

# PROFINET MODULE

## INSTRUCTIONS

FOR ASAC-0/ASAC-1/ASAB

Issued on 29/08/14

R. 00

- This manual is integrant and essential to the product. Carefully read the instructions contained herein as they provide important hints for use and maintenance safety.
- This device is to be used only for the purposes it has been designed to. Other uses should be considered improper and dangerous. The manufacturer is not responsible for possible damages caused by improper, erroneous and irrational uses.
- Elettronica Santerno is responsible for the device in its original setting.
- Any changes to the structure or operating cycle of the device must be performed or authorized by the Engineering Department of Elettronica Santerno.
- Elettronica Santerno assumes no responsibility for the consequences resulting by the use of non-original spareparts.
- Elettronica Santerno reserves the right to make any technical changes to this manual and to the device without prior notice. If printing errors or similar are detected, the corrections will be included in the new releases of the manual.
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Elettronica Santerno S.p.A.  
Via della Concia 7, 40023 Castel Guelfo (BO) Italy  
Tel. +39 0542 489711 — Fax +39 0542 489722  
[www.santerno.com](http://www.santerno.com), [info@santerno.com](mailto:info@santerno.com)

# 1 Important User Information

## 1.1 Safety

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.

Close attention is required to the electrical installation and the system design to avoid hazards either in normal operation or in the event of equipment malfunction. System design, installation, commissioning and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and this guide carefully.

## 1.2 Product Design

The Profinet Module allows a Santerno soft starter to connect to an Ethernet network and be controlled or monitored using an Ethernet communication model.

Separate modules are available for Profinet, Modbus TCP and Ethernet/IP networks.

The Profinet Module operates at the application layer. Lower levels are transparent to the user.

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

## 1.3 Compatibility

The Profinet Module is compatible with the following Santerno soft starters:

- ASAC – 24 VAC/VDC and 110/240 VAC control voltage.  
**The Profinet Module is not suitable for use with ASAC starters using 380/440 VAC control voltage.**
- ASAB – all models.

## 1.4 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.

## 2 Installation

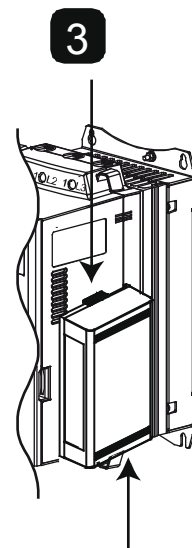
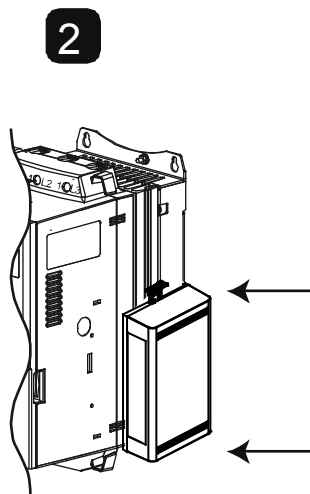
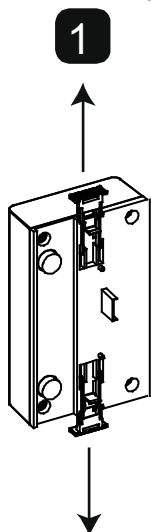


### CAUTION

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

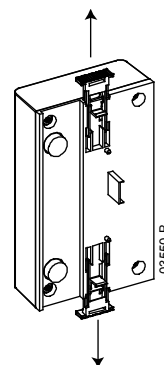
1. Remove control power and mains supply from the soft starter.
2. Fully pull out the top and bottom retaining clips on the module.
3. Line up the module with the comms port slot.
4. Push in the top and bottom retaining clips to secure the module to the starter.
5. Insert the network connector.
6. Apply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



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Remove the module using the following procedure:

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



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### 3 Connection

#### 3.1 Soft Starter Connection

The Profinet Module is powered from the soft starter.

ASAC: For the Profinet Module to accept fieldbus commands, a link must be fitted across terminals A1-02 on the soft starter.

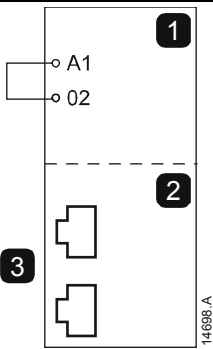
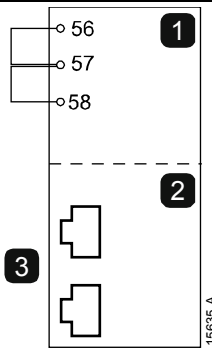
**The Profinet Module is not suitable for use with ASAC starters using 380/440 VAC control voltage.**

ASAB: 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

ASAB: Control via the fieldbus communication network is always enabled in local control mode, and can be enabled or disabled in remote control mode (parameter 6B *Comms in Remote*). Refer to the soft starter user manual for parameter details.

ASAC		ASAB	
			
<b>1</b>	ASAC A1, 02: Stop input	<b>1</b>	ASAB (Remote mode) 56, 57: Stop input 58, 57: Reset input
<b>2</b>	Profinet Module	<b>2</b>	Profinet Module
<b>3</b>	RJ45 Ethernet ports	<b>3</b>	RJ45 Ethernet ports

## 3.2 Network Connection

### 3.2.1 Ethernet Ports

The Profinet Module has two Ethernet ports. The ports are equal and interchangeable - if only one connection is required, either port can be used.

### 3.2.2 Cables

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

### 3.2.3 EMC Precautions

To minimise 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°.

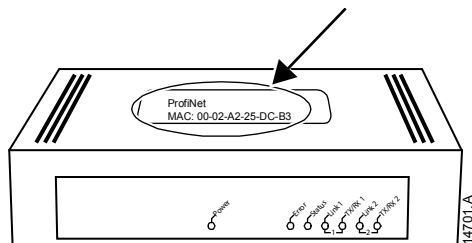
## 3.3 Network Establishment

The controller must establish communications directly with each module before the module can participate in the network. Once communications are established, the module can participate in an existing network.

## 3.4 Addressing

Each device in a network is addressed using a MAC address and an IP address, and can be assigned a symbolic name associated with the MAC address.

- The module will receive a dynamic IP address (via DHCP) when it is connected to the network, or can be assigned a static IP address during configuration.
- The symbolic name is optional and must be configured within the device.
- The MAC address is fixed within the device and is printed on a label on the front of the module.



## 4 Device Configuration

To permanently configure attributes in the Profinet Module, use the Ethernet Device Configuration Tool and untick "Store settings temporary".



### NOTE

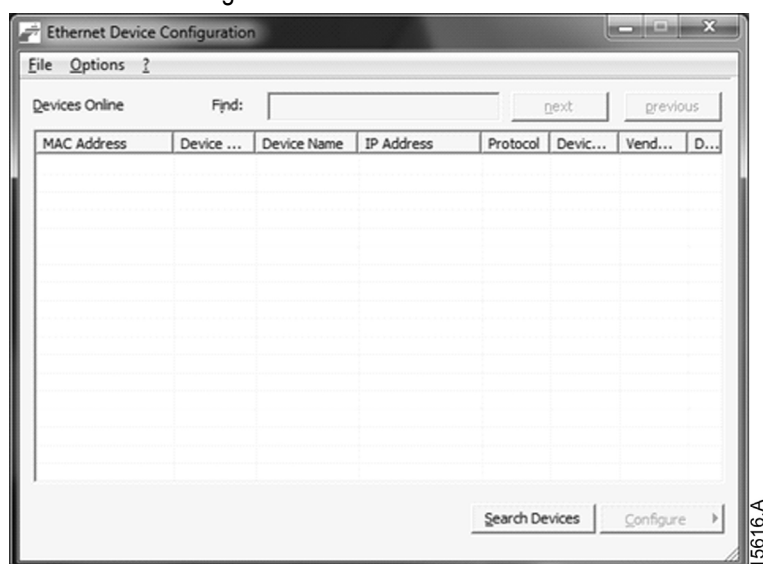
The Error LED flashes whenever the module is receiving power but is not connected to a network. The Error LED will flash throughout the configuration process.

### 4.1 Ethernet Device Configuration Tool

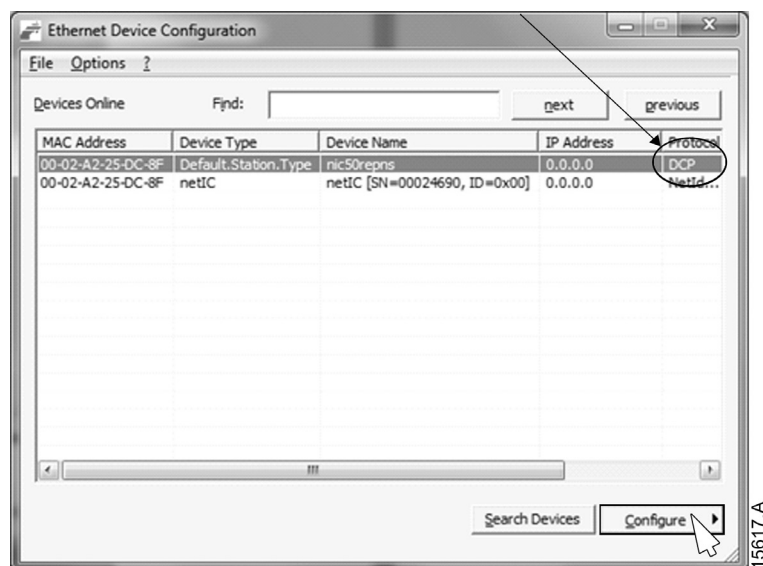
The Ethernet Device Configuration Tool can be downloaded from [santerno.com](http://santerno.com).

To configure the device using the Ethernet Device Configuration Tool:


1. Attach the module to a soft starter.
2. Connect one Ethernet port on the module to the Ethernet port of the PC.
3. Apply control power to the soft starter.
4. Start the Ethernet Device Configuration Tool.



5. Click on Search Devices. The software will search for connected devices.
6. The search results will contain two entries for each connected device. Select the DCP Protocol entry for the required device.



7. To set a static IP address, click Configure then select Set IP address.



IP Configuration for 00-02-A2-25-DC-8F

☒ Use static IP address

IP address: 0 . 0 . 0 . 0

Subnet mask: 0 . 0 . 0 . 0

Default gateway: 0 . 0 . 0 . 0

☐ Get IP Address via DHCP

Authentication method: MAC address

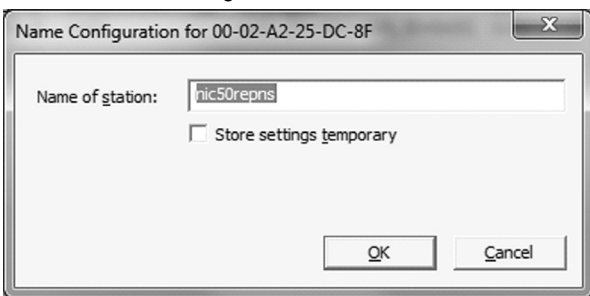
Client ID:

☐ Store settings temporary

OK Cancel

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8. To configure a device name, click Configure then select Device Name.



Name Configuration for 00-02-A2-25-DC-8F

Name of station: nic50repns

☐ Store settings temporary

OK Cancel

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## 5 Operation

The Profinet Module 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

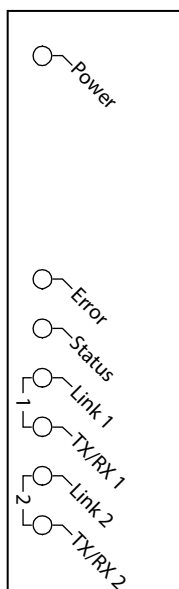
The Profinet Module is a Profinet IO-Device and must be managed by an IO-Controller over Ethernet.

### 5.2 Master Configuration

Import the latest GSDML file into your Master configuration tool. This file is available from [santerno.com](http://santerno.com).

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 LEDs



LED name	LED Status	Description
Power	Off	Module is not powered up.
	On	Module is receiving power.
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 data.



## 6 Packet Structures



### NOTE

Some soft starters do not support some functions.

### 6.1 Ensuring Safe and Successful Control

Data written to the Profinet Module will remain in its registers until the data is overwritten or the module is reinitialised. The Profinet Module will not transfer successive duplicate commands to the soft starter.



### NOTE

If the soft starter is started via fieldbus communications but stopped via the keypad or a remote input, an identical start command cannot be used to restart the starter.

In order to operate safely and successfully in an environment where the soft starter may also be controlled via the keypad or the remote inputs (as well as via fieldbus communications), a control command should be immediately followed by a status query to confirm the command has been actioned.

### 6.2 Control Commands (Write Only)

Use the following structures to send a control command to the soft starter:

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 (coast to 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>	Forward run

#### 6.2.1 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*

#### 6.2.2 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.

#### 6.2.3 Forward Run

When Forward run changes from 0 to 1, the soft starter will start according to the Motor set setting.

When Forward run changes from 1 to 0, the soft starter will stop according to the Quick stop setting.

### 6.3 Status Commands (Read Only)

Starter status information is always available when the module is connected to a soft starter, in the following format:

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9
Control status (low byte)/(high byte)		Starter state (low byte)/(high byte)		Trip code (low byte)/(high byte)		Motor current (low byte)/(high byte)		Motor temperature (low byte)/(high byte)	

#### 6.3.1 Control status

Byte 0							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Ramping	Local mode	Motor current (% FLC) <sup>1</sup>					
Byte 1							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Reserved	Reserved	Reserved	Reserved	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 ASAB-0053B 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.

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

#### 6.3.2 Starter state

Byte 2							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Communication failure between module and starter	Initialised (set after first start once phase sequence has been confirmed)	Current exceeds FLC	Positive phase sequence	The decimal value of bits 0~3 indicates the starter's state: 0 = Unknown (communication error between module and soft starter) 1 = Ready 2 = Starting 3 = Running 4 = Stopping 5 = Not ready (restart delay, restart temperature check) 6 = Tripped 7 = Menu open (cannot start) 8 = Jog forward 9 = Jog reverse			
Byte 3							
Reserved							

### 6.3.3 Trip Codes

Trip Code	Description	ASAC-0	ASAC-1	ASAB
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)	●	●	●
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 ASAB, time-overcurrent protection is only available on internally bypassed models.

#### 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 ASAB soft starters. For parameter details, refer to the soft starter User Manual.

#### 6.3.4 Motor current

Bytes 6 and 7 report motor current in amperes. For models ASAB-0053B and smaller this value will be 10 times greater than the value displayed on the keypad.

#### 6.3.5 Motor temperature

Bytes 8 and 9 report motor temperature as a percentage of the motor service factor (calculated by the soft starter's thermal model).

#### 6.3.6 Extended Information

Bytes 10~73 report information from the soft starter's internal registers.

Byte	Description	Bits	Details
10-11	Version	0 to 5	<i>Reserved</i>
		6 to 8	Product parameter list version
		9 to 15	Product type code <sup>1</sup>
12-13	Device details		
14-15	Changed parameter number <sup>2</sup>	0 to 7	0 = No parameters have changed 1~255 = Index number of the last parameter changed
		8 to 15	Total number of parameters available in the starter
16-17	Changed parameter value <sup>2</sup>	0 to 13	Value of the last parameter that was changed, as indicated in register 2
		14 to 15	<i>Reserved</i>
18-19	Starter state	0 to 4	0 = <i>Reserved</i> 1 = Ready 2 = Starting 3 = Running 4 = Stopping 5 = Not ready (restart delay, restart temperature check) 6 = Tripped 7 = Programming mode 8 = Jog forward 9 = Jog reverse
		5	1 = Warning
		6	0 = Uninitialised 1 = Initialised
		7	0 = Local control 1 = Remote control
		8	0 = Parameter(s) have changed since last parameter read 1 = No parameters have changed <sup>2</sup>
		9	0 = Negative phase sequence 1 = Positive phase sequence
		10 to 15	Refer to Trip Codes on page 11 <sup>3</sup>
20-21	Current	0 to 13	Average rms current across all three phases <sup>4</sup>
		14 to 15	<i>Reserved</i>
22-23	Current	0 to 9	Current (% motor FLC)
		10 to 15	<i>Reserved</i>
24-25	Motor temperature	0 to 7	Motor 1 thermal model (%)
		8 to 15	Motor 2 thermal model (%)
26-27	Power <sup>5</sup>	0 to 11	Power
		12 to 13	Power scale
		14 to 15	<i>Reserved</i>

Byte	Description	Bits	Details
28-29	% Power factor	0 to 7	100% = power factor of 1
		8 to 15	<i>Reserved</i>
30-31	<i>Reserved</i>		
32-33	Current <sup>4</sup>	0 to 13	Phase 1 current (rms)
		14 to 15	<i>Reserved</i>
34-35	Current <sup>4</sup>	0 to 13	Phase 2 current (rms)
		14 to 15	<i>Reserved</i>
36-37	Current <sup>4</sup>	0 to 13	Phase 3 current (rms)
		14 to 15	<i>Reserved</i>
38-39	<i>Reserved</i>		
40-41	<i>Reserved</i>		
42-43	<i>Reserved</i>		
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	0 to 15	For all inputs, 0 = open, 1 = closed (shorted) 0 = Start 1 = Stop 2 = Reset 3 = Input A 4 to 15 = <i>Reserved</i>
48-73	<i>Reserved</i>		

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

4 = ASAC

9 = ASAB

<sup>2</sup> Reading register 3 (Changed parameter value) will reset registers 2 (Changed parameter number) and 4 (Parameters have changed). Always read registers 2 and 4 before reading register 3.

<sup>3</sup> Bits 10~15 of register 4 report the soft starter's trip or warning code. If the value of bits 0~4 is 6, the soft starter has tripped. If bit 5 = 1, a warning has activated and the starter is continuing to operate.

<sup>4</sup> For models ASAB-0053B and smaller this value will be 10 times greater than the value displayed on the keypad.

<sup>5</sup> 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

## 6.4 Parameter Management (Read/write)

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

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

- Parameter number 1 corresponds to parameter 1A *Motor Full Load Current*
- The ASAB has 102 parameters. Parameter number 102 corresponds to parameter 16M *Low Control Volts*.

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

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 2	Parameter number to read/write							
Byte 3	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	Write parameter	Read parameter	<i>Reserved</i>
Byte 4	Low byte parameter value to write to soft starter/ zero data values for read							
Byte 5	High 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 114	Echo parameter number							
Byte 115	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	<i>Reserved</i>	Invalid parameter value	Invalid parameter number
Byte 116	Low byte parameter value read from soft starter							
Byte 117	High byte parameter value read from soft starter							

## 6.5 Examples

### 6.5.1 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						

### 6.5.2 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		

### 6.5.3 Parameter Read/Write

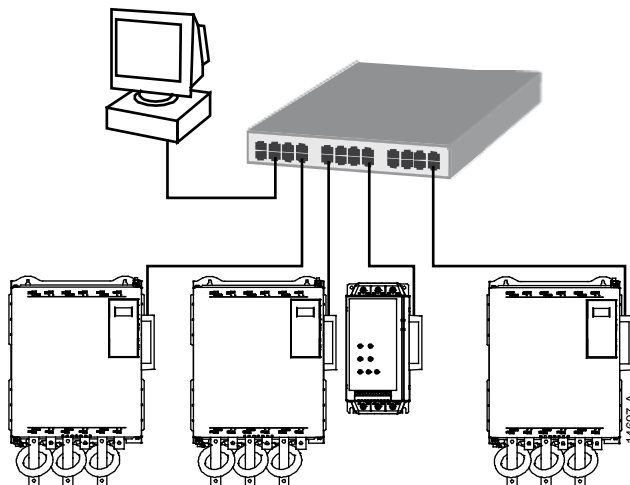
Write parameter to starter: parameter number 1, 1A Motor Full Load Current = 55							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
		1	4	55	0		
Acknowledge parameter write							
Byte 112	Byte 113	Byte 114	Byte 115	Byte 116	Byte 117	Byte 118	Byte 119
		1	0	55	0		
Read parameter from ASAB: parameter number 13, 2H Stop Mode							
Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
		13	2	0	0		
Parameter read response: parameter 2H Stop Mode = 1 (TVR Soft Stop)							
Byte 112	Byte 113	Byte 114	Byte 115	Byte 116	Byte 117	Byte 118	Byte 119
		13	0	1	0		

## 7 Network Design

The Profinet Module supports star, line and ring topologies.

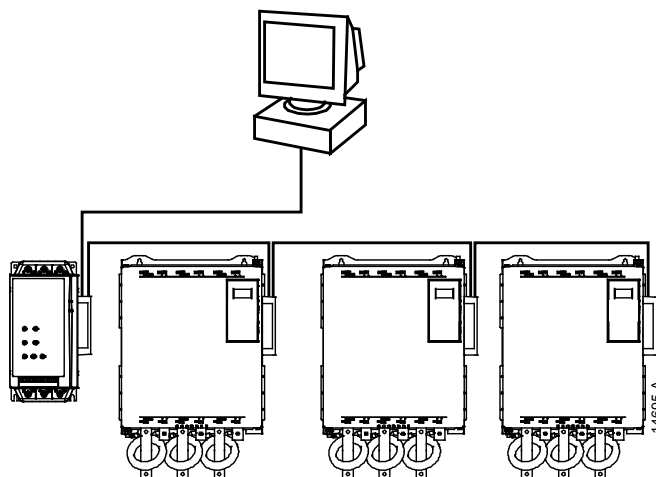
### 7.1 Star Topology

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 Profinet Module. The second Ethernet port of the Profinet Module connects to another module, which in turn connects to another module until all devices are connected.



#### NOTE

The Profinet Module has an integrated switch to allow data to pass through in line topology. The Profinet Module 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

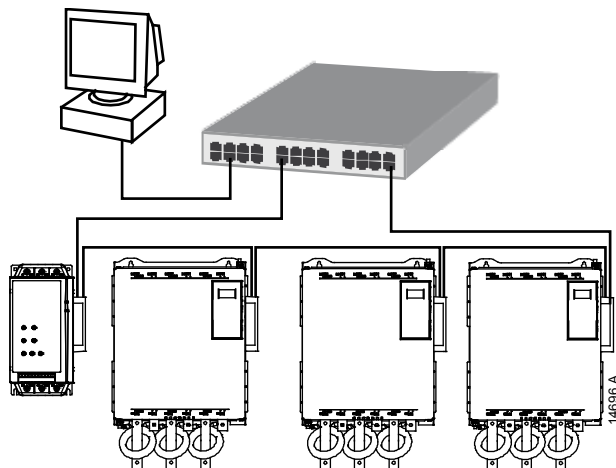
Each connection adds a delay to communication with the next module.

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 Profinet Module, via a network switch. The second Ethernet port of the Profinet Module connects to another module, which in turn connects to another module until all devices are connected. The final module connects back to the switch.

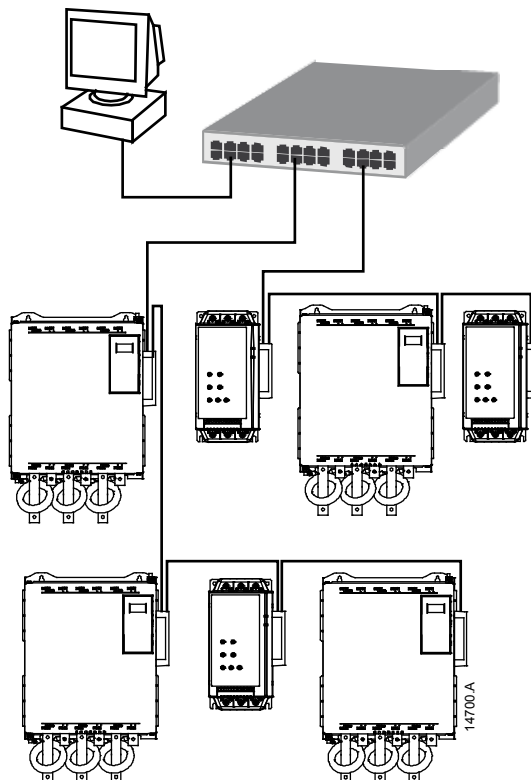


#### NOTE

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

### 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 ..... 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 at 24 VDC  
 Reverse polarity protected  
 Galvanically isolated

### Certification

C✓ ..... IEC 60947-4-2  
 CE ..... IEC 60947-4-2

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