number	Function	Description		
1,2	DP card and inverter baud rate selection	Item 1	Item 2	baud rate
		OFF	OFF	115.2K
		OFF	ON	208.3K
		ON	OFF	256K
		ON	ON	512K
3-8	Profibus-DP Communication slave address	The 6-bit binary consists of 64 addresses. Addresses beyond 64 can only be set with function codes. The following are some slave addresses and switch settings		
		address	Switch settings	
			0 00 0000	
			7 00 0111	
			20 010100	

### 1.2 Interface Description

#### 1.2.1 External communication terminal J4-6PIN

Terminal serial number	Identifier	Function
1	GND_ISO	Isolated from 5V power supply in power ground
2	RTS_ISO	Request to send signal
3	TR-	Negative electrode of data cable
4	TR+	Positive electrode of data cable
5	+5V_ISO	Isolated from 5V power supply in power ground
6	retain	retain



**1.2.2 Upper computer communication interface SW1-8PIN**

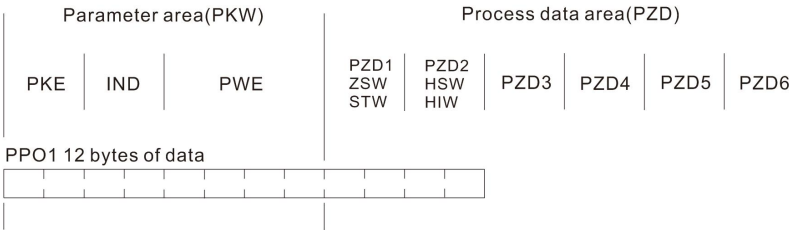
<b>Terminal serial number</b>	<b>Identifier</b>	<b>Function</b>
1	BOOT0	ARM boot choose
2	GND	power ground
3	VCC	Power Supply
4	Reserve	Reserve
5	PC232T	232 communication sending terminal of upper computer
6	PC232R	232 communication receiving terminal of upper computer
7	RREST	ARM reset
8	GND	Power supply ground

# Chapter II. PROFIBUS-DP Instruction

## 2.1 Brief introduction of PROFIBUS

The communication between PROFIBUS-DP and PROFIBUS master station is to access the services in the PROFIBUS data link layer2 through the service access points (SAP). Each service access point (SAP) in PROFIBUS has a clear definition. Please refer to the relevant PROFIBUS protocols for details. PROFIDRIVE (variable speed drive) in this protocol uses the PROFIBUS protocol model to meet the parameter data and process data of PROFIDRIVE. In PROFIDRIVE protocol, PPO (Parameter/Process Data Objects) type is used as the data transmission format. PPO type is divided into PPO1, PPO2, PPO3, PPO4, PPO5. In our system, only PPO1 is used, which meets the user's perfect control of multiple functions of the inverter.

The specific description of PPO format is as follows:



## 2.2 Format supported by 9KDP1 card

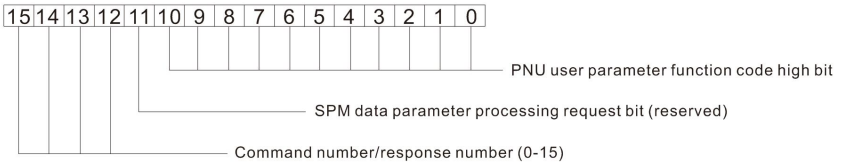
The data format supporting PROFIBUSDRIVE is PPO1. The characteristics of the data format are described as follows:

Data type	Data information	Reaction rate	Adapt scope
PPO1	little	fast	The required data information is general

## 2.3 Description of PPO

### 2.3.1 Description of data format in PPO1 parameter area:

#### 1) Description of PKE



#### 2) Description of command number

Command number	Function description
0	No task
1	Request to read function code parameter data (word)
2	Request to change function code parameter data (word)
14	Request to change function code parameters and store them in EEPROM (word)
others	Reserve

#### 3) Description of parameters under different commands:

Parameter No	1 Command	2Command	14Command
PKW[1], PKW[2] PKW[6], PKW[7]	Read operation	Write operation	
PZD1	Read/write operation		
PZD2	Read operation	Read/write operation	
PZD3~PZD12	Read operation	The read/write operation is determined by the function code of the inverter parameter group	

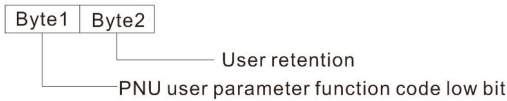
#### 4) Description of response number:

Corresponding number	Content description
0	No response
1	Function code parameters operate correctly (read/change)
7	Function code parameters operate correctly (read/change)
others	Reserve

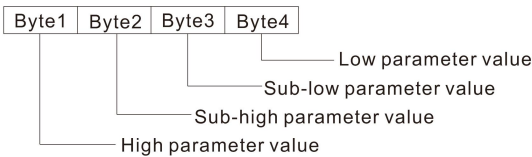
When the response command number is 7, the definition of the error number corresponding to the last byte of PWE:

Error number	Content description
0	No fault
1	Password error
2	Command code error
3	CRC verification error
4	Invalid address
5	invalid parameter
6	Invalid parameter correction
7	The system is locked
8	EEPROM operation in progress

5) Description of IND



6) Description of PWE



7) Description of PKE instance in parameter area

Read the operation baud rate function code F9-00 of the frequency inverter, and the baud rate is 9600BPS according to the set value 6015.

The specific command frame is as follows:

Send by master station:

Command | Function Code | Reserve | None | PZD parameter |

```
{16|249|0|0|0|0|0|0|0|0|0|0}
```

Return from station:

Command | Function Code | Reserve | Baud Rate 9600BPS | PZD Parameters |

{16|249|0|0|0|0|23|127|0|0|0|0}

8) Set the baud rate F9-00 for the operation of the inverter, the set data is 19200 BPS and its specific command frame is as follows:

Master sends:

Command | Function Code | Reserve | Baud Rate 19200BPS | PZD Parameters |

{32|249|0|0|0|0|23|126|0|0|0|0}

Return from station:

9) Command |Function Code | Reserve | Baud Rate 9600BPS | PZD Parameters |

{16|249|0|0|0|0|23|126|0|0|0|0}

### 2.3.2 Description of the PPO1 process data

1) Description of PZD1 for process data:

The data format is as follows :

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
----	----	----	----	----	----	---	---	---	---	---	---	---	---	---	---

a) Description of the control word:

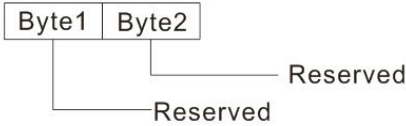
PZD1 Numerical values	Function description
0X0001	Inverter forward operation
0X0002	Inverter reverse operation
0X0003	Inverter forward jogging
0X0004	Inverter reverse jogging
0X0005	Inverter free stop
0X0006	Inverter deceleration stop
0X0007	Inverter fault reset

b) Slave to host as status word

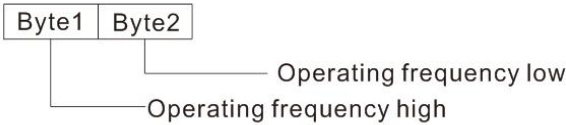
Control words	Value	Definition content	Description
Bit0	0	Frequency inverter stop status	
	1	Frequency inverter operating status	
Bit1	0	Inverter forward operation	
	1	Inverter reverse operation	
Bit2	0		
	1	Frequency inverter fault	
Bit3	0		
	1	Frequency reached	
Bit14~Bit15	Reserved		

2) Description of the PZD2 of the process data:

a) Host to slave reservations



b) Slave to host as operating frequency



# Chapter III. Profibus-DP card test and engineering

## process set up

### 3.1 Test preparation

1) Naked eye inspection of the surface of the DP card for tin-free slag, inspection of components, connectors for leakage, soldering errors, false soldering.

2) Use a multi meter to measure the DP card power supply +5V, +5V\_ISO, VCC, VDD3.3 for short circuit; measure the DB9 interface for short circuit.

3) Hardware connection, pin 1,2 of J1 plug in the shorting cap, dip switch 2,7,8 bits to ON position, insert the DP card into the inverter control board, DB9 cable ends are connected to the DP card and CP5613 or CP5611 board.

4) Turn on the computer, power up the inverter control board and measure the correct power supply on the DP card +15V, -15V, +5V, +5\_ISO, VCC, VDD3.3.

### 3.2 Relevant configuration parameters for the use of PROFIBUS

#### communication

F0.11 (command source selection) = 2

F0.03 (main frequency source selection) = 9

F9.07 (type of communication card) = 1.

F9.00 (baud rate) = 6015.

F9.02 (local address) = 1.

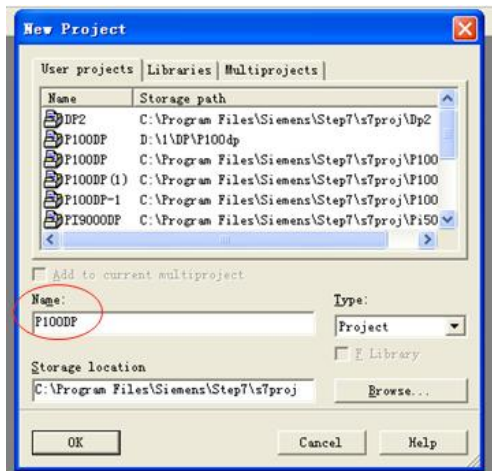
F9.04 (communication timeout time) = 0.

F9.05 (data transfer format) = 00.

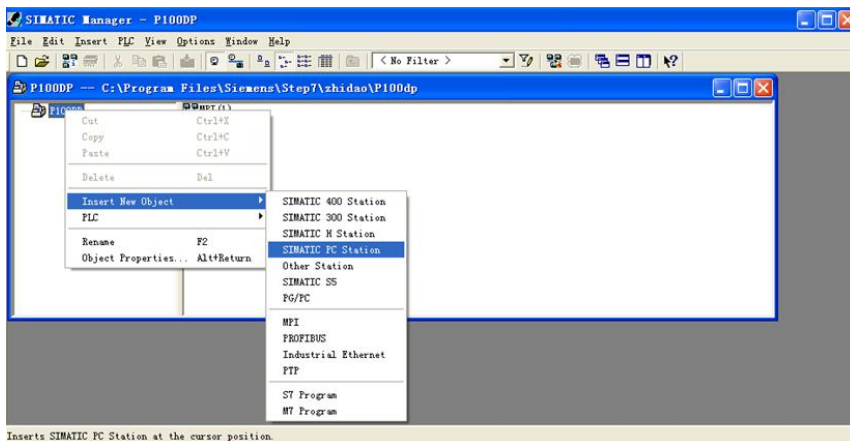
### 3.3 Configuration software to build the project

For software configuration, open the SIMATIC Manager software on your PC.

To create a new project, click on the "File" option in the toolbar of the software, select "New", the interface will pop up, enter the project name in the circle and confirm.

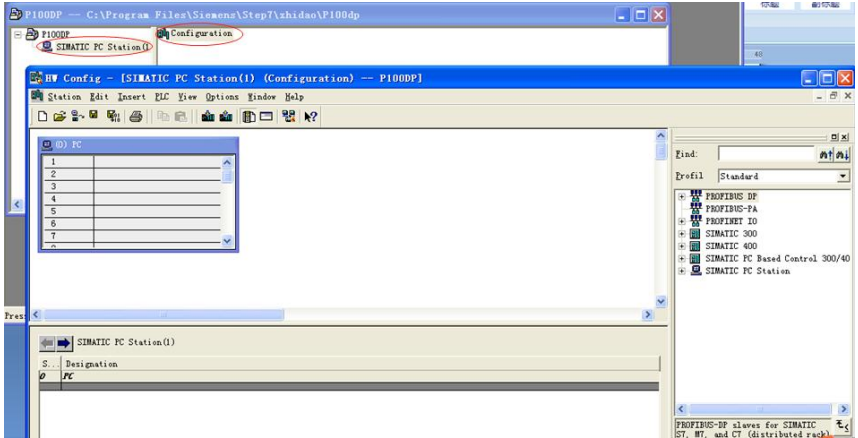


Set up a PC site.

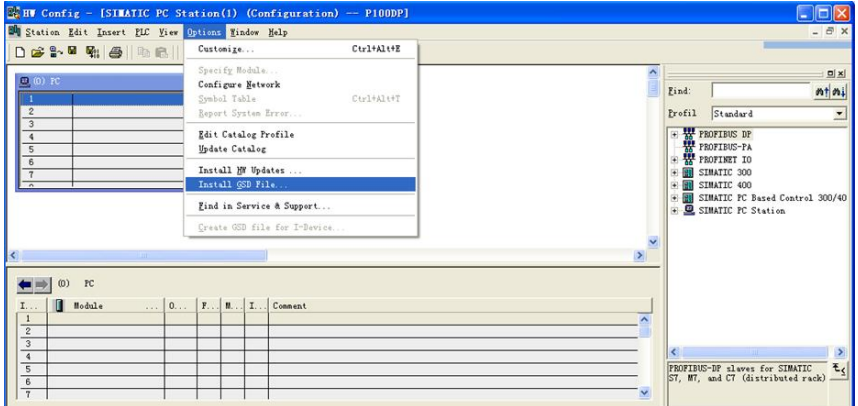




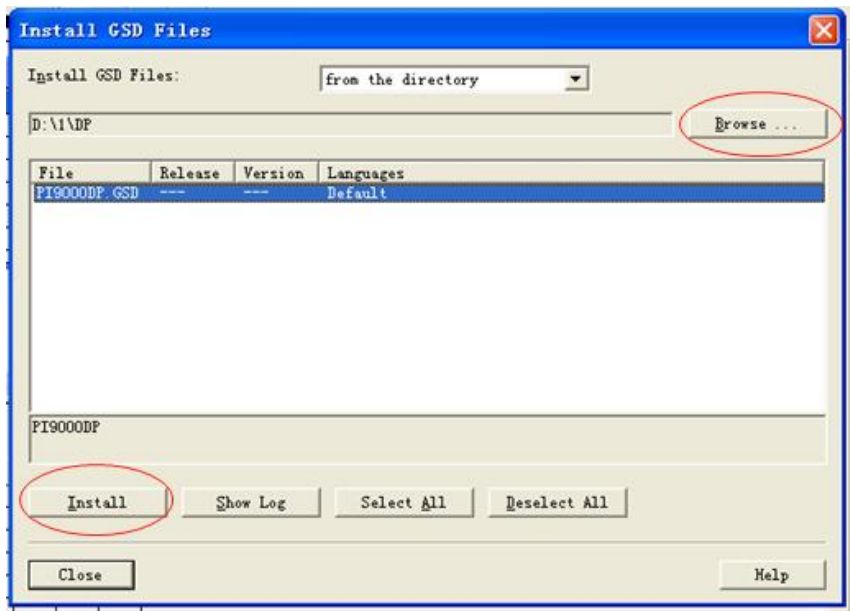
Tap out of the configuration screen.



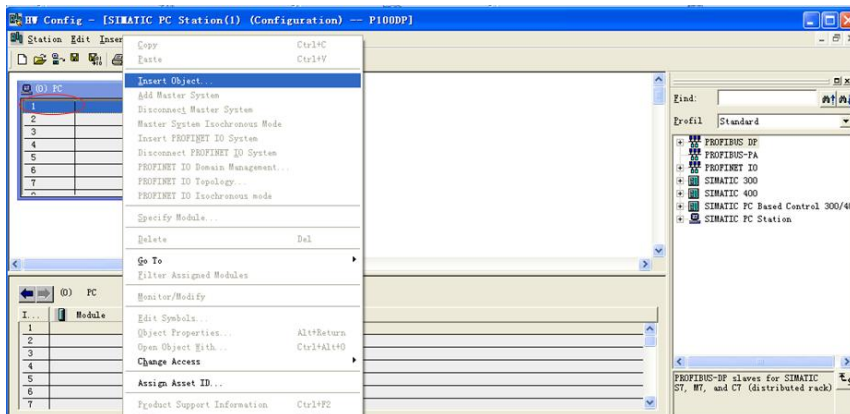
### 3.4 GSD file loading

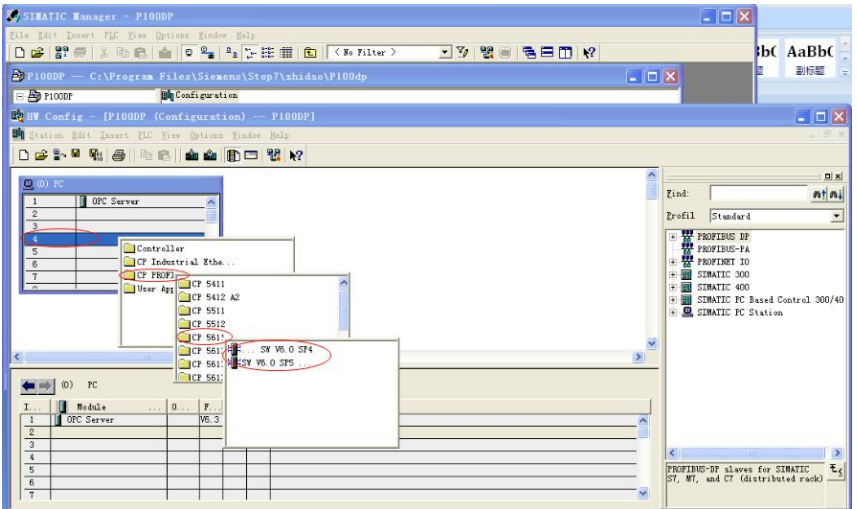
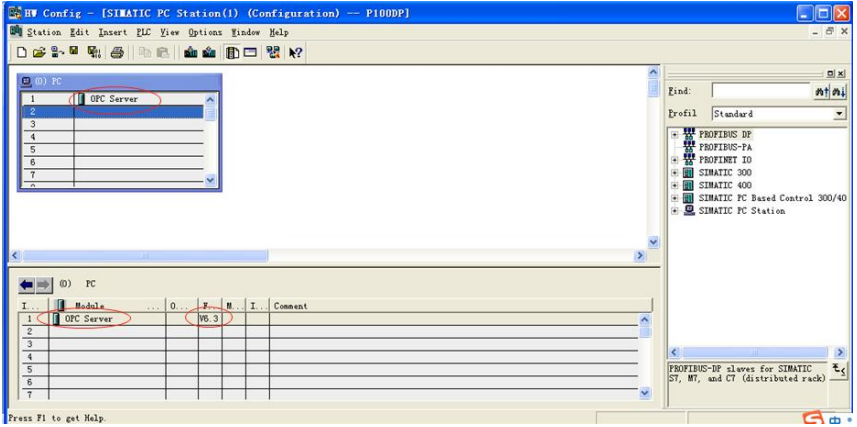


Install the GSD file, select the GSD path in the browser, and then click Install.

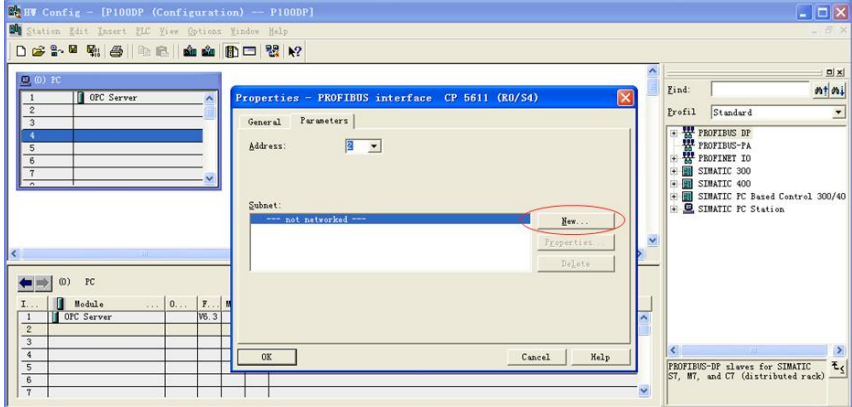


Configure the OPC server, select the insertion object, and select the OPC server according to the red circle.

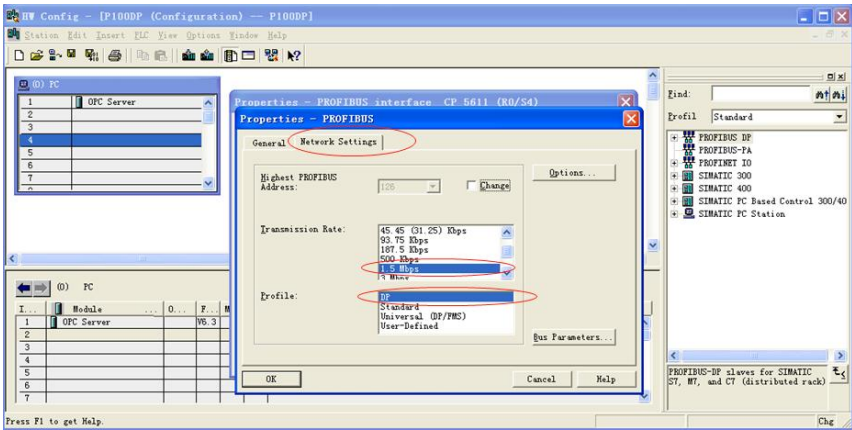




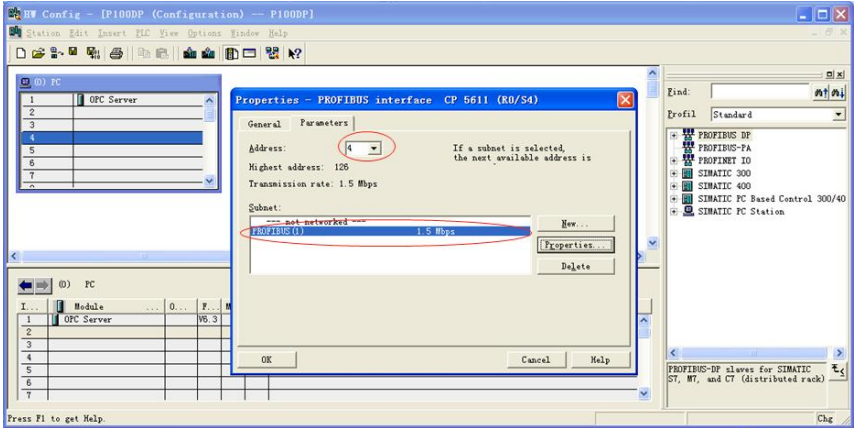
Click New to create a PROFIBUS network.



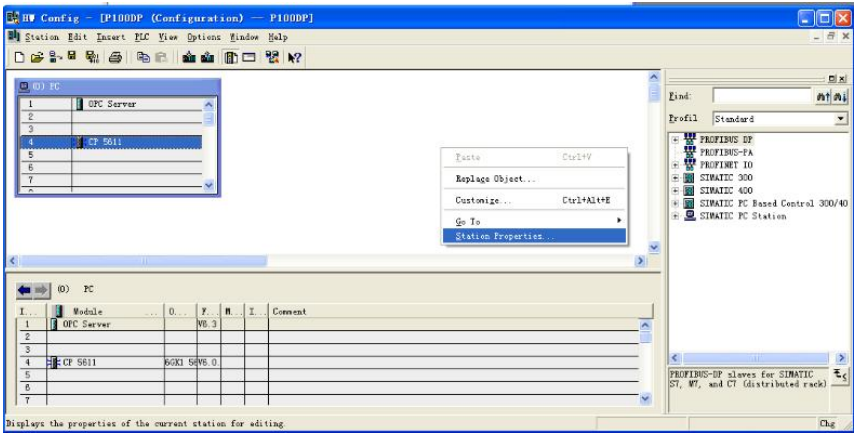
Set PROFIBUS parameters, select network settings, transmission rate and configuration file according to the red circle, and then click OK.



Select the board address according to the red circle.

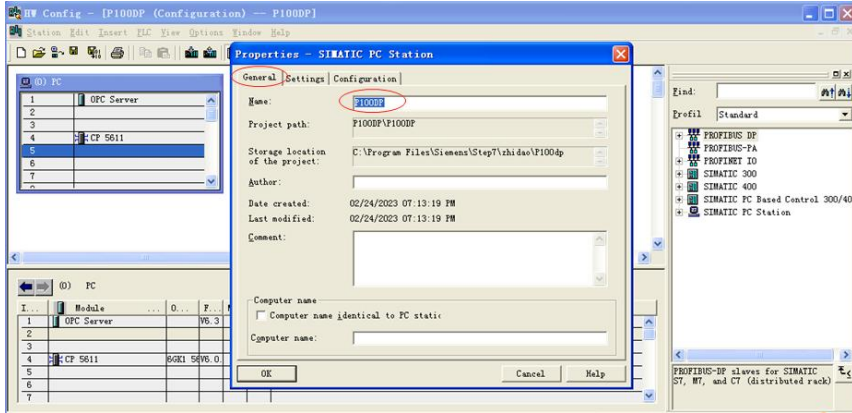


Set site properties.

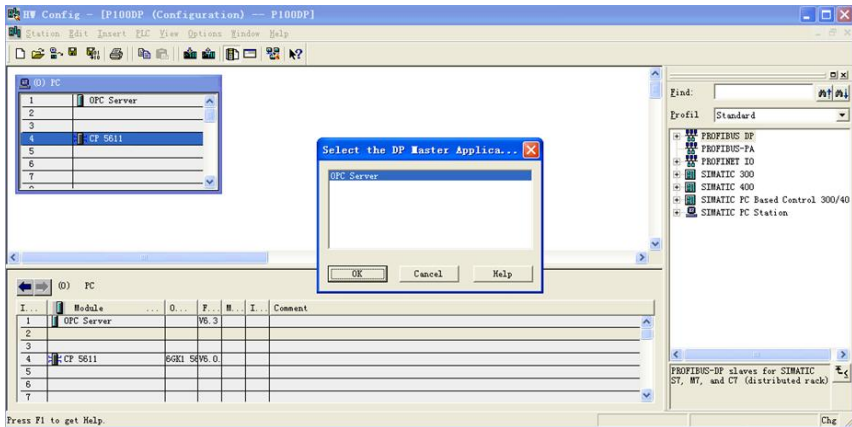
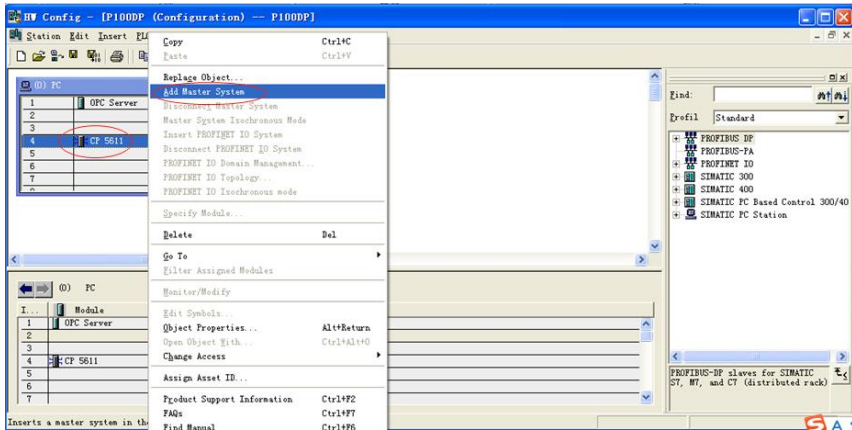


Modify the site name in the red circle

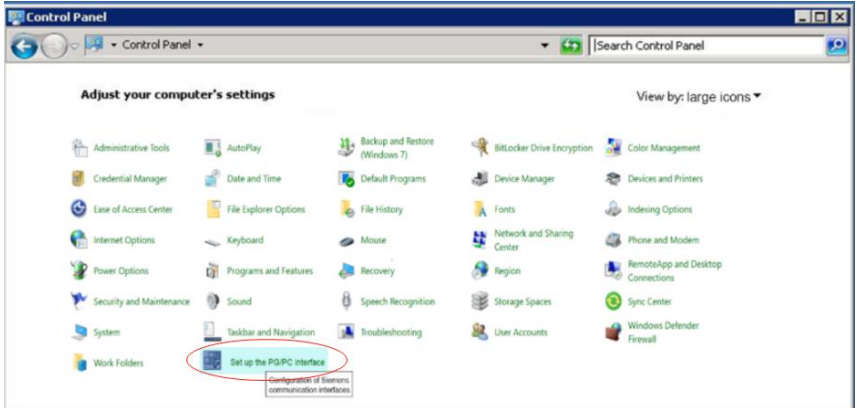
### Chapter III. Profibus-DP card test and engineering process set up



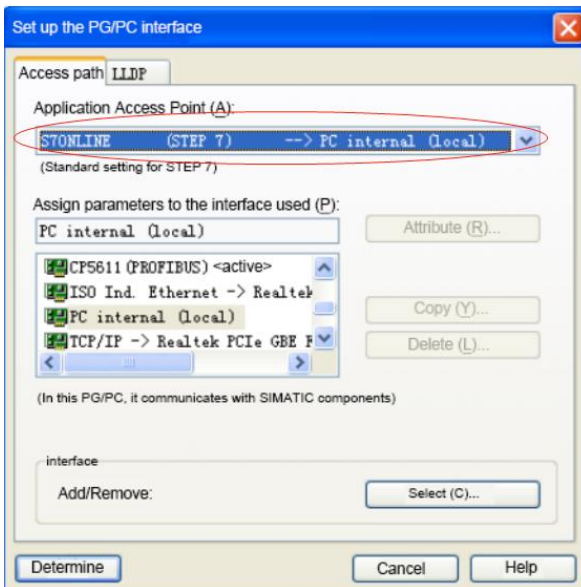
Right-click in the red circle and select Add Master System.



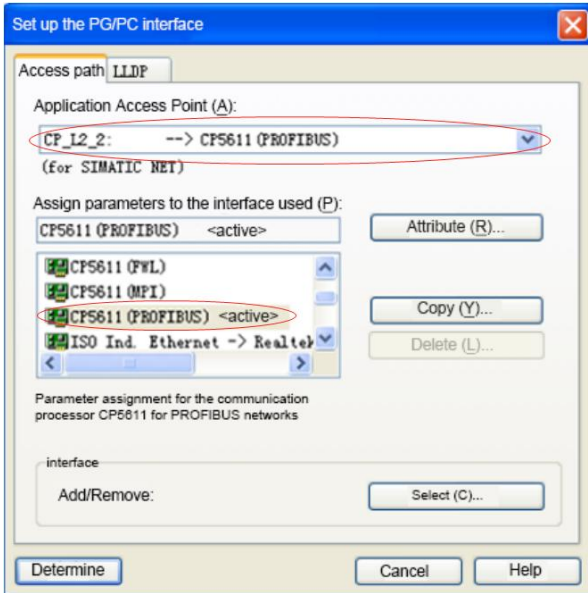
Select the PG/PC option in the control panel.



Add PG/PC interface according to the red circle.



Set the PG/PC interface to the option in the red circle.

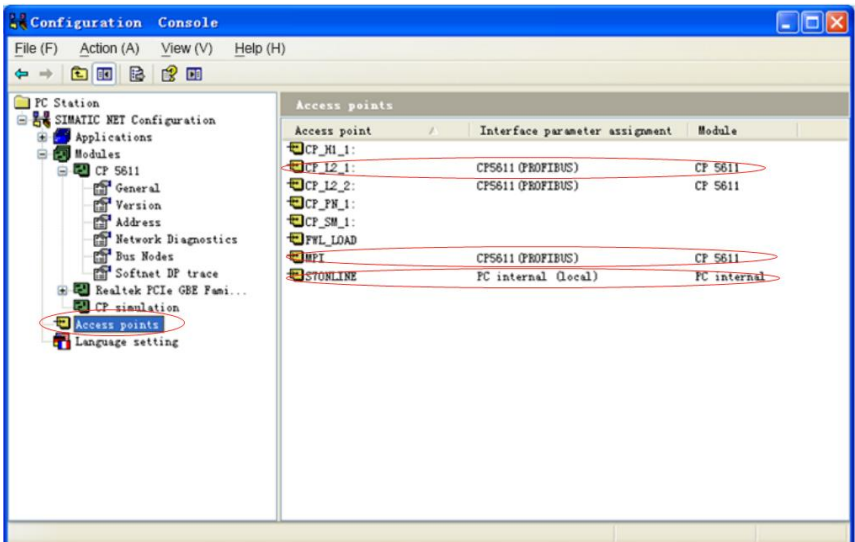
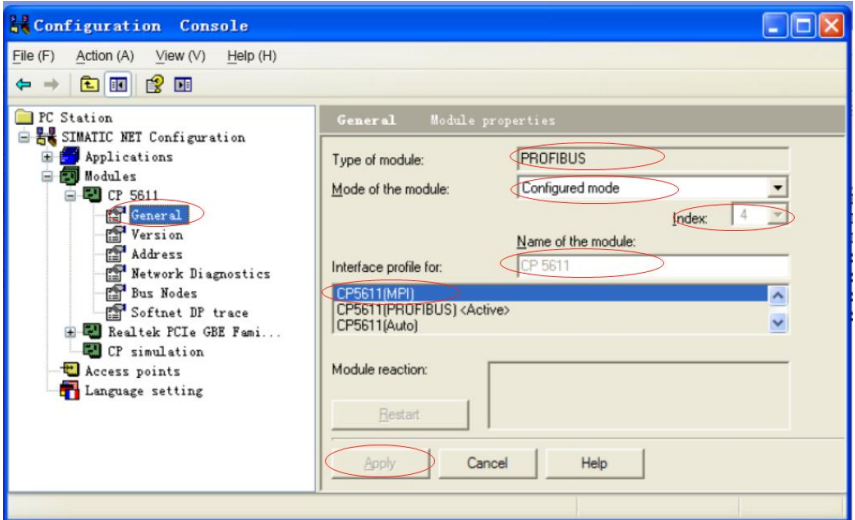


Double-click to open the Configuration Console in SIMATIC. NET



Set the corresponding parameters according to the red circle.



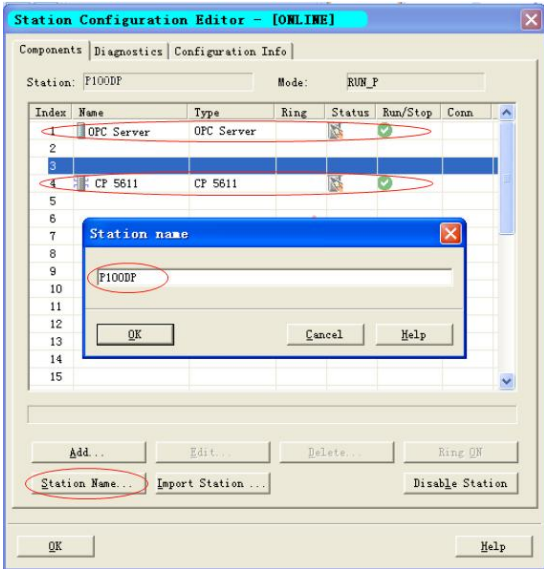


Open the Station Configurator software





Modify the site name in the red circle, which needs to be the same as the site name set in step

7. Add servers and boards in the red circle and observe whether they are connected.



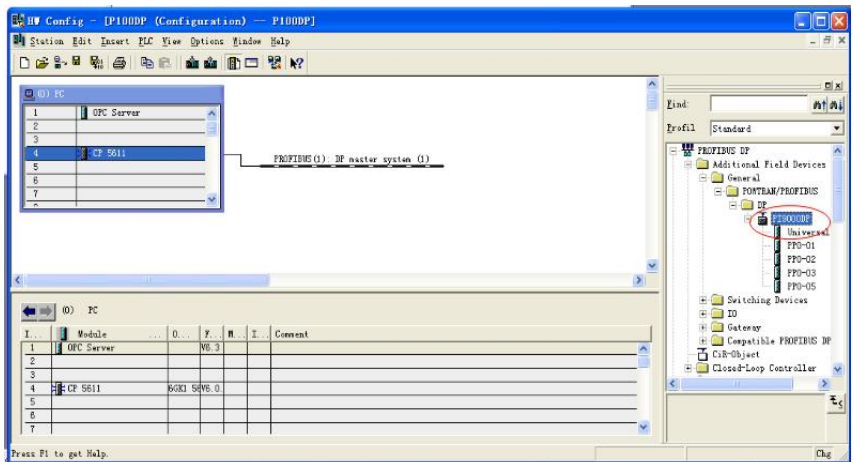
Normally, the OPC server does not appear. At this time, we need to move the mouse to index 1 and right click ADD to add the OPC server. At this time, the OPC server appears as shown in the figure:

Index	Name	Type	Ring	Status	Run/Stop	Conn
1	OPC Server	OPC Server				

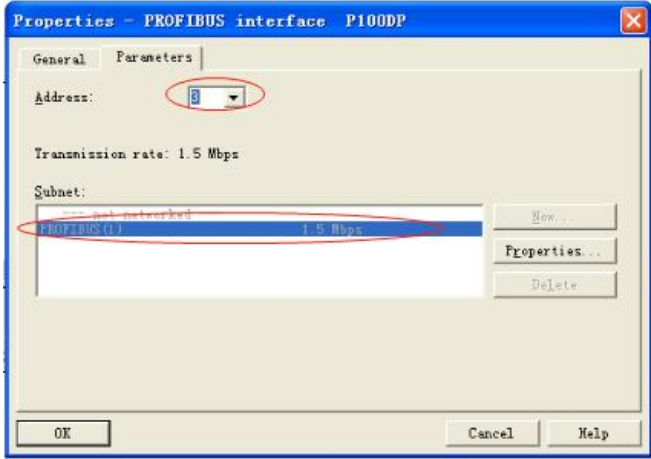
Status is a red cross.

### 3.5 System configuration block diagram

Hang the corresponding communication DP block on PROFIBUS according to the red circle

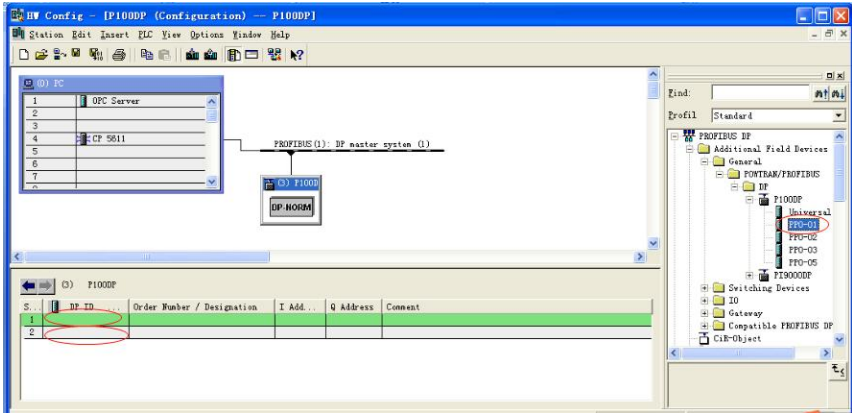


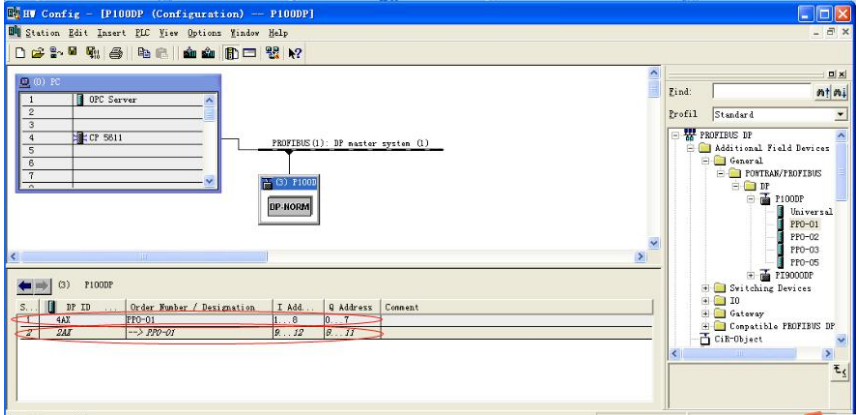
Set the slave address according to the red circle, which is the same as the dial switch address of the DP card.



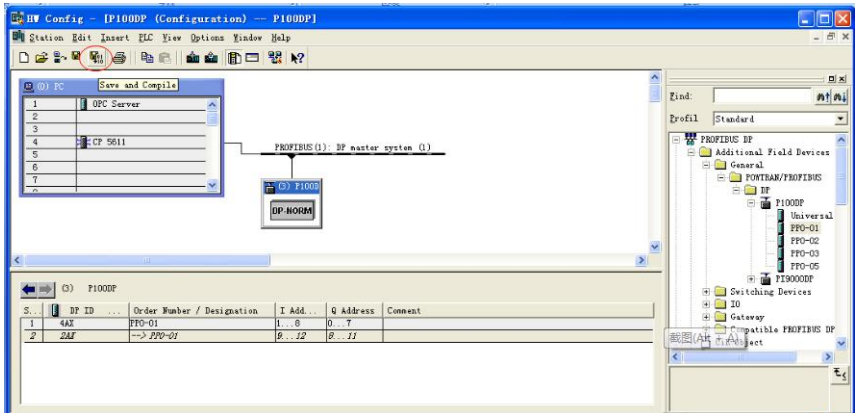
### 3.6 Communication data format configuration of slave station

Configure the communication format, and drag the communication format in the right red circle to the left red circle.

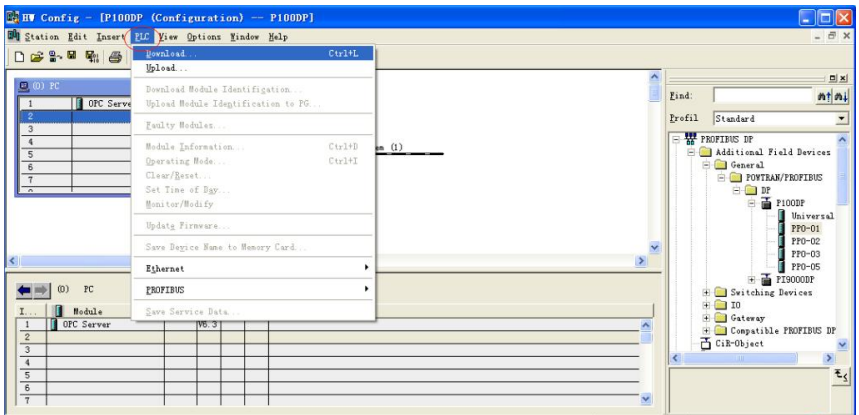




Power up the control board of the frequency inverter, click the red circle to save and compile.



Then select PLC as shown below.

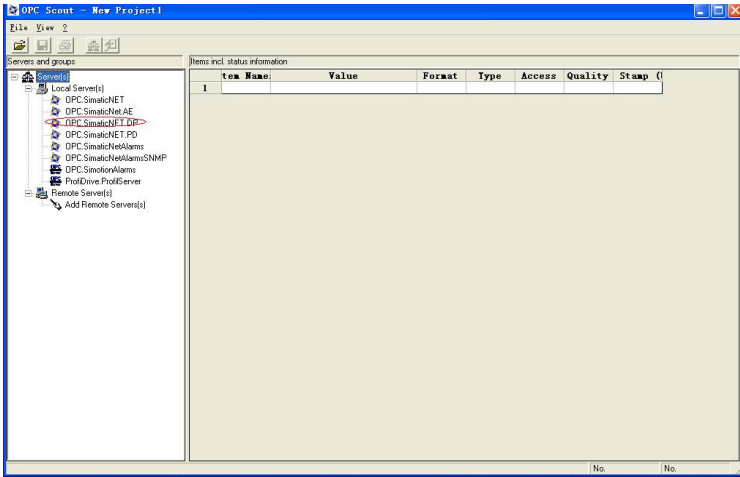


Select and complete the download.

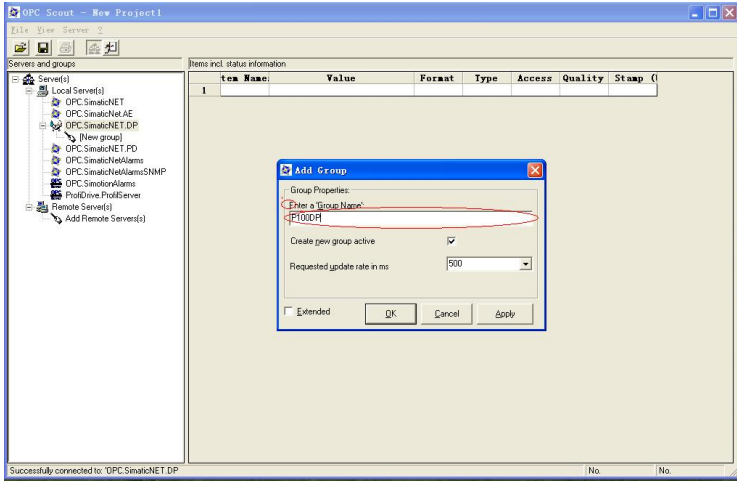
Click and open OPC Scout software



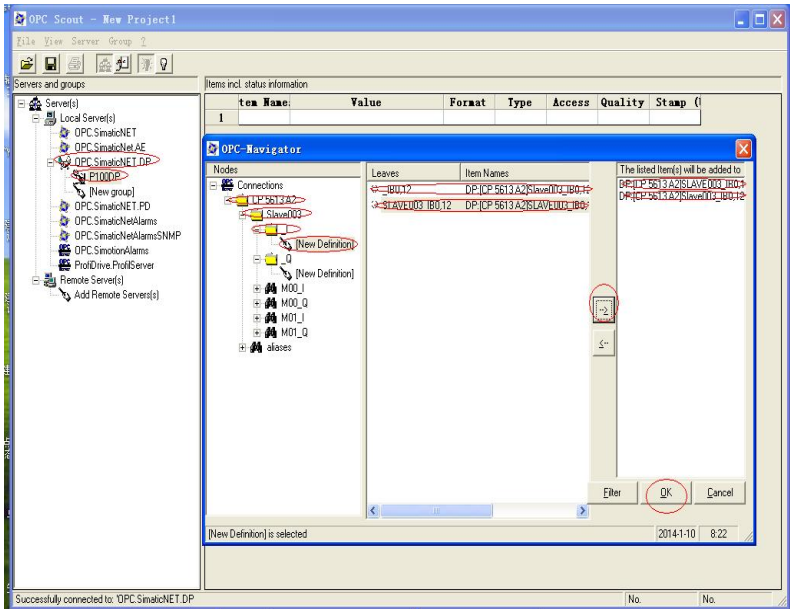
Configure the upper computer file according to the red circle below.

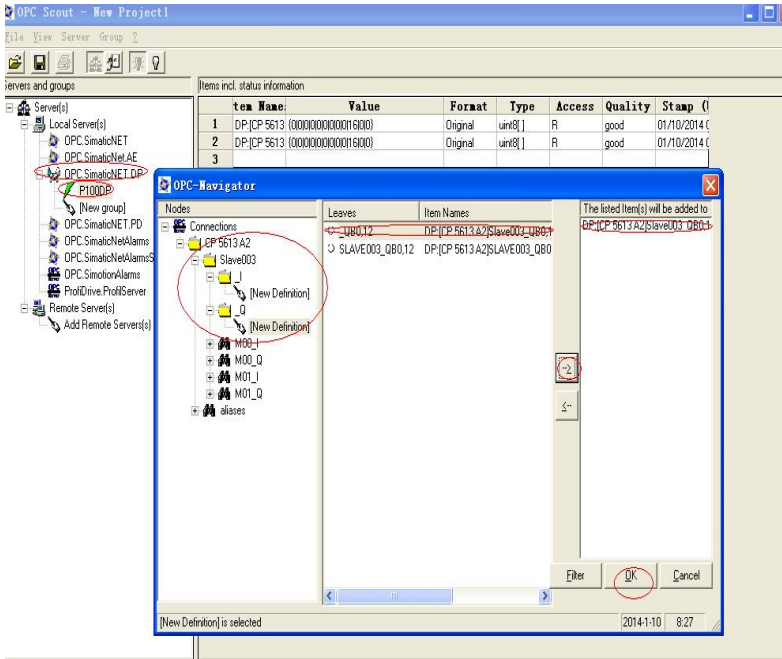


Enter the name of the upper computer file in the red circle.



Set up the read-write format of the upper computer file according to the red circle





- {16|240|8|0|0|0|19|136|20|64|0|0} Return F0.08
- {32|240|8|0|0|0|1|144|0|0|0|0} Write F0.08=4.00
- {16|240|8|0|0|0|1|144|20|64|0|0} Return F0.08
- {32|240|8|0|0|0|0|255|0|0|0|0} Write F0.08=2.55
- {16|240|8|0|0|0|0|255|20|64|0|0} Return F0.08
- {32|240|8|0|0|0|1|0|0|0|0|0} Write F0.08=2.56
- {16|240|8|0|0|0|1|0|20|64|0|0} Return F0.08
- {32|240|8|0|0|0|1|255|0|0|0|0} Write F0.08=5.11
- {16|240|8|0|0|0|1|255|20|64|0|0} Return F0.08
- {32|240|8|0|0|0|2|255|0|0|0|0} Write F0.08=7.67
- {16|240|8|0|0|0|2|255|20|64|0|0} Return F0.08
- {32|240|8|0|0|0|3|255|0|0|0|0} Write F0.08=10.23
- {16|240|8|0|0|0|3|255|20|64|0|0} Return F0.08



## Chapter IV. Fault Description and Treatment

LED Indicator	Definition	Description
Green	Power indicator	If the DP card is connected well with the inverter interface, the LED indicator should be always on after the inverter is powered on.
Red	DP card and inverter serialport connection indicator	If the connection between the DP card and inverter is normal, the indicator is always on. Flashing indicatethe connection is intermittent (interference exists). If the light is off, it means the connection between DP card and inverter serial port is not successful (check the baud rate setting).
Yellow	DP card and Profibus master station connection indicator	If the connection between the DP card and the Profibus master station is normal, the indicator is always on. Flashing indicatethe connection is intermittent (interference exists). If the light is off, it means the connection between DP card and Profibus master station is not successful (check slave address, data format and Profibus cable connection).

# Appendix Parameter Address Function code parameter :

Code		Parameter code (decimal)	Register address (hexadecimal)
d0	Monitoring function group (Read-Only)	D0.00~D0.41	0x7000~0x7029
F0	Basic function group	F0.00~F0.27	0xF000~0xF01B
F1	Input terminal group	F1.00~F1.39	0xF100~0xF127
F2	Output terminal group	F2.00~F2.19	0xF200~0xF211
F3	Start and stop control group	F3.00~F3.15	0xF300~0xF30F
F4	V/F control parameters	F4.00~F4.14	0xF400~0xF40E
F5	Vector control parameters	F5.00~F5.22	0xF500~0xF516
F6	Keyboard and display	F6.00~F6.15	0xF600~0xF60F
F7	Accessibility group	F7.00~F7.54	0xF700~0xF736
F8	Fault and protection	F8.00~F8.35	0xF800~0xF823
F9	Communication parameter	F9.00~F9.07	0xF900~0xF907
FA	Torque control parameters	FA.00~FA.07	0xFA00~0xFA07
FB	Control optimization parameters	FB.00~FB.09	0xFB00~0xFB09
FC	Extended parameter group	FC.00~FC.02	0xFC00~0xFC02
E0	Pendulum frequency, fixed-length and counting	E0.00~E0.11	0xA000~0xA00B
E1	Multi-stage command ,simple PLC	E1.00~E1.51	0xA100~0xA133
E2	PID function	E2.00~E2.27	0xA200~0xA21B
E3	Virtual DI、Virtual DO	E3.00~E3.21	0xA300~0xA315
b0	Motor parameters	b0.00~b0.35	0xB000~0xB023
y0	Function code management	y0.00~y0.04	0xC000~0xC004
y1	Fault query	y1.00~y1.30	0xC100~0xC11e

**Stop/Run parameters section:**

Inverter Parameter	Parameter description	Inverter Parameter	Parameter description
1000	*Communication set value (-10000~10000)( decimal)	1011	PID feedback
1001	Running frequency	1012	PLC step
1002	Bus voltage	1013	High-speed pulse input frequency , unit0.01kHz
1003	Output voltage	1014	Feedback speed, unit 0.1Hz
1004	Output current	1015	Remaining run time
1005	Output power	1016	A11 voltage before correction
1006	Output torque	1017	A12 voltage before correction
1007	Operating speed	1018	Reserve
1008	DI input mark	1019	Linear speed
1009	DO output mark	101A	Current power-on time
100A	A11 voltage	101B	Current run time
100B	A12 voltage	101C	High-speed pulse input frequency, unit 1Hz
100C	Reserve	101D	Communication set value
100D	Count value input	101E	Actual feedback speed
100E	Length value input	101F	Master frequency display
100F	Load speed	1020	Auxiliary frequency display
1010	PID setting		

**Note:**

There are two ways to modify the settings frequencies through communication mode:

The first: Set F0.03 (main frequency source setting) as 0/1 (keyboard set frequency), and then modify the settings frequency by modifying F0.01 (keyboard set frequency). Communication mapping address of F0.01 is 0xF001 (Only need to change the RAM communication mapping address to 0x0001).

The second: When F0.03 (frequency source master) is set to 9 (remote communication setting), the setting frequency can be modified by modifying (communication setting), and the communication address of this parameter is 0x1000. the communication set value is the percentage of the relative value,10000 correspond to 100.00%, -10000 correspond to -100.00%. For frequency

dimension data, it is the percentage of the maximum frequency (F0.19); for torque dimension data, the percentage is F5.08 (torque upper limit digital setting).

**Inverter read status: (read-only)**

Inverter Parameter	Status word function
3000	0001: Forward run
	0002: Reverse run
	0003: Stop

**Digital output terminal control: (write only)**

Inverter Parameter	Command content
2001	BIT0: SPA output control BIT1: RELAY2 output control BIT2 RELAY1 output control BIT3: Manufacturer reserves the undefined BIT4: SPB switching quantity output control

**Analog output DA1 control: (write only)**

Inverter Parameter	Command content
2002	0~7FFF indicates 0%~100%

**Analog output DA2 control: (write only)**

Inverter Parameter	Command content
2003	0~7FFF indicates 0%~100%

**SPB high-speed pulse output control: (write only)**

Inverter Parameter	Command content
2004	0~7FFF indicates 0%~100%

**Inverter fault description:**

Inverter Parameter	Inverter fault information	
8000	0000: No fault	0015: Parameter read and write abnormal
	0001: Inverter unit protection	0016: Inverter hardware fault
	0002: Acceleration overcurrent	0017: Motor short to ground fault
	0003: Deceleration overcurrent	0018: Reserved
	0004: Constant speed overcurrent	0019: Reserved
	0005: Acceleration overvoltage	001A: Running time arrival
	0006: Deceleration overvoltage	001B: Customized definition 1
	0007: Constant speed overvoltage	001C: Customized definition 2
	0008: Control power failure	001D: Power-on time arrival
	0009: Under-voltage fault	001E: Load drop
	000A: Inverter overload	001F: PID feedback loss when running
	000B: Motor overload	0028: Fast current limiting timeout
	000C: Input phase loss	0029: Switch motor when running fault
	000D: Output phase loss	002A: Too large speed deviation
	000E: Module overheating	002B: Motor over speed
	000F: External fault	002D: Motor over temperature
	0010: Communication abnormal	005A: Encoder lines setting Error
	0011: Contactor abnormal	005B: Missing encoder
	0012: Current detection fault	005C: Initial position error
	0013: Motor parameter auto tuning fault	005E: Speed feedback error
	0014: Encoder/PG card abnormal	