Profibus Interface

Part Number: PIM-PB-01
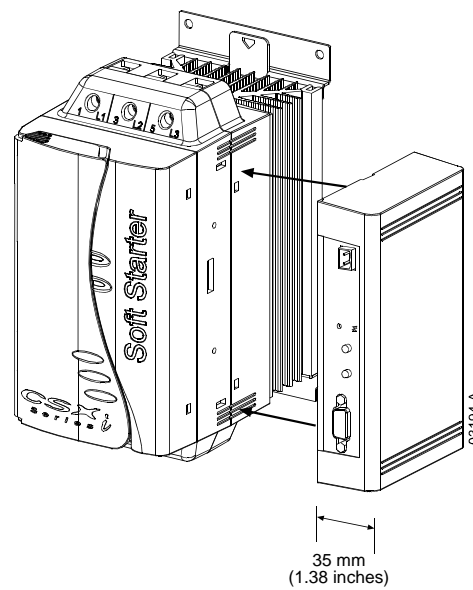
1.   Installation

Install the Profibus Interface using the following procedure:

1.   Remove control power and mains supply from the soft starter.
2.   Attach the Interface to the starter as shown.
3.   Set the interface address to match the address set in the Master configuration tool.
4.   Apply control power to the soft starter.
5.   Insert the network connector and power up the interface.

CSX Series:
Plug the interface onto the side of the soft starter.


35 mm
(1.38 inches)

EMX3:

1.   To plug the interface onto the side of the soft starter, line the interface up with the communications port slot.

2.   Press the top retaining clip of the interface into the soft starter chassis.

3.   Press the bottom retaining clip of the interface into the soft starter chassis.

35 mm
(1.38 inches)
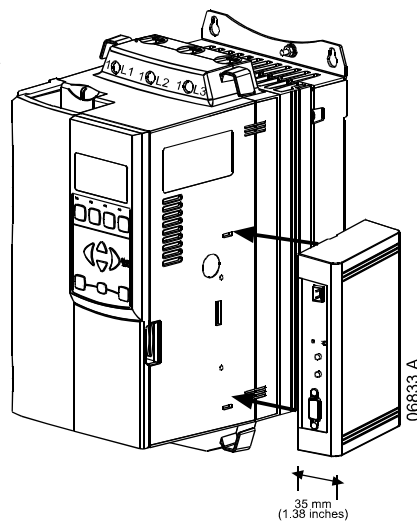
MVS:

Plug the interface onto the back of the MVS Controller.
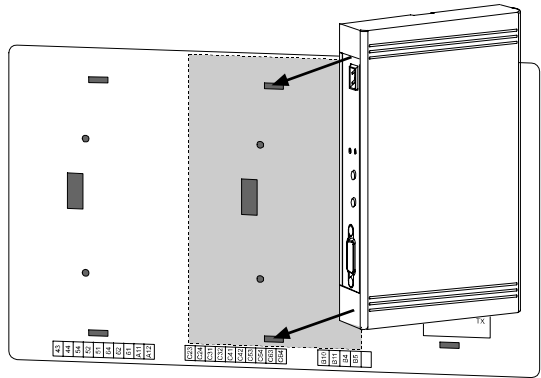
Remove the Profibus Interface using the following procedure:

1. Remove power from the interface.

2. Remove control power and mains supply from the soft starter.

3. Disconnect all field wiring from the interface.

4. Push a small flat-bladed screwdriver into the slots at the top and bottom of the interface and depress the retaining clips.

5. Pull the interface away from the soft starter.
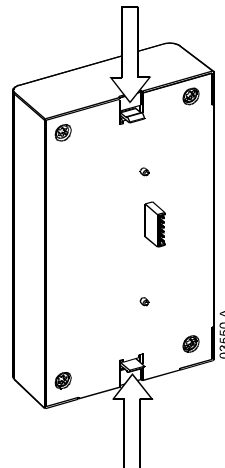
> ⚠ **CAUTION**
> Remove mains and control voltage from the soft starter before attaching or removing accessories. Failure to do so may damage the equipment.

2.   Configuration

Import the file "SSPM08A8.gsd" into your Master configuration tool. This file can be downloaded from the Resources section of the website www.aucom.com or available on disk. The GSD file contains three operating modules – refer to *Data Structures* on page 4 to select the appropriate module for your application.

If your Master uses on-screen icons, there are two graphic bitmap files available from disk or can be downloaded from the website www.aucom.com. SSPM_N.bmp indicates normal mode. SSPM_D.bmp indicates diagnostic mode.

> ⚠ **NOTE**
> The Profibus Interface has a slave address range of 0 to 99.

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

A Communication Timeout parameter in the GSD file sets how long after this event it takes for the soft starter to 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.

3. Adjustment

Before powering up the Profibus Interface, set the two rotary switches so that the interface address matches the address set in your Master configuration tool (the diagram below shows the factory default setting for the rotary switches).

The interface automatically detects the data rate.
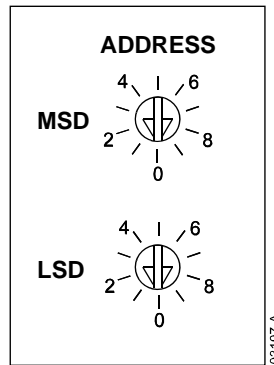
4. Connection

The interface connects to the Profibus network via a standard 9 pin Sub-D connector.

The Profibus Interface can be powered through the network cable or externally (24 VDC).

If the EMX3 or MVS soft starter is operating in Remote mode, links must be fitted to terminals C31-C32 and C41-C42 as shown (these links are not required for Local mode operation).

⚠️ NOTE
EMX3 parameter 6-R selects whether the soft starter will accept Start, Stop and Reset commands from the serial network Master. Refer to the EMX3 User Manual for parameter details.
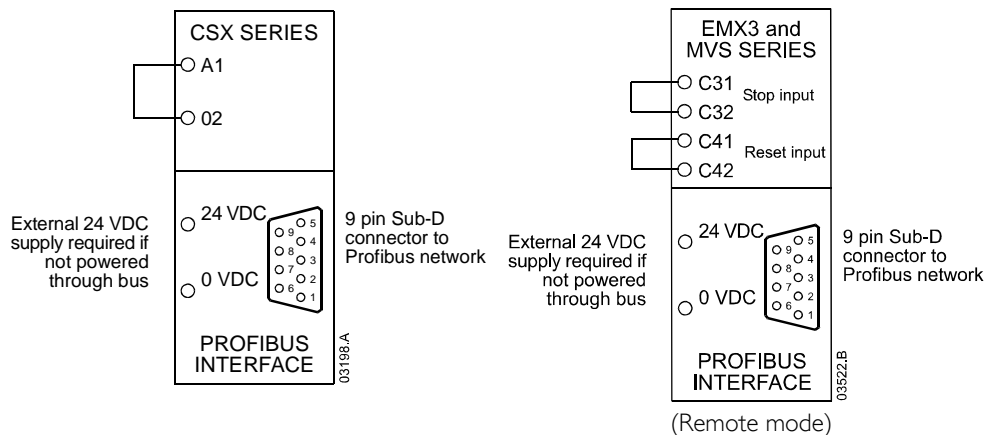
9 pin Sub-D connector	
Pin No.	Assignment
1	Shield
2	24 VDC negative (optional)
3	RxD/TxD-P
4	not used
5	DGND
6	VP (end of bus slave only)
7	24 VDC positive (optional)
8	RxD/TxD/-N
9	DGND

5. Power Status LED (Red) and Bus Status LED (Green)

LED	OFF	ON
Power Status	Interface not powered up	Interface powered up and ready to go online
Bus Status	No connection, offline or data exchange failure	Interface online and in data exchange state

Power Status LED — Bus Status LED

03523.B
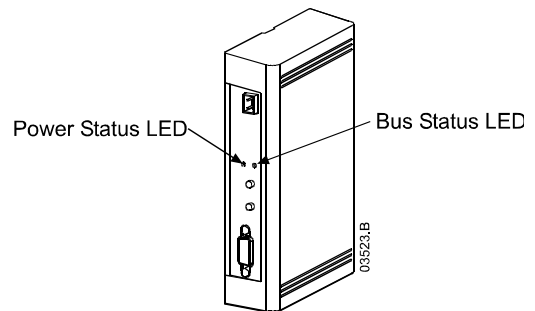
⚠ **NOTE**
If communication fails between the interface and the network, the Bus Status LED will go off. When communication is restored, the Bus Status LED will come back on.

⚠ **NOTE**
When a communications failure occurs, the soft starter will trip if the Communication Timeout parameter for the network is set greater than zero. When communication is restored, the soft starter must be reset.

6. 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	✓	✓	✓
Soft Starter Monitoring I/O	✗	✓	✓
Soft Starter Programming I/O	✗	✗	✓

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 the EMX3 and MVS soft starters).

7. 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	Parameter 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	Fwd run

Quick stop and Parameter set function as follow:

Quick stop

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.

Parameter set (EMX3 and MVS only)

Selects which parameter set to use when starting:
0 = selected from soft starter remote input
1 = soft starter parameter set 1
2 = soft starter parameter set 2
3 = reserved

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 [2]	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 [2]	Fault	On	Ready

[1] Motor current (% FLC) represents current as a percentage of the set motor FLC. A maximum value of 63 represents 200% FLC. To render this value as a readable percentage, divide by 0.315. Only available on CSX*i*, EMX3 and MVS soft starters.
[2] Only available on EMX3 and MVS soft starters.

Ready is set when the soft starter is ready to start the motor.
On is set when the soft starter is starting, running, soft stopping or jogging 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.

8. Soft Starter Monitoring I/O Data Structure

Master > Slave output byte is structured as follows:

Byte 2
Operating data request (Data request numbers 1 to 14)

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	
High byte operating data value read from the soft starter	
Byte 5	
Low byte operating data value read from the soft starter	

⚠️ **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*	*Reserved*
1	Soft starter product type code: 4 = CSX Series 5 = MVS Series 6 = EMX3 Series	Soft starter software version number
2	Trip/Warning code	Soft starter status
3 [1]	Average current (high byte)	Average current (low byte)
4 [2]	Motor 2 temperature	Motor 1 temperature [1]
5	*Reserved*	Percentage power factor
6	Power (kW)	
7	Power (kVA)	
8	Average voltage	
9	L1 current	
10	L2 current	
11	L3 current	
12 [3]	L1 voltage	
13 [3]	L2 voltage	
14 [3]	L3 voltage	
15	*Reserved*	*Reserved*

[1] CSX open loop soft starter models will read back average current as "2222" and motor temperature as "111" decimal.

[2] Motor temperature is calculated using the soft starter thermal modelling. Motor temperature is available only on CSX*i*, EMX3 and MVS soft starters.

[3] L1, L2, L3 voltage data is only available from the EMX3 if a voltage field fit option card is installed.

Input bytes for data request numbers 6 and 7 are defined as follows:

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
High Byte	Power scale factor				Power high nibble			
Low Byte	Power low byte							

The power scale factor functions as follows:

0 = multiply power by 10 to get W/VA
1 = multiply power by 100 to get W/VA
2 = power is represented in kW/kVA
3 = multiply power by 10 to get kW/kVA

NOTE

Data request numbers 5 to 14 are only valid for EMX3 and MVS soft starters. CSX soft starters will return zero values.

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 interface and soft starter)
1	Ready to start (waiting)
2	Starting (soft starting)
3	Running (running – full voltage at the motor)
4	Stopping (soft stopping)
5	Not ready (restart or thermal delay and Run simulation)
6	Fault (tripped)
7[1]	Starter in Menu, Logs or Tools mode (cannot start)
8[1]	Jog Forward (slow speed)
9[1]	Jog Reverse (slow speed)

Bits 4 to 7 function as follows:

Bit Number	Function
Bit 4	Set if positive phase sequence detected (Bit 6 must = 1)
Bit 5	Set if average current exceeds soft starter FLC setting
Bit 6	Set after first start once phase sequence has been confirmed
Bit 7	Set if a communication failure occurs between interface and soft starter

[1] Status is only applicable to the EMX3 soft starter.

Trip/Warning Codes

The high byte data value of data request number 2 reports the soft starter trip or warning code. Details are as follows:

Trip Code	Trip Type	CSX	CSX*i*	EMX3	MVS
1	Excess start time		●	●	●
2	Motor 1 overload (thermal model)		●	●	●
3	Motor thermistor		●	●	●
4	Current imbalance (Phase imbalance)		●	●	●
5	Frequency (Mains supply)	●	●	●	●
6	Phase sequence		●	●	●
7	Instantaneous overcurrent			●	●
8	Power loss (Power Circuit)	●	●	●	●
9	Undercurrent			●	●
11	Motor connection			●	●
12	Input A trip (Auxiliary input A)			●	●
13	FLC too high (FLC out of range)			●	
14	Unsupported option (not available in 6-wire)			●	
15	Starter communication (between interface and soft starter)	●	●	●	●
16	Network communication (between interface and network)	●	●	●	●
17	Internal fault			●	●
18	Overvoltage			●	●
19	Undervoltage			●	●
20	Ground fault			●	●
21	RTD relay				●
22	RTD communication fail				●
23	EEPROM fail			●	●
24	Input B trip (Auxiliary input B)			●	●
25	Bypass fail (Bypass contactor)			●	●
26	L1 phase loss			●	●
27	L2 phase loss			●	●
28	L3 phase loss			●	●
29	L1 shorted SCR			●	●
30	L2 shorted SCR			●	●
31	L3 shorted SCR			●	●
32	Motor 2 overload (thermal model)			●	
33	Time overcurrent (Bypass overload)		●	●	
34	SCR overtemp (SCR thermal model)				●
35	Battery/Clock			●	●
36	Thermistor circuit			●	
37	RTD A overtemperature			●	
38	RTD B overtemperature			●	
39	RTD C overtemperature			●	
40	RTD D overtemperature			●	
41	RTD E overtemperature			●	
42	RTD F overtemperature			●	
43	RTD G overtemperature			●	
44	RTD H overtemperature			●	
45	RTD circuit fail			●	
46	Analogue input trip			●	
255	No trip	●	●	●	●

9. 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*	*Reserved*	*Reserved*	*Reserved*	*Reserved*	Write parameter	Read parameter	*Reserved*
Byte 5	High byte parameter value to write to soft starter/ zero value for read							
Byte 6	Low byte parameter value to write to soft starter/ zero value 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*	*Reserved*	*Reserved*	Parameter access level		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							

Parameter access level is defined as follows:

0 = Read only
1 = Operator (MVS parameter groups 1-16, EMX3 parameter groups 1-12)
2 = Supervisor (MVS parameter groups 20 and 21, EMX3 parameter groups 15 and 16)
3 = Commissioning (MVS parameter group 30, EMX3 parameter group 20)

⚠️ **NOTE**
This operating module only functions with EMX3 and MVS soft starters.

10. Profibus Diagnostic Telegram and Flag

The Profibus Interface 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 (EMX3 and MVS only)

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 *Soft Starter Monitoring I/O Data Structure* for trip codes).

Changed Parameter Number

If a parameter is changed via the soft starter's local control interface, the affected parameter number is reported in Byte 2. When the Master reads the changed parameter, Byte 2 is reset = 0.

A changed parameter number does not set a diagnostic flag.

This function is only available on EMX3 and MVS soft starters.

11. Profibus Freeze Mode

The Profibus Interface 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 Interface to normal operation.

12. Profibus Sync Mode

The Profibus Interface 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 Interface to normal operation.

13. Profibus Clear Mode

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

14. Specifications

Enclosure	
Dimensions	35 mm (W) x 157 mm (H) x 90 mm (D)
Weight	250 g
Protection	IP20

Mounting
Spring-action plastic mounting clips (x 2)

Connections	
Soft starter	6-way pin assembly
Contacts	Gold flash
Network	DB9 female
External power supply	2-way removable screw type
Maximum cable size	2.5 mm^2

Settings	
Network address	
Setting	MSD and LSD rotary switches
Range	0 to 99
Data rate	
Setting	Auto-detect
Range	9.6 kb/s ~ 12.0 Mb/s

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

Certification	
C✓	IEC 60947-4-2
CE	IEC 60947-4-2
Profibus International	