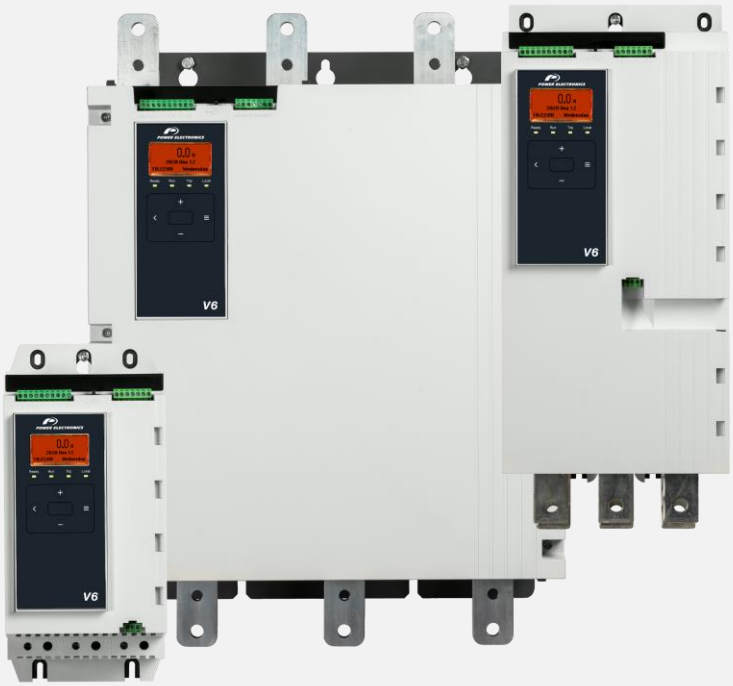
POWER ELECTRONICS

V6

ACCESSORIES MANUAL

PROFIBUS BOARD



DIGITAL SOFTSTARTER

V6

DIGITAL SOFTSTARTER

Programming and Software Manual

Edition: June 2023

Rev. A

ABOUT THIS DOCUMENT

COMPATIBILITY

The Profibus Card is suitable for use with V6 soft starters.

The available features may vary according to the model and version of the starter.

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.

Failure to follow the information and instructions in this manual will void the warranty.

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REVISIONS CONTROL

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EN

SAFETY SYMBOLS

Always follow safety instructions to prevent accidents and potential hazards from occurring.

In this manual, safety messages are classified as follows:

NOTICE

Indicates a hazard that may cause personal injury or death.

CAUTION

Indicates a hazard that may damage the equipment or installation.

WARNING

Provides helpful information.

Other symbols used in this manual for safety messages are the following:

Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.

Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.

Energy storage timed discharge. Wait for the indicated time to avoid electrical hazards.

Caution, risk of hearing damage. Wear hearing protection.

Warnings

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

WARNING

For your safety, isolate the soft starter completely 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.

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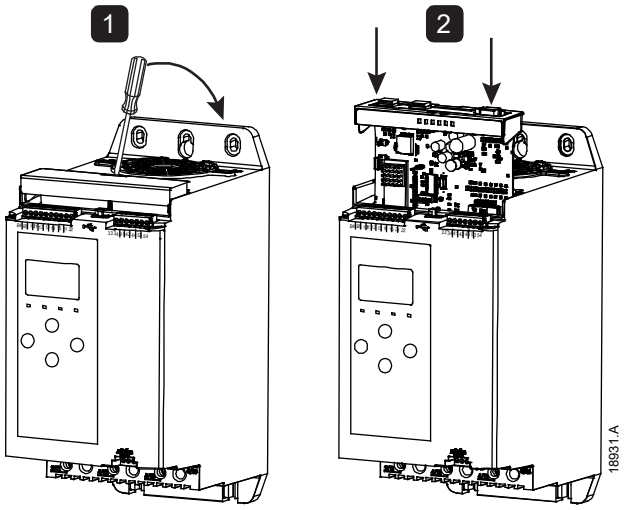
1 INSTALLATION

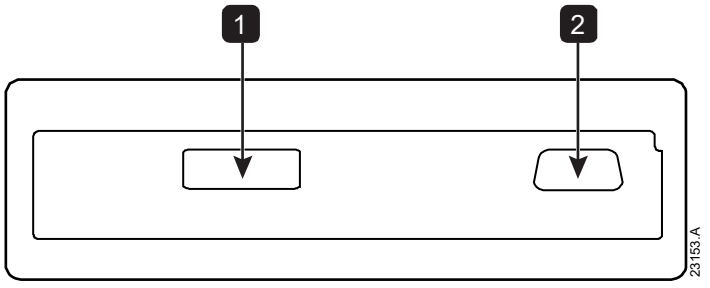
1

Installing the expansion card

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.



Connections



1	DB9 connector to Profibus network
2	DB9 connector for optional remote keypad

Connecting to the communication 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

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

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

NOTICE
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.

2 CONFIGURATION

2

Import the latest .gsd file into your Master configuration tool. This file is available from your supplier.

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.

Profibus Address

The network address for the card must be set via the soft starter (parameter 12G *Profibus Address*). For details on how to configure the soft starter, see the soft starter user manual.

NOTICE
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.

Enabling network control

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

NOTICE
If the reset input is active, the starter will not operate. If a reset switch is not required, use parameter 7I to set the reset input to normally open or 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.

NOTICE
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.

3 DATA STRUCTURES

3

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 9	✓	✓	✓
Soft Starter Monitoring I/O Data Structure on page 11	×	✓	✓
Soft Starter Programming I/O Data Structure on page 13	×	×	✓

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.

NOTICE
The available features and parameter details may vary according to the model and software version of the starter. Refer to the soft starter user manual for details of parameters and supported features.

Soft Starter Control I/O Data Structure

Master > Slave control word is structured as follows:

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*

Byte	Bits	Details
1	0	0 = Stop 1 = Start
	1 to 2	*Reserved*
	3	1 = Reset
	4 to 7	*Reserved*

NOTICE
Bit 4 of byte 0 must be set to 0 for the soft starter to perform a start.

Slave > Master status word is structured as follows:

Byte	Bits	Details
0	0 to 5	Motor current (% FLC)
	6	Command source 0 = Network 1 = Remote Keypad, Digital Input, Clock
	7	1 = Ramping (starting or stopping)
1	0	1 = Ready
	1	1 = Starting, running or stopping
	2	1 = Tripped
	3	1 = Warning
	4 to 7	*Reserved*

[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 0064B and smaller this value will be 10 times greater than the value displayed on the keypad.

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)	

NOTICE
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	**Description**	**Bits**	**Details**
0	*Reserved*		
1	Product information	0 to 7	*Reserved*
		8 to 15	Product type code: 12 = n/a 13 = V6
2	Starter state	0 to 3	1 = Ready 2 = Starting 3 = Running 4 = Stopping (including braking) 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
		4	0 = Negative phase sequence 1 = Positive phase sequence (only valid if bit 6 = 1)
		5	1 = Current exceeds FLC

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Data Request Number	Description	Bits	Details
		6	0 = Uninitialised 1 = Initialised
		7	1 = Communication error between device and soft starter
		8 to 15	See *Trip Codes* on page 14
3	Motor current	0 to 7	Average rms current across all three phases (low byte)
		8 to 15	Average rms current across all three phases (high byte)
4	Motor temperature	0 to 7	Motor thermal model (%)
		8 to 15	*Reserved*
5	% Power factor	0 to 7	100% = power factor of 1
		8 to 15	*Reserved*
6	Power (kW)	0 to 11	Power
		12 to 15	Power scale 0 = Multiply power by 10 to get W 1 = Multiply power by 100 to get W 2 = Power (kW) 3 = Multiply power by 10 to get kW
7	Power (kVA)	0 to 11	Power
		12 to 15	Power scale 0 = Multiply power by 10 to get VA 1 = Multiply power by 100 to get VA 2 = Power (kVA) 3 = Multiply power by 10 to get kVA
8	Voltage	0 to 13	Average rms voltage across all three phases
		14 to 15	*Reserved*
9	Current	0 to 13	Phase 1 current (rms)
		14 to 15	*Reserved*
10	Current	0 to 13	Phase 2 current (rms)
		14 to 15	*Reserved*
11	Current	0 to 13	Phase 3 current (rms)
		14 to 15	*Reserved*
12	Voltage	0 to 13	Phase 1 voltage
		14 to 15	*Reserved*
13	Voltage	0 to 13	Phase 2 voltage
		14 to 15	*Reserved*
14	Voltage	0 to 13	Phase 3 voltage
		14 to 15	*Reserved*
15	Parameter list version number	0 to 7	Parameter list minor revision number
		8 to 15	Parameter list major version number

Data Request Number	Description	Bits	Details
16	Digital input state		For all inputs, 0 = open, 1 = closed (shorted)
		0	Start/Stop
		1	*Reserved*
		2	Reset
		3	Input A
		4	Input B
		5 to 15	*Reserved*

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.

CAUTION
Changing the values of the Advanced parameters (parameter group 20) may cause unpredictable behaviour in the soft starter. Consult your local supplier before adjusting the Advanced parameters.

NOTICE
Parameter lists vary according to the model and version of soft starter.

See the relevant soft starter literature for a complete parameter list.

Outputs

Master > Slave output bytes are structured as follows.

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

Inputs

Slave > Master input bytes are structured as follows.

Byte	Bits	Details
6	0 to 7	Echo parameter number
7	0	1 = Invalid parameter number
	1	1 = Invalid parameter value
	2 to 7	*Reserved*
8	0 to 7	High byte parameter value read from soft starter
9	0 to 7	Low byte parameter value read from soft starter

Trip Codes

Trip Code	Description
255	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	Communications card fault
16	Forced network trip
17	Internal fault
18	Overvoltage
19	Undervoltage
20	Ground fault
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
47	Overpower
48	Underpower
56	Keypad disconnected
57	Zero Speed Detect
58	SCR Itsm
59	Instantaneous overcurrent
60	Rating Capacity
70	Current Read Err L1
71	Current Read Err L2
72	Current Read Err L3
73	Remove Mains Volts (mains voltage connected in run simulation)
74	Motor Connection T1
75	Motor Connection T2
76	Motor Connection T3
77	Firing Fail P1
78	Firing Fail P2
79	Firing Fail P3
80	VZC Fail P1
81	VZC Fail P2
82	VZC Fail P3
83	Low Control Volts
84~96	Internal fault x. Contact your local supplier with the fault code (X).

4 PROFIBUS DIAGNOSTIC TELEGRAM AND FLAG

4

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 (see *Trip Codes* on page 14).

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.

5 PROFIBUS FREEZE MODE

5

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 device to normal operation.

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6 PROFIBUS SYNC MODE

6

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 device to normal operation.

7 PROFIBUS CLEAR MODE

7

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

EN

8 SPECIFICATIONS

8

- **Connections**

Soft starter ..... 6-way pin assembly
Network ..... DB9 female
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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