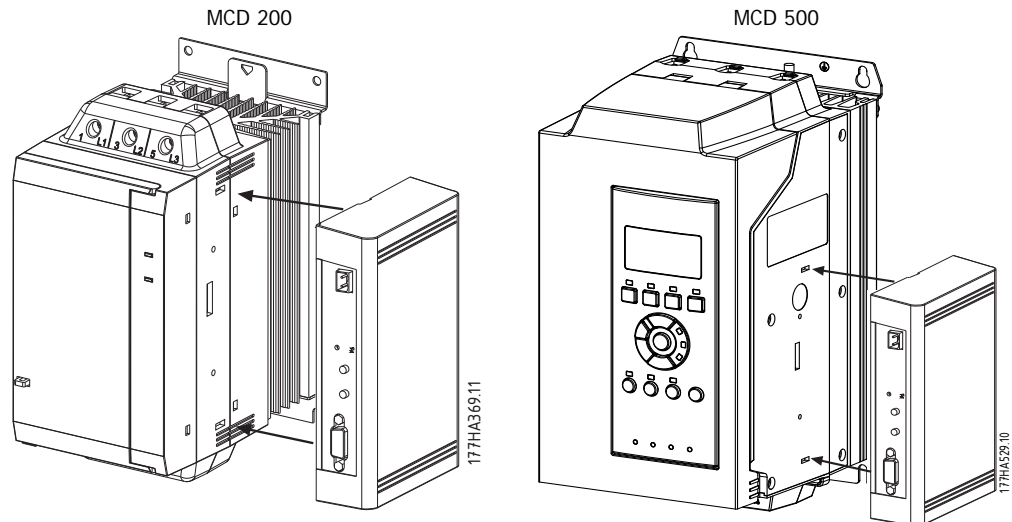


INSTALLATION INSTRUCTIONS: MCD PROFIBUS MODULE

Order Code: 175G9001

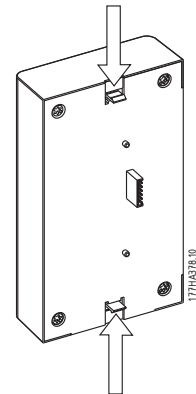
1. Installation

1. Remove control power and mains supply from the soft starter.
2. Attach the module to the soft starter as illustrated below.
3. Set the module 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 module.



Remove the Profibus Module using the following procedure:

1. Remove power from the module.
2. Remove control power and mains supply from the soft starter.
3. Disconnect all field wiring from the module.
4. Push a small flat-bladed screwdriver into the slots at the top and bottom of the module and depress the retaining clips.
5. Pull the module away from the soft starter.



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 is available on the supplied CD or can be downloaded from the website www.danfoss.com/drives. The GSD file contains three operating modules – see *Data Structures* to select the appropriate module for your application.

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



N.B.!:

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.



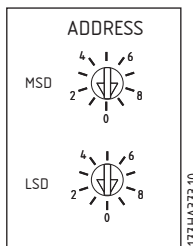
N.B.!:

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 Module, set the two rotary switches so that the module address matches the address set in your Master configuration tool (the diagram shows the factory default setting for the rotary switches).

The module automatically detects the network data rate.



4. Connection

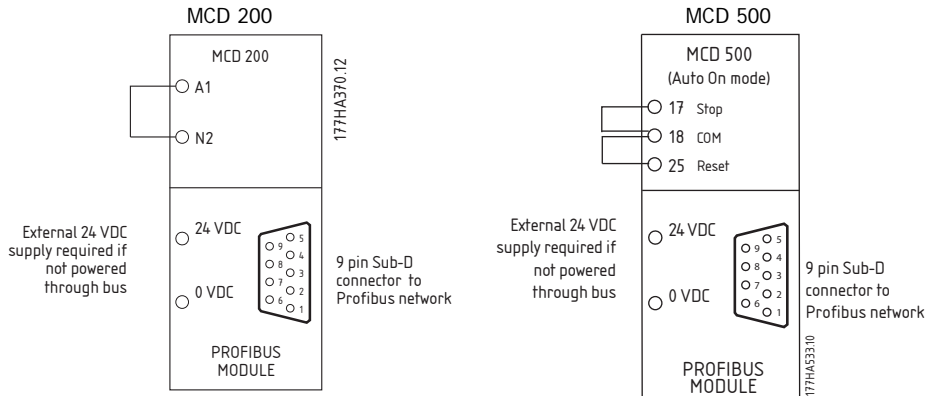
The module connects to the Profibus network via a standard 9 pin Sub-D connector.

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

For the Profibus Module to accept serial commands, a link must be fitted across terminals A1-N2 on MCD 200 Series starters.

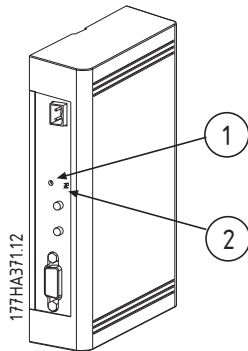
In order for the MCD 500 to accept commands from the serial network, the soft starter must be in Auto On mode and links must be fitted to terminals 17 and 25 to 18.

In Hand On mode, the starter will not accept commands from the serial network but the starter's status can still be monitored.



| 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. LEDs



| | | OFF | ON |
|---|--------------------|---|--|
| 1 | Power status (Red) | Module not powered up | Module powered up and ready to go online |
| 2 | Bus status (Green) | No connection, offline or data exchange failure | Module online and in data exchange state |



N.B.!:

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.



N.B.!:

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.

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 MCD 500 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 |
| <i>Reserved</i> | <i>Reserved</i> | <i>Reserved</i> | Quick stop | Motor set ¹ | | <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 |

¹ Ensure that the programmable input is not set to Motor Set Select before using this function.

Quick stop and Motor set function as follow:

7.1. 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 (i.e. coast to stop).



N.B.!

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

7.2. Motor set bits (MCD 500 only)

Selects which parameter set to use when starting:

0 = selected from soft starter remote input

1 = soft starter primary motor set

2 = soft starter secondary motor set

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 | Hand On ² | Motor current (% FLC) ¹ | | | | | |
| 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 ² | Fault | On | Ready |

¹ Motor current (% FLC) represents current as a percentage of the set motor FLC (only available on MCD 202 and MCD 500 soft starters). A maximum value of 63 represents 200% FLC. To convert this value to a readable percentage, divide by 0.315. For MCD 500 models MCD5-0068B and smaller this value will be 10 times greater than the value displayed on the LCP.

² Only available on MCD 500 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 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 On is set when the soft starter is set to Hand On 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 <i>Reserved</i> Bit 0 = 1: Invalid data request number |
| Byte 4 |
| Data value - high byte |
| Byte 5 |
| Data value - low byte |



N.B.!:

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 | <i>Reserved</i> | <i>Reserved</i> |
| 1 | Soft starter product type code: 4 = MCD 200 7 = MCD 500 | Version number (soft starter serial communications software) |
| 2 | Trip/Warning code | Soft starter status |
| 3 ¹ | Average current (high byte) | Average current (low byte) |
| 4 | <i>Reserved</i> | Motor temperature ² |
| 5 ³ | <i>Reserved</i> | Percentage power factor |
| 6 ³ | Power (kW) | |
| 7 ³ | Power (kVA) | |
| 8 ³ | Average voltage | |
| 9 ³ | L1 current | |
| 10 ³ | L2 current | |
| 11 ³ | L3 current | |
| 12-14 | <i>Reserved</i> | |

¹ MCD 201 open loop soft starter models will read back average current as "2222" and motor temperature as "111" decimal. For MCD 500 models MCD5-0068B and smaller this value will be 10 times greater than the value displayed on the LCP.

² Motor temperature is calculated using the soft starter thermal modelling. Only available on MCD 202 and MCD 500 soft starters.

³ Only available on MCD 500 soft starters.

8.1. Power Data

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 | | | | | | | |

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



N.B.!

Data request numbers 5 to 11 are only valid for MCD 500 soft starters. MCD 200 soft starters will return zero values.

8.2. 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 or thermal delay and Run simulation) |
| 6 | Fault (tripped) |
| 7 ¹ | Menu or Alarm Log open |
| 8 ¹ | Jog Forward (slow speed) |
| 9 ¹ | Jog Reverse (slow speed) |

¹ Only available on MCD 500 soft starters.

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 |

8.3. 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 | MCD 201 | MCD 202 | MCD 500 |
|-----------|--|---------|---------|---------|
| 1 | Excess start time | | ■ | ■ |
| 2 | Motor overload (thermal model) | | ■ | ■ |
| 3 | Motor thermistor | | ■ | ■ |
| 4 | Current imbalance | | ■ | ■ |
| 5 | Frequency (Mains supply) | ■ | ■ | ■ |
| 6 | Phase sequence | | ■ | ■ |
| 7 | Instantaneous overcurrent | | | ■ |
| 8 | Power loss (Power Circuit) | ■ | ■ | ■ |
| 9 | Undercurrent | | | ■ |
| 10 | Heatsink overtemperature | | | ■ |
| 11 | Motor connection | | | ■ |
| 12 | Input A trip | | | ■ |
| 13 | FLC too high (FLC out of range) | | | ■ |
| 14 | Unsupported option (not available in inside delta) | | | ■ |
| 15 | Starter communication (between module and soft starter) | ■ | ■ | ■ |
| 16 | Network communication failure (between module and network) | ■ | ■ | ■ |
| 17 | Internal fault | | | ■ |
| 23 | EEPROM fail | | | ■ |
| 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) | | ■ | ■ |
| 35 | Battery/Clock | | | ■ |
| 36 | Thermistor circuit | | | ■ |
| 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 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 | 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 (MCD 500 parameter groups 1 to 8)
- 2 = Supervisor (MCD 500 parameter groups 15 and 16)
- 3 = Commissioning (MCD 500 parameter group 20)



N.B.!:

This operating module only functions with MCD 500 soft starters.

The numbering of parameter options via serial communications differs slightly from the numbering displayed on the LCP. Numbering via the Profibus Module starts at 0, so for Par. 2-1 Phase Sequence, the options are 1~3 on the LCP but 0~2 via the module.

10. 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 (MCD 500 only) |

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

10.2. Changed Parameter Number

If a parameter is changed via the LCP, 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.

11. 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.

12. 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 Interface to normal operation.

13. Profibus Clear Mode

If the Master sends a global Clear command, the Profibus Module 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 | |

