CONTROL TECHNIQUES™

User Guide:
Communications module

Profinet

For use with D1/D2 soft starters

Product Compatibility

This communications module is suitable for use with Digistart D1 and D2 soft starters.

NOTE: This module is not suitable for use with soft starters using 380/440 VAC control voltage.

For the latest manuals and software, please visit our website.

Contents

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.

1 Important User Information

1.1 Product Design

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

The Profinet Module operates at the application layer.

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

1.2 Safety

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.

2 Warnings

WARNING
For your safety, isolate the soft starter completely from mains voltage before attaching or removing accessories.

WARNING
Observe all necessary safety precautions when controlling the soft starter remotely. Alert personnel that machinery may start without warning.

3 Installation

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

3.1 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. [A]
3. Line up the module with the comms port slot. [B]
4. Push in the top and bottom retaining clips to secure the module to the starter. [C]
5. Connect Ethernet Port 1 or Port 2 on the Profinet Module to the network.
6. Apply control power to the soft starter.
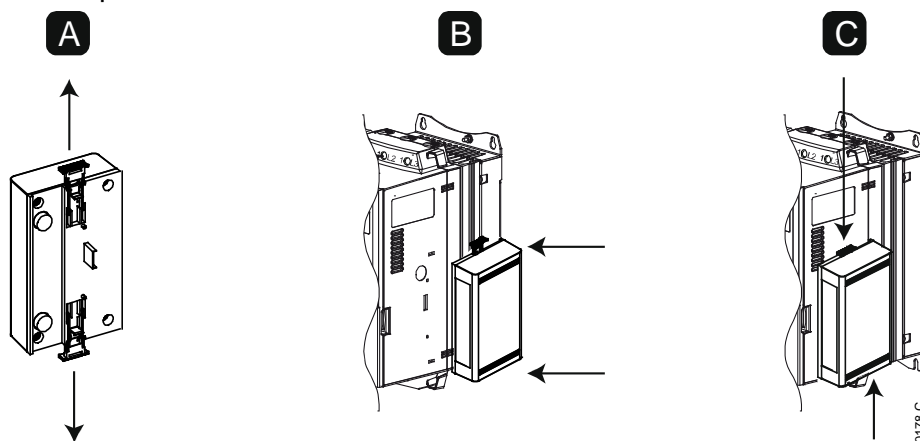
To remove the module:

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. [A]
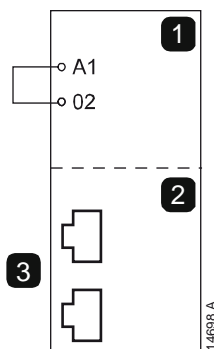4. Pull the module away from the soft starter.
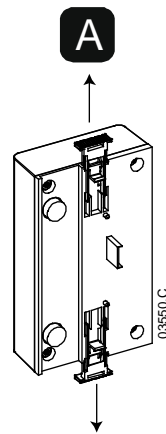
4   Connection

4.1   Soft Starter Connection

The device is powered from the soft starter.

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

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

1	Soft starter
	A1, 02: Stop input
2	Profinet Module
3	RJ45 Ethernet ports

4.2   Network Connection

Ethernet Ports

The device has two Ethernet ports. If only one connection is required, either port can be used.

Cables

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

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°.

4.3   Network Establishment

The controller must establish communications directly with each device before the device can participate in the network.

4.4   Addressing

Each device in a network is addressed using a MAC address and a device name. The MAC address is fixed within the device and is printed on a label on the front of the device.

5 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 is on if the device is not configured. If the device is configured but is not passing I/O data, the Error LED will flash. The Error LED will be active during the configuration process.

5.1 Ethernet Device Configuration Tool

The Ethernet Device Configuration Tool is available from your local supplier.

To configure the device using the Ethernet Device Configuration Tool:

1. Attach the module to the soft starter.
2. Connect Ethernet Port 1 or Port 2 on the Profinet Module to the network.
3. Apply control power to the soft starter.
4. Start the Ethernet Device Configuration Tool.
5. In Options > Protocols, select DCP and deselect NetIdent.
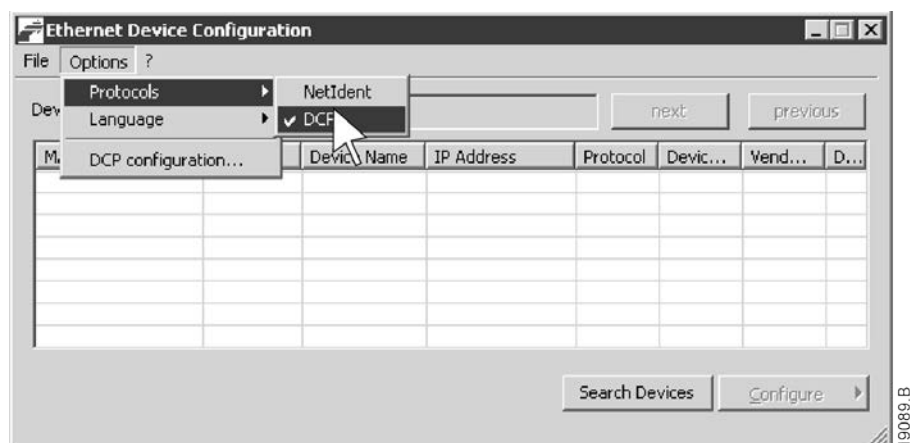
6. Click on Search Devices. The software will search for connected devices.
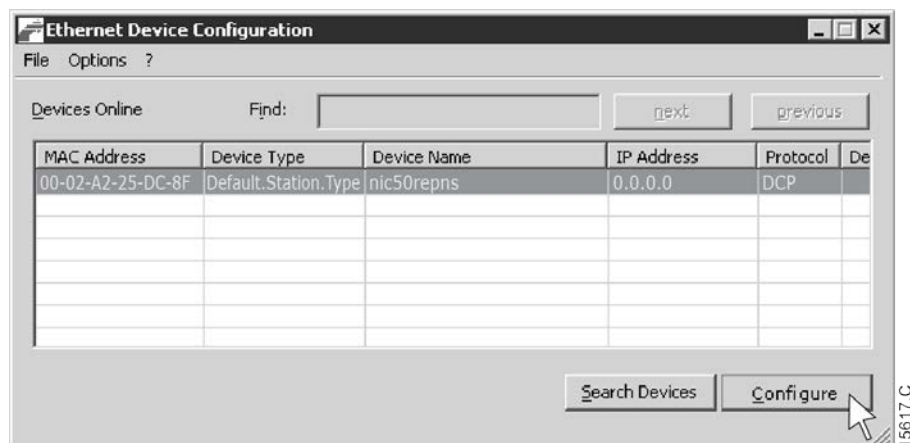
7. To configure a device name, click Configure then select Device Name.

6 Operation

The device 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.

6.1 Device Classification

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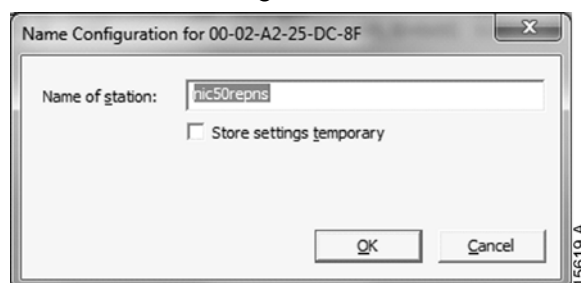
6.2 Master Configuration

Import the latest GSDML 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.

6.3 Feedback LEDs
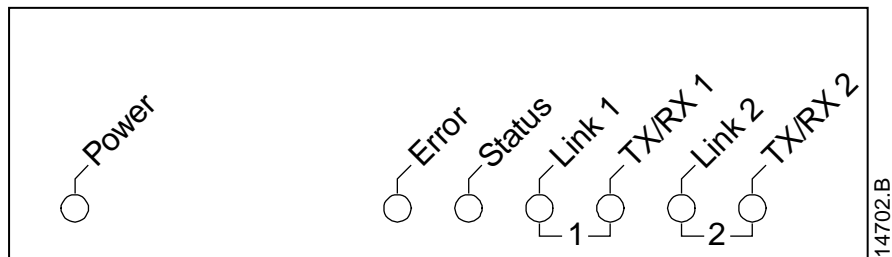
LED name	LED Status	Description
Power	Off	Device is not powered up.
	On	Device is receiving power.
Error	Off	No error.
	Flashing	Connection not established.
	On	No physical link or slow physical link. No configuration.
Status	Off	No error.
	Flashing	DCP signal service initiated via the bus.
Link x	Off	No network connection.
	On	Connected to a network.
TX/RX x	Flashing	Transmitting or receiving data.

7   Packet Structures

7.1   Ensuring Safe and Successful Control

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

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

7.2   Control commands (controller to device)

Use output bytes 0-1 to send a control command to the soft starter.

Bits	Details
0 to 3	*Reserved*
4	0 = stop action will be as selected in the soft starter 1 = stop action will be a coast to stop
5 to 7	*Reserved*
8	0 = Stop 1 = Start
9 to 10	*Reserved*
11	1 = Reset
12 to 15	*Reserved*

NOTE
Bit 4 of byte 0 must be set to 0 before the soft starter can perform a start.

7.3   Status information (device to controller)

Starter status information is always available when the device is active.

Bytes 0-1: Control status

Bits	Details
0 to 5	Current (% motor FLC)
6	*Reserved*
7	1 = Ramping (starting or stopping)
8	1 = Ready
9	1 = Starting, running or stopping
10	1 = Tripped
11 to 15	*Reserved*

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.

Bytes 2-3: Starter state

Bits	Details
0 to 3	The decimal value of bits 0~3 indicates the starter's state: 0 = Communication error between device and soft starter 1 = Ready 2 = Starting 3 = Running 4 = Stopping 5 = Not ready 6 = Tripped
4	0 = Negative phase sequence 1 = Positive phase sequence
5 to 6	1 = *Reserved*
7	1 = Communication error between device and soft starter
8 to 15	*Reserved*

Bytes 4-5: Trip code

Bits	Details
0 to 15	See *Trip Codes* on page 7

Bytes 6-7: Motor current

Bits	Details
0 to 15	Average rms current across all three phases

Bytes 8-9: Motor temperature

Bits	Details
0 to 15	Motor thermal model (%)

7.4   Trip Codes

Trip Code	Description
1	Excess start time
2	Motor overload
3	Motor thermistor
4	Current imbalance
5	Frequency
6	Phase sequence
8	Power circuit
15	Starter communication (between device and soft starter)
16	Network communication (between device and network)
33	Bypass overload
255	No trip

7.5 Examples

Control commands (controller to device)

Start the motor

Byte 0	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
0	1						

Soft stop the motor

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						

Status information (device to controller)

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		

8   Network Design

The device supports star, line and ring topologies.

8.1   Star Topology

In a star network, all controllers and devices connect to a central network switch.
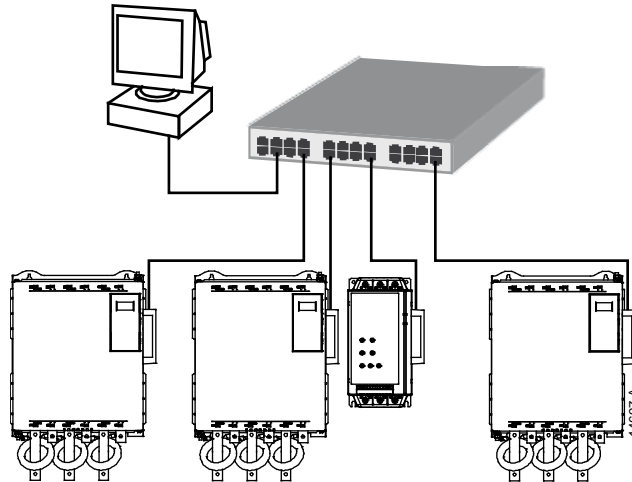
8.2   Line Topology

In a line network, the controller connects directly to one port of the first module. The second Ethernet port connects to another module, which in turn connects to another device until all devices are connected.
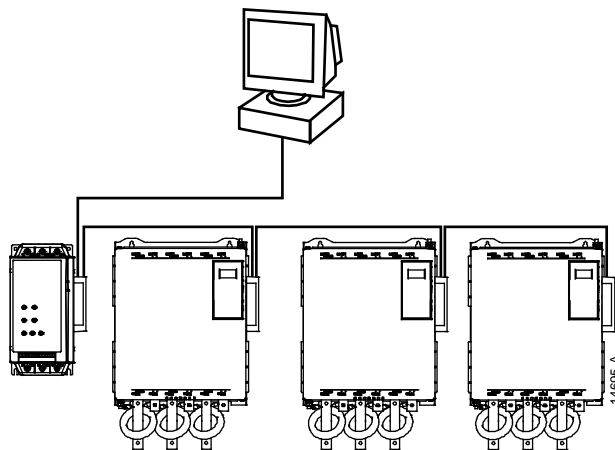
> **NOTE**
> The device has an integrated switch to allow data to pass through in line topology. The device must be receiving control power from the soft starter for the switch to operate.

> **NOTE**
> If the connection between two devices is interrupted, the controller cannot communicate with devices after the interruption point.
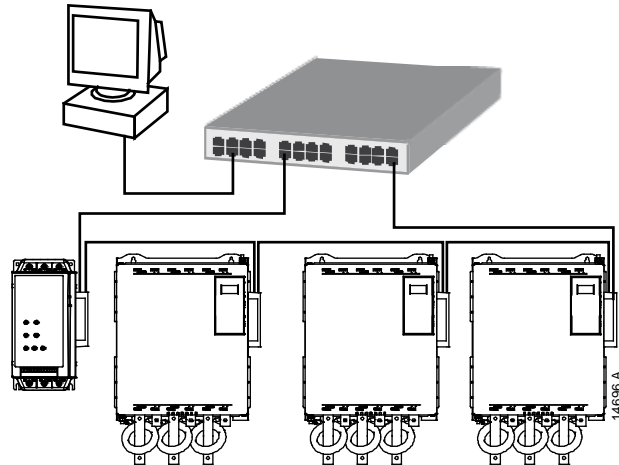
> **NOTE**
> Each connection adds a delay to communication with the next device.
> The maximum number of devices in a line network is 32. Exceeding this number may reduce the reliability of the network.

8.3 Ring Topology

In a ring topology network, the controller connects to the first module, via a network switch. The second Ethernet port of the module connects to another device, which in turn connects to another device until all devices are connected. The final device connects back to the switch.
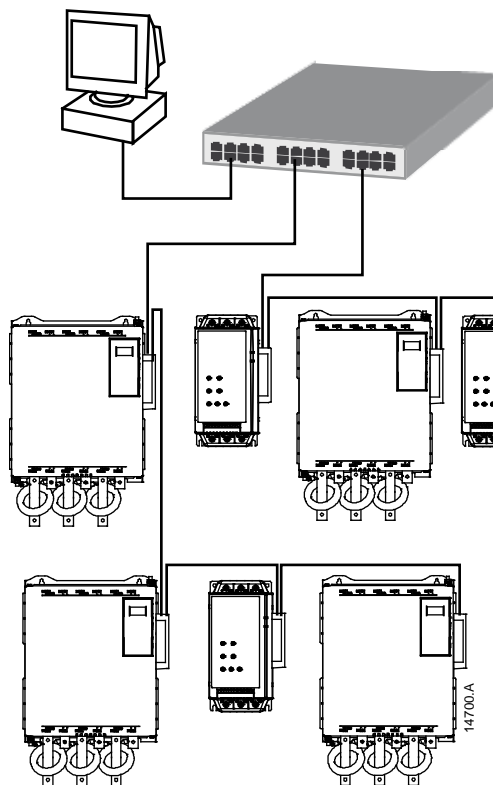
The device supports beacon based ring node configuration.

	NOTE
	The network switch must support loss of line detection.

8.4 Combined Topologies

A single network can include both star and line components.

9   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

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 @ 24 VDC

Reverse polarity protected

Galvanically isolated

- **Certification**

CE .... EN 60947-4-2

Profibus & Profinet International ....