



# Profibus Module

## User Manual

### 1 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 Installation

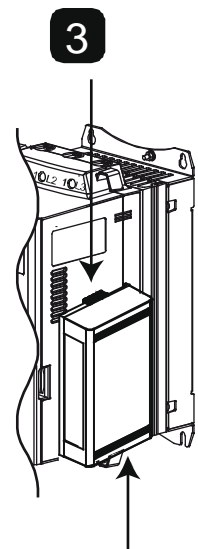
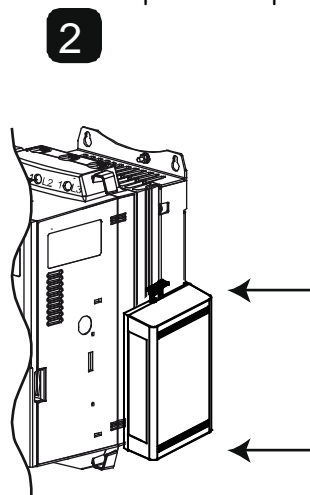
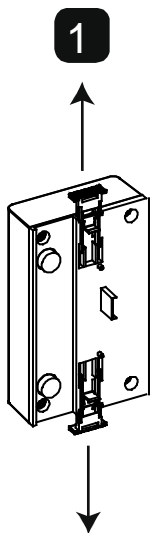


#### CAUTION

Remove mains and control voltage from the soft starter before attaching or removing accessories. Failure to do so may damage the equipment.

#### 2.1 Installation Procedure

1. Remove control power and mains supply from the soft starter.
2. Fully pull out the top and bottom retaining clips on the module.
3. Line up the module with the comms port slot.
4. Push in the top and bottom retaining clips to secure the module to the starter.
5. Set the module address to match the address set in the Master configuration tool.
6. Apply control power to the soft starter.
7. Insert the network connector and power up the module.

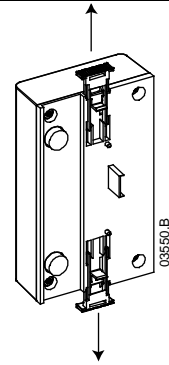


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Remove the module using the following procedure:

1. Take the module off-line.
2. Remove control power and mains supply from the soft starter.
3. Disconnect all external wiring from the module.
4. Fully pull out the top and bottom retaining clips on the module.
5. Pull the module away from the soft starter.



### 3 Configuration

Import the latest .gsd file into your Master configuration tool. This file is available from [www.ge.com/ex/industrialsolutions](http://www.ge.com/ex/industrialsolutions).

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.



#### NOTE

The Profibus Module has a slave address range of 0 to 99.

If the Profibus network fails, the module 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

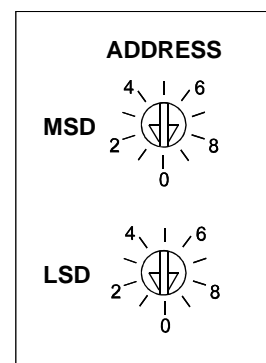
If the Communication Timeout parameter is set to 0, the current state of the soft starter will remain unchanged on a network failure. This gives the user the option of operating the soft starter via local control, but is NOT failsafe.

### 4 Adjustment

Before powering up the Profibus Module, set the two rotary switches so that the module address matches the address set in your Master configuration tool.

eg MSD = 2 and LSD = 1 corresponds to address 21.

(The diagram shows the factory default setting for the rotary switches).



The module automatically detects the network data rate.



## 5 Connection

The module connects to the Profibus network via a standard DB9 connector. The Profibus Module can be powered either through the network cable or externally (24 VDC).

ASTAT XB/XBm: For the Profibus Module to accept fieldbus commands, a link must be fitted across terminals A1-02 on the soft starter.

ASTAT XL: Input links are required across the stop and reset inputs if the soft starter is being operated in Remote mode. In Local mode, links are not required.



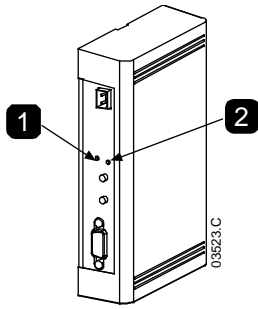
### NOTE

ASTAT XL: Parameter *Comms in Remote* selects whether the soft starter will accept Start and Stop commands from the Serial Network Master while in Remote Mode. See the soft starter user manual for parameter details.

ASTAT XB/XBm		ASTAT XL	
<b>1</b>	ASTAT XB/XBm A1, 02: Stop input	<b>1</b>	ASTAT XL (Auto mode) 56, 57: Stop input 58, 57: Reset input
<b>2</b>	Profibus Module	<b>2</b>	Profibus Module
<b>3</b>	External 24 VDC supply required if not powered through bus	<b>3</b>	External 24 VDC supply required if not powered through bus
<b>4</b>	DB9 connector to Profibus network	<b>4</b>	DB9 connector to Profibus network
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		



## 6 LEDs



		OFF	ON
<b>1</b>	Power status (red)	Module not powered up	Module powered up and ready to go online
<b>2</b>	Bus status (green)	No connection, offline or data exchange failure	Module online and in data exchange state



### NOTE

If communication fails between the module 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 may trip if the Communication Timeout parameter for the network is set greater than zero. When communication is restored, the soft starter must be reset.

## 7 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	x	✓	✓
Soft Starter Programming I/O Data Structure on page 10	x	x	✓

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 ASTAT XL soft starters).



## 7.1 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
<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	Quick stop	Motor set		<i>Reserved</i>	<i>Reserved</i>
Byte 1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	Reset	<i>Reserved</i>	<i>Reserved</i>	Fwd run

### 7.1.1 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.

### 7.1.2 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	Hand	Motor current (% FLC) <sup>1</sup>					
Byte 1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	Warning	Fault	On	Ready

<sup>1</sup> 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 QLxxB0053D 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.

**Hand** is set when the soft starter is set to Hand mode.

## 7.2 Soft Starter Monitoring I/O Data Structure

Master > Slave output byte is structured as follows:

<b>Byte 2</b>
Operating data request (Data request numbers 1 to 16)

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

<b>Byte 2</b>
Echo data request number
<b>Byte 3</b>
Bits 7 to 1 <i>Reserved</i>   Bit 0 = 1: Invalid data request number
<b>Byte 4</b>
Data value - high byte
<b>Byte 5</b>
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:



### NOTE

Some soft starters do not support some functions.



### NOTE

Data request numbers 4 (only 'Motor 2 Temperature') to 16 are only valid for ASTAT XL starters. ASTAT XB/XBm starters will return zero values. ASTAT XB open loop soft starters will read back average current as "2222" and motor 1 temperature as "111" decimal.

Data Request Number	Data Value High Byte	Data Value Low Byte
0	<i>Reserved</i>	
1	Soft starter product type code <sup>1</sup>	Soft starter software version number
2	Trip/Warning code	Soft starter status
3 <sup>2</sup>	Average current (high byte)	Average current (low byte)
4 <sup>3</sup>	Motor 2 temperature	Motor 1 temperature
5	<i>Reserved</i>	% Power factor
6	Power (kW)	



7	Power (kVA)	
8	Average voltage	
9 <sup>2</sup>	L1 current	
10 <sup>2</sup>	L2 current	
11 <sup>2</sup>	L3 current	
12	<i>Reserved</i>	
13	<i>Reserved</i>	
14	<i>Reserved</i>	
15	Software major version number	Software minor revision number
16	<i>Reserved</i>	Digital Input state

<sup>1</sup> Product type code:

4 = ASTAT XB/XBm

9 = ASTAT XL

<sup>2</sup> For models QLxxB0053D and smaller this value will be 10 times greater than the value displayed on the keypad.

<sup>3</sup> Motor temperature is calculated using the soft starter thermal modelling.

### 7.2.1 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 module 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 delay, restart temperature check)
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	Set if positive phase sequence detected (Bit 6 must = 1)
Bit 5	Set if average current exceeds Motor FLC setting
Bit 6	Set after first start once phase sequence has been confirmed
Bit 7	Set if a communication failure occurs between module and soft starter



### 7.2.2 Power

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

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

Powerscale functions as follows:

- 0 = multiply Power by 10 to get W
- 1 = multiply Power by 100 to get W
- 2 = Power is represented in kW
- 3 = multiply Power by 10 to get kW

### 7.2.3 Digital Input State

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

	<b>Bit 7</b>	<b>Bit 6</b>	<b>Bit 5</b>	<b>Bit 4</b>	<b>Bit 3</b>	<b>Bit 2</b>	<b>Bit 1</b>	<b>Bit 0</b>
<b>Low Byte</b>	<i>Reserved</i>				Input A	Reset	Stop	Start

### 7.2.4 Trip Codes

Data request number 2 high byte indicates the soft starter trip or warning code. Details are as follows:

<b>Trip Code</b>	<b>Description</b>	<b>ASTAT XB</b>	<b>ASTAT XBm</b>	<b>ASTAT XL</b>
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 module and soft starter)	●	●	●
16	Network communication (between module and network)	●	●	●





Trip Code	Description	ASTAT XB	ASTAT XBm	ASTAT XL
17	Internal fault x (where x is the fault code detailed in the table below)			●
23	Parameter out of range			●
26	L1 phase loss			●
27	L2 phase loss			●
28	L3 phase loss			●
29	L1-T1 shorted			●
30	L2-T2 shorted			●
31	L3-T3 shorted			●
32	Motor 2 overload			●
33 <sup>1</sup>	Time-overcurrent / Bypass overload		●	●
35	Battery/clock			●
36	Thermistor circuit			●

<sup>1</sup> For ASTAT XL, time-overcurrent protection is only available on internally bypassed models.

### 7.2.5 Internal Fault x

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	Internal fault X Contact your local supplier with the fault code (X).
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).



#### NOTE

Only available on ASTAT XL soft starters. For parameter details, see the soft starter User Manual.



### 7.3 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
<b>Byte 3</b>	Parameter number to read/write							
<b>Byte 4</b>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	Write parameter	Read parameter	<i>Reserved</i>
<b>Byte 5</b>	High byte parameter value to write to soft starter/ zero data values for read							
<b>Byte 6</b>	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
<b>Byte 6</b>	Echo parameter number							
<b>Byte 7</b>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	Parameter access level	Write access denied	Invalid parameter value	Invalid parameter number	
<b>Byte 8</b>	High byte parameter value read from soft starter							
<b>Byte 9</b>	Low byte parameter value read from soft starter							

#### 7.3.1 Parameter Access Level

Parameter access level is defined as follows:

0 = Read only

1 = Operator (ASTAT XL parameter groups 1~10)

2 = Supervisor (ASTAT XL parameter groups 15 and 16)



#### NOTE

This operating module only functions with ASTAT XL soft starters.



## 8 Profibus Diagnostic Telegram and Flag

The Profibus Module 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 (ASTAT XL only)

### 8.1 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 8).

### 8.2 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.

## 9 Profibus Freeze Mode

The Profibus Module 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 Module to normal operation.

## 10 Profibus Sync Mode

The Profibus Module 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 Module to normal operation.

## 11 Profibus Clear Mode

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



## 12 Specifications

### Enclosure

Dimensions ..... 40 mm (W) x 166 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<sup>2</sup>

### 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 .....

