

## SD600-RU DP Card Manual

### Appendix: SD6-DP-01 programming

#### 1. System configuration

After the SD6-DP-01 communication card is installed correctly, the host station and the inverter need to be configured so that the host station can establish communication with the SD6-DP-01 communication card. Each PROFIBUS slave station on the PROFIBUS bus must have a "device description file" called a GSD file, which is used to describe the characteristics of the PROFIBUS-DP device. The GSD file contains all the defined parameters of the device, including: supported baud rate, supported message length, input/output data quantity, meaning of diagnostic data, etc.

The GSD file (extension of .gsd) of SD6-DP-01 communication card can be downloaded from our website or contact our sales staff. The user can copy this GSD file to the relevant sub-directory of the configuration tool software. For the specific operation and PROFIBUS system configuration method, please refer to the description of the relevant system configuration software, such as Siemens SIMATIC Manager.

Function code	Name	Setting Ranges	descriptions	Factory default	Attributes
A03.00	PPO type	0~4	Set the communication data type between host station and slave station, corresponding to PPO1~PPO5 message type, the default is PPO3	2	⊙
A03.01	DP Slave address	1~127	Set the address of the DP slave during system configuration	1	⊙
A03.02	PZD3 write	0~21	Receive the data required to set the inverter from the host.	0	○
A03.03	PZD4 write	0~21		0	○
A03.04	PZD5 write	0~21		0	○
A03.05	PZD6 write	0~21		0	○
A03.06	PZD7 write	0~21		0	○
A03.07	PZD8 write	0~21		0	○
A03.08	PZD9 write	0~21		0	○
A03.09	PZD10 write	0~21		0	○
A03.10	PZD11 write	0~21		0	○
A03.11	PZD12 write	0~21		0	○
A03.14	PZD3 read	0~45	The inverter sends the current status data to the host.	0	○
A03.15	PZD4 read	0~45		0	○
A03.16	PZD5 read	0~45		0	○
A03.17	PZD6 read	0~45		0	○
A03.18	PZD7 read	0~45		0	○
A03.19	PZD8 read	0~45		0	○
A03.20	PZD9 read	0~45		0	○
A03.21	PZD10 read	0~45		0	○
A03.22	PZD11 read	0~45		0	○

A03.23	PZD12 read	0~45		0	o
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**Notice:**

The settings of function codes A03.00-A03.01 must be consistent with the settings of the master station, otherwise it will affect the success of the system configuration; and it is required that after these two parameters are changed, the inverter must be powered on again to take effect; the rate of communication is determined by system configuration.

## 2. Transmission rate and maximum transmission distance

The maximum length of the cable depends on the transmission rate. The following table shows the relationship between the transmission rate and the transmission distance.

Transfer rate (Kbps)	Type A wire (m)	Type B wire (m)
9.6	1200	1200
19.2	1200	1200
93.75	1200	1200
187.5	1000	600
500	400	200
1500	200	.....
12000	100	.....

Transmission wire related parameters

Transfer rate (Kbps)	Type A wire (m)	Type B wire (m)
Impedance (ohm)	135~165	100~130
Capacitance per unit length (picofarad/meter)	<30	<60
Loop resistance (ohm/km)	110	.....
Core diameter (mm)	0.64	>0.53
Core interface (mm <sup>2</sup> )	>0.34	>0.22

## 3. Profibus-DP communication protocol

The Profibus-DP bus allows fast data exchange between the master station and the inverter. The access to the inverter device is always carried out in a master-slave mode. The inverter acts as a slave station, and the PLC acts as a master station. The master station and the slave station Periodically transmit data between them, and the data supports five data formats: PPO1, PPO2, PPO3, PPO4, and PPO5; the data blocks contained in the PPO type data format are divided into two areas, namely the PKW area (the parameter identification area occupies 8 bytes ) and PZD area (the process data area occupies up to 24 bytes), of which PPO3 and PPO4 only contain PZD data.

The functions supported by each data format are as follows:

Data Type	Support Function	PKW/PZD
PPO 1	1. Single function code parameter read and write operation 2. Inverter command, frequency setting 3. Inverter status, running frequency reading	Contains PZD1, PZD2 data in the PKW area

PP O2	1. Single function code parameter read and write operation 2. Inverter command, frequency setting 3. Inverter status, running frequency reading 4. Four communication parameters are written periodically 5. Periodic reading of four communication parameters	Contains PZD1~PZD6 data in PKW area
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Data Type	Support Function	PKW/PZD
PPO3	1. Inverter command, frequency setting 2. Inverter status, running frequency reading	Only supports PZD1~PZD2 data
PPO4	1. Inverter command, frequency setting 2. Inverter status, running frequency reading 3. Four communication parameters are written periodically 4. Periodic reading of four communication parameters	Only supports PZD1~PZD6 data
PPO5	1. Single function code parameter read and write operation 2. Inverter command, frequency setting 3. Inverter status, running frequency reading 4. Ten communication parameters are written periodically 5. Periodically reading ten communication parameters	Contains PZD1~PZD2 data in PKW area

## Parameter Identification Area (PWK) Description:

The PKW data contains three groups of array areas, respectively CMD occupies 2 bytes, IND occupies 2 bytes, and VAL occupies 4 bytes, which can realize the read and write operations of function code parameters.

Parameter Identification Area (PWK)							
Command code	Function code		Reserve			Parameter value	
CMD	CMD	IND	IND	CMD	VAL	VAL	VAL

The data format as follows:

The master sends data PKW description			Inverter response data PKW description		
CMD	bits 15: 12	Operation command code 0: no operation 1: Function code parameter reading 2: The function code is written to the RAM 4: The function code is written to the EEPROM	CMD	bits 15: 12	response code 0: no operation 1: The function code parameters are read and written correctly 7: Cannot execute correctly
	bits 11: 8	Reserve		bits 11: 8	Reserve
	bits 7: 0	The upper 8 bits of the function code address		bits 7: 0	The upper 8 bits of the function code address
IND	bits 15: 8	The lower 8 bits of the function code address	IND	bits 15: 8	The lower 8 bits of the function code address
	bits 7: 0	Reserve		bits 7: 0	Reserve
VAL	bits 31: 16	Reserve	VAL	bits 31: 16	Reserve
	bits 15: 0	when reading means it's not used. when writing means code parameter value		bits 15: 0	Operation succeeded: return parameter value Operation failed: return error code

Summary of error codes:

Error code	Name
1	illegal order
2	illegal data address
3	illegal data value
4	operation failed
5	wrong password
6	data frame error
7	parameter is read only
8	Parameters cannot be changed during operation
9	password protection

### Process data area (PZD) description:

The data in the PZD area realizes the real-time change and reading of the inverter data by the master station and periodic data exchange. The communication address of the data is set by the inverter function code A03.02-A03.23, which can realize the inverter control command, the target frequency real-time given inverter current status, the running frequency real-time reading, the real-time parameter change and the real-time parameter monitoring.

Process data area (PZD)											
PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10	PZD11	PZD12

Each PZD data consists of two bytes.

Master sends data PZD		
Inverter running command	Inverter target frequency	Real-time change of inverter function parameters
PZD1	PZD2	PZD3
Inverter responds to master data PZD		
Inverter running status	Inverter operating frequency	Real-time reading of inverter function parameter values
PZD1	PZD2	PZD3~PZD12

The master station sends data PZD description	
PZD1	Inverter running command (command source F00.01 needs to be set to 3 or 4) 0: No operation 1: Forward rotation 2: Reverse rotation 3: Forward jog 4: Reverse jog 5: Deceleration to stop 6: Coast to stop (emergency stop) 7: Fault reset
PZD2	Inverter target frequency (frequency source F00.06 needs to be set to 11, Setting range: 0-maximum frequency (F00.03))
PZD3~PZD12	Real-time parameter value change, the parameter options set by A03.02-A03.11 are as follows

PZD3~PZD12 parameter value change selection setting:

Function code	Name	Setting ranges	Factory value	Attributes
A03.02	PZD3 write	0: no operation	0	○
A03.03	PZD4 write	1: Communication setting frequency	0	○
A03.04	PZD5 write	2: PID setting (0~PID range)	0	○
A03.05	PZD6 write	3: PID feedback (0~PID range)	0	○
A03.06	PZD7 write	4: Torque setting value (-10000~10000)	0	○
A03.07	PZD8 write	5: Forward upper limit frequency setting value (0~10000)	0	○
A03.08	PZD9 write	6: Reverse upper limit frequency setting value (0~10000)	0	○
A03.09	PZD10 write	7: Electric torque upper limit (0~10000)	0	○
A03.10	PZD11 write	8: Braking torque upper limit (0~10000)	0	○
A03.11	PZD12 write	9: Virtual output terminal command 10: VF separation output voltage setting (0~1000) 11: AO1 output voltage setting (0~0x7FFF) 12: AO2 output voltage setting (0~0x7FFF) 13: HDO output setting (0~0x7FFF)	0	○

Inverter responds to master data PZD		
PZD1	Digit15~8	Indicates PZD data set status 0: The running command frequency is given or the parameter is changed correctly 1: The running command or frequency given is incorrect 2: Incorrect parameter change 3: The running command or frequency given and parameter changes are not correct
	Digit 7~0	Indicates the current state of the inverter 1: Forward running 2: Reverse running 3: The inverter stops 4: Inverter failure 5: Inverter under-voltage
PZD2	The current operating frequency of the inverter	
PZD3~PZD12	Read the parameter value in real time, set the parameter options by A03.14-A03.23 as shown in the table below	

PZD3~PZD12 Parameter value read selection setting:

Function code	Name	Setting ranges	Factory value	Attributes
A03.14	PZD3 read	0 : running frequency(Hz on)	0	○
A03.15	PZD4 read	1 : setting frequency(Hz blinking)	0	○
A03.16	PZD5 read	2 : Bus voltage(V on)	0	○
A03.17	PZD6 read	3 : output voltage (V on)	0	○
A03.18	PZD7 read	4 : output current (A on)	0	○
A03.19	PZD8 read	5 : running rotational speed (rpm on)	0	○
A03.20	PZD9 read	6 : output frequency(%on)	0	○
A03.21	PZD10 read	7 : output torque (%on)	0	○
A03.22	PZD11 read	8 : PID given value(%on)	0	○
A03.22	PZD11 read	9 : PID feedback value (%on)	0	○
A03.22	PZD11 read	10 : input terminal status	0	○
A03.22	PZD11 read	11 : output terminal state	0	○
A03.23	PZD12 read	12 : torque setting value (%on)	0	○
		13 : Pulse count		
		14 : Length value		
		15 : PLC current stage		
		16 : Multi-speed current stage		
		17 : Analog AI1 value(on)		
		18 : Analog AI2 value(on)		
		19 : Analog AI3 value(on)		
		20 : high speed pulse HDI frequency		
		21 : motor overload percentage(%on)		
		22 : AC drive overload percentage (%on)		
		23 : slope frequency given value (Hz on)		
		24 : linear speed		
		25 : AC line current		
		26 : Speed set value		
		27 : Linear velocity set value		
		28 : Inverter Module Temperature		
		29 : Reserve		
		30 : Running frequency at current fault		
		31 : Slope given frequency at current fault		
		32 : Output voltage at current fault		
		33 : Output current at current fault		
		34 : Bus voltage at current fault		
		35 : Max temperature at current fault		
		36 : Input terminal status when the fault occurs		
		37 : Output terminal status when the fault occurs		



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#### 4. Application examples

- a、 To set the function code F00.03=11

The frequency source is given by DP communication 25.00Hz (PPO1 format).

The master sends data

CMD	IND	VAL	VAL	PZD1	PZD2
0x2000	0x06xx	xxxx	0x000B	0x0000	0x09C4

xx- invalid parameter

The CMD high byte is 0x20. Therefore, only data is written to RAM and data is not saved to EEPROM. The program is written regularly, when the EEPROM data in order not to affect the service life, please be careful to operate

Attention:

Some function codes can only be written in standby,  
and writing in running will return an error communication state.

Inverter response data

CMD	IND	VAL	VAL	PZD1	PZD2
0x1000	0x0600	0x0000	0x000B	0x0003	0x0000

CMD: 0x1000 data write successfully

PZD1: 0x0003 Inverter is in stop state

PZD2: 0x0000 Inverter output frequency is 0

b、The frequency inverter starts and runs in reverse, and the frequency is given as 40.00Hz (PPO3 format)

The master sends data

Inverter response data

PZD1	PZD2
0x0002	0x0FA0

PZD1	PZD2
0x0002	0x0FA0

The inverter has correctly responded to the data request of the master station, and the current running frequency has reached 40Hz.

F00.01=3 or 4, F00.02=2 must be set in order to use the inverter to respond to the running command of the master station.

c、Communication settings AO1 output 5.00V, AO2 output 7.00V, communication read output current, motor speed, output voltage, bus voltage. (PPO5 format)

In order to realize this data interaction, the following function codes must be set first:

A03.02 = 11 PZD3 receives AO1 output setting

A03.03 = 12 PZD4 receives AO2 output setting

A03.14 = 4 PZD3 read output current

A03.15 = 5 PZD4 read the motor speed

A03.16 = 3 PZD5 read the output voltage

A03.17 = 2 PZD6 read bus voltage

F06.14 = 19 AO1 is given by communication

F06.15 = 20 AO2 is given by communication

The master sends data

CMD	IND	VAL	VAL	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
0x0000	XXXX	XXXX	XXXX	XXXX	XXXX	0x3FFF	0x5998	0x0000	0x0000

CMD: 0x0000 does not operate on function parameters, so IND and VAL no need set.

Attention:

Using the PPO5 data format, the running command and target frequency will be set. If the running command and target frequency are selected by DP communication, you should pay attention to the data settings of PZD1 and PZD2 at this time; when the running command or target frequency is not from the DP communication setting, it is not necessary to set PZD1 or PZD2.

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xx-data does not need to be set, please pay attention to the settings of PZD1 and PZD2.

CMD	IND	VAL	VAL	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
0x0000	XXXX	XXXX	XXXX	0x0001	0x1388	0x0035	0x05DC	0x017C	0x1518

PZD1: 0x0001 The inverter is running forward

PZD2: 0x1388 Inverter output frequency 50HZ

PZD3: 0x0212 Inverter output current 5.3A

PZD4: 0x05DC Motor speed 1500

PZD5: 0x017C Inverter output voltage 380V

PZD6: 0x1518 Inverter bus voltage 540.0V

Hint:

Supports PZD1 to PZD12 due to the use of PPO5 data format

The remaining unused PZD7~PZD12 no need set;

Keep A03.04-A03.11=0, A03.18-A03.23=0.

## 5、Definition of function codes in communication

Function code group	Address high byte	Function code group	Address high byte
F00 group	0x00	F01 group	0x01
F02 group	0x02	F03 group	0x03
F04 group	0x04	F05 group	0x05
F06 group	0x06	F07 group	0x07
F08 group	0x08	F09 group	0x09
F0A group	0x0A	F0B group	0x0B
F0C group	0x0C	F0D group	0x0D
F0E group	0x0E	A00 group	0x0F
A01 group	0x10	A02 group	0x11
A03 group	0x12		

## 6. SD6-DP-01 communication card LED working status indication

There are two indicator lights on the SD6-DP-01 communication card, D2 and D3 respectively, which are used to let the user know the current state of the SD6-DP-01 communication card in the system.

Its SD6-DP-01 communication card acts as an intermediate link in the system and is responsible for receiving the request data sent by the master station and transmitting it to the inverter.

After the inverter receives the request, it responds and sends data back to the SD6-DP-01 communication card.

Then send back to the master station through SD6-DP-01 communication card,

The slave station in the system is composed of SD6-DP-01 communication card and inverter.

Name	Definition	Light State	Illustrate
D2	the data communication between the master station and the SD6-DP-01 communication card normal or not	Flash	The interval of flash once per second indicates that there is an error in the current communication between the master station and the DP card, there may be interference on site, or the multi-baud rate setting of the slave station is too low
		OFF	It indicates that there is no communication between the current master station and the DP card (check the cable connection, configure the address and PPO data type)
		ON	The master communicate with DP card normal
D3	the communication between the DP card and the inverter is normal or not	Flash	The interval of flash once per second indicates that there is an error in the current communication between the inverter and the DP card, there may be interference on site.
		OFF	Indicates that there is no communication between the inverter and SD6-DP-01 card (check the hardware connection, whether this series of inverters supports DP expansion)
		ON	The inverter communicate with DP card normal
D2、D3	Hardware self-test and initialization wait	Both Flash	At intervals of four flashes per second, the indicator SD6-DP-01 card hardware is faulty
		Both OFF	Time from 7s to 10s after power on as the initialization waits while the two LEDs are off, If it does not light up for a long time or overtime, it should be considered the card is abnormal and needs to be replaced.