

Profibus communication card user manual

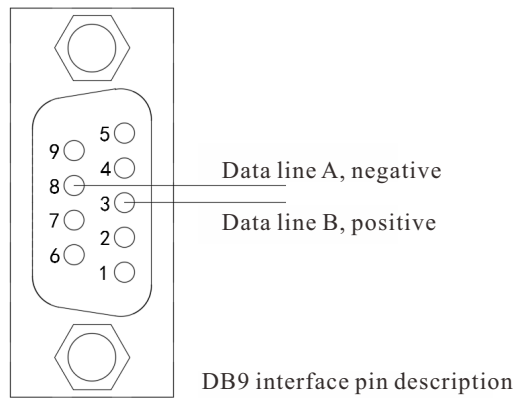
1. Introduction to Communication Card

This communication card is a Profibus DP field bus adapter card, which conforms to the international general Profibus field bus standard, and can easily realize networking function, so that the soft starter can become a slave station of the field bus and receive the control of the field bus master station.

2. Networking connection description

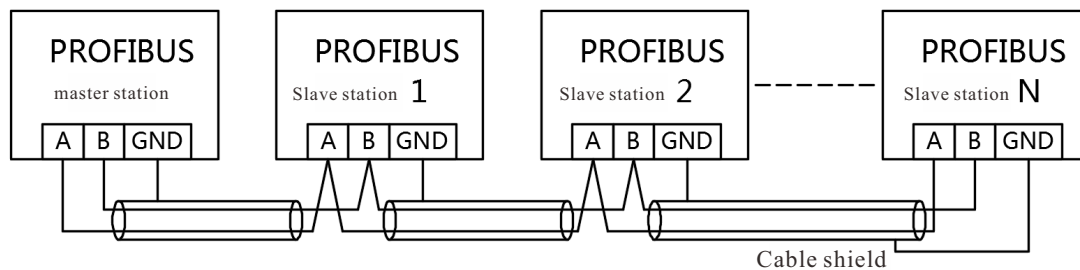
2.1 Interface definition

The standard Profibus DB9 interface is used for connection. The DB9 interface is shown in the figure below:



2.2 Network topology

The wiring diagram between the soft starter and the Profibus master station is shown below:



Both ends of the Profibus bus need to be connected to the terminal matching resistance. After the terminal resistance is correctly connected, the resistance between A1 and B1 should be about $110\ \Omega$ in case of power failure. If the terminal resistance is not connected or less connected, the communication quality will be affected and the communication will be unstable.

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According to the different communication baud rate settings of the master station, the length of the communication wire between the DP expansion card and the Profibus master station is also required. The length of the communication data wire must be strictly limited according to the SIEMENS DB9 wiring standard. Baud rate and wire length requirements are shown in the following table.

Transmission rate Kbps	Maximum length of cable type A (m)	Maximum length of cable type B (m)
9.6	1200	1200
19.2	1200	1200
187.5	600	600
500	200	200
1500	100	70
3000	100	Not Supported
6000	100	
12000	100	

See the table below for cable technical specifications

Cable parameters	Type A	Type B
Impedance	135 Ω ~ 165 Ω (f=3~20MHz)	100 Ω ~ 130 Ω (f>100kHz)
Capacitance	<30pF/m	<60pF/m
Resistance	<110 Ω /km	Not specified
Conductor cross-sectional area	$\geq 0.34\text{mm}^2$	$\geq 0.22\text{mm}^2$

3.Communication description

3.1 Description of communication protocol

Data transmission format: PPO type is used as the data transmission format. PPO types are divided into five types: PPO1, PPO2, PPO3, PPO4, and PPO5. This DP expansion card supports all data formats. The functions supported by each data format are shown in the following table.

Data Type	Support functions
PPO1	Single function parameter operation Soft starter control Soft starter status, average current reading
PPO2	Single function parameter operation Soft starter control Soft starter status, voltage and current parameter reading
PPO3	Soft starter control Soft starter status, average current parameter reading
PPO4	Soft starter control

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	Soft starter status, voltage and current parameter reading
PP05	Single function parameter operation Soft starter control Reading of all parameters such as soft starter status, voltage and current

The data block contained in PPO type data format is divided into two areas, namely PKW area (parameter area) and PZD area (process data area). The communication data adopts the big end structure, with the high byte first and the low byte last. The PPO type data format supported by this DP expansion card is shown in the following figure.

PKW				PZD									
PKE	IND	PWE1	PWE2	CW SW	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10
1 ST	2 nd	3 rd	4 th	1 ST	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	9 th	10 th
word	word	word	word	word	word	word	word	word	word	word	word	word	word
PPO1													
PPO2													
				PPO3									
				PPO4									
PPO5													

3.2 W PKW Data Description

PKW data is mainly used to read and write single parameters of the soft starter by the master station. The communication address of the soft starter parameters is directly given by the communication data. The functions are as follows:

- Reading of soft starter function parameters
- Change of functional parameters of soft starter

data format

PKW data consists of three groups of array areas, namely PKE, IND and PWE. The length of PKE data bytes is 2 bytes, IND is 2 bytes, and PWE is 4 bytes. The data format is shown in the following table.

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Master station sends PKW description		Soft starter response PKW description	
PKE	High 4 digits: command code 0: No request 1: Read parameter data 2: Write parameter data Lower 12 bits: Reserved	PKE	High 4 digits: response code 0: No request 1: Correct parameter operation 2: Parameter operation failed Lower 12 bits: Reserved
IND	Parameter address (8~207)	IND	Parameter address
PWE1	retain	PWE1	retain
PWE2	Read request: Not used Write request: parameter value	PWE2	Request succeeded: parameter value Request failed: error code (consistent with Modbus)

Example: The master station reads the soft starter parameters ->the rated current of the motor (communication address 8, the current rated current is 100A):

Data sent by master station:

PKE	IND	PWE1	PWE2
1000H(16Base)	8	0	0

Soft starter response data:

PKE	IND	PWE1	PWE2
1000H(16Base)	8	0	100

For example, the master station modifies the soft starter parameter ->current limit (communication address 15, current limit is 350%, and it is modified to 300%):

Data sent by master station:

PKE	IND	PWE1	PWE2
2000H(16Base)	15	0	300

Soft starter response data:

PKE	IND	PWE1	PWE2
1000H(16Base)	15	0	300

3.3 PZD Process Data Description

Master station sends PZD description		Soft starter response PZD description	
PZD1(CW)	Bit: 0~2 0=No request 1=Start 2=Stop 3=Reset Bit: 3~15 reserved	PZD1(SW)	Bit: 0~4 1=Ready 2=Start 3=Running 4=Stop (including braking) 5=Not ready 6=Trip 7=Reserved 8=Jog Bit: 5 0=normal 1=warning Bit: 6 1 second heartbeat Bit: 7 0=local 1=remote Bit: 8 reserved Bit: 9 0=negative phase sequence 1=positive phase sequence Bit: 10~15 tripping code
PZD2	Not Used	PZD2	Average current
PZD3	Not Used	PZD3	Supply voltage
PZD4	Not Used	PZD4	U phase current
PZD5	Not Used	PZD5	V phase current
PZD6	Not Used	PZD6	W-phase current
PZD7	Not Used	PZD7	Load ratio
PZD8	Not Used	PZD8	Motor temperature thermal model percentage (0~7: motor 1, 8~15: motor 2)
PZD9	Not Used	PZD9	Terminal DI input status
PZD10	Not Used	PZD10	Not Used

During the hardware configuration of the master station, five message formats can be selected: PPO1, PPO2, PPO3, PPO4, and PPO5. Different formats have different contents. The user needs to select them according to actual needs. The current example is PPO5. The process data PZD channel will return all data.

Example: master station control startup:

Data sent by master station:

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10
1	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid	Invalid

Soft starter response data:

PZD1	PZD2	PZD3	PZD4	PZD5	PZD6	PZD7	PZD8	PZD9	PZD10
2	Average current	Supply voltage	U phase current	V phase current	W-phase current	Load ratio	Thermal model	DI Status	invalid

3.4 Soft starter parameter setting

Menu item 21A Communication protocol ->Profibus DP

Menu item 21B Communication address ->2 ~127

Note: The communication address of the soft starter cannot be the same as that of the master station. The communication card baud rate is adaptive and does not need to be set separately;

Power on again after changing the communication address;

4.Operation steps of PROFIBUS communication

1. Master station and soft starter slave station networking;
 2. Set the communication protocol and address of the soft starter;
 3. Master station equipment programming, import the GSD file of soft starter into the software, add the slave station equipment to the master station system, and conduct configuration programming. After that, you can conduct PROFIBUS communication control;
- Note: GSD documents can be obtained from the soft starter agent or manufacturer.

Appendix: Communication Address List of Soft Starter

Postal address	Code	Parameter group	Default setting
8	1A	Motor rated current	Depending on the type:
9	1B	Locked rotor time	0m: 10s
10	1C	Locked rotor current	600%
11	1D	Motor service factor	105%
12	2A	Starting mode	Constant current
13	2B	Start ramp time	10 S
14	2C	Initial current	350%
15	2D	Current limit	350%
16	2E	Adaptive starting curve	Constant acceleration
17	2F	Jump start time	0000ms
18	2G	Jump starting amplitude	500%
19	2H	Stop mode	Taxi stop
20	2I	Stop time	0m: 00s
21	2J	Adaptive stop curve	Constant deceleration
22	2K	Adaptive control gain	75%
23	2L	Braking torque	20%
24	2M	Braking time	0m:01s
25	3A	Automatic starting mode	shut
26	3B	Automatic starting time	00h:01m

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27	3C	Automatic stop mode	Close
28	3D	Auto stop time	00h:01m
29	4A	Starting limit time	0m:20s
30	4B	Starting limit time-2	0m:20s
31	4C	Undercurrent	20%
32	4D	Undercurrent delay	0m:05s
33	4E	Instantaneous overcurrent	400%
34	4F	Instantaneous overcurrent delay	0m:00s
35	4G	Phase sequence	Any order
36	4H	Current unbalance	30%
37	4I	Current unbalance delay	0m:03s
38	4J	frequency measurement	During start-up and operation
39	4K	Frequency variation	± 5 Hz
40	4L	Frequency delay	0m:01s
41	4M	Restart delay	10s
42	4N	Motor temperature measurement	Do not measure
43	4O	Earth fault current	100 mA
44	4P	Earth fault delay	0m:03s
45	4Q	Undervoltage	100V
46	4R	Undervoltage delay	5s
47	4S	Overvoltage	800V
48	4T	Overvoltage delay	5s
49	5A	Automatic reset function	Turn off automatic reset
50	5B	Maximum reset times	1
51	5C	A/B reset delay	00m:05s
52	5D	C Reset delay	05 m
53	6A	AA input function	Motor parameter selection
54	6B	Enter AA name	Input trip
55	6C	AA transmission trip	Always On
56	6D	Input A trip delay	0m:00s
57	6E	Input A initial delay	0m:00s
58	6F	AB input function	Input trip (N/0)
59	6G	Enter B name	Input trip
60	6H	Transmission AB trips	Always On
61	6I	Input B trip delay	0m:00s
62	6J	Input start delay	00m:00s
63	6K	Input C function	Close
64	6L	Input D function	Close
65	6M	Remote reset logic	Normally Closed (N/C)
66	6N	Analog input trip	No trip
67	6O	Analog input range	2-10 V

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68	6P	Analog trip point	50%
69	6Q	Local/Remote:	Always On
70	6R	Telecontrol communication	Enable on remote control
71	7A	Relay A function	Main contactor
72	7B	Opening delay of relay A	0m: 00s
73	7C	Closing delay of relay A	0m:00s
74	7D	Relay B function	function
75	7E	Opening delay of relay B	0m: 00s
76	7F	Closing delay of relay B	0m:00s
77	7G	Relay C function	tripping operation.
78	7H	Opening delay of relay C	0m: 00s
79	7I	Closing delay of relay C	0m:00s
80	7J	Relay D function	shut
81	7K	Relay E function	shut
82	7L	Relay F function	shut
83	7M	Low current indication	50%
84	7N	High current indication	100%
85	7O	Motor temperature indication	80%
86	7P	Analog output A	Current (% rated current)
87	7Q	Analog A range	4-20 mA
88	7R	Analog A max	100%
89	7S	Analog A min	0%
90	7T	Analog Output B	Current (% rated current)
91	7U	Analog B range	4-20 mA
92	7V	Analog B max	100%
93	7W	Analog B min	0%
94	8A	language	English
95	8B	F1 button function	Automatic start/stop setting
96	8C	F2 button function	Not set
97	8D	Display current or power	electric current
98	8E	Upper left corner of the screen	Starter status
99	8F	Upper right corner of the screen	blank
100	8G	Lower left corner of the screen	Operating hours
101	8H	Lower right corner of the screen	Analog input
102	8I	Graphic data	Current (% rated current)
103	8J	Graphic display period	10s
104	8K	Graph display maximum	400%
105	8L	Graphic display minimum	0%
106	8M	Current calibration	100%
107	8N	Main power supply voltage	400 V
108	8O	Voltage calibration	100%

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109	9A	Dual thermal protection model	Single model
110	9B	Motor rated current-2	Depends on model
111	9C	Locked rotor time-2	0m: 10s
112	9D	Locked rotor current-2	600%
113	9E	Motor service factor-2	105%
114	10A	Starting mode - 2	Constant current
115	10B	Start ramp - 2	0m: 10s
116	10C	Initial current-2	350%
117	10D	Current limit - 2	350%
118	10E	Adaptive starting curve-2	Constant acceleration
119	10F	Jump starting time-2	0000 ms
120	10G	Jump starting amplitude - 2	500%
121	10H	Stop mode - 2	Taxi stop
122	10I	Stop time-2	0m:00s
123	10J	Adaptive stop curve-2	Constant deceleration
124	10K	Adaptive Control Gain-2	75%
125	10L	Braking torque - 2	20%
126	10M	Braking time - 2	0m:01s
127	11A	RTD/PT100 A。 C	50 。 C (122 。 F)
128	11B	RTD/PT100 B° C	50 ° C (122 。 F)
129	11C	RTD/PT100 C° C	50 ° C (122 ° F)
130	11D	RTD/PT100 D° C	50 。 C (122 。 F)
131	HE	RTD/PT100 E° C	50 ° C (122 。 F)
132	11F	RTD/PT100 F° C	50 ° C (122 ° F)
133	11G	RTD/PT100 G° C	50 ° C (122 ° F)
134	12A	Motor Data 1 Ramp	Single slope
135	12B	Motor Data 2 Ramp	Single slope
136	12C	Conversion time	150 ms
137	12D	Slip ring deceleration	50%
138	15A	Access password	0
139	15B	Parameter write protection	Reading and writing
140	15C	Emergency operation	Disable
141	15D	Short circuit thyristor action	Three phase control only
142	15E	Jog torque	50%
143	16A	motor overload	Starter trip
144	16B	Starting limit time	Starter trip
145	16C	Undercurrent	Starter trip
146	16D	Instantaneous overcurrent	Starter trip
147	16E	Current unbalance	Starter trip
148	16F	frequency	Starter trip
149	16G	Input A tripped	Starter trip

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150	16H	Input B tripped	Starter trip
151	16I	Motor thermistor	Starter trip
152	16J	Starter communication	Starter trip
153	16K	Network communication failure	Starter trip
154	16L	heatsink OT	Starter trip
155	16M	Battery/clock failure	Starter trip
156	16N	Ground fault	Starter trip
157	16O	RTD/PT100 A	Starter trip
158	16P	RTD/PT100 B	Starter trip
159	16Q	RTD/PT100 C	Starter trip
160	16R	RTD/PT100 D	Starter trip
161	16S	RTD/PT100 E	Starter trip
162	16T	RTD/PT100 F	Starter trip
163	16U	RTD/PT100 G	Starter trip
164	16V	Retain	–
165	16W	Retain	–
166	16X	Low control voltage	Starter trip