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1 Safety

1.1 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. Responsibility or liability is never accepted for direct, indirect, or consequential damage resulting from the use or application of this equipment.

1.2 Warnings

⚠ W A R N I N G ⚠

SHOCK HAZARD

Attaching or removing accessories while the soft starter is connected to mains voltage may cause personal injury.

- Before attaching or removing accessories, isolate the soft starter from mains voltage.

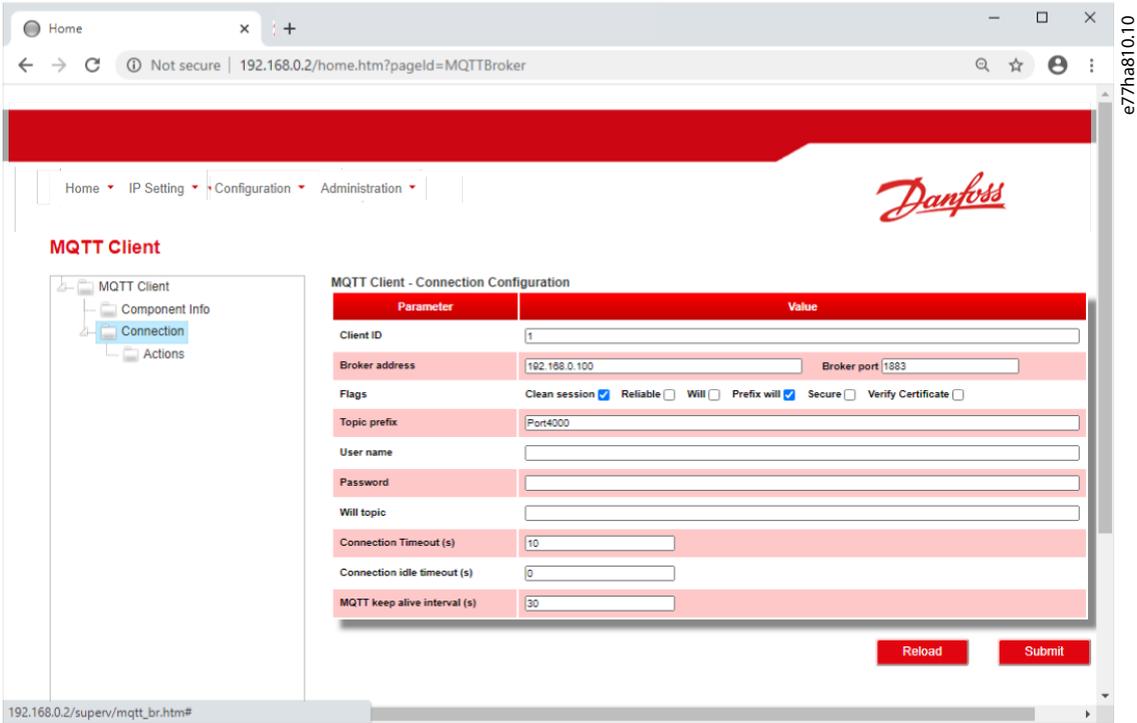
⚠ W A R N I N G ⚠

RISK OF PERSONAL INJURY AND EQUIPMENT DAMAGE

Inserting foreign objects or touching the inside of the soft starter while the expansion port cover is open may endanger personnel and can damage the soft starter.

- Do not insert foreign objects in the soft starter with the port cover open.
- Do not touch the inside of the soft starter with the port cover open.

4.3.3.1 Configuring MQTT Settings



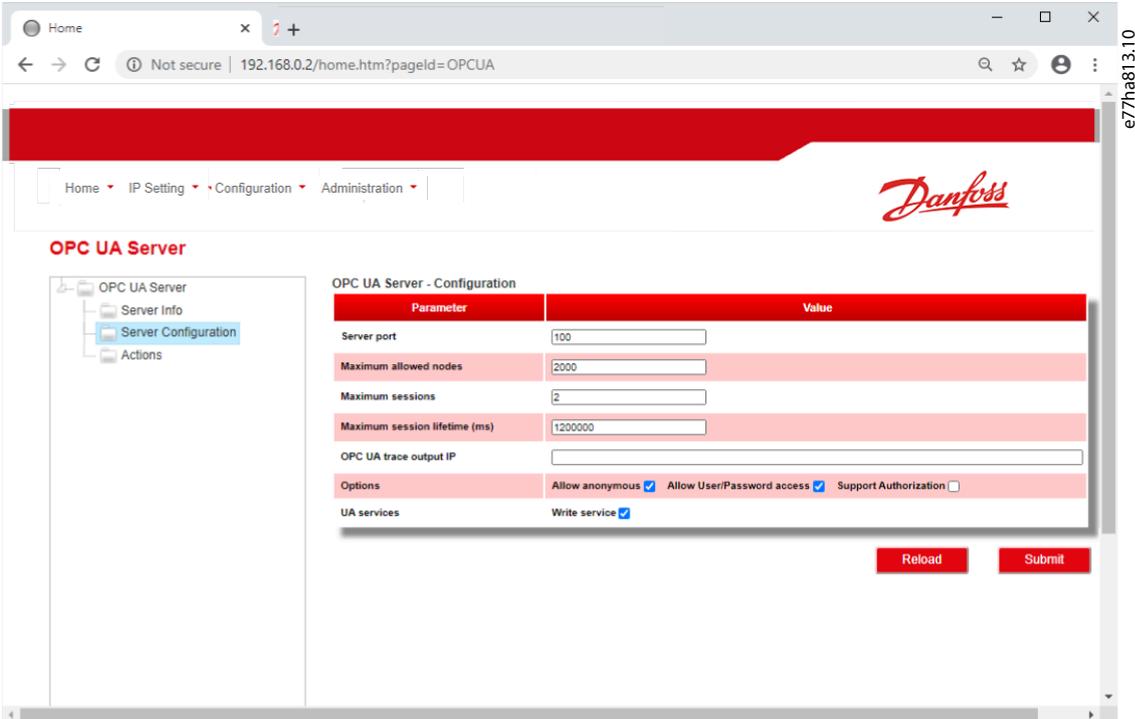
Procedure

1. Connect to the web server and click *Configuration*.
2. Select *MQTT Client*.
3. Tick the *Enable* checkbox to enable MQTT client operation.

The MQTT client is enabled by default.

4. Click *Connection* and configure the settings as required.
5. Click *Connections*⇒*Actions* to select which information the card should publish.
6. Click *Submit* to save all settings in the card.

4.3.3.2 Configuring OPC UA Settings



The screenshot shows the 'OPC UA Server - Configuration' page. It features a table with the following data:

Parameter	Value
Server port	100
Maximum allowed nodes	2000
Maximum sessions	2
Maximum session lifetime (ms)	1200000
OPC UA trace output IP	
Options	Allow anonymous <input checked="" type="checkbox"/> Allow User/Password access <input checked="" type="checkbox"/> Support Authorization <input type="checkbox"/>
UA services	Write service <input checked="" type="checkbox"/>

Procedure

1. Connect to the web server and click *Configuration*.
2. Select *OPC UA Server*.
3. Tick the *Enable* checkbox to enable OPC UA client operation.

The OPC UA client is enabled by default.

4. Click *Server Configuration* and configure the settings as required.
5. Select *Actions* to select the actions for different object instances.
6. Click *Submit* to save all settings in the card.

4.4 Master Configuration

Import the latest GDSML file into the Master configuration tool. This file is available from the website. SSPM_N.bmp indicates normal mode. SSPM_D.bmp indicates diagnostic mode.

5 Operation

5.1 Requirements for Successful 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 manual.

5.2 Device Classification

The PROFINET Card is a PROFINET I/O-device and must be managed by an I/O-controller over Ethernet.

5.3 Ensuring Safe and Successful Control

Data written to the device remains in its registers until the data is overwritten or the device is reinitialized. If the soft starter is controlled via *parameter 7-1 Command Override* or is disabled via the reset input (terminals RESET, COM+), fieldbus commands should be cleared from the registers. If a command is not cleared, it is re-sent to the soft starter once fieldbus control resumes.

5.4 Feedback LEDs

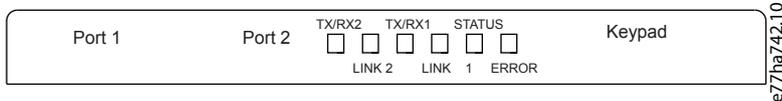


Table 2: LED Descriptions

LED name	LED state	Description
Power	Off	The device is not powered up.
	On	The 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.

6 Packet Structures

6.1 Important Information

N O T I C E

The available features and parameter details may vary according to the model and software version of the soft starter. Refer to the VLT® Soft Starter MCD 600 Operating Guide for details of parameters and supported features.

6.2 Control Commands (Controller to Device)

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

Table 3: Control Command Bits

Byte	Bits	Details
0	0–1	Reserved.
	2–3	0 = Use soft starter remote input to select motor set. 1 = Use primary motor set when starting. 2 = Use secondary motor set when starting. 3 = Reserved.
	4	0 = Stop action as selected in the soft starter. 1 = Stop action will be a coast to stop.
	5–7	Reserved.
1	0	0 = Stop. 1 = Start.
	1–2	Reserved.
	3	1 = Reset.
	4–7	Reserved.
2–5		Parameter management.

6.3 Status Information (Device to Controller)

Soft starter status information is always available when the device is active.

N O T I C E

For models MCD6-0063B and smaller, current reported via communications is 10 times greater than the actual value (shown on the LCP).

6.3.1 Bytes 0–1: Control Status

Bits	Details
0–5	Current (% of motor FLC)
6	Command source 0 = Network, timer 1 = Remote LCP, digital input, clock
7	1 = Ramping (starting or stopping)
8	1 = Ready

Bits	Details
9	1 = Starting, running, or stopping
10	1 = Tripped
11	1 = Warning
12–15	Reserved

6.3.2 Bytes 2–3: Starter State

Bits	Details
0–3	The decimal value of bits 0–3 indicates the state of the soft starter: 0 = Communication error between device and soft starter. 1 = Ready. 2 = Starting. 3 = Running. 4 = Stopping. 5 = Not ready (restart delay, restart temperature check, run simulation, reset input is open). 6 = Tripped. 7 = Menu open (cannot start) 8 = Jog forward. 9 = Jog reverse.
4	0 = Negative phase sequence. 1 = Positive phase sequence.
5	1 = Current exceeds FLC.
6	0 = Uninitialized. 1 = Initialized.
7	1 = Communication error between device and soft starter.
8–15	Reserved.

6.3.3 Bytes 4–5: Trip Code

Bits	Details
0–15	See the chapter <i>Trip Codes</i> .

6.3.4 Bytes 6–7: Motor Current

Bits	Details
0–15	Average rms current across all 3 phases.

6.3.5 Bytes 8–9: Motor Temperature

Bits	Details
0–15	Motor thermal model (%)

6.3.6 Bytes 10–63: Extended Information

Table 4: Information from Internal Registers of the Soft Starter

Byte	Description	Bits	Details
10–11	Version	0–8	Reserved.
		9–15	Product type code: 15 = MCD 600.
12–13	Model number	0–7	Reserved.
		8–15	Soft starter model ID.
14–15	Reserved		
16–17	Reserved		
18–19	Starter state	0–4	0 = Reserved. 1 = Ready. 2 = Starting. 3 = Running. 4 = Stopping. 5 = Not ready (restart delay, restart temperature check, run simulation, reset input is open). 6 = Tripped. 7 = Programming mode. 8 = Jog forward. 9 = Jog reverse.
		5	1 = Warning.
		6	0 = Uninitialized. 1 = Initialized.
		7	Command source: 0 = Network, timer. 1 = Remote LCP, digital input, clock.
		8	Reserved.
		9	0 = Negative phase sequence. 1 = Positive phase sequence.
		10–15	Reserved.
		20–21	Current
14–15	Reserved.		
22–23	Current	0–9	Current (% motor FLC).
		10–15	Reserved.
24–25	Motor temperature	0–7	Motor thermal model (%).
		8–15	Reserved.
26–27	Reserved		

Byte	Description	Bits	Details
28–29	% Power factor	0–7	100% = power factor of 1.
		8–15	Reserved.
30–31	Voltage	0–13	Average rms voltage across all 3 phases.
		14–15	Reserved.
32–33	Current	0–13	Phase 1 current (rms).
		14–15	Reserved.
34–35	Current	0–13	Phase 2 current (rms).
		14–15	Reserved.
36–37	Current	0–13	Phase 3 current (rms).
		14–15	Reserved.
38–39	Voltage	0–13	Phase 1 voltage (rms).
		14–15	Reserved.
40–41	Voltage	0–13	Phase 2 voltage (rms).
		14–15	Reserved.
42–43	Voltage	0–13	Phase 3 voltage (rms).
		14–15	Reserved.
44–45	Parameter list version number	0–7	Parameter list minor version.
		8–15	Parameter list major version.
46–47	Digital input state		For all inputs, 0 = open, 1 = closed (shorted).
		0	Start/stop.
		1	Reserved.
		2	Reset ⁰ .
		3	Input A.
		4	Input B.
		5–15	Reserved.
48–49	Trip code	0–15	See the chapter <i>Trip Codes</i> .
50–59	Reserved		
60–63	Parameter management		See the chapter <i>Parameter Management</i> .

6.4 Parameter Management

The PROFINET Card can read parameter values from and write parameter values to the soft starter. The card handles 1 parameter at a time.

The device references parameters according to their position in the soft starter parameter list. Parameter number 1 corresponds to *parameter 1-1 Command Source*. Refer to the VLT® Soft Starter MCD 600 Operating Guide for details of the soft starter parameters.

Code	Description
5	Frequency
6	Phase sequence
7	Overcurrent
8	Power loss
9	Undercurrent
10	Heat sink overtemperature
11	Motor connection
12	Input A trip
13	FLC too high
14	Unsupported option (function not available in inside delta)
15	Communications card fault
16	Network communication
18	Overvoltage
19	Undervoltage
23	Parameter out of range
24	Input B trip
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)
34	SCR overtemperature
35	Battery/clock
36	Thermistor circuit
47	Overpower
48	Underpower
56	LCP disconnected
57	Zero speed detect
58	SCR Itsm
59	Instantaneous overcurrent

7 Network Design

7.1 Star Topology

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

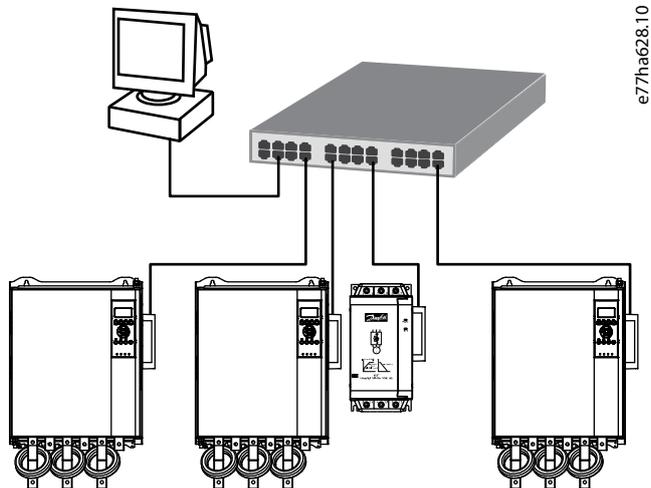


Illustration 2: Example of Star Topology

7.2 Line Topology

In a line network, the controller connects directly to 1st port of the 1st card. The 2nd Ethernet port connects to another card, which in turn connects to another device until all devices are connected.

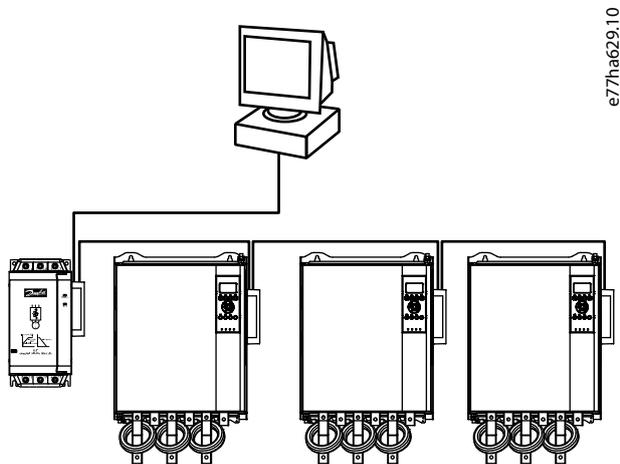


Illustration 3: Example of Line Topology

NOTICE

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.

NOTICE

If the connection between 2 devices is interrupted, the controller cannot communicate with devices after the interruption point.

N O T I C E

Each connection adds a delay to the 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.

7.3 Ring Topology

In a ring topology network, the controller connects to the 1st card via a network switch. The 2nd Ethernet port of the card 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.

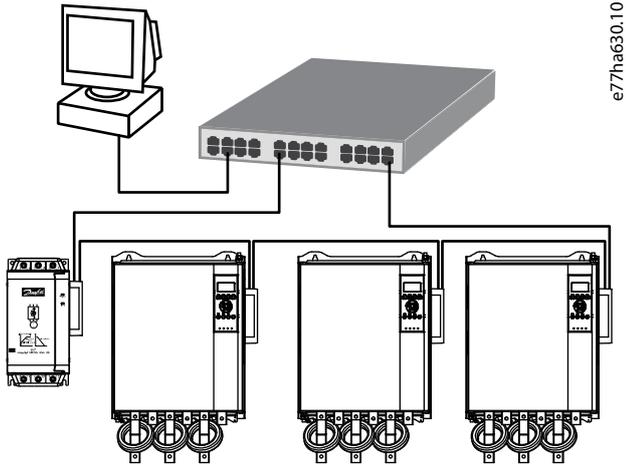


Illustration 4: Example of Ring Topology

N O T I C E

The network switch must support loss of line detection.

7.4 Combined Topologies

A single network can include both star and line components.

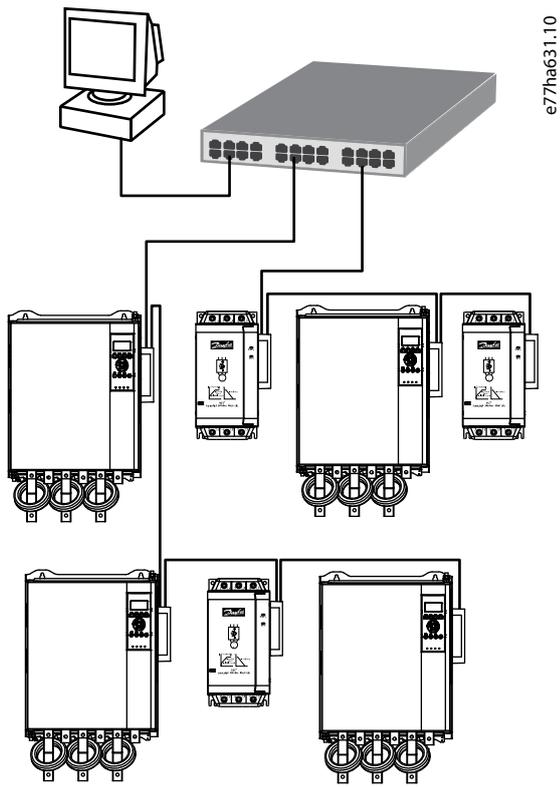


Illustration 5: Example of Combined Topologies

ENGINEERING
TOMORROW

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* 1 3 0 R 0 9 4 7 *



* M 0 0 2 5 7 0 1 *