RD11 option Profibus
Manual

Directory

Preface

Thank you for purchasing RD11 option Profibus_DP card. This manual describes how to use this product correctly to get a good profit. Please read this manual carefully before using the products (installation, wiring, operation, maintenance, inspection, etc.).

Our company is always committed to continuous product improvement, therefore, the relevant information of this series is subject to change without prior notice. Sorry for any inconvenience this may cause.

Chapter 1 Installation and wiring

1.1 Extension card hardware layout and interface description

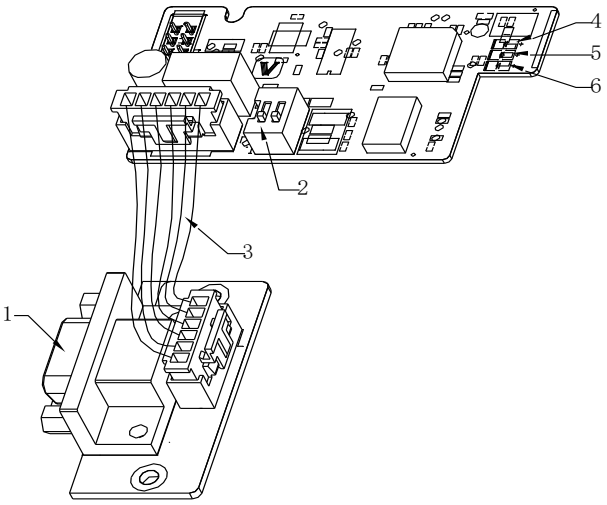


Figure 1-1 Interface diagram of Profibus card

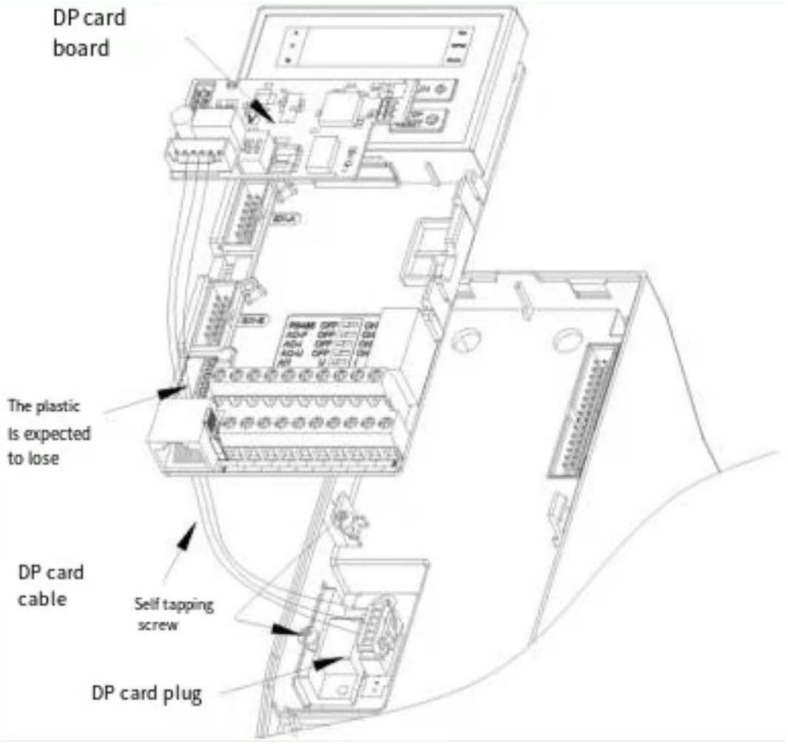
Table 1-1 Interface label description of Profibus card

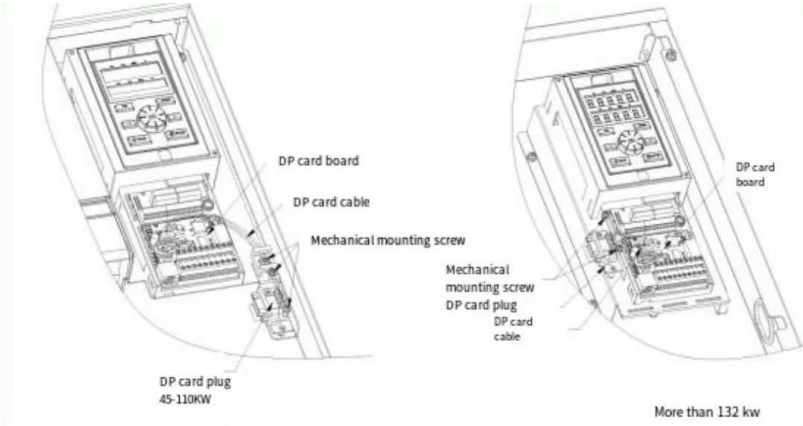
Grade	Function	Description
1	Profibus-DP Transfer board interface	Obey SIEMENS's DB9 socket
2	Internal terminal resistance select code - out switch	ON: Turn ON the internal terminal resistance OFF: Turn OFF the internal terminal resistance
3	Connecting wire (6P)	Used to connect the adapter plate to the DP card
4	DP master connection indicator light (green)	Indicates whether the DP card communicated successfully with the master station
5	COM connection indicator light with inverter (green)	Indicates whether the DP card and inverter have been successfully

		connected
6	POW power indicator light (red)	Indicates whether the DP card is powered on

1.2 Assembly instructions

The installation method of DP card is shown in the figure below (taking plastic shell machine as an example). First, DP9 socket should be fixed on the plastic shell of the main engine with self-tapping screw. Subtract the plastic shell on the control board, let the DP connection line pass through, and then place the DP card motherboard on the control board. Note: Please make sure the power off operation，Please install the DP card in EX-A





1.3 Profibus DB9 standard interface description

RD11 option Profibus card adopts standard DB9 socket to connect with Profibus master station, and its pin signal definition is distributed according to DB9 socket standard of SIEMENS. As shown in the figure below:

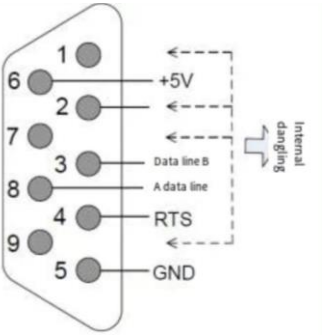


Figure 1-3 ProFIBUS-DP interface

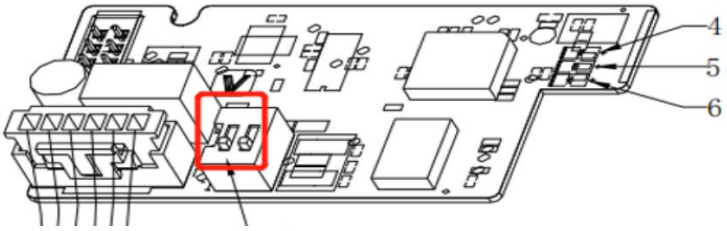
Terminal symbols	The name of the terminal	Function description
1,2,7,9	NC	Internal dangling
3	data cable B	Positive terminal of data line
4	RTS	Request sending signal

5	GND	Isolate the 5V power source
6	+5V	Isolate 5V power
8	data cable A	Negative terminal of data line

Table 1-2 Profibus DB9 description

1.4 Dial code switch description

When the dial - code switches are ON, the internal terminal resistance is effective. Otherwise the internal terminal resistance is invalid.



The terminating resistor is designed to eliminate signal reflection in the communication cable, and simply when the communication When the communication is unstable, you can turn the dial code to ON to enhance the communication ability.

1.5 Indicator light description

Table 1-3 DP card indicator light description

Type	Name	Function description
POW (red)	power light	Constant light: means the converter is switched on; Out: the inverter is not connected to the power supply or the DP card is not installed correctly
DP （green）	DP card communicates with master station indicator light	Constant light: indicates that DP card and Profibus master station communicate normally; Out: no communication between DP card and Profibus master station (Check Profibus cable connection and station number); Flicker: indicates that the master station is not running or there is an error in DP card communication with Profibus master station

COM **（green）**	DP card communicates with inverter indicator light	Steady on: indicates that the communication between the DP card and the inverter is normal; Off: indicates that the communication between the DP card and the inverter is unsuccessful; Flashing: It means there is interference in the communication between the DP card and the inverter or the address of the expansion card is not within the range of 1~125

Chapter 2 Communication Parameters

After the RD11 option Profibus card is correctly installed on the inverter, the relevant communication configuration needs to be completed before the DP card can establish communication with the inverter

2.1 Communication card command source and given frequency setting

RD11 needs to set the parameter F0.02 (running command channel) to 2 (RS485 communication control), and F0.03 (frequency reference source channel A) to 6 (frequency reference source selection RS485 reference). F1.02 to 10, choose optional card as command channel and frequency setting)

2.2 Profibus-DP Communication slave address setting

The user can set the profibus slave address through F13.27 (RD11) of the inverter. The specific meaning is shown in Table 2-1.

Table 2-1 Profibus communication slave station setting parameter code description

Parameter code	Name	Content	Factory default	Adjustable attributes
F13.27(RD11)	DPcard address	1~127	1	RUN

Chapter 3 communication examples

3.1 DP card and Profibus connection

The wiring diagram of DP card and Profibus main station is shown in Figure 4-1 below:

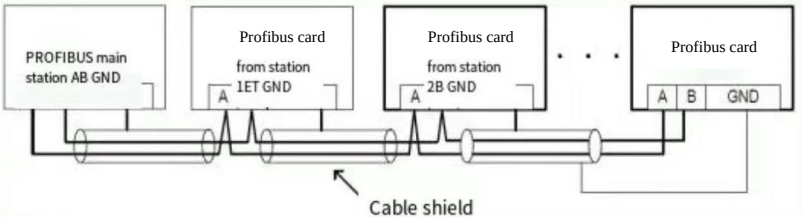


Figure 3-1 schematic diagram of DP card connection with Profibus master station

1. Access terminal matching resistance is required at both end and end of Profibus bus, and the dialing code should be dialed according to the schematic on the terminal.

2. 2. Right after the access terminal resistance, power case test A1 / resistance should be for approximately 110 Ω between B1.Not connected or less connected terminal resistance, will affect the quality of communication, resulting in communication instability.

3. For devices at both ends of the Profibus network, the communication cable on the DP connector should be connected to the channel shown IN "IN" (that is, the channel corresponding to A1/B1), otherwise the terminal resistor will not be connected.

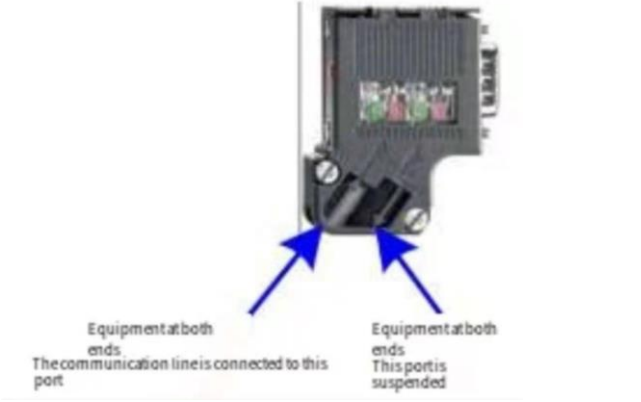


Figure 3-2 SCHEMATIC diagram of DP communication line connection

3.2 DP card and Profibus master station communication configuration description

3.2.1 Data transfer format

In ProfiDrive (variable speed drive) protocol, PPO type is used as data transfer format. PPO types are divided into PPO1, PPO2, PPO3, PPO4 and PPO5.

Each data format can accomplish the following functions:

Table 3-1 ProfiDrive data structure description

Data type	Support functions
PPO1	◆Single function parameter operation ◆Frequency converter command, frequency setting ◆Inverter status, running frequency read
PPO2	◆Single function parameter operation ◆Frequency converter command, frequency setting ◆Inverter status, running frequency read ◆Four functional parameters are written periodically ◆Four functional parameters are read periodically
PPO3	◆Frequency converter command, frequency setting ◆Inverter status, running frequency read
PPO4	◆Frequency converter command, frequency setting ◆Inverter status, running frequency read ◆Four functional parameters are written periodically ◆Four functional parameters are read periodically
PPO5	◆Single-function parameter operation ◆Frequency converter command, frequency setting ◆Inverter status, operation frequency read ◆8 functional parameters are written periodically ◆8 functional parameters are read periodically

The data block contained in PP0 type data format is divided into two areas, namely PKW area (parameter area) and PZD area (process data area). The data format is shown in Figure 3-3.

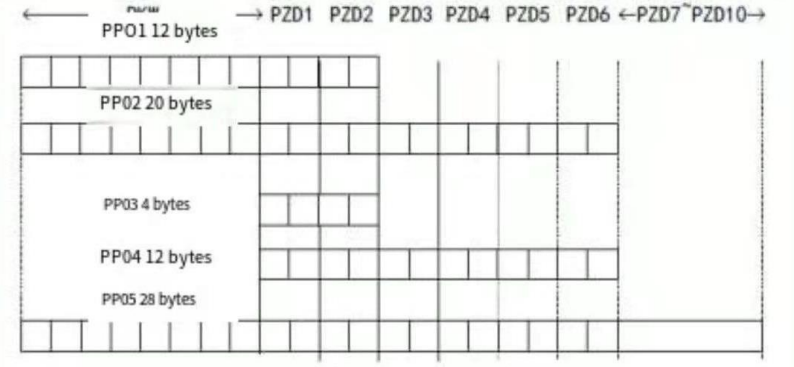


Figure 3-3 Description of PP0 data format

3.2.2 PKW data description

PKW data mainly realizes the reading and writing operation of a single parameter of the converter by the master station, and the communication address of the converter parameters is directly given by the communication data.The function is to read the function parameters of the converter and change the function parameters of the converter.

PKW data contains three sets of array areas, namely PKE, IND and PWE. The length of PKE data byte is 2 bytes, IND is 2 bytes, and PWE is 4 bytes. The data format is shown in Table 4-2 below:

Table 3-2 PKW data description

Description PKW data sent by master station		Frequency converter response data PKW description	
PKE	High 4 bits: Command code 0：No requests 1：read parameter data 2：change parameter data (The above command code is decimal data) Lower 4: reserved Low 8 bits: parameter address high	**PKE**	High 4 bits: Response code 0：No requests 1：parameter operation is correct 8：can not be implemented Low 8 bits: parameter address high
IND	High 8 bits: parameter address low	**IND**	High 8 bits: parameter address low
PWE	Lower 8: reserved	**PWE**	Lower 8: reserved

Examples:

The transmission data PKW area of the main station reading the frequency converter function parameter C0.01(address 0 x2101) and the frequency converter response data PKW area are shown in figure 4-4 below:

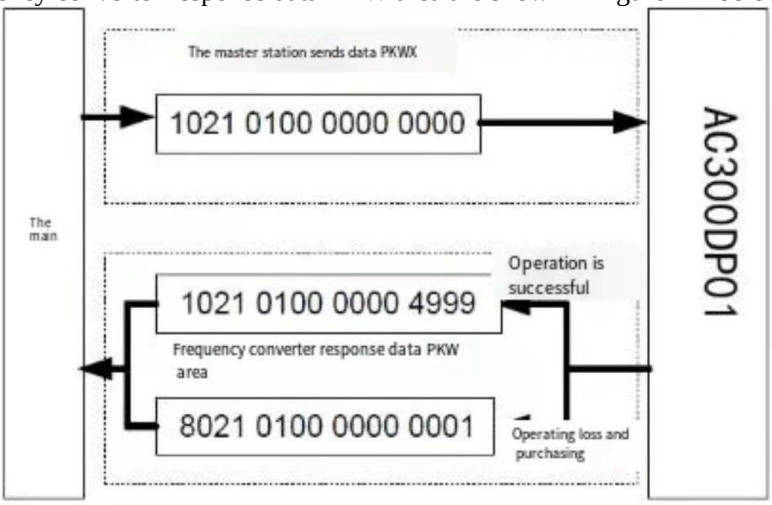


Figure 3-4 Main Station reads the function parameters of frequency converter through PKW

3.2.3 PZD Area Data Description

PZD area data realizes real-time data change and read of frequency converter and periodic data interaction. The communication address of the data is directly configured by the frequency converter (PZD1-PZD2[cured address]) and the PLC configuration (PZD3-PZD10). It mainly includes the following:

a) frequency converter control command, target frequency real-time given

b) the current state of the frequency converter real-time reading

c) the real-time interaction between the function parameters and the monitoring parameters data between the inverter and the Profibus master station PZD the process data mainly completes the periodic data interaction between the main station and the frequency converter, as shown in Table 4-3 below:

Table 3-3 PZD Area Interaction Data

Data PZD Area		
converter command	converter target frequency	Real-time Change of Converter Function Parameters
PZD1	**PZD2**	**PZD3~PZD10**
Frequency converter response data PZD area		
converter status	converter operating frequency	Real-time reading of converter function parameter value
PZD1	**PZD2**	**PZD3~PZD10**

3.3 Use S7-300 master station in STEP7V5.4 to configure the slave station

When the GSD file is not installed for the first time, after selecting the options menu item in the HW Config configuration interface, click install GSD File (the GSD file must be installed in the new project and it is not recommended to change the name of the GSD file). After installation, close the installation GSD file dialog box. You can view the installation results in the configuration file directory in the right-hand column.

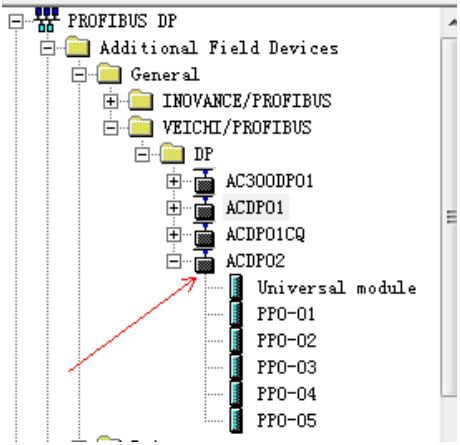


Figure 3-5 Installation Results Right sidebar display

Drag the ACDP02 to the bus with the mouse, configure the actual hardware system, or drag to multiple ACDP02 as slave stations. Double-click the slave icon ACDP02, view the parameter settings to change the address in the Profibus-Dp slave station, select the PROFIBUS button in the node / main station system bar.

Configure the data characteristics of the slave station.

After adding PPO type, Can see the address PLC assigned to the station, As shown below, A slot 1 marked in the diagram corresponds to a PKW address, Eight bytes, Address of slot 2 corresponding PZD, A total of 12 bytes. Where the selected PPO type has no PKW area, Then the I address and Q address of slot 1 correspond to empty (where the I address and Q address of slot 1 correspond to the area)

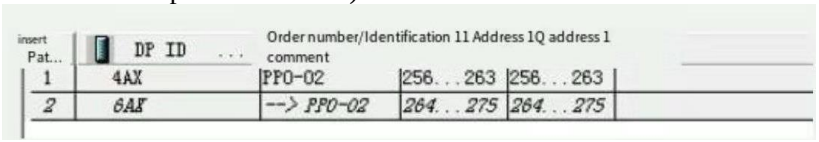


Figure 3-6 Double-click icon to configure slots

Configuration PZD： PZD1、PZD2 for solidified configuration, corresponding to PIW/PQW264~266, users do not need to modify. PZD3~PZD10 user-defined periodic data interaction, corresponding to PIW/PQW268PZD3~PZD10 275, this parameter is set in the hardware configuration. Double-click the ACDP02 icon in the hardware system (HW Config) and click on "device specific parameters"

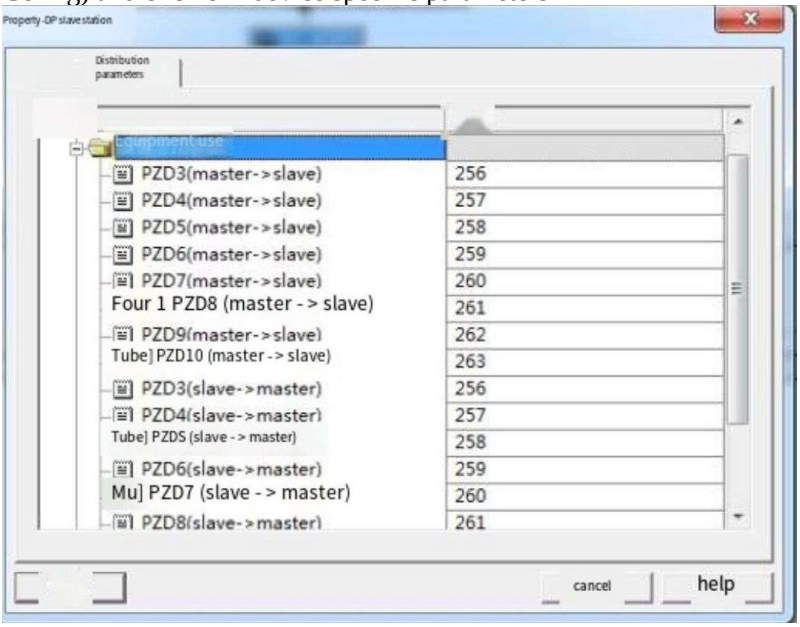


Figure 3-7 Number of slots configured

where PZDx (master ->slaver) representation is the corresponding address of the master station write slave; PZDx (slaver -) representation is the corresponding address of the master station read slave.

The range of PZD that can be set is PZD3~PZD10, display format is

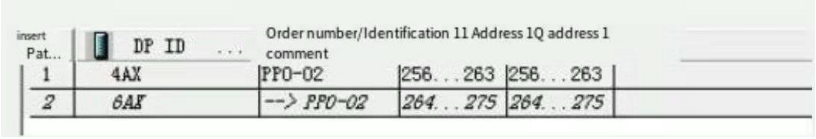
decimal, that is, if you want to set the PZD3(master- PZD3~PZD10,slaver) address to 0 hexadecimal), you need to fill in 12288 values in that line.

ACDP02 the default value of all PZD is 0 x0000 address (corresponding to decimal 0), the PZD not used can be modified without modifying the default value.

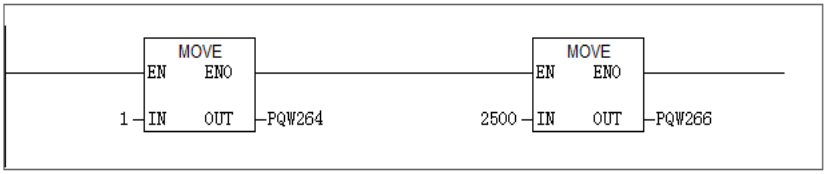
The PZD mapping relationship should be set separately according to the requirement (if the mapping relationship of each slave is the same, this can select a set slave, press the CTRL C, and then select the Profibus-DP bus in the configuration to modify the station number directly by CTRL V).

3.4 Operate periodic reading and writing of frequency converter slave station

The address assignment shown in the following figure is PLC as S7 PN/DP 315-2

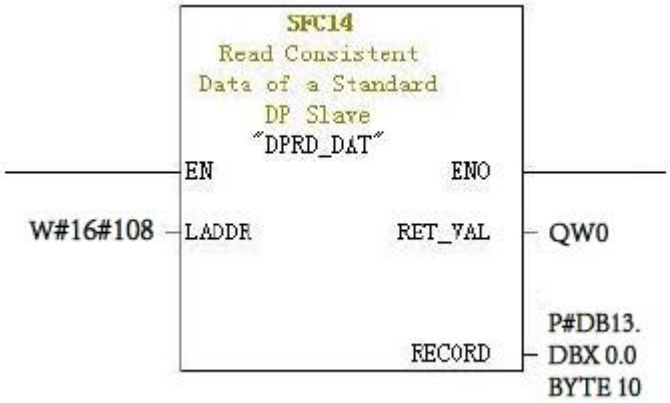


Example 1: direct use of MOVE instructions, such as the following figure, start the inverter positive turn, target 25.00 Hz



Similarly, other write data is the same, read data can also be passed from the PIW register to the ordinary Q、I、L、M、D register through MOVE instructions, and then resolved.

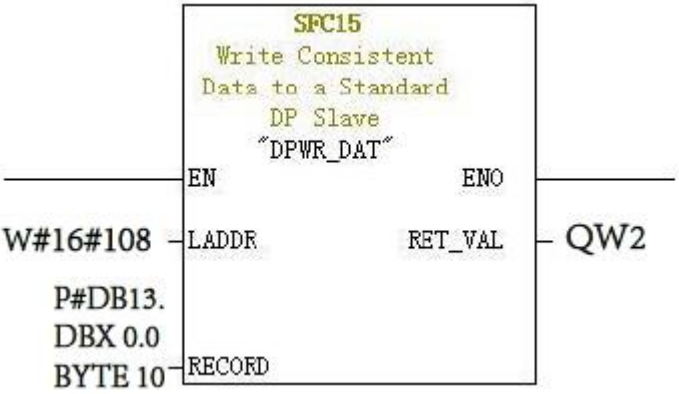
Example 2: Use SFC14、SFC15 to do this



LADDR： starting address configured in the I area of the module must be completed in hexadecimal format;

RET_VAL： if an error occurs when the function is activated, the return value will contain an error code. Returns 0 when there is no error;

RECORD： target area of user data to be read must be exactly the same length as STEP 7 configuration for the selected module, allowing only BYTE. data types



LADDR： starting address configured in the Q area of the module must be completed in hexadecimal format;

RET_VAL： if an error occurs when the function is activated, the return value will contain an error code. Returns 0 when there is no error;

RECORD： source area to write user data must be exactly the same length as STEP 7 configuration for the selected module, allowing only BYTE. data types

Whether SFC14 or SFC15, All addresses must be hexadecimal (in this

case 264) corresponding to the starting address of the I、Q address, Convert to hexadecimal H108), RECORD length must be BYTE with the PPO type used

The length is the same (in this case, the use PPO2, contains 6 PZD a total of 12 BYTE, one PZD consists of two BYTE).

Chapter 4 Fault Description and Handling

4.1 DP lamp status and handling

Table 4-1 Indicator Status and Handling

Indicator Light	Fault Condition	Fault Description	Solution
POW（ Red Lights）	Off	DP card not powered on	Check that the DP card and inverter interface are connected
DP（ green light ）	Off	DP card and Profibus master station connection failed	Check that the slave address is correct, Profibus the cable connection is normal, the master station is running, and the terminal resistance is set correctly
	vague	DP card and Profibus master connection disturbed	Check that the Profibus cable connection is normal and the master station tries to reduce the baud rate
COM（ green light ）	vague	Abnormal connection of DP card and frequency converter or incorrect communication address of main station	Please check that the DP card and the frequency converter are connected properly or that PLC address of the read-write frequency converter is valid
	Off	Abnormal connection of DP card and frequency converter	See if F0.02 and F0.03 are set to 2 and 6, respectively

4.2 Common Fault Handling Methods

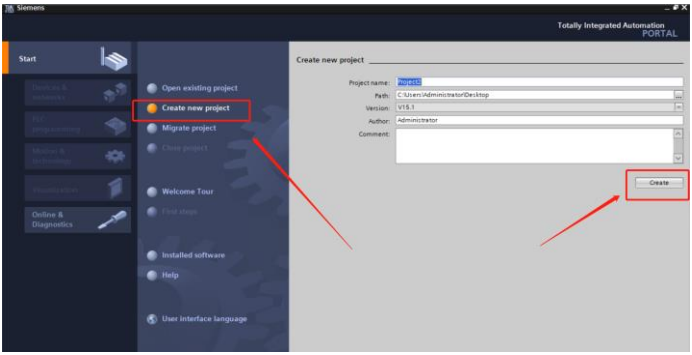
Table 4-2 Common Fault Treatment Methods

Fault Description		Solution
After the connection is successful, the lights on the PLC are all green, but the data can not be written / read to the frequency converter	No data can be written and read	Please check the address operation and whether the parameter F0.02/F1.01 is set to 2, the F0.03/F01.2 is set to 6, and the Profibus-DP is selected as the serial communication frequency of the converter
	No address to read and address to write	Check PLC hardware configuration to see if the configuration type is added, for example PPO1/PPO2/PPO3/PPO4/PPO5
	Address and data are written, but data shows exceptions	Refer to the Section on Communication Parameters in Chapter 3 to see if the correct address is written and whether the F0.02 and F0.03 parameters are configured correctly
When the frequency converter is not in operation, the communication is normal. When one or more units are in operation, the frequency converter drops off at random		1.When the power is cut off, the resistance between the A1/B1 on the terminal DP slave joint shall be measured by a multimeter, which shall be 110±10Ω
		2.To check that the cable shield layer is connected, the cable shield layer should be in good contact with the metal sheet in the DP joint and the shield layer does not need to be connected to other GND
When the inverter is powered on, only the power supply lamp (POW) and the communication indicator lamp (COM) are on		Check that the slave address is correct, Profibus the cable connection is normal, the master station is running, and the terminal resistance is set correctly

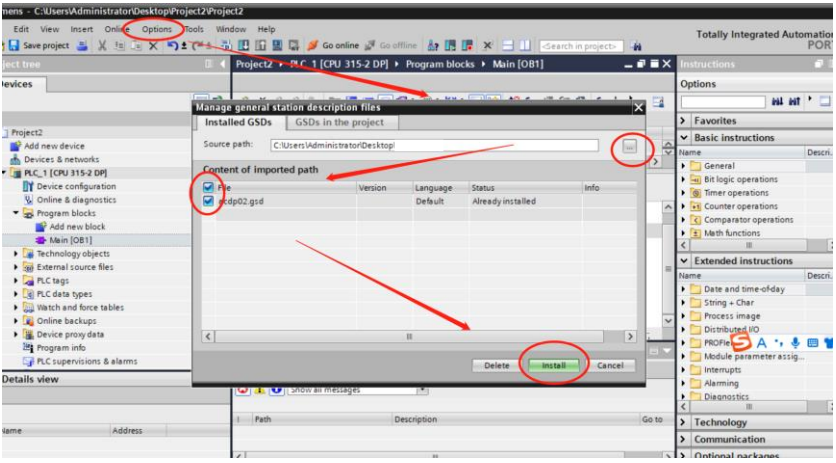
Chapter 5 Configuring DP Communications in TIA PORTAL V15.1

This side takes SIMATIC S7-300 CPU315-2 DP and RD11 communication as a case study. The GSD file must be ACDP02.GSD. If you don't have the GSD file, please download it from the official website vedaindrives.com，ACDP02 is for RD11 inverter DP communication.

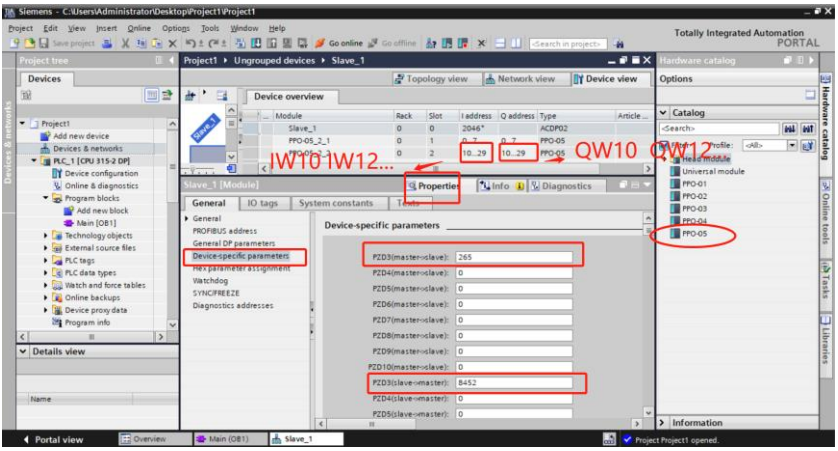
5.1 New construction projects



5.2 Installing GSD files



5.3 A set of PP0 values is selected



Here we have chosen the PPO5 type, which supports cyclic writing of 8 sets of functional parameters. The addresses we have assigned are PQW10~PQW29. The address assignment in the PPO-05 data is divided into two parts. The first part "PPO-05_2_1" corresponds to the PKW area in the PPO data， It is basically not used in DP communication.，The second part "PPO-05_2_2" is the PZD zone，It is this part of the data area that is generally used in actual communications， Chapter 3.2 has shown that either of the PPO data types solidifies the run command given and frequency given data sets，Other periodic function parameters can be freely configured, and the PZD data area of PP02 corresponds to the address in the following table:

PZD Data area	Address （QW）	Function Code Description	Address （IW）	Function Code Description
PZD1	10	Run command	10	Inverter status
PZD2	12	Frequency setting	12	Reading operating frequency
PZD3	14	Free distribution	14	Free distribution
PZD4	16	Free distribution	16	Free distribution
PZD5	18	Free Distribution	18	Free distribution
PZD6	20	Free Distribution	20	Free distribution
PZD7	22	Free Distribution	22	Free Distribution
PZD8	24	Free Distribution	24	Free Distribution
PZD9	26	Free Distribution	26	Free Distribution

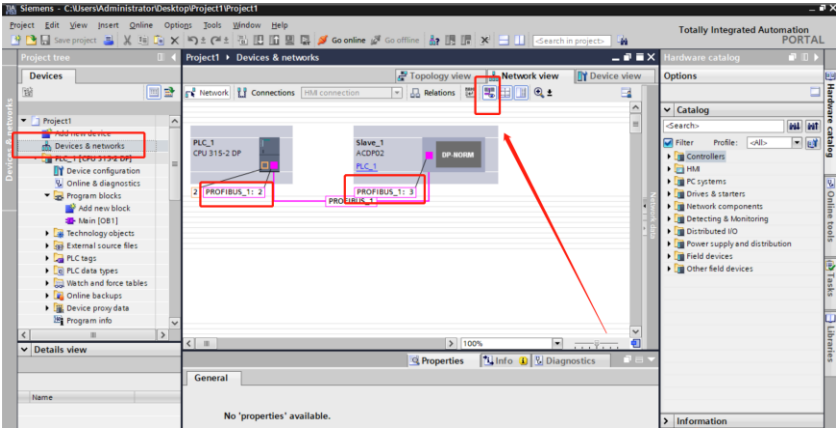
PZD10	28	Free Distribution	28	Free Distribution

Freely assigned feature code addresses need to be configured by selecting "Properties" in the "Network View"， The input address data is a decimal number converted from the hexadecimal address of the inverter communication。

For example, PZD3 (master->slave) "265" stands for 0x0109 address (keypad digital frequency is given)

For example, PZD3 (master->slave) "8452" stands for 0x2104 address (output voltage)

5.4 Make sure that the addresses of the master and slave cannot be the same



Here the slave address is 3, the station number address of RD11 is F13.27.

5.5 Program example

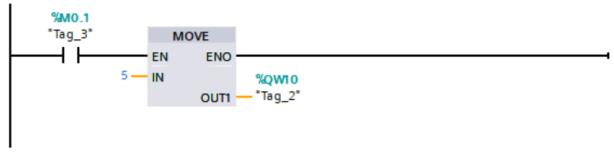
Set the communication parameters: F01.01=3 F01.02=10

Network 1:

Start, frequency given 10hz

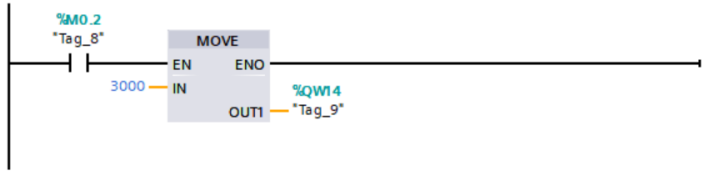
Network 2:

stop



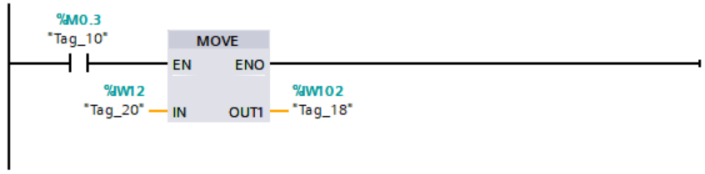
Network 3:

Digital feed frequency F01.09=30HZ



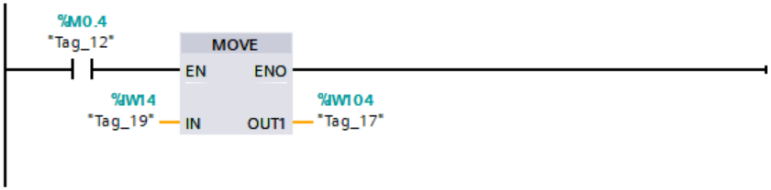
Network 4:

Read out the output frequency to IW102

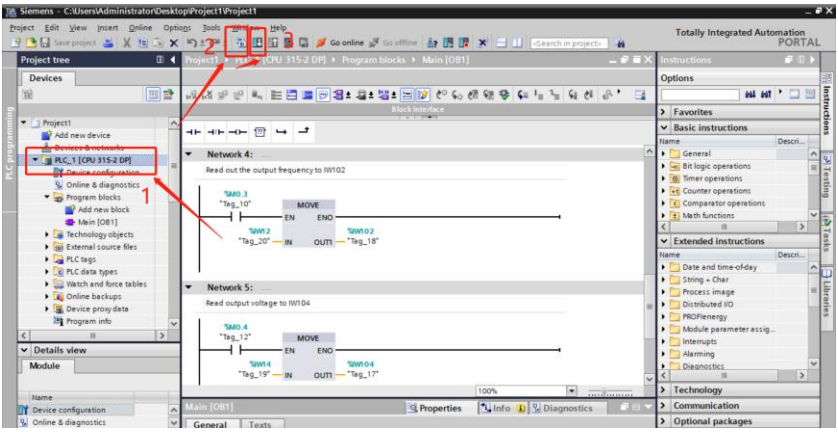


Network 5:

Read output voltage to IW104



5.6 Compile and download



Note: must be in the selection of plc all compiled, otherwise easy to report errors

Appendix RD11 Parameters (partial)

RD11 communication configuration instructions

N0.	Name	Setting range	Set value	Meaning
F00.02	Run command selection	0：Keyboard Giving 1：Terminal Giving 2：RS485 Giving 3：Option Card	2	Giving commands via RS485
F00.03	Frequency given source channel	0：Keypad number giving 1：Keypad analog potentiometer give … 10: Option Card	6	Giving frequency via RS485
F00.10	Upper limit frequency source	Selecting the upper limit of the inverter The given source of frequency 0：The upper frequency limit is given digitally 1：Reserved 2：Current/voltage analog	-	Use the Profibus card to limit the

	selection	AI1 given 3：Current/voltage analog AI2 given 4： Reserved 5： Terminal pulse PUL Given 6： RS485 given 7: Option Card		upper frequency, then you need to set this to 6
F07.01	Torque command giving	0： Keyboard numbers 1： Keypad Potentiometer Giving … 6： RS485 given 7： Option Card	-	If the torque command is given via the Profibus card, the setting is 6
F07.10	Torque control positive speed limit selection	0： Function code F07.12 Set 1： Reserved … 6 ： RS485 given *F07.12 7： Option card*F07.12	-	If limiting via Profibus card, set to 6
F07.11	Torque control reversing speed limit selection	0:Function code F07.13 Set 1： Reserved … 6 ： RS485 given *F07.13 7： Option card*F07.13	-	If limiting via Profibus card, set to 6
F13.27	DP Card Address	1~127	-	To set the same PROFIBUS address as on the Siemens software

Address	Function Description	Description of data meaning	State
0x3000	Communication given frequency	Unit 0.01Hz, e.g. 5000 corresponds to 50.00Hz	R/W
0x3001	Communication command setting	0：No command 1：Forward running 2：Reverse Run 3：Forward JOG 4：Reverse JOG 5：Deceleration stop 6：Free stop 7：Fault Reset 8：Run the disable command 9：Run the allow command	R/W
0x3004	Communication given upper frequency (0.01Hz)	Unit 0.01Hz	R/W
0x3005	Communication torque setting (0.1%)	Unit 0.1%	R/W
0x3006	Torque control forward maximum frequency Limit (0.1%)	Unit 0.1%	R/W
0x3007	Torque control reverse maximum frequency Limit (0.1%)	Unit 0.1%	R/W
0x3008	Communication gives the PID setpoint (0.1%)	Unit 0.1%	R/W
0x3009	Communication gives the PID feedback value (0.1%)	Unit 0.1%	R/W
0x300A	Voltage and frequency separation voltage value setting (0.1%)	Unit 0.1%	R/W
0x300B	Tension setting	0～Max. tension	R/W
0x300C	Roll diameter setting	0～Max. roll diameter	R/W
0x300D	Line speed setting	0～Maximum linear speed	R/W

Note: If you need to read other addresses of RD11, please look inside the RD11 manual.