Instructions

Profibus Card

(WSIQ-COM-PB)

Contents

Product Compatibility

The Profibus Card is suitable for use with WSB and WSIQ soft starters.

Disclaimer

The examples and diagrams in this manual are included solely for illustrative purposes. The information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct, indirect or consequential damages resulting from the use or application of this equipment.

1 Warnings

WARNING
For your safety, isolate the soft starter from mains voltage before attaching or removing accessories.

WARNING
Inserting foreign objects or touching the inside of the starter while the expansion port cover is open may endanger personnel, and can damage the starter.

2 Important User Information

Observe all necessary safety precautions when controlling the soft starter remotely. Alert personnel that machinery may start without warning.

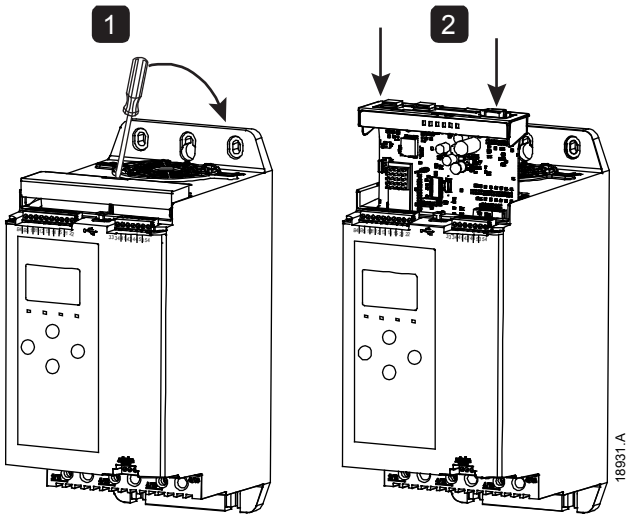
It is the installer's responsibility to follow all instructions in this manual and to follow correct electrical practice.

Use all internationally recognised standard practice for RS-485 communications when installing and using this equipment.

3 Installation

3.1 Installation Procedure

1. Push a small flat-bladed screwdriver into the slot in the centre of the expansion port cover, and ease the cover away from the starter.
2. Line up the card with the expansion port. Gently push the card along the guide rails until it clicks into the starter.



3.2 Connecting to the Network

After the card is in place, control power can be restored and field wiring can be connected via the DB9 plug.

DB9 connector	
Pin No.	**Assignment**
1	Shield
2	24 VDC negative (optional)
3	RxD/TxD-P
4	Not used
5	DGND
6	VP (end of bus slave only)
7	24 VDC positive (optional)
8	RxD/TxD/-N
9	DGND

3.3 Feedback LEDs

	Off	On
Power (red)	Device is not powered up.	Device is powered up and ready to go online
Network (green)	No connection, offline or data exchange failure	Device is online and in data exchange state

NOTE
If communication is inactive, the soft starter may trip on Network Communications. If parameter 6G *Network Communications* is set to 'Soft Trip and Log' or 'Trip Starter', the soft starter will require a reset.

NOTE
If communication fails between the device and the network, the Bus Status LED will go off. When communication is restored, the Bus Status LED will come back on.

4 Configuration

Import the latest .gsd file into your Master configuration tool. This file is available from www.worldwideelectric.net.

If your Master uses on-screen icons, two graphic bitmap files are available from the website. SSPM_N.bmp indicates normal mode. SSPM_D.bmp indicates diagnostic mode.

4.1 Profibus Address

The network address for the card must be set via the soft starter (parameter 11G *Profibus Address*). For details on how to configure the soft starter, refer to the soft starter user manual.

NOTE
The Profibus Card will read the network address from the soft starter when control power is applied. If parameters are changed in the starter, control power must be cycled for the new values to take effect.

4.2 Enabling Network Control

The soft starter will only accept commands from the Profibus Card if parameter 1A *Command Source* is set to Network.

NOTE
If the reset input is active, the starter will not operate. If a reset switch is not required, fit a link across terminals 10, 11 on the soft starter.

If the Profibus network fails, the device will leave data exchange mode after the network watchdog timeout period has expired. This timeout period is set at the Master configuration tool.

A Communication Timeout parameter in the GSD file sets how soon after this event the soft starter will be forced into a trip state.

The user can adjust the Communication Timeout parameter in the GSD file to any setting between 0 and 100 seconds. The default setting is 10 seconds.

NOTE
If the Communication Timeout parameter is set to 0, the current state of the soft starter will remain unchanged on a network failure. This gives the user the option of operating the soft starter via local control, but is NOT failsafe.

5 Data Structures

The GSD file contains three operating modules, supporting data I/O structures as follows:

Data Structure	Basic Module	Extended Module	Parameter Upload/ Download Module
Soft Starter Control I/O Data Structure on page 5	✓	✓	✓
Soft Starter Monitoring I/O Data Structure on page 6	×	✓	✓
Soft Starter Programming I/O Data Structure	×	×	✓

The Basic Module allows the user to start and stop the soft starter and read limited information on operating status.

The Extended Module defines additional bytes allowing the user to read soft starter operating data such as actual motor current and motor temperature.

The Parameter Upload/Download Module allows the user to read and write soft starter parameter values (only applicable to EMX3 soft starters).

5.1 Soft Starter Control I/O Data Structure

Master > Slave control word is structured as follows:

Byte 0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	*Reserved*	*Reserved*	Quick stop	Motor set		*Reserved*	*Reserved*
Byte 1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	*Reserved*	*Reserved*	*Reserved*	Reset	*Reserved*	*Reserved*	Forward run

Quick Stop Bit

When Fwd run bit changes from 1 to 0:
0 = stop action will be a soft stop (as selected on the soft starter).
1 = stop action will be a quick stop (ie coast to stop).

NOTE
The Quick stop bit must be set to 0 before the soft starter can perform a start.

Motor Set Bits

Selects which parameter set to use when starting:
0 = selected from soft starter remote input (programmable input must be set to 'Motor Set Select')
1 = soft starter primary motor set (ensure soft starter programmable input is not set to 'Motor Set Select')

2 = soft starter secondary motor set (ensure soft starter programmable input is not set to 'Motor Set Select')
3 = *Reserved*

NOTE
Ensure that the programmable input is not set to Motor Set Select before using this function.

Slave > Master status word is structured as follows:

Byte 0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Ramping	Local	Motor current (% FLC) [1]					
Byte 1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	*Reserved*	*Reserved*	*Reserved*	Warning	Fault	On	Ready

[1] Motor current (% FLC) represents current as a percentage of the set motor full load current. A maximum value of 63 represents 200% full load current. To convert this value to a readable percentage, divide by 0.315. For models WSx-0064BP and smaller this value will be 10 times greater than the value displayed on the keypad.

Ready is set when the soft starter is ready to start the motor.
On is set when the soft starter is starting, running or soft stopping the motor.
Warning is set when the soft starter detects a warning condition.
Fault is set when the soft starter has tripped.
Ramping is set when the soft starter is starting or soft stopping the motor.
Local is set when the soft starter is set to Local mode.

5.2 Soft Starter Monitoring I/O Data Structure

Master > Slave output bytes are structured as follows.

Byte 2
Operating data request (Data request numbers 1 to 16)

Slave > Master input bytes, in response to an operating data request, are structured as follows:

Byte 2	
Echo data request number	
Byte 3	
Bits 7 to 1 *Reserved*	Bit 0 = 1: Invalid data request number
Byte 4	
Data value (high byte)	
Byte 5	
Data value (low byte)	

NOTE
An invalid data request number will result in the invalid data request number bit being set = 1.

Data values are defined as follows:

Data Request Number	Data Value (high byte)	Data Value (low byte)
0	*Reserved*	
1	Product type code	*Reserved*
2	Trip code	Starter state
3 [1]	Average current (high byte)	Average current (low byte)
4	*Reserved*	Motor temperature (thermal model)
5	*Reserved*	% Power factor
6	*Reserved*	
7	*Reserved*	
8	*Reserved*	
9 [1]	L1 current	
10 [1]	L2 current	
11 [1]	L3 current	
12~14	*Reserved*	
15	Software major version number	Software minor revision number
16	*Reserved*	Digital Input state

[1] For models WSx-0064BP and smaller this value will be 10 times greater than the value displayed on the keypad.

Soft Starter Status

The low byte data value of data request number 2 reports soft starter status.

Bits 0 to 3 function as follows:

Value (decimal) Bits 0 to 3	Soft Starter Status
0	Unknown (Communication error between device and soft starter)
1	Ready to start (waiting)
2	Starting (Soft starting)
3	Running (full voltage at the motor)
4	Stopping (Soft stopping)
5	Not ready (restart delay, restart temperature check, run simulation, reset input is open)
6	Fault (Tripped)
7	Menu or Logs Menu open (cannot start)
8	Jog forward (slow speed)
9	Jog reverse (slow speed)

Bits 4 to 7 function as follows:

Bit number	Function
Bit 4	Positive phase sequence (Bit 6 must = 1)
Bit 5	Average current exceeds Motor FLC setting
Bit 6	Set after first start once phase sequence has been confirmed
Bit 7	Communication error between device and soft starter

Digital Input State

The low byte of data request number 16 reports digital input state as follows (0 = open, 1 = closed):

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Low Byte	*Reserved*			Input B	Input A	Reset	*Reserved*	Start/ Stop

Trip Codes

Trip Code	Description
1	Excess start time
2	Motor overload
3	Motor thermistor
4	Current imbalance
5	Frequency
6	Phase sequence
7	Instantaneous overcurrent
8	Power loss
9	Undercurrent
10	Heatsink overtemperature
11	Motor connection
12	Input A trip
13	FLC too high
14	Unsupported option (function not available in inside delta)
15	Starter communication (between device and soft starter)
16	Network communication (between device and network)
17	Internal fault x (where x is the fault code detailed in the table below)
23	Parameter out of range
24	Input B trip
26	L1 phase loss
27	L2 phase loss
28	L3 phase loss
29	L1-T1 shorted
30	L2-T2 shorted

Trip Code	Description
31	L3-T3 shorted
33	Time-overcurrent (Bypass overload)
34	SCR overtemperature
35	Battery/clock
36	Thermistor circuit
49	Low Control Volts
56	Keypad disconnected
57	Zero Speed Detect
58	SCR Itsm
59	Instantaneous overcurrent
60	Rating Capacity

The table below details the internal fault code associated with trip code 17.

Internal fault	Message displayed on the keypad
70 ~ 72	Current Read Err Lx
73	ATTENTION! Remove Mains Volts
74 ~ 76	Motor Connection Tx
77 ~ 79	Firing Fail Px
80 ~ 82	VZC Fail Px
83	Low Control Volts
84 ~ 98	Internal fault X Contact your local supplier with the fault code (X).

5.3 Soft Starter Programming I/O Data Structure

The Soft Starter Programming I/O Data Structure allows the user to upload (read) and download (write) soft starter parameter values over the network.

Master > Slave output bytes are structured as follows.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 3	Parameter number to read/write							
Byte 4	*Reserved*					Write parameter	Read parameter	*Reserved*
Byte 5	High byte parameter value to write to soft starter/ zero data values for read							
Byte 6	Low byte parameter value to write to soft starter/ zero data values for read							

Slave > Master input bytes are structured as follows.

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Byte 6	Echo parameter number							
Byte 7	*Reserved*					Write access denied	Invalid parameter value	Invalid parameter number
Byte 8	High byte parameter value read from soft starter							
Byte 9	Low byte parameter value read from soft starter							

6 Profibus Diagnostic Telegram and Flag

The Profibus Card supports external diagnostics. The following telegram will be sent to the Master if the soft starter trips or if a parameter is changed at the soft starter.

Diagnostic Telegram Data Structure	
Byte 0	User diagnostic length (Always set = 3)
Byte 1	Trip Code
Byte 2	Changed parameter number

Profibus Trip Code

When the soft starter trips, a diagnostic flag is set at the Master and the trip code is reported in Byte 1. When the soft starter is reset, the diagnostic flag and trip code data are reset = 0, provided the trip condition does not still exist (refer to *Trip Codes*).

Changed Parameter Number

If a parameter is changed via the keypad, the affected parameter number is reported in Byte 2. When the Master reads or writes the changed parameter, Byte 2 is reset = 0.

A changed parameter number does not set a diagnostic flag.

7 Profibus Freeze Mode

The Profibus Card supports Freeze Mode.

In Freeze Mode, inputs are only updated with new data from the soft starter when another Freeze action is carried out. An Un-Freeze action returns the Profibus Card to normal operation.

8 Profibus Sync Mode

The Profibus Card supports Sync Mode.

In Sync Mode, commands to the soft starter are not processed until another Sync action is carried out. An Un-Sync action returns the Profibus Card to normal operation.

9 Profibus Clear Mode

If the Master sends a global Clear command, the Profibus Card will send a Quick Stop command to the soft starter.

10 Specifications

- **Connections**

Soft starter ..... 6-way pin assembly
Network ..... 5-way male and unpluggable female connector (supplied)
Maximum cable size ..... 2.5 mm^2

- **Settings**

Address range ..... 1 to 125
Data rate (bps) ..... 9.6 kb/s ~ 12.0 Mb/s (auto-detect)

- **Certification**

CE ..... EN 60947-4-2
RoHS ..... Compliant with EU Directive 2011/65/EU
Profibus International .....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