Installation Guide

VLT® PROFINET MCA 120

VLT® Frequency Converter Series FC 102 • FC 103 • FC 202
FC 301/302
## Contents

### 1 Introduction
- 1.1 Purpose of the Manual ............................................. 2
- 1.2 Additional Resources .............................................. 2
- 1.3 Product Overview .................................................. 2
- 1.4 Approvals and Certifications .................................... 2
- 1.5 Disposal ................................................................ 3
- 1.6 Symbols, Abbreviations and Conventions ..................... 3

### 2 Safety
- 2.1 Safety Symbols ...................................................... 4
- 2.2 Qualified Personnel ................................................ 4
- 2.3 Safety Precautions ................................................... 4

### 3 Installation
- 3.1 Safety Instructions ................................................... 6
- 3.2 Mounting ............................................................... 6
- 3.3 EMC-compliant Installation ...................................... 7
- 3.4 Grounding ............................................................. 7
- 3.5 Cable Routing ........................................................ 7
- 3.6 Topology ................................................................ 8
- 3.7 Setting Address Switches ......................................... 9
- 3.8 Electrical Installation .............................................. 10
- 3.9 Reassembling Cover ................................................. 12
- 3.10 Applying Power ..................................................... 12
- 3.11 Checking Network Cabling ...................................... 12

### 4 Troubleshooting
- 4.1 Warnings and Alarms .............................................. 13
- 4.2 Troubleshooting ..................................................... 13
  - 4.2.1 LED Status ..................................................... 13
  - 4.2.2 No Communication with the Frequency Converter .... 14
  - 4.2.3 Warning 34 Appears ........................................ 14

### Index ........................................................................... 15
1 Introduction

1.1 Purpose of the Manual

This installation guide provides information for the quick installation of a VLT® PROFINET MCA 120 interface in a VLT® frequency converter. The installation guide is intended for use by qualified personnel. Users are assumed to be familiar with the VLT® frequency converter, with PROFINET technology, and with the PC or PLC that is used as a master in the system. Read the instructions before installation and ensure that the instructions for safe installation are observed.

VLT® is a registered trademark.

1.2 Additional Resources

Resources available for the frequency converters and optional equipment:

- The VLT® Operating Instructions provide the necessary information for getting the frequency converter up and running.
- The VLT® Design Guide provides detailed information about capabilities and functionality to design motor control systems.
- The VLT® Programming Guide provides greater detail on working with parameters and many application examples.
- The VLT® PROFINET MCA 120 Installation Guide provides information about installing the PROFINET and troubleshooting.
- The VLT® PROFINET MCA 120 Programming Guide provides information about configuring the system, controlling the frequency converter, parameter access, programming, troubleshooting, as well as some typical application examples.

Supplementary publications and manuals are available from Danfoss. See www.danfoss.com/BusinessAreas/DrivesSolutions/Documentations/VLT+Technical+Documentation.htm for listings.

1.3 Product Overview

1.3.1 Intended Use

This installation guide relates to the PROFINET interface. Ordering number:

- 130B1135 (uncoated)
- 130B1235 (conformal coated)

The PROFINET interface is designed to communicate with any system complying with the PROFINET schema version 2.2 and 2.3 standards. PROFINET provides users with the network tools to deploy standard Ethernet technology for manufacturing applications while enabling internet and enterprise connectivity.

VLT® PROFINET MCA 120 is intended for use with:

- VLT® HVAC Drive FC 102
- VLT® Refrigeration Drive FC 103
- VLT® AQUA Drive FC 202
- VLT® AutomationDrive FC 301/FC 302

1.3.2 Items Supplied

When the fieldbus option is not factory mounted, the following items are supplied:

- Fieldbus option
- LCP cradle
- Front covers (in various sizes)
- Stickers
- Accessories bag
- Strain relief (only for A1 and A2 enclosures)
- Installation Guide

1.4 Approvals and Certifications

More approvals and certifications are available. For more information, contact a local partner.
1.5 Disposal

Do not dispose of equipment containing electrical components together with domestic waste. Collect it separately in accordance with local and currently valid legislation.

1.6 Symbols, Abbreviations and Conventions

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCP</td>
<td>Discovery and configuration protocol</td>
</tr>
<tr>
<td>EMC</td>
<td>Electromagnetic compatibility</td>
</tr>
<tr>
<td>IP</td>
<td>Internet protocol</td>
</tr>
<tr>
<td>LCP</td>
<td>Local control panel</td>
</tr>
<tr>
<td>LED</td>
<td>Light emitting diode</td>
</tr>
<tr>
<td>PC</td>
<td>Personal computer</td>
</tr>
<tr>
<td>PLC</td>
<td>Programmable logic control</td>
</tr>
</tbody>
</table>

Table 1.1 Symbols and Abbreviations

Conventions
Numbered lists indicate procedures.
Bullet lists indicate other information and description of illustrations.
Italicised text indicates:
- Cross reference
- Link
- Parameter name
2 Safety

2.1 Safety Symbols

The following symbols are used in this document:

**WARNING**
Indicates a potentially hazardous situation that could result in death or serious injury.

**CAUTION**
Indicates a potentially hazardous situation that could result in minor or moderate injury. It can also be used to alert against unsafe practices.

**NOTICE**
Indicates important information, including situations that can result in damage to equipment or property.

2.2 Qualified Personnel

Correct and reliable transport, storage, installation, operation, and maintenance are required for the trouble-free and safe operation of the frequency converter. Only qualified personnel are allowed to install or operate this equipment.

Qualified personnel are defined as trained staff, who are authorised to install, commission, and maintain equipment, systems, and circuits in accordance with pertinent laws and regulations. Additionally, the qualified personnel must be familiar with the instructions and safety measures described in this document.

2.3 Safety Precautions

**WARNING**
HIGH VOLTAGE
Frequency converters contain high voltage when connected to AC mains input, DC power supply, or load sharing. Failure to perform installation, start-up, and maintenance by qualified personnel can result in death or serious injury.

- Installation, start-up, and maintenance must be performed by qualified personnel only.

**WARNING**
UNINTENDED START
When the frequency converter is connected to AC mains, DC power supply, or load sharing, the motor may start at any time. Unintended start during programming, service or repair work can result in death, serious injury, or property damage. The motor can start by means of an external switch, a serial bus command, an input reference signal from the LCP or LOP, via remote operation using MCT 10 software, or after a cleared fault condition.

To prevent unintended motor start:
- Disconnect the frequency converter from mains.
- Press [Off/Reset] on the LCP, before programming parameters.
- The frequency converter, motor, and any driven equipment must be fully wired and assembled when the frequency converter is connected to AC mains, DC power supply, or load sharing.

**WARNING**
DISCHARGE TIME
The frequency converter contains DC-link capacitors, which can remain charged even when the frequency converter is not powered. Failure to wait the specified time after power has been removed before performing service or repair work, can result in death or serious injury.

- Stop motor.
- Disconnect AC mains and remote DC-link power supplies, including battery back-ups, UPS, and DC-link connections to other frequency converters.
- Disconnect or lock PM motor.
- Wait for the capacitors to discharge fully, before performing any service or repair work. The duration of waiting time is specified in the relevant frequency converter Operating Instructions, Chapter 2 Safety.
**WARNING**

**LEAKAGE CURRENT HAZARD**
Leakage currents exceed 3.5 mA. Failure to ground the frequency converter properly can result in death or serious injury.

- Ensure the correct grounding of the equipment by a certified electrical installer.

**WARNING**

**EQUIPMENT HAZARD**
Contact with rotating shafts and electrical equipment can result in death or serious injury.

- Ensure that only trained and qualified personnel perform installation, start up, and maintenance.
- Ensure that electrical work conforms to national and local electrical codes.
- Follow the procedures in this document.

**CAUTION**

**INTERNAL FAILURE HAZARD**
An internal failure in the frequency converter can result in serious injury, when the frequency converter is not properly closed.

- Ensure that all safety covers are in place and securely fastened before applying power.
3 Installation

3.1 Safety Instructions

See chapter 2 Safety for general safety instructions.

3.2 Mounting

1. Check whether the fieldbus option is already mounted in the frequency converter. If already mounted, go to step 6.
2. Remove the LCP or blind cover from the frequency converter.
3. Use a screwdriver to remove the front cover and the LCP cradle.
4. Mount the fieldbus option. Mount the option with the Ethernet port facing up for top cable entry (see Illustration 3.2).
5. Remove the knock-out plate from the new LCP cradle.
6. Mount the new LCP cradle.

![Illustration 3.1 Exploded View]

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>LCP</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>LCP cradle</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fieldbus option</td>
<td></td>
</tr>
</tbody>
</table>

![Illustration 3.2 Option Mounted with the Ethernet Port Facing Upwards]

<table>
<thead>
<tr>
<th>Signal</th>
<th>M12 PIN#</th>
<th>RJ 45</th>
</tr>
</thead>
<tbody>
<tr>
<td>RX +</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TX +</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>RX -</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>TX -</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>
3.3 EMC-compliant Installation

To obtain an EMC-compliant installation, follow the instructions provided in the relevant frequency converter Operating Instructions and Design Guide. Refer to the fieldbus master manual from the PLC supplier for further installation guidelines.

3.4 Grounding

- Ensure that all stations connected to the fieldbus network are connected to the same ground potential. When there are long distances between the stations in a fieldbus network, connect the individual station to the same ground potential. Install equalising cables between the system components.
- Establish a grounding connection with low HF impedance, for example by mounting the frequency converter on a conductive back plate.
- Keep the ground wire connections as short as possible.

3.5 Cable Routing

**NOTICE**

**EMC INTERFERENCE**

Use screened cables for motor and control wiring, and separate cables for fieldbus communication, motor wiring, and brake resistor. Failure to isolate fieldbus communication, motor, and brake resistor cables can result in unintended behaviour or reduced performance. Minimum 200 mm (7.9 in) clearance between power, motor, and control cables is required. For power sizes above 315 kW, it is recommended to increase the minimum distance of 500 mm (20 in).

**NOTICE**

When the fieldbus cable crosses a motor cable or a brake resistor cable, ensure that the cables cross at an angle of 90°.
3.6 Topology

The PROFINET module features a built-in Ethernet switch with 2 Ethernet RJ 45/M12 connectors. The module enables the connection of several PROFINET options in a line topology as an alternative to a traditional star topology. The 2 ports are equal. Select and use the 2 ports freely.

Star Topology

![Illustration 3.5 Star Topology](image)

Line Topology

In many installations, line topology enables simpler cabling and the use of smaller Ethernet switches. The PROFINET interface supports line topology with its 2 ports and built-in Ethernet switch.

When line topology is used, take precautions to avoid timeout in the PLC when more than 8 frequency converters are installed in series. Each frequency converter in the network adds a small delay to the communication due to the built-in Ethernet switch. When the update time is too short, the delay can lead to timeout in the PLC. Set the update time as shown in Table 3.1. The numbers given are typical values and can vary from installation to installation.

<table>
<thead>
<tr>
<th>Numbers of frequency converters connected in series</th>
<th>Minimum update time [ms]</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;8</td>
<td>2</td>
</tr>
<tr>
<td>8-16</td>
<td>4</td>
</tr>
<tr>
<td>17-32</td>
<td>8</td>
</tr>
<tr>
<td>33-50</td>
<td>16</td>
</tr>
<tr>
<td>&gt;50</td>
<td>not recommended</td>
</tr>
</tbody>
</table>

Table 3.1 Minimum Update Time

NOTICE

In a line topology, activate the built-in switch by powering all frequency converters, either by mains or a 24 V DC option card.

NOTICE

Installing frequency converters of different power sizes in a line topology may result in unwanted power-off behaviour while using controlword timeout (8-02 Control Word Source to 8-06 Reset Control Word Timeout). It is recommended to mount the frequency converters with the longest discharge time first in the line topology. In normal operation, the larger power size frequency converters have a longer discharge time.

Ring/Redundant Line Topology

![Illustration 3.7 Ring/Redundant Line Topology](image)
Ring topology can increase the availability of an Ethernet network.

For ring topology:
- Install a special switch (redundancy manager) between the PLC and the frequency converters.
- Configure the redundancy manager switch to clearly define the ports that connect to the ring.

The redundancy manager sends out test frames on its 2 ports where the ring is connected. When no test frames are lost, the redundancy manager keeps the ring in operational. If the switch detects a fault in the ring, it reconfigures the ring into 2 lines instead. The transition time from 1 ring into 2 lines is up to 500 ms, depending on the components installed in the ring. Set the timing of the PLC to ensure that the transition time does not lead to timeout fault.

**NOTICE**

For ring/redundant line topology, ensure that the redundancy manager switch supports detection of loss of line topology. The switch inside the PROFINET interface does not support this detection.

**Recommended design rules**
- Pay special attention to active network components when designing an Ethernet network.
- For line topology, a small delay is added with each additional switch in the line. See Table 3.1 for more information.
- Do not connect more than 50 frequency converters in series. Exceeding this limit can result in unstable or faulty communication.

**3.7 Setting Address Switches**

The option has address switches that are used to set the station name (host name). This feature is available from firmware version 3.00 onwards.

- When all switches are set to On, or all are set to Off, change the station name via 12-08 Host Name or via DCP command.
- In all other combinations, the address switches have priority over the parameter setting. The station name is set based on the value in 15-40 FC Type, and a 3-digit number selected from the DIP settings.

**Illustration 3.8 Recommended Design Rules**

**Use the address switches to set the 253 different station names according to Table 3.2:**

<table>
<thead>
<tr>
<th>Switch</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>12-08 Host Name</td>
<td>+128</td>
<td>+64</td>
<td>+32</td>
<td>+16</td>
<td>+8</td>
<td>+4</td>
<td>+2</td>
<td>+1</td>
</tr>
<tr>
<td>FC-302-005</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>FC-302-035</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
</tr>
<tr>
<td>FC-302-082</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
<tr>
<td>FC-302-212</td>
<td>ON</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

**Table 3.2 Host Names Setting (FC 302 used in this example)**

The station name change comes into effect at the next power-up. Read the station name in 12-08 Host Name.
3.8 Electrical Installation

3.8.1 Cabling Requirements

- Choose suitable media for Ethernet data transmission. CAT5e and CAT6 cables are recommended for industrial applications. Both types are available as unshielded twisted pair and shielded twisted pair.
- Screened cables are recommended for use in industrial environments and with frequency converters.
- A maximum cable length of 100 m is allowed between the switches.

3.8.2 Cable Specifications

PROFINET cables used are based electrically on category 5 balanced LAN cables according to ISO/IEC 11801 Edition 2.0, Class D.

Type C cables can be used in special applications (for example, the use of trailing cables and frequently moved machine parts), even though their design and mechanical parameters can deviate from the specifications of type A and type B cables. Still, most of the electrical parameters (for example, impedance levels) are retained.

Highly flexible copper cables generally have the finest stranded conductors and a highly resistant polyurethane outer sheath. Various outer sheath materials are permitted to meet the various demands regarding resistance of industrial environments and exterior/underground laying (natural and synthetic oil, grease, coolants/lubricants, chemicals, high and low temperatures, UV radiation, and so on).

<table>
<thead>
<tr>
<th>Cable type</th>
<th>Application type A</th>
<th>Application type B</th>
<th>Application type C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design</td>
<td>Data Cable</td>
<td>Data Cable</td>
<td>Data Cable</td>
</tr>
<tr>
<td>Cable installation type</td>
<td>Stationary, no movement after installation</td>
<td>Flexible, occasional movement or vibration</td>
<td>Special applications (for example, highly flexible, permanent movement, vibration, or torsion)</td>
</tr>
<tr>
<td>Cable marking</td>
<td>PROFINET type A</td>
<td>PROFINET type B</td>
<td>PROFINET type C</td>
</tr>
<tr>
<td>Core cross-section</td>
<td>AWG 22/1</td>
<td>AWG 22/7</td>
<td>AWG 22/...</td>
</tr>
<tr>
<td>Outer diameter</td>
<td>5.5–8.0 mm</td>
<td>Application dependent</td>
<td>Application dependent</td>
</tr>
<tr>
<td>Core diameter</td>
<td>1.5 ± 0.1 mm</td>
<td>Application dependent</td>
<td>Application dependent</td>
</tr>
<tr>
<td>Colour (outer sheath)</td>
<td>Green RAL6018</td>
<td>Application dependent</td>
<td>Application dependent</td>
</tr>
<tr>
<td>Core identification (colours)</td>
<td>White, yellow, blue, orange</td>
<td>Pair 1: white (RXD+), blue (RXD-) Pair 2: yellow (TXD+), orange (TXD-)</td>
<td></td>
</tr>
<tr>
<td>Number of cores</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable design</td>
<td>2 pairs or 1 star quad</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shielding design type</td>
<td>Aluminium foil + Cu braiding</td>
<td>Application</td>
<td></td>
</tr>
<tr>
<td>Plug type</td>
<td>RJ 45 (IP20 or IP65/67)/M12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3.3 Cable Specifications for Application Types A, B and C

<table>
<thead>
<tr>
<th>Relevant standard</th>
<th>ISO/IEC 11801 Edition 2.0, IEC 61156 (minimum Category 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay skew</td>
<td>≤20 ns/100 m</td>
</tr>
<tr>
<td>Transfer impedance</td>
<td>≤550 mΩ/m at 10 MHz</td>
</tr>
</tbody>
</table>

Table 3.4 Transmission Performance Requirements
3.8.3 Wiring Procedures

Wiring procedure for enclosure types A1-A3

1. Mount the pre-configured cable wires with the connectors on the fieldbus option. For A1 and A2 enclosures, mount the supplied strain relief on top of the frequency converter with 2 screws, as shown in Illustration 3.10. For cable specifications, refer to chapter 3.8.2 Cable Specifications.

2. Position the cable between the spring loaded metal clamps, to establish mechanical fixation and electrical contact between cable and ground.

Wiring procedure for enclosure types A4-A5, B1-B4, and C1-C4

1. Push the cable through the cable glands.

2. Mount the pre-configured cable wires with the connectors on the fieldbus option. For cable specifications, refer to chapter 3.8.2 Cable Specifications.

3. Fix the cable to the metal base plate using the springs, see Illustration 3.11.

4. Tighten the cable glands securely.

Illustration 3.10 Wiring for Enclosure Types A1-A3

Illustration 3.11 Wiring for Enclosure Types A4-A5, B1-B4, and C1-C4
Wiring procedure for enclosure types D, E, and F

1. Mount the pre-configured cable wires with the connectors on the fieldbus option. For cable specifications, refer to chapter 3.8.2 Cable Specifications.

2. Fix the cable to the metal base plate using the springs, see Illustration 3.12.

3. Tie down the cable and route it with other control wires inside the unit, see Illustration 3.12.

3.9 Reassembling Cover

1. Mount the new front cover and the LCP.

2. Attach the sticker with the correct product name to the front cover.

3.10 Applying Power

Follow the instructions in the frequency converter Operating Instructions to commission the frequency converter. The frequency converter automatically detects the PROFINET interface and 2 new parameter groups (group 9 and group 12) appear.

3.11 Checking Network Cabling

**NOTICE**

After installing the PROFINET interface, be aware of the following parameter settings:

- 8-01 Control Site: [2] Control word only or [0] Digital and control word
- 8-02 Control Word Source: [3] Option A

**NOTICE**

Do not strip the Ethernet cable. Do not ground it via the strain relief plate. Ground the screened Ethernet cables through the RJ 45 connector on the PROFINET interface.
4 Troubleshooting

4.1 Warnings and Alarms

**NOTICE**

Refer to the relevant Operating Instructions for an overview of warning and alarm types and the full list of warnings and alarms.

PROFINET alarm words and warning words are shown on the frequency converter display in hex format. When there is more than 1 warning or alarm, the sum of all warnings or alarms is shown. Alarm word, warning word, and PROFINET warning word can also be displayed using the serial bus in 16-90 Alarm Word, 16-92 Warning Word, and 9-53 Profibus Warning Word.

For warning 165 Baudrate search, refer to Table 4.1.

<table>
<thead>
<tr>
<th>Bit (hex)</th>
<th>Unit diagnose bit</th>
<th>PROFINIBUS warning word (9-53 Profibus Warning Word)</th>
</tr>
</thead>
<tbody>
<tr>
<td>00000001</td>
<td>160</td>
<td>Connection with DP-master is not ok</td>
</tr>
<tr>
<td>00000002</td>
<td>161</td>
<td>Unused</td>
</tr>
<tr>
<td>00000004</td>
<td>162</td>
<td>FDL (Fieldbus data link layer) is not ok</td>
</tr>
<tr>
<td>00000008</td>
<td>163</td>
<td>Clear data command received</td>
</tr>
<tr>
<td>00000010</td>
<td>164</td>
<td>Actual value is not updated</td>
</tr>
<tr>
<td>00000020</td>
<td>165</td>
<td>Baudrate search</td>
</tr>
<tr>
<td>00000040</td>
<td>166</td>
<td>PROFINIBUS ASIC is not transmitting</td>
</tr>
<tr>
<td>00000080</td>
<td>167</td>
<td>Initialising of PROFINIBUS is not ok</td>
</tr>
<tr>
<td>00000100</td>
<td>152</td>
<td>Drive is tripped</td>
</tr>
<tr>
<td>00000200</td>
<td>153</td>
<td>Internal CAN error</td>
</tr>
<tr>
<td>00000400</td>
<td>154</td>
<td>Wrong configuration data from PLC</td>
</tr>
<tr>
<td>00000800</td>
<td>155</td>
<td>Wrong ID sent by PLC</td>
</tr>
<tr>
<td>00001000</td>
<td>156</td>
<td>Internal error occurred</td>
</tr>
<tr>
<td>00002000</td>
<td>157</td>
<td>Not configured</td>
</tr>
<tr>
<td>00004000</td>
<td>158</td>
<td>Timeout active</td>
</tr>
<tr>
<td>00008000</td>
<td>159</td>
<td>Warning 34 active</td>
</tr>
</tbody>
</table>

Table 4.1 9-53 Profibus Warning Word

Module Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Tri-colour LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>No IP address assigned</td>
<td>Off</td>
</tr>
<tr>
<td>No communication to PROFINET module. Module is waiting for a configuration telegram from the controller.</td>
<td>Green: ▀ ▀ ▀ ▀ ▀ ▀ ▀</td>
</tr>
<tr>
<td>IO AR established</td>
<td>Green: ▀ ▀ ▀ ▀ ▀</td>
</tr>
<tr>
<td>Supervisor AR established, No IO AR.</td>
<td>Green: ▀ ▀ ▀ ▀ ▀</td>
</tr>
<tr>
<td>Internal error</td>
<td>Red: ▀ ▀ ▀ ▀ ▀</td>
</tr>
<tr>
<td>Wink</td>
<td>Yellow: ▀ ▀ ▀ ▀</td>
</tr>
</tbody>
</table>

Table 4.3 MS: Module Status

4.2 Troubleshooting

4.2.1 LED Status

The PROFINET interface has 3 bi-coloured LEDs that allow a fast and detailed diagnosis. Each LED is linked to its unique part of the PROFINET interface, see Table 4.2.

Table 4.2 LED Label

<table>
<thead>
<tr>
<th>LED label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS</td>
<td>Module status, reflects the activity on the PROFINET stack</td>
</tr>
<tr>
<td>NS1</td>
<td>Network status 1, reflects the activity on port 1</td>
</tr>
<tr>
<td>NS2</td>
<td>Network status 2, reflects the activity on port 2</td>
</tr>
</tbody>
</table>

Illustration 4.1 Overview of PROFINET Interface
Network Status

<table>
<thead>
<tr>
<th>Phases</th>
<th>Status</th>
<th>Tri-colour LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power off</td>
<td>No power or No link on the corresponding port</td>
<td>Off</td>
</tr>
<tr>
<td>Power on</td>
<td>IP address conflict</td>
<td>Red:</td>
</tr>
<tr>
<td></td>
<td>Waiting for configuration</td>
<td>Green:</td>
</tr>
<tr>
<td>Running</td>
<td>In Data Exchange mode</td>
<td>Green:</td>
</tr>
<tr>
<td></td>
<td>Wrong configuration</td>
<td>Red:</td>
</tr>
<tr>
<td>Data exchange</td>
<td>No increment in &quot;In Octets&quot; counter of corresponding port in last 60 s</td>
<td>Yellow:</td>
</tr>
</tbody>
</table>

Table 4.4 Indication on Network Status LED

During normal operation, the MS and at least 1 NS LED shows a constant green light.

Wink command
The interface responds to a Wink command from the network by flashing all 3 LEDs yellow simultaneously.

4.2.2 No Communication with the Frequency Converter

When there is no communication with the frequency converter, proceed with the following checks:

Check 1: Is the cabling correct?
Check that the cable is mounted correctly. Check if the corresponding network LED shows link activity. NS1 or NS2.

Check 2: Does the hardware configuration match?
Check that the hardware configuration matches the value in 12-08 Host Name.

Check 3: Is the correct GSD file installed?
Download the correct GSD file from www.danfoss.com/BusinessAreas/DrivesSolutions/.

4.2.3 Warning 34 Appears

Warning 34 is not only related to wiring.
Warning 34 appears when:

- There is no master communication for 60 s after power-up.
- The master is in stop mode.
- Master communication is not established, or is incorrectly configured.
- Wiring is incorrect.

Action:

- Check the master mode and master configuration.
- Check the wiring if the master mode and communication are correct.
# Index

## A
- Abbreviation ................................................................. 3
- Additional resources .................................................. 2
- Address switches .......................................................... 9
- Alarm ................................................................................. 13
- Alarm word ......................................................................... 13
- Applying power ............................................................. 12
- Approvals .............................................................................. 0

## C
- Cable routing ........................................................................ 7
- Cable specifications ......................................................... 10
- Cabling requirements ...................................................... 10
- Certifications .......................................................................... 0
- Convention ............................................................................. 3

## D
- Discharge time ............................................................... 4

## E
- Electrical installation ....................................................... 10
- EMC interference ........................................................... 7
- EMC-compliant installation ............................................. 7
- Exploded view ...................................................................... 6

## G
- Grounding .......................................................................... 7

## H
- High voltage ....................................................................... 4
- Host name ............................................................................. 9

## I
- Intended use ........................................................................ 2
- Items supplied ...................................................................... 2

## L
- Leakage current .................................................................. 5
- LED ...................................................................................... 3
- Line topology ......................................................................... 8
- Load sharing ......................................................................... 4

## M
- Module status ..................................................................... 13
- Motor wiring ......................................................................... 7

## N
- Network cabling .................................................................. 12
- Network status ..................................................................... 14
- No communication with frequency converter .................. 14

## Q
- Qualified personnel .......................................................... 4

## R
- Redundancy manager switch ......................................... 9
- Ring/redundant line topology .......................................... 8

## S
- Safety .................................................................................... 5
- Screened cable .................................................................... 7, 10
- Star topology ......................................................................... 8
- Symbol .................................................................................. 3

## T
- Topology ................................................................................. 8

## U
- Unintended start .............................................................. 4

## W
- Warning ............................................................................... 13
- Warning 34 .......................................................................... 14
- Warning word ....................................................................... 13
- Wink command ...................................................................... 14
- Wiring procedure ............................................................ 11