Instructions

Profinet Card

(WSIQ-COM-PNET)

Contents

Product Compatibility

The Profinet 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.

2.1 Product Design

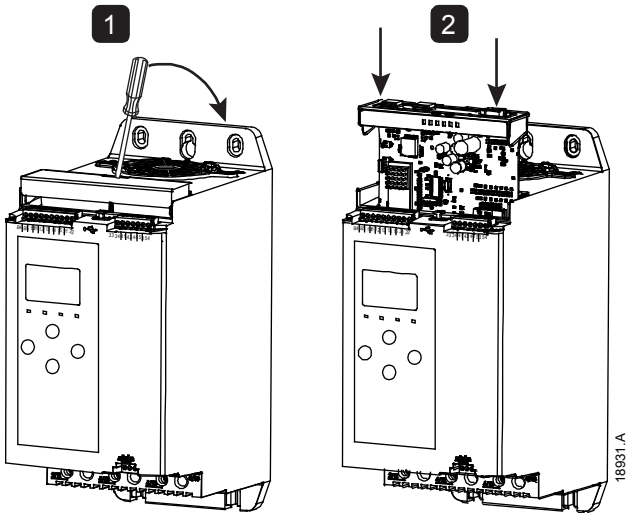
The Profinet Card allows the soft starter to connect to an Ethernet network and be controlled or monitored using an Ethernet communication model.

Familiarity with Ethernet protocols and networks is required to operate the device successfully. For difficulties using this device with third party products, including PLCs, scanners and commissioning tools, contact the relevant supplier.

3 Installation

3.1 Installation Procedure

1. Push a small flat-bladed screwdriver into the slot in the center 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 Network Connection

Ethernet Ports

The device has two Ethernet ports. If only one connection is required, either port can be used.

Cables

Use Category 5, 5e, 6 or 6e cable to connect to the device.

EMC Precautions

To minimize electromagnetic interference, Ethernet cables should be separated from motor and mains cables by 200 mm.

If the Ethernet cable must cross motor or mains cables, the crossing should be at an angle of 90°.

3.3 Enabling Network Control

The soft starter will only accept commands from the Profinet 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.

3.4 Network Establishment

The controller must establish communications directly with each device before the device can participate in the network.

3.5 Addressing

Each device in a network is addressed using a MAC address and an IP address.

- The device must be assigned a static IP address via the soft starter, or can be assigned an IP address by the master via DCP. DHCP addressing is not supported.
- The MAC address is fixed within the device and is printed on a label on the front of the device.

4 Device Configuration

Network communication parameters for the card must be set via the soft starter.

NOTE
The Error LED flashes whenever the device is receiving power but is not connected to a network. The Error LED will flash throughout the configuration process.

Parameter	Parameter name	Default
11H	*Gateway Address*	192
11I	*Gateway Address* 2	168
11J	*Gateway Address* 3	0
11K	*Gateway Address* 4	100
11L	*IP Address*	192
11M	*IP Address* 2	168
11N	*IP Address* 3	0
11O	*IP Address* 4	2
11P	*Subnet Mask*	255
11Q	*Subnet Mask* 2	255
11R	*Subnet Mask* 3	255
11S	*Subnet Mask* 4	0
11T	*DHCP*	Disable
11U	*Location ID*	0

NOTE
DHCP addressing is not supported with Profinet.

5 Operation

The device has been designed for use in a system complying with the Profinet standard. For successful operation, the controller must also support all functions and interfaces described in this document.

5.1 Device Classification

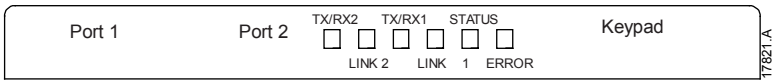
The Profinet Card is a Profinet IO-Device and must be managed by an IO-Controller over Ethernet.

5.2 Master Configuration

Import the latest GSDML 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.

5.3 Feedback LEDs



LED name	LED Status	Description
Error	Off	No error.
	Flashing	No data exchange.
	On	No physical link or slow physical link. No configuration.
Status	Off	No error.
	Flashing	DCP signal service initiated via the bus.
Link x	Off	No network connection.
	On	Connected to a network.
TX/RX x	Flashing	Invalid controller.
	On	Transmitting or receiving data.

6 Packet Structures

6.1 Ensuring Safe and Successful Control

Data written to the device will remain in its registers until the data is overwritten or the device is reinitialized.

If the soft starter may be controlled via Command Override (parameter 7A) or may be disabled via the reset input (terminals 10, 11) fieldbus commands should be cleared from the registers. If a command is not cleared, it will be re-sent to the starter once fieldbus control resumes.

6.2 Control Commands (Write Only)

Use output bytes 0-1 to send a control command to the soft starter.

Byte	Bits	Details
0	0 to 1	*Reserved*
	2 to 3	0 = Use soft starter remote input to select motor set 1 = Use primary motor set when starting 2 = Use secondary motor set when starting 4 = *Reserved*
	4	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)
	5 to 7	*Reserved*
1	0	0 = Stop 1 = Start
	1 to 2	*Reserved*
	3	1 = Reset
	4 to 7	*Reserved*

6.3 Status Commands (Read Only)

Starter status information is always available when the device is connected to a soft starter.

NOTE
For models WSx-0064BP and smaller (soft starter model ID 1~4), the current reported via communications registers is 10 times greater than the actual value.

Bytes 0-1: Control status

Bits	Details
0 to 5	Motor current (%FLC)
6	Command source 0 = Remote Keypad, Digital Input, Clock 1 = Network, Smart Card, Smart Card + Clock
7	1 = Ramping (starting or stopping)
8	1 = Ready
9	1 = Starting, running or stopping
10	1 = Tripped
11	1 = Warning
12 to 15	*Reserved*

Bytes 2-3: Starter state

Bits	Details
0 to 3	The decimal value of bits 0~3 indicates the starter's state: 0 = Communication error between device and soft starter 1 = Ready 2 = Starting 3 = Running 4 = Stopping 5 = Not ready (restart delay, restart temperature check, run simulation, reset input is open) 6 = Tripped 7 = Menu open (cannot start) 8 = Jog forward 9 = Jog reverse
4	0 = Negative phase sequence 1 = Positive phase sequence
5	1 = Current exceeds FLC
6	0 = Uninitialized 1 = Initialized
7	1 = Communication error between device and soft starter
8 to 15	*Reserved*

Bytes 4-5: Trip code

Bits	Details
0 to 15	Refer to Trip Codes on page 11

Bytes 6-7: Motor current

Bits	Details
0 to 15	Average rms voltage across all three phases

Bytes 8-9: Motor temperature

Bits	Details
0 to 15	Motor thermal model (%)

Bytes 10-59: Extended information

Bytes 10~59 report information from the soft starter's internal registers.

Byte	Description	Bits	Details
10-11	Version	0 to 8	*Reserved*
		9 to 15	Product type code: 12 = WSB 13 = WSIQ
12-13	Model number	0 to 7	*Reserved*
		8 to 15	Soft starter model ID
14-15	*Reserved*		
16-17	*Reserved*		
18-19	Starter state	0 to 4	0 = *Reserved* 1 = Ready 2 = Starting 3 = Running 4 = Stopping 5 = Not ready (restart delay, restart temperature check, run simulation, reset input is open) 6 = Tripped 7 = Programming mode 8 = Jog forward 9 = Jog reverse
		5	1 = Warning
		6	0 = Uninitialized 1 = Initialized
		7	0 = Remote Keypad, Digital Input, Clock 1 = Network, Smart Card, Smart Card + Clock

Byte	Description	Bits	Details
		8	*Reserved*
		9	0 = Negative phase sequence 1 = Positive phase sequence
		10 to 15	Refer to Trip Codes on page 11
20-21	Current	0 to 13	Average rms current across all three phases
		14 to 15	*Reserved*
22-23	Current	0 to 9	Current (% motor FLC)
		10 to 15	*Reserved*
24-25	Motor temperature	0 to 7	Motor thermal model (%)
		8 to 15	*Reserved*
26-27	*Reserved*		
28-29	% Power factor	0 to 7	100% = power factor of 1
		8 to 15	*Reserved*
30-31	*Reserved*		
32-33	Current	0 to 13	Phase 1 current (rms)
		14 to 15	*Reserved*
34-35	Current	0 to 13	Phase 2 current (rms)
		14 to 15	*Reserved*
36-37	Current	0 to 13	Phase 3 current (rms)
		14 to 15	*Reserved*
38-39	*Reserved*		
40-41	*Reserved*		
42-43	*Reserved*		
44-45	Parameter list version number	0 to 7	Parameter list minor revision
		8 to 15	Parameter list major version
46-47	Digital input state		For all inputs, 0 = open, 1 = closed (shorted)
		0	Reset
		1	*Reserved*
		2	Start/Stop
		3	Input A
		4	Input B
		5 to 15	*Reserved*
48-49	Trip code	0 to 15	Refer to Trip Codes on page 11
50-59	*Reserved*		

6.4 Parameter Management (Read/write)

The Profinet Card can read parameter values from and write parameter values to the soft starter. The card handles one parameter at a time.

The device references parameters according to their position in the starter's parameter list.

- Parameter number 1 corresponds to parameter 1A *Command Source*.
- The WSB has 143 parameters. Parameter number 143 corresponds to parameter 20E *Screen Timeout*.
- The WSIQ has 192 parameters. Parameter number 192 corresponds to parameter 20E *Screen Timeout*.

Use the following structures to read parameter values from or write parameter values to the soft starter.

CAUTION
Do not change the default values of the Factory parameters (parameter group 20). Changing these values may cause unpredictable behavior in the soft starter.

Output

Use output bytes 2-5 to read or write a parameter to the soft starter.

Master > Slave output bytes are structured as follows.

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

Input

Parameter management data from the starter is reported in input bytes 60-63.

Slave > Master input bytes are structured as follows.

Byte	Bits	Details
60	0 to 7	Echo parameter number
61	0	1 = Invalid parameter number
	1	1 = Invalid parameter value
	2 to 7	*Reserved*
62	0 to 7	Low byte parameter value read from soft starter
63	0 to 7	High byte parameter value read from soft starter

6.5 Trip Codes

Trip Code	Description
0	No trip
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
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).

6.6 Examples

Control Commands

Start the motor using parameter set 1							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
4	1						

Start the motor, select via remote input							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0	1						

Stop the motor using the programmed soft stop for motor set 2							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
8	0						

Quick stop the motor							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
16	0						

Reset a trip							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
≤ 28	8						

Status Commands

Read control status - Ready							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0	1						

Read control status - Running							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
		3	0				

Read control status - Tripped, trip code 4 (Current imbalance)							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
		6	0	4	0		

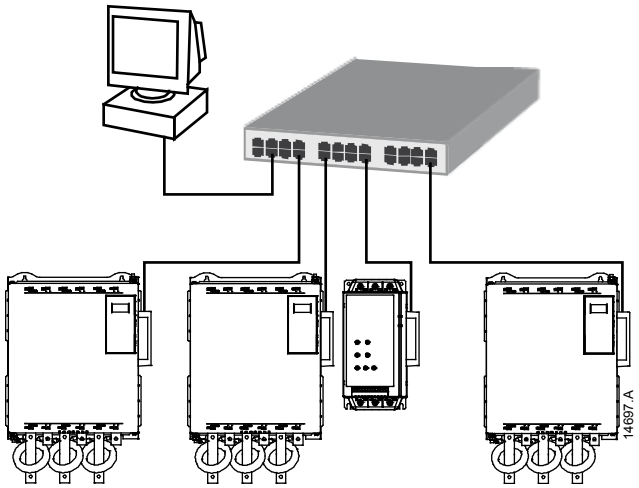
Write parameter to starter: parameter number 2, 1B *Motor Full Load Current* = 55							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
		2	4	55	0		
Acknowledge parameter write							
Byte 56	Byte 57	Byte 58	Byte 59	Byte 60	Byte 61	Byte 62	Byte 63
				2	0	55	0
Read parameter from WSB parameter number 12, 2I *Stop Mode*							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
		12	2	0	0		
Parameter read response: parameter 2I *Stop Mode* = 1 (TVR Soft Stop)							
Byte 56	Byte 57	Byte 58	Byte 59	Byte 60	Byte 61	Byte 62	Byte 63
				12	0	1	0

7 Network Design

The device supports star, line and ring topologies.

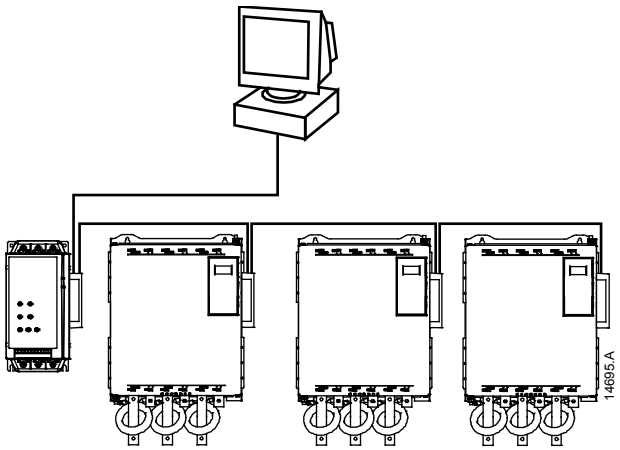
7.1 Star Topology

In a star network, all controllers and devices connect to a central network switch.



7.2 Line Topology

In a line network, the controller connects directly to one port of the first card. The second Ethernet port connects to another card, which in turn connects to another device until all devices are connected.



NOTE
The device has an integrated switch to allow data to pass through in line topology. The device must be receiving control power from the soft starter for the switch to operate.

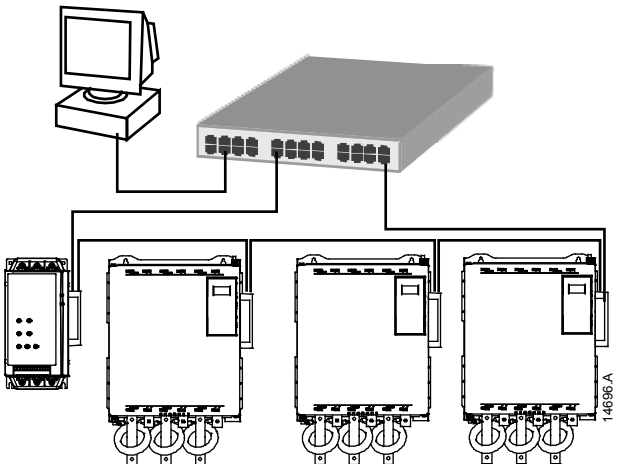
NOTE
If the connection between two devices is interrupted, the controller cannot communicate with devices after the interruption point.

NOTE
Each connection adds a delay to communication with the next device. The maximum number of devices in a line network is 32. Exceeding this number may reduce the reliability of the network.

7.3 Ring Topology

In a ring topology network, the controller connects to the first card, via a network switch. The second Ethernet port of the card connects to another device, which in turn connects to another device until all devices are connected. The final device connects back to the switch.

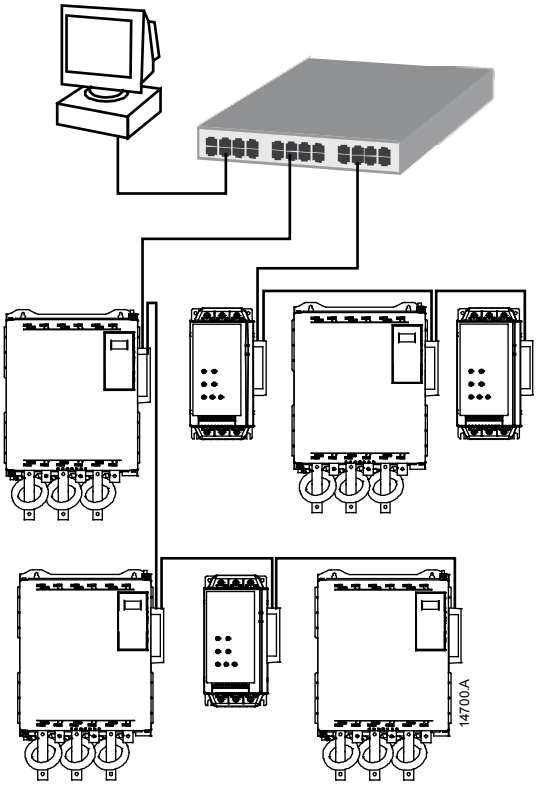
The device supports beacon based ring node configuration.



NOTE
The network switch must support loss of line detection.

7.4 Combined Topologies

A single network can include both star and line components.



8 Specifications

Connections

Soft starter ..... 6-way pin assembly
Contacts ..... Gold flash
Network RJ45

Settings

IP address ..... Automatically assigned, configurable
Device name ..... Automatically assigned, configurable

Network

Link speed ..... 10 Mbps, 100 Mbps (auto-detect)
Full duplex
Auto crossover

Power

Consumption (steady state, maximum) ..... 35 mA @ 24 VDC
Reverse polarity protected
Galvanically isolated

Certification

CE ..... EN 60947-4-2

Profibus & Profinet International .....

710-18895-00A